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C O N T E N T S

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THE GREEN FOREST WORKS PROGRAM - A CHANCE TO RECOVER THE FORESTS OF THE APPALACHIAN REGION IN THE EASTERN UNITED STATES

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Key words: *Green Forest Works Program, Appalachian Region, recover, reforestation, mined lands*

Abstract

The goal of this paper is to present The Green Forest Works for Appalachia Program established by The Appalachian Regional Reforestation Initiative (ARRI), created in 2004 in order to reforest mined lands in the Eastern United States. Established under ARRI's guidance and with government, patron, or corporate funding, the Program would have the aim to combine in the best way all the economic, social, environmental and ecological aspects which contribute to the development of the region. Its benefits will have a deep economic, social, ecological and environmental impact. More than 2,000 local residents from the rural coalfield communities could be involved in the re-establishment of over 175,000 acres of formerly mined lands by planting more than 125 million trees by 2014 with a deep influence upon unemployment rate, land productivity, forest fragmentation, carbon sequestration and environment quality.

INTRODUCTION

The Appalachian region is characterized by landscapes of a rare beauty and a large variety of natural resources, but during the last three decades the extraction of coal has scarred the landscape. Despite the intense coal mining activities, poverty is still pervasive. Since the enactment of the Surface Mine Control and Reclamation Act of 1977 (SMCRA), more than 1.2 million acres of Appalachian forest have been impacted by surface mining. Under SMCRA, mined lands are required to be reclaimed to protect the regions biodiversity and natural beauty and to protect the local population.

MATERIAL AND METHOD

This paper is based on the documents issued by The Appalachian Regional Reforestation Initiative (ARRI) in accordance with The *Green Forest Works for Appalachia Program* which can address economic, environmental, and ecological challenges simultaneously.

RESULTS AND DISCUSSIONS

The Appalachian Regional Reforestation Initiative (ARRI) was created in 2004 in order to reforest mined lands in the Eastern United States. ARRI has joined together the efforts of State, Federal, industry, and non-profit entities of the Appalachian region in order to encourage restoration of high quality forests on reclaimed coal mines. Its main goals are to:

(a) Plant more high-value hardwood trees species on reclaimed coal mined lands in Appalachia;

(b) Increase the survival rates and growth rates of planted trees;

(c) Expedite the establishment of forest habitat through natural succession.

ARRI partners are operating as a working team in dealing with the co-ordination of the actions of all the entities and persons interested in giving a helping hand in creating

productive forestland on reclaimed mined lands. Therefore, it allows a large co-operation between coal industry, landowners, university researchers, the watershed, environmental and conservation groups, and State and Federal government agencies. Also, ARRI develops collaborations and partnerships with other entities to provide critical new habitat for species of conservation concern that are targeted for conservation by the U.S. Fish and Wildlife Service and Appalachian States.

ARRI is developing a new approach of the former mined lands, where the mine soils have been severely compacted, aggressive grasses cover the site, and mining companies have no further reclamation responsibility under Federal or State laws. Recently, it has been estimated that about three-quarters to one million acres of the formerly mined lands could be available for reforestation in Appalachia region.

Photo 1. Using a dibble bar to plant seedlings at a Letcher County, Kentucky tree planting event; March, 2009. Photo: Jessica Vierling.

For this reason, *The Green Forest Works for Appalachia Program* has been established under ARRI's guidance with the hopes of attracting government, patron, or corporate funding. Its main goal is to combine, in the best way, all the economic, social, environmental and ecological aspects which contribute to the development of the region. More than 2,000 local residents from the rural coalfield communities could be involved in the re-establishment of over 175,000 acres of formerly mined lands by planting more than 125 million trees by 2014 with a deep impact upon unemployment rate, land productivity, forest fragmentation, carbon sequestration and environment quality.

Photo 2.
One year old chestnut seedling growing in mine spoil, Bent Mountain, Kentucky. Photo: Patrick Angel.

The environmental benefits derived from the *Green Forest Works for Appalachia* program include:

(a) Sequestering and accumulating carbon on available and mostly unused lands;

(b) Stimulating new economic incentives for reforestation and forest management, which would provide both ecological and economic value in the future;

(c) Stimulating plant diversity through natural succession of native forest plants;

(d) Providing habitat for endangered and declining species and enhancing habitat for several game species;

(e) Improving soil and water conservation;
(f) Recovery of the hydrologic balance.

Photo 3: P
Oak seedling planted on reclaimed mineland. Photo: Patrick Angel.

The economic benefits consist of:
- Jobs for the local economy
- Income from tourism and development
- A more breathable air due to the potential carbon sequestration
- Improved landscape aesthetics

Benefits for Appalachia consist of:
- High value ecosystem services due to restoration of productive forests. The Appalachian forests constitute an "environmental infrastructure" that produces ecosystem services of tangible value to local communities, the United States, and the world. For example, forested landscapes provide natural buffers to watersheds, an ecosystem service that is of significant value for:

- Maintaining clean water supplies to Appalachian communities and larger cities fed by their headwater streams;
- Globally significant numbers of declining, rare, threatened, and endangered fish, mussels, salamanders, birds, and mammal species;
- Watershed protection services such as reduction of peak flows that can cause flooding and maintenance of water flows during dry weather periods;
- Reducing forest fragmentation, which has detrimental effects on many Appalachian wildlife species that depend on large expanses of unbroken forest, including rare bird species such as the Cerulean Warbler;
- Improving landscape aesthetics, thus enhancing the capacity of communities in coal-mined areas to serve as tourist destinations and to support tourism-related businesses and jobs.

- Job opportunities in the mining industry, Due to factors such as increased mechanization and low coal prices, more and more miners are becoming unemployed. The Green Forest Works program would help ease unemployment by creating jobs planting trees on one million acres of formerly mined lands in the Appalachia region.
In five years, the *Green Forest Works for Appalachia* program could provide secure jobs to over 2,000 citizens living in the area and jump-start the reforestation process on nearly one quarter of the formerly mined lands in the Eastern part of the United States .

Photo 4: Preparing to begin planting at a site in Boone County, West Virginia, March 2009. Photo: Jessica Vierling

- ***Setting up a renewable, sustainable, multi-use resource*** due to the reestablishment of native hardwood forests that once dominated these sites. In this way, new economic opportunities will be created while enhancing the local and global environment.

Photo 5: CERULEAN WARBLER: BILL HUBICK.

CONCLUSIONS

1. The Green Forest Works for Appalachia Program have been proposed by The Appalachian Regional Reforestation Initiative (ARRI).
2. The main goal of ARRI is to reforest mined lands in the Eastern United States.
3. The reforestation program for the Appalachia region has been set up under ARRI's guidance with the hope of attracting government, patron, or corporate funding.
4. The aim of the program is to combine, in the best way, all the economic, social, environmental and ecological aspects which contribute to the development of the region.
5. The program benefits will result in economic, social, ecological and environmental impact.
6. More than 2,000 local residents from the rural coalfield communities could be involved in the re-establishment of over 175,000 acres of formerly mined lands by planting more than 125 million trees by 2014.
7. All these actions will have a deep influence upon unemployment, land productivity, forest fragmentation, carbon sequestration and environment quality.

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CONSUMATION AND COST ANALYSIS FOR SUGAR BEET PRODUCTION IN S.R.L. „DESETINCOM", R. DROCHIA

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Key words: *consumption, sugar, finance, technical,R. Drochia*

Abstract

Inputs are the values of resources used to manufacture products or supply services to gain income. As mentioned above, consumption is raw materials, materials that form the essence of the product made, pay workers employed directly in production, and take various inputs related to maintenance of equipment, the rooms department, management and maintenance of the production process, which are called indirect inputs of production. All these inputs are embedded section of baza. Totodată consumption is consumption of ancillary departments that contribute to the basic production process. These inputs consist of material consumption, the labor remuneration and indirect inputs of production. Inputs to be attributed to the finished product and services form their cost. Being a very important indicator, reflecting the cost of resource efficiency, level of specialization, quality raw material and labor consumption.

INTRODUCTION

One of the branches of national economy with a specific historical significance, which is kept today, is Agricultura.O great significance in enhancing agricultural development is a manufacture of grain crops.Technical and material base of agriculture, an agricultural enterprise that represents all assets such as land, means of mechanization, production and administrative buildings, etc. and existing rights at a time entered in the balance sheet.[1] Mechanization of agriculture in all branches of national economy that directly affect labor productivity growth, and indirectly make the work promptly and quality, is also the factor of increase in production.[2] The book includes self-determination date means and methods that are available to increase production of grain crops they obtain data including household S.R.L."Disetincom", with special forms to reflect the business activities, statistical reports, accounting records and other sources include statistical data that characterize the economic situation of enterprise data for the years studied.[3]

MATERIAL AND METHOD

In this paper using the following methods: economic method - statistical calculation method - design, economic method - mathematics. Using the research methods we used as an accumulative rich deep knowledge about the essence of phenomena and processes taking place in the company. According S.N.C.3, consumption is grouped into the following elements of consumption: direct consumption of materials, direct inputs on the remuneration of work, consumption of social security contributions, indirect consumption of production. Analysis by items of consumption allows to calculated the share of each item in the total amount of consumption. Thus we can draw conclusions on the fact that such production requires a higher volume of work life or materialized.

RESULTS AND DISCUSSIONS

Consumption analysis provides grouping them by various criteria, such as: the economic factors on consumer items, etc.
Analyzing the data table 1, we see a reduction in the direct consumption of labor remuneration and direct consumption of materials, 2007 to 2006 with 173 thousand lei and a decrease of 293 thousand lei of direct consumption of material. A decrease in consumption is observed indirectly by production (in 2007 compared to 2006 this decrease was 943 thousand lei).

Table1. Consumption structure by assessing economic factors entirely entity S.R.L. "Disetincom"

Economic elements	Years					
	2006		2007		Deviations (+,-)	
	amount, thousands lei	share,%	amount, thousands lei	share%	amount, thousands lei	Percentage points %
Direct consumption of labor remuneration	1060	13,21	887	13,4	-173	0,19
Direct consumption of materials	5163	64,33	4870	73,6	-293	9,27
Indirect consumption of production	1803	22,46	860	13	-943	-9,46
Total consumption	8026	100	6617	100	-1409	X

The next stage of analysis is the analysis of consumption as consumer articles. This article of consumption implies a set of inputs that includes one or several elements Articles in the following computer analysis determined and analyzed the following indicators: Absolute deviation, relative deviation, share the article in the modification cost of production. Analyzing the data table 7, we see that the highest share is held by direct consumption of material (4.775 million lei in 2007), followed by consumption indirectly production (826 thousand lei in 2007), the remuneration of labor (866 thousand lei in 2007). Also, depending on the volume of production, consumption can be divided into fixed (consumed) and variable. Meanwhile, after the manner of distribution of consumption is divided into direct and indirect.

Table.2 Analysis of consumption by consumer items for plant production in S.R.L. "Disetincom"

Consumer Products	**2006**	**2007**	**Absolute deviation (+,-)**	**Relative deviation, %**	**Article share in roduction cost change,%**
1.Consumuri total direct material including:	4875	4775	-100	97,95	1,31
1.1 Seeds and Plants	1132	1013	-119	89,49	-1,55
1.2 produse oil	1689	1119	-570	66,25	-7,44
1.3 Mineral fertilizers	1369	1674	305	122,28	3,98
1.4 pesticides and other means of plant protection	-	605	605	-	7,9
1.5 parts, materials for repairs	685	364	-321	53,14	-4,19
2.Consumuri privind total remuneration of work including:	1015	866	-149	85,32	-1,95
2.1 direct inputs on the remuneration of work	860	707	-153	82,21	-2
2.2 social security contributions stat obligatorii	138	142	4	102,9	0,05
2.3 mandatory health insurance contributions	17	17	-	100	-
3. Total indirect production inputs including:	1768	826	-942	46,72	-12,3
3.1 wear with distinație productive fixed assets	383	353	-30	92,17	-0,39
3.2 pay to rent land	1017	473	-544	46,51	-7,1
3.3 Other indirect consumption	368	-	-368	-	-4,81
Total consumption	7658	6467	-1191	84,45	X

Consumption analysis on articles produced in the household level will lead to a year on several tables.

Table 3. Determination of basic production consumption ratio in SRL "Disetincom"

Indicators	2006	2007
1. Total consumption in the culture, thousands lei	2912	2373
1.1 including the basic production	2912	2373
2. Ponderea basic production consumption in the total amount of consumption,%	100	100

Analyzing the data table 3 we can say that the share of consumption in the production of basic amount of consumption in 2006 and 2007 was 100%. What refers to the total consumption culture that is in 2007 this indicator amounted to 2.373 million lei and in 2006 was 2.912 million lei. In conclusion table 4 we can say that the total consumption of 1 q production base increased by 90 lei. All this indicator for consumption at 1 q production base in 2006 was 35.46 and in 2007-37,5 lei. Other articles of consumption: consumption directly on the remuneration of work, seed and planting material, fertilizer (chemical and natural) 1 q production basis decreased by 83 thousand lei, that was increased by 140 thousand lei.

Table.4 Determination of the consumption items for sugar beet production in S.R.L. "Disetincom"

Consumer Products	Amount consumption to production in years, thousands lei		Inputs to the production of basic production q 1, lei		Deviation of consumption in 2007 compared to 2006 (+,-)	
	2006	2007	2006	2007	the production of basic 1q	to all basic production
1. Consumuri direct labor remuneration on state social insurance contributions and compulsory medical	417	262	5,08	4,14	-155	-0,94
2. Semințe and Plants	664	581	8,09	9,18	-83	1,09
3.Îngrășăminte chemical and natural	639	779	7,78	12,31	140	4,53
4. Consumption and production of ancillary activities	1077	751	13,12	11,87	-326	-1,23
5. Other inputs	115	-	1,4	-	-	-
6. Total consumption	2912	2373	35,46	37,5	-539	2,04
7. Main production volume, q	82110	63275	x	x	x	x

Table.5 Initial data for the analysis of consumption per item "direct Consumptions on labor remuneration" for sugar beet production in LLC Disetincom"

Indicators	Years	
	2006	2007
Factorial 1. Global production volume production base (VPG), q	82110	63275
2. Direct consumption of production work on basic q 1 (M), man-hours	1,2	1,01
3. Remuneration level 1 man-hours (Rm), lei Result	4,23	4,1
4. Direct consumption of labor remuneration basic production (CDRM), thousands lei	417	262

Analyzing the data table 5 we can say that global production volume of beet sugar in 2007 was 63,275 q reduced to 2006 which was 82,110q. Direct consumption of production work on Q1 base in 2007 compared to 2006 decreased by 0.19 man-hours, just dropped and the remuneration of man-hours in 2007 this indicator was 4.1 lei when in 2006 to 4.23 lei, or decreased in 2007 compared to 2006 to 0.13 lei. In terms of direct consumption of basic remuneration of work in production, here again we see a decrease in 2007 over 2006 with 155 thousand lei.

Calculation of factors influence the modification of direct consumption of labor remuneration on 1 ha of sugar beet S.R.L."Disetincom"

Influența primului factor (213-307,9)x4,23 = -402,01

Influența factorului II (4,1-4,23)x213 = -27,79

Balanța influenței 873,33- 1303,13 = -402,01- 27,79-429,8= -429,8

In conclusion we can say that the direct consumption of labor to 1 ha in 2007 compared to 2006 and decreased to 94.9 man-hours, the remuneration of man-hours just fell by 0.13 lei. Level labor remuneration man - hours to analyze the outcome indicator shows a decrease of 27.79 lei per hectare.

Table.6Reserve calculations to reduce the expense Unitary ccostului increase yield per hectare of sugar beet S.R.L." Disetincom "

Indicators	Year 2007
1..Suprafața ha	300
2. Roada effective, q / ha	210,9
3. Increasing fruit, q/ha- total account including:	28,18
3.1 application of more productive soils	18,99
3..2 the timeliness Optimal planting	3,02
3..3 the timeliness of harvest	3,02
4. The fruit can, q / ha	53,21
5.Consumurile actual production from 1 ha, thousands lei	7910
6. Additional consumption per 1 ha, to maximize reserves to increase fruit, Lei	54,59
7. Unit cost, lei:	7,5
7.1 actually	37,5
7.2 possible	35,46
8.Rezervele to reduce consumption of production of the product at all, thousands lei	16377

Analyzing the data table 6 we can conclude on the basis of 2006 data may be possible to harvest 210.9 q / ha, reducing the Unitary reserves of 37.5 thousand lei, increasing the total harvest-28, 18 q / ha, cost Unitary 35.46 lei possible and actually 37.5 lei. Reduction in total reserves consumption production will be produced at 16,377 lei. S.R.L,"Disetincom" is located in northern republic which allows to have favorable conditions for sugar beet, both pedology as well as climate.

CONCLUSIONS

Organization of beet sugar production in S.R.L." Disetincom" takes place from one stage to another. First of all every year to meet the technology work processes, i processes since preparation of the soil. The structure of arable area, the structure of sales revenue for sugar beet occupies 20% and is one of the most profitable branches, bringing annual revenue of the entity.

1. Organisation while all the technological processes work best;
2. achieve a global production peak of optimal consumption, it must respect the ways to reduce production cost;
3. achieving production at processing plants fast because with 10 days delay lowers sugar% 5%;
4. Ensuring household equipment needed for growing, harvesting and transporting sugar beet;

5. Dezvoltarea new forms of organization of production and work within the entity. They all will allow us to end, to obtain the economically maximum efficiency, resulting in a high and senior location in the country, year terms for sugar beet production.

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EFFECT OF DIFFERENT PLANTING METHODS OF SHORT ROTATION COPPICE WILLOW (*SALIX*) ON THE SPROUTING AND GROWTH IN THE FIRST YEAR AFTER PLANTATION IN DRY CONDITIONS OF SOUTH SLOVAKIA

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Key words**:** *biomass, short rotation coppice, willow, planting methods, cuttings establishment*

Abstract

Short rotation woody crops present, in the conditions of climate change, an alternative which reduces the amount of greenhouse gases emitted into atmosphere. Growing of short rotation coppice trees like Salix also helps to increase employment and rural development. The plantation of short rotation coppice willows in Kolíňany (Nitra district, Slovakia) was established in the spring of 2009 to verify an impact of planting methods on the crop establishment and further growth in dry conditions of South Slovakia. The willow cuttings were planted on two sites in three repetitions. Two different willow varieties (Sweden variety Inger and Hungarian variety Expressz) were planted in three different ways. The cuttings establishment of variety Inger varied from 97.92 to 98.96% and the variety Expreszz varied from 93.75 to 100%. The results indicate no significant differences according to chosen method of planting. The planting method has a significant impact on the number of the shoots per plant depending on the variety. There were some differences among the stem diameters and stem heights in compared planting methods.

INTRODUCTION

Growing of short-rotation woody crops (SRWC) presents sustainable system that simultaneously produces a renewable feedstock for bioenergy [1]. It also brings environmental benefits [2] and contributes to rural development associated with economic growth and creation new job opportunities [3]. In addition, cultivating of SRWC decreases an amount of CO_2 releasing to atmosphere [4].
Considering their long-term production and sustainability the initial survival and prosperous aboveground biomass production are very important. At the end of the establishment year should be survival rates more than 80% otherwise the establishment is considered as unsuccessful [5]. One of the main conditions for successful cuttings establishment is water. Water is also limiting factor of the production process, particularly in a dry weather conditions [6]. Providing a good weed control in the first year after plantation helps cuttings to establish and to grow optimally [7]. It is obvious to use only high quality, appropriate plant material and to accomplish the planting in right time [8].
The aim of the research is to determine which planting method provides the best optimal living conditions for cuttings establishment and how the planting method influence the number of the shoots and their growth in the dry conditions of South Slovakia.

MATERIAL AND METHODS

The field trial is located in Kolíňany (18°12` E, 48°21` N). This area belongs to warm and very dry climate region with altitude around 180 m above sea level. The average year temperature is 9.7 °C with average temperatures -1.7 °C in January and 19.7 °C in July. The soil is medium clay with average soil pH 7.26 and average humus content 1.8 %. The soil type is fluvisol. The average annual precipitations are 500 mm.
The research plot was established in April 2009. For plantation were used cuttings from two different varieties. Variety Inger (*Salix triandra* x *Salix viminalis*) was supplied by Lantmännen Agroenergi (Sweden) and Hungarian variety Express (*Salix alba)* was supplied by plant-breeder Németh Jenő -

Silvanus Diszfaiskola (Hungary). There were planted 288 cuttings of Inger and 288 cuttings of Express in total, on the two plots (24 x 20 m) with three replicates on the each plot. Cuttings from one year old willow shoots had stem diameter about 10-15 mm and length 200 mm. They were planted by hand with the assistance of metal bar in twin-rows, 8 plants in the each one. The cuttings in the row are 750 mm apart, the space between the two rows is 1000 mm and the space between two twin-rows is 2000 mm.

For planting cuttings were used three different methods (marked in the paper as I., II. III.). In the first planting method (I.) 17 cm of 20 cm long cuttings was pushed to the ground what means that other 3 cm of the cuttings were left above the ground. In the second planting method (II.) was whole length of cuttings pushed to the ground. In the third method (III.) were again whole length of cuttings pushed to the ground but moreover there was applied layer of compost about 3 cm thickness on the plantation.

The quantity of established cuttings was counted one month after plantation. The cuttings establishment and growth dynamic were compared in accordance to used planting methods. On the end of January were measured the heights of selected plants (32 plants of each planting methods), number of shoots and their stem diameters measured in 100 cm above the ground.

Recorded dates were statistically analyzed if there is any dependence between planting method and observed parameters. For analyzes were used one-way ANOVA. Observed parameters are cuttings establishment, number of the shoots per plant, height and stem diameter.

RESULTS AND DISCUSSION

The average number of established cuttings shows Tab. 1. The survival rate of cutting establishment exceeds mentioned 80 % [5]. The plantation was established successfully. There was not observed a significant impact of variety or planting method on the cuttings establishment.

Tab. 1 - The ratio of average cuttings establishment.

Cuttings establishment			
Planting method	I.	II.	III.
Inger	98.96%	98.96%	97.92%
Express	100.00%	97.92%	97.40%

The results from research area in Kolíňany were also compared with results from area in Selice, where similar research was done in resembling conditions. The ratio of cuttings establishment in Selice was 78.36 % [8] for Inger variety what is noticeably less in compare with the ratio of cuttings establishment for the same variety in Kolíňany (97.92–98.96 %). Lower ratio of cuttings establishment in Selice was probably caused by low quality of cuttings and by poor weed control in the year of establishment [8].

Another of the parameters - the average number of the shoots per individual plant - according to the planting method shows Tab. 2.

Tab. 2 - The average number of shoots per plant.

Average number of shoots			
Planting method	I.	II.	III
Inger	1.88	1.68	1.35
Express	1.94	1.74	1.69

The highest was reached in first planting method (I.). The lowest number of shoots per plant was reached in third planting method (III.). The variety Inger proved significant difference ($P<0.05$) in number of shoots per plant according to the planting method. The number of shoots per plant relative to the planting method is not clearly differentiated at variety Express. There were not proved significant differences at the $P<0.05$ level (within 95% reliability) but can be proved differences at the $P<0.1$ level (within 90% reliability).

Proportional representation of 1, 2 and 3-shoots individuals were compared according to used planting methods (Fig. 1. and Fig. 2.)

The 1-shoot and 2-shoots plants dominated in the plantation for both varieties.

Inger – 1-shoot plants dominated in III. planting method and 2-shoots plants dominated in I. planting method. In II. planting method

were representation of 1-shoot and 2-shoots plants balanced.

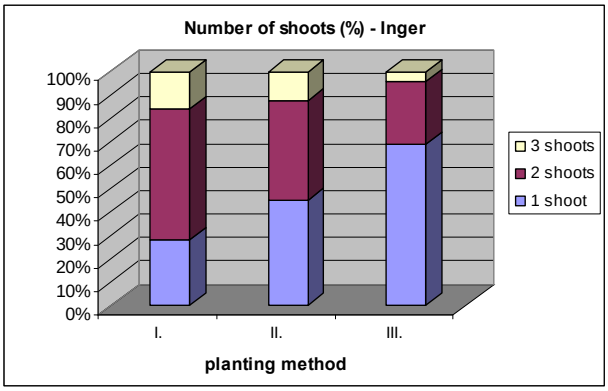

Fig. 1 - Proportional representation of 1, 2 and 3-shoots plants (Inger).

Express – 2-shoots plants dominated in all planting methods.

Fig. 2 - Proportional representation of 1, 2 and 3-shoots plants (Express).

The average number of shoots per plant (Inger) in Selice was 1.59 [8] where was cuttings partially pushed to the ground with 2-3 cm left above the ground like I. planting method in our research. The value is apparently different from the one which was reached in Kolíňany in the same planting method, where the value was 1.68.

The average of stem diameters and heights of varieties Inger and Express shows Tab. 3.

For both varieties were proved significant differences ($P < 0.05$) in shoot heights according to planting method.

The variety Inger shows significant differences also in stem diameters ($P<0.05$) relative to planting method unlike the variety Express where was not.

Tab. 3 – Average height of shoot and stem diameter

Height and diameter of shoots				
Planting method		I.	II.	III.
Inger	height (cm)	252.83	259.06	283.00
	diameter (mm)	11.47	11.83	13.78
Express	height (cm)	270.59	249.11	252.67
	diameter (mm)	14.01	13.05	13.65

The average height in Selice (Inger) was 196.23 cm and the average stem diameter was 10.1 mm [8]. By comparing the growth dynamic of variety Inger in Selice and Kolíňany the variety reached better results in Kolíňany (see Tab. 3).

CONCLUSION

Hypothesis was that the highest cuttings establishment will be reached in plantation with compost layer (III. planting method), because this method helps to keep the moisture in the upper layer of the soil horizon. This hypothesis was not proved. Follow from measured dates is clear that planting methods do not influence significantly the cuttings establishment. Survival rate of planted Express and Inger cuttings is similar. It is probably due to the broad ecological tolerance of willow planted on the plot. It is more likely that more important impact to cuttings establishment has soil moisture, proper plant material, and the right time of establishment and good weed control in the first year after planting cuttings as it is seem from the comparisons with similar research in Selice. These factors have probably impact not only for cuttings establishment but also for their sprouting and subsequent growth.

The field trial confirmed the significant impact of planting method on the number of shoots per plant mainly for Inger variety.

Significant differences were observed in the parameters of stem diameters and shoot heights, in particular Inger variety. The highest values were reached at III. planting method. The impact of the planting method on the shoot heights and stem diameters was not directly proved in Express variety.

We suppose that these differences between planting methods will even out next years due to coppicing all plants in spring 2010 – first

year after plantation. This is common way in SRWC management.
After coppicing we will search the impact of current number of shoots per plant on the subsequent regrowth and eventually on the total biomass production. We are especially interested in how the current number of shoots per plant will affect the subsequent shoots production of the same plant after coppicing.

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DAMAGES TO CROPS IN BURNAS PLAIN MADE BY FIELD MOUSE CASE STUDY – RAPE

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Key words *: field mouse, rape, biomass, damage index*

Abstract
Field mouse (microtus arvalis) became extremely aggressive the latest two years in Burnas Plain, and especially between Alexandria – Zimnicea – Turnu Măgurele, on the well-known plateau on the right side of Vedea river. The field mouse attacks especially during autumn, and preferably rape crop. But it is also very aggressive to barley and wheat crops. Our studies revealed that microtus arvalis population grew during the autumn of the analyzed years up to 2100 individuals/ha, of which at least 1,4 – 1,6 individuals/m^2 newly born reprezentation, much more sensitive than the adults towards both agricultural cultivation works and natural pests within the agroecosystem.
Field mouse attacks in hearths and has its habitat in soil, predominantly at depths of 20 – 50 cm. At bigger depths he is making his food reserves and the den where females give birth to their cubs. Reproduction rate is very big: 7 – 8 generations per year. Up to 2726 holes/ha were counted on the average in the studied area of Agrovet Farm company, and the autumn rape crop was 26,6% destroyed, which led to yield decrease on the average with 686 kg/ha, but with intervals on the attacked area from 240 to 1010 kg/ha. Losses in 2008 at the farm level were 400 tons x 275 Euro = 110.000 Euro/year. In calculating the prejudice index we noticed there was a direct correlation between this and the yield losses, and a very significant correlation between the number of individuals, the damaged surface and the yield losses. In our opinion these big attacks in this area are due to the imbalances caused by the Hunters' Association which destroyed the natural enemies of mice (sparrow-hawks, crows, foxes, etc.) There are not efficient control methods.

INTRODUCTION

The field mouse, scientific name *microtus arvalis,* has a broad world spreading from Spain, passing over Western and Central Europe, Middle East and central Russia up to the Far East, including a part of Mongolia (fig. 1) [3]. In Siberia and Island there are isolated populations. A big part of the surfaces in Southern Europe, as well from the northern part of England and Russia are not populated by mice. Field mouse can be found in the populated regions from the sea level up to 2600 m altitude [4]. Naturally the population density is stable and around 1000 individuals/ha. It varies from year to year, and in case of pandemic, the population increases 10–20 times, or even more.
According to professor Lauenstein [2] (figure 2) this species has a big reproduction capacity. In normal conditions, the gestation lasts 20 days, the number of generations being minimum 7 per year. The reproduction period is long, it can take place also in winter. According to the same author, when the attack is spreading out in green areas (pastures, meadows, etc.), the population is abt. 5000 individuals/ha. A family can invade within one year 300 – 1000 m^2.
Damages made by field mice to crops are determined by crop type, moment of attack, duration of attack and compensation capacity of crops. Within the German space for instance, during the agricultural year 2006/2007 they were about 400 – 500 millions Euro [2].
The population control is difficult to achieve. At the level of European Union the rodenticides are still allowed to be applied, but only on limited surfaces, and especially at the level of galleries by slipping in baits into the galleries. Application on the surface or by

sprinkling is not permited. Rodenticides homologated as baits refer within EU only at two substances: chlorphacinon and zinc fosphide. In order to block the extension of surfaces occupied by walking in the galleries, the same Lauenstein [2] recommends to place the baits along the furrow of a plough and to cover them (preventive measure).
Achieving ecological balances in the area by which natural pests are being stimulated, is efficiently helping to the settlement of populations and decrease of pandemic situations. In Romania field mice caused in many regions big losses, which could lead even to population starvation. Corlan [1] explains in *Gorjul* newspaper in 31 October 2009 that the average (normal) damages caused by a field mice family is up to 30 kg cereals per year, and together with their offsprings they can reach 15 to/year. At global level 10% of the cereals for people's food are lost in this way, i.e. 25 millions tons, quantity which could feed over 150 millions people.

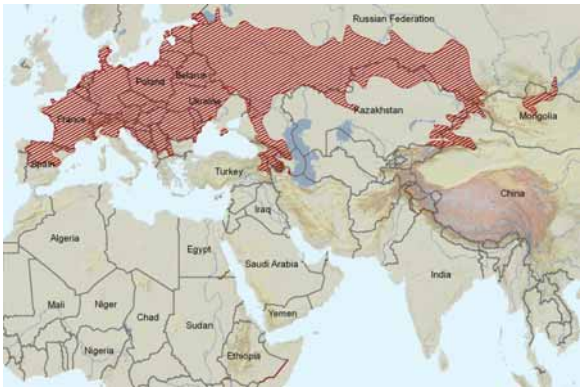

Fig. 1.Geographical distribution on the planet of field mouse (*microtus arvalis)*.
Source: Schenbrot G.I., Krosnov B.R., 2005 [3].


Fig.2. Field mouse caught in green areas by Lauenstein [2].

MATERIAL AND METHOD

It is difficult to use a standard method in order to study the damages done by this species. Taking in consideration the big damages made by field mice, the authors of this paper had as objective to discover the mechanisms of the rodents' attacks on the agricultural crops, in this case the rape.
We also focused on: the attack moment, the attack model, the density of the population causing untolerated damages, the setting up of an evaluation parameter which we called damage index I_d. In our view, this was defined as a multiplication between the surface attacked and destroyed by mice S_a and the intensity of the attack I_a, all expressed in %. Therefore:

$$I_d\ \% = S_a \times I_a$$

In order to determine the population during the climax of the attack, the following determinations were made: number of galleries/ha, number of total mice and young mice, and the surface invaded and destroyed outside the tolerance limits.
An other goal was to measure the yield losses and also we tried to solve the impossible, i.e. field mice population control measures. Through special programs we settled correlations between I_d and the yield, and tridimensionaly between the number of rodents, the occupied surface and the yield losses. Finally we evaluated the indexes of economic loss.
The aim of the work was to place at research and practice disposal the scientific information necessary to elaborate population control measures and to avoid yield losses.

RESULTS AND DISCUSSIONS

In conditions of tolerant losses or lack of losses the mice natural population (*microtus arvalis*) does not exceed during critical attack periods the density of 350-400 individuals/ha. At this density the biomass of the agricultural crops rapidly compensates the potential yield losses.
An increase in the virulence of the attack was noticed in the farm's lots during sowing

period, and especially during rape springing in 2007 and 2009. We consider the following factors as major causes of mice population increase towards summer end:

1. Disappearance of predators and raptors in the territory which we have analysed, mainly foxes, sparrow-hawks and crows. These were eliminated from the area by the Local Hunters Association who wanted to transform Burnas Plain in a polygon for raising hares and export them alive in Italy. Such an anthropic intervention favoured the rapid increase of the rodent population.

Cultivated exclusively after cereals, rape benefited of rodent families well established, due to the big reserves of wheat kernels on the ground and stocked by the animals into the galleries up to 50 cm depth. In tabel 1 we present the main results of the investigation.

Table 1. Average values and intervals of manifestation of the main indicators of the attack of field mice (*microtus arvalis*) at Agro Farm Alexandria

Crop	No. galleries		No. rodents		Surface destroyed S_o	
	average	interval	average	interval	average	interval
Rape, diverse witness hybrids	150	0-312	0,006 x 10^4	0 – 0,025 x 10^4	0	0
Rape, diverse witness hybrids attacked (sown after wheat)	2726	701 - 4624	2,1 x 10^4	1,5 x 10^4 – 2,4 x 10^4	26,6	12,0 – 39,1

Crop	Intensity of attack		Indicator of loss I_p		Yield losses	
	average	interval	average	interval	average	interval
Rape, diverse witness hybrids	0	0	0	0	0	0
Rape, diverse witness hybrids attacked (sown after wheat)	85,9	79 – 95,1	23,1	8,0 – 36,1	686	240 - 1010

Within witness variant the number of galleries was random or was not at all, and the number of rodents did not exceed 60 per hectar. Consequently, rape crop within the average 2008-2009 developed without a significant attack, the average yield being of 3200 kg/ha. Within an extremely differentiated attack the average number of galleries was 2726 (see also fig. 4-5) with a variation from 700 to over 4600/ha, and the number of rodents was about 20.000/ha of which about 5000 were adults and the others youth. The multiplication of mice population began strongly around the 10th of September and reached a climax one month later when the attack became so big that interventions with rodenticides were necessary, distributed with big efforts to the galleries.

The surface attacked was on the average of 26,6% with an interval from 12 to 40%, and the intensity of the attack, expressed in % plants destroyed was about 85,9% (interval 79 – 95,1%). Consequently, the loss indicator I_d was 23,1%, varying from 8,0 - 36,1%, and the actual yield losses were on an average of 686 kg/ha with a variation from 240 to 1010 kg/ha.

Fig.3.Phenotypic model of field mouse on Burnas Plain – Teleorman. The rodent is an adult and it seems longer than the one presented in specialty literature (see fig.1). Author's photo.

Fig.4. Model of galleries digged by field mouse *microtus arvalis*. This starts from the surface and moves in depth. Author's photo.

The model of field mouse presented in figure 3 is very active, very hardworking after which he is cutting the rape plants transporting them in the food storehouse in depth through the model galleries (figure 4 and figure 5).

Fig.5.Five galleries were seen on about 0,5 m^2. In this case the ground around the galleries is completely free of rape, the damage being 100%.

Fig.6.Rape biomass is brought by the animals to the entrance of the gallery and then quickly dragged inside this.

In case of danger, the food is brought only to the entrance of the gallery and afterwards only dragged into the depth. Storehouses seem to be different. For instance, the mouse does not mix the grain storehouses with the ones with green biomass, showing some kind of intelligence. As order of consumption, he is eating first the biomass, and then the grains. Within the refference period, (10 September – 10 October) it was a dry weather, therefore we consider that the attack on the rape was also a water provisioning both of adults and youth in the galleries.

The attack is initially as small circles or eclipses (fig. 7) afterword these unite and form big surfaces without the crop biomass, or with a biomass significantly diminished (figure 8).

The calculation of damage index (I_d) led us easily to intuit that these correlate well with yield losses. This correlation, though almost linear, is still a complex function type NL and benefits a very big determination r^2 = 99% (figura 9). In the first two phases of increase of I_d all 10 points bring a loss of 250 kg rape, and between 30 – 40 points the loss is 200 kg/ha. Totally, on the interval 6 – 40 points an yield of 1100 kg/ha is lost, i.e about 260 Euro/ha at this moment and prices.

Fig.7. The beginning of the attack model is achieved in eclipses or small circles.

Fig.8. In less than two weeks the attack becomes very strong, the crop evolving toward total destruction.

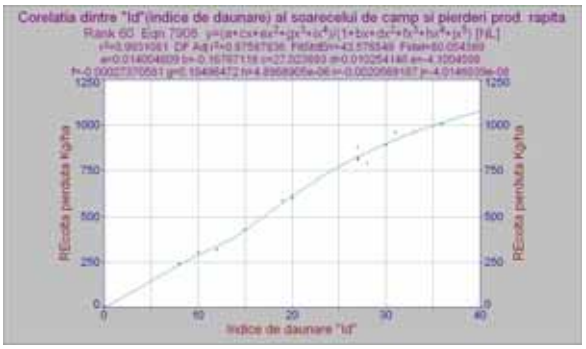

Fig.9. The correlation between „Id" of field mous and loses of rape yield

Figure 10 presents a tridimensional model of the relation between the number of rodents, the surfaces destroyed and the lost surface with rape.

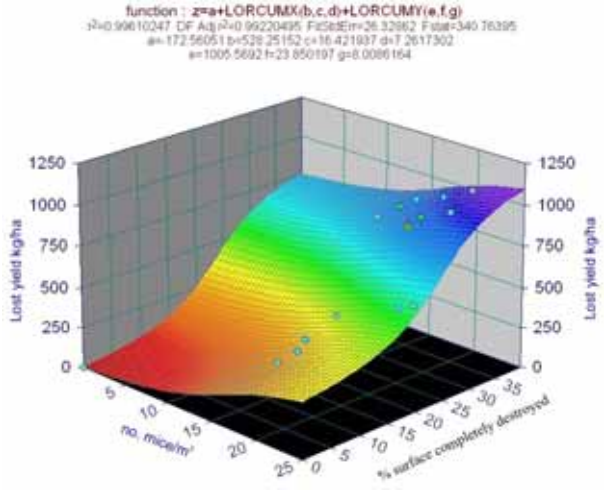

Fig.10.Tridimensional model of the relation between the number of rodents, the surfaces destroyed and the lost surface with rape.

We notice that the two indicators, the number of mice and the surface completely destroyed have a synergic effect on the yield losses. As big as the number of rodents would be, the yield losses would be small if the destroyed surfaces wouldn't increase, and vice versa. On the other hand, the diagram suggests that starting from the lost production (easy to estimate) and from the destroyed surfaces (easy to measure) we can find out the number of rodents involved in this calamity.

At the beginning of October treatments with rodenticides were done in the galleries. However, the effect was insignificant untill the rain season began, starting with 14-15 October when we consider that the toxic penetrated into the galleries. We will see in November, during the good weather, if the attack starts again. Anyway, at the present level of attack – medium – the rape loss is of almost 180 Euro/ha, meaning for Agrovet Farm at least 100.000 Euro each year.

Generally control measures are only a few and inefficient if we think at curative methods. The severity of the phenomenon led the Ministry of Agriculture to advise, after 25 October, with big restrictions, the use of Endosulphane in order to limit the invasion. The approval, even if late, could be efficient if the attack starts again. If not, the losses would be definitive.

Preventive measure should be considered, i.e.:

a) Field mice do not like at all in depth works made with plough or with the trigger. But these are not enough.

b) Populating the area with predators and raptors and remaking of the ecological systems would be a more efficient method, especially on the long run.

c) Utilization of intestinal parasites for the rodent could be a good method, even if not yet enough studied. Until then the method of mice populations control and the losses made by them still remains an unsettled one.

CONCLUSIONS

1. The field mouse (*microtus arvalis*) made in Burnas Plain, Teleorman county, Romania, on rape crop, during September – October on the average a loss of 23,1% from the witness production, the equivalent of almost 700 kg

kernels with variations from 240 – 1100 kg if the damage index reach the figure 40. Lacking any control, the calamity could be total. The average value is 180 Euro/ha, increasing up to 270-280 Euro/ha.
2. The evolution and the rodent attack are favoured by the autumn droughts and the ecological imbalances present in the territory.
3. If we know the yield losses and the surfaces destroyed we could find out mathematically the number of rodents in the agroecosystem.
4. We do not have at this moment efficient curative methods authorised by the government and EU and therefore the farmers are sure only on the damages they have, not the solution of the problem.
5. A much more efficient solution would be the ecological reconstruction of the ratio between the pests of the mammal and its natural enemies could be a more efficient. It is about foxes, sparrow-hawks, crows, etc.

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RESEARCHES REGARDING YIELD MODELLING WITHIN SUSTAINABLE AGRICULTURAL SYSTEM DEPENDING ON CROP ROTATION, ECOLOGICAL INDEX AND PRECIPITATIONS IN THE SOUTHERN PART OF ROMANIA

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Key words : *crop rotation, models, agricultural crop, humus*

***Abstract*:**

Reintensification of agricultural production starting from natural models requires long and diverse crop rotations and a high index of soil ecological condition (I_E). Using common crops in the Southern part of Romania, well acclimatized, the level of yield proved to be dependent on the soil ecological index and the level of rain-falls during the year. The authors established the ecological index by evaluation from 1 (inapt for agriculture) to 5 (excelent for agriculture) and it was got in the field by special methods of soil work associated with large crop rotations where ameliorating plants (pea) occupy at least 20%. Crop rotation directly contributed to I_E increasing. A direct correlation existed both technically and economically between the three parameters (Production: P, Ecological index: I_E and Precipitations: Prec.) In the Southern part of Romania the yield is economical from I_E 3,5 and Prec. > 450 mm in sustainable crop rotations.

INTRODUCTION

For the first time at the Interministerial Conference in Berlin in 2009, Bartmer C.A., 2009 [1], synthesizing the research effort of thousands of scholars aware of the necesity to rebuild another model of agriculture useful for the planet during these times, said: *„The world population increases. Now we are 6,7 billions of people on the earth but in 2030 we will be over 8 billions. All these people want to eat, to drink water and to live well within the lowest possible social costs. It's time to abandon the agricultural intensive conventional systems which are producing food at too big costs and harming the environment. Time is already come when a new reintensification of agriculture became extremely necessary. But it has to start from the natural models of plants and animal breeding. A re-greening of agriculture is necessary"*. In a series of other previous works Berca M., 2008 [2]; Berca M., 2009 [3], Berca M., Robescu V.O., 2009 [4]; Berca M., Buzatu C., Secuiu V., 2009 [5], by the means of an international program aiming to shape new models starting from natural systems model, created for the Southern Romanian space, technical and managerial models able, by one side, to reduce the costs of basic photosynthetic agricultural products, and by the other side to lead to the increase of the ecological condition of soil and environment in its entirety, and to reincorporate the CO_2 surplus in humus [8].

MATERIAL AND METHOD

We started from the idea that the average level of cereal yield is in Romania 2,5 to/ha and we looked for the causes of this situation. We found out big mistakes in crop technology, which led at the same time to

loosing comparative advantages owned by Romanian soils, such as: high content in organic matter, soil architecture/structure, biological activity, and water and nutrients conservation.

In order to be able to elaborate the models of yields determined by the ecological condition of soil the authors imagined an evaluation scale for the „condition" indicators with marks from 1 to 5. By studying the effect of precursory plants on soil, the ecological index was corrected according to their ameliorating qualities, and on the whole according to the model and the rotation functions.

We worked with special statistic programs processing data in 3D, we elaborated by simplification nomograms in 2D, and we worked out the best crop rotations in the Southern part of Romania, as well as the most appropriate ecological parameters in order to reach success in plant culture, depending on the precipitations volume, always considered a limitative factor. We worked in two locations: on the terrace of Burnas Plateau (Agrovet company) and in Modelu area (Probstdorfer company).

RESULTS AND DISCUSSIONS

If mathematically we note the ecological index I_E with x, and the precipitations in the area with y, then the yield of whatever crop would be a function of the two variables (z = yield. = f (x, y). In determining the „x" the authors had a personal vision, considering „x" an ecological parameter and also an indicator of fertility conditions. And this because from calculations came out that a correlation between the two is positioned almost at determination level: $r^2 = \approx 1 \pm 0{,}0005$. In essence, the variable „x" was and is being generated by the natural fertility condition got by the cartographic studies within the Romanian space (marks from 0 to 100, or 0 to 1) [6] and also due to the improvements made by the authors in the pilot farms.

Table 1 was set taking into account these data, and describes the ecological index of soils, studied on a scale from 1 to 5.

We analysed then several crop rotations in the area. The most frequent are dominated by cereals (40%), rape (30%), 20% maize or sunflower. In the crop rotation the fourth year is lacking and also the ameliorating plants. The making of crop rotation by the farmers in the area is an aleatory one, generated more by the easy access toward the markets than a mixt one where the soil conservation would ultimately find its place.

1.1.1. Table1. Ecological index conception and description $I_E = x$ (original)

No.	Level indicator	Indicator description
1	1	Settled soil, without structure, without essential biological activity, without conductibility for water and air. Agriculture cannot be practiced.
2	2	Soil with forming structure, with a biological activity of soil at 20% from normal, where ecological profile works (scarification) began.
3	3	Average ecologized soil, structure over 50%, formed and stable, bilogically active over 50%, remade. Fluxes on profile function in percent over 50%. Water can be partially preserved, and alike the nitrogen. Important quantities of biomass (straw + rape stems) were already incorporated - 4000 kg/ha.
4	4	Soils over 75% ecologized. Soil structure remade over 75%. A stable soil architecture comes out, with a good biological activity. Beside the organic matter, ameliorating plants were introduced in the crop rotation, and bioactivators were applied (mychorriza, biovin), and other concentrated composts.
5	5	Soil completely ecologically remade 90-100%, with an architecture, structure complete and stable, with a biological activity totally restored and active, in which the biodiversity of different species is balanced and its function complete, including water conservation and in which the effect of the precursory plant is taken into account. (It can be obtained by reducing soil works, dead biomass, living biomass [intermediary crops] and soil bioactivators).

That's why we proposed two types of crop rotations for a 2000 ha standard farm, namely: crop rotation 1 (figure 1) where the stalky cereals prevail (30%), the oleaginous plants sunflower and rape (50%) and maize (20%).

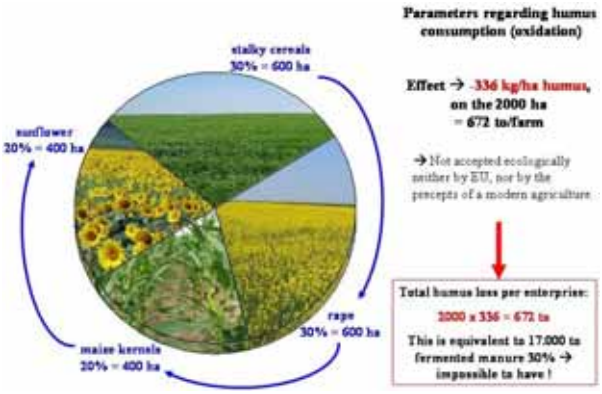

Fig. 1.A proposed crop rotation without an ameliorating plant in the southern part of the country, a 2000 ha farm (original).

As the figure shows, if we have a relatively balanced crop rotation according to the EU recommendations and in the absence of an ameliorating plant (see program LIZ [7] - humus balance), the crop rotation consumes 672 to humus/farm, i.e 336 kg humus/ha. The European Union allows a variation between [-73 - 100 kg/ha]. In order to get the closest to the market demands and at the same to depreciate not and to diminish not the humus quantity in the soil, we propose also a crop rotation with an ameliorating plant. The proposed plant was pea (figure 2).

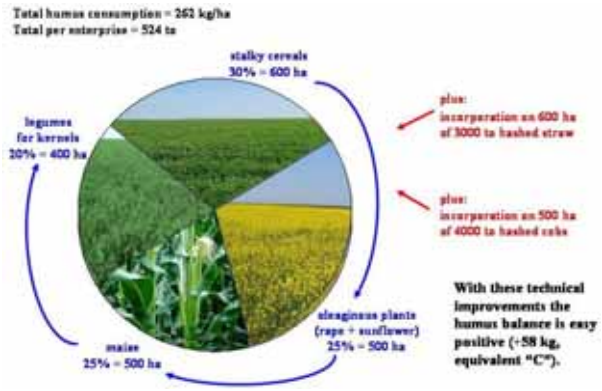

Fig. 2.Example of an ameliorated crop rotation for a 2000 ha farm (original).

By simply introducing the pea in the crop rotation we reduce the humus losses at the crop rotation level with aprox. 150 tons. The rebalance of humus-C onward can be done by incorporating in soil 3000 tons of straw on 600 ha, and 4000 to hashed cobs on 500 ha.
By these ecologization efforts the humus balance comes to + 58 kg/ha, accepted and payed by the European Union.

Table 2. The ameliorating effect of I_E (x) at enterprise level given by the quantity of the precursory plant 2008-2009 (original)

No.	Precursory/following crop	No. points	Effect on index
1	wheat after rape	+ 0,5 points	IE = 4,0
2	wheat after barley	0 points	IE = 3,5
3	rape after wheat	+ 0,5 points	IE = 4,0
4	rape after barley	+ 0,75 points	IE = 4,25
5	barley after wheat	- 0,25 points	IE = 3,25
6	wheat after peas	+ 1,5 points	IE = 5
7	peas after wheat	+ 1,0 points	IE = 4,5

Starting though from the reality that $x = I_E$ at the level of our farm is 3,5, the precursory plants brought ameliorating effects according to data in table 2. Pea is bringing most of the points in ameliorating the crop rotation effect, followed by barley for rape, and by wheat for rape. Wheat after pea brings also 1 point in I_E.
The calculations in the above table were the basis of a larger study regarding the yield formation and its economic analysis within the crop rotation. The four crops within the crop rotation were analysed by the means of the correlation in 3D between the yield (z), ecological index (x) and the fallen yearly precipitations (y). The technical analysis is presented in figure 3, on the upper left side, where are the yield formation models for each of the four crops analysed, with the following results:
For each crop on the diagram three favourability areas were marked depending on the ecological condition of the lots and the yearly precipitations. In the electronic variant in order to see the model 3D of each crop the black point on the left side, down, must be pushed. The technical conclusions are as follows:

- Any crop, regardless the precipitation volume cannot get the yields considered boundary (as costs) at an ecological index under 2,5 ($I_E < 2,5$). The favourable area $I_E > 2,5$ and Precip. > 450 mm.
- The favourable area is considered a transit area and it will disappear when the soils will be completely ecologized.
- The unfavourable area is not appropriate for any crop. Within the parameters of this area the practice of agriculture is not recommended $I_E < 2$ and Precip. < 400

mm. In order to practice agriculture in this area a sustained activity to ecologize the soil is necessary (reconstruction of fluxes on profile, of the structure, of the humus, of the biological activity, of water conservation, etc.).

- The model of valoric yields of the crop rotation depending on I_E and precipitations is studied in figure 3, down, on the right side.
- By analysing the model of valoric yields in a 4 years crop rotation with pea as an ameliorating plant, we found out the following (considering the prices of the product those specific for 2009: 130 Euro/to Premium wheat, 230 Euro/to peas, 95 Euro/to barley, 270 Euro/to rape, 170 Euro/to sunflower):
  In the poorest ecological conditions and those related to precipitations, the value of maximum yield in a good crop rotation does not exceed 579 Euro/to/4 years) (I_E = 2, precip. = 350), coresponding to an average yield of 144,5 euro/to/year. The yield level is unconvincing and covers only 35-40% of costs. In these conditions the agriculture cannot be practiced before the soil ecological reconstruction works.

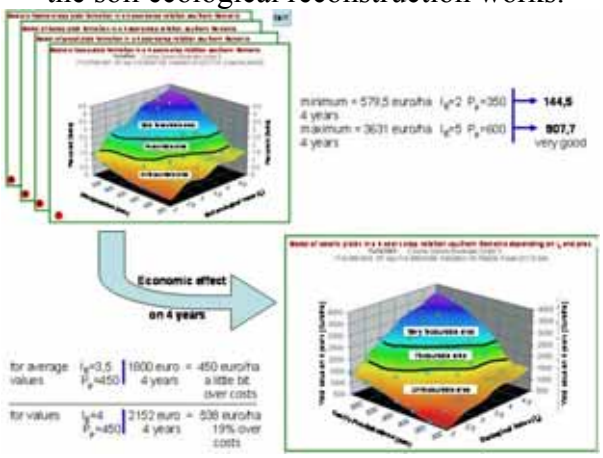

Fig. 3. Model of the technical and economic analysis of a 4 years crop rotation in the Southern part of Romania, 2008-2009 (original).

- An optimum soil ecologization through reconstruction can secure, even in drought conditions, an yield at least at the level of costs.
- In case of a good ecologization I_E = 4 normal precipitations (> 450 mm/year) the value of the yield obtained in the proposed crop rotation exceeds with 19-20% the level of costs. By introducing also other models of symbiotic and associative nitrogen fixation models, one can press over the costs and the marge can reach over 40%.
- For the benefit of farmers, in figure 4 we provide also the nomogram of the valoric yields of the crop rotation for 4 years so that, depending on the ecologization degree and precipitations, the farmers could evaluate alone the production and to decide on the opportunity to practice one or another of the agricultural production systems.

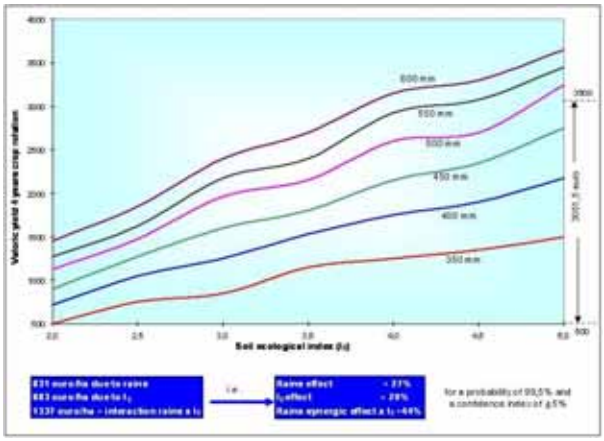

Fig. 4. Nomogram of the agricultural production value in a 4 years crop rotation with peas, stalky cereals and rape in the Southern part of Romania, depending on the yearly precipitations and the soil ecological condition.

CONCLUSIONS

1. In Romania over 5 millions ha arable land have an ecological index I_E under 2,5, and with the actual technologies and under the present climate conditions cannot cover their production costs. Due to these reasons many farmers cannot live only from agriculture.
2. In order to get valoric productions at least at the level of costs, the farmers need a soil ecological reconstruction able to reach an I_E >3 within the conditions of 450 mm precipitations/year.
3. A reasonable production can be obtained with an I_E >4, under average precipitations, case when a marge of 19% per year could be got, convenient for any farmer.
4. At this ecological index any surplus of water could bring a production benefit of 246

Euro/ha/year for every 100 mm precipitations in the studied interval of maximum 600-650 mm precipitations.

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APPLE GROWING AND FRUCTIFICATION DEPENDING ON GARDEN SOIL MULCHING

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Key words**:** *apple-trees, soil mulch, vegetation residues, polyethylene film, Republic of Moldova.*

Abstract

Article presents data on trunk thickness and fructification of apple-trees of Idared, Spartan and Golden Delicious varieties grafted on MM-106 depending on six options of garden soil mulching. Garden soil mulching by covering with polyethylene film removed from one position to another (once per 12-16 days) ensures high fructification of apple-trees.

INTRODUCTION

Systems of soil maintenance constitute an important part of the set of agro technical measures used in gardens. If care over tree tops is adjusted relatively satisfactorily from technological point of view to requirements of the current stage of horticulture development, soil maintenance requires yet considerable researching efforts for rationalization. It is necessary to determine the priority direction for improvement of the soil maintenance technology taking into account climatic conditions of the Republic of Moldova trending to manifest themselves in most extremely way (significant reduction of atmospheric precipitates, persistent long-term high-temperature periods, hot and dry weather) in the plant vegetation period [1, 2].

Therefore, currently, in the opinion of horticulture researchers, revolution of problem concerning as much as possible efficient mineralization of water evaporation from soil by covering its surface with mulching materials is in the foreground.

Purpose of researches undertaken by us within above described experiments was to reveal optimal options of soil mulching ensuring substantial reduction in consumption of mulching materials and prevention of their deterioration in the moment of technologic transfer among intervals between rows of trees by agricultural machines aggregated with tractors [3, 4].

The present article contains data on the trunk thickness and fructification of apple-trees depending on garden soil mulching.

MATERIAL AND METHOD

Systems of soil maintenance constitute an important part of the set of agro technical measures used in gardens. If care over tree tops is adjusted relatively satisfactorily from technological point of view to requirements of the current stage of horticulture development, soil maintenance requires yet considerable researching efforts for rationalization. It is necessary to determine the priority direction for improvement of the soil maintenance technology taking into account climatic conditions of the Republic of Moldova trending to manifest themselves in most extremely way (significant reduction of atmospheric precipitates, persistent long-term high-temperature periods, hot and dry weather) in the plant vegetation period [1, 2].

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transfer among intervals between rows of trees by agricultural machines aggregated with tractors [3, 4].

The present article contains data on the trunk thickness and fructification of apple-trees depending on garden soil mulching.

RESULTS AND DISCUSSIONS

In accordance with the Table 1, options of mulching in respect of tree trunk thickness growth have manifested themselves as follows. Fourth, fifth and third options providing mulching of soil in a garden by its covering with polyethylene film periodically removed from one position to another ensure the maximal growth of trunk of apple-trees. Trees have demonstrated positive response to the sixth option as well. Specificity of this experiment consists in that reference option (except Idared variety) with regard to the trunk thickness remains significantly lagging as compared with other studied options.

Table1. Growth and productivity of apple trees depending on garden soil mulching.

Option	**Experimental plot no.1, agricultural holding „Fructovâi Donbas”**						**Experimental plot no. 2, Agricultural holding „Nicolae Munteanu” (industrial studies)**			
	Idared grafted on MM-106		Spartan grafted on MM-106		Golden Delicious grafted on MM-106		Idared grafted on MM-106		Idared grafted on M-9	
	A^x	B^x	A^x	B	A^x	B^x	C^x	D^x	C^x	E^x
1 reference	87	81	73	75	83	85	110	109	81	79
2	81	78	78	80	87	88	104	107	84	83
3	93	91	89	83	108	94	112	119	88	85
4	113	109	112	103	120	113	129	138	91	90
5	95	98	109	95	116	100	117	125	97	94
6	105	101	103	88	94	99	123	130	94	91
$LD_{0,95}$	5,9	9,7	8,5	7,8	7,0	8,6				

x- A- the trunk thickness, mm (in 1991, the 7 year following planting)

B-total crop for 1988-1991, kg/tree

C-the trunk thickness, mm (in 2007, the 9 year following planting)

D-total crop for 2003-2007, kg/tree

E-total crop for 2002-2007, kg/tree

For example, with Golden Delicious variety, the tree trunk thickness in the seventh year following planting has achieved the level of 120 mm (fourth option); growth amounted to 37 mm ($DL_{0,\ 95}$ – 7 mm). With regard to fructification of trees, it was revealed just the same disposition of options studied one by one under data featuring summarized crop (kg/tree) for the period of 1978-1988.

Data obtained in experiment no.2 of industrial research confirms the disposition of options studied one by one under data concerning the trunk thickness and summarized crop (kg/tree) recorded in experiment no.1. For example, the largest summarized crop was recorded with trees under option 4 – 138 kg/tree (MM 106) and 5 – 94 kg/tree (M-9).

CONCLUSIONS

Mulching of soil in the garden of apple-trees of Idared, Spartan and Golden Delicious varieties grafted on MM-106 and M-9 by covering polyethylene film, which is relocated periodically from one position to another, ensures maximal growth of the trunk thickness and high fructification of fruit trees. Periodic relocation around the trunk of vegetal remains used as mulching material had the same positive effect over fruit trees.

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PROGRESS OF AGRICULTURE IN NATIONAL ECONOMY

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Keywords: *economic system, structural balance, stopping the decline of agriculture, recovery, development.*

Abstract

Agriculture is a subsystem of the national economic system in which are applied the same economic laws as the system overall. Agriculture, an important branch of economic gear, condition the structural balance, dynamic, but only in a state of normality. The fundamental objective of agriculture, as an important branch of national economy under the new conditions caused by integration into European structures is to halt the decline, gradual recovery and assuring the conditions for farming recovery, in line with natural potential, economic and human available to Romania, to ensure food security and population development of export availabilities. Development opportunities must overcome the impediments of current global crisis.

INTRODUCTION

Scientific-technical progress in agriculture, led to a global virtual process of merchandising / marketing of all its natural-biological processes. Agriculture, although more conservative and rigid to new technical, has surpassed the industry in some areas.

Before 1989, the Romanian agriculture policy had common features with those of states with command economy, but with strong overtones of excessive centralization.

Prices of most agricultural products were not set by the market, they were set by the Government for the yields development of basic food products and to maintain consumer prices.

Developments in modernizing agricultural production highlights some branches in the state sector and some agricultural production cooperatives, generally supported by the state. In essence, the Romanian agriculture was not competitive, and gaps were evident from the developed countries. Structure practiced did not provide incentives for farmers. Agricultural production cooperatives were set up by measures of forced collectivization and not by their owners. Ensuring supply of inputs and marketing was directed at the central level and made by a handful of state enterprises, which had the monopoly of wholesale trade. Retail trade of small individual farmers was limited, and prices were dependent on a market determined by state administrative organisations.

Reform measures have been unbalanced by a funding system that should have led to technical and technological modernization and setting of marketing channels on a cooperative or private property system.

Agricultural reform has lingered and has evolved without a legislative basis to facilitate the formation of market structures. At the same time, it was not pursued the development of farm performance.

The land legislation has led to excessive parcelling of land. Agricultural policy mechanisms have facilitated the transformation of most of the Romanian agriculture in subsistence agriculture, and the system has not boosted funding for modernization and investment in economic organization of agricultural land.

The process of privatization and restructuring of agriculture has exercised an influence of political factors in a negative way and broke the scientific foundation of agricultural policy decision.

Romania has an area of 238 km^2 and a population of over 21 million inhabitants, and it is in size, an important new EU member state, although the level of economic and social development is a significant disparity from the old Member States. Countryside plays an important role, both by size and by features residential, economic and recreational they carry out.

Agricultural enterprises of the future must aggregate four cultural levels: global, world, national and local, to fit the logic of the market and world power.
Current rate of agricultural production in developed countries leads to an unhealthy production to the environment.
The oldest objective of a systematic policy of supporting the agricultural sector was to ensure food security for the population. This means increased production for both consumption to saturation coverage and the requirements resulting from demographic growth. [1]

MATERIAL AND METHOD

Romania has about 15 million ha of agricultural land, of which 9.3 million ha arable, 0.6 million ha plantation vineyards and orchards, over 4.8 million hectares of natural grassland, the majority of areas having high fertility.
Romania's agricultural yield results from the structure of how land is used. Depending on the quality and the location of agricultural land, various sectors of agriculture have been organized and developed. A branch of the old traditions of Romanian agriculture is the cultivation of cereals: wheat, corn, barley.
The most important process that took place after 1989 consist in dividing, reorganization and privatization of state enterprises, central planning abandoning, creating the premises for the entire farming to settle on the basis of private property. Fertilization of agricultural land is provided entirely from domestic production of fertilizers in the ten large chemical plants. Essential role in increasing agricultural production is taken by irrigation, whose network currently covers approximately 3 million hectares. Main direction of action to form a new structure keeps land privatization, which essentially determines the property and holding that lead to restructuring of production, in line with market demand.
After 1989, in Romanian agriculture, there were less impressive changes than in other branches in the structure and volume of production. But in this area have been some major changes on the organization and ownership of the occupied population and export-import relations.

Ownership and farm structure

After 1990, for example, the entire area was in collective ownership (CAP or IAS); since 1991 (under Law 18) a large number of old owners have regained ground, getting back to 9340 thousand ha of arable land, but not more than 10 hectares per family. Thus were formed 3.9 million small agricultural properties.
Law no. 169/1997 on the privatization of IAS, specifies that up to 50 hectares per family may be returned to former owners, at their request, the land associated with former IAS.
This type of reform, according to the standards of EU countries, is implemented by limiting the areas returned and by banning the sale of land (a number of years after ownership changing), and the prohibition of voting law on the formation and maintenance of very small farms.
Small properties have approx. 66.5% of the agricultural area of the country. They have no ability to make investments necessary to use the system of irrigation and soil fertilization and apply modern technologies. In this way, a part of agriculture could not increase productivity gains and exit from a state of subsistence to market relations.
Optimal type of pooling the land will be done soon, both by selling small properties, and by association. This will occur for sure because the current legislation in Romania permits it.

Structuring of the agricultural occupied population

Implementation of the Law no. 18/1991 led to the return of all former land owners or their descendants (Romanian citizens). A number of new landowners live in other cities or are involved in other activities. Usually, cut branches of industry or other domains lead to an increase of returning to agriculture and therefore the number of landowners.
Farmers have a good professional structure, 50,000 highly qualified specialists and 35.4% of the population employed in agriculture is high school graduation. Only 6.4% have no education.
Regarding the primary objective of agricultural policy was to stop the decline, the gradual recovery of agriculture and creating conditions

for recovery under natural potential, economic and human available to Romania, to ensure food safety population, the availability for economic exchanges.

Agriculture is still subject to the direct influence of climatic factors, the support for irrigation maintenance was unable to balance all these influences.

Assessing agriculture as an industry that enjoys priority in national economy by the current government program office were established provisions and actions to make a significant revival in the sector, including: quantitative and qualitative increase in crop production and animal to ensure food security for the population and creating export availabilities, accelerating land reform, completion of the privatization and concession of land assets of former IAS, and agricultural services, stimulating and supporting the establishment of true agricultural holdings performance and professional organizations, technical equipment of agriculture. By supporting farmers to purchase tractors, agricultural machinery, equipment, plants, fertilizer, petroleum, agricultural development in accordance with the rules of environmental protection, development of a competitive market, developing complex, harmonious, sustainable rural area etc..

After 1990, as the depreciation of the technical and deepening nature of subsistence agriculture to market links have not been consolidated, as was natural to happen as a result of general economic reform and structural adjustment of agriculture. Since 1997, fixed capital of Agriculture has lower growth rates and sluggish investment. In 1999, in terms of reducing fixed capital in the economy, agriculture had only 3.1% in total compared to 10.9% in 1989, and total investment was 6.7%, to 16.8% in 1989 and 17.2% in 1990. The low volume of investment in agriculture reflects the weak financial strength of farmers who produce primarily for their own, destruction of assets (irrigation systems, planting, machinery, livestock complex, etc.), and state careless in managing its property and support the process of formation of private commercial agriculture.

With the reduction in GDP per capita, share of gross value added of agriculture in total GVA has declined and since 1998 began to decline rapidly (21.2% in 1990, 18.7% in 1996, 18.4% in 1997, 15, 6% in 1998, 12.9% in 1999 and 11.4% in 2000). After 1997, agricultural resources have not ensured that a relatively constant level of production, the equipment deteriorated and were not replaced in the corresponding rate used tractors and agricultural machinery, intermediate consumption decreased continuously, and the effects of severe drought in recent years could not be annihilated in accusing destruction of irrigation systems and rehabilitation of their inability large areas affected, due to excessive divide of land and funding difficulties. About 42.5% of active population in agriculture in 2000 provide only 11.4% of GDP, while in 1989, 27.5% of farmers provide 13.7% of GDP, reflecting a reduction less than half the level of labour productivity. These figures reflect a process accentuated by the use of labour from agriculture, hidden unemployment. Relieve serious agricultural and food exports and Romania to open international markets, while increasing domestic demand of import coverage, determines annually a negative balance of agricultural trade and the loss of foreign markets. [2]

The changes that took place in Romania's agriculture in transition shows that the crucial factors of economic efficiency depend on the market.

Since agricultural organizations formed in the process of privatization and structural adjustment policies of the offer were not compatible with market requirements, did not ensure conditions for economic efficiency and welfare population. Approaching Romanian agriculture market is slow. Internal market of food products known failure sensitive and has limited foreign market. Lack of competition in rural households that produce primarily for own and developments weakened the private sector producing for the market, combined with the demolition of the food channels, leading to deepening subsistence nature of agriculture and the loss of domestic market segments. Lack of performance in Romanian food products in foreign markets led to sharp drop in exports and increase imports. In 2000, compared with 1999,

exports of agricultural products decreased by 30% and food sector's trade deficit represented 22% of the total trade deficit.
Although 2000 began to record some progress in the economy, the backwardness of agriculture is strongly felt today. Agriculture supports harder the slow process of reform and restructuring of the negative impact of upstream and downstream industries. The contribution of this industry to the overall process of economic growth is weak and uncertain from year to year depending on climatic variations. Although the first years of transition more easily borne the shock of agriculture reform, as the base material disruption of the low capitalization and increasing wastage of livelihood of most of the farms which produce for the market, but for own.

RESULTS AND DISCUSSIONS

Agriculture's progress in national economy

Importance of gross value added in agriculture in total GDP, after a strong growth (2000-2006) reached in 2006 to about 8.8%, which shows that medium-term agriculture will remain a significant branch of Romanian economy. In the long term, membership of EU farm structures will generate the relative decline of agriculture in GDP.
The importance of net investment in agriculture compared to the EU is lower than the industry contribution to GDP and there are wide variations in investment flows in the sector.
The contribution of agriculture (including hunting and fishing) in Romanian exports is very low and declining. [3]
Agriculture trade balance tends to be balanced in 2006, the balance of trade in agricultural products (livestock and animal products, plant, animal or vegetable fats and oils) was in decline, although exports had a growth trend.
Nominal producer price index (the total agricultural production) has increased disproportionately high compared to EU 25 average (in 2004, 130.8% in Romania compared to 5.3% in the EU in 2005, 115.8% in Romania compared to + 3.5% in the EU25 in 2006, 136.2% in Romania compared to EU25 average + 8.8%).
Continued decreasing number of employed persons in rural area during 2003-2006 and increasing occupied population in urban area; business and employment rates were higher in rural areas compared to urban areas; but this result should be viewed with caution, given that the methodology for the inclusion of a person among persons active in Romania differs from the EU.
In 2004, Romania had an overall yield of 36.4% of the EU25 average and only 17.2% in agriculture, given that 2004 was declared a year of record agricultural production in the period considered.
Low farmers income in the period 2004-2006 reveals that the increase in prices paid by farmers for inputs of industrial origin is top rate is increasing food prices sold, and thus deepen the phenomenon of "price scissors".

Progress and farm structure

Romanian agriculture is heterogeneous in terms of operating structures and varying levels of training in terms of production structures to meet market requirements and efficient use of natural and human resources in rural areas.
In the 2002-2005 period, the changes in operating structures materialized through an increase in 5-50 hectares size classes from 7.8% to 9.03%. In total, holdings were reduced by a total of 178,114 units, of which 4203 units with legal personality. In 2005, holding up to 2 hectares represented 66.03% of the total and held 21.30% of agricultural area used, compared to 71.34% and 26.35% in 2002. In 2005, individual holdings had an overwhelming share in the total and 65.45% in the agricultural area used, while units with legal personality had in total about 0.43% and 34.55% of utilized agricultural area. [4]
The most visible mutations occurred in the structure of individual holdings by size class due to several factors such as land regulations that have benefited especially small owners, but also owners of 5-10 hectares. Change the share holdings of class size from 50-100 ha and over 100 ha in total area and total holdings are insignificant. Average territorial size of individual holdings had suffered more relevant mutations in group 50-100 ha (a slight increase

from 65.58 meters to 66.84 meters) and especially in group over 100 hectares (an increase from 213.02 ha to 253.94 ha). Average area of individual farms increased from 1.8 hectares in 2002 to 2.22 hectares in 2005.
Although the number of individual farms is too small and average farm area is reduced all the individual sector, slight tendency to increase surface medium holdings (size classes 10-50 ha and 5-10 ha) is a positive sign.
In the following period, measures are necessary to attract small individual households in the local business circuit integration measures in the CAP, especially for traditional and organic produce, and protect the environment.
Agriculture supports all components of GDP formula uses
The contribution of agriculture to the final consumption of government and private social assistance programs we remember the food (e.g. school program "bread and milk").
Final consumption of population (households) is supported by agriculture both directly, through raw agricultural products that reach the market as well indirectly through processed related industries. In a very high share of rural population (44.5%) agriculture supports most of the self-consumption. According to the GDP calculation methodology used in household final consumption are incorporated and the value of food and non-food consumption from own resources. The Romanian economy share this type of self-consumption in total consumption of households is very high (21.8% in 2004 and 17.3% in 2005). CAP impact vision on self-consumption ratio to GDP can be expected that any reduction in self-consumption to be accompanied by an increased 'visibility in the markets of agricultural production' and hence its contribution to GDP. Differences should not be important if the assessment of self-consumption in GDP is correct. [5]
Gross capital formation: the contribution of agriculture and forestry is aimed at macroeconomic structure and tangible net investment (fixed assets). Note that the share of net investment in agriculture is lower than the industry contribution to GDP and that there are large fluctuations in investment flows in the sector. Regarding the fluctuation of stocks, the methodology of calculation of GDP includes 'stocks of harvested crop and livestock for slaughter' (I., Capanu, P. Wagner, C., Mitru 1994).
Net Exports: agriculture's contribution to Romanian exports is very low and declining (2.1% in 2003, 1.9% in 2004 and 1.86% in 2005). Statistical yearbook emphasizes imports by product type, which could be useful to achieve a balance export-import of agricultural products. It is difficult to point out imports of agriculture.

CONCLUSIONS

Agricultural production in the first decade of transition has fallen branches throughout the plant, compared to 1989, and in animal husbandry except cow's milk, are significant decreases. Overwhelming share (over 97%) of production is obtained in the private sector, its organizational structure and status of peasant subsistence agriculture on the general fund reduction of material and technical equipping of the loss of technological advance in the practice of modern management to install a steady decline in output. So far, the private sector has become the favourable training and competitive agricultural market functioning.
Enhancing measures to support the stabilization process of the private sector of agriculture, technical and technology through systematic accelerated on the achievements of scientific progress, training of farmers and practice management, in a new comprehensive development of rural economy, are essential measures agricultural policy which can ensure the formation and functioning market and progress to integrate the value of EU farm structures.
Romanian agriculture is currently characterized by a lack of industry developed producing large quantities of products sold on domestic and foreign markets.
In Romania, in the year 2007, there are a total of 3,931,350 of farms, of which 99.5% of individual farms, which operates 65.2% of utilised agricultural area (UAA), with an average size of 2.34 ha per holding. Units with legal personality is only 0.5% of total holdings,

using 34.8% of the UAA and having an average size of 275.37 ha/holding. The average size of farms in Romania is 3.57 hectares, compared with 25 hectares as much as the EU-15 or 18 hectares in EU-25.
In Romania 99.4% of farms are small holdings (less than 8 ESU), small to average holdings 0.3% (8-16 ESU), 0.2% average to large farms (16-40 ESU) and 0.1% large holdings (more than 40 ESU). [6]
With deteriorating investment climate and the low correlation between price trends and reassessment of fixed capital, the share of agriculture in total tangible economy evolved oscillating in the range 1989-2007, with general trends of decreasing from 10.9% in 1989 to 1.7% in 2007.
Lack of domestic capital or foreign, made that the investments in agriculture to be lower and lower and the process of creation and development, modernization and restructuring to occur very slowly. The contribution of agriculture to the creation of GDP, varied from a maximum of 21.0% in 1993 to a minimum of 5.7% in 2007 compared with the share of agricultural investment in total investment in Romania, which ranged from 11.7% in 2002 and 3.4% in 2007, we can say that financial resources allocated to agriculture was modest enough to reflect the needs of farms and agricultural marginalization in the economic development, low income levels of farmers and lack of stimuli from the market.
With intermediate inputs per ha for only 585 euro, Romania is outpaced by all old EU countries, as well as new, except Latvia, Lithuania and Estonia. Intermediate consumption per hectare are higher than in Romania by 12.7 times in the Netherlands, 6.0 times in Belgium, 4.2 times in Denmark, by 3.0 times in Germany, and the average EU-15 allocated for intermediate consumption 2.3 times more than Romania.
Gross value added per ha is significantly higher in the old EU countries than in Romania (10.1 times in the Netherlands, 4.3 times in Italy, 4.1 times in Belgium, 3.5 times in Greece 2.3 times in France). Large gaps between Romania and EU countries on average yield and gross value added are based mainly intermediate consumption much higher in these countries. The statement remains valid if we compared the new Member States, Romania was exceeded by almost all countries of the EU gross value added indicator to meters, excluding the Baltic countries.

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QUALITATIVE PECULIARITIES OF THE FLAVOURED WINES AND OF THE VERMOUTH TYPE WINES, OBTAINED FROM THE WHITE FETEASCA VARIETY

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Key words : *White Feteasca, hidroalcoholic macerates from plants, nutraceutical potential, quality parameters*

Abstract

In order to establish the dynamics of the physico-chemical parameters of flavoured wines and vermouth type wines, obtained by the addition of hidroalcoholic macerates from plants to the White Feteasca wine variety, we analyzed certain physical and chemical characteristics (D^{20}_{20}, Alcool %, Total Dry Extract mg/l, Free Sugar g/l, Unreducing Extract g /l, Total Acidity g/L $C_4H_6O_6$, Free SO_2 mg/l Total SO_2 mg/l) for 9 samples. Compared with the main wine parameters, the determined parameters had the following evolution: Alcoholic Strength, Free Sugar and Density increased significantly in vermouth type wines, Total Acidity decreased slightly in flavoured wines and more in vermouth type wines, Total Dry Extract increased very significantly in vermouth type wines, Unreducing Extract decreased significantly in vermouth type wines, the amount of Free SO_2 was higher in flavoured wines, and Total SO_2 had lower values, both for flavoured wines and vermouth type wines. Plant macerates added to the wine varieties, influence most of the physical-chemical parameters.

INTRODUCTION

Modern research of producers of flavoured wines and vermouth type wines are directed towards recipes of macerates obtained from plants which are rich in active principles and can be added to the wines from different varieties **[5].** Flavouring substances from the hidroalcoholic extracts obtained from macerates give specific prevailing flavours to the basic wines, and most of the physical and chemical quality parameters have different values towards the initial wine [1].
This work intends to highlight comparatively the changes of the physical and chemical quality parameters of White Feteasca wine variety, resulted from the preparation of flavoured wine, processed only with hidroalcoholic extracts, and the quality parameters of vermouth, processed with hidroalcoholic extracts and other ingredients **[2, 3].**

We mention that the wine used as raw material has been obtained at SC OSTROV SA, from Ostrov Wine Center. Currently there are few studies on the white flavoured wines and on vermouth produced in our country and even less studies on superior white wine from the Ostrov Vineyard **[4].**
The originality of this work consists in addressing of a theme which is related to drinks with nutraceutic potential, particularly important both for oenological industry, and for maintaining the consumers' health, which is a basic directive of the current European food policies.

MATERIAL AND METHOD

We determined the physical and chemical parameters of the following samples: one sample of wine from the variety White Feteasca, the 2007 harvest, called basic wine, 4 samples of flavoured wines (samples 1, 2, 3

and 4), obtained by the addition of hidroalcoholic extract (filtered macerate from plants) to the basic wine and to 4 samples of vermouth type wines (samples 5, 6, 7 and 8), obtained by the addition of hidroalcoholic extract and ingredients (sugar, citric acid, alcohol) to the basic wine. In order to prepare the hidroalcoholic macerate from plants we used two recipes of herbal mixtures: Recipe I (16 plants: anise, cumin, thyme, yarrow, coriander, clove, fennel, hyssop, briar, marjoram, peppermint, chamomile, nutmeg, southernwood, balm mint, elder) and recipe II (anise, briar, nutmeg, orange peel, lemon peel). The macerates from plants have been prepared in ethylic alcohol 45% (recipes IA and IIA) and 60% vol. (recipes IB and IIB), in ratio 1:10 **[2]**. Hidroalcoholic extracts have been added to the White Feteasca wine also in ratio 1:10.

We determined the following quality parameters: d^{20} (picnometric method STAS 6182/8-71), Alcool Content, % vol. (picnometric method, STAS 6182/6-70), Total Dry Extract mg/l (densimetric method STAS 6182/9-80), Free Sugar g/l (iodometric method STAS 6182/18-81), Unreducing Extract g/l, Total Acidity g/l, $C_4H_6O_6$ (titrimetric method STAS 6182/1-79), Free SO_2 mg/l, Total SO_2, mg/l **[6].**

RESULTS AND DISCUSSIONS

The results of the physical and chemical determinations of White Feteasca basic wine, as well as the results for the samples of flavoured wine and vermouth, are highlighted in Table 1.

In table 1 we can see that the addition of the hidroalcoholic plant extracts and the addition of the ingredients necessary to obtain the vermouth type wines led to quite significant changes of some physical and chemical parameters, compared with the reference values of the basic wine.

The **Density** of all the flavoured wines has been a little lower compared with the White Feteasca wine variety which has been selected for processing, due to the addition of alcohol. All vermouth samples had a higher density, compared with the original wine, due to sugar and citric acid addition.

Table 1. The quality parameters of White Feteasca wine, flavoured wines and vermouth

Sample number	Sample type	Physical and chemical analysis							
		d_{20}^{20}	Alcohol (vol %)	Total dry extract (g/l)	Free Sugar (g/l)	Un-reducing extract (g/l)	Total Acidity (g/l $C_4H_6O_6$)	Free SO_2 (mg/l)	Total SO_2 (mg/l)
Basic wine									
-	White Feteasca	0.9924	12.2	22.2	2.2	20.0	5.33	38	142
Flavoured wines									
1.	White Feteasca + Recipe I A (45 % alc)	0.9909	13.5	21.9	1.9	20	5.26	32	105
2.	White Feteasca + Recipe I B (60 % alc)	0.9899	14.4	21.9	1.9	20	5.38	30	105
3.	White Feteasca + Recipe II A (45 % alc)	0.9909	13.9	23.2	1.9	21.3	5.18	30	105
4.	White Feteasca + Recipe II B (60 % alc)	0.9899	14.4	21.9	1.9	20	5.10	30	105
Vermouth type wines									
5.	White Feteasca + Recipe I A (45 % alc) + ingredients	1.0429	17	167.4	150	17.4	4.75	27	77
6.	White Feteasca + Recipe I B (60 % alc) + ingredients	1.0414	17	165.9	150	15.9	4.75	27	75
7.	White Feteasca + Recip II A (45 % alc) + ingredients	1.0414	17	165.9	150	15.9	4.68	27	75
8.	White Feteasca + Recipe II B (60 % alc) + ingredients	1.0416	17	165.4	150	15.4	4.83	25	77

The **Total dry extract** decreased in flavoured wines for all recipes, but increased very significantly in vermouth, comparatively with the basic wine from the White Feteasca variety. The Alcoholic Strength, Free Sugar and Total Acidity are responsible for the wine quality, largely causing its taste. Free Sugar also influences the Total dry extract. Wine flavouring and its transformation into vermouth also changes the mentioned parameters.

Figure 1 shows the dynamics of the Alcoholic Strength for White Feteasca basic wine, flavoured wine and vermouth, for different recipes.

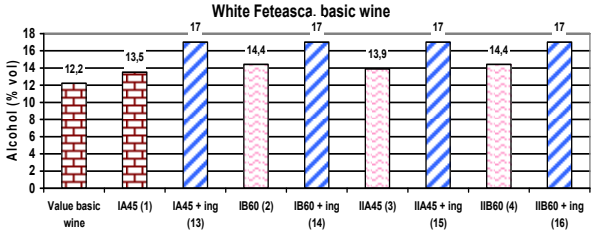

Figure 1. Alcoholic Strength of the basic wine, of theflavoured wines and of vermouth type wines

The addition of plant hidroalcoholic extracts accordingly increased the Alcoholic Strength of the flavoured wines, with a rate which is dependent on their concentration. The addition of ingredients, including ethylic alcohol, resulted in significant increase in Alcoholic Strength of vermouth type wines. Thus, the Alcoholic Strength increased compared to the basic wine in this order: the flavoured wines having recipes IA, IIA with 45% alcohol, followed by flavoured wines with recipes IB, IIB 60% alcohol, followed by vermouth type wines, which finally had 17% alcohol, according to STAS.

In figure 2 we can see the evolution of the parameter Free Sugar in beverages with nutraceutic potential, prepared from White Feteasca wine variety and using different recipes.

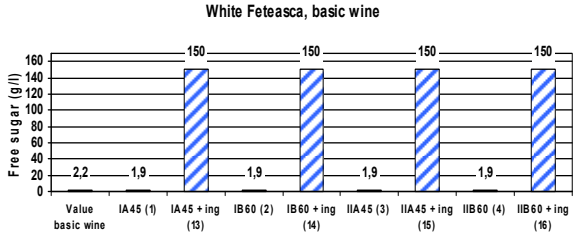

Figure 2. Free Sugar of the basic wine, of the flavoured wines and of vermouth type wines

Free Sugar in flavoured wines had a smaller value than the value of the Free Sugar in the basic wine (1,9 g/l towards 2,2 g/l). The very significant increase of the value of this parameter in vermouth type wines has been achieved by adding ingredients specific to the recipes which contain sugar, which is correcting the taste of these drinks.

The taste and flavour are also mainly due to Total Acidity, ranging for the beverages prepared from the White Feteasca variety, as seen in figure 3.

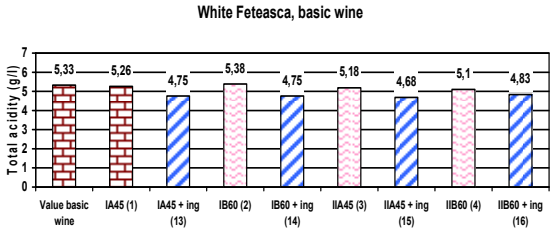

Figure 3. Total Acidity of the basic wine, of the flavoured wines and of vermouth type wines

The **Total Acidity** of the flavoured wines slightly decreased, compared to the value of the basic wine. Decreasing of acidity has been more pronounced in vermouth type wines; they have a more pronounced sweetish taste, less bitter and less sour compared with the taste of the flavoured wines.

The **Unreducing Extract** parameter decreased in all types of beverages with nutraceutic potential, in relation to the value of this parameter in the basic wine. Decreasing of Unreducing Extract has been less pronounced in the case of flavoured wines and more pronounced for vermouth.

The amount of **Free SO_2** was higher in the basic wine, slightly decreasing in flavoured wines and decreasing more in vermouth type wines.

The parameter **Total SO_2** presented significantly lower values both for flavoured wines and for vermouth type wines, compared with the basic wine.

CONCLUSIONS

1. Density of flavoured wines was lower, and density of vermouth was higher, compared with the value of this parameter in the basic wine;

2. Total Dry Extract increased very significantly in vermouth, compared with the basic wine;

3. Alcoholic Strength increased slightly in flavoured wines and significantly, about 5%, in vermouth type wines;

4. Free Sugar increased very significantly in vermouth, compared with the basic wine, due to the added sugar in the recipe;

5. Total Acidity has been comparable for the basic wine and the flavoured wines, but decreased by almost 1% in vermouth;

6. Unreducing Extract decreased to 4.6 % in vermouth type wines, compared with the basic wine;

7. Free SO_2 and **Total SO_2** presented diminished values in drinks with nutraceutic potential; decreases are significant, especially in vermouth type wines.

In conclusion, flavoured wines and vermouth type wines have qualitative features which are

in correlation with the wine of origin. The hidroalcoholic extracts which are added to the basic wine decisively changed certain physical and chemical parameters, giving the nutraceutic potential to the wines.

ACKNOWLEDGEMENTS

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NOTE ON THE STRATEGY OF ROMANIAN AGRICULTURE AND RURAL SUSTAINABLE DEVELOPMENT (SARD)

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Key words : *sustainable farm modernisation, rural development, cultural heritage, biodiversity and agrobiodiversity*

Abstract

The old rural civilization, which have assured the long and miraculous surviving of the Romanian people is at the critical moment of its breaking up. Production and rural living standard have become uncompetitive items , traditions and customs are abandoned and people is running to cities. Rural development is economically unefficient, a non lasting etnico-socially problem. Under the pressure of this situation but also due to the international and European concerns (UN 1972, FAO-SARD, UE), Romanian scientists and authorities are more and more focused on sustainable agricultural and rural development(NSSDt 2013/2020-2030, NPRSD 2007-2013). This study points out the necessity to pass from a finding status to a strategic action and noticig the complexity of problems, anailye just some aspects of The SARD and RDP implication for Romania of (1)farm modernisation as an economic and strategic imperative, and mention some aspects of (2) sustainable rural development including. the local and national cultural heritage, and (3) biodiversity and agrobiodiversity conservation.

„Agriculture " (and rural life)" is a strategic resources, and the maintenance of national security includes maintaining the long-term sustainability of agriculture".
S.Baie, R. Healty (1980)

INTRODUCTION

The „enigma and the historical miracle" who is the apparition and the persistence of Romanian people (Ferdinand Lot 1932, G.I.Bratianu 1988), seems to be connected, as some ethnographers suppose, with the rural, especially pastoral life. The former Latin-speaking inhabitants of the former East Roman empire rescued in the VII-th century from the newcomers immigrants and from the new Byzantine power retiring in marginal lands, especially in mountains, in a modest rural, pastoral-agricultural life. This life, a real national heritage, saved their ethnic survival until the penetration of the new West-European contemporaneous civilisation paradigm (Chirot 2004), which helped the formation of the Romanian state, but imposed a radical change, sometimes mislead, the agro-rural socio-economical life, and we are still leaving in the era of social changes.

In a search for a fairly social and competitive change, and under the pressure of some economical and political difficult situations, in the XIX-th and XX-th century in Romania there were 5 agricultural reforms of a great attention to the science (Gusti 1923). The 1950 a forcefully, "terroristic cooperativisation", with a justification as policy of production modernisation competitive to CAP of EU, produced a crossroad moment for the rural life.

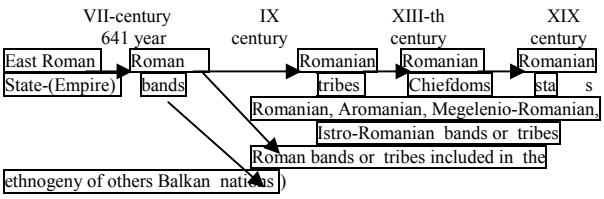

Fig.1. Apparition and persistency of Romanian people, their society's evolution connected with old, low intensity farming and pastoral rural life (Draganescu, C, 2007). Most of theirs native sheep breeds started their formation during the Roman Empire and evolved during the bands, tribes and possible chiefdoms societies.

In 1990 by ethic-policy reasons, it was a return to economically uncompetitive subsistence agriculture. The Garoflid's 1925 idea after the 1918 agricultural reform that:

"The merge of smalls farms and the free economies policy are the most important objective conditions without which it is not possible any culture improvement, and the state intervention is necessary" was forgotten, even Sisesti (1931) has warned again that " association " is the only solution for agricultural progress. Now, when agriculture and rural life is passing through a more difficult position… "*Tradition, customs, aspirations, who conseved the ethnic cohesion of old vilages, are abandoned. Villages tend to become slums, outskirts (Stahl) and people is running to cities"*.It is signalised a danger of Mankind Predicament (1972-the Report of Club of Rome, UNCED 1992). **All that and the necessity to increase the food production and to preserve natural resources impose now a world and national programme and strategy for a sustainable agriculture and rural development (FAO-SARD; EU and Romania** The Rural Development Programe 2007-2013-RDP**).** The EU self-sufficient in basic agricultural products is vital, not only for its citizens' wellbeing , but also for the political independence of its Member States. **A colaps in a country could affect many others country, and the Europe, the origin of the present civilization, could lose his position.**

We note that, according to FAO, a**griculture and rural development is considered sustainable when they are (1) ecologically sound, (2) economically viable, (3) socially just, (4) culturally appropriate, (5)humane and (6) based on a holistic scientific approach. The concept must be considered not as final objective but a development direction.** SARD must be a guardian of the environment and of Romania's rural heritage .**For us , the question is: Is the Romanian agriculture and rural life sustainable, competitive in the EU and world context? The scientists' duty is to answer to these questions and to give solutions.**

At the national level SARD was perhaps from a long time in the state authority's vision, but practically not solved, as economic, social-behavioural, educational value thus, as a strategic problem. The SARD and RDP implication for Romania are very large. We note between them:

1. Farm modernisation as an economic and strategic imperative *1. Ecosystemic restriction - 2. Farm size, 3. Farmers qualification, 4. Development of agricultural complementary or alternative rural servicies ("The agriculture solution lies forth of agriculture" - Klatzmann); 5. Vertical integration as an imperative of agricultural modernization; 5. Territorial systematization and arable area preservation. 6. Efficiency of research institutions.* 7.

2. Sustainable rural development (*the Romanian rural community evolution and typology, village teritorrial sistematization, education, promotion of rural positive traditions, national and local heritage models, folklore, restrains in rural architecture, natural heritage* - biodiversity and agrobiodiversity**.**

From all this problems we will insist now, for extend reasons, just upon some aspects of farm size and rural, and of rural development.

REASONS FOR A CORRECT SARD POLICY

A correct, scientific SARD policy is now an imperative need, for 4 main reasons.

1. Agriculture is a problem of **food security, strategy, (a potential "food weapon" -***S.Batie 1980***),** as well as of **economic resources.** It is the essential part of the **rural life.**

2. Poverty, hungry and inequality are world and national **sources of social and political instability of uncohensiveness of social structure**. That determined the ONU to act for the development of agricultural production establishing the FAO organisation (1948), and SARD of FAO-(1998). We note that the **objectives** of the EC CAP (art. 33 of the EC treaty, ex-art. 39) are: higher agricultural productivity; guarantee of a fair standard of living to farmers; market stabilization; supply security and reasonable prices for consumers.

3. The city super development is economically and ecologically unsustainable. Even ecologically, the rural life is more suitable to man, it is a dangerous exodus of rural inhabitants to towns, produced by poverty and unemployment. It is noted that

the number of farmers in Europe is already so low , so that a further decrease would be catastrophic for cultivations, rural areas, landscapes and even for the European traditions which farmers preserve.

4.A correct SARD policy must be adapted to the agro-ecosystems of each country. **In Romania**, there are 22 ecological area (Vădineanu (1992) or 23 agro ecosystems-(Teaci 1978., 2000). However these agro-ecosistems are grouped by the EU legislation into 2 categories: (a) **Favoured agricultural area-FA** (climate, possibility of mechanical works, soil a.s.o.) **(b) Less favoured agriculture area-LFA** (EC 1257/1999)

The NPRD 2007-2013 recommend some important key actions for SARD (axis 1, on improving the competitiveness of the agricultural and forestry sector). Perhaps more attention must be paid to the International Federation of Agricultural Producers (IFAP) organization (Romania is not a member, but Moldavia is), and to the IFAP Committee on Agricultural Cooperatives.

2.FARMING MODERNISATION

According to a the Farm Structure Survey in 2007 , about 2/3 , meaning 64 % from the 866,700 Romanian farms over 1,3 ha use to produce most for their own consumption; just 35% farms are producing for direct sale. Thus , these farms assure food for about 10 millions people. If all 866, 000 farms will produce for sale, using all agricultural land, the food could be enough for 30 millions people. The present production systems are extensive systems of low inputs. By the application of modern production systems , food production could increase by 30 %, assuring food for other 20 million people. At the moment, we consider that according to our SARD policy , we must "**chose either to fail or succeed** " because the present situation „is like time bombs with fuses of less than 50 years", as Jared Diamond (1999, 2006) stated. Just in 2008 , the Law 204 has protected the localization of surviving intensive farms. Many great agricultural scientists (Bold, Teaci, Otiman, Tofan, Hera, Stanciu et all) pay a special attention to SARD on the occasion of all scientific workshops and a department of USAMV is devoted to this problem. We will refer just to some aspects related to the sustainable agricultural modernisation in Romania, considering the agricultural scientific visions. .

2.1. FARMING TYPE. In Romania, the climate, the high proportion of mountain to plains, and the socio-economic-historical conditions have been favourable during the centuries to the development of low-intensive farming, named since 1990 years High Nature Value farming (HNVF), because it protects agrobiodiversity and wild biodiversity. . This agricultural systems, also named cultural landscapes (CL), found in the less favoured agricultural areas (LFA (art. 18 19, 20 of the EC 1257/1999)), sustain in the same time agriculture production and nature conservation. Farm animals and cultivated plants are associated in the some ecosystems with the wildlife plant and animals.

However such HVN farming do not maintain now a social efficient balance between needed for food production, environment and biodiversity conservation. **For solving such a multiple and contradictory demand, Romania will be obliged, as a vision for 21st century, not forgiving the warning of Meadows Report, to follow a three-track strategy on the agricultural production systems (Draganescu 1992..2003):**

1. **Vitalization** ***in plain area****, in FA***,** the development of **sustainable intensive commercial farms** with innovation and high productivity of medium and high-payoff input;

2. **Revitalization**, ***in mountain and marginal area (LFA),*** the conservation and sustainable development of **low intensive farmland**, especially **the pastoral systems**;

3. Development **especially *in marginal area*** *(LFA),* of **organic**, and **niche products** small size commercial farming systems, maintain on short and medium term the **part-time, subsistence production systems and even small "hobby"(100-500 mp) periurban of urban inhabitance**.

Future policies will need to divide financial support structure towards all three directions.

2.2. Sustainable Intensive Farming in Favoured agricultural area. Sustainable intensive farming, named also integrated

farming, entail using inputs in a rational way, taking advantage of all available knowledge and technique in order to achieve an optimal yield from the agro-zootechnic and economic points of view. It is based in particular on the following techniques and principles: a better use of natural resources, of improved plants and farm animals, recycling of organic matter, optimum organization of crop rotation, and farm animals management and nutrition, use of pesticides based on a warning or indicator system and not in a systematic way, use of biological pest control whenever possible.

According to Ruttan (1980), there are 6 "models" of agricultural production systems (Draganescu 1998): **(a) The frontier** model=expansion of cultivated or grazed area**);(b) The conservation model=**old rotational system, inspiration to organic farming; **(c) The urban-industrial impact model=**effect of urban vicinity; **(d)The diffusion model**=transferring the better husbandry practice; **(e) The High-Payoff Input Model**=high input, higher output; (f) An **Induced Innovation Model**=including biological technology. The most efficient has been considered his last model, but he supposes , like his predecessor , 3 conditions: **(a) the capacity of public and private-sector research institutions to produce new technical knowledge; (b) the capacity of industrial sector to develop, produce, and market new technological inputs and (c) the capacity of farmers to acquire new knowledge and use new impute effectively. We added (1967, 1992, 1998) the vertical integration of this 3 factors plus aval of farms the wholesale trading.**

From these scientific opinions we may conclude that the secrets of farming modernization in Romania depends on : 1.**Ecosystemic restriction-** 2. **Farm size, 3. Farmer's qualification, 4. Development of agricultural complementary or alternative rural services ("The agriculture solution lies forth of agriculture" - Klatzmann) ; 5. Vertical integration as an imperative of agricultural modernization; 5. Territorial systematization and arable area conservation, 6. Efficiency of research institutions.** Due to the lack of space and because we have already analysed , we will try to analyze just the first 2 problems.

2.2.1. Farmer qualification. For a modern farm or farm enterprise, it is needed that the farmer or enterprise leader to graduate an agricultural professional school or a high school. This is possible only if (1) the farm efficiency assures to him an income comparable to his qualification, at least at the level of average country income; this is possible just in a reasonable large farm. For example we calculate that under the situation of the year 1994 , the minimum cattle size farm must be 12 cows. (2) Farm ownership must be attributed just to an agriculturalist educated person . This could be a problem of country agricultural policy. In Germany , none could manage or inherit a farm , if he or she did not graduate an agricultural school. In Denmark , compulsory courses have been organized especially for farmers even from the beginning of the XX-th century .

In Romania the Low no/166/10.04.2003 , art .4 provides that commercial agricultural holdings must by managed by qualified agriculturalists, and the family farm should be managed by their owners accepted as qualified agriculturalists. It is not clear how this stipulation is applied.

2.2.2. Farm size. There is a minimal, optimal or maximal economic size for different agricultural production (cereal, cattle etc) and for different farm types (full=time, part-time etc) and ecosystems (agriculture, pastoral). Farm size must be scientifically calculated and stimulated by the state agricultural policy.

When the EU started the modernisation of its farms (1956..1958 W) , one of the first problem considered was farm size. The EU Mansholt Plan (1962) preconceived a dramatic increase of farms size, not accepted by farmers, even it was a strong propaganda for that. Klatzman (1978) analysed the evolution of farm size in France (table 1). A French scientific paper ("A France without peasants" 1965) preconceived 3 types of agricultural exploitations: modernized (large, with a technical educated farmers), modernisable (possible to be modernised by state help), and unmodernisable. Some results

are presented in Table 1, comparable with the situation in USA.

Sykes 1963, quoted by Draganescu (1967, 1992,1995), estimated that the normal size of a small family farm must be of **100 milkers, or 20 000 layers, 40 000 broilers, 800 fattening steers, 400 ha cereals. The Commun Agricultural Policy of the EU vizualized in 1960's such a farm size.** He estimated that most farmers must be integrated in co-operatives, contract farming and the farmers can be just part time workers, they having their basic working place in other fields. We note that **in Norway all milk is produced and marketed by farmers' cooperatives,** and that all over the world poultry companies having **million hens or broilers or hundred thousand pigs.**

Table 1 Estimated evolution of French farm size (Andre Neveau 1993, Draganescu 2000)

Farm Type	Average. Size ha		% from country agricultural territorry		No.of farms	
	1988	2000	1988	2000	1988	2000
Enterprise	100 *	120 *	35.1	52.6	100	120
Family farms	27	45	51.6	32.9	540	200
-Special**	10	10	2,8	3,6	80	100
Supliment***	10	10,5	15	10,9	300	200

*(viticole, armagniac, fat liver etc *equivalent to over 40 daiy cows or 80 sows *** supliment salary(part-time) or before retirement'

We note than in the USA , a land owner was considered farmer just if he sell out products more than $ 4,883 (1978). (If we apply such a principle, how many farmers have we in Romania?).In 1991 156, Poultry Companies, each having over 250,000 layers (22 over 1 million) produced 67% of eggs in the USA (Draganescu 1992). Between 1989 and 2006, the number of companies supplying Poultry genetics at a global scale was reduced from 10 to 2 in layers and from 11 to 4 in broilers. In turkey breeding, only three companies supply the world market. The US food giant Smithfield produced 25% of US the pork products well as pigs (Gura 2007).

Table 2. Evolution of average farm size and workers productivity in the USA (Otto C 1980, Draganesacu 2005)

Year	Farm size Ha	Workers on the farms	$ production per woker
1940	70	1.8	3,300
1950	87.4	184	9,400
1960	120	178	21,100
1970	153.7	153	96,562
1979	183	1.69	172,637

In 1976 , 17% of farms produced 90% of agricultural production value.

Romania , which is placed among the first 10 world countries in bee, poultry and pig production, "restructured" its agriculture and now, with most "small farms" of subsistence or small commercial type, passed from a net exporter to a net importer of products. The question for scientists and managers is : Could it survive in the present and future economic world without considering this situations?

The problem of Romanian farm size and type was analysed by many prestigious scientists (Otiman 1994-2010, Teaci 2000, Tofan 2005, Bold, Buciuman, Draghici 2003, Alecu et al) with some prudence in their conclusions, paying more attention to the economic than to the physical farm size, and generally with a support for family farms.

In 1992, 1995 we pleaded without success for the conservation and development as **sustainable, private enterprises** of former state large, intensive companies, at least in animal production, and suggested some strategic measures for assure the development.

The Law no.166/10.04.2003, art 5 establishing **the minimal farm size in Romania,** seems to do it just for commercial farms . Some of these sizes are: **cereals, technical culture 110 ha (plain)-50 ha (hills); orchard, vineyard, vegetable 5-05 ha, 15 milking cows, sheep 300, pigs 100, hens 2000, broilers 5000 etc.** We note that most of "farms" are family, subsistence or "small commercial "(under 50% of production sold) and the low do not touch them; it is not clear how much the low affected the size of commercial farms.

We note that in 1995, **Heinz Muth,** a graduate of Timisoara Faculty of Animal Production, having a consulting agricultural firm in

Germany, sugested the following evolution (1995 –2005) of farm size in Romania. Sure, the Romanian administration and even mass-media **didn't pay attention to him**, and we are importing now meat, milk, vegetable products, sending our „farmers" to work in Spain to have money for food imports.

We note that one of the most difficult problems of farm size in Romania has been **the division of farms by inheritance**. In 1864 , the agricultural reform established 5 ha as an economic farm size for that time (in 1921 , the estimated optimal size, by Garoflid was 20 ha), but after other 2-3 generations , he became by division between children's of some 1 ha, uneconomical and no sustainable for the owner. This is the reason for which in Germany **just the old son can inherit the farm, if he have an agricultural qualification (if not, the farm must be sold to a qualified man).**

Table 3.The recommended evolution of farm type and size in Romania from 1995 to 2005(Heintz Muth,1995)

Farm type	1995				2005			
	No (Thousands)	Average Size (ha)	All Surface (Thousand ha)	%	% No	Aver Size (ha)	All Surface (Thousand ha)	%
Familys farms	3,600	**2**	7,540	51	64	**40**	2,570	17
Families fellowships	14	**100**	1,530	10	18	**300**	5,400	37
Juridical society	4	**450**	1,770	12	7	**600**	4,200	28
State farms	0.6	**2,000**	1,330	9	-	-	-	-
Public Sector	-	-	2,620	18	-	-	2,620	18
Total	3,619	**3.4**	14,790	100	89	**137**	14,790	100

2.2.3. Vertical integration-an imperative of agricultural modernization. Much of food cost to consumer includes costs of processing, transportation, marketing, and preparation of restaurant meals plus the benefit for each chain. As an example from 18% of total expenditure for food actually paid in the USA, to the farm sector is only about 6 %. For this reason , the integration of all food production chain is now an economical imperative.

2.2.4 Arable area conservation, Territorial systematization, Environment change

The First Raport of Rome Club paid attention to the fact that one of dangers for food insufficiency in the 21 Century can be the decreasing size of arable area, inclusive by change of its utilisation. In 2003, the FAO estimated that an additional 120 million ha – an area twice higher than France or one-third of India surface – will be needed to support the traditional growth in food production by 2030. It seems that in Romania the problem is not in the attention, as well as territorial systematization, identification of FA and LFA for different utilizations. A complicate problem can be that foreign investors and governments have shown in a last time a growing interest in the acquisition or long-term lease of large portions of arable land in others countries.

The agricultural production is affected on medium and long term by market demand, environment variation and evolution. As a result of continuous demographic explosion and increase of animal food consumption, the demand for food production will increase in this century, but the environment, especially climate, variation and evolution rise complicated problems. We note the opinion of Shaw (1980) who argued that (1) " the climate of the future cannot be predicted", and (2)" for the present, we must be more concerned about year-to-year variation than about long/term trends". We note however that using relatively conservative estimates (assuming a 4.4°C increase in temperature and a 2.9% increase in rainfalls), Cline concluded that by 2080, global agricultural output potential is likely to decrease by about 6% (or 16% without carbon fertilization, the impacts of which are disputed). The decline will vary between 10 and 25% across regions, but it is projected that by 2080, agricultural output potential may be reduced by up to 60% for several African countries, on average 16–27%, dependent upon the effect of carbon fertilization.

2.3. Sustainable Traditional Farming in Less Favored agricultural area

One third of Romania is represented by mountain and parts of foothills regions, areas where, because of natural handicaps, there was not possible to organize cooperative farms in years 1950-1989. It represents a **cultural landscape, a High Nature Value farming.** There they have developed over many centuries, specific ecosystems in which farm animals and cultivated plants, are associated with the wildlife plant and animals. These landscapes must be regarded as having major

importance, a balanced relationship among environmental, social, and economic goals, in landscape and biodiversity preservation. It received an international attention (Carpathian Convention 2001, Science for the Carpathians-MRI etc), even it seem that Romanian agricultural scientist are not present in this actions. The conservation and development of sustainable traditional farming suppose: (a) a correct identification of less favoured agricultural area, and (b) type of farming recommendable in different type of area. The problem is the object of a special study (Draganescu 2010).

(a). Identification of less favoured agricultural area. In Romania it is not a clear scientifically delimitation of LFA, of noncooperativised area of years 1960-1990. In EU the identification of LFA is in place since 1975, for special aid to farmers., Under the Articles of Council Regulation (EC) 1257/1999 still in force, an area may be classified as less favoured according to one of three categories. (part of **Axis 2 (Sustainable Land Management)** of the Rural Development Policy for 2007-2013): 1. **Mountain Areas (**Art 19); 2., **'Intermediate' Less Favoured Areas (**Art. 19), land of poor productivity; with a low or dwindling population predominantly dependent on agricultural activity; 3. **Areas Affected by Specific Handicaps (**Art. 20): conserve or improve the environment; maintain the countryside; preserve the tourist potential of the areas; protect the coastline.

(b). Type of farming recommended in different types of areas. For this moment we add to our previous recommendation, one more:

- Revitalization, *in mountain and marginal area (LFA),* the conservation and sustainable development of low intensive farmland, especially the pastoral systems;
- Development especially *in marginal area (LFA),* of organic farming (based on the choice rejecting the use of chemical fertilizers, pesticides et all), and niche products small size commercial farming systems, maintain on short and medium term the part-time, subsistence production systems and even small "hobby" crafting (100-500 mp) of urban inhabitance.
- IUCN protected area *including some agrobiodiversity conservation.*

1. SUSTAINABLE RURAL DEVELOPMENT

The rural life, a real national heritage of Romanians, saved the ethnic survival in this part of Europe. It was and it is in the attention of philosophers (Blaga), ethnographs (Densusanu, Benea), sociologists (Gusti, Herseni, Stahl, Golopentia et al), writers (Cosbuc, Rebreanu et al). *The preffered place of villages-the typical elementary social unity- was the marginal areas, near the forests. After the 1864, the villages moved toa better place, but not always looking for economical and ecological better conditions, having the tendency to occupy very good arable are. Bernea (2006) noticed that from this time started a rapid change of village civilization to a crisis of it.* Gusti (1936) and his sociological school introduced a scientific approach of village study (sociological monographyc method, 60 village studied, village museums) and an atempted to manage the vilage evolution in a correct direction, with the help of vilages intelectuality and students crews, but his work was not continued.

Bold (1969, 2003) made a comprehensive study on the Romanian rural agricultural evolution and the The Rural Development Program 2007-2013 established the most important technical objectives for rural development. The focus of life quality (Axis 1,2,3) of techno-sociological development, and it seems that some cultural heritage problems, specified to the old national village deserve some more attention. We note some essential aspects of economical development and cultural heritage, under his three aspects: cultural physical, natural, "intangible".

4.1. Development of agricultural complementary or alternative rural services. Farm modernisation means the increase the mechanical and biological productivity, that is to reduce the numbers of agricultural workers. As agricultural production is just a component of rural life, a dificult sociological problem is the development services for former agriculturalist. Klatzman (1976) was right to say that „The agriculture solution lies forth of agriculture". It is the difficult problem to

exploit the endogenous potential of these areas in order to create new jobs or develop new extra income sources in order to contribute to the stabilization of population. Just services and rural turism are not a solution. Must be developed an agricultural complementary or alternative industry and that deserves more attention. In 1936 , it was an essay on the „ An industrialisation outset of an Romanian villages" Vladescu-Racoasa.

4.2. Village territorial systematization, perservation and improvement the landscape's natural beauty, the local architecture, harmonisation of new buildings with the traditional environment. The highly chaotic and decentralized rural development must be stopped by law. Each village must have territorial systematization, keep the essential of green village tradition with needed institutions, small individual crafts adapted to the modern road type, canalisation, avoiding the dissipation of arable land, restoration and new functionality for building or public space must both reveal their economic and social value as well as their cultural heritage value and aesthetic control, have a local architecture value. (there is an European legislation for that).

4.3. Cultural and natural heritage management, protection, restoration, conservation

The role of cultural heritage protection and restoration in the contemporarily world is of utter importance, to a large extent comparable with that of environment protection Cultural heritage is widely recognised as a vehicle of cultural identity. Preserving and enhancing cultural heritage is one of the key objectives of the rural development; it have a considerable contribution towards the quality of life in rural areas. We can distinguee 3 type of cultural heritage.

(a) **Physical or "tangible" cultural** heritage, the **entire man-made environment** (architecture, archaeology, monuments, agricultural science artefact, **and movable** cultural property) connected with the national and local history. The European Agricultural Guidance and Guarantee Fund (ERDF) provide financial assistance for the renovation of buildings, cultural sites, movable property and objects support.

(b) **Natural heritage** encompassing the countryside and natural environment, the agro-biodiversity (breeds, plants), floristic and fauna biodiversity, the IUCN protected area (biosphere reservation, national parks, scientific reservation) where, with regret are not conserved farm animals and plants and there is not a cooperation with the agro-biodiversity preservation.

(c) **Intangible heritage, aspects of local culture , which include social value, means of behaviour in society, customs and practices, ethic, aesthetic and spiritual beliefs, artistic expression, folklore tradition specific for the country, area, locality. We note that intangible cultural heritage is** essential **for rural life and is more difficult to preserve than physical object. School and Church can and must interfere in conservation of intangible cultural heritage, in ethical rural life; local mangers must be an example in that.**

The **long term conservation of national traditions** is the result of all this type of **cultural heritage influence, as well the development of tourism to non traditional tourist destination.** Romania can be a tourism destination due to its varied cultural heritage

Each village must establish an ideal rural social concept, a model for the present social reality, and a program, a strategy to achieve this ideal, this livelihood, this local social culture envisaged.

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NEW STATISTICAL ALGORITHMS FOR DATA ANALYSIS

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Key words : *milk production, evolution, NW Region,Romania*

Abstract

New statistical algorithms based on the absolute deviation have been implemented for computing the covariance and the correlation coefficient. The values obtained using this new relations are slightly different from that calculated with the classic relationship. In the case of the normal distributed random variables the numerical results obtained with the new absolute correlation coefficient are identical with those computed with the Pearson's correlation coefficient. The main advantage of these new algorithms is tats are less sensitive to outliers. The presence of outliers can be detected comparing the values obtained with the new algorithms and with the classical ones.

INTRODUCTION

The new algorithms are mainly based on the mean (average) absolute deviation (MAD) that is the average absolute deviation from the mean of a random variable X. The MAD of the random variable X is computed with (1) where E is the expectation operator. For the elements of a data set X1, X2… Xn, D(X) is computed with (2) where is the average value of the elements in the data set .

$$D(X) = E\left[\left|X - E[X]\right|\right] \tag{1}$$

$$D(X) = \frac{1}{n}\cdot\sum_{i=1}^{n}\left[\left|X_i - \bar{X}\right|\right],\ \bar{X} = \frac{1}{n}\cdot\sum_{i=1}^{n} X_i \tag{2}$$

The results obtained with (2) is only an approximation of the absolute value obtained with (1) but in all applications is available only a finite number of data.
In the normal distribution case, the difference between the values obtained with and the standard deviation is a multiplicative constant (3).

$$\sigma(X) = \sqrt{E\left[\left(X - E[X]\right)^2\right]} = \frac{D(X)}{c_\sigma} \tag{3}$$

$$c_\sigma = \int_{-\infty}^{+\infty} f(x;0,1)\cdot|x|\,dx = \sqrt{\frac{2}{\pi}} \tag{4}$$

$$f(x;0,1) = \frac{1}{\sigma\cdot\sqrt{2\cdot\pi}} e^{-\frac{x^2}{2\cdot\sigma^2}},\quad x = X - E[X] \tag{5}$$

When the random variable does not have a normal distribution, the constant c_σ has a different value and in some situations, it may be different for different parameters of the distribution. For example, when X has a Poisson distribution with a different parameter lambda, the values of c_σ in this case are presented in Table 1. For large values of lambda, the Poisson distribution tends to a normal distribution and the value of c_σ tends to $\sqrt{\frac{2}{\pi}}$.

Table 1 . Comparison between the values calculated with the standard deviation ant that with the MAD.

lambda	std(x)	dev(x)	dev(x)/std(x)
1.000	1.001	0.737	0.736
2.000	1.415	1.083	0.766
3.000	1.733	1.344	0.776
4.000	2.005	1.566	0.781
5.000	2.237	1.756	0.785
6.000	2.449	1.927	0.787
7.000	2.645	2.086	0.789
8.000	2.827	2.232	0.790
9.000	3.001	2.372	0.790
10.000	3.164	2.503	0.791
11.000	3.312	2.623	0.792

Bradley has defined an absolute deviation correlation [1] (6) for the random variables u and v that must satisfies the conditions (7).

$$\rho(u,v)=\frac{E(|u+v|-|u-v|)}{E(|u|+|v|)} \tag{6}$$

$$E(|u|)=E(|v|),\quad E(u)=E(v)=0 \tag{7}$$

The values computed with this relation, and with the Pearson's correlation coefficient are different, but this relation is less sensitive to outliers [2-4].

ABSOLUTE DEVIATION COVARIANCE

The classical covariance relation (8) can be rewritten using the variance operator (9).

$$Cov(X,Y)=E\left[X-E[X]\right]\cdot E\left[Y-E[Y]\right] \tag{8}$$

$$Cov(X,Y)=\frac{1}{4}\left[Var(X+Y)-Var(X-Y)\right] \tag{9}$$

The equivalent relation of the absolute deviation covariance (10) is obtained by replacing the variance operator with the square of the standard deviation, and after that with the right side of Eq. (3).

$$D\operatorname{cov}(X,Y)=\frac{1}{4\cdot c_\sigma^2}\left[\left(D(X+Y)\right)^2-\left(D(X-Y)\right)^2\right] \tag{10}$$

The absolute deviation (AD) covariance is computed faster and this relation is less sensitive to the outliers.

ABSOLUTE DEVIATION CORRELATION COEFFICIENT

The relation of the Pearson's correlation coefficient (11) can be rewritten as (12), which means that the correlation coefficient is the covariance of the normalized variables.

$$Corr(X,Y)=\frac{E\left[X-E[X]\right]\cdot E\left[Y-E[Y]\right]}{\sigma(X)\cdot\sigma(Y)} \tag{11}$$

$$Corr(X,Y)=E\left[\frac{X-E[X]}{\sigma(X)}\right]\cdot E\left[\frac{Y-E[Y]}{\sigma(Y)}\right] \tag{12}$$

The relation we propose for the AD correlation coefficient derives from (9) and (12) where the standard deviation is replaced with the MAD from Eq. (3). The resulting relation of the AD correlation coefficient is (14), where the random variables are normalized to the MAD (3.3) and not to the standard deviation.

$$X_{an}=\frac{X-E[X]}{D(X)},\quad Y_{an}=\frac{Y-E[Y]}{D(Y)} \tag{13}$$

$$D\operatorname{corr}(X,Y)=\frac{1}{4}\left[\left(D(X_{an}+Y_{an})\right)^2-\left(D(X_{an}-Y_{an})\right)^2\right] \tag{14}$$

In the case when the random variable has a different distribution, the difference between the classical correlation and the MAD correlation coefficient is about 1%.

OUTLIERS' INFLUENCE

Outliers are data samples, which are not generated by the same stochastic process as the random variables X and Y. The occurrence frequency of outliers is very small and generally is difficult to establish if a stochastic or deterministic process generates these. Their contribution to the mean is not significant, but these can produce a bias of the covariance and the correlation coefficient.

Outliers less affect the MAD correlation than the Pearson's correlation coefficient because in the first cases, the absolute deviations of the random variables are averaged and after that, the result is squared. As an example, with the pseudo random variables generated with MatLab x = normrnd(0,3,N,1) and y = normrnd(0,1,N,1) + s1*x), we compute the MAD and the standard deviation (std) of x in two cases with and without outliers.

As an outlier was introduced a single value such as the average value of x changes with 0.2%, and the dataset of the random variable in this case is noted with xa. The relations (15) and (16) give the percentage difference between the values of the MAD and standard deviation.

$$delta(D)=100\cdot\frac{D(x)-D(x_a)}{D(x)} \tag{15}$$

$$delta(std)=100\cdot\frac{\sigma(x)-\sigma(x_a)}{\sigma(x)} \tag{16}$$

Table 2 . Comparison between the values of the correlation coefficient calculated with the Eq. (11) and Eq. (14).

s1	corr(x)	Dcorr(x,y)	corr(x,y)-Dcorr(x,y)
1.0000	0.9954	0.9972	0.0018
0.5000	0.9820	0.9893	0.0073
0.2500	0.9333	0.9366	0.0033
0.1250	0.7925	0.7809	-0.0117
0.0625	0.5447	0.5139	-0.0308
0.0000	-0.0004	0.0000	0.0004

The values of the MAD change insignificantly when the outlier is present compared to the standard deviation that has undergone a change of 20%. This result is reflected in the values of the correlation coefficients. In the columns, four and five are presented the percentage changes of the correlation coefficients Dcorr and respectively corr computed with (15) and (16). Outliers compared with the Pearson correlation coefficient, which suffered an average change of 10%, insignificantly affect the AD correlation coefficient.

CONCLUSIONS

1.The AD covariance can be considered as an alternative to the classical covariance. It can be computed faster, and for the distribution for which the constant is known, the values computed with relation (2.3) approximate those of the classical covariance. Another advantage is that outliers less affect the Ad covariance.
2.The AD correlation coefficient has similar advantages as the AD covariance. What is important to mention is that in this case is not necessary to know a conversion constant like in the case of the covariance. The values computed with AD correlation coefficients differ only by 1% from those computed with the Pearson's correlation coefficient.
3.This difference of 1% can be observed only if the sample population number is greater than 10^4 and in the absence of outliers.
4.The presence of outliers can be detected by computing the difference between the Ad and the classical correlation coefficient. If this difference is much grater than 1% then is a good chance that outliers are present.

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EFFECT OF HEAT TREATMENT ON THE PHYSICAL PROPERTIES FOR SOME OIL SEED

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Key words: *physical properties*, *different heat treatments*, *Canola, Linseed, Nigella and Roselle seeds milk production, evolution, NW Region , Romania*

Abstract

This work was carried out to investigate the characterization of Canola, Linseed, Nigella and Roselle seeds under using different heat treatments (dry heat at 85 °C for 10 and 20 min, seaming for 10 and 20 min) . The study was revealed to the following main points:
-The dimension including length, width, thickness and the weight of 1000 seeds of studied seeds was slightly decreased by dry heat treatment while the steam treatment was increased the dimension of studied seeds.
-The results revealed that, some physical properties of the canola seeds, linseeds, nigella seeds and roselle seeds were considered such as the weight of 1000 seeds (seed index) was 5, 8, 4 and 35g and bulk density was 1.57, 1.48, 1.58 and 1.16g/cm^3, respectively. The seeds dimensions including length, width and thickness were (1.95, 1.85 and 1.71 mm), (4.40, 2.38 and 0.10 mm), (3.01, 1.51 and 1.09 mm) and (5.19, 4.21 and 2.64 mm), respectively.

INTRODUCTION

The most important economical crops are oil seeds as they participates in oil production. In Egypt, the cultivated area for oil crops is about of 158.48×103 Ha, producing 979.94×103 ton oilseed giving 110×103 ton oil. It was reported that Egypt consumed about 469×103ton oil where it produced about 575×103 ton. This means that we produce only about 19% of our needs and import about 81% Ministry of Agricultural (2004).
Amin et al., (2004), calibrated that the effect of moisture content on some physical properties of lentil seeds. They indicated that diameter, thickness, porosity, mass of 1000 seeds and angle of repose increased linearly from 3.84 to 4.06 mm, 2.18 to 2.48 mm, 34.48 to 37.00%, 20 to 25.5 g and 24.80 to 27.78°, respectively with increase in moisture content from 10.33% to 21.00%. Ebaid (2005), Studied physical properties of Roselle seeds cultivated in Egypt (length, width, thickness, moisture content, mass of 1000-kernels, volume, percent of sphericity, geometric diameter, arithmetic diameter and bulk density). The length, width and thickness of the seeds were 5.40, 4.20 and 2.56 mm, respectively. The 1000 seeds mass was 40.10 g, the sphericity were 71.61. The bulk density was 0.68 Kg m^{-3}. Coskuner (2007), reported that physical properties of Linseed have been evaluated as a function of seed moisture content, varying from 6.09% to 16.81% (d.b.). They showed that seed length, width, thickness, arithmetic mean diameter, and geometric mean diameter of the seeds were increased linearly from 4.27 to 4.64 mm, from 2.22 to 2.38 mm, 0.88 mm, 2.45 to 2.63 mm and from 2.00 to 2.12 mm respectively with increasing in moisture content. Also 1000-seed weight increased linearly from 4.79 to 5.32 g,. Yalcin (2007), evaluated the physical properties of cowpea seed as a function of moisture content. The average length, width and thickness were 9.92 mm, 6.87 mm and 6.06 mm, respectively, at 12.01% (d.b.) moisture content. He measured that in the moisture range from 12.01% to 38.90% dry basis (d.b.), studies on rewetted cowpea seed showed that 1000 seed mass increased from 209.23g to 256.88g, the projected area from 22.59 to 32.72 mm^2, the sphericity from 0.781 to 0.799, the porosity from 50.64% to 51.49%. The bulk density decreased from 569.9 to 535.6 Kg m^{-3} and the true density

from 1154.8 to 1104.1 Kg m^{-3} respectively, with an increase in moisture content from 12.01 to 39.90 %(d.b.). The objective of this work to study the effect of heat treatment on physical properties of Canola, Linseed, Nigella and Roselle seeds.

MATERIAL AND METHODS

This research was carried out at Faculty of Agriculture-Farm, Tanta Univ. El-Gharbia Governorate, Egypt. The experiments were designed to study the changes in the physical properties of oilseeds under different heat treatments (dry heat at 85 °C for 10 and 20 min, seaming for 10 and 20 min)

Seed varieties used in this investigation

-Canola seeds (*Brassica napus*) and Linseed (*Linum usitatissimum* L.) were obtained from Agricultural Reserch Station at Sakha Field Crops Research Institute, Kafr El-Sheikh Government.

-Black cumin (*Nigella sativa*) seeds and Roselle (*Hibiscus sabdariffa* L.) seeds were obtained from Agriculture Research Center, Ministry of Agriculture, Giza, Egypt.

Physical properties of seeds

The seed dimensions (length, width, and thickness mm), moisture content, mass of 1000-kernels g, volume (V) mm^3, percent of sphericity (S) %, Geometric diameter (D_g) mm, arithmetic diameter (D_a) mm, transverse surface area (A_t) mm^2, flat surface area (A_f) mm^2, and bulk density Kg/m^3 were calculated according to **El-Raie *et al.*, (1996)** as follows:

$$V = (\pi/6)(L*W*T)mm^3$$

$$S = 100*(L*W*T)^{1/3}/L\%$$

$$D_g = (L*W*T)^{1/3}mm$$

$$D_a = (L+W+T)/3mm$$

$$A_t = (\pi/4)(T*W)mm^2$$

$$A_f = (\pi/4)(L*W)mm^2$$

The porosity ε of bulk seed was computed from the values of kernel density and bulk density using the relationship given by **Mohsenin (1970)** as follows:-

$$\varepsilon = \frac{\rho_K - \rho_b}{\rho_K}100$$

Where: ρ_b = bulk density ρ_k = kernel density.

Heat Treatments:

Canola, Linseed, Nigelle and Roselle seeds were cleaned by hand and divided into four portions. The first and second portions were separately roasted by dry heat at 85 °C for 10 min (DH1) and 20 min (DH2), respectively. The third and fourth portions were individually subjected to steam, hence the were autoclaved under atmospheric pressure for 10 min (ST1) and 20 min (ST2), respectively. Control (Con.) was run simultaneously without any heat treatment.

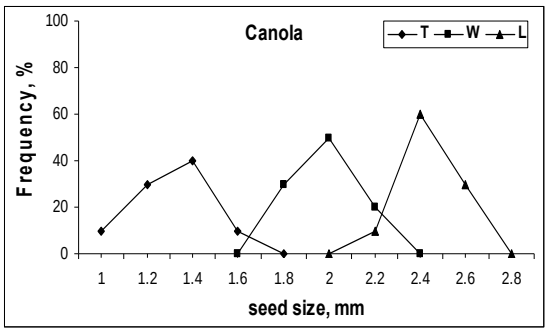
RESULTS AND DISCUSSION

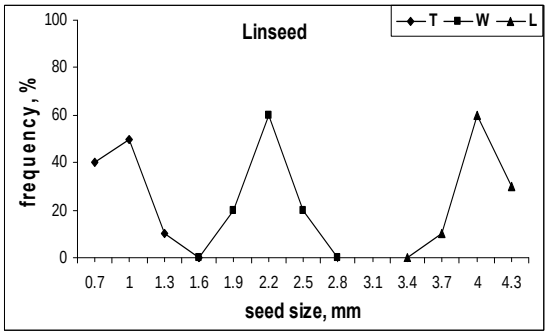
Physical properties of seed

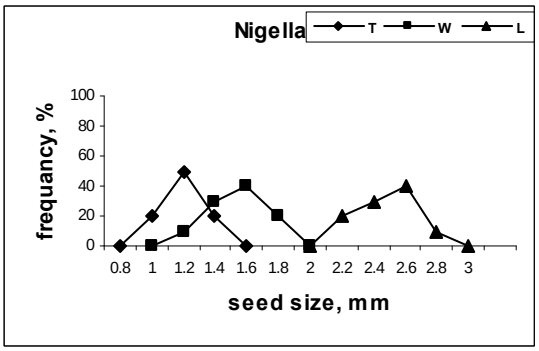
The physical properties such as width, length, thickness, weight of grain, volume, geometric diameter, arithmetic diameter, percent of sphericity, flat surface and transverse surface area were evaluated for Canola, Linseed, Nigelle and Roselle seeds are shown in Fig.1. and Table 1

Canola seeds, Table 1 shows the average of each of Length, width, thickness, mass of 1000 seed, volume, percent of sphericity, geometric diameter, arithmetic diameter, transverse surface area, flat surface and bulk density were 1.95 mm, 1.85 mm, 1.71mm, 5 g., 3.24 mm^3, 94.13 %, 1.83 mm, 1.84 mm, 2.48 mm^2, 2.84 mm^2 and 1.57 kg/m^3. respectively. Results in Fig. 1 showed that the percentage of frequency were 60 % at mean grain length of about 2.2 mm, for mean grain width of about 1.9 mm with the percentage of frequency is 50 % at mean grain thickness of about 1.5 mm.

Linseeds, Table 1 shows the average of each of length, width, thickness, mass of 1000 seed, volume, percent of sphericity, geometric diameter, arithmetic diameter, transverse surface area, flat surface and bulk density were 4.40 mm, 2.38 mm, 1.00 mm, 8 g., 5.47mm^3, 49.68 %, 2.18mm, 2.59 mm, 1.86 mm^2, 8.21 mm^2 and 1.48 kg/m^3. From Fig. 1 data indicates that, the percentage of frequency was 60 % at mean grain length of about 4.2 mm, for mean grain width of about 2.1 mm with the percentage of frequency is 60 % at mean grain thickness of about 0.9mm.







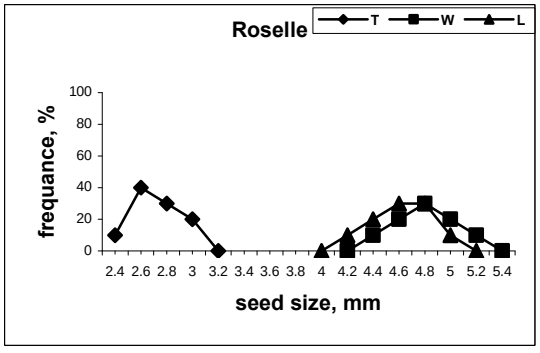


Fig. 1: Physical properties of Canola, Linseeds, Nigella and Roselle seeds

Nigella seeds, Table 1 shows the average of each of length, width, thickness, mass of 1000 seed, volume, percent of sphericity, geometric diameter, arithmetic diameter, transverse surface area, flat surface and bulk density were 3.02 mm, 1.51 mm, 1.09 mm, 4 g., 2.60 mm^3, 56.53 %, 1.70 mm, 1.87mm, 1.29 mm^2 , 3.58 mm^2 and 1,581 kg/m^3. Data in Fig. 1 indicates that, the percentage of frequency is 40 % at mean grain length of about 2.8 mm, for mean grain width of about 1.6 mm with the percentage of frequency is 40 % at mean grain thickness of about 1.2 mm.

Table (1): Physical properties of Canola, Linseeds, Nigella and Roselle seeds

Physical properties	Canola	Linseeds	Nigella	Roselle
L (mm)	1,95	4,40	3,02	5,19
W (mm)	1,85	2,38	1,51	4,21
T (mm)	1,708	0,99	1,09	2,67
V $(mm)^3$	3,24	5,47	2,60	30,17
Dg (mm)	1,83	2,18	1,70	3,86
Da (mm)	1,84	2,59	1,87	4,01
S%	94,13	49,68	56,53	74,46
Af $(mm)^2$	2,84	8,21	3,58	17,17
AT $(mm)^2$	2,48	1,86	1,29	8,72
M (g)	5.00	8.00	4.00	35.00
ρ (g/mm^3)	1,57	1,48	1,58	5,19

L: Length (mm). W: Width (mm). T: Thickness (mm). V: Volume (mm^3).D_g: Geometric diameter (mm). D_a: Arithmetic diameter (mm). S: Percent of sphericity (%). A_f: Flat surface area (mm^2). A_t: Transverse surface area (mm^2). M: Mass of 1000-kernels (g). ρ bulk density (g/mm^3)

Rosella seeds, Table 1 shows the average of each of length, width, thickness, mass of 1000 seed, volume, percent of sphericity, geometric diameter, arithmetic diameter, transverse surface area, flat surface and bulk density were 4.8 mm, 4.6 mm, 12.7 mm, 35 g., 31.25 mm^3, 83.65 %, 3.9 mm, 4.05 mm, 10.02 mm^2, 17.76 mm^2 and 1,165 kg/m^3. Data in Fig. 1 indicates that, the percentage of frequency is 60% at mean grain length of about 4.8 mm, for mean grain width of about 4.5mm with the percentage of frequency is 50% at mean grain, thickness of about 2.5mm.

Effect of heat treatment on physical properties of seed

Physical properties of oilseeds affected by heat treatments (dry heat at 85 °C for 10 and 20 min and steaming for 10 and 20 min). The results obtained for all heat treatments show a changes in seeds physical properties.

Canola seeds physical properties were evaluated before and after heat treatments.

Results in Fig. 2. shows that increasing the time of dry heat at 85 °C form 10 min (DH1) to 20 min (DH2) increased the reduction percentage of length, width, thickness, volume, geometric diameter, arithmetic diameter, sphericity, flat surface area, transverse surface area, and mass of 1000 kernels, from 0.10 to 1.53 %, 0.18 to 2.70 %, 1.16 to 2.33 %, 1.85 to 6.48%, 0.54 to 2.18 % , 0.54 to 2.17 %, 0.37 to 0.95 %, 0.70 to 4.22 %, 1.21 to 4.83 % and 3.60 to 5.4 % respectively. While increasing the time of steam heat under atmospheric pressure form 10 min (ST1) and 20 min (ST2) increased the percentage of length, width, thickness, volume, geometric diameter, arithmetic diameter, sphericity, flat surface area, transverse surface area, and mass of 1000 kernels, from 4.61 to 6.15 %, 2.70 to 3.24 %, 4.09 to 4.19 %, 11.11 to 13.27% , 3.82 to 4.37 %, 3.26 to 4.34 %, 0.84 to 1.64 %, 6.69 to 8.80 %, 6.80 to 7.25 and 41.0 to 60.0 % respectively.

Linseeds physical properties were evaluated before and after heat treatments. Results in Fig. 3 shows that increasing the time of dry heat at 85 °C form 10 min (DH1) to 20 min (DH2) increased the reduction percentage of length, width, thickness, volume, geometric diameter, arithmetic diameter, sphericity, flat surface area, transverse surface area, and mass of 1000 kernels, from 1.10 to 1.30 %, 1.68 to 2.10 %, 0.10 to 1.01 %, 2.92 to 4.38, 0.91 to 1.37 % , 1.15 to 1.54 %, 0.14 to 0.14 %, 2.67 to 3.53 %, 1.61 to 2.68 % and 4.00 to 6.01 % respectively. While increasing the time of steam heat under atmospheric pressure form 10 min (ST1) and 20 min (ST2) increased the percentage of length, width, thickness, volume, geometric diameter, arithmetic diameter, sphericity, flat surface area, transverse surface area, and mass of 1000 kernels, from 1.10 to 9.31 %, 1.26 to 10.08 %, 4.04 to 57.50 %, 5.48 to 88.11 % , 1.83 to 23,58 %, 1.54 to 15.44 %, 0.68 to 12.80 %, 2.55 to 20.58 %, 4.83 to 72.04 and 50.0 to 70.0 % respectively.

Nigella seeds physical properties were evaluated before and after heat treatments. Results in Fig. 4. shows that increasing the time of dry heat at at 85 °C form 10 min (DH1) to 20 min (DH2) increased the reduction percentage of length, width, thickness, volume, geometric diameter, arithmetic diameter, sphericity, flat surface area, transverse surface area, and mass of 1000 kernels, from 4.66 to 4.98 %, 0.19 to 1.32 %, 5.05 to 5.50 %, 10.38 to 11.92, 3.52 to 4.11 % , 3.70 to 3.74 %, 1.13 to 1.45 %, 5.30 to 6.10 %, 4.40 to 6.9 % and 3.50 to 5.50 % respectively. While increasing the time of steam heat under atmospheric pressure form 10 min (ST1) and 20 min (ST2) increased the percentage of length, width, thickness, volume, geometric diameter, arithmetic diameter, sphericity, flat surface area, transverse surface area, and mass of 1000 kernels, from 3.97 to 11.92 %, 12.84 to 19.20 %, 5.50 to 17.40 %, 17.69 to 57.69 % , 5.88 to 15.50 %, 5.34 to 15.50, 1.59 to 3.78 %, 11.17 to 33.79 %, 13.17 to 40.31 %, and 41.50 to 60.75 a respectively.

Rosella seeds, Physical properties of linseeds were evaluated before and after heat treatments. Results in Fig. 2 shows that increasing the time of dry heat at 85 °C form 10 min (DH1) to 20 min (DH2) increased the reduction percentage of length, width, thickness, volume, geometric diameter, arithmetic diameter, sphericity, flat surface area, transverse surface area, and mass of 1000 kernels, from 3.36 to 4.04 %, 3.08 to 4.51 %, 7.86 to 9.36 %, 14.45 to 14.68, 4.9 to 5.81 % , 4.48 to 4.74 %, 0.65 to 1.12 %, 6.58 to 8.44 %, 11.35 to 12.90 % and 3.0 to 5.0 % respectively. While increasing the time of steam heat under atmospheric pressure form 10 min (ST1) and 20 min (ST2) increased the percentage of length, width, thickness, volume, geometric diameter, arithmetic diameter, sphericity, flat surface area, transverse surface area, and mass of 1000 kernels, from 6.16 to 14.45 %, 6.88 to 15.43 %, 10.37 to 11.61 %, 14.55 to 19.18 % , 7.66 to 14.24 %, 5.23 to 14.46% , 1.42 to 1.98 %, 13.33 to 31.91 %, 17.91 to 30.27 and 40.0 to 60.0 % respectively.

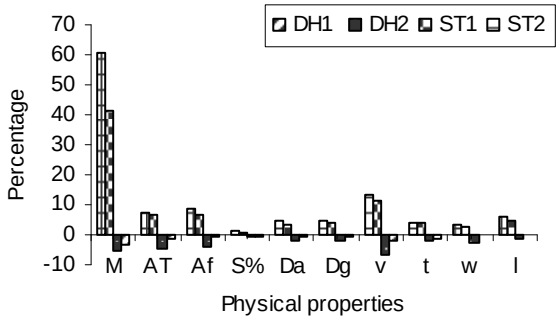


Fig. 2. Effect of heat treatment on canola physical properties

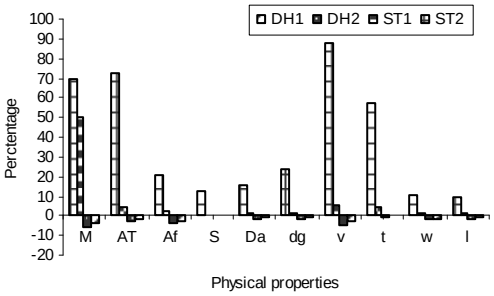


Fig. 3. Effect of heat treatment on linseed physical properties

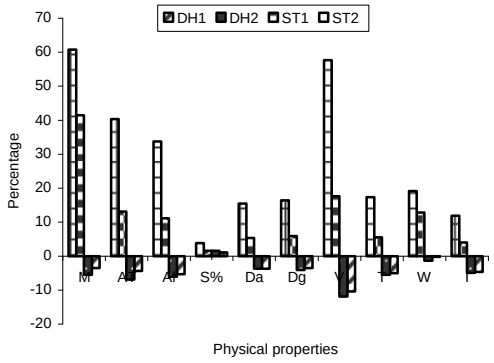


Fig. 4. Effect of heat treatment on rosella physical properties

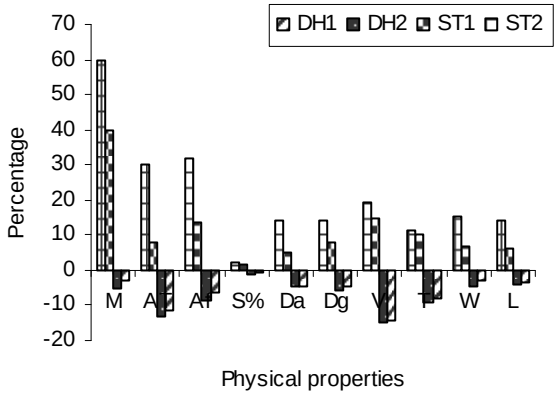


Fig. 5. Effect of heat treatment on rosella physical properties

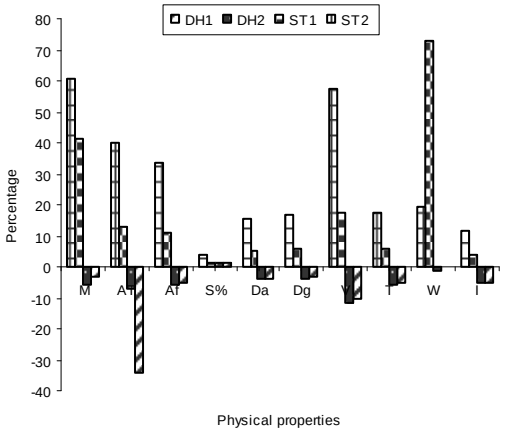


Fig. 6. Effect of heat treatment on rosella physical properties

CONCLUSIONS

Some physical properties of the Canola , Linseeds, Nigella and Roselle seeds were considered such as the weight of 1000 seeds (seed index) was 5, 8, 4 and 35g and bulk density was 1.57, 1.48, 1.58 and 1.16g/cm^3, respectively. The seeds dimensions including length, width and thickness were (1.95, 1.85 and 1.71mm), (4.40, 2.38 and 0.10mm), (3.01, 1.51 and 1.09mm) and (5.19, 4.21 and 2.64mm), respectively.

The dimension including length, width and thickness of studied seeds was slightly decreased by dry heat treatment but the steam treatment was increased the dimension of the Canola , Linseeds, Nigella and Roselle seeds

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PRICES INTERDEPENDENCE IN THE DAIRY PRODUCTS SUPPLY CHAIN

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Key words: *elasticity coefficient, prices interdependence, milk supply chain, agrifood market*

Abstract

The paper approaches the issue of the interactions among prices within the dairy products supply chain, by means of analysing the elasticity coefficients. The interpretations were based on the results of the investigations within the dairy supply chain through the price-production, production-price and price-consumption correlation forms. The level and intensity of the cause-effect dependences emphasises the need to increase competitiveness within dairy supply chain through the two-dimensional insight into the product/price interdependence.

1 – METHODOLOGICAL ARGUMENTS

The phenomenon considered to be the effect (y) is represented though the dairy products consumption requirements and derivative products prices, and the phenomena considered to be changes in causes (x) are presented through the milk purchase prices, considered raw material. It was necessary to calculate the elasticity coefficients in the fixed base type (E), in the chain base type (E') or to maintain a sub-period constant (E''). The results of the calculations give the possibility to analyse and interpret the indicators in their dynamics, as follows:

- the elasticity situation, when the elasticity coefficients values are supraunitary: E>1 (y depends on the x phenomenon which was considered);
- the lack of elasticity, when the elasticity coefficients are smaller than the unit, but not negative. In this case, y does not depend on the considered phenomenon;
- reverse elasticity, in case the elasticity coefficients are negative (E<0). Therefore, y is influenced in a reverse manner by the x phenomenon.

2 – THE INTERDEPENDENCE BETWEEN THE OVERALL MILK PRODUCTION AND PRICE

The use of elasticity coefficients in the milk supply chain starts from the premise that *the overall milk production influences both the milk purchase price and its selling price.* In <u>*table 1*</u> these influences are quantified using the forms of the elasticity coefficient calculated for various comparison bases (E, E', E''), in the interval 2002-2007:

a) In case of *the influence of the overall milk production (x) on the purchase price (y),* the following are noticed:

- the influence of the overall milk production on the purchase price, fixed base: the year 2002, emphasises the direct influence (E >1). Therefore, the higher the milk production is, the higher the purchase price is, as this is a situation in which the milk production was encouraged (the increase in purchase prices at the same time with the increase in the supplied amounts of milk);
- for the previous year's calculation base (E'), there are differentiations which can match the following interpretations:

- in the interval 2003-2005 there is elasticity (E'>1) in the sense of the increase in prices at the same time with the increase in the amounts of milk produced;
- in 2005 there is a lack of elasticity (1>E'>0) so the production is no longer stimulated through he price;
- in 2007: the milk production has a reverse influence on the purchase price (E'<0);

- in the case of calculating elasticity coefficients for which the comparison base is 2007, two situations can be identified: the existence of elasticity in 2002, 2003 and 2007 (E''>1), in

which the increase in production also leads to an increase in the purchase price; the situation of 2004 and 2005, in which there is no elasticity (1>E''>0), therefore the overall milk productions variation does not influence the purchase price.

b) In the case of *the influence of the overall milk production (x) on the agrifood market price (y)*, the elasticity coefficients level generates the following interpretations:

- for the fixed base, represented by the comparison year 2002, we notice the existence of supraunitary values in all the years of the analysed interval (E>1). In this case, the trend within the supply chain was to market the dairy products using very short chains;
- for the chain base, the following situations are identified: in the interval 2003-2005 there is a direct influence through elasticity (E'>1); in 2006: lack of elasticity (1>E'>0); in 2007: reverse elasticity (E'<0);
- by maintaining the year 2006 as comparison base (year in which the largest milk production was recorded), we notice a phenomenon which is similar to the previous correlative form, when the elasticity coefficient level matches the two situations (E''>1 and 1> E''>0).

Table 1 **– The elasticity between the milk production and the price level**

Year	Variation between the purchase price (y) and the overall milk production (x)			Variation between the agrifood market price (y) and the overall milk production (x)		
	E	E'	E"	E	E'	E"
2002	0	0	1.80728	0	0	2.275216
2003	4.067571	4.067571	1.304374	4.335053	4.335053	1.973555
2004	3.047396	1.945954	0.959967	3.605049	2.616594	1.802536
2005	3.162521	3.695556	0.642516	4.550158	11.88053	0.731186
2006	2.150803	0.625759	0	3.042948	0.716753	0
2007	4.318836	-2.38748	+2.38748	5.326145	-1.65565	-1.65565

E"→ year 2006, records the maximum annual level for the dairy cows production and livestock
Source: Our own processing, using the database in the Romanian Statistical Yearbook, NIS, 2008

3 – QUANTIFYING THE PRICES INFLUENCE ON MILK CONSUMPTION

The economic agents' competitiveness within the milk and dairy products supply chain can be analysed, even quantified, through *the prices influence on milk consumption*. This influence can be seen in the elasticity forms with a fixed base (E), with a chain base (E') and maintaining the year 2005 constant (E'), year in which the maximum milk consumption per capita was recorded. The calculations presented in <u>*table 2,*</u> in the interval 2002-2007, are based on two situations, namely the "farm gate" takeover form and the final destination "takeover by the consumer".

Year	Elasticity variation between the milk consumption per capita (y) and the purchase price (x)			Elasticity variation between the milk consumption per capita (y) and the agrifood market price (x)		
	E	E'	E"	E	E'	E"
2002	0	0	1.059453	0	0	0.825682
2003	0.242894	0.242894	1.983957	0.227907	0.227907	1.198004
2004	0.34831	0.576593	6.449198	0.294431	0.42881	2.159111
2005	1.082736	7.824613	0	0.758796	2.462178	0
2006	0.345395	+3.75045	-3.75045	0.244131	+3.31015	-3.29992
2007	0.295116	0.210564	-0.90228	0.239302	0.303637	-1.11033

Table 2 **– Elasticity between the market price and the milk consumption per capita**

E"→ year 2005, records the maximum milk consumption per capita.
Source: Our own processing, using the database in the Romanian Statistical Yearbook, NIS, 2008.

a) The correlative situation of *the purchase price influence (x) on the milk consumption per capita (y)* reflects the following effects of competitiveness at the beginning of the supply chain ("at the farm gate"):

- fixed base 2002: in most years, we notice a lack of elasticity (0<E<1), situation explained by the fact that the milk and dairy products consumption is present for any initial purchase price;
- the chain base (E') reflects two situations: the years 2003, 2004 and 2007, in which this influence is not present (0<E'< 1) and the case of the years 2005 and 2006, in which there is a strong dependence (E'>1);

b) The correlation was also traced through *the retail price influence (x) on the agrifood market, compared to the milk consumption per capita (y)*, which is in fact the presence of competitiveness, at the end of the milk supply chain. The presentation is made through the three elasticity forms:

- fixed base 2002: here is a lack of elasticity (E<1), respectively the consumer needs and takes this product over regardless of the retail price on the agrifood market;
- the chain base (E') maintains the lack of elasticity on the years 2003, 2004 and 2007 (E'< 1), and in the years 2005 at 2006 there is this dependence correlation (E'>1);
- 2005 comparison base: (E'') emphasises positive values for the previous years, namely direct influences (E''>1) and still negative ones – reverse elasticity (E'' < 0).

4 – PRICES INTERDEPENDENCE WITHIN THE MILK AND DAIRY PRODUCTS SUPPLY CHAIN

The need to know these price interferences is considered to be a price policy form of manifestation within the milk supply chain. The effects are felt on the market through the increase in consumption, which is why it is necessary to have two-dimensional knowledge of prices correlation, namely: purchase price ("at the farm

gate") ↔ retail price (on the agrifood market). In table 3 using the elasticity methods (E', E'', E'''), these correlative forms are present.

a) *The variations between the milk price on the agrifood market (y) and the milk purchase price (x)*, lad to the following conclusions:

- for the fixed base 2002 (E) we notice a direct elasticity form (E>1), situation which indicates the dependence between the agrifood market retail price (y) on the milk purchase price (x);
- the chain base (E'), follows the same trend of price dependence in the interval 2003-2006. We notice a lack of elasticity only in 2007;
- the functional dependence of elasticity on the base level of 2007 (E''), which records a maximum price level, identifies two sub-intervals in the interval 2002-2006: the interval 2002-2004, in which there is a direct influence between the two factors (E'>1), namely the retail price (x) depends on the purchase price (x); the interval 2005-2006, in which we notice a lack of elasticity (0<E''<1), therefore, the retail price does not depend on the purchase price.

Table 3 - **Elasticity between the sheep milk prices and the derivative products prices**

E"→ year 2007 which records and maximum level of prices.

Year	Variation between the milk agrifood market (y) and the milk purchase price (x)			Variation between the sheep's cheese price on the agrifood market (y) and the sheep's milk price (x)		
	E	E'	E"	E	E'	E"
2002	0	0	1,240336	0	0	1,444898
2003	1,06576	1,0676	1,320124	0,686135	0,686135	4,00
2004	1,82993	1,34633	1,298643	1,377315	-3,36256	1,986264
2005	1,438776	3,214815	0,90856	1,61948	2,738908	1,797619
2006	1,414796	1,145414	0,73824	3,925816	-0,9355	0,270408
2007	1,233236	0,693471	0	1,768959	0,234168	0

Source: Our own processing, using the database in the Romanian Statistical Yearbook, NIS, 2008.

b) *The variation between the ewe's milk cheese product price on the agrifood market (y) and the ewe's milk price (x*), starts from the situation in which it is aimed to find out the correlative form between the raw material price and the derivative product price. By using the same elasticity forms (E', E', E'') we notice the following:

- fixed base the year 2002 (E): there is elasticity, therefore there is a direct correlation between the milk price influence on the resulting cheese product (E>1). There is a lack of elasticity only in 2003 (0<E<1);
- in the case of chain base elasticity (E') the following situations are identified: a lack of elasticity in 2004 and 2007 (0<E'<1); the existence of elasticity in 2005 (E'>1); reverse elasticity in 2004 and 2006 (E'<0);
- the comparison to the base level 2007 (E'') emphasises a functional dependence of the cheese product (y) on the raw material price – ewe's milk (x) in most years, respectively the sub-interval 2002- 2005. We notice a lack of elasticity in 2006 (0<E''<1).

CONCLUSIONS

From the analyses we performed, we can identify the existence of certain factors with a direct influence on *competitiveness* within the milk supply chain. An important part is played by the milk and dairy products price level, which is analysed using the results of the elasticity coefficient, as follows:

- *the prices influence on milk consumption:* there are two situations within the supply chain, namely "the farm gate" takeover form and "takeover by the consumer". In both situations, the price is the decisive element, with influences both on the producer and on the consumer;
- *the prices influence on milk consumption:* the consumer needs and takes over this product regardless of the retail price on the agrifood market (inelastic demand);
- *the prices interdependence within the milk and dairy products supply chain,* emphasised the fact that the dairy products' retail price does not always depend on the milk purchase price.

The assessment of competitiveness in the milk supply chain places special emphasis on the effect on the producer through: the quality/price ratio which will have to increase in comparison to the competitors; knowing and influencing the expenditures/product ratio level will have to decrease, faster than the increase in production compared to expenditures.

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THE ROLE AND PROSPECTS OF BIOFUELS PRODUCTION IN THE EUROPEAN UNION

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Key words : *biodiesel, supply and demand, self-sufficiency, biofuels deployment, sustainability criteria*

Abstract

Agreed as part of the EU's climate change and energy package in December last year, the new Renewable Energy Directive requires each member state to satisfy 10% of its transport fuel needs from renewable sources, by 2020. Most of the 10% goal will be met through biofuels, creating a market coveted by EU farming nations, which produce about 10 billion litres a year. Our paper examines some of the latest trends on the important market of biofuels, (biodiesel mainly) in the European Union. We included some drivers of the demand and supply of biodiesel and the broader actual context in which it has arisen, as well as the latest concerns regarding the potential harmful impact of increased biofuel production.

INTRODUCTION

The main driving forces behind the policies promoting biofuel development have been concerns over energy security and a desire to reduce greenhouse gas emissions. However, a marked change appeared in the perceptions of biofuels, since recent analysis has raised serious questions regarding the full environmental impacts of producing biofuels from an already stressed agricultural resource base.
In recent years biofuels have shown a dynamic development in the European Union as well, and thus exerted a considerable influence on agricultural commodity markets. Here, the general development of bioenergy over the last 15 years has seen the share of biomass as an energy source remain virtually constant at around 4%, although bioenergy use has grown significantly in absolute terms.

MATERIAL AND METHOD

In order to characterize the evolution of biofuels-namely biodiesel-production in the European Union, the following indicators were used : total biodiesel production, (in kt and ktoe); total biodiesel production capacity (in kt); biodiesel and biofuel self-sufficiency ratios (in %). The longest period analyzed in this study is 2000-2009, depending on data available . The data , collected from Member States' Reports, EBB and EBio (producer data) and EurObserver's Biofuel Barometer, have been statistically processed and interpreted, building a trend line where possible.

RESULTS AND DISCUSSIONS

The EU is supporting biofuels with the objectives of reducing greenhouse gas emissions, boosting the decarbonisation of transport fuels, diversifying fuel supply sources and developing long-term replacements for fossil oil.
In 2000 biofuels contributed about 0.2% in energy terms of all fuels used in the EU. If Member States had achieved the national indicative targets they adopted under the Biofuel Directive (Directive 2003/30/EC of 8 May 2003 on the promotion of the use of biofuels or other renewable fuels for transport), the contribution of biofuels would

have reached 1.4% by 2005. Although the national targets are, on average, significantly lower than the reference value of 2% that the Directive laid down, some Member States have not met them. Recent assessments have concluded that the 2010 indicative target (5.75% contribution of biofuels for transport in energy terms) set out in the Biofuel Directive is also unlikely to be achieved[1].

Hence, the biofuels for transport have achieved a very limited market penetration; however, their cost has been reduced and their strategic importance augmented due to the hikes in the price of oil. Still, looking beyond 2010, biofuels could have a bigger role to play if oil prices increase further, with a reformed agricultural policy, new technological breakthroughs and the challenge of imports from third countries.

Unlike the two world leaders in biofuel, Brazil and the United States, for whom bioethanol is the major biofuel, Europe produces 80% of its biofuels in the form of biodiesel. Oil for biodiesel production can be extracted from almost any oilseed crop; globally, the most popular sources are rapeseed in Europe and soybean in Brazil and the United States of America. The global biodiesel production is principally concentrated in the EU (with around 60 percent of the total), so that the European Union is the biggest producer of biodiesel in the world.

Use of biodiesel results in a significant reduction in the CO2 emission (65%-90% less than conventional diesel), particulate emissions and other harmful emissions. As such, an increased use of biodiesel in Europe represents an important step for the European Union to meet its emission reduction target as agreed under the Kyoto agreement.

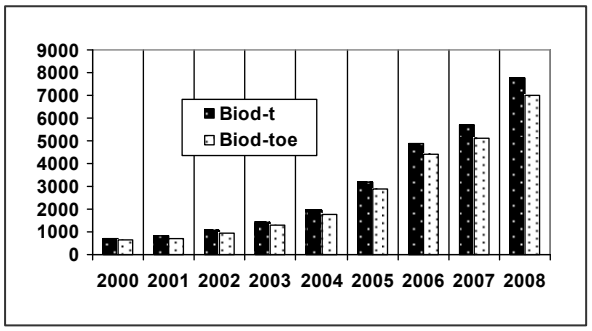
Biodiesel is also the most important biofuel in the EU, representing about 75 % of the total biofuels market in the transport sector. Biodiesel was the first biofuel developed and used in the EU in the transport sector in the 1990s. Its rapid expansion was driven mainly by an increasing crude oil price, the *Blair House Agreement* (which allowed the EU to produce oilseeds for non-food use of up to 1 million MT of soybean equivalent) and resulting provisions, the EU's set-aside scheme, and generous tax incentives.

***Table 1* - Biodiesel production in the European Union, since 2000**

SPECIFIC.	2000	2001	2002	2003	2004	2005	2006	2007	2008
Total (in kt)	715.1	802.7	1065	1434	1933.4	3184	4890	5713	7755
Total (in ktoe)	643.5	722.4	958.5	1290.6	1740	2865.6	4401	5141.7	6979.5

Source: Eurobserver, European Biodiesel Board EBB and own computations (1 t of biodiesel gives 0.9 toe-tons of oil equivalent)

***Fig.1* - Trends of the total biodiesel production in EU since 2000**



From 2004 to 2005, the total EU25 biodiesel production increased by 65%, jumping from 1.9 to nearly 3.2 million tonnes. This growth confirms the continuous trend of the sector over the last few years, with growth rates of around 30-35% per annum between 2002 and 2004. The trend shows a 54% growth of the 2006 production as compared with 2005, and the 16.8% growth of the 2007 production compared to 2006.

Actually, the total biodiesel production in 2007 was 8 times higher than in 2000. Once again, the European biodiesel production rose to 7.8 million tons in 2008, equivalent to a 35.7% progression between 2007 and 2008 (table 1). This trend reinforces European leadership in worldwide biodiesel production, while the US, the world's number 2 in biodiesel, produces only around 0.250 million tonnes.

As a result of the good profits in the EU biodiesel sector, by implementing the Biofuel Directive of 2003, after 2005 there was also a large expansion of biodiesel capacity in the

[1] COM/2009/0192 final, Communication from the Commission to the Council and the European Parliament - The Renewable Energy Progress Report - Commission Report in accordance with Article 3 of Directive 2001/77/EC, Article 4(2) of Directive 2003/30/EC and on the implementation of the EU Biomass Action Plan.

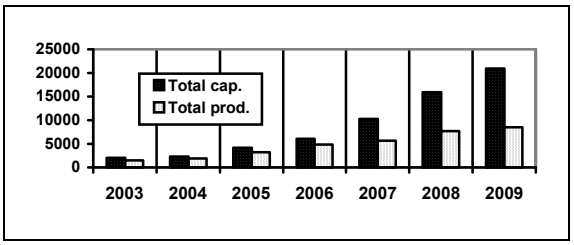
EU. The number of plants producing biodiesel increased thus from 40 in 2003 to 240 in 2008 and 276 in 2009.

***Table 2* - Biodiesel production capacity in the EU, since 2000**

SPECIF.	2003	2004	2005	2006	2007	2008	2009
Total (in kt)	2048	2246	4228	6069	10289	16000	20909

Source: Eurobserver, European Biodiesel Board EBB and own computations

***Fig. 2* - Trends in total biodiesel production capacity since 2003 (as compared to the biodiesel production) in the EU**



However, as one may notice from the above figure, capacity increased faster than consumption, especially in the last 3 years. As a consequence, in 2007, only 60 % of the capacity on average was utilized. The high vegetable oil prices and competitively priced biodiesel imports from the world market contributed to the low utilization rates, and this trend is likely to continue, taking into account the current economic recession.

Hence the European biodiesel industry has suffered from biodiesel imports from the United States over the last few years. According to EBB, American biodiesel imports reached 1.5 million tons in 2008 (equivalent to 16.3% of European biodiesel consumption for transport), compared to less than 100,000 tons in 2006. Following their anti-dumping complaint, the European Biodiesel Board was awarded the case by the Commission in March 2009, through the approval of the temporary imposition of antidumping and anti-subsidy rights on American biodiesel imports.

As concerning the demand for biodiesel, a breakdown of European biofuel consumption devoted to transport is still largely to the advantage of biodiesel consumption which represents 78.5% of the total, compared to 17.5% for bioethanol and 4% for vegetable oil. The total biofuel consumption rose by 45.7% between 2006 and 2007 (5,376 ktoe to 7,834 ktoe) and 70.9% between 2005 and 2006 (3,146 ktoe to 5,376 ktoe). With growth of 28.5% between 2007 and 2008, the total biofuel consumption in the European Union increased once again, (at a slower rate however than in the previous years).

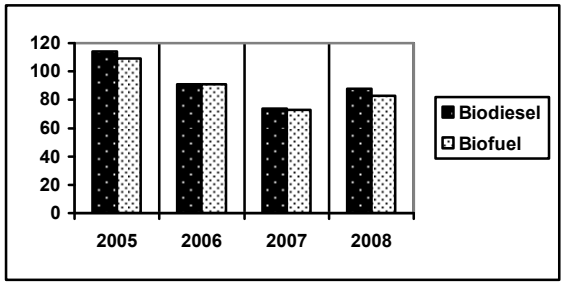
An important indicator for the analysis of biodiesel supply and demand in the European Union is the self-sufficiency ratio, namely the ratio of the production to consumption in %. Table 3 shows recent developments in the share of domestically produced biodiesel.

***Table 3* - Biofuel and biodiesel self-sufficiency in the EU27**

BIODIESEL SUFFICIENCY RATIO (%)				BIOFUEL SUFFICIENCY RATIO(%)			
2005	2006	2007	2008	2005	2006	2007	2008
114	91	74	88	109	91	73	83

Source: Member States' Reports, EBB and EBio (producer data) and EurObserver's Biofuel Barometer. Note: 100% implies full self sufficiency; a higher figure implies potential for export of biofuels; and a lower figure means that some or all of biofuel consumption in a given Member State is met by imports.

***Fig. 3* - Self-sufficiency ratios of biodiesel and biofuel in the EU27**



The overall balance for biodiesel changed from positive in 2005 with 14% (355 Ktoe) exported, to negative in 2007 with 25.8% (1.8 Mtoe) imported. During the same period, the biofuel balance changed from +9% in 2005 to negative 27% in 2007, reduced to 17% in 2008 (due to an increase in the production of bioethanol in the EU). The main reason for these changes was the increasing market share of competitively priced biofuel for import, mainly soy oil methyl ester (SME B-99.9) from the United States and Argentina.

To meet the national targets that Member States have set themselves under the Biofuel Directive, the consumption of biofuel and other renewable fuels would need to more than double over the next two years. Assuming that in 2010 the increase in fuel for transportation was the same as in 2000-2006 for each Member State and the ratio between bioethanol and biodiesel remained the same as the average observed in 2005-2007, the

additional biofuel consumption would be approximately 10 Mtoe (7.8 Mtoe biodiesel and 2.8 Mtoe bioethanol). The additional estimated biofuel required in Romania is of 293 Ktoe biodiesel[2].
By 2010, consumption of biofuels would reach 16.5 Mtoe at best, equivalent to an incorporation rate of 5.3% for total consumption in road transport of 310 Mtoe.

CONCLUSIONS

As for the European biodiesel industry, after a few years of flourish and strong expansion, it faces a slowdown, due to the global recession as well as the change of policy and approach. In the EU and in Romania, in this time of economic and financial crisis, the best chances of survival are for those biodiesel plants that have their own oil mill; are located close to a major waterway, or a mineral oil company; belong to a large company or group that can bridge a cash-flow gap and work with petroleum oil companies that blend biodiesel into their diesel.
Achieving the sustainability criteria for biofuels production may be another essential challenge in promoting biofuels in Romania and the European Union. This issue incited the European Union to set forth specific sustainability criteria to include biofuels in the new renewable energies directive 2009/28/EC, providing for a reduction in greenhouse gas emissions resulting from the use of biofuels of at least 35%. This reduction rate will increase to 50% as of 1st January 2017, then to 60% as of 1st January 2018 for biofuels produced in facilities in which production has begun on 1st January 2017 or later.
To resume, since about 10 years, the production of biofuels has become an important sector in the European Union. Due to many potential positive economic, environmental and social impacts, the development of this sector is supposed to outline a path of sustainable development, at local, national and European level, since: increased use of biofuels has contributed to security of supply by decreasing fossil fuel and diversifying fuel consumption in the EU, so that in 2007 the use of biofuels in the EU replaced almost 3% of the total EU fuel consumption in road transport; biomass and biofuel sectors have also contributed to the EU economy by generating additional jobs; agricultural activity related to the renewable energy sector generates gross value added of well over €9bn per year; net greenhouse gas savings achieved in the EU from biofuels placed on the market and consumed in 2007 amounted to 14.0Mt CO2-equiv. respectively.
On the other hand, the biofuel production leads to intensification of agricultural production in the EU, increasing pressure on the use of land with high biodiversity value, the soil carbon stock and use of fertiliser. Actually, to meet concerns that energy crops replace other sustainable land uses (the so-called 'indirect land-use change'), the Renewable Energy Directive and the Fuel Quality Directive, (part of the EU's climate change and energy package 2009), requires the European Commission to compile a report "reviewing the impact of indirect land-use change on greenhouse gas emissions" and to seek ways to minimise its impact.

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THE FORMATION PROCESS PECULIARITIES OF THE GUTTER, IN CONDITIONS OF CEREALS SOWING AT MAJOR WORKING SPEED.

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Key-words: *furrow –opener, gutter, technological parameter.*

Abstract

In this article are shown the experimental tests data that had as aim the parameter determination of the experimental furrow-opener structure for cereals drill at major sowing working speed. The tests were done according to the methodology of experimental research. After tests the experimental furrow- opener showed a parameter reduction of gutter, that approximately remains 33% , by the breadth, and 40 % by depth ,towards the examined models at major working speed.

INTRODUCTION

The open-furrows as working device are used at sowing machines and for planting agricultural cultures through the outstanding methods, that are used worldwide.
Scientifical project elements of agricultural machine devices were belaboured by V. Gorâčkin [2,3]. O. Laburov [4] who proposed the combined sowing machine equipied with disks. V. Gajdukov [1] proposes to accomplish cereals cultures drill in strips with combined, modified open-furrows. I. Morozov, [5] modifing of technologic and constructive parameters of existent open-furrows, he obtiened an increasing of autumn wheat harvest from 6,3 to 9,4%.

MATERIAL AND METHOD

As basis for tests was taken the relative shifting principle of open-furrow toward the soil .
The experimental trolley (fig.1) is moving along the chanel with 30m. lenth and it is put on by the electric engine (8). The influence of open-furrow elements over the soil particles are determined through tacking photografs of the remained gutter profile.

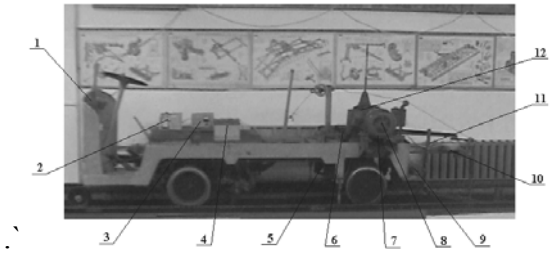

Fig. 1. General viewing of instalation.
1-panel of order, 2- registration device, 3-amplifier l, 4-storage battery, 5- breaking, 6-gearing trough belt, 7-gear clutch, 8-electric engine, 9- coupling device, 10-dynamometer, 11-the system of rivulet, 12-the speed box.

In condition of producing experimental tests were done in the first decade of october 2007, on fields of didactical and experimental station „Petricani" of The State Agrarian University of Moldova according to the methodology OCT-70.5-1-82. All indexes of experimental open-furrow working were verified at allowed agrotechnical speed and afterward at those increased (9...14 km/h).
After each passing of sowing machine, over the control area, were analysed the gutter profile that was left of each tested open-furrow. As in the laboratory, was used the method of taking photographs.

RESULTS AND DISCUSSIONS

One of the estimate norms of the open-furrows efficiency serve the remained gutters dimension. The tests showed that at a speed almost equal to zero the remained gutter

dimensions for all types of researched profiles, practicaly are identical. With increasing of moving open-furrow speed, the depht and lenth of the remained gutter increased.

In conditions of laboratory the experimental open-furrow showed a decrease of the remaind gutter parameters in the lenth with 14,3% toward the brace open-furrow and 45,5% toward the standart open-furrow with disks. In depth the decrease represented 2,8%toward the brace open-furrow and 56,3% toward the standart open-furrow with disks, at major working speed.

Middle values of experimental producing tests results of open-furrow qualitative working indexes are shown in table 1.

Table 1. Working values indexes of open-furrows.

Nr. crt.	Indexes	The type of open-furrow		
		brace with sharp anglet	disk	experimental
1	The depth of remaind gutter, m	0,065	0,03	0,025
2	The lenth of remaind gutter at the field area, m	0,200	0,16	0,130

Sharp soil penetration angle of brace open-furrow and the stuffness of frontal side had a negative influence on the formation process of the gutter. The experiments showed that the open-furrow of that type can't be used at major working speed. So it left a deeper gutter with 61,5% toward the experimental open-furrow and with 53,8% in comparison to standart open-furrow with disks. On breadth the digression was 35% toward the experimental open-furrow, and, 20% in comparison to standard open-furrow with disks. Mix up with power moist lower soil layers with upper dry ones. The gutter depth of these open-furrows is near to critical one, so it is almost equal with its working depth. The standard open-furrow with disks presented a digression more with 16,7%, by depth with 18,8% , by the remaind gutter breadth toward the experimental open-furrow.

CONCLUSIONS

1. The gutter of brace open-furrow depth at major working speeds its almost critical, so it is almost equal to the working depth.
2. In conditions of laboratory the experimental open-furrow demonstrated a decrease of the remained gutter by breadth with 14,3% toward the brace open-furrow and 45,5% toward the standard open-furrow with disks , and by depth the decrease was 2,8% and 56,3% respective,at working major speeds.
3. The fields experiments confirmed the decrease of open-furrows working indexes by breadth with 35% toward the brace open-furrow, and 18,8% toward the standard open-furrow with disks and by by the depth, the decrease was 61,5% and 16,7% respective,at major working speeds.
4. In basis of theoretical and experimental researches the profile and shape of the open-furrow can be accepted as optimal and able to work at the speeds of 3,4 m/s, and more.

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THE DETERMINATION OF SOIL PARTICLES THROWING IN THE GUTTER FORMATION PROCESS, IN CONDITIONS OF SOWING DURING MAJOR WORKING SPEED.

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Key-words: *furrow –opener, gutter, sowing, technologic parameter.*

Abstract:

This article explains the experimental research data that had as goal the parameter determination of the experimental furrow-opener cereals sowing, at major working speed. In basis of obtained data the experimental furrow-opener demonstrated a lateral diminish moving of soil with approximately 39% comparative with researched models, at 3,4 m/s working speed.

INTRODUCTION

The open-furrows as working device are used at sowing machines and for planting agricultural cultures through the outstanding methods, that are used worldwide.
Scientifical project elements of agricultural machine devices were belaboured by V. Gorâčkin [2,3]. O. Laburov [4] who proposed the combined sowing machine equipied with disks. V. Gajdukov [1] proposes to accomplish cereals cultures drill in strips with combined, modified open-furrows. I. Morozov, [5] modifing of technologic and constructive parameters of existent open-furrows, he obtiened an increasing of autumn wheat harvest from 6,3 to 9,4%.

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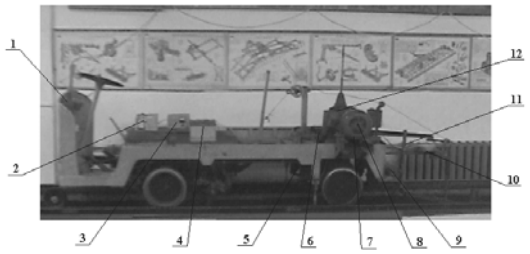

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After each passing of sowing machine, over the control area, were analysed the gutter profile that was left of each tested open-furrow. As in the laboratory, was used the method of taking photographs.

RESULTS AND DISCUSSIONS

The gutter formation is explaind through the lateral soil shifting by the open-furrow edges, and at major working speeds –the lateral

throwing of soil. Tests showed that at the speed almost equal to zero, the distruction soil zone is spread over the open-furrow at a distance of 0,2...0,26m from it. These results allowed us to determine the soil throwing values which depends on the open-furrow moving speed.

Laboratory tests results middle values of lateral soil shifting by the experimental open-furrows are shown in following table 1.

Tablel 1 Lateral soil particle shifting

Nr crt	Shift speed; V m/s	Lateral soil shifting , m		
		Sharp angle brace open-furrow	Standart double disks open-furrow	Experimental open-furrow
1	0,30	0,220	0,260	0,200
2	1,40	0,224	0,270	0,200
3	2,32	0,240	0,320	0,200
4	3,40	0,300	0,420	0,220

Lateral shifting was proved to be minuter for experimental open-furrow with 9% ,toward the brace open-furrow with 23% ,toward the standard open-furrows with disk, at shifting speed of 0,3m/s, and reaching 27% and52% values, respectively at moving speeds of 3,4m/s.

From the point of gutter formation in conditions of major working speed, the satisfactory results showed that the open-furrows which have the open angle edges in limits of $8...10^0$ and the oblic cutting of jaws that improved the technological indexes.

The experimental production research confirmed the optimal open-furrow parameters showing a decrease of lateral soil shifting with 45% toward the brace open-furrow and 21,5% toward the open-furrow with standard disks at major sowing speeds.

Lateral shifting proved to be minuter than for the experimental open-furrow which is explained by the negative angle of its jaws. Due to this, the hill breadth from the front open-furrow is smaller than other models. This pecularity is very important for the sowing technology because the decrease of soil accumulation improve the capacity of the open-furrow passing.

CONCLUSIONS

1. For cereals sowing at major working speeds must to be utilised open-furrows with oblic small cutting jaws and with opened angle edges in limit of $8...10^0$.

2. In conditions of laboratory the experimental open-furrow showed a decrease of the lateral soil shifting almost with 16% toward the brace open-furrow and with 35% toward the standard open-furrow with disks.

3. The field experiments confirmed a lateral soil throwing decrease at the experimental open-furrow almost with 45% toward the brace open-furrow and with 21,5% toward the standard open-urrow with disks at major working speeds..

4.In basis of experimental and theoretical researches the gutter and the shape of the experimental open-furrow, must be accepted as optimal and able to work at 3,4 m/s speeds and more.

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NEW TYPE OF PLANTING MATERIAL PRODUCTION FOR MOLDOVIAN APPLE ORCHARDS

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Key words: *apple tree, new type of planting material, variety, rootstock, fruit nursery.*

Abstract

The researches made had on base a new technology of plant material production at the fruit nursery called "Fruit Nurseries" Ltd. during the period 2004-2007. There were taken into the study the varieties: Golden Reinders, Jonagored (long-term varieties) and Idared (homologated variety) that were grafted on the rootstock M 9. Bench-grafts were made at the beginning of March and it was used the method of perfected copulation with detached branch. The distance of plantation of the grafted plants is 90x35 cm. In results were registered best indicators of the production of apple trees with the crown formed according to the "knip-baum" type in the second field of the fruit nursery at the first category of quality according to the current European standards is attributed to all the investigated varieties as for graft's height (153,7-189,0 cm), trunk diameter (15,2-17,1 mm), number of anticipated branches (6,4-12,7 pieces/tree) so as for their average length, and respectively the apple trees can be planted in the superintensive system of cultures.

INTRODUCTION

An important role at the foundation of superintensive orchard had the planting material, especially with ramifications, that constitute the crown basis [1, 3, 5].

Nowadays, in the countries with a well-developed fruit growing like Poland, Holland, Italy, Great Britain, France, Germany, etc., the orchards of this type are planted with two-year old apple trees with the crown basis already formed in the fruit nursery [1, 3, 4].

The crowned apple trees in the fruit nursery, being planted in the orchard, have an early fruit production and increase it more rapidly in comparison with those trees that don't have a crown [3, 5].

Crown formation in the school nursery means having cuttings and other methods of a rational structure of the crown basis adequated to the biological features of the species, varieties, variety/rootstock association, ecological and technological conditions in order to have an urgent fructification of the apple trees after their plantation in the orchard [4, 5].

MATERIAL AND METHODS

During the period of 2004 to 2007 were made researches in the fruit nursery of the mixed industrial unit "Fruit Nurseries" founded on the basis of collaboration between the joint-stock company "Codru-ST" and the Dutch "Van Rijn International". The first field was planted on the second part of April with bench grafts made in March and it was used the method of perfected copulation with detached branch.

As a rootstock was used the biotype M 9, and as a graft the variety Idared homologated in the Republic of Moldova and the long-term varieties: Golden Reinders and Jonagored. For grafting were used marcottes with a diameter of 10.0 mm and graft branches with high biological qualities imported from Holland.

The place of grafting was tied with special film, the graft was paraffined. The obtained grafts have been stratified by placing them vertically in containers, in the way that the basic part of the layer (20-25 cm) should be in a wet and moist stratum of sand. The temperature of stratification in the refrigerator is +2…+4 ^{0}C. The distance of plantation of the grafted plants is 90x35 cm. The annual trunk was cut at the height of 50 cm from the graft's place in spring, in the second field. Simultaneously with the growth of lateral shoots was made the clear up of the trunk leaving only the terminal one. To obtain sylleptic shoots on the central axle, when they reached the length of 15-20 cm, it was made the remove of apical leaves without hurting the point of growth. This operation is repeated every 5-7 days for 5-6

times. To stimulate the development of sylleptic shoots, are made more frequent irrigations and fertilizations with manures on the basis of nitrogen. The aerial part was palisated on a stick of bamboo.

The usual black soil, the content of humus is 2.6%, that is maintained as cultivated field, irrigation is made by sprinkling keeping the soil wet at 75-80% from the capacity of field.

The aim of the research is to determine the main growth indicators of "knip-baum" apple trees in the first and second field of the nursery.

The number of repetitions in each variant is 4. The number of trees in each repetition is 20. The researches were made in field and laboratory conditions according to the required methods for doing experiments with fruit-growing plants. The main results obtained were statistically processed.

RESULTS AND DISCUSSION

The studies made demonstrate the development of "knip-baum" apple trees in the fruit nursery which depends on the biological characteristics of the varieties.

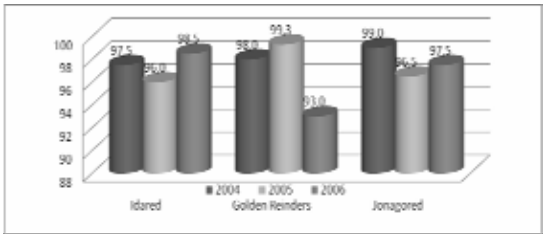

Fig. 1. The degree of striking of the bench graftings in the first field of the nursery, %.

The degree of striking and growth starting of the bench graftings, planted in the first field (fig. 1), is between the limit: 96.0-98.5% at Idared variety, 93.0-99.3% - Golden Reinders, and 96.5-99.0% - Jonagored.

The graft diameter at 10 cm above the grafting's place constituted 9,3-11,0 mm. The leaf surface, according to the variety, is between the limits of 5.39-6.66 thousand m^2 per 1 ha.

In 2006 the values of the main indicators of apple tree growth were lower with about 6-16% than in 2004 and with 5-14% than in 2005.

In the second field at the end of the second period of vegetation in the fruit nursery (table 2) the tree's height of the studied varieties constituted 184-189 cm (2005), 167.9-181.1 cm (2006) and 153.7-179.0 cm (2007). The greatest values were registered by the variety Jonagored, and then were followed by Golden Renders an Idared. The trunk diameter's between the limits of 15.2-17.1 mm.

Table 1. The main indicators of growth of the apple trees in the first year of vegetation in the nursery.

Variety	Graft height, *cm*	Graft diameter, *mm*	Leaf surface, *thousand m^2/ha*
2004			
Golden Reinders	112	9,3	6.03
Jonagored	126	10,2	6.66
Idared	112	9.6	6.03
Dl $_{0,05}$	*4.65*	*0.62*	*0.58*
2005			
Golden Reinders	116	10.2	6.03
Jonagored	122	11.0	6.34
Idared	115	9.8	6.34
Dl $_{0,05}$	*4.65*	*0.35*	*0.58*
2006			
Golden Reinders	110	9.6	5.71
Jonagored	116	9.6	6.34
Idared	106	9.8	5.39
Dl $_{0,05}$	*5.22*	*0.24*	*0.76*

The leaf surface influences directly on the development of the aerial and subterranean part of apple trees which increases depending also on the varieties from 0.41-0.50 m^2/tree to 0.67-0.72 m^2/tree.

Table 2. The main indicators of the aerial part development of apple trees in the second year of vegetation in the nursery.

Variety	Graft height, *cm*	Trunk diameter, *mm*	Leaf surface, *m^2/tree*
2005			
Golden Reinders	184.0	17,1	0,47
Jonagored	185.0	17,0	0,72
Idared	189.0	16,8	0,46
Dl $_{0,05}$	*4.65*	*0,35*	*0,02*
2006			
Golden Reinders	167.9	15.2	0.56
Jonagored	181.1	15.4	0.67
Idared	179.9	16.0	0.50
Dl $_{0,05}$	*5.70*	*0.30*	*0.03*
2007			
Golden Reinders	171.7	15.5	0.59
Jonagored	179.0	15.2	0.50
Idared	153.7	15.5	0.41
Dl $_{0,05}$	*6.56*	*0.32*	*0.03*

The average number of sylleptic shoots in the crown zone (table 3) in the second field of the nursery depends greatly on the hereditary capacity of the variety to emit sylleptic shoots and depending on the variety constitutes 6.4-12.7 pieces/tree. In 2007 the number of sylleptic shoots in the crown zone was strongly influenced by drought and has registered the

lowest number (6.4-8.2 pieces/tree) for all the varieties taken into to study.
Their average length increases from 34.0-40.2 cm (Idared) to 54.2-55.7 cm (Jonagored) or with 38-59% than Idared, and for the Golden Reinders variety the value of this index is intermediary and constitutes 37.9-46.9 cm that greatly depends on the biological features of the variety.

Table 3. Parameters of sylleptic shoots in the crown zone of apple trees in the second field in the nursery.

Variety	Parameters of sylleptic shoots		
	Average number, *piece*	Average lenght, *cm*	Summed lenght, *m/tree*
2005			
Golden Reinders	10.1	41.0	4.14
Jonagored	9.4	55.7	5.23
Idared	9.3	34.0	3.16
Dl $_{0,05}$	*0.78*	*6.92*	*0.80*
2006			
Golden Reinders	12.7	37.9	4.81
Jonagored	10.0	54.2	5.42
Idared	8.6	34.2	2.94
Dl $_{0,05}$	*0.82*	*3.69*	*0.23*
2007			
Golden Reinders	8.2	46.9	3.84
Jonagored	8.2	55.4	4.54
Idared	6.4	40.2	2.57
Dl $_{0,05}$	*0.66*	*4.88*	*0.12*

The summed length of sylleptic branches for the varieties taken into the study depends on the hereditary quantity of the variety to emit sylleptic shoots and also on their average length. The lowest value of this index registered the variety Idared – 2.57-3.16 m/tree, and the highest – Jonagored – 4.54-5.42 m/tree or it increased with 71-76% than Golden Reinders (3.84-4.81 m/tree).

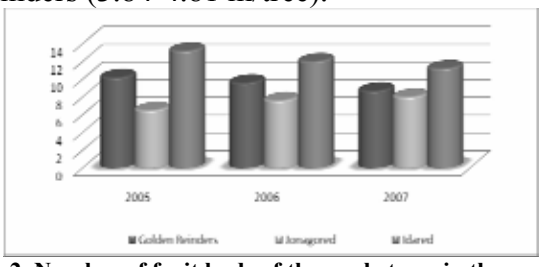

Fig. 2. Number of fruit buds of the apple trees in the second field of the nursery, *pieces/tree.*

A very important index is the quantity of bud fruits (fig. 2) that exist at the variety Golden Reinders – 8.7-10.2 pieces/tree, Jonagored – 6.5-8,0 pieces/tree and Idared – 11.2-13.2 pieces/tree.
The root system development of the apple trees that are bench grafted at the end of the second year of vegetation in the second field of the nursery is more emphasized at the variety Jonagored with vigor of growth that is over the normal average and where it was registered a length of 66.82m/tree than 62.93 m/tree for the variety Golden Reinders and 59.90 m/tree for Idared. The roots weight doesn't differ essentially, depending on the varieties taken into the study, and is between the limits of 27.26-30.03 g/tree.

Table 4. Root system development of the apple trees in the second field of the nursery, *2006.*

Variety	Root weight, *g/tree*			Root length, *m/tree*		
	diameter		*sum*	diameter		*sum*
	< 3 mm	*> 3 mm*		*< 3 mm*	*> 3 mm*	
Golden Reinders	17.43	9.83	27.26	62.10	0.83	62.93
Jonagored	19.40	10.63	30.03	66.01	0.81	66.82
Idared	12.86	14.90	27.76	58.73	1.17	59.90

The maximum quota of these main indicators was registered by Jonagored, where their value increased with about 6-10% in comparison with Golden Reinders and with 8-11% than Idared.
According to the type of roots and their thickness in the second field of the fruit nursery, at the varieties Golden Reinders and Jonagored predominates fibred root weight with a diameter lower of 3 mm – 63.9-64.6%. At the variety Idared non-significantly predominates the root weight with a diameter bigger than 3 mm, being 53,6%. For all the varieties under the study, the fibred root length constitutes 98.0-98.7% of the total length.

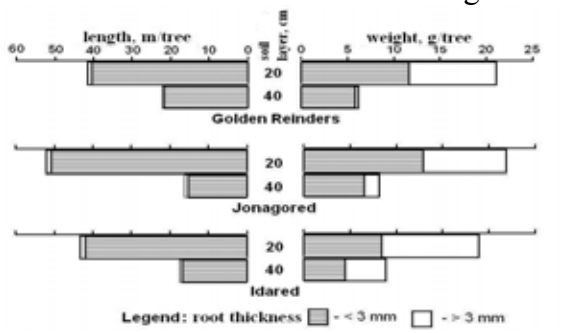

Fig. 3. Root system architectonics of apple trees in the second field of the nursery, *2006.*

The root system location on the vertical profile of the soil is more emphasized in the soil layer of 0-20 cm where 52-75% of the total quantity of roots is.
The obtained results demonstrate that all the indicators of the varieties taken into the study

in the second field of the fruit nursery are corresponding to the first category of quality according to the current standards.

Table 5. Profitability and goods' quality of "knip-baum" type apple trees in the second field of the nursery, *average in 2005-2007.*

Variety	Productivity, *thousand pieces/ha*	Goods quality, *thousand pieces/ha*	
		I	*II*
Golden Reinders	30,52	29,28	1,22
Jonagored	30,63	29,91	0,72
Idared	30,31	27,77	2,54

At the variety Golden Reinders the productivity of apple trees of first quality constitutes on an average 29.28 thousand pieces/tree or about 96%, at the Jonagored variety – 29.91 thousand pieces/tree or 98% and represents the highest values and for Idared variety is 27.77 thousand pieces/tree or 96-98% of the number of the planted graftings in the first field.

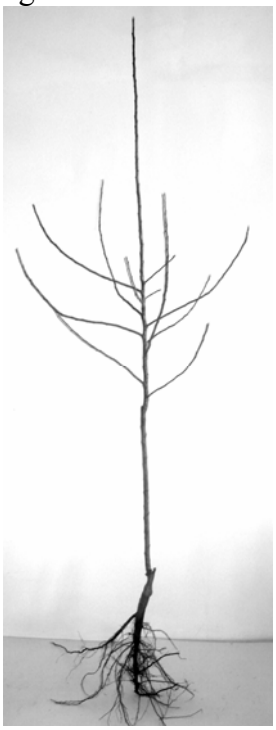

Photo. 1. Aspect of new type of planting material ("knip-baum") in Moldavian fruit nursery.

CONCLUSIONS

As a conclusion of the researches made, were established:

1. Bench graftings the striking degree is very high, being 93.0-99.3%;
2. At the production of apple trees with the crown formed according to the "knip-baum" type in the second field of the fruit nursery at the first category of quality according to the standard is attributed to all the investigated varieties as for graft's height (153.7-189.0 cm), trunk diameter (15.2-17.1 mm), quantity of anticipated branches (6.4-12.7 pieces/tree) so as for their average length, and respectively the apple trees can be planted in the superintensive system of cultures;
3. The leaf surface of a fruit nursery depends directly on the biological characteristics of the varieties being in the first year of vegetation of 0.17-0.21 m^2/tree and in the second year is 0.4-0.72 m^2/tree;
4. The highest production profitableness was registered by the Jonagored variety, followed by Golden Reinders and respectively Idared;
5. The main weight of apple tree roots in the first and second field of the fruit nursery is places in the soil layer of 0-40 cm, inclusively 52-75% in 0-20 cm soil layer;
6. The long-term varieties (Jonagored, Golden Reinders) reached more superior values of apple tree development in the second field of the nursery in comparison with the homologated varieties (Idared) that are corresponding entirely to the pedoclimatic conditions from our country.

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DEVELOPING THE TRANSMISSION SYSTEM OF THE COMBINE CUTTING DEVICE FOR HARVESTING RICE CROP

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Key wards: *developing, combine, cutting device, harvesting, Egypt*

Abstract

The transmission system of the combine cutting device was developed and manufactured from local material to be suitable for the harvesting operation under Egyptian conditions. Performance evaluation of the combine before and after development during the harvesting operation of rice crop was carried out in terms of grain losses, field capacity , field efficiency, fuel consumption, required power, energy, wearing rate, wearing resistance and cost requirements. The combine performance was studied as a function of change in combine forward speed and grain moisture content and operating time. The results were obtained to gave maximum field capacity, field efficiency, wearing resistance and minimum energy, power, fuel consumption wearing rate, and cost requirements for the two systems of the combine cutting device before and after development as following: It is recommended to used the developed combine, at a forward speed of 3.5 km/h and a grain moisture content of 23%.

INTRODUCTION

Rice crop is considered one of the most important foods and export crops in Egypt. The cultivated area of rice in Egypt is about 1.77 million feddan yearly producing about 7.24 million ton with an average yield of 4.091 tons/feddan. **Habib et al. (2001)** mentioned that increasing plant stem diameter need higher knife velocity for performing the free cutting operation. Whereas, increasing mass of plant stalks need low critical speed. Also, moisture content of plants materials affecting on the critical knife velocity throwing by the cutting force, where the cutting force variation with the moisture content. **El-Nakib et al. (2003)** found that header, threshing, separating and shoe losses increased with the increase of the forward speed and the decrease of grain moisture content. The optimum operating parameters for harvesting rice crop were combine forward speed of 4.5 km/h and grain moisture content of 16.5%. **Badr et al. (2005)** indicated that increasing the forward speed from 1.0 to 4.0 km/h at a constant moisture content of 22 %, increased field capacity from 0.31 to 1.14 fed/h. While the field efficiency decreased from 89.3 to 82.7 % using Yanmar combine. **El-Sharabasy (2006)** tested that increasing machine forward speed from 1.5 to 3.0 km/h increased effective field capacity from 0.277 to 0.452, 0.251 to 0.382, 0.208 to 0.349 and 0.181 to 0.296 fed/h at different grain moisture contents of 21.45, 22.20, 23.12 and 24.60%, respectively. **Fouda and El-Tarhuny (2007)** studied that the wearing behavior are affecting by many factor such as composition of material, hardness, strength, toughness and working time. Also, they added that increasing working time increased wearing rate. **Abdelmotaleb et al. (2009)** showed that the increase of combine forward speed forward 0.8 to 2.5 km/h leads to decrease the field efficiency from 84.96 to 62.35% at cutting height of 0.2 m by using the combine without control system. The other cutting heights and combine systems had the same above mention trend. **El-Hanfy et al. (2009)** studied that the power consumption for cutting straw rice was increased with increasing forward speed and cutting speed. The minimum value of power consumption was (15 kW) noticed at (0.35 m/sec and 450 rpm) forward and cutting speed respectively.

So one of the serious problems during the harvesting operation were noticed that the vibration in the transmission system of the combine cutting device which causes to high wearing rate and break the crank.

The objectives of the present work are developing the cutting blade crank of the combine for harvesting rice crop and selecting the combine optimum conditions. Also estimate the expected life for the cutting blade crank before and after development.

One feddan (fed.) represents an agricultural area unit in Egypt = 4200.83 m^2 and one American dollar =5.54 Egyptian pound (L.E) according to prices of 2010

MATERIAL AND METHOD

The main experiments were carried out during seasons 2007 and 2008 at Bassuen farm, Gharbia Governorate to develop the cutting blade crank on the Yanmar combine for harvesting rice crop (Sakha 101 variety) and select the optimum conditions (combine forward speed and grain moisture content) for operating the developed combine.

Materials: The mean values of crop characteristics of rice variety Sakha 101 were plant height, 92.3 cm, no. of panicles 526.5 / m^2 and weight of 1000 grain, 29.18 gm

-Combine harvester (Yanmar), Type (CA-385 EG. Japan), output power hp/rpm, 35/2800 and engine vertical, water cooled 4-cyclediese.

Methods: The experiments were conducted in an area of 5 feddans at different forward speeds of 2, 2.5, 3.5 and 5 km/h and grain moisture contents of 15, 20.3, 23 and 25.7% during operating time (250, 500, 750 and 1000 hours) to select the operational optimum operational conditions.

The combine cutting device: The combine cutting device in the Yanmar combine is a three dimensional – slider crank six bar mechanism. This mechanism is used to drive the combine cutters. It consists of crank shaft, connecting rod (pitman), lever, link and knife. Such problems had been noticed during the harvesting operation using the ordinary cutting mechanism. By many observations, it is noticed that the crank shaft of the cutting mechanism is the source of these problems. The wearing rate in the crank joints is very high, leads to increase of vibration in the whole cutting mechanism parts that tends to break the crank. For this reason, such core had been taken to construct, develop and operate another crank taking into consideration cutting efficiency and crank durability.

Crank shaft of the cutting mechanism before development.

Crank cutting blade unit was made of hard steel metal, the unit consists of yoke crank jointed with the rod reap edge crank and at the end there is a ball connected with arm reaping edge trans the motion to cutting blade as shown in Fig. 1.

Crank shaft of the cutting mechanism after development.

The developed crank is constructed in such a case to avoid vibration of the cutting device and to prevent any loss of knife speed. The developed cutting device has a new design with two flange bearings. The device consists of holder bearing, bearing ball, nut, Shaft connect, holder bearing and bearing ball. The design was used to control the knife speeds and minimize the wearing rate of this part as shown in Fig. 2.

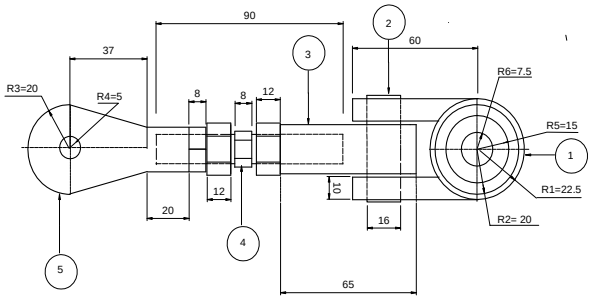

Fig. 1: Crank of the cutting device before development
(1) Yoke crank (2) Pin yoke (3) Joint rod
(4) Lock nut (5) Ball rbl

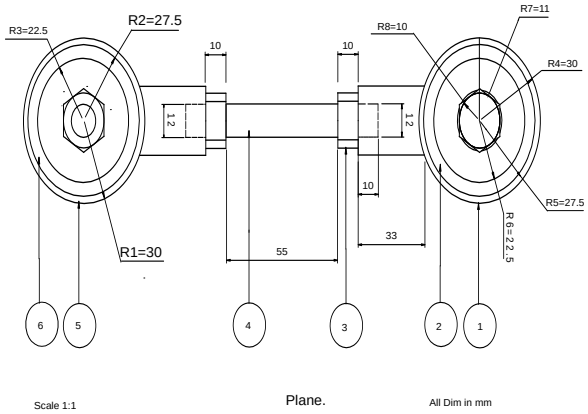

Fig.2: Crank of the cutting device after development
(1) Holder bearing-L (2) Bearing ball
(3) Nut (4) Connecting rod
(5) Holder bearing-R (6) Bearing ball

Evaluation of the combine performance was carried out taking into consideration the following indicators:

Effective field capacity: Is the actual average working rate of area and theoretical field capacity is calculated by multiplying machine forward speed by the effective working width of the machine.

Total grain losses: The percentage of total grain losses was calculated by using the following equation:-

Total grain losses= (pre-harvest + header +un-cutting + threshing and cleaning) losses, %

Required power: To estimate the engine power during harvesting process, the decrease in fuel level accurately measuring immediately after each treatment. Hunt equation (1983) was used to estimate the engine power.

-Wearing rate: It was calculated as a removal weight (g), or removal area from cutting device divided by operating time (h), or, area (m^2), or harvest length (km).

Wearing resistance: It was calculated as inverted wearing rate (Kantarc, 1982):

$$\text{Wearing resistance, } (\text{km.g}^{-1}) = \frac{1}{\text{Wearing rate , } (\text{g.km}^{-1})}$$

Harvesting cost: The total cost of harvesting operation was estimated using (Awady, 1982) equation. The criterion cost was estimated by the following equation:-

Criterion cost/fed. = operating cost + grain losses cost/fed**.**

RESULTS AND DISCUSSIONS

Effect of grain moisture content: The most critical factor causing un-cutting losses is grain moisture content**.** Figs. 3 and 4 show the effect of grain moisture content on the percentage of un-cutting and total losses**.** The increase of grain moisture content less than 23.0% leads to increase the un-cutting and total losses. Also, increasing of grain moisture content more than 23.0% leads to increase the un-cutting and total losses due to increase un-cutting plants. Increasing the grain moisture content more than 23.0 up to 25.7% insignificantly affect the un-cutting and total losses. Therefore, the lowest un-cutting and total losses values were recorded with the rice moisture content of 23 %. Also, increasing of un-cutting and total losses by increasing forward speed is due to decrease the cutting efficiency and increase un-cutting plants.

Effect of combine forward speed: The effect of forward speed on field capacity and field efficiency is shown in Fig. 5. The results revealed that by increasing of forward speed from 2 to 5 km/h. at a constant grain moisture content of 23% and operating time of 750 h. the field capacity increased from 0.59 to 1.34 fed/h. and from 0.61 to 1.35 fed/h. before and after cutting device development respectively. While, increasing of forward speed from 2 to 5 km/h, the field efficiency decreased from 85.5 to 77.5% and from 88.4 to 78% under the same previous conditions. However, the high field efficiency of the modified combine may be due to higher actual field capacity comparing the original combine. Power as well as energy requirements are too related to the combine forward speed. Results show that, power required increased as the forward speed increased while the vice versa was noticed with energy requirements as shown in Fig. 6. The results evident that by increasing forward speed from 2 to5 km/h at a constant grain moisture content 23% and operating time of 750 h required power increased from 13.62 to14.47 kW and from 13.15 to14.28 kW before and after development respectively. Increasing of required power by increasing

combine forward speed is attributed to the excessive load of plants on the cutter-bar in the time unit and the high impact of cutter-bar with the plants added to the excessive load of plants on the other combine devices.

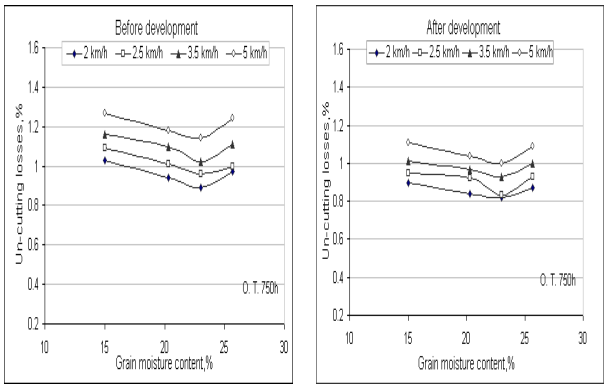

Fig. 3: Effect of grain moisture content on un-cutting losses under different forward speeds before and after cutting device development.

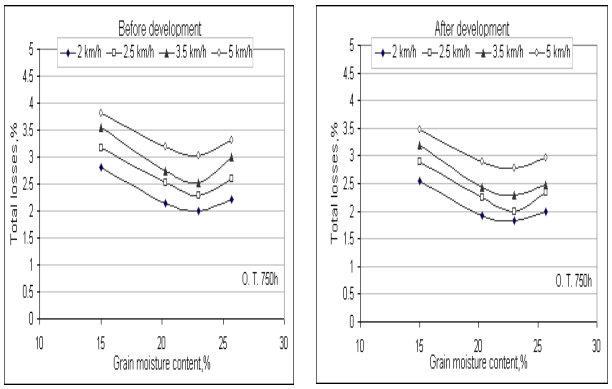

Fig. 4: Effect of grain moisture content on total grain losses under different forward speeds before and after cutting device development

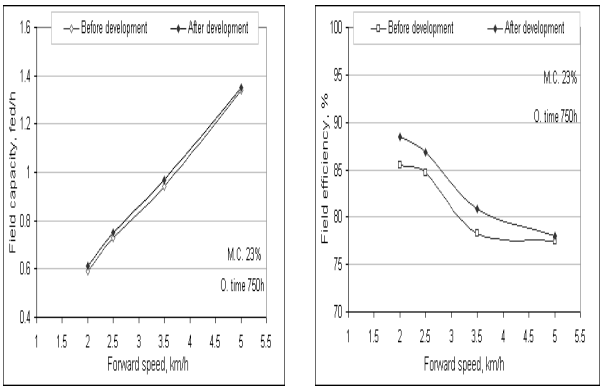

Fig. 5: Effect of combine forward speed on field capacity and field efficiency before and after cutting device development

By increasing forward speed from 2 to 5 km/h, energy requirements decreased from 23.08 to 10.80 kW.h/fed and from 21.56 to 10.58 kW.h/fed under the same previous conditions. The decrease in energy requirements by increasing combine forward speed is attributed to the increase in field capacity.

Wearing rate and wearing resistance on cutting device:

The effect of operating time on wearing rate and wearing resistance in combine cutting device before and after development is shown in Fig. 7. Results indicated that by increasing operating time from 250 to 1000 h. the wearing rate in combine cutting device increased from 0.044 to 0.062 g/h and from 0.03 to 0.04 g/h before and after development respectively. While the wearing resistance decreased from 79.5 to 56.45 km.g^{-1} and from 116.7 to 87.5 km.g^{-1} at the same condition.

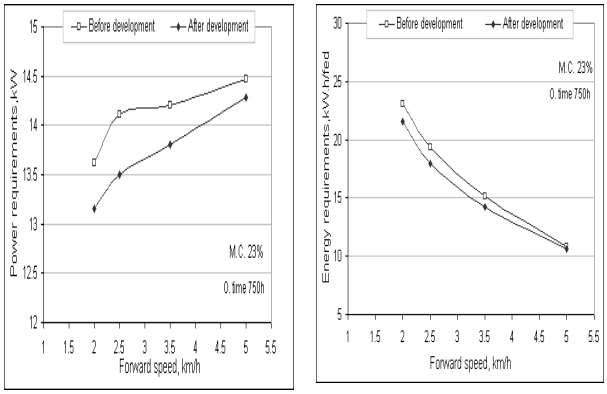

Fig. 6: Effect of combine forward speed on required power and energy requirements before and after cutting device development

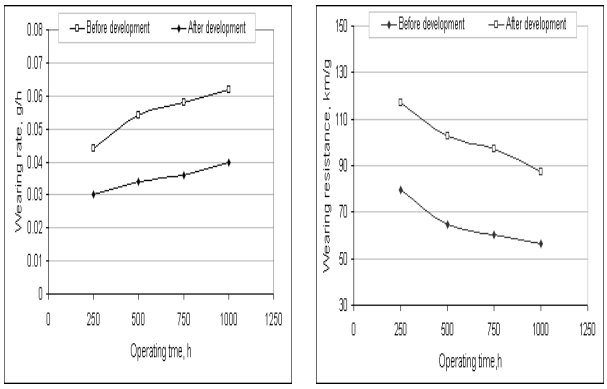

Fig.7: Effect of operating time on wearing rate in combine cutting device before and after development

Harvesting cost: The effect of combine forward speed on operating and criterion cost

before and after development shown in Fig. 8. Results showed that increasing forward speed from 2 to 5 km/h at a constant grain moisture content 23% and operating time of 750 h operating cost decreased from 101.64 to 44.78 LE/fed and from 98.36 to 44.44 LE/fed before and after development respectively. The higher values of operating cost at lower forward speed are due to the decrease in combine field capacity. While by increasing forward speed from 2 to 3.5 km/h the criterion cost decreased from 214.92 to 198.19 LE/fed and from 201.89 to 175.42 LE/fed, increase in forward speed from 3.5 to 5 km/h criterion cost will increase from 198.19 to 215.7 LE/fed and from 175.42 to 201.14 LE/fed under the same previous conditions.

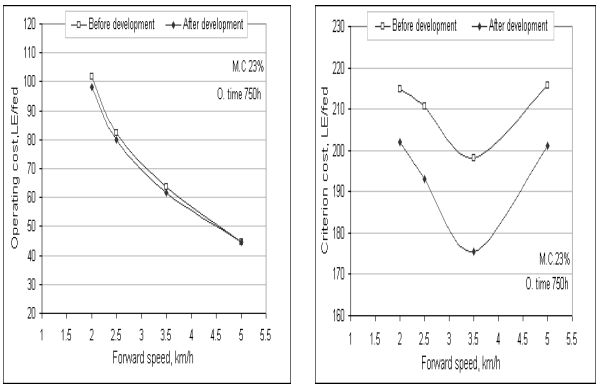

Fig.8: Effect of combine forward speed on operating and criterion cost before and after cutting device development

CONCLUSIONS

The main results of the present research can be summarized as follows:

1. The development of the combine cutting device during harvesting of rice crop gave to maximum field capacity, field efficiency, wearing resistance and minimum required power, energy, wearing rate and cost requirements.
2. The optimum conditions for operating the combine during harvesting of rice crop were forward speed of 3.5 km/h., operating time of 750 h and rice grain moisture content of 23%.

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ENVIRONMENTAL PROTECTION THE CONTEXT SUSTAINABLE DEVELOPMENT

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Key words: *environmental protection, recovering, stategy*

Abstract

Environmental protection is a general concern on the one hand, it is an issue related to the development of the society, and on the other hand, it is a matter of recovering, preserving and protecting the environment. In order to solve this problem as efficiently as possible, some strategies in the field have been elaborated, as well as action plans on local, regional, national, European and international levels. Astrategy regarding environmental protection must define general guidelines, principles, directions, objectives and criteria to identify actions that may lead to a social, economic and sustainable development envisaging environmentally related issues.The action plan must comprise the objectives and tasks embodied and quantified in time, space and costs.Without environmental protection, no sustainable development can be carried out.Sustainable development includes environmental protection, while environmental protection conditions sustainable development in its turn.

INTRODUCTION

The word "environment" has a large and fundamental meaning which includes biotic and abiotic world, practically everything that surrounds human beings. Considering man's central position in his environment, it is only natural that the environment is referred to only in relation with man and his natural interests.

The term of environment comes from the corresponding English noun, which also entered in other languages, meaning the space around man. Specialized legal literature, different regulations and documents of international organizations also use the terms of "biological environment", "surrounding environment" or "human environment".

The word "pollution" is of latin origin; *polluero-ere* means to dirty, to profane. Pollution can also have natural causes, but mainly human activity, man "dirtying" his own environment. But pollution is the result of the existence and activity of any being which produces waste, making life difficult or even impossible in the given environment.

In other words, pollution is the poisoning caused by pollutants and it is deeper when the difference between the concentration of the polluting agent and the tolerance limit is higher. Pollution – as a natural, but especially artificial phenomenon - is a barrier against social-economic development and is also a warning that natural resources can't be exploited irrationally, that natural material and energy resources should be used rationally and efficiently in human interest.

MATERIAL AND METHOD

During the last decades the multiple causes of pollution have caused "environment protection" to become one of the most important issues of humanity, affecting people's lives and economic development all over the world.; environment protection supports life on Earth quantitatively and qualitatively.

Thus, environment protection can be defined as a human conscious activity, scientifically funded, with the concrete aim of preventing pollution, maintaining and improving life conditions on Earth.

In order to characterize the evolution of milk production , the following indica Environment

factors to be protected are all the elements of natural environment: soil, subsoil, water, vegetation, terrestrial and aquatic animals, forests, reservations and nature monuments, as well as the two categories of artificial environment, meaning human settlements with everything man created outside them. "Sustainable development", meeting present needs without compromising those of future generations – is a fundamental objective, acknowledged by international agreements. To reach this objective, economic, social and environment policies must be approached in a synergy, at all levels.

RESULTS AND DISCUSSIONS

Up to the present day, three international conferences have played a decisive part in environment protection and sustainable development:
UN Conference on Environment, Stockholm, 5-16th June1972;
UN World Conference on Environment and Development, Rio de Janeiro, 3-14th June 1992;
World summit on Sustainable Development, Johannesburg (South Africa), 26th August – 4th September 2002
In the first World Conference on environment protection, in Stockholm, 114 countries sent their delegates, Romania included, the slogan being "A single Earth". During this conference, the 5th June was proclaimed International Environment Day.
Among the numerous documents of this important event, the *Plan of Action for Environment* has been adopted; it includes 109 recommendations for the states, which are not legally compulsory, to be applied after drawing up national regulations according to those texts. Thus, this plan led to subsequent international, regional or national measures, such as Sea Charter (protection of the Baltic Sea and the Black Sea), Protection of the Antarctic etc. The main document of this conference is the *Final Declaration on Environment*, which starts from the idea that man is the creator and the destroyer of the environment which supports life and the possibility to develop socially, intellectually, morally and spiritually. Also, the declaration emphasizes the organic connection between environment and peoples' economic and social progress, in the context of removing the negative effects of underdevelopment.
The Conference in Rio took place in two stages. Environment ministers, representatives of of similar bodies and institutions, UN specialized bodies, representatives of inter-government and non-government bodies in 181 states. The second stage was called Earth Summit.
Several documents were issued during this conference, the most important of which was the *Declaration of Principles*, also called "Earth Charter". It contains principles o be followed in interhuman relationships, as well as in human-nature ones. This document was meant to ensure the extension of Stockholm conference and its aim was to prepare the international agreements protecting world system of the environment, through international partnership, with new cooperation levels in key sectors of economy.

The Declaration of principles includes the fundamental rights and obligations of states and citizens in the field of environment, grouped in 27 principles, without compulsory legal power. Other important documents issued on the occasion of this conference were:
Agenda 21, consisting in an action program to be applied by the governments, development agencies, UN organizations and independent sector groups, in each sector where human activity affects the environment;
Convention on climate changes is a firm commitment of the signing countries that until year 2000 they would diminish their carbon dioxide emissions to the 1990 level. This commitment also had direct repercussions on industrial development, energy production and road traffic;
Convention on biological diversity – includes the measures to be taken for the protection of ecosystems and the various life forms. Signing states commited into establishing protection areas, to integrate biological issues in the national development plan and to ensure – for the entire human community – the advantages coming from the use of genetic resources, including the transfer of b iological technologies

from the developed countries to the developing ones;

Declaration of principles regarding forest preservation and exploitation, which was supposed to be a convention, but stayed just a declaration of principles because an agreement could not be concluded.

Although environment issues are not new, it was only in 1970 that the European Commission declared for the first time, in an official statement addressed to the Council, the necessity of elaborating a Community program on environment. Six environment programs were elaborated within CEE and later within UE since then, in 1973, 1977, 1983, 1987, 1992 and 2001. They express a real Community "phylosophy" on environment protection and improvement and established/establish a schedule of specific actions for the years covered by each program. Those documents do not have legal power and are just political declarations which present objectives to be reached within a precise schedule.

The first four action programs approached ecological issues in a vertical and sector manner. During these programs, the Community issued almost 200 legislative documents on environment, which referred mainly to pollution reduction, introduction of minimum norms, especially in the fields of waste management and water and air pollution. However, this legal regulation did not prevent environment degradation. Thus, the principle of systainable development was integrated within Community missions, and environment protection became an absolute priority.

The fifth action program in the field of environment, "Towards sustainable development" included a new Community strategy for environment and the actions to be carried out for a sustainable development during 1992 – 2000. The program was the basis of a European strategy based on voluntary actions, marked the beginning of a horizontal Community action, taking into account all polluting agents (industry, energy, tourism, transport, agriculture) and established four essential issues which must be the object of international actions: climate changes, ozone layer deterioration, lower biological diversity and deforestation.

The sixth Community program for environment, entitled "Environment 2010: our future, our choice" establishes the objectives, deadlines and priorities, priority lines of strategic approach of environment, at European level and has four action priorities: to forecast climate change, to protect nature and biodiversity, to solve environment and health issues, to manage natural resources and wastes.

An important innovative element which deserves to be emphasized is product integration policy, which aims at the development of a more ecological market

Despite older preoccupations in the field, it was only in June 2001 that the European Commission in Göteborg developed a strategy for sustainable development, offering a third dimension, the environment one, to the strategy in Lisbon and establishes a new approach of the policies. This strategy is practically a continuation of the efforts for reaching the sustainable development objectives in the fifth EU Action Program (1992–2000), "Towards sustainable development", which acknowledges that environment protection is essential for the future development of the Community.

This Community strategy is a part of the sixth EU Action Program for Environment, "Our future, our choice", which establishes priority actions for 2001-2010

The strategy is based on the principle that the economic, social and environment effects of the policies should be examined in a coordinated manner and must be taken into account when making decisions.

European Council identified several objectives and measures in the four priority fields of the future EU development policy: stopping climate change, achieving sustainable development, public health, a more responsible administration of natural resources.

The conclusions of the Council in Brussels on 20-21st March 2003 stresses that there was significant progress in the accomplishment of objectives established in Lisbon strategy, and a sustainable increase based on the global strategy issued at Goteborg stays a EU priority. Among the objectives mentioned by this Committee,

there is also environment protection for a sustainable development. The concrete measures to be taken within the following years to reach that objective are: improvement of environment indicators, new ways of transporting oil products, new fuels and technologies for vehicles, a system of penalties (including penal ones) for ocean pollution, a program entitled "Smart energy for Europe", application of protocols and agreements on environment.

Like other countries, Romania faces serious issues regarding environment protection, especially following intense pollution caused by industry and agriculture, by populated centres or by neighboring countries, which resulted in disbalanced ecosystems and deteriorated human life condition.

It is impossible to ensure a sustainable development without environment protection. Therefore, the main directions in the strategy for environment protection can be found in Romania's National Strategy for Sustainable Development.

The Strategy for Environment Protection was elaborated in 1995 and published in 1996 with PHARE support. In 1999, the Government approved the National Strategy for Sustainable Development.

Starting with 2001, the Government Program includes concrete measures and actions for environment protection, a clean and healthy environment for the entire population, also observing the main objectives and priorities in the National Action Program for environment protection

The Strategy for environment protection in Romania had to be updated yearly from multiple causes: changes in environment factors, Romania's social-economic status, elaboration of the National Strategy for Sustainable Development, Government regulations connected to environment protection, ongoing elaboration of sector strategies, Romania's participation in new international conventions and agreements, regional and international documents and regulations. Therefore, the Strategy for environment protection is a dynamic one.

The general principles used when drawing up the strategy for environment protectionwere as follows

- preservation and improvement of health conditions ;
- sustainable development;
- avoiding pollution through preventive measures;
- conservation of biological diversity and ecologic reconstruction of damaged systems;
- preservation of cultural and historical legacy;
- maintaining and improvement of of population health and life quality;
- maintaining and improvement of nature's existing potential;
- observing the international conventions and programs on environment protection.

The Strategy for environment protection includes short term objectives (up to 2004), medium term objectives (up to 2010) and long term objectives (up to 2020), based on the general principles and criteria which had been taken into account when establishing the priorities and actions for environment protection

CONCLUSION

Increase number and complexity of pollution issues required the update of existing tasks in the field and elaboration of new ones. Thus, the actions for environment protection are connected to economic development policy, to medium and long term economic and social forecasts. Society, economy must work, and environment protection must be ensured at any costs.

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SUSTAINABLE DEVELOPMENT REQUIREMENTS INTEGRATION IN AGRICULTURE

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Key words: *sustainability,features, measure,increasing*

Abstract

Recent developments in agriculture have been significant, but also led to an increasing environmental impact. One of the most important topics nowadays is to provide a sustainable development, in order to secure food security and environmental protection. The need to identify real measures that will bring us closer to the generous objectives of sustainability transferred the focus on analyzing the requirements in different sectors. Therefore, in agriculture, the environmental component, but also the social component triggered particularities will be found at the levels of principles and general aims formulation, and also at the more pragmatic level of measures that have to be implemented in order to rich the sustainability targets have particular features.

INTRODUCTION

All countries attempted to promote agricultural development by financing research activities, providing services and other forms of aid, stimulating production through subsidies. This is the reason for the four times higher agricultural production since the beginning of the century, contributing to the development of society in general. At the same time though, agricultural pollution increased, altering the quality of certain landscapes.
Agriculture became intensive, with a higher specialization of farms and regions. By replacing man and animals with the energy of fossil fuels, enhancing soil productivity and crop yields with fertilizers and pesticides, agriculture has got to a stage where it is possible to obtain short term profitableness of farms, to the detriment of the harmony and independence of secular agriculture – environment relationships.

MATERIAL AND METHOD

Changes in farm practice and in used technologies had great impact on the environment. Among the main issues of agriculture, we can mention the following:

1.Effects on human health (residues of pesticides, chemical fertilizers, heavy metals, additives in animal food and other pollutants in soil, water and entire food chain)
2.Contamination of surface and underground water and eutrofizarea of surface water due to nitrates and phosphates
3.Agricultural pollution connected to animal intensive breeding
4.Air pollution from crop spraying and spreading of semi-liquid and liquid animal waste on the field
5.Soil settling, erosion and pollution
6.Degradation of landscape and wild species habitat.
Currently,Romanian agriculture sometimes faces serious pollution issues, thus becoming a rather defenseless victim, following the various social-economic activities of our country. Since the Environment Conference in Stockholm in 1972, people started to acknowledge the fact that environment degradation depends on human welfare and economic increase in general. Thus, World Commission on Environment and Development with the UNO identified 60 definitions for the sustainable development concept until 1987.
According to Brundtland Report presented in 1997 to the International Commission for Environment and Development, sustainable

development is "the one that meets the requirements of present time, without compromising the possibilities of future generations to meet their own needs". There fore, this type of development includes criteria for the protection of ecosystems, soil, air and water and for the preservation of the biological diversity, taking into account the needs of future generations. In time, the sustainable development concept was also introduced in agriculture, in response to a lot of difficulties in conventional agriculture. Despite its being an early concept, sustainable agriculture became a word doctrine in agrarian economics through its central theme which was the main debate subject of the XXIth Congress of the International Association of Agrarian Economists (Tokio, 1991). The concept was defined by the president of this association, the Australian John W. Langworth as having three components:

a) economic increase (the capital);
b) distribution (the market);
c) environment (the ecological component)

A rigid definition for sustainable agriculture is not appropriate because countries and even regions of the same country work in different social, economic and ecological contexts. Therefore, when establishing agricultural and ecological objectives some countries consider solely soil, air and water protection, while others also include vegetation and animals, landscape beauty, energy or climate changes:

- they use complex management techniques to preserve ecological integrity, inside and outside the farm
- they are zone specific and flexible;
- they preserve biodiversity, landscape beauty and other goods that are not evaluated on existing markets;
- they are profitable for the producers on a long term;
- they are economically efficient from a social perspective.

To practise **sustainable agriculture**, the following must be identified:

the potential of old and new practices and technologies of delivering agricultural products without altering the environment, reducing long term economic viability or compromising the interests of future generations (preservation of soil, water and biodiversity by reducing the chemicals used in agriculture);

technical possibilities and research priorities to support transition towards more sustainable forms of agriculture;

economic, institutional and cultural instruments in the development and application of technologies and practices of sustainable agriculture It is clear that sustainable agriculture is a system of technologies and practices which not only ensure a satisfactory production, but also reach ecological objectives.Rational use of fertilizers and other chemicals is compulsory due to the main objective of agriculture – food safety; these chemicals ensure a 40% higher production compared to other technologies, which can't be neglected by the food ensuring policies.

An equally important objective of sustainable agriculture is environment protection, which is why agriculture must become a less polluting and energy consuming ecosystem. It can be accomplished by means of a technical progress which can avoid the issues of industrial agriculture and can focus on the improvement of biological factor, by using bio-engineering and bio-technologies to increase vegetal and animal production.

Formation of sustainable agriculture is a long process and a very difficult one too, due to numerous contradictions**.** There are many obstacles in applying the practices and technologies specific to sustainable agriculture. One of the most important issues is the fact that existing programs and policies often bring contradictory objectives. Information traveling from consumer to production is often screened, causing the farmers to answer to price signals which do not fully reflect the social costs of natural resource use. In many countries, the result was an agricultural community with no flexibility of giving a positive answer to the different agricultural technologies.Other obstacles are those blocking the proper use of farm input. For instance, despite the current

attention given to underground water pollution, the regulations of pesticide labelling do not always compel the producers to inform the farmers on the pesticide doses and pest control degree. Also, in case farmers are informed, there is no system to check whether the chemical fertilizers or pesticides are applied in correct doses.Another issue is connected to the government trend of subsidizing inputs (irrigation water and other inputs), offering the farmers very low cost. Consequently, farmers use more inputs than the social optimum level.

RESULTS AND DISCUSSIONS

As a conclusion, sustainable agriculture is a wide concept. The following objectives of sustainable agriculture are:

food security (meeting food and fiber human needs) ;

preservation of environment and natural resource quality);

a more efficient use of renewable and non-renewable resources;

supporting the viability of agricultural activity and improvement of life quality;

wide participation of the population with decision power.

It is essential that transition to a sustainable agriculture take into account the need to maintain a competitive and economically efficient agricultural sector, capable of meeting the changing preferences of consumers and of developing the agricultural product marketing, while preserving the natural environment and the future resource base.In countries with transition economy, such as Romania, farm sustainable development faces difficulties like poverty and lack of productive technologies, rather than the application of polluting technologies or the high consumption level occurring in developed countries. Land fund law had a major impact on agriculture, causing excessive division of agricultural area, blocking an efficient application of technologies. Consequently, extensive cereal production developed excessively, at the expense of grain vegetables, thus leading to natural environment degradation.

The following requirements should be fulfilled for a **sustainable farm**:

larger size of the farm by buying land or leasing land, especially by the non-agricultural or old owners; association of farmers, while maintaining their land ownership and other production factors;

rational quantities of chemical fertilizers and pesticides; granting farmers the financial facilities for buying agricultural equipment, superior varieties and hybrids, chemical fertilizers etc; consulting granted to farmers in informing and improving centres, on the subject of recent technologies, as well as current economic and ecological status of agriculture.

The necessity of imposing farmers some rules for building sustainable farms reveals the political dimension of natural environment issue and of food security. There is a regulation that requires the intervention of "public force", which is entitled to impose a collective rule. The political character of this intervention is even more visible especially as it is performed to the general interest of humanity. The necessity of adopting such regulations is even stronger since the polluting space is not necessarily the polluted one and that is why the principle "the polluter pays" must be applied. Here comes the issue of the territory levels where policy and decisions should be made. Since coercions and taxes are imposed and social costs must be supported, the natural environment is and will be a major subject of conflicts and negotiations between territory communities and the government, as well as between different international organizations.To persuade farm leaders to practice sustainable agriculture, financial support is needed, but at the same time, they are interested in the income obtained and their position in society, if these are going to improve, no more coercion will be necessary. If farmers apply sustainable agriculture, the issues of the natural environment and food security will become a major component of social debate.

Economic, social and ecological effects of sustainable farm organization are numerous, both at macroeconomic and microeconomic levels, leading to performance. These are the main effects:

1.The effect of practicing sustainable agriculture at macroeconomic level is to ensure food security. Given the current situation of Romanian agriculture, there is no discussion about surplus and setting aside agricultural land to stop overproduction; in Romania, all agricultural land available should be cultivated with proper technologies, such as those of sustainable agriculture.

2.An equally important effect is human health. Applying sustainable agriculture reduces the amounts of pesticides, so that their residues in agricultural products are not health threatening.

3.Creation and development of sustainable farms will increase farmers' incomes and will improve rural life quality.

4.Higher quality of vegetal and animal products, following strict control of fungicide and chemical fertilizer use.

5.As a consequence of practicing sustainable agriculture and implicitly of the investments made and the support granted by the government, the number of work places and that of young people established in the rural increase.

6.Advanced technologies will reduce production costs.

7.Processing and marketing of agricultural products will improve, along with the added value by product.

8. Professional development of farmers and other persons involved in agricultural activity.

9.Applying environment friendly production techniques, capable of ensuring products of European standard quality. From an ecological point of view, there will be an increase in the area where correct agricultural practices are applied, as well as a lower diffuse pollution.

10.Organization of farms based on a sustainable development at macroeconomic level will develop and improve infrastructure connected to the requirements of agriculture development.

CONCLUSIONS

These are the main effects of practicing sustainable agriculture. There is though a dilemma about implications. Population must be well informed, so that they can participate in the expenses required by sustainable agriculture, as well as (indirectly) in those reflected in the prices of agricultural and food products. If they produce in a sustainable and ecological way, farmers will get a lower production, and they will have to retrieve expenses and unaccomplished production through prices. It is questionable whether Romanian population will be able to support the higher prices.One thing is sure though. If sustainable agriculture is applied, two macroeconomic requirements (healthy natural environment and healthy population) will be met.

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THE IMPACT OF BREEDING PROGRAMMES UPON THE EVOLUTION OF SOME QUANTITATIVE CHARACTERS AT BOMBYX MORI L. SILK WORMS

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Key words : *Bombyx mori L., breed, shell weight, silk , fiber length*

Abstract

The silkworm rearing was practiced long ago in Romania and the first silkworm breeds were imported from France, Italy and Japan.Simultaneous with silkworm races importation, the local populations were constituted under action of natural selection. These populations had a short silk fibre (625-800 m) and a low silk shell (29.6-31.8%).Beginning with the 1950 year the breeding works were initiated (Alb Orsova , Galben Centurat Baneasa, Alb Cislau, Alb Baneasa). The first silkworm indigenous races represented the first step in improvement of the quantitative parameters: silk shell 17-22 %, filament length 900-1100 m, cocoon yield 2.8-3.2 kg/g eggs.The improvement of the quantitative characters carried on being based on the genetical parameters, selection and crossing as the main methods of selection. The highest value of the raw cocoon weight (2.2-2.3 g), shell weight (0.520-0.570 g) and filament length (1200-1400 m) were achieved. An incontestable genetical gain was obtained as a result of the silkworm hybrids rearing, their performances being based on the heterosis.

INTRODUCTION

The beginnings of silkworm rearing – dating back from the 15th century in Banat and Transylvania and the 19th century in Moldova – were based on silkworm breeds original from Turkey and later on from France, Italy and Japan, which had yellow and white cocoons.
In the absence of supervised research programs to study the adaptation of the imported breeds to our climate conditions as well as the creation of national breeds, the principle of natural selection caused the establishment of local breeds in rustic households.

MATERIAL AND METHOD

The following silkworm breeds created in Romania were used as biological material: Alb Cislau, Galben Centurat Baneasa, Alb Baneasa, Baneasa 75, S_{76}, RG-90, J90 and the hybrid combinations: Record, Zefir, Triumf, Baneasa Super, Select and Miraj.
A synthesis of the Romanian silkworm breeds was achieved using specific silkworm methods, presenting their biological and technological characters. [4]

RESULTS AND DISCUSSIONS

Characterized by the pink color of the cocoons (Corabia 21, Oltenita 1, Oltenita 14, Rusavatu 2) or by the yellow color (Calvin 2), the above mentioned populations presented a small length of the silk fiber - on average between 625-800 m and a reeled silk percentage representing 29,6 - 31,8% of the dried cocoons weight.
However, these species stood out through a high hatching percentage (96-98%) and through a high endurance rate against the infestation with pebrine (*nozema bombicis*).
The year 1950 brought the first supervised selection work concentrated on producing autochthon breeds. Starting with a sort study of 8 breeds with white cocoons (Alb European P937, Alb European A931, Alb European P.I.R., Alb Chinez R380, Alb Chinez A.P.11, Alb Adrianopoli and Alb Ungaria) and following up with a selection and a crossbreeding process which lasted 8 years; the first autochthon

silkworm breed (named Alb Orsova [3]) was obtained at the Research Center Orsova.
Characterized by: precocity (27 days larval period), high larval viability (98,8%), high cocoons production (3,0 kg/g eggs), cocoons of medium size and weight, a silk shell of 0,410 g and a silk cocoon percentage of 16,8% and the fiber length of 910 m; the Alb Orsova breed maintained in the hybridation scheme well over 20 years after his creation.
Between 1950-1956, starting from the Galben Centurat T.G. breed, the Galben Centurat Baneasa was created; being characterized by viability, a high larval hardiness, and a production of 2,8 kg/g eggs. This breed was withdrawn off production when the white cocoon species were introduced.
In 1958 the Alb Cislau breed was created, following extensive research work. This species progressively started being cultivated in the hill regions, being characterized by precocity (larval period 29 days), production of 3,2 kg cocoons/g and a fiber length of 930 m [11].
In 1953, a new sort of breeds was brought to our country, out of which the Alb Japonez breed was selected and used as initial study material. Starting from research of consangvinization and hybridation, in 1960 the synthetic breed Alb Baneasa was obtained, which stood out through its high silk content (22%) and its length fiber (1131 m) [10].
The act of improving our national sort breeds continued with imports and repeated exchanges of biological material from Russia, People's Republic of China, Korea, Italy, India, Japan, Ukraine, Indonesia, France and Bulgaria.
Being a permanent concern of the silkworm breeding, the establishment and the preservation of the genetic stock (organized based on original methods) was materialized in the existence of a 72 silkworm breeds, sp. Bombyx mori L., which represents the initial material in breeding work. The act of preserving the silkworm breeds entitles the maintenance of a constant genetic population, with familiar genetic parameters and an actual size of 100 females and 100 males, which avoids the genetic drift and allows a small augmentation of the consangvinisation coefficient per generation and reproductive isolation of the breed.
The improvement of the quantitative parameters remained an objective in the breeding programs developed after 1970, process based on establishing certain genetic parameters (heritability, correlation) of the populations in question, as well as on practicing the selection and the directed cross-breeding as main breeding methods [2], [9].
In 1975 the creation of Baneasa 75 breed was completed; the breed was characterized by high prolificacy (650-800 eggs/laying), precocity (28 days larval period) simultaneous precocity of the larva and the short period of cocoons warping. The mass of the silk shell cocoon weighs approximately 0, 460 g, the silk content is about 22,1% and the length fiber measures circa 1100 m [1].
The synthetic breed "S76", obtained in 1978, possessed parameters similar to the previous breed [1]. The latest created breeds, RG-90 (with yellow cocoons) and J90 (with white cocoons) patented in 2002 achieve remarkable technological performances: the shell cocoon weight 0,436-0,500 g, the silk encasement 20,5-23,83%, the fiber length 1191-1250 m [5], [6], [7], [8].
Simultaneously with the creation of innovative sorts, new breeding studies were launched with the purpose of maintaining at high parameters the existing breeds, used as genitors for obtaining hybrids.
High values of the technological characteristics were obtained by using interfamilial and combined selection as well as by applying a high selection pressure among the breeds (Tables 1, 2, 3 and 4).

Table 1. Raw cocoon weight of genetic stock breeds

Breed origin	Raw cocoon weight (g)		
	Minimum value	Maximum value	Average
Chinese	1,700 ± 0,038	2,159 ± 0,033	1,929± 0,035
Japanese	1,402 ± 0,034	2,188 ± 0,028	1,795± 0,031
Romanian	1,718 ± 0,031	2,309 ± 0,043	2,014± 0,037
Average	1,607 ± 0,102	2,219 ± 0,046	1,913± 0,034

Table 2. Shell cocoon weight of genetic stock breeds

Breed origin	Shell cocoon weight (g)		
	Minimum value	Maximum value	Average
Chinese	0,294 ± 0,007	0,423 ± 0,012	0,358 ± 0.009
Japanese	0,218 ± 0,009	0,505 ± 0,048	0,362 ± 0,028
Romanian	0,347 ± 0,005	0,504 ± 0,006	0,426 ± 0,005
Average	0,286 ± 0,037	0,477± 0,027	0,382± 0,014

Table 3. Dry cocoon weight of genetic stock breeds

Breed origin	Dry cocoon weight (g)		
	Minimum value	Maximum value	Average
Chinese	0,728 ± 0,010	0,909 ± 0,021	0,818 ± 0,015
Japanese	0,553 ± 0,017	0,942 ± 0,010	0,747 ± 0,013
Romanian	1,719 ± 0,016	0,890 ± 0,015	0,804 ± 0,015
Average	0,667 ± 0,057	0,913 ± 0,015	0,790 ± 0,014

Table 4. Fiber length of genetic stock breeds

Breed origin	Fiber length (m)		
	Minimum value	Maximum value	Average
Chinese	834 ± 23	1200 ± 15	1017 ± 19
Japanese	710 ± 10	1350 ± 12	1030 ± 11
Romanian	890 ± 31	1202 ± 34	1046 ± 32
Average	881,33 ± 53,18	1250,67± 49,67	1031 ± 21

The maximum values of the raw cocoons weight are as follows: 2,361 g (the Chinese breeds group), 2,230 g (the Japanese breeds group), 2,340 g (the national breeds group); with the shell cocoon weight of 0,522 g, 0,579 g and 0,496 g respectively. The maximum values registered for the fiber length measured are: 1297 m for the Chinese breeds group, 1417 m for the Japanese breeds group and 1350 m for the indigenous breeds.

An incontestable genetic progress was accomplished following the introduction in the production line of the silkworm hybrids whose performances are based on the heterosis phenomenon.

The technological characteristics of the cocoons and silk fibers of the new hybrid combinations (Record, Zefir, Triumf, Baneasa Super, Select and Miraj) are ranging between the subsequent limits:

- the raw cocoon weight (g) 2,200-2,428
- the shell cocoon weight (g) 0,420- 0,568
- the silk content (%) 19,09 – 24,94
- the filament length (m) 1250 – 1450

Although Romania had a tradition in silkworm breeding taking into consideration the favorable climate, we must underline the fact that in last decade the cocoons production has dwindled significantly, reaching the brink of extinction. Moreover, there is a real risk of demise for the scientific research in this sphere and, along with it, the danger of losing the national genetic stock.
Without immediate measures, Romania runs the risk of becoming yet again a silkworm eggs importer.

CONCLUSIONS

Although Romania had a tradition in silkworm breeding taking into consideration the favorable climate, we must underline the fact that in last decade the cocoons production has dwindled significantly, reaching the brink of extinction. Moreover, there is a real risk of demise for the scientific research in this sphere and, along with it, the danger of losing the national genetic stock.
Without immediate measures, Romania runs the risk of becoming yet again a silkworm eggs importer.

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DETECTION AND EVALUATION OF CHROMOSOMAL ANEUPLOIDY AS A MODEL FOR IN VITRO FERTILIZATION PROCESSES VALUATION (OOCYTE MATURATION, SPERM CAPACITATION AND IVF) IN ANDALUSIAN AUTOCHTHONOUS ENDANGERED CATTLE BREEDS

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Key words: *chromosomal aneuploidy, evaluation, in vitro fertilization , cattle breeds , Andalusia Spain*

Abstract

The main objective of the project is to detect, analyze and identify through different molecular-cytogenetic methodologies the chromosomal alterations relating to changes in the chromosome number or aneuploidy, produced in our autochthonous Andalusian cattle breeds endangered during the process In Vitro Fertilization (IVF) in both sperm and in the oocytes and the embryo itself. The aims is to answer a series of questions with which every day many researchers who study them, as the reason for the low fertility of our autochthonous endangered cattle breeds or what happens in their germ cells to make this happen. A review of the published studies carried out in many other breeds, with no particularities of our breeds, showed very few information to give us satisfactory answers, finding in them a great diversity and disparity that we think there are not applied to our breeds because of their own characteristics. We try in this project to combine all existing techniques in the fields of production, reproduction and genetics, and develop and put in place other that we can really know what happens and at the same time allowing to help to farmers in their efforts to maintain and breeding the autochthonous breeds that, we can not forget, have a fundamental value which is to enable the sustainable development in the production areas.

INTRODUCTION

In a review of the current state of research in the field of germ cell cytogenetics in domestic livestock should be noted that in the 60's were carried out cytogenetic studies on early embryos of domestic animals. Since that time techniques for direct observation of chromosomes in the pre-implantation in mice and pigs, cattle and sheep were optimized (Tarkowski, 1966; McFeely, 1967; McGaughey and Polge, 1971; Rajakoski and McFeely , 1968, King et al., 1979, Hare et al., 1980, Long 1977, Long and Williams, 1978), but with very limited results due to the low number of metaphase plates that could be obtained in each embryo and secondly that the embryos on which they worked also had a very uneven number of cells (usually between 2 and 150) (King, 2008).

Through the years lots of data on embryos of different species have been accumulated. In 1996 Kawarsky et al. studied the chromosomal abnormalities in bovine embryos, from 2 to 5 days old, in vitro obtained using semen from two normal and a Robertsonian translocation carrier 1, 29 bulls. The results revealed a prevalence of aneuploidy (the presence of an extra chromosome or less) in approximately 9% in embryos obtained from the semen of normal animals and 23% in those obtained from semen translocation carrier bull; in terms of ploidy (haploid embryos, polyploids or mixoploids) the incidence were 24% in embryos derived from normal and 21% in those obtained from the carrier one. In another

study by Ocana-Quero, et al. (1999) using conventional methods in embryos produced in vitro, obtained 18% of chromosome abnormalities clustered in an 8% haploidy, aneuploidy 2% and 8% polyploidy. All studies carried out, despite the limited number of cells per analysed embryo, have shown that the most frequent abnormality in embryos is the mixoploidy 2n/4n, although there have been cases of mixoploidy 2n/3n and 2n/n (King, 2008). The following table summarizes the percentage of embryos with chromosomal abnormalities following the method of obtaining them (in vivo, in vitro or cloning) (King, 2008).

Species	method of production			reference
	AI / N	IVF	SCNT	
Sheep	19,6	65,3	56,2	Alexander et al., 2006, Coppola et al., 2007
Cattle	25,0	72,2	76,8	Viuff et al., 1999, Booth et al., 2003
Horse	18,2	40,0	-	Rambags et al., 2005
Pig	11,4	-	-	Zudova et al., 2003

AI / N = Artificial insemination or natural mating, IVF = in Vitro fertilization, SCNT = somatic cell nuclear transfer (cloning)

Regarding the incidence of aneuploid embryos (2n-1 or 2n +1), there are not many publications about it. However Ocana-Quero et al., (1999) found 2% and Kawarsky et al., (1996) 9% of incidence in cattle. In pigs Zudova et al. (2003) estimated a higher value, equivalent to 16.2%.

Chromosomal abnormalities in oocytes

Most cytogenetic papers in oocytes of domestic animals have been made using conventional methods. This allowed to precisely define the incidence of diploid oocytes of different species, but in relation to the study of the incidence of aneuploid oocytes the published papers are very few, except for those studies in which the FISH technique have been used, because isn't possible to identify the supernumerary chromosome, making this fact impossible to investigate the existence of interchromosomal differences in the rate of non-disjunction.

In 1967 Baker and Franchi analysed for the first time the cytogenetics of oocytes in domestic animals, studying the structure of the chromosomes in bovine oocytes.

King et al. (1988) found that approximately 75% of activated oocytes were haploid in cattle. From a total of 836 oocytes tested Yadav et al. (1991) reported a maturation rate of 72% and an incidence of aneuploid and diploid oocytes of 5.8% and 10.7%. In pigs the frequency of non-disjunction varied between 11.9% and 21.6% in gilts, respectively, in the first and third estrus (Koenig and Stormashak, 1993). In 1999, Ocaña-Quero, et al. analyzed the influence of follicle diameter, the culture medium, temperature and incubation time on the incidence of diploid oocytes in cattle. The higher incidence of diploid was found to higher serum concentrations of estrus in the maturation medium in the lower temperature of cultivation and the extension of the incubation time (48 hours). It was also noted that the cryopreservation of oocytes influences the changes in the arrangement of the chromosomes on the spindle. After thawing, less than 31% of the oocytes showed a normal arrangement of chromosomes, compared with 90% of the oocytes have undergone no treatment (Saunders and Parks, 1999).

As we have observed, in cattle there is a complete lack of data on the incidence of aneuploidy of individual chromosomes in oocytes because the available data are sporadic and inconclusive. We can only provide general results as those collected by Yadav et al. (1991) and Lechniak and Switonski (1998) establishing a general aneuploidy incidence of 6-7%, with an incidence of 10-12% diploid oocytes by Yadav et al. (1991) and Sosnowski et al, (1996).

Chromosome abnormalities in sperm

The organization of chromatin in the nucleus of the sperm is very complex and different from the organization found in somatic cells. The differences are based on the degree of methylation, higher in the sperm, and the replacing of the histone proteins by protamine (Meistrich et al., 1976; Kim, 1978; Balhorn, 1982), small highly basic proteins that allow greater condensation of chromatin in the sperm head resulting in about six times more compact than in the somatic cells (Wyrobek et al., 1976). The introduction of the FISH

technique came to solve the problem, allowing the study of sperm faster and analyzing thousands of cells without the need to culture cells in vitro interspecific fertilization. In 1991, Schwerin et al. opened the way by developing a protocol for the visualization of the Y chromosome in the sperm of cattle by the method of tritiated thymidine. However, while the availability of probes for human chromosomes has increased greatly and allowing to research the incidence of aneuploidy in several chromosomes in normal, subfertile or infertile persons, the virtual absence of domestic animals probes considerably limited the scope of research into their reproductive problems.

Bonnet-Garnier et al. (2006) reported an incidence of 0,05% and 0,06% of disomy in bovine sperm for chromosomes 1 and 29 respectively, but these results are relate to one animal used as a control in a study with the aim to analyze the meiotic segregation in rob (1, 29) translocation carrier animals.

According to the literature there is a general lack of data regarding the incidence of aneuploidy in sperm of domestic animals. Nevertheless different studies in human, chromosomally normal, have shown an increased rate of aneuploidy in sperm mainly due to hyperploidy of sex chromosomes and diploidy. In addition, the incidence of aneuploidy is inversely proportional to the concentration of sperm in the ejaculate and to the total sperm motility in patients with oligoasthenozoospermia (Egozcue et al., 2000a, 2000b; Vegetti et al., 2000). In cattle, the available data refer to the Friesian breed individuals: five animals (10,000 SP / animal) in the work of Hassanane et al. (1999), 3 animals (1,000 SP / animal) in Di Berardino et al. (2004).

MATERIAL AND METHOD

I. PROCEDURE FOR RECUPERATION OF GERM CELLS:

OOCYTES

A)Collect the ovaries of cows from the following Andalusian autochthonous endangered cattle breeds: Pajuna, Berrenda en Negro and en Colorado; Negra Andaluza; Cárdena and Mostrenca in different slaughterhouses in the Autonomous Community. The procedure followed is:

1 - Place the ovaries collected in a plastic container containing 250 ml of sterile Hank ss-supplemented with antibiotics and maintained at a temperature between 30-33 ° C.

2 - Transposing the ovaries in a cooler containing 2 litters of hot water to maintain the interior of the plastic container at a temperature above mentioned, which is controlled by a thermometer.

B) Extraction of the oocytes from the ovaries and maturing them. The summarise procedure is:

1 - Wash the ovaries in ss-Hank supplemented with antibiotics.

2 - Draw the follicles to obtain the follicular fluid.

4 - Locate and collect the oocytes with the help of an inverted microscope.

7 - Wash in ss-Hank.

8 - Select the oocytes that we will grow through the criteria of numbers of layers of the cumulus oophorus and the morphology of the cytoplasm.

9 - Incubate them at 39 ° C in 5% CO2 mist chamber.

SPERMATOZOA

A) Pick up frozen semen of bulls of the breeds available in the study.

B) Capacitating of sperm.

The project will apply the method of capacitating sperm described by Ocaña Quero et al. (1997) and will be used, to evaluate the acrosome reaction, the bicolour FITC-PNA/PI staining technique with four possibilities:

-Live spermatozoa without acrosome reaction: No colour.

-Live spermatozoa with acrosome reaction: No colour in caudal region and intense green colour in the acrosome.

-Died spermatozoa without acrosome reaction: whole sperm red.

-Died spermatozoa with acrosome reaction: intense red colour in caudal region and green colour in the acrosome.

IN VITRO FERTILIZATION

The methodology followed to perform in vitro fertilization of oocytes matured in vitro is the described by Ocaña Quero et al (1997).

CLASSICAL AND MOLECULAR CYTOGENETICS TECHNIQUES

On individual cells or on embryos will implement the classical and molecular cytogenetic techniques. In order to reach the objective it is necessary to obtain molecular probes from somatic whole chromosomes.

1. PREPARATION OF SPECIFIC PROBES FROM CHROMOSOMES

a) Preparation of labelled probes for specific chromosomes. To obtain this:

-We need cell cultures.

-Preparation of extensions and chromosome banding.

-Microdissection of chromosomes.

-DOP-PCR.

b) In vitro maturation of bovine oocytes.

c) Decondensation of sperm nuclei.

d) Fluorescent in situ hybridization on mitotic metaphase plate in the sperm and oocytes recondenses

e) Microscopic examination and data collection.

f) Statistical analysis.

For the preparation of the probes of chromosomes is necessary to have obtained somatic cell metaphases. To do this is needed to culture lymphocyte cells as usual from bovine whole blood. After that the microscopic preparations must be performed on 24x60 mm coverslips previously washed in ethanol, air dried and kept immersed in cold distilled water until use. The preparations obtained must be stored in ethanol at -20 ° C until use.

To identify the chromosomes during microdissection, GTG banding is applied to the preparations obtained. Thus, 2-3 coverslips from the ethanol stored are air-dried and immersed in a solution of 0.05% trypsin in PBS for a time between 30 to 90 seconds. After washing in PBS the coverslips were stained for 5 minutes with a solution of 5% Giemsa in distilled water, washed with distilled water and air dried. Preparations were checked to determine if the banding is correct.

II.MICRODISSECTION OF CHROMOSOMES

For chromosome microdissection an inverted microscope equipped with an electronic micromanipulator is used. The microscope must also be equipped with a photo camera. The micromanipulator allows guiding the needle along the three axes X, Y and Z. The plate for the insertion of the needle support should be able to endure an inclination of 90 °. The microneedles for microdissection were obtained from solid borosilicate glass capillaries of 1 mm in diameter in a pump. This extractor allows, through variations in temperature resistance, to modulate the diameter of the microneedle according to the uses for which they are manufactured, in our case they must have a minimum diameter of 0.5 microns.

Obtained the chromosomes the amplification by DOP/PCR (Degenerated Oligonucleotide Primers / Reaction Polymerase Chain) method is made using the following primer:

5'CGACTCGAGNNNNNNATGTGG3'

(Telenius et al., 1992).

The amplification process is different for the sex chromosomes and the others.

III.AMPLIFICATION OF THE X AND Y SEX CHROMOSOMES

In 20 µl of 2.5 mM $MgCl_2$ Taq buffer (Applied Biosystems) solution the chromosomes are recovered. Reached the minimum required number of chromosomes the thermal pre-treatment and treatment with a thermocycler is made. After the amplification process the samples were frozen at -20 ° C until the labelling reaction.

IV.LABELLING OF THE X AND Y PROBES

The probes are marked alternately using biotin-16-dUTP (Roche) and digoxigenin-11-dUTP (Roche) in a second DOP-PCR which is used with 2 µl aliquots of the first reaction product. The X probe is labelled with digoxigenin-11-dUTP to be used simultaneously with Y probe (in sperm) labelled with biotin-16-dUTP. The labelled probes obtained were stored in a container at -20 ° C until use for FISH.

V.TREATMENT OF THE OOCYTES

After obtaining the mature oocytes (24 hours of maturation) the analysis of chromosomes are made and the oocytes in metaphase II with visible and identifiable corpuscular body are selected. The preparations obtained were stored at -20 ° C until use.

VI.TREATMENT OF SPERM NUCLEI

Capacitated spermatozoa were washed with 1 ml of Diitiotreitolo (5mM in PBS) (Sigma) in order to decondense them. The time of treatment and the optimum temperatures are adjusted previously. In the literature these variables are about 20 minutes of treatment at room temperature. At the end washed 2 times with PBS and fixed with methanol: acetic acid (3:1). A drop of suspension placed on slides pre-washed with ethanol and stored until use at -20 ° C.

VII.FLUORESCENT IN SITU HYBRIDIZATION IN MITOTIC METAPHASE PLATES IN OOCYTES AND SPERM

Having established that the hybridization probes of the chromosomes obtained by DOP-PCR give a clearly visible on both chromosomes in the interphase nucleus is necessary to apply on capacitated spermatozoa and matured oocytes.

Microscopic observation and data collection:

Preparations observed with a 100x immersion objective mounted on a Reichert microscope Polivar with a UV lamp equipped with specific filters for DAPI, FITC, and Cy3 (respectively for the observation of fluorescent blue, green and red) with a three-band filter for simultaneous observation of the 3 fluorochromes and the phase-contrast optics. The microscope must be equipped with a digital camera.

RESULTS AND DISCUSSIONS

Analysis of semen .For every bull be analyzed about 5000 sperm. For each sperm nucleus must record the type (X or Y) and the number of sex chromosomes present. Sperm is considered normal with a single sex chromosome (red or green). Nuclei with more than one sex chromosome are classified by signal type (XX, YY or XY) disomy or diploid comparing the size of the cell that contains double signal with the cell in the same observation field with less signal. In cases of overlap of two sperm or the presence of a somatic cell is suspected, the phase contrast to see the tail of the sperm is used. It must be also count the free signal sperm to verify the efficiency of hybridization. ***Analysis of oocytes.*** To avoid errors in the incidence of chromosomal abnormalities only oocytes in which, in addition of the observed metaphase II, the visible 1st polar body with fluorescent signal is clearly observed. The diploid oocytes are also included. The oocytes were classified according to the classification:

Metaphase plate signal	Classification	Signal st polar body
RV	Haploid	RV
RRV	Disomic X	V
RVV	Disomic autosomal	R
V	Nulisomic X	VRR
R	Nulisomic autosomal	RVV
R	Absent Diploid	RVV

R = red (X), V = green (autosomal).

Statistical analysis

The distribution of chromosome abnormalities in sperm cells differ from normal distribution (Shapiro tests, Anderson-Darling and Kolmogorow-Smirnov) because of that nonparametric tests, that are independent of the type of distribution, are used. The proportion of sperm carrying X and Y chromosome in relation to the expected frequency of 1:1, was analyzed by chi square test using Yates correction; the interindividual differences in the incidence of different types of anomalies will be analyzed with chi-square test, assuming an uniform distribution of each anomaly among the animals tested. The differences in the incidence of different types of alterations (disomy-diploid, XX-YY-XY, errors in meiosis I-II of meiosis), and the differences between breeds will be analyzed with the Kruskal-Wallis and Mann Whitney

test. To determine the associations between the different anomalies the Spearman correlation coefficient is used. The interchromosome and interracial differences in the incidence of abnormalities in oocytes will be assessed with chi-square.

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CONCLUSIONS

1.The main objective of the project is to detect, analyze and identify through different molecular-cytogenetic methodologies the chromosomal alterations relating to changes in the chromosome number or aneuploidy, produced in our autochthonous Andalusian cattle breeds endangered during the process In Vitro Fertilization (IVF) in both sperm and in the oocytes and the embryo itself.
2.The aims is to answer a series of questions with which every day many researchers who study them, as the reason for the low fertility of our autochthonous endangered cattle breeds or what happens in their germ cells to make this happen.
3.A review of the published studies carried out in many other breeds, with no particularities of our breeds, showed very few information to give us satisfactory answers, finding in them a great diversity and disparity that we think there are not applied to our breeds because of their own characteristics.
4.We try in this project to combine all existing techniques in the fields of production, reproduction and genetics, and develop and put in place other that we can really know what happens and at the same time allowing to help to farmers in their efforts to maintain and breeding the autochthonous breeds that, we can not forget, have a fundamental value which is to enable the sustainable development in the production areas.

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AGRICULTURE DEVELOPMENT BY ITS INTEGRATION WITH OTHER BRANCHES

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Key words: *agriculture, integration, rural, development*

Abstract

Agriculture integration with industrial branches – producers of the production means for the agrarian sector, and also industrial enterprises of agrarian raw materials processing, with trade, catering, acquisitions, transport, other branches and/or segment of industry of infrastructure does not constitute a new problem for national economics.

INTRODUCTION

Taking into account the fact that actual position in economics in the Republic of Moldova is not simple and does not confront with the crisis phenomenon in all the fields of activity including first of all the agricultural food sector and the rural space. In connection with this fact insistent continuation of reforms can be a resolution, at this period, at which reflection and economic financial position is followed in the given sector on the fields and branches of rural economic activity. Investigations realization in this field needs a general analysis for setting the position at the present moment and for working up recommendations for corresponding activity of economic improvement in the rural locality.

MATERIAL AND METHOD

The investigations have been realized on the basis of the agricultural enterprises of the Republic of Moldova. The article has been realized under the theoretical scientific aspect in the context of the complex and systematic approach of contemporary economic concepts. It was found necessary every phenomenon and process to be subjected to the analysis, the last one being obligatorily completed with synthesis. The fact was taken into consideration that dialectics has the connection of big importance between logic and historical ones in economic phenomena and processes investigation in agriculture. There was interdisciplinarity considered as well – one of the fundamental characteristics of the investigation method.

RESULTS AND DISCUSSIONS

Although mass privatization of the land and agricultural property have been finished practically simultaneously with privatization of industrial enterprises, development rhythms of these principal production fields of products-goods are quite different. As the data from the table 1 informs us the indices of production volumes in the industrial sector, including food and drinks industry, are permanent approximately 3-4 times higher than those ones of the agricultural production.

Table 1. Dynamics of agricultural and industrial production indices (year 2000 – 100 %).

2. INDICATORS	Years								year 2008 as regards 2000 (± percentage points)
	2001	2002	2003	2004	2005	2006	2007	2008	
Volume indices of agricultural production	106,4	110,1	95,2	115,0	116,0	114,7	88,2	116,3	+16,3
Volume indices of industrial production	115,1	126,0	145,7	157,6	168,7	160,6	158,5	160,8	+60,8
including food and drinks industry, from which:	118,3	138,3	164,2	173,7	182,4	148,8	137,2	149,5	+49,5
- meat industry	91,5	114,7	140,5	123,8	112,9	124,0	161,3	166,2	+66,2
- milk industry	137,8	148,3	160,2	176,9	190,7	187,2	194,0	206,5	+106,5

Source: Data of the National Statistics Bureau of the year 2009, page 291-294

The volume indices of production in the year 2008 as regards the year 2000 have been practically doubled in the industrial sector on some positions (example – milk, bread

fabrication and others) while in agriculture the production volumes of raw materials for respective branches have not been increased, and vice-versa – they have been decreased (on the meat section at the mentioned period – with 12,2 % and on the milk section – with 5,6 %).

So, on the basis of statistic data distinguished earlier we can conclude that during all the periods of post privatization the principal partner of integration on the vertical line of the agricultural sector and namely – processing industry of agricultural raw materials has worked absolutely independently (without assistance) keeping the agrarian sector, the main thing, but on many positions – single or supplier, also independently and without assistance. The fact has to be emphasized that the years 2003 and 2007 (from the mentioned period) for the agrarian sector were proved to be very droughty years, as consequences being lowering of production volumes in agriculture up to 95,2 % (year 2003) and even up to 88,2 % (year 2007) as regards the year 2000. At the same time the volume indices of production of food industry, including the processing fields of wheat, meat and milk, were proved to be indifferent with respect to this natural cataclysm revealing steady and dynamical rhythms enough (especially on the processing position of milk) of economic development. The comparison of development rhythms of the agrarian sector with that of commercialization of agricultural and agricultural food products at the period after privatization seems to be more polarized as well. If at the beginning of this period the volume of retail sales by all the ways of commercialization constituted (in current prices) – 2741,5 mln. lei (year 2000), then in the year 2007 it grew up to 9418 mln. lei, that is 3,44 times.

The comparative results of economic activity of food products agriculture and retail are reflected in the table 2 (fig. 1).

We can learn from the data of the table 2 that the levies figure has been remaining practically at one and the same level - 4,0-4,5 mlrd. lei (with the exception of the year 2008) during the last 5 years (years 2004-2008) according to the report of agricultural production.

Table 2. Dynamics of production volumes within the cost chain: agriculture, food industry, retail (in current prices).

mln. lei

2.1. Indicators	3. YEARS									year 2008 in % towards the year 2000
	2000	2001	2002	2003	2004	2005	2006	2007	2008	
Agricultural production, totally:	8268	8646	9474	10354	11819	12688	13734	12825	16503	199,6
- from which it was sold in the market of agricultural food products	2239,3	368,8	2930	3101,3	4021,8	4405,0	4145,3	4184,2	5639,3	251,8
Food and drinks industry	3798,2	4968,5	6355,8	8269,8	8752,1	10242,8	9226,2	9952,5	11781,4	310,2
Sales volume of retail food products	2741,5	3419,3	4604,5	5885,6	6632,0	7060,2	7178,4	9418,0	11301,2	412,2
Specific weight of food products sales from the total volume of retail sale	45,6	44,9	42,8	40,5	40,0	36,2	30,7	33,4	32,6	-13,0 p.p
Counting on 1 lei of sold agricultural production it was sold:										
- volume of agricultural food industrial fabricated production, lei	1,70	2,10	2,17	2,67	2,18	2,33	2,23	2,38	2,10	+0,4 lei
- volume of retail sales of food products, lei	1,22	1,44	1,57	1,90	1,65	1,60	1,73	2,25	2,00	0,78 lei

Source: Elaborated from the author on the basis of the NSB data of the year 2009, p. 463.

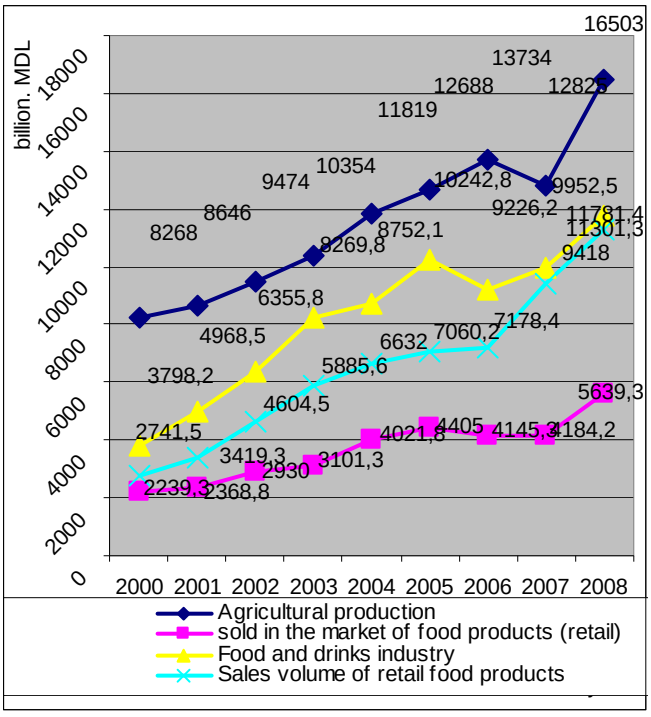

Fig. 1. Dynamics of production and commercialization volumes.

The retails sales volume of food products was increased with 4,7 mlrd. lei or with 34,6 up to

one hundred at this period as well, but the industrial fabricated products volume was increased with 3,0 mlrd. lei or with 34,6 up to one hundred at the respective period. But it is clear that considerable surpluses of industrial fabricated products and especially of the retails sales volume, in their overwhelming majority, have massive imports of these products as origin source. The accentuated interest of "traders" in the autochthonous wholesale and retail market has been stipulated on a violent growth of absolute and relative volumes of profits from the activity of raw materials processing and from wholesale and retail trade for the last years.

CONCLUSIONS

As a result of: inadequate changes between principal links of the cost chain; of the autochthonous market flood with agricultural food products cheap of import, so, as a result of these negative phenomena the agrarian sector is the first one to suffer from absence of enlarged reproduction sources and even simple ones of its production potential. The illegal "sequestration" dimensions of reproduction factors from the agrarian sector are enormous. We can make a conclusion about these real amounts having analyzed the indices dynamics of salary payment of agrarians in comparison with analogical indices from the adjacent branches of national economics.

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ENERGY EFFICIENCY IN ARABLE FARMS – A COMPETITIVE ANALYSIS

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Key words : *energy efficiency, arable farms, soil tillage systems, fuel consumption*

Abstract

Five arable farms in the semiarid region of Austria were analysed in regards to their energy input (direct: fuel; indirect: fertilizer, pesticide and seed) and energy output (heat value of the harvested crops). The main energy inputs considered in this case were fertilizer and fuel respectively and the total energy input of these factors ranges between 8.5 and 12.2 GJ/ha. The total energy input determines, other than the site specific factors (soil and climate) in the area, the productivity of the cropping system itself.
The energetic output of the analysed farms varied between 86.0 and 119.1 GJ/ha which also represents the photosynthetic storage of solar energy. The net energy balance expressed as Energy Output (EO) – Energy Input (EI) is between 76.1 and 121.0 GJ/ha.
The direct energy input via fuel for arable farms is a significant expense factor. The shift from soil tillage systems with plough application to conservation tillage systems causes a significant decrease in the fuel consumption and the total work time required in this sector. In addition to the economic benefits (fuel and work time saving) gained from this trend, a better soil structure with higher soil water storage capacity could be observed in conservation tillage systems in semi-arid regions.

INTRODUCTION

Farming – from beef, pig, poultry or dairy and crops – has become increasingly mechanized and requires significant energy inputs at particular stages of the production cycle to achieve optimum yields. In accordance to Factor Five [5], the agricultural Sector has the potential to achieve a Factor 10-100 improvement in resource productivity. The awareness in saving of direct energy has grown rapidly in this sector due to continues increase in energy prices (for example fuel) in the last couple of years. Plant cropping systems store solar energy in form of biomass, which has an average heat value of 18 MJ/kg dry matter in the case of cereals. The average heat value of kernels form oil plants is even higher (26 MJ/kg dry matter). The increase of the photosynthetic yield in plant cropping systems requires external facilities.

The energy input in plant cropping can be categorised into two main groups:

- Direct energy: fuel for machinery, heating oil and electricity for drying processes or conveyors
- Indirect energy: (process energy for the production on "annual" facilities e.g. fertilizer, pesticides, seeds and "perennial" facilities e.g. farm machinery, farm buildings.

In comparison to animal farms, the energy Output/Input ratio in arable farms is greater than 1:1. According to the "Criteria of environmentally compatible land management" the energy balance for plant cropping should be more than 50 GJ/ha
An energy analyses was done for five arable farms in this study in collaboration with the local official agricultural consulting association in Lower Austria. Additional results of the influence of the soil tillage system on fuel consumption are also presented and discussed.

MATERIAL AND METHOD

The five arable farms as already mentioned are located in Lower Austria, about 50 km south of Vienna. The semiarid climate (500 – 600 mm rainfall, 9.5°C – 10.0 °C), the Gleyc Chernozem as well as the pure Chernozem in this area are good requirements for arable farming. The farms 1- 4 don't use a plough for soil tillage. Only the farm 5 ploughs before planting sugar beet and maize 6 to 10 ha land.

Table 1. Share of crops to the arable land of the investigated farms the year 2007/2008.

	Farm 1	Farm 2	Farm 3	Farm 4	Farm 5
Arable land [ha]	**59.9**	**71.7**	**62.4**	**93.4**	**150.0**
Soft Wheat [%]	22.8	33.1	30.3	34.0	38.0
Durum Wheat [%]	26.9	12.5	20.5	22.5	
Barely [%]	5.3	13.8	3.5	7.8	18.7
Rye [%]	14.8				5.3
Rape seed [%]	13.5		4.7	7.0	
Sun flower [%]			13.5		15.3
Maize (Corn) [%]		12.8			6.0
Sugar beet [%]	4.8	19.3	17.3	12.5	6.0
Potato [%]				9.0	
Green pea [%]		5.3	6.7	4.1	
Meadow [%]					6.7
Vineyard [%]					1.3
Fallow [%]	11.8	3.0	3.4	3.0	2.7

In the first part of this study, the amount of used facilities (fuel, pesticides, fertilizer, and seed) and the yearly harvested crops in the farm were recorded. The amount of energy used in the setting up of machines and farm buildings was not considered.

The stocks of facilities and crops were converted into energy units (MJ respectively GJ).

In order to enable a comprehensive interpretation of the results gained from the energy balancing for the 5 farms, measured fuel consumptions for the different soil tillage systems were presented. The measurement of fuel consumption was conducted with a high-performance flow-meter, which was integrated in the fuel system of the 4 WD-tractor (92 kW). The presented fuel consumption [l/ha] for the different operated machines are only for the "main time" meaning, it does not consider the fuel consumption during turning events at the headland.

RESULTS AND DISCUSSIONS

Energy Analysis

The results of the analysis show that fertilizer and fuel are the main energy inputs for these farms (As indicated in table 2). The energy input, which expresses the production intensity, varies between 8.5 and 12.2 GJ/ha*a. The maximal tolerable total energy input value for arable farms is 15 GJ/ha*a [2]. According to an analysis for the cumulative energy amount in wheat production [1], the sum of direct and indirect energy input varies between 7.5 and 16.5 GJ/ha, depending on the kind of production system been practiced: Organic or conventional; soil tillage system with plough or conservation tillage with or without tillage and the farm size (50 ha or 200 ha arable land). Considering only the indirect energy amount of wheat production resulting from machinery production, the values gained varied between 1.2 and 3.0 GJ/ha [1].respectively.

The calculated energy output for the harvested crops varied between 86 and 133 GJ/ha (table 2). These values however depends on crop-yields in the rotations.

Table 2. Energy analysis for the five investigated arable farms

	Farm 1	Farm 2	Farm 3	Farm 4	Farm 5
Energy input [GJ/ha]					
Fertilizer	5.3	4.6	4.1	5.9	4.4
Pesticides	0.7	1.1	0.7	1.0	0.7
Seed	0.6	0.5	0.7	0.9	0.6
Fuel	3.4	5.9	3.0	4.5	4.6
Total Energy input (EI)	**9.9**	**12.2**	**8.5**	**12.2**	**10.3**
Energy output (EO) [GJ/ha]	**86.0**	**133.2**	**92.7**	**119.1**	**104.9**
EO - EI	76.1	121.0	84.2	106.9	94.6
EO/EI-Ratio	8.7:1	10.9:1	10.9:1	9.8:1	10.2:1

The energy balance (EI-EI) is higher than the threshold value of 50 GJ/ha according to the "Criteria of environmentally compatible land management" [2]. The combination of the energy-output and input-Parameter in the so called EO/EI-ratio shows the energetic productivity of the production systems. The EO/EI-values in the range between 8.7:1 and 10.9:1 shows the net energy production in plant cropping.

Fuel consumption for soil tillage

The soil tillage system has a great effect on fuel consumption and work time requirement [4].

About 40 % of the energy input is caused by fuel consumption in soil tillage operations. Figure 1 point out the measured fuel consumption in different soil tillage systems. The conventional tillage with plough has the highest fuel consumption (40 l/ha). About 50 % (= 19.1 l/ha) is caused by ploughing. One of the significant influence factors on fuel consumption in plough is the soil texture. Soils with a high content of clay require more draw power which leads to a higher fuel consumption. Investigations show that on soils with loamy clay the fuel consumption for ploughing is 35.6 l/ha [3]. The situation at the moment shows that the conventional cropping system with plough is still very common in the humid and semi-humid region of Austria.

The substitution of plough by a heavy cultivator in the conventional tillage systems causes a 50 % decrease in the fuel consumption in general as indicated in figure 1. The typical conservation tillage systems with shallow tillage (10 cm) and No-tillage systems have the lowest fuel consumption and a better conserved soil structure. Other than the fuel saving benefits in conservation tillage systems there is also a higher soil water storage capacity in semi-arid regions.

The application of conservation tillage has site-specific limitations. Soil tillage systems with ploughing has a phytosanitary effect in wheat production especially in humid and semi-humid regions with high risk for infection with *Fusarium graminearum* and *Fusarium culmorum* resulting to followed mycotoxin-contamination.

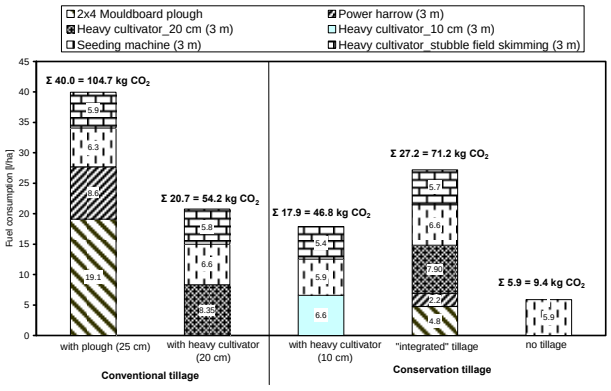

Figure 1. The average fuel consumption and direct fossil CO_2 emission (emission factor: 2.62 kg CO_2/ Liter diesel fuel) for different soil tillage systems.

CONCLUSIONS

1. Fertilizer and fuel are the main energy inputs in arable farming.
2. The intensity of farm facilities usage (fuel, seeds, fertilizer and pesticide) in crop production systems influences the energy input the energy efficiency.
3. Energy efficiency can be improved through increasing of soil productivity and application of conservation tillage.
4. The shift from soil tillage systems with plough to conservation tillage systems reduces the direct energy input and working time.
5. The risk for mycotoxin-contamination in the humid and semi-humid region could be a limitation of conservation tillage application.

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NATURAL RISKS ALEVIATION IN AGRICULTURE OF THE REPUBLIC OF MOLDOVA

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Key words : *natural risks, climate change, vulnerability, adaptation, Republic of Moldova.*

Abstract

The agriculture of the Republic of Moldova is particularly prone to natural and market risks due to a specific combination of geographical position, inadequate practices of soil cultivation and climate change, as well as conjuncture on the external markets. In order to integrate and synchronize the efforts on fighting the negative effects of the natural phenomena, in 2008, with the financial support of the World Bank, has been worked up the draft of the National Strategy of Natural Hazards Mitigation (NSNHM). The team of experts has facilitated the participatory process of working up the Strategy in cooperation with specialists from line ministries, Academy of Science of Moldova, local public authorities and non-governmental organizations. The Strategy offers risks alleviation policies through adaptation measures, risks transfer, infrastructure development and strengthening of the institutional framework.

INTRODUCTION

Agriculture is one of the key driving forces in shaping Moldovan landscape, nature and culture over centuries. Favourable climate and high quality soils historically have determined Moldova's agricultural specialization, particularly in the production of high value crops like fruits and vegetables. The status of the agricultural sector has changed dramatically over the last two decades along with the disruption of production and distribution networks [1]. Land areas used for high value crops have been reduced by two times. The shift in production has also been accompanied by significant reductions in land productivity.

At the same time the Republic of Moldova is particularly prone to natural hazards due to a specific combination of geography, inappropriate land use practices and climate change [5]. Moreover, as a result of the high poverty level in the rural areas, the vulnerability of agriculture in the Republic of Moldova, as well as the inadequate risk mitigation measures, the impact of natural hazards on the poor population in the rural areas is particularly severe.

MATERIAL AND METHOD

Different aspects of the impact of climate change and natural disasters are tackled in the respective strategic documents developed in the Republic of Moldova. These include the National Action Plan for Combating Desertification, approved by Government's Decision No. 367, of 13.04.2000; the National Strategy on Sustainable Development of the Forest Fund, approved by the Parliament of the Republic of Moldova in 2001; the National Development Strategy of the Republic of Moldova, approved by the Parliament of the Republic of Moldova in 2007; the Strategy on Sustainable Development of the agriculture for 2008-2015, approved by Government's Decision No. 282 of 11.03.2008; as well as other documents and legal acts. However, there is lack of an integral document which would tackle the issue of environmental risks systematically and according to priorities.

One of the most recent policy documents elaborated in this domain is the National Strategy of Natural Hazards Mitigation (NSNHM) that has been developed with the financial support of the World Bank. It has

been developed through a participatory process involving experts from Business Consulting Institute, Academic Institutions, line Ministries, business representatives and NGOs during the year 2008.

The Project Management has been provided by the core team constituted of 7 experts in the field, including also a representative of the Government. Additionally to the main team, during the project there have been employed also special consultants in providing assistance in specialized fields.

Project activities have been monitored by the Oversight Committee assigned by the Government and representing key institutions.

Implementation of participatory approach has been based on the interactive methodology with the utilization of the instruments as follows:

- Seminars;
- Workshops and public debates;
- Interviews of the key persons and institutions;
- Information dissemination.

At the phase of initiation of the participatory process the stress has been laid on the notification of the representatives of both central and local public administration, academic institutions, NGO sector and population about the importance of the problem and the need to elaborate measures to alleviate the natural risks.

Seminars

The seminars have been conducted in an intensive manner, with duration of half a day. The main characteristic of the seminars has been intensification of the experts' professional contribution in working up the NSNHM. Discussions and exchange of ideas have been practiced during the seminars. There were carried out six seminars during the participatory process:

Workshops and public debates

Five workshops have been held in the process of the participatory process. In the framework of these workshops have been elaborated the strategic vision of the NSNHM, SWOT analysis and strategy objectives. After submission of the first draft of the Strategy, opinions and proposals of the experts involved in the participatory process were collected. Their comments and suggestions have been analyzed and the strategy has been amended with completions in terms of analysis of climate modifications, localization of risk zones in the Republic of Moldova and improvement of institutional framework. An essential element introduced in the strategy, based on suggestions of the Local Public Authorities representatives during public debates, was to work up both regional and local activity plans for exceptional situations.

Interviews of the key persons and institutions

Interviews with_key persons and institutions have been focussed toward identification of the qualitative aspects of the study. The core team experts undertook a number of structured interviews with stakeholders. In order to get the more complete information was selected the following set of categories of key respondents: a) Members of the Government; b) Officials of the central and local public administration; c) Scientists; d) Representatives of non-governmental organizations.

All discussions with respondents have been registered, including details of their practical experience and their attitude.

Information dissemination

Establishing mechanisms of knowledge and information dissemination is an essential aspect of an efficient strategy of communication. In this regards the communication means and procedures have been established for each key institution and person separately. The communication means, and the communication instruments and materials have been selected by taking into account their effectiveness for specific target groups.

The campaign of information dissemination has been lined towards several target groups, and namely academic circles, central and local public authorities, agricultural producers and the rural population and the foreign investors and donor community. The program of public relations and mass information has been foreseen to cover the whole period of the project activity. The information about the

project has been disseminated by means of official WEB page of the project, by most important national newspapers, TV and radio channels, and by news agencies.
In order to disseminate the information about the alleviation of the natural risks in an accessible form for economic agents and population from the rural area there have been published and distributed three leaflets, a poster and a brochure „Natural hazards and climate change mitigation in Moldova: actual situation and policy recommendations".

RESULTS AND DISCUSSIONS

The modification, intensification and increase of the frequency of natural risks, as processes induced by the climate change, together with the cross-border character of many natural risks and the small territory of the country, enforce the development of well coordinated strategic and operational activities of forecasting, preventing and mitigation of the risks and their consequences at national, local and regional levels.
The main natural risks in the Republic of Moldova are as follows:

- **Erosions and land slides.** Affect approximately half of the agricultural lands and approx. one third of the country's surface, are mainly spread throughout the central and northern districts of the country.
- **Floods.** Approximately 50% of the communities are located in flood prone areas, and about 45 000 hectares of agricultural land have already been waterlogged.
- **Droughts.** These affect particularly the central and southern districts of the country, having a negative impact on agriculture.
- **Hail and frost.** These represent a threat mainly to the high value added agricultural crops, particularly vineyards and orchards.
- **Seismic activity.** Has a greater impact on urban than rural areas, though it may lead to flooding due to breach of dykes and dams, and will exacerbate landslides [5], [3].

In the cross-sector analyses there have been identified a set of drawbacks that can influence the stability and sustainability of the natural, ecologic, social and economic systems:

- Shortage of financial resources in a under-developed economy
- Infrastructure of protection against natural risks at local level is poorly developed
- The insurance sector is on the incipient stage of development
- Limited capacity of agriculture adaptation
- Insufficient coordination and division of responsibilities between the institutions involved in natural risks alleviation
- Insufficient awareness of the population and of decision makers

Alleviation of risks provoked by the natural calamities and by climate change are in the sight of more institutions and organizations from the Republic of Moldova, such as Ministry of Agriculture and Food Industry, Ministry of Ecology and National Recourses, Ministry of Internal Affairs and other state structures which work up and implement measures to reduce risks; most of them are focused on ex-post activities, to minimize and liquidate the consequences, and less envision the ex-ante measures, to anticipate and intervene in cases when natural calamities are unleashed.
In order to integrate and synchronize the efforts on fighting the negative effects of the natural phenomena there has been worked up the draft of the National Strategy of Natural Hazards Mitigation.
The aim of the National Strategy of Natural Hazards Mitigation consists in reducing the vulnerability of the Republic of Moldova towards natural risks and minimization of human casualties, economic and financial losses, eventually caused by the natural calamities and anthropic factors, through: a) increase the level of adaptation of the natural resources, ecosystems and agriculture to climate change; b) maintaining low levels of greenhouse gas emissions; c) consolidating the institutions involved in management and alleviation of adverse phenomena; and d) raising the level of awareness in the society

concerning the problems related to natural risks and climate change.
The National Strategy of Natural Hazards Mitigation is oriented at the adaptation of the positive principles and practices of the European Community countries with the aim of ensuring sustainable development and competitiveness enhancement for the Republic of Moldova within European and international cooperation framework [6].
In the frame of participatory process there has been launched several national and regional public debates. As a result of these discussions main suggestions have been formulated as follows:

- The Strategy is focused too much on agriculture. This is why it is necessary to envision the structure of the economy in sequence of reducing dependence of agriculture which will diminish the vulnerability of the national economy and of the population towards the natural risks.
- It has been mentioned the need to include in the strategy, in more details, the measures of anticipation and alleviation of natural disasters risks, including modifications in agricultural practices, agricultural diversity, improvement of techniques, varieties of crops and animal races, revise the construction standards and plans of land plots usage, as well as forestation.
- As an important moment for working up the Strategy has been underlined the problem of assuring the food security of the country.
- It was revealed the importance of local action plans for exceptional situations and the necessity to uproot risks caused by floods on small rivers and lakes.

Diminishing country's vulnerability to risk factors and an integrated risk control can be promoted by applying a number of policies and carrying out certain actions: legislative, economic, environmental, social, etc. A necessary step is the inclusion into all strategic documents on the development of Moldova's social and economic system of measures of prevention, adaptation and mitigation of natural risks, in accordance with the "sustainable development" principles, including prevention, precaution and environmental efficiency. In the medium to long term these policies include the following actions that can be used:

- **Promoting investment in value-addition.** Suppliers of raw materials tend to face stronger price fluctuations than do those of finished or semi-finished products. Investment in appropriate processing, storage and marketing facilities will therefore be necessary, both to retain income in or near areas of production, and to reduce fluctuations in that income.
- **Promoting farm-level diversification**, so that risks are spread across a number of enterprises. The danger of specialization is well illustrated by the "grapes' crisis" of 2008 in Moldova.
- **Public investment in buffer stocks** is, in principle, an effective way of evening out seasonal price fluctuations. State reserves of cereals, despite of rather modest volumes, permitted stabilization of prices in 2008, during the price fluctuation caused by the crisis of agricultural products on foreign markets.
- **Promoting appropriate insurances.** Crop insurance schemes potentially mitigate risk but have been largely abandoned owing to the high administration costs of collecting the premiums and verifying claims. Also, the covariant nature of major risks (attributable to adverse weather) mean that only the biggest insurers can withstand the large number of simultaneous claims likely to be made. In conditions of the global financial crisis insurance companies from the Republic of Moldova have limited capacities to extend insurances in agriculture. At present, just about 1% of agricultural land is insured against adverse phenomena.
- **Reducing transaction costs and risks**. Efforts to reduce transaction costs and risks often require public investment in transport, storage and communications infrastructure. However, important initiatives can be taken within agriculture, such as public-private

partnership for funding the start-up of market information systems.

- **Support to small-scale farmers and laborers to organize groups, associations and unions** may offer important possibilities for reducing the transaction costs of breaking into new markets, and/or preventing exclusion.
- **Support to skills enhancement** will be necessary if low-skill laborers are to be assisted in finding new job opportunities, launching new enterprises, develop innovations and technological transfer in agriculture**.**
- **Investment in small scale infrastructure,** including soil, water and wet zones protection that can reduce risks of natural disasters like land slides, floods as well as soil erosion.

The institutions currently involved in natural phenomena's risk mitigation are represented by exceptional situations' coordination commissions, early warning and forecast entities and corresponding ministries and catastrophe management entities.

These institutions should promote the NSNHM on the territory of the Republic of Moldova and should incorporate the principles of risk mitigation into national initiatives and programs. In the same time they should involve the local public authorities and other relevant structures in the process of including natural risk mitigation components in the existent programs and activities (for instance, urban plans, social and healthcare programs, etc.), as well as in the activities for the monitoring and protection of vital infrastructure.

In order to strengthen the institutional and legal framework the NSNHM has proposed to:

- Strengthen the good neighbouring and stability relations, by exchanging of information, experience and good practice in the field of natural disasters' management
- Conduct an awareness campaign concerning problems related to natural risks and climate change
- Develop and adopt a legal framework in the area of natural risk prevention and mitigation
- Strengthen the Moldova Hydro-meteorological Service in view of increasing promptness and precision of weather forecasts.
- Create the Centre for Competence and Assistance in Natural Risk Mitigation for the coordination of activities on mitigation of natural phenomena, with a status of public institution, to be constituted based on Government Decision.

The main functions of the Centre will be: analysis, evaluation, and forecasting impacts of natural hazards, coordination of working groups' activity, technology and competency transfer, facilitation of the Strategy implementation and monitoring, information dissemination and public awareness campaign. The Centre expects to be financed from state and international programs, external and local donors.

The Centre will promote an inter-disciplinary process of knowledge collection and transfer in the field of alleviating risks of natural hazards and climate change by involvement of the central and local public administration, academic institutions, private companies and NGOs sector, and by submission of obtained results in a manner accessible for all potential service users.

The competency centre will offer to local experts professional development opportunities, such as courses, seminars, practical training programs, summer schools, etc., while educating the young generation of scientists and decision makers.

The NSNHM acknowledges that sustainable activities of natural risk mitigation have to be based on the scientific research, on good practices and local and international experience. In the same time, the Strategy will support new and existent researches that represent the knowledge base for decision making in the area of risk mitigation.

National Strategy to Mitigate Natural Hazards is directed to the adaptation of the principles and positive practices of European community countries with the aim of sustainable development and to enhance the competitiveness of the Republic of Moldova in the European and international cooperation.

CONCLUSIONS

1. The critical situation of the agriculture within the rural transformation and national economy, with its structural features, requires substantial governmental and financial interventions oriented at the reduction of natural risks that could affect the rural communities, as well as at generating necessary savings and investments in agriculture.
2. A set of interrelated measures is required to be implemented in order to reduce the vulnerability of the agricultural sector: a) the use of specific agricultural and technical methods, b) the selection of a production structure suitable for the specific climate conditions of the Republic of Moldova, c) the creation of reserves for risk management in agricultural sector, d) the preserving and development of the local protection infrastructure against natural risks aiming at the alleviation of soil erosion, landslides, floods prevention and reduction of droughts' impact, e) the development of the insurance system in agriculture.
3. The reduction of the vulnerability of Moldova to natural risks shall be carried out during the change of the national economy's structure by an increased development of different sectors, based on advanced technologies. Simultaneously, radical transformations in the agricultural sector shall be carried out by reducing the cultivated surfaces, enhancing the production, extending of forest areas and natural reservations, creating a national environmental network.
4. Public relations and awareness program has generated a better understanding of importance of natural risks mitigation in academic circles, central and local public administration, farmers and rural population as well as in the community of foreign investors and donors.

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THE FISCAL RELATIONSHIP BETWEEN THE STATE AND RATEPAYERS AS THE OBJECT OF FISCAL PUBLIC AND MANAGEMENT

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Key words: *taxpayer, department, entity, financial, public, fiscal.*

Abstract

The purpose of the article consists in the guide use of the methods of the improvement of fiscal management and the development of fiscal services. It identifies the fiscal services and the relationship between money supply, fiscal budget deficit and their tools.
We have used many methods: the method of the deficit and monetary rate growth, the real interest method, object of taxation method, monetary analysis method. The use of these methods resulted in the enrichment of the public and private management, the functioning and relationship of the employees, the role of the fiscal relations regarding tax formation and payment. These results contributed to the continuous perfection of the evaluation of fiscal services in agricultural units.

INTRODUCTION

Experience shows that tax reform is a process whose effects did not occur immediately but over time, sometimes after many years, involving not only the legislative and organizational changes, but change behavior and taxpayer's attitude. The success of reform approach presents the significance of the two major problems that success depends on developing the services tax in Romania, but also in Moldova:
1. *Impact assessment on tax reform measures* on the revenue budget, determine short-term deficit that it induces the measures proposed.
2. *Establish sources cover the deficit in the short term,* their compatibility with the possibilities and allowances of budget system to pay future obligations.

MATERIAL AND METHODS

There have been used a number of methods: Method to increase the deficit and currency rates, real interest method, the method object of taxation, monetary analysis method. Using these methods work to enrich concepts brought public and private management, operation and relationships of employees, the role of fiscal relations in the creation and paying taxes. These results have contributed to the continuous improvement of business services evaluation tax agricultural units.

RESULTS AND DISCUSSION

Taxation has been and will be a bridge between the state and the taxpayers, bridge which I see it as unusual, contradictory, and with no possibility of exit, such as results from the motto shown below belonging to Sir Sydney Smith appeared in Edinburgh Review, 1820.
Abstract entity of the state from the legal point of view, but as concrete reality of economic and financial point of view, has the constitutional obligation to reasonably meet the social needs of the existing population. To meet these minimum requirements and other reasonable and will be speaking about the need for resources mainly collected from taxpayers millions of individuals, legal persons and other entities. Modern characteristics of the legal relationship has become biunivocal with double sense which means some taxpayers have not only obligations of paying taxes,

but under certain conditions have become beneficiaries of subsidies, transfers, raising funds for projects eligible under the funding Community National Budget. They have become important for the contributors that deal to have good management of fiscal flows and tax accounting so that the costs claimed by them to be minimal and the law is not violated, these considerations are valid for fiscal and taxpayers of the 2 countries, the economy of space we can deepen and comments only when differences will require.

The opinions of the author in conditions above mentioned are the tax issues of a corporate taxpayer and even physical must be a management process. If individual taxpayers in most cases calling to help an expert (which usually have professional quality tax advice) and legal persons according to size means a person or department, located in the financial services and accounting structure, or may appeal to a specialized independent consulting firm, found in the attributions to the company, the power of service, etc.. As regards its staff to be employed by content specialists willing to concerns documentation, training, to keep pace with continuous changes, as the legal and documentary was characterized as: dull, dense, fluid.

The subjects of the legal relationship are tax under the provisions of the Fiscal Procedure Code: State, administrative units - regional, taxpayer and other persons who acquire rights and obligations in this report. The State is represented by the Ministry of Economy and Finance through the National Agency for Fiscal Administration (NAFA) and its territorial units. All of category fiscal bodies, along the National Tax Administration Agency and its territorial units, are also specialized sections of the local administrative authorities, within the powers delegated to local administrative authorities, which are administrative units - regional. (conf art. 17 paragraph (4) and (5) of the Fiscal Procedure Code) and for establishing, controlling and collecting local taxes and related fines and penalties (conf art. 291 of the Tax Code).

Subject tax (taxpayer) is a natural person, legal person or entity without legal personality, on whose liabilities are secured by the consolidated state budget. The quality of imposable subject it has the persons who have a taxable income or has made taxable supplies. Physical or legal people, that obtain foreign taxable income or owns property in the country, are obliged to pay, in general, the same taxes as the Romanian people, applying the principle of equality. In this sense we can understand why taxpayers should be considered and those who have continuously gains or advantages to certain assets, income or other securities without their owners, to the extent that they refuse to show who is the owner of those goods gains or values (conf art. 66 of the Fiscal Procedure Code).

Inclusion in the list of categories of taxpayers organizations (entities) association does not have legal personality is a positive aspect (Examples: family associations, joint ventures, etc.). The taxpayer is the person required to make the calculation and payment of tax, income tax or other public. It should be noted that, because in theory and practice of tax is not a distinction between subject ¬ partners and imposing the tax payer, although the consequences are very important. Only the entry into force of the Tax Procedure Code (art. 26) the institution acquired its own rules. First, the payer may be the very subject of taxation (taxpayer), which generally has the personal duty to support his tax obligation and to pay the actual tax owed.

Fiscal Procedure Code governing representation in tax matters. Thus, taxpayers in dealings with the tax body can be represented by a commissioner or, failing that, by a trustee. Agent must submit to the fiscal authority empowered to act as authentic (Art. 18 paragraph (2) of the Fiscal Procedure Code). The appointment of an assignee is required for taxpayers without tax domicile in Romania, which is required to submit the statement to the fiscal authorities in the country. When the agent is an attorney, the form and content is resulting from the empowerment of law on the legal profession. It should be noted that the agent does not acquire its own tax obligations (except for recording the exchequer), he

assuming the obligation and on behalf of the taxpayer that it represents. You should not make confusion between empowerment and the situation of the relationship between the parent and its subsidiary. In this case, the lack of legal personality, is paying parent company, it is taxable and subject. This case is governed by Art. 26 paragraph (2) of the Fiscal Procedure Code, legal persons based in Romania that establishments. When there is an assignee, the fiscal authority will ask the competent court appointment of a trustee tax in the following cases, provided by art. 19 of the Fiscal Procedure Code:

Returning to support of the author as report state - the taxpayer, it must be treated as a management process so it is a work process - but one particular work process.

As you know, work processes taking place in any human organization is divided, in relation to their content and its effects in two basic groups: processes of implementation and management processes. Implementation processes of economic organizations (firms) are those that capture the activities in which factors of production - labor, capital, and land - are combined according to certain rules, resulting in the production itself, that various goods or services meet the needs of the consumer society. Unlike the processes of implementation, management processes are conducted by managers, which is a group of people (a part of employee organization) special representative, who guided the work of all employees toward fulfilling exactly the preset objectives. The word "management" derives from "manus" and suggests the idea of "handling", "Control". Manager is in charge of piloting, with management, participating directly in carrying out the action. From the Latin "manus" was formed in Italian "manegio" and French "Manege". It was borrowed from those languages in English in the form of the verb "to manage «which means to manage. Hence have arisen derived words "maneger", and "management", which mean leadership and management. So etymologically, management, means "to take in hand," to lead effectively.

One apparently unusual observation, the Peter Duckner, known as the father of management "is:" You make people productive training is the first of the challenges of our time "because, for centuries, to be educated means to be unproductive. Term management prevails in the economic sphere over the past 50 years due to spread the work of James Burnham the Managerial Revolution, "which first published in New York in 1941. He imposed a categorical definition of manager as a catalyst for innovation and progress, and the management. The idea of new, high value and timeliness of Burnham circulated is that "any company, regardless of ideological regime, legal and political needs of managers if they want the economy to thrive on innovation and creative rhythm.

In the meaning of the concept of management, it falls off if we use the definitions of specialists.

Thus, William Newman defines management as "important social technique as targeting, management and control efforts to a group of individuals to achieve a common goal. It is clear that a good leader is one who makes the group was to reach its goals in terms of a minimum expenditure of resources and efforts. A. Mackensie shows that "management is the process in which the manager operates with three basic elements - ideas, things and people, achieving the objective through others, and after Jean Gerbier" management means organizing, captaincy, and run ".

Other specialists, such as H. Johannsen and AB Robertson indicated that "management is the art or science to direct, manage and administer the work of others to achieve objectives, making decisions and management, for an economist, a factor production organization and coordination of other factors (land, labor and capital) to achieve maximum efficiency, the social process that involves responsibility for planning and effective regulation and economic operations (activities) of an enterprise in achieving a goal or a task data. It includes the proceedings, assessment and

decision (decision) in determining the plans and use of data for monitoring the performance and implementation plans and guidance, integration, motivation and supervision of staff in carrying out its work. H. Koontz, C. O'Donnell and H. Weihrich explained directly as management seeks to firm level, indicating that managers aim to achieve that surplus is profit, that extra income over costs.

Of course, for this they must also ensure a climate in the team that each individual should contribute effectively to achieve its objectives. Through management processes are conducted within private organizations as a system, the smooth functioning of all parts thereof (including tax and team described above), the dialectical relationship between the system manager and lead system (Figure 2.1).

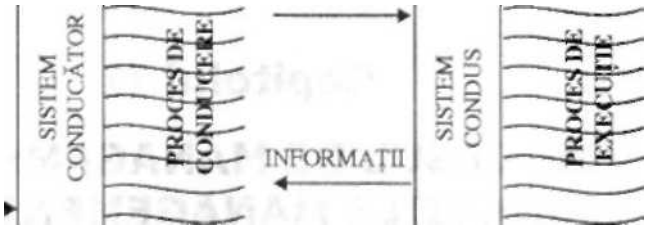

Figure 2.1. Dialectical link between the systems manager and lead system

Scope and intensity of management is in a dependent relationship with the management echelon in the sense that the more is done on a higher level of hierarchy management system of organization, the more comprehensive, more intensive and rich in meanings and results.

Management process is conducted continuously and uninterrupted in the organization say that begins with setting goals to achieve, continue with development decisions and drawing tasks, so that ends with the completion of these tasks and, through them, the objectives.

CONCLUSIONS

1.The objectives of fiscal management become more concrete well summarized in the national economy macroeconomic indicators – the base of training taxes, obtaining resources to cover expenses for carrying out the role of the economic - social state.

2. Analysis and diagnosis was achieved in the research tax dynamic market economy, taxation becomes a variable which must never be neglected.

3. Taxation is seen and becomes the root of the state budget. The enterprise becomes a catalyst for sound fiscal management on each charge, the results are reasonable enough so they introductory considerations, with high development potential.

4. Rates and local taxes are the main source of their income from training administrative-territorial budgets. The local tax system plays an important role in real estate tax and land tax. These taxes have an important role in training and contribute to their income and increase the tax base of the territory.

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THE METHODS OF RATIONAL CONSUMPTIONS OF MATERIALS, RAU MATERIAL AND FINISHED PRODUCTS RESOURCES

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Key words: *consummation resources, materials, value, use.*

Abstract

The paper's purpose consists in the implementation of new methods of supply and consumption of materials, raw material, tehnical land tehnological resources in the Moldova's agricultural entreprises. To reach this purpose various kinds of methods of rational resources and materials consumption were used: direct evaluation method, natural indicators method, the calculation method on the analogy basis in establishing necessary raw material,fuel, tools, etc., the method of global consumption indices, the method of dynamic differential. These mutual concessions contribute to successive materialization of materials, raw materials consumption state, which were used in about 20 entreprises. In conclusion, we mention sufficient savings in rational use of the consumption system of raw material, materials, energy, fuels, technical and tehnological resources.

INTRODUCTION

The purpose of the paper is to implement new methods of supply and consumption of materials, raw material, technical and technological resources in agricultural enterprises in Moldova.

MATERIAL AND METHODS

To achieve this goal have been used a number of methods of rational use of resources and materials, direct calculation method, the method of natural indicators, method of calculation based on analogy to determine the need for raw materials, fuel, spare parts etc.., method of index global consumption, method of dynamic coefficients. These concessions contribute to the materialization successive state material consumption, raw material or used to about 20 companies. In conclusion mention savings sufficient rational use of the system of consumption, raw materials, energy, fuel, technical and technological resources.

RESULTS AND DISCUSSION

Direct calculation method is considered only to be used to substantiate the needs (requests for materials), the mathematical calculations because the results are reflected ultimately in the establishment of specific needs, real, proper concrete consumption requirements of production. But the applicability of this method requires that, when determining the needs of materials, each economic unit to be secured the nomination in physical expression, the structure of the entire production program and have developed specific consumption-based technical documentation for all products profile for all manufacturing and materials involved in delivering them.

The method of **direct** calculation to the product or piece of material and energy resources requirements to ensure that production is only recommended to be used and who is also possible to apply because:

- With the market economy **an enterprise can set off** a new period of administration **if they do not know the market of its products**, in terms of assortment structure, competition, the price of the call. **This information is to be placed on the pillars of productive activity in the coming period, manufacturing plans and programs, product strategies, technologies, research, innovation and improvement of products to be fabricated ,and many others**

- Contact with the market, **continuous information on the relations between supply and demand, the actual and potential buyers and consumers should ensure the company's portfolio of orders for the period following, on which to build the whole design and manufacturing base to the whole process of production in all its details:** assortment, staggered deliveries, production schedules etc. launcher. **A productive start business without at least this information means that you take a big risk**, the more so with how the transitional economy conditions manifests a boisterous game of prices, the market is weak and incomplete contour and domestic capital is weak and uninsured.

Obviously, the situation may be different for monopolies or Monopsony, the products of first necessity, vital and irreplaceable. But even in these cases, competition can fight off the competing products or producers previously classics, which non-valorifying its full potential, market information, take risks and assessing the maximum production scheduling based only on inspiration, inertia, routine and its desire without any justification.

- It is an objective truth, relentlessly that the manufacture of one product **introduction or improvement of others already in current production** should be based on its technical documentation, appropriate (projects, formulation, specifications, etc.) **of the estimate with the necessary material resources can not miss**, be it of a technical borrowed, purchased from a specialized institution or developed in their own businesses. Today, **even manufacturing production cannot allow work on the basis of inspiration**, general knowledge, and no technical documentation more or less serious. It is this technical documentation is the one that gives clear information on the volume of material required product quality assortment, active substance, etc., and the quality of these resources, the strength of color, design, etc.

Calculation method based on analogy to use to establish the necessary materials for new products that have been made, but will be recorded in the series, and the specific consumption of documentation is not yet finalized. The calculation is based on the specific consumption of documentation related products, previously manufactured or maintained in parallel in manufacturing,
(CSA) and estimated volume of production for new product (Qn), the result is corrected by a coefficient (ξ) which expresses the difference (weight, size, complexity, etc.) between similar products. Under this method, the necessary material is determined using the relationship:

$$N_{pp} = Q_n + C_{sa} \times (1 \pm \xi)$$

or

$$N_{pp} = \sum_{i=1}^{n} Q_{ni} \times C_{sai}\, x\,(1 + \xi_i)$$

This method of calculation leads to the determination of material needs larger or smaller than real ones, depending on the relativity degree of expression differences produced by the weighting. Therefore, that method is applied rarely, usually in the calculations of estimates, preliminary, informative, the overall determination of need for materials or dynamic calculations, the trend for a longer appreciation of the development of material consumption.

Method overall consumer index one million lei nominated production is used to determine the materials needed when economic unit is not mentioned in full, on developing its program, the physical structure of production volume and freight. By this method of consumer needs are determined in several stages:

a) establishing requirements for the physical production materials nominated (NN), using the. this calculation method directly:

$$N_n = \sum_{i=1}^{n} Q_{ni} x C_{sai} x (1 + \xi_i)$$

wher e ***n*** is a natural product nomination and

b) determining the average consumption index of materials for manufacture of a designated production million lei (IGC) using the relationship:

$$I_{gc} = \frac{N_n}{P_n} \times 1.000.000$$

where P_n is the value of the nominees expressed in million.

c) Establish the necessary materials for production nominated (NNN) using the relationship:

$$N_{nn} = P_{nn} \times I_{gc}$$

P_{nn} is the value of the nominees, in million.

d) determination of the materials to implement the plan to the whole structure of production (NPP) by adding the two categories of need, using the relationship:

$$N_{pp} = N_n + N_{nn}$$

Global index method of production consumption to one million lei nominated lead but to obtain approximate results, because they extrapolate the consumption of materials for the production of the named individuals not nominalized without a plausible justification. Physical differences in volume and structure of the two categories of products and construction differences, technology, complexity, component materials may not provide an appropriate determination of actual material. This method can be used where a constant structure of production from one period to another, and when it is necessary to determine the volume of materials for construction, maintenance and repair workshops or secondary production company.

Coefficients method is a highly dynamic and requires extrapolation of statistical data for the following year consumption period of basic materials using the relationship:

where:

$$N_{pl} = \frac{C_r \times K \times (100 - P_r)}{100}$$

C_r = total consumption actually recorded during the basic material;

P_r = estimated to reduce consumption of materials by type, range or product variant, due to technical measures, technology and organizational set to be implemented in the next period, new production conditions that provide programs to ensure as modernization developed;

K = coefficient expressing the change in volume production next period (Qpl) from the base (Q = 0). The coefficient K is calculated using the relationship:

This method of calculation is limited and subject to the application of simultaneous fulfillment of the following conditions:

- maintain the following period of stable structures of production compared with that produced in base year;
- growth rate and relatively equal proportions of each component of the production structure (the following year the share of each product in total production should be approximately the same as that achieved in the base year);
- determine the level (percentage) reduction in the next stage of consumption for each material and product analysis based on actual consumption dynamics recorded in previous years, the influence due to new production conditions provided for insurance during the period.

In using this method of calculation must take into account that the unconditional technical progress, introduction into production of new achievements of science and technology entail improvements in the structure of material consumption from year to year. Therefore, the percentage of reduction would not reflect accurately determine the effect of technical change, technological or organizational provide to register in the next period. Therefore, the method is used more for forecast calculations, the trend of developments in the consumption of material resources, and to determine the destinations auxiliary consumption needs or which have not yet been developed, based on documentation, specific consumption (as such as, for example, some maintenance and repairs, insurance and working conditions of normal production, etc.)

The method of calculating the resource requirements based on material type is used

when the assortment is producing a very broad product mix of products. This category includes establishments in the textile, clothing, leather, food etc.., Registering variations of structure of production for each product, due to influences caused by the fashion of the season, specific area, unexpected orders etc.. By this method, material requirements are determined by total production (Q) for a specific group of products considered (eg boots, shoes, dresses, suits, etc..) And specific consumption of materials that meet the wide range particular type (CST) using the relation: $N_{pp} = Q \times C_{st}$ or

$$N_{pp} = \sum_{i=1}^{n} Q_i \times C_{sti}$$

This method results in determining a volume of raw materials and usually larger than strictly necessary, because the range type is generally share allocation, the most important in relation to the other, in this case, the scope of Use to narrow gradually, that method is practiced today only in some situations, for determination of material to tooling, matrixation, rebuild parts, etc.

CONCLUSIONS

1.În Research by new consumers is a final operator to income earned and within its market looking to buy a certain number of goods and services you have intention needs and desires, which arise from the author as a passive role, our calculations to maximize reduction - is to establish a scale of preferences depending on the nature and intensity requirements, individuals, subdivisions, businesses, all consumers of goods, services, materials, raw materials through the inter-relationship between producer and consumer, relationship which will find their development in the next chapter.

2. Management consumption myth created and sustained the sovereign consumer, the individual who, unrestrained by external constraints, they choose based on specific calculations, which the structure of consumption to bring up welfare. One such concept is the basis of our work that we have managed to propose a subtle and less abstract model, the consumer's taken directly from our heirs in direct line developed under the new market economy.

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THE INDICATORS OF THE ECONOMICAL EFFICIENCY OF THE VEGETABLE PRODUCTION AND THEIR MODE OF EVALUATION

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Key words: *unitary cost, productivity rate, profit rate, productivity per hectare.*

Abstract

The purpose of the work consists in the study of the indicators system of economical efficiency of vegetable production and the mode of their determination. The utilized criteria are: the maximalization of the work productivity; the maximalization of the work productivity degree of extensive and intensive utilization of the ale production capacities; the maximalization of the capitalization degree of the natural resources etc. The practical and scientific interest concerning the economical efficiency essence, the production means of the vegetable crops has an exclusive great importance in the development of the vegetable growing in Republic of Moldova.

INTRODUCTION

At the national economy, economic efficiency in all areas of activity, including gardening, reflect social labor productivity, it is a direct expression. In - The social labor productivity is determined by the ratio of working life and social and mass materialized use values created by these charges. Any increase economic efficiency in the national economy is a result of social labor productivity growth in its sectors of activity.

The purpose of the paper is to study the system's economic efficiency indicators of vegetable production and how to determine them. The criteria used are: maximizing labor productivity, maximizing the degree of extensive and intensive use of all production capacity, maximizing the degree of exploitation of natural resources, etc. Using these criteria increased scientific and practical interest to the essence of economic efficiency, the means of production of vegetable crops that are only important in the development of vegetable growing in Moldova.

MATERIAL AND METHODS

In the present study were used the following methods and techniques for measuring the economic efficiency of vegetable production:

Analysis and synthesis - the study of economic efficiency is based on study and analysis of factors influence the results of split and joint influence of all factors on the results is the synthesis. Study of dynamic phenomena in development, such global vegetable production volume changes under the influence level of intensity, using PTS and others, to study the volume change is necessary to study it by comparing the levels in dynamic motion.

Research - is the process of understanding the phenomena using methods, procedures, techniques, etc., and includes all of a large number of closely related actions, duly organized, rigorously planned data collection, systematization and processing, storage and retrieval, analysis and interpretation etc.., knowledge and information necessary for guiding economic and social processes.

Monograph is a statistical method of observation and used to characterize multilateral agricultural unit complex.

Statistical observation which is the collection, criteria established for all units studied crowd, values, variations, characteristics foreseen in the research. These data should fulfill two main conditions:

- volume condition, which involves collecting data on all or most of the units studied, in order to play the essential features

of the general crowd studied the formation sample using random selection methods and non-renewable;

- registration of real, genuine

The material used for the purposes of the study conducted found in research, data analysis and interpretation of literature, Statistical Yearbook of the Republic of Moldova, National Bureau of Statistics of the Republic of Moldova.

RESULTS AND DISCUSSION

The essence of economic efficiency that category expressed achieving high results with the lowest consumption or reduce to a production or work carried out, ie bringing the lowest total loss of the work to get a production or work. The concept of economic efficiency has a lot of significance and meaning of which is a question of why, as the product. Almost any product there is several methods.

For example vegetables can be produced in large enterprises with a high level of mechanization of work processes. But they can be made and small businesses use manual labor. Efficiency in the first case will be higher than the second. Correct knowledge of the essence of economic efficiency as a very complicated category is necessary, in our view, both for science, as well as practical purposes. In economic literature there are different views on the issue of economic efficiency: the origin of the class, the concept of economic efficiency, criteria of assessment systems and its indicators etc. Economic efficiency is a complex concept expressed in the most comprehensive results that are obtained in - an economic activity, measured in terms of resources consumed for the pursuit of concrete activities. Efficiency is determined by the relationship between volume and quality efforts as elements of effects and results that are obtained in - a period as a result of the completion of those efforts.

Efficiency is synonymous with effectiveness, terms used since antiquity. Both words come from Latin: *efficiency derived from efficere (make), and the efficacy of effices - efficacis (which has the desired effect).* The efficiency of economic activity is general in nature, amounting to effective part of economic units, branches and branches of national economy.

Each of the latter in turn may occur as the overall efficiency in relation to the efficiency of components. Efficiency is calculated as a ratio between the size effects and the efforts or the efforts and the size of effects.

The two comparisons can be expressed as:

$e = E / \varepsilon$ - *max and* $e^* = \varepsilon / E$-*low*

where:

e and e^* - is the economic efficiency

E - is the outcome

ε – efforts

The symbols e and e^* have the following meanings: the first case is established that the effect is achieved within a unit of effort and to be up, in the second case, which is calculated effort to obtain a unit of effect, and which must be minimal.

In the first case presented to require a maximum effect at a given effort, and the second implementation proposed effect with minimum effort. Hence the formula is wrong to maximize impact while minimizing effort. Generally increase as the growing efforts and economic effects, increasing the latter being accelerated to a certain level of efficiency. After this level of effort is a degree of saturation and the effects of slower growing, stagnant or decreasing.

Also, certain efforts meet some variations that effect is maximum. Economic efficiency must be the basic component of all economic activity because the amount of resources is limited only by one character - better use of them can ensure economic growth and thus raising the standard of living of the population. So, economic efficiency should be seen both at the microeconomic level as well as macroeconomic.

Economic efficiency is the main factor in the quality of economic growth because it ensures the absolute increase of effects with the same amount of effort.

Economic efficiency is complex, which

requires a detailed analysis of all efforts and outcome in terms of volume but also the structure and social importance. With competitive economy, economic efficiency will be calculated both at micro and macro level as well as the national economy.

Macroeconomic efficiency is measured by considering the aggregate levels of economic performance indicators in the national economy - produced (GDP), level of exports, etc.. The units can be analyzed sectors of national economy (agriculture, industry, field services, etc.), the often observed trends (the dynamics)

The main goal of macroeconomic development lies in raising the welfare of society based on gross domestic product growth, which is the overall value of the final product, created, distributed and used (consumed) in the national economy during the year.

Efficiency refers to the level of industry analysis at branch level business productivity. Here units often operators in the field are compared with each other by how they use their resources to realize results. Microeconomic level includes the entity whose principal purpose, in conditions of market economy is a profit range for a unit of resources consumed and for operators in gardening - and autoassurance means of consumption.

At the micro level efficiency concerns, in particular, in assessing the use of internal resources of a trader.

So but, on the whole economy, efficiency is expressed as the increase of national income per unit effort, and at company level by level of labor productivity, unit cost of production, the profitability etc. For these economic levels is characteristic necessary to improve the process of increasing production and improving the resources of their use: at the macroeconomic level - the whole country and separate branches of national economy, at the microeconomic level - the enterprise. Thus, the size of economic efficiency materializes at the microeconomic level, but it is important for the national economy as a whole.

An issue in dispute in the literature is one that the system of indicators, this resulting in confusion that comes from how to interpret the economic efficiency of vegetable production and economic efficiency of agricultural production resources.

The indicator, which can be expressed multilateral economic efficiency:

1. Global production in thousand lei production and consumption in humans - days;
2. Net production in thousand lei production and consumption in humans - days;
3. Net income per thousand lei production inputs,
4. The rate of return or profit;
5. Unit cost.

Need to use indicators system, the interaction, is determined by the contradictory nature of the development of these indicators in reverse.

Thus, increased global production in thousand lei production inputs is not always accompanied by increased net production due to possible material consumption growth faster.

Income or profit that acts as the final indicator of economic efficiency cannot be considered an indicator of generalized, even if it is not only a resultant training but also a source of all accumulation funds.

The shortcomings of this indicator are determined that its calculation methodology, the quantification is influenced by economic policy in agriculture at a time that makes it variable and unstable. Using a system of indicators in assessing the economic efficiency of production of vegetables and especially does not preclude the need to find a generalizing indicator.

Economic efficiency of production of vegetables, is determined by a system of indicators which can be conventionally divided into two groups.

Indicators of the first group are used to determine the economic efficiency of vegetables in comparison to several years in dynamic - a household, or the comparison between different households. These

indicators can be used in one and the same culture or group of crops and breeds of animals.

In this group of indicators concerns:

1. Productivity per 1 ha, q.
2. Production quality.
3. Labor productivity, man - hours.
4. The cost of a quintal of vegetables, lei.
5. The average price of a quintal of making vegetable lei.
6. Profit in the calculation of a quintal of vegetables.

Indicators second group also characterized the economic efficiency of vegetables, but also used in comparative analysis of various agricultural industries.

They refer to the following indicators:

1. Size of total income and net income in the calculation of a man - hours of labor inputs, 1 ha of area equivalent to a penny of production inputs.
2. Income in calculating the size of 1 ha area that has been made production, lei.
3. The level of profitability,%.

This system of indicators enables us to determine the economic efficiency of vegetables, revenue sources and causes of losses and allow us to trace the ways to increase branch efficiency data.

Economic efficiency indicators of vegetables can be natural and values. In the natural concerns of a hectare yield and production and consumption calculation working 1 q production.

Return a - ha as an indicator of efficiency of vegetables take q / ha. To discover the economic effect it is necessary to know the entire consumption contributed to a harvest date. The quality of vegetables is a very important indicator as in - it largely depends on price and size profit making vegetables.

Labor productivity as an indicator of economic efficiency can be calculated directly and indirectly, and expressed by quantity of production obtained in - a unit of time, or the amount of time consumed in obtaining a production unit. The value indicators relate the following indicators:

- 1 q cost of vegetables, which are determined by the ratio of production consumption to achieve global vegetable harvest vegetables;
- The average achievement 1q vegetables, as determined by the relationship:

$$\frac{veniturideLarealizarealegumelor}{cantitateadelegumerealizate}, lei$$

- Profit in the calculation of q 1 vegetable, as determined by the relationship:

$$\frac{profit}{cantitateadelegumerealizate}, lei$$

Income is the difference between world production and production cost. It is composed of two parts: the nature and value. Part value is the difference between net sales and cost of production made - profits: profit calculated to 1 ha area that has been made production, is determined as the ratio of profit and surface that was achieved vegetables; the profitability of vegetables, which is the ratio between profit and cost of production achieved.

CONCLUSIONS

1. Efficiency is determined by the relationship between volume and quality efforts as elements of effects and results that are obtained in - a period as a result of the completion of those efforts.
2. Studied in the literature there are several views on economic efficiency, but the main indicator is the profit realized from production activities.

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THE EFFECT OF NITROGEN FERTILIZATION ON THE ORGANIC MATTER IN THE MOLD VERMOUTH FROM MĂRCULEŞTI

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Key words: *black earth vermouth, humus substances, total carbon, humus carbon, fulvic carbon.*

Abstract

The mineralization of the soil organic matter, therefore of the humic substances is favourably influenced by the mineral fertilization. The paper presents the effect of long run field treatments with ammonium nitrate on the mold vermouth from Mărculeşti. The paper studies the effect of different doses of fertilizers on the humus from the soil (C_t), of the humic organic matter(C_e),of the contents of humus and fulvic carbon (C_{ah} şi C_{af}). The results of the tests have been processed statistically by analysis of variance.

INTRODUCTION

The nitrogen is the element essential for the plants, determining the cultures productivity. The mineral fertilizers caused problems during the time, especially on the processes of mineralization and nitrification of nitrogen in the soil.
In case the organic substance of the soil can make available to the plants by mineralization processes significant quantities of nitrogen, it is required to make more researches to find some methods to improve the nitrogen regime to ensure an increased efficiency of the mineral fertilization.
In agriculture, the humic substances play an important role in obtaining big and stable crops during the time. The organic matter in the soil provides approximately 50% of the nitrogen used by the agricultural plants all over the world.
The system of humic substances play also an important role in obtaining big and stable crops during the time. It is subdued permanently to a double process: of humification of organic material that settles in the soil and of mineralization of the components in different phases of humification. The representation of this process is influenced by the type of soil, clime, irrigation, fertilization.
In this context, in the present paper we proposed to study the effect of long term treatments with fertilizers on vermouth-clay black earth in Mărculeşti.

MATERIAL AND METHOD

The vermouth-clay black earth from Mărculeşti presents good physical characteristics: the texture is medium, the soil is loosen, permeable and aired, the high capacity of water retaining accessible to the plants. These favourable physical characteristics can be found during the entire thickness of the soil profile and of the development layer of radicular system, not existing limitative horizons of fertilization within its contents.
The contents in humus of the soil in Mărculeşti is between 3 and 3,30, the mineral nitrogen decreases per profile of soil and is of 0,183 – 0,206%; the soil pH is 7.1-7,8.
The researches were made on soil tests collected from long term experiences, of Amp horizon (0-20 cm), in three field repetitions and were mixed in a medium test of experimental variant.

The factors were studied: temperature of incubation – with degrees: 5^0C (as it occurs in early spring), 20^0C (spring) and respectively 30^0C (summer); capacity of field for water C.C.A. – with degrees: 40%, 80%, 100%; doses of nitrogen fertilizer NH_4NO_3 (N active substance) with degrees: N_0, N_{50}, N_{100}, N_{150}, N_{200}.

The capacities of field for water, introduced as factor of influence in pedobiological transformations try to explain the modifications made in the agricultural practice, both in case of irrigated and not irrigated crops.

In order to estimate the processes of mineralization and nitrification Waksman method was used of incubation of soil in the laboratory, in the conditions of controlled temperature and humidity, eliminating the possibility of losing the nitrates by leaching.

The analyses made are needed to mention the fertility level of the soil:

- Determination of contents of colorimetric ammonia nitrogen;
- Determination of contents of nitrates by colorimetric method;
- Determination of contents of C total in spectrophotometrical way (method Salfeld);
- Determination of humificated organic matter in soil (extractible carbon C_e);
- Determination of contents of humus acids in soil (C_{ah});
-Determination of contents of fuvic acids in soil (C_{af}) was made by difference.

The division of carbon was made according to scheme Kononova-Belchikova.

The results obtained after the analyses were processed statistically by variation analyses. The description of methods is given by Cecilia Neagu and collaborators (2006).

RESULTS AND DISCUSSIONS

The data of chemical and biological analyses resulted from the experimental models with soil tests from Mărculeşti (vermouth black earth), treated with ammonia nitrogen doses, at different capacities of field for water and at different temperatures are presented as follows.

The humus in soil is determined by the contents of organic carbon (C_t). by the determination of the extractible carbon C_e in soil, in fact we identify the humified organic substance in soil.

The organic substance of soil has a significant influence on its physical and biological characteristics. It determines the soil structure, the accessibility of nutritive elements and serves to soil conditioning. The un worked soils have more organic substance (with a bigger molecular mass) and a higher capacity of cationic change.

Capacity of mineralization-nitrification in vermouth black earth in Mărculeşti

Table.1.a, b, c The mineral nitrogen resulted from the two processes in the soil in Mărculeşti:

a. 40% C.C.A.

Nitrogen dosis	5^0C	20^0C	30^0C	Σ N
0	1,57	3,85	0,29	1,90
50	-0,92	1,09	-1,81	-0,55
100	4,23	5,22	1,84	3,76
Σ_t	1,63	3,39	0,11	1,71

At 40% capacity of field for water the intensity of the nitrogen mineralization decreases with the incubation temperature, except for temperature of 20^0C, to which it has the highest values.

The dosis of nitrogen fertilizers influence positively the mineralization, except for N_{50}.

b. 80% C.C.A.

Nitrogen dosis	5^0C	20^0C	30^0C	Σ N
0	6,18	2,73	1,82	3,58
50	0,42	0,82	-0,06	0,39
100	2,74	7,75	3,25	4,58
Σ_t	3,11	3,77	1,67	2,85

At this capacity of field for water, in not fertilized variant, the nitrogen mineralization decreases, and at dosis of N_{100} and temperature of 20^0C the highest quantity of mineral nitrogen was obtained.

The increase of fertilizer dosis led to the increase of mineral N, less than in case of N_{50}.

c. 100% C.C.A.

Nitrogen dosis	5^0C	20^0C	30^0C	Σ N
0	2,08	1,63	0,89	1,53
50	-2,59	-0,82	-1,37	-1,59
100	4,43	4,56	1,70	3,56
Σ_t	1,31	1,79	0,41	1,17

At the capacity of field for maximum water, the intensity of nitrogen mineralization decreases once with the increase of the temperature of incubation of tests, especially at not fertilized soil.

The mineralization of nitrogen increases with a dosis of fertilizer incorporated, except for the dosis of N_{50}.

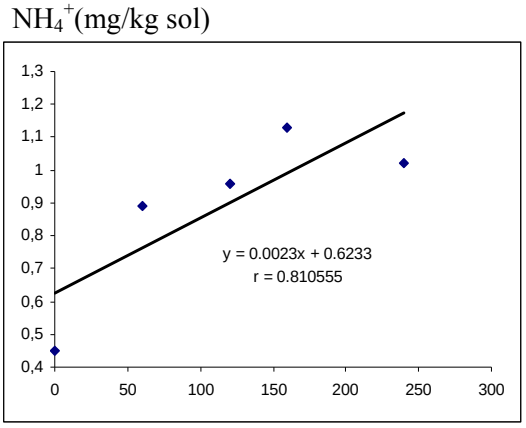

Fig.1. Correlation between the quantity of ammonia in vermouth black earth in Mărculeşti and dosis of nitrogen fertilizer incorporated annually in soil (n = 5)

The multi annual fertilization with nitrogen determines the quantity of free ammonia in soil solution. Regardless the inherent losses, by volatilisation, the irreversible fixation on clays, nitrification, passing to organic forms, correlate the values.

The effect of differentiated fertilization with nitrogen on the total percent of organic substance (C_t) and its forms in vermouth black earth in Mărculeşti

Tab.2. Agro chemical characterization of chemically fertilized soils, in long term experiences on the effect of factors of influence for the vermouth black earth in Mărculeşti

Soil	Dosis of NH_4NO_3	Humus C_t%	C_e %	C_{ah} %	C_{af} %
Vermouth black earth Mărculeşti	0	1,87 b	0,94 b	0,55 a	0,39
	50	1,79 d	0,86 c	0,52 b	0,34
	100	1,93 a	0,99 a	0,54 a	0,45
	150	1,85 c	0,92 b	0,54 a	0,38
	200	1,84 c	0,85 c	0,54 a	0,31
D.L.	5%	0,026	0,034	0,008	
	1%	0,039	0,049	0,012	
	0,1%	0,058*	0,074*	0,019*	

*the groups difference was made for D.L. 0,1%

In the black earth in Mărculeşti, with very high natural potential of fertility, the multi annual incorporation of nitrogen does not influence the regime of the organic substance in soil, no matter if we refer to the total percent or to different fractions. Still, the fractions of organic substances – extractible carbon (C_e) or fulvic carbon (C_{af}) – are correlated with the total contents of organic substance (fig.2 şi 3)

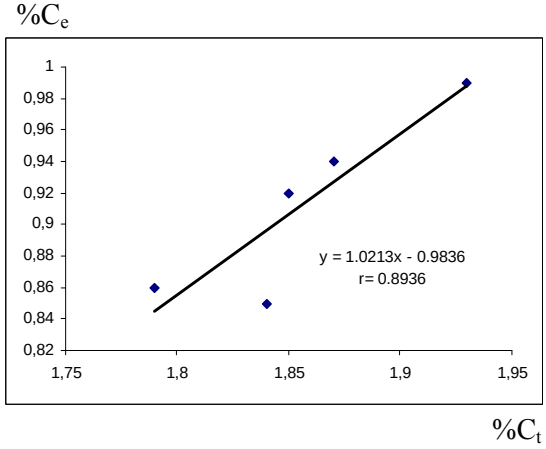

Fig.2. Correlation of extractible carbon with total carbon in vermouth black earth in Mărculeşti (n = 5)

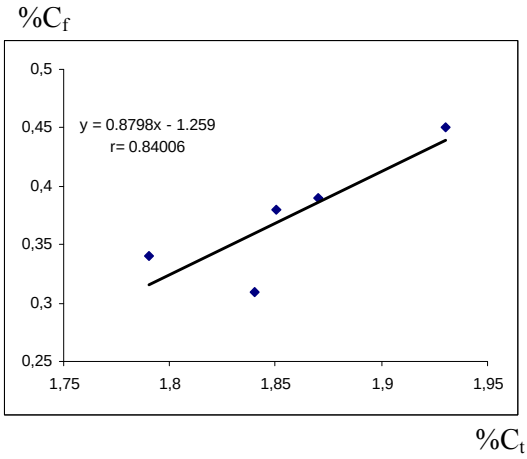

Fig.3. Correlation of carbon in fulvic acids with percent of total carbon in vermouth black earth in Mărculeşti (n =5)

The total humus carbon (C_e) determines the carbon in fulvic fraction (fig.4). the correlation in this case is closely.

There are significant correlations between the organic substance in soil and some properties associated with it. The organic substance is responsible for the stability of the soil aggregates. The total contents of organic substance can be used as an indicator for the soils that have problems of structural instability.

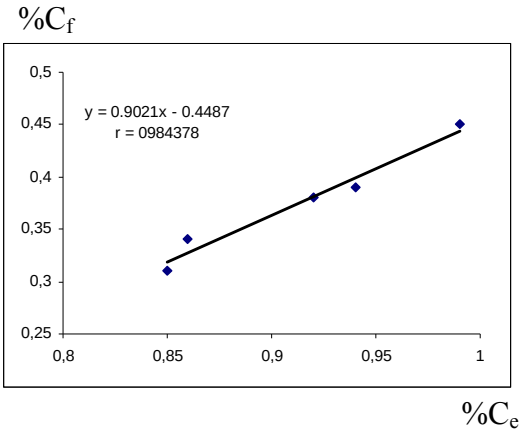

Fig.4. Correlation between the fulvic carbon and extractible carbon in vermouth black earth in Mărculeşti (n = 5)

CONCLUSIONS

1. The data in the paper certify that there is a very close correlation between the total carbon in the soil and the humified carbon, in the first place with carbon in humus acids. The fulvic carbon considered as a rule a sub layer of mineralization processes, the ammonia provider and then nitrites for plants nutrition and formation of crops is correlated with total carbon.
2. The dosis of nitrogen fertilizer in soil determines very closely the soil contents in total carbon (C_t), of humified carbon (C_e) and carbon in humus acids (C_{ah}).
3. The extractible carbon is alos closely correlated with the carbon in humus acids and with fulvic one, highlighting the fact that these fractions are in a relatively constant process in humus substance, determining both the stable humus and the nutritive one.
4. As a conclusion, the incorporation of mineral nitrogen in soil determines the intensification of humus substances synthesis, inclusively the strongly polymerized fraction of humus acids and (or) stops the excessive mineralization of these substances by an alternative source of nitrogen, provided by fertilizer.
5. Referring to the dynamics of the processes started in soil by administration of ammonia nitrogen in the model presented in our study and knowing that the ammonia nitrogen represents 50% of the ammonia nitrogen, we notice that the increasing dosis of ammonia hinders the process of ammonification, especially in case of favourable temperatures of 20-30^{o}C, used in soils incubation in our experimental model. Seldom, we find out at the end of the period of incubation even a decrease of concentration of ammonia in soil test. The disappearance of this mineral nitrogen can be explained by passing it in organic forms, more likely in new microbial biomass, but also by its oxidation at nitric form.
6. The mineralization of humus substances is influenced favourably by the organic fertilization and even with mineral. The effect of organic fertilization is explained by the increase of the quantity of nutritive substances, that determines the increase of the number of micro organisms in soil.
7. The synthesis of humus substances represents the main problems of maintaining the fertility potential of the soil, and their mineralization – the support of agricultural productions that are obtained. The humus balance of a cultivated soil consists of its capacity to set the potential of humification-mineralization of humus at identical levels.

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AGRICULTURAL POLLUTION SOURCES IN CĂLĂRAŞI COUNTY

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Key words: *fertilizers, pesticides, eutrophication, bioremediation, phitoremediation*.

Abstract

The paper analyses the pressures made by some sources of agricultural pollution on the water and soil in Călăraşi county.The agriculture is a polluting factor of soil, surface water and underground water by excessive, uncontrolled use of chemic and natural fertilizers, of pesticides, of irrigation water (inadequate from quantitative and qualitative point of view).The polluting agents are: compounds of nitrogen and phosphor (nitrates, phosphates), pesticides, heavy metals, pathogen germs. The risk of pollution with nitrates of the underground water is high, due to their high solubility in soil water. The Eutrophication is a phenomenon that appears as a result of collection of organic nutrients in aquatic area.The polluted waters can be cleaned, and the polluted soils can be recovered by bioremediation processes (that use micro organisms) and phitoremediation (that use plants on this purpose).

INTRODUCTION

The application of some new agricultural practices, based on the most advanced scientific knowledge in the technology field, especially those viable ecologically, is a major requirement to promote the sustainable agriculture.
The impact of agriculture on the environment affects all its components: air, water, soil and biodiversity are deteriorated or threaten by the agricultural activities that generate pollution.
In Romania, the agricultural activities ensure the existence of a considerable percent of population and as a paradox, agriculture contributes also to the deterioration of the environment and decrease of population life quality. The lands used in agriculture occupy 62% of our country surface, that indicates obviously the impact of these activities on the environment.
The renewable natural resources are constituted of water, air, soil, flora, fauna, sun energy, wind energy and tide, and those not renewable contain all mineral substances and fossil fuels. The main factor that transforms almost entirely and irreversibly the renewable natural resources in not renewable resources is the pollution.
The agriculture, together with the industry, can become one of the important sources of polluting agents with negative impact on the environment quality, by deterioration or even destruction of some of its components. Today, it is practically unanimously accepted that the intensive agriculture can lead to the soil and water pollution by excessive use of fertilizers, pesticides, inadequate irrigation water qualitatively and quantitatively, especially on the arable lands loosen excessively by different works.

MATERIAL AND METHOD

In this paper we tried to analyse the pressures made by some factors on the state of water and soils quality in Călăraşi county, especially those that derive from agricultural sources.
The polluting agents of the soil, surface waters and underground water are: compounds of nitrogen and phosphor (nitrates, phosphates), heavy metals, pathogen germs. The risk of pollution with nitrates of the underground

waters is high due to their high solubility in soil water.

Nitrates and nitrites - both forms are soluble in water**.** The result of an analysis of water solution is expressed in units of nitrogen, nitrogen in the forms of nitrates or nitrites. The determination of nitrites was made using methods of humid chemistry, and the nitrate using and electrode ion selective and spectrophotometer UV.

In determining the nitrites, the method used is based on the formation of an nitrogenous colorant, red-purple, after the reaction between the dinitrogenated sulphanilamide and diclorhidrate N-(1-naftil)-etilendiamina (NED diclorhidrate) at a pH between 2,0 and 2,5. The coloured compound is determined by measuring the absorbance at 543 nm. This method could be used also for the nitrogen determination, if the proof is pre-treated in a column of bottle full of granules of cadmium treated with copper sulphate. When the proof passes by column, the nitrogen is reduced to nitrite, then it is determined according to the above described procedure. Using the column of cadmium the proof contents is determined for the sum between nitrate and nitrite. In order to determine only the nitrate, of total quantity (nitrate + nitrite) the quantity of nitrite is deducted from the proof.

Pesticides. Methods of preparing the proofs applied at the analyses of pesticides are very diverse. The procedures used depend on the type of proof, its size, as well level of concentrations of interest analytes. Two or even three techniques of proofs preparation were used for a single type of proof, so that to achieve both the analytes concentration, and the efficient elimination of interfering matrix.

Heavy metals. Although most of the metals are toxic, only one of them are major pollutants of the environment, due to the extensive use. The European Register of Pollutants Emmission classified seven metals as priority pollutants: cadmium, chrome, copper, lead, mercury, nickel and zinc.

The metals effect on the environment (water, air, soil) vary from the benefit to very toxic. Some metals are essential for the plants and animals growing, while others can have a toxic effect. The benefits of some metals versus toxicity depend on their concentration in the environment.

The metals were analysed spectrofotometrically in solution and by spectrophotomety of atomic absorption (AAS) or spectrometric of atomic matrix (AES). Some metals are determined by methods based on ion-selective electrodes, volametry, chromatography of ionic change, electrophoresis, analysis by activating with neutrons, redox titration and gravimetric.

Indicators of oxygen regime in waters:

CBO_5 The biochemical requirement in oxygen of the waste water is given by the quantity of oxygen used by the micro organisms in water to deteriorate the biodegradable organic substance present in the used water, by means of biochemical processes. The standard time established is of 5 days, at temperature of 20^0C.

CCO of the used waters is given by the quantity of oxygen used by the oxidation of the organic substance by jeans of some chemical reactive. Method with $K_2Cr_2O_7$ and H_2SO_4 (CCO –Cr) was used.

At the base of the achievement of this analysis was also the information provided by the Ialomiţa Water Department - Buzău, SGA Călărasi, Arges Water Department – Vedea, as well Department for Agriculture and Rural Development Călăraşi.

RESULTS AND DISCUSSIONS

EU Directives created a complete framework of requirements that must be adopted in the national legislation of all EU member states. There are three types of **directives**, that include ***framework directives, daughter directives*** and ***specific directives.*** The framework directives ensure the general aims or principles of a directive, and the daughter directives are much more specific and approach a specific problem of the framework directive. These directives were transposed in the national legislation. As regards the water, in our country, the Law on Waters no. 106/1996 was completed by Law no. 310/2004. The modifications

include also to transpose the EU directives (Framework Directive Water and daughter Directives), introducing the principles of environment protection used in EU (prevention, precaution, damage avoidance at source and „polluter pays").

As a result of the completion of the Water Law were identified the hydrographic basins based on which the management of the water resources will be achieved. Thus, 11 hydrographyc basins were identified: Someş-Tisa, Crişuri, Mureş, Banat, Jiu, Olt, Argeş-Vedea, Buzău-Ialomiţa, Siret, Prut and Dobrogea-Litoral. Călăraşi county is included in two hydrographic basins: Argeş-Vedea and Buzău-Ialomiţa. For each identified basin a Basin Committee was created, its secretariat is ensured by the Regional Waters Department in the respective area.

The source of drinking water supply for Călărasi and Oltenița cities is the Danube river. For the other urban areas the supply is made from underground.

The hydrographic network of Călărasi county is represented by:

- the Danube river – 150 km;
- Borcea branch – 66 km;
- Arges river – 37 km;
- Dambovița river– 28 km;
- Mostistea lake – 213 km length with 5670 ha water surface;
- Gălățui lake – 610 ha water surface;
- Iezer lake– Călărasi - 300 ha water surface;
-Water surface – 3341 ha, including not arranged lakes, fish ponds, etc.

According to the data provided by Ialomița – Buzău Water Department, SGA Călărasi, the situation of the water taking in Călăraşi county in the water 2008 present as follows:

Total 177135.3 thousand m^3, of which: 170270 thousand m^3 surface waters and 6865.5 thousand m^3 underground waters.

According to the data provided by DA Arges – Vedea, placing the sections of characteristic interior rivers on classes of quality compared to the physical-chemical indicators, according to the Order MMGA no. 161/2006, for the years 2008 is presented below.

As it is noticed in the table below, the lowest quality of water compared to the physical-chemical indicators is in Dâmbovița – entrance - confluence Argeş.

Table 1. The situation of the interior rivers in the year 2008 under the jurisdiction of Arges – Vedea Water Department.

County	Water course	Total Km	Cal. II km	Cal. III Km	Cal. V km
Călărasi Hydrographic Basin Danube	**Arges** Entrance Budesti	**46** 9	**9** 9	**37**	
	Budesti – Confluence Danube	37		37	
	Dambovița Entrance confluence Argeş	**23**			**23**
	Câlnău	**31**		**31**	
	Luica	**17**		**17**	

* **Observations:** The placing is determined by indicators of oxygen regime

The values CBO_5 obtained from the surface waters demonstrate that if:

- CBO_5 *is lower than* ***2mg/l****, the waters are of good quality;*
- CBO_5 *is equal with* ***3-4mg/l****, the waters are rich in organic substance;*
- CBO_5 *is higher than* ***5mg/l****, the waters are polluted.*

The determination of the rate between CBO and CCO allows to establish the need to make a biologic or physical-chemical treatment of the used water. There are three cases:

- If the rate CBO_5/CCO is lower than 0,2, the pollution is of inorganic origin, the substance obtained being less biodegradable and it is needed a physical-chemical treatment;
- If the rate CBO_5/CCO is of 0,2-0,4, the compounds contained by the used water are considered as being biodegradable;
- If the rate CBO_5/CCO is higher than 0,4, the pollution is considered by organic nature, the substances being very biodegradable and it is recommended to make a biologic treatment; CCO oxidizes all the organic substance, while the rate CBO/CCO will be always lower than 1.

According to the data provided by DA Ialomița – Buzău, SGA Călărasi, the quality

from physical chemical point of view of the lakes monitored by SGA Călărasi and Arges – Vedea Waters Department for the year 2008 presents as follows:

Table 2. Placing on classes of quality from physical-chemical point of view of the lakes in Călărasi county in the year 2008

County	Lake	Waters department under jurisdiction it is	Placing from physical chemical point of view
Călăraşi	**Fundeni**	DA Arges – Vedea	**II**
	Frăsinet	DA Ialomiţa – Buzău	**II**
	Iezer	DA Ialomiţa – Buzău	**II**
	Gălăţui	DA Ialomiţa – Buzău	**II**
	Iezerul Călărasi	DA Ialomiţa – Buzău	**II**

We remark from the table that all lakes in the county are placed in II class of quality, from physical-chemical point of view.

Pressures of some factors on the quality state of the soil

Fertilizers. According to the data provided by the Department for Agriculture and Rural Development Călărasi, the fertilizers used during the last years were: nitrogenous, phosphorus, potassium, as well natural fertilizers.

Table 3. a, b. Evolution of using chemical fertilizers in the period 2000-2008

a.

YEAR	Chemical fertilizers used (tone active substance)			
	N	P_2O_5	K_2O	Total
2000	10369	4028	482	14879
2001	10141	2763	369	13273
2002	8941	2552	116	11609
2003	6138	1862	269	8269
2004	7133	2103	239	9475
2005	12790	5046	149	17985
2006	11206	3338	240	14 787
2007	13223	6108	214	19545
2008	13720	3579	346	17645

b.

YEAR	$N+ P_2O_5+ K_2O$ (kg/ha)	
	Arable	Agricultural
2000	36	36,86
2001	32	32,76
2002	28	28,76
2003	20	20,47
2004	23	23,55
2005	43	44,03
2006	79	0
2007	87	0
2008	104	0

According to these statistical data, we notice the increase of quantity of fertilizers used until the year 2002, the a slightly decrease, after that an increase of their quantity until 2008.

Fito-sanitary products

Table 4 a,b. Situation of using fito-sanitary products, in Călăraşi county

a.

Year	TOTAL Fito-sanitary products (tones)	In which:		
		Insecticides tones	Herbicides tones	Fungicides tones
2000	258,24	19,78	175,45	26,97
2001	228,68	17,85	133,34	26,02
2002	165,72	25,16	113,81	24,24
2003	146,47	18,13	105,00	13,85
2004	177,45	20,13	135,20	15,90
2005	192,34	16,20	142,25	22,30
2006	239,34	28,60	165,70	29,32
2007	253,62	30,11	180,15	31,20
2008	168,89	9,86	108,64	47,39

b.

YEAR	TOTAL Fito-sanitary products (tones)	In which:	
		Insect fungicides tones	Insect acaroids tones
2000	258,24	36,04	-
2001	228,68	51,47	-
2002	165,72	2,50	0,01
2003	146,47	9,38	0,01
2004	177,45	6,20	0,02
2005	192,34	12,20	0,01
2006	239,34	15,70	0,02
2007	253,62	15,15	0,1
2008	168,89	3,00	-

From the table it results that in the years 2000-2001, respectively 2006-2007 the highest quantity of fito-sanitary products in Călăraşi county was applied.

Biodiversity of Călărasi county. Călărasi county has a total surface of **508785 ha,** the percent being of 2,1% of Romania territory, occupying 28 place as size among the country counties, it has **34.009,6 ha** protected surface, representing 6,68% of the county surface.

These polluting agents, respectively toxic and/or noxious substances can accumulate in quantities that exceed the maximum admissible limits, both in the soil and in the surface and underground waters. Among these

polluting agents can be considered: zoo technical waste, town mud (sewerage and domestic) mud from the processing of sugar beet, linen and hemp, celluloses, etc., that can contain over the maximum accessible limits heavy metals, organo clorhide substances in class HCH and DDT, triasines, compounds of nitrogen and phosphor (nitrites and phosphates) etc. but also different pathogen agents.

Among the noxious consequences of these substances we mention especially: cancer and mutagen effects, accumulation in the trophic chain, high toxicity, etc., all contributing to the severe perturbation of the natural balance.

The nitrates can generate nitrites, that in high quantities have noxious effects on the human health. Also, if the phosphates and nitrates reach in different ways in still waters, contribute to the production and intensification of the eutrophication process, that finally determines their deterioration and partial or even total destruction of the fauna by the elimination of oxygen and formation of noxious chemical compounds.

Both nitrites and nitrates can contribute to eutrophication if the nitrogen is a limitative factor. This leads to the production of organic substance, then by decomposing consume oxygen. If the concentration of the organic substance is high, the areas that lack oxygen in the water systems can produce severe effects on the aquatic organisms. The nitrites are themselves noxious for the fish.

When the haemoglobin is exposed to nitrates, it is oxidized at methemoglobine. This transformation leads to the increase of protein capacity to link oxygen, this situation is very severe. This can appear when there are nitrates in the drinking water and become very dangerous for the children and for the herbivores, especially ruminant animals, due to the big number of bacteria of nitrates present in their digestive system.

The phosphates result especially from detergents.

The irrigation and incorrect drainage, associated with other inadequate practices (mono culture or short term crops rotation, excessive loosen of soil, especially by numerous superficial works, not respecting the best periods of work and traffic of soil, etc, work of soil on lands situated in slope upstream or downstream etc.) added also an inadequate management and use of agricultural lands and an irrational use of forest stock, determines the appearance and intensification of the physical degradation of the soil by processes: destruction, compacting, crust, wind and hydro erosion, contributing in this way and more to the sensibility, favouring and accentuation of pollution on different ways of main components of the environment.

The sources generating heavy metals in the environment are mainly linked to the industrial agents, agriculture, food products and chemical waste. The metals toxicity modifies by the action of the environment factors such as light, temperature and pH (for example on soil or in water). The most important factors that influence also the real effects of the metals are: age, sex, species and dosis/duration of exposure. The toxic effects of the metals can be very diverse: renal toxicity, nervous toxicity on the genital organs, toxicity on development [1].

The cadmium presents toxic effects on the renal system, lung, bone system, testicular and nervous system.

The mercury steams enter the central nervous system (by penetration of blood-brain barrier) with very easily and are considered very toxic. The neuro toxic mechanisms of the mercury are extremely complex. The inorganic mercury salts are very toxic for the kidneys producing necrosis of some renal tissues [1].

One of the most known effects of the inorganic lead is its impact on the haemoglobin synthesis, leading to anomalies of erythrocytes and to anaemia. The chronic exposure to lead are mostly specific to children and refer to contaminations with small quantities derived from drinking water, paints that contain lead or environment rich in lead. The important modifications of the neuro behaviour and deficiencies linked to the learning process are compared at animals and children exposed to lead at an early age.

CONCLUSIONS

1. The farmers in our country are requested to observe a set of minimum standards defining the so called Good Agriculture and Environment Conditions (GAEC – Good Agriculture and Environment Conditions). In developing GAEC for Romania, some management standards were defined that most farmers must consider reasonable practices.

2. From the data provided by SGA Călărasi, for Călărasi county were established:

a. Sensitive areas as regards the pollution of surface and underground waters: Drajna, Chirnogi, Oltenița, Budesti, Valea Mostistea-lakes Lac Gălățui, Brațul Borcea – Jegălia.

b. Vulnerable areas as regards the pollution of surface and underground waters**:** Frumusani – Sohatu.

3. Nitrates Directive - Directive 91/676/EEC on the water protection against pollution caused by nitrates from agricultural sources - adopted in 1991, establishes the maximum admitted quantity of nitrates in the water – 50 mg/l and nitrites – 0,3 mg/l.

4. Objectives and measures on water pollution in Călăraşi county

Flowing continuously waste unclean or poorly cleaned waters in the surface waters will have serious consequences on the natural phenomenon of self cleaning, the Danube and Borcea branch being at present in sector of Călărasi county at the limit of natural possibilities of biogeochemical balance, and it is imposed: rehabilitation and modernisation of cleaning stations; completion of cleaning stations with installations for biological steps; laboratories equipment to achieve the self monitoring.

As measures of preventing the water pollution are: forbidden to remove at random any type of waste that could pollute the water, correct organisation of sewerage systems and local installations, building of cleaning stations, control of solid waste disposal, etc.

5. Objectives and measures on soil pollution in Călăraşi county

By the Government Decision no. 1408/2007 on the modalities of investigation and evaluation of the soil and subsoil pollution the investigation and evaluation modalities are regulated on the soil and subsoil pollution, in order to identify their damage and establish the responsibilities to restore the geologic environment.

6. Bioremediation is a discipline of microbiology that describes the scientific bases of the biodegradation of the organic compounds and promotes the techniques of their destruction, allowing to recovery the soil, waters and other natural environments contaminated with these pollutants. As working instruments, it uses micro organisms able to biodegrade certain organic substances (pesticide, waste of food industry, chloride organic compounds).

7. In order to treat the soils polluted with heavy metals, the most important directions of research are the treatment in electric field, phitoremediation, soil cleaning, solidification or stabilization. Among these, only phito-remediation has reduced costs. **Phito-remediation** of polluted soil with heavy metals is a procedure that is based on phito-extraction of heavy metals (extraction with the help of some adequate plants); the procedure uses plants to clean, depollute the contaminated soil and underground water, having the advantage of natural abilities of plants to take over, accumulate and/or deteriorate some constituents from these soils and waters.

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AGRICULTURAL INNOVATION FOR ENVIRONMENTAL PROTECTION

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Keywords**:** *organic agriculture, environmental protection, evolution.*

Abstract

This paper is a set of procedures and measures taken to try to prevent environmental degradation due to practice farming intensive methods. We. chosen examples that, adapting techniques to the climate of each region studied, can lead to sustainable agriculture and not to injure the environment. I analyzed all regions in different parts of the world: South and Central America, South Africa, Asia, Australia, just in order to diversify the processes by which agriculture has developed primarily to support the environment and human health.

INTRODUCTION

As a current activity in the world, agriculture is a threat to biodiversity. Growing population and increasing demand for agricultural products made to increase agricultural production, especially in the tropics, for at least several decades before the world population will stabilize. Saving the environment can be done by referring to land use and management of land for both agricultural production and for biodiversity conservation. Many farmers in economically developed countries, especially in intensive culture conditions, faced with the choice to sacrifice production for biodiversity. The challenge is to expand production capacity without adverse effects on biodiversity, find technologies and managerial resources, institutions and policies that give farmers the choice easy balance between the production and preservation of biodiversity.
Unfortunately, antiquated technology in developing countries require more land worked by drawing on the culture of surfaces have not been grown before. . For agriculture dominates land requirements, and so acute that threatens biodiversity, it is necessary to have a plan for its protection. The ecological agriculture save wildlife and also increase the production We must understand that just need a human acute food is imperative to protect biodiversity. Researchers do this challenge elaborating effective strategies. Obviously, the potential to integrate different types of wild species in agricultural landscapes should vary depending on the type of farming system.

MATERIALS AND METHODS

We explain six methods of success in organic agriculture, based on case studies and documents from various parts of the world, and which demonstrated coexistence between productivity and biodiversity.
First strategy: reduce habitat destruction by increasing agricultural productivity in areas under Natural habitats are often converted to arable land only to take advantage of new opportunities in sales, but more often when existing farms do not produce enough, or not there are enough posts labor market, or there is degradation due to inappropriate agricultural practices leading to land abandonment.
Most of the world rural population is poor quality agricultural land. If they increase productivity in more productive areas, could reduce pressure on marginal areas, poor quality which could restore wildlife. This strategy would also prevent the destruction of other habitats.
Replacement techniques "cut and burn" of Honduras with some advanced techniques

While the rural population has degraded hilly areas of Honduras, farmers are busy every year pine forest lands for increased production, leading to reduction of deer population , raccoons, squirrels and AGOUT. Working with local people, researchers have introduced improved varieties of coffee and vegetables, as well as new methods of fertilization, irrigation and crop rotation, leading to an explosion of production and number of employees. Revenues increased in these cultures led to the purchase of fertilizers to replace soil nutrients, leading to duplication of production, leading to abandonment of marginal lands, which were converted to forests. Studies show that forests have kept their integrity in areas that were used as techniques improved. [2]

Saving the Brazilian forests by improving methods for obtaining milk.

Atlantic forests of Brazil, the unique characteristics of wet tropical forests, are most threatened habitats on earth. As a result of 5 centuries of population growth where there has been deforestation and burning uncontrollably, only 7% of the original environment of the forest remains. Today, small farms milk production is the activity in this area, but put into operation environmentalists conflict with farmers because they are needed more and more land for grazing. Since 90 years, the NGO Pro-Nature has provided technical assistance to farmers to improve farm productivity and income growth. Instead, they have begun to regenerate , replant land and nature. The organization helped to invest in genetically modifying animal, use mineral supplements, improving food. [3] As a result, participating farmers have seen double and triple the production of milk income. [1] improved pastures could feed more cattle, so areas used could be reduced. More than 60 ha in 16 farms have been converted into forests, and over 50,000 trees were planted by Pro-Nature. [4]

The Strategy 2:Improvement of wildlife corridors and creation of farm surfaces joining numerous species cultivated fallow farm land can be used as habitat for migratory animals or union of different species protected areas, increasing the possibility of their survival.

Creating a wind stops in Costa Rica

In humid mountainous areas of northern Costa Rica, destroyed aroborii wild species of coffee, and strong winds have limited milk production and increased mortality of calves. In 1989, working with farmers, the League for biodiversity conservation have created 150 ha of cultivated land with indigenous and exotic trees to stop the wind. They have increased production capacity of pastures and led to increased production of milk.

Also, a corridor of trees served as a passage connecting the various pieces of woods, finding 174 different species of plants in this area.

Creating habitat for wild birds in Britain

In Britain, farmers came to help endangered by financial aid provided by European governments to farmers who create habitat for wild species on their farm areas. Through an effective approach, farmers are planting the seeds for creating habitat combinations in small ridges that are strategically distributed around the farm. This strategy gives nutrition during winter and nesting for birds. In this area, the 600,000 hectares were left fallow became the third type of land use in the area, after cereals and pastures.

The 3rd strategy: the creation of protected areas near farms

This strategy may make marginal agricultural land to become habitat for species salads. Farmers can support these wild species, especially when they are beneficial to agriculture, such as the bee pollination, protection against floods or forest resources.

Creating new spaces for wildlife in Australia

In Australia, agriculture has destroyed habitat and sensitive areas of degraded soil and water. Working with a group of soil protection, farmers in a community managed to produce more wheat and sheep eat more, while creating new spaces for wildlife. They have planted over 35,000 trees and large areas of land are restricted to protected areas. Two marsupial species have been reintroduced to the area. [2] [10]

Helping the fish stocks and fishermen from marine reserves in the Philippines

In the Philippines, intensive exploitation of fisheries in the coral reef has become a big problem. To help recovery, the community has

created 3 reserves in which fishing was prohibited. Each protected area was a breeding space. In the first 3 years of existing species have diversified and increased fish abundance in some families, between 20 and 40 percent, while in full, the number of fish increased up to 290%. Fishermen have been pleased with the results itself, creating up to 100 such reserves in the world with outstanding results.

The 4th strategy: miming natural habitats by integrating productive perennial plants.

With the expansion of agriculture in wild areas, natural habitat complexes have been simplified, eliminating the plants are native. Agricultural landscapes and forests can be manipulated to produce crops, but at the same time give similar habitat wild by mixing perennials and annual crops in ways that conserve natural systems and protect wildlife.

Creating the eco-forests that will create income farmers and wildlife habitat Indonesia

In Indonesia, the need to conserve species in forests came into conflict with the economic necessities of food. Local community found a solution: creating eco-forests. These are areas with a complex variety of trees and crops found in wet places, and which are similar in structure rainforest. Over 4 million hectares of such forests are found today in Indonesia. These are sustainable, profitable for farmers, for example rubber, which is worth at 1.9 million dollars. Also, the rubber trees forests contain up to 300 different species. [1] [5]

Creation of coffee plantations which supports biodiversity, profitable coffee plantations in Central America, which grow in the shade of a variety of other tropical plants, tropical moist forests resembles in terms of species diversity. However, species that grow coffee in the sun have been promoted and adopted long-range due to higher production as give, though costs are more than 50 percent higher, use more chemicals, and reduce the use of land. In Central America, wild animals and plants have lost their habitat to deforestation carried once for coffee cultivation. Specialists look for ways to promote plantations in the shadows and found that the use of native shrubs that grow rapidly, has a minimal impact on coffee production. [3] Other studies and non-governmental associations, provide financial benefits to growers of shade coffee plantations.

The Strategy 5: use of farming practices that reduce pollution

Intensive farming systems, pesticides and fertilizers led to large gains Peter farms instead of their abuse and misuse can lead to poisoning of water and soil and animal waste. But were found effective ways to reduce pollution during the control of pesticides and increase production. For example: The use of buffer zones in the Chesapeake Bay Chesapeake Bay is one of the richest natural fishermen on Earth. In the last century, pollution - of which one third comes from agriculture - led to the dramatic decline of fish stocks, health problems of people and wildlife, the loss of wild species. In 1992, Maryland dedicated to restoring the productivity of this area. To "cure" the valley, farmers began to use "buffer zones", ie regions in which to develop wildlife along the farms, to filter waste and excess fertilizer from the waters which cross the area. These areas will occur and as habitat for flora and waterfowl species. By 1995, almost half of the farmers in Maryland have created such areas. As a result of these measures, emissions of phosphorus were reduced by 56% in 1985, and the nitrogen by 35%. Many aquatic species have recovered from the process.

Reduction of pesticides in rice fields in China

East Asia have the highest levels of pesticides used. Pollution by pesticides has destroyed many species of crops irrigated rice areas and affect the entire food chain, from microorganisms to insects and frogs, causing disappearance of eagles and falcon. In Yunnan Province, farmers have reduced the pollution by combining rice varieties to limit the disease. One study showed that farmers planted more than one variety of rice prevented the disease spreading to the entire harvest, up to 89%. For rice diseases have been reduced to 94% of rice crops requiring

less pesticide. In 2000, 42,000 hectares of rice fields were planted by this method, and 10 Chinese provinces have begun to adopt the method.

Reducing excess pesticides by public education in Vietnam Vietnam farmers applied large quantities of pesticides than necessary to control the fish, creating a pollution damage local habitats. Research has led to new recommendations to farmers to reduce pesticide without killing crops. Radio campaigns and flyers, recommendations reached over 92% from holders firm's Mekong delta. In 5 years, the amount of insecticides decreased by 72% and rice production increased by 27%. Reducing pesticide use has benefited the local species of frogs and fish, which had their habitat in rice plantations, and that protein intake is vital local population. [4] [11]

Reduction of erosion through vegetation zones in Philippines

In the Philippines, erosion is a major problem for farmers in hilly areas. Marginal areas of bushes and hedges have been promoted to reduce soil erosion and improving soil quality, but farmers have not wanted to take the necessary costs planting these trees. Of studies have found that natural vegetation areas left uncultivated in their nature take the course were as effective as and shrubs grown, but less expensive. Studies that followed showed how to improve areas left uncultivated by fruit trees from which farmers could profit. Since the introduction of these areas, thousands of farmers have adopted this technique. [7]

The 6-th strategy: change management of farm resources to improve quality and habitat improvements in agricultural area

In natural resource management can increase the number of wild species without lowering productivity, using methods that adapt full of production systems. [6] **The creation of habitats for songbirds in flooded areas of California**

In Sacramento and San Joaquin Valleys in California, the conversion of wetlands to rice plantations destroyed habitat for many species of birds. Now, farmers who produce rice, they found that by flooding the land during the season, the farms become habitat for species close to extinction and singing birds and ducks, but without reducing profits and migration. The system manages to achieve the objectives of farmers to break down the soil and remove diseases. [8] [10]

Creating eco-forests gives profits to farmers and protecting wild species in Indonesia

In Indonesia, the need to protect wild species in forests has created a conflict with the need to produce crops and income. Locals have found a solution: create "agricultural forests" complex areas, multi-mixer plant trees, shrubs and agricultural crops are found in the wet tropics which resemble the structure of the equatorial forests. Over 4 million hectares of "agricultural forests" are found today in Indonesia. "Agricultural forests" are profitable for farmers and economically important for this country. Rubber in the forests - a quarter of the world-is estimated at 1.9 billion dollars. While reducing economic pressure on protected forest reserves, "agricultural forests" encourages and biodiversity. For example, rubber tree forests contain 300 species of wild plants. [2] [11]

RESULTS AND DISCUSSION

Future development of the concepts of organic agriculture The successful application of eco-agriculture still has many barriers to overcome. Few farmers associations, NGOs, governments are aware of the need eco-agriculture, or the existence of innovative methods that fulfill this need. A major constraint is the lack of production technologies, conservation practices and resource management systems that suceed to create an agriculture that support biological diversity without decreasing the level of production. In many cases, basic information about the interaction of agriculture-wildlife, quite missing. But during the development of studies in the field, researchers will discover general principles to help create new agricultural management systems to protect biodiversity. However, research institutions

have pursued intensive wildlife conservation, is concerned about the other challenges of production that still involved in agriculture. Many governments and market policies reward farmers still scattered means of production and land. Need a global effort to mobilize research and innovation. Eco-agriculture can be encouraged through concrete steps towards research, public policy and public education. Research can continue to bring light on the complex relationships between wild biodiversity and agriculture. The use of advanced methods, as well as research in-situ farming techniques should lead to wildlife conservation, increase productivity and boost farmers are good managers of the earth. Universities, governments and environmental associations can develop new agricultural practices to provide solutions to various challenges in developing countries. Efforts will involve creating new hybrids of fertilizers, and new management methods to increase agricultural production. Viable solutions can be found when farmers and researchers work together. Public education may lead to the improvement of environmental consciousness, the population. An important step would be to bring together farmers and conservationist to learn the best techniques and the relationship between biodiversity and agriculture. Management of future landscapes challenge is preserving wildlife, increase productivity and employment in rural areas. As the examples show researchers, eco-agriculture can achieve these goals.

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ROMANIA'S POTENTIAL IN CERTAIN CROPS FOR THE PRODUCTION OF BIOFUELS AS COMPARED TO CERTAIN EU COUNTRIES

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Key words: *objectives, biofuels, wheat, maize, sunflower, rapeseed*

Abstract

For the production of biofuels, Romania's general strategic objective is to increase their ratio of the transport fuel. It is also aimed at increasing energy security, improving the energy effectiveness of biofuel production technologies and usage, the use of the agricultural potential in rural areas at full capacity.Romania's farmers, benefiting from the pedoclimatic conditions in Romania, can provide the biomass resources necessary in the biofuels production. In the research performed on the basis of comparing the yields of the energy crops obtained in Romania with those obtained in EU countries, it was aimed to find resources in order to increase the biomass production.

INTRODUCTION

Considering the objectives established by the EU for the Member States to incorporate 5.75% in the biofuel mix by 2010 and 10% by 2020, Romania has set the following as strategic objectives in the field of biofuel production:

1.Energy security by means of enlarging the energy resources base and of diversifying them.

2.Sustainability through rational land use, by improving the energy efficiency, supporting the research and development and results dissemination activities related to biofuel production and use.

3.Competitiveness by means of improving the plant cultivation technologies, the technologies used in obtaining first generation biofuels.

4.The socio-economic development of rural areas by means of setting up SMEs, of producing and using biofuels on farms and in towns, increasing employment and the rural population incomes.

Taking into account the pedoclimatic conditions in Romania which are favourable to agriculture, the most useful crops for the production of first generation biofuels are:

- for biodiesel: rapeseed, sunflower and soybeans
- for bioethanol: maize, wheat, sugar beet.

MATERIAL AND METHOD

The paper is based on the statistical data referring to the areas cultivated with wheat , maize, sunflower , rape and sugar beet and their yield per ha during the period 2005-2009. All data have been provided by National Institute of Statistics .

RESULTS AND DISCUSSIONS

The areas, the yield levels per ha and the overall outputs obtained for these crops in the interval 2005 – 2009 are presented in Table 1.

For the ***wheat crop***, the area cultivated in Romania varied between 2012.6 thousand ha in 2006 to 2476 thousand ha in 2005 (in 2007 the harvested area was smaller due to the unfavourable conditions in that year).

In Romania, the area cultivate with wheat amounts to 20-26% of the arable land.

The average yield level per ha for wheat varied between 2342 kg/ha in 2009 and 3403 kg/ha in 2008 (3403 kg also being the highest yield level obtained in the interval 2000 – 2009).

Maize was cultivated on areas that varied between 2267.5 thousand ha (2009) and 2630 thousand ha (2005), ranging from 25 to 34% of the arable land (2004). Regarding the yield

level per ha, it varies between 3212 kg in 2008 and 3951 kg in 2005 (except for 2007).
For ***the sunflower crop***, the cultivated area was the smallest in 2009 – 787.2 thousand ha and the largest, 991.4 thousand ha, in 2006 (in 2003, 1188 thousand ha were cultivated), representing between 8.5% and 10.6% of the arable land.
The average yield level per ha ranged from 1831 kg in 2005 and 1540 kg in 2006.

Table 1 The Dynamics of the areas and yield levels in the interval 2005-2009

Specification	**UM**	**2005**	**2006**	**2007**	**2008**	**2009**
Wheat						
Areas	thou. ha	2476.0	2012.6	1975.0	2110.3	2207.3
Average yield level	kg/ha	2965	5746	1541	3403	2342
Overall output	thou. to	7812.4	5526.2	3044.5	7181.0	5170.5
Maize						
Area	thou. ha	2630	2520.8	25 25.8	24 49.6	22 67.5
Average yield level	kg/ha	3951	3565	1526	3212	3304
Overall output	thou. to	10390.3	8986.0	3855.1	7869.9	7491.8
Rapeseed						
Area	thou. ha	87.8	110.1	364.9	365	435.6
Average yield level	kg/ha	1681	1590	991	1844	1317
Overall output	thou. to	147.6	175.1	361.5	673.0	573.5
Sunflower						
Area	thou. ha	971.0	991.4	835.9	813.9	787.2
Average yield level	kg/ha	1381	1540	654	1437	1413
Overall output	thou. to	1340.9	1526.2	546.9	1170	1112.5
Sugar beet						
Area	thou. ha	25.2	39.8	28.7	20.4	18.3
Average yield level	kg/ha	28.932	28 942	26065	34642	31918
Overall output	thou. to	729.7	1152.2	748.8	706.7	584.7

2005-2009 – Romania's Annual Yearbook
2009 – MAPDR Operative data

The rapeseed crops covered an area ranging from 87.8 thousand ha and 435.6 thousand ha in 2009, this crop being the one that recorded the most spectacular growth as a result of the development in the biodiesel production in Romania.
As percentage of the arable land, the rapeseed crop increased from 1% to 4.6% during the analysed interval.
The yield levels per ha varied between 1317 kg in 2009 and 1681 kg in 2005, yield levels of about 2000 kg/ha being obtained in 2004.

The sugar beet crop decreased its cultivated areas from about 40 thousand ha in 2006 to 18.3 thousand ha in 2009 (in 2003 even 45.2 thousand ha being cultivated) as a result of closing down sugar plants or lowering their processing capacity.
Nevertheless, considering the current directions, both in the EU and worldwide, related to the use of sugar beets in producing bioethanol, it is expected that the areas cultivated with sugar beets will increase in Romania as well.
The yield levels per ha varied between 26,065 kg in 2007 and 31,918 kg in 2009.
Comparing the areas and the yield levels obtained in Romania and in the main countries that cultivate energy crops, positive aspects are noticed, together with resources to improve the results in Romania.
The cultivated areas, the overall outputs and the yield level per ha are presented in Tables 2, 3 and 4 at the level of 2008, which was generally a favourable year for crops in the EU (Data source: Eurostat New Cronos, for Romania NIS).

Table 2. The cultivated area and the yield levels for **Wheat** in Romania and in certain European Union Member States, in 2008

Country	**Cultivated area (thou. ha)**	**Output (thou. tonnes)**	**Yield level per ha (kg)**
Romania	**2103.0**	**7144.0**	**3397**
Bulgaria	1112.0	4632.0	4165
Denmark	636.9	5027.2	7890
Germany	3218.5	26012.0	8083
Spain	2067.0	6714.3	3248
France	5495.5	39.038.5	7104
Italy	2294.6	8909.8	3882
Hungary	1125.5	5653.7	5023
Poland	2278.0	9274.9	4070
Sweden	361.2	2206.5	6108
UK	1819.0	13362.0	7345

The data for the UK refer to 2007

In terms of the area cultivated with **wheat** (table 2), Romania is among the first 5 EU Member States, following France, Germany, Italy and Poland, and in terms of the overall output, Romania filled the sixth position, following France, Germany, The UK, Poland and Italy. This was due to the average yield

level which was lower than the one in these countries.
Romania produced only 3297 kg per ha, respectively 42% of the yield level obtained in Germany and Denmark, 46% compared to England, but also 81.5% compared to Bulgaria and 67.6% compared to Hungary.

For the ***maize grain*** (table 3), Romania in 2008 filled the top position in terms of cultivated area in the EU, being followed by France, Hungary, Italy and other states, and in terms of the overall output, Romania filled the fourth position, following France, Italy and Hungary due to the lower yield levels per ha. Thus, with the 3218 kg, Romania produced only 29% per maize hectare, compared to Austria, between 32% and 34% compared to Germany, France, Italy and Spain. Compared to Hungary, Romania produced only 43%, and to Poland 55%.

Table 3. The cultivated area and the output for **Maize grain,** in Romania and in certain European Union Member States, in 2008

Country	Cultivated area (thou. ha)	Output (thou. tonnes)	Yield level per ha (kg)
Romania	**2435.0**	**7837.0**	**3218**
Bulgaria	329.0	1368.0	4158
Germany	518.1	4881.4	9423
Spain	362.9	3603.1	9925
France	1746.5	15804.0	9050
Italy	1059.0	10283.2	9710
Hungary	1199.6	8962.9	7475
Austria	194.1	2147.2	110.67
Poland	317.2	1844.4	5817
Slovakia	153.5	1148.8	7500

In 2008, Romania also cultivated the largest area of land with sunflower, followed by Bulgaria, Spain, France, Hungary and other Member States, but in terms of overall output, as in the case of the maize grain, it goes down to fourth position after France, Hungary and Bulgaria, the cause also being the lower yield levels per ha.
Thus, with the 1432 kg/ha, Romania produced 56.6% of the yield/ha obtained by France and Hungary, 65.7% compared to Italy and 87.5% of the yield per ha obtained by Bulgaria.

Table 4. The cultivated area and the output for **Sunflower,** in Romania and in certain European Union Member States, in 2008

Country	Cultivated area (thou. ha)	Output (thou. tonnes)	Yield level per ha (kg)
Romania	**809.0**	**1159.0**	**1432**
Bulgaria	724.0	1184.0	1635
Spain	710.7	899.2	1264
France	625.9	1584.9	2532
Italy	121.7	265.2	2179
Hungary	560.1	1409.1	2516

CONCLUSIONS

From those presented above, the following aspects can by emphasised:
1. Romania has a true area potential for the production of energy crops, compared to certain EU countries (even at the current sizes).
2. Romania must improve its cultivation technologies, this measure resulting in the increase in the overall biomass output for the biofuel production, both in terms of its own production, and as possibility to export biomass or biofuels.
3. The increase in the yield levels per ha can also decrease the cultivated areas and those used for the production of biofules in favour of those with a food production purpose.
4. In order to increase the yield levels per ha through the implementation of effective technologies, a more obvious and substantial support from the state is necessary (see the recent Decision of the Ministry of Agriculture not to subsidise energy crops any longer in 2010).
5. Making correlations between the sectoral objectives ad programmes for the development of the national economy, respectively between the strategies regarding the biomass and biofules production and the measures taken at the level of the Ministry of Agriculture and other ministries which are involved.

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THE MANAGEMENT OF HUMAN RESOURCES IN AGRICULTURE

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Abstract

The concept of human resources, characterized through the medium of management and the three types of human resources strategies (investments, undertaken set of values and resources), presents a serial of particularities and implications in agriculture sector. The purpose of this project is to present a synthesis of classification criteria of resources and factors of production from agriculture, with management insertion as enhancer factor of human resources .Thus, being emphasized the concepts, proceedings and definitions which stand for the statistic of working time utilization in agriculture, as well as the methodological – analytic instrumentation of measuring the efficiency of human resources in agriculture.

INTRODUCTION

The place of the management of human resources in agriculture is well specified in the context of general management. Thus, in the literature, emerged until present, are emphasized the aspects which belong with the relations, starting with recruitment, selection, employment, further training, stimulation throughout the employment period until the end of it. The management of the human resources could be defined as a complex of measures conceived interdisciplinary, concerning the recruitment of the staff, selection, employment, utilization through ergonomic work, material and moral stimulation until the termination of the employment contract. Due to actual reliefs, profounds, of technical, economic and social nature located in all romanian economy and, implicit, in agriculture field, the human resources and their management , presents a special importance, by this token, Romania disposes of a great weight of labor force in agriculture – 35,2 % of the total of labor force, which situates it to a considerable distance from the countries with a developed agriculture, where the people occupied in this field are much under 10 % to the total labor forcThe management of human resources shows a great importance in the context of the characteristics of agriculture work, becoming distinctive to the other economic fields. Thus, from technical point of view, the work in agriculture presents more particularities, as it follows : it has a diversified character; it has a high extent of difficulty; it varies in time; it is subordinated objectively to the needs of living beings.

MATERIALS AND METHODS

The management of human resources, in general, especially in the agriculture, dispose of a large speciality literature, a multitude of theories, methods, particularities, etc. In the present project, we propose to synthesize the conclusions of the main bibliographic sources on the field and, so, to identify the role and the place of the specific concepts of human resources in the economic theory, to present the evolution of the management of human resources notion within the different schools of managerial thinking and, not in the end, to present the main conceptual elements in the field. The methods that are used for the present project were deduction, logical research and synthesis. Thus, the present project follows the goal to synthesize the classification criteria of the resources and factors of production in agriculture, with management insertion as enhacer factor of human resources to emphasize the concepts, proceedings and definitions which stands for

the statistic of working time utilization in agriculture, as well as the methodological – analytic instrumentation of measuring the efficiency of human resources in agriculture .

RESULTS AND DISCUSSIONS

1.The concept of human resources from beginning until present

The first terms that reference to the importance of human resources are from the utopist R.Owen (1820 – 1850).The interest for the management of human resources appeared on the junction with the development of psychology, sociology, juridical sciences, operational researches, statistic, etc.

The founders of this discipline are personalities with resonance within the pioneers of management, sociology, psychology. Thus, Fr.Taylor (1915), was preoccupied of the employees welfare which depends on the performance of the tasks prescribed, Elton Mayo (1931), founder of the human relation school.

In 1936, H.Maslow, became known for the human needs study, which he ranks according to the "pyramid of needs " or " Maslow scale ", and Peter Drucker (1955), accentuates the need of a "Creative Leadership". Mc Gregor, in the sixties, was preoccupied of the managers preparing as for a fight (five fighters).

Also now, starts and is developed the " Behavioral Science Movement ", which had 3 stages : 1915-1965, 1965-1985, 1985-2000.

On the end of sixties starts and gets consistence the concept of "Staff Management ", as a result of different approach, as "Welfare & Services ", "training" and "Trade Union Barganing ".The second wave, is between 1965 – 1985, and the approaches are focused around two poles : one "hard", all that is palpable, "Manpower planning", and other "soft", with the accent on the subtle and not palpable elements, conceptual approaches characterized in "the new approach of the staff ".The period 1985-2000 focuses on the development of the cultural school concepts and is represented by A. Athos, R. Pascale, preoccupied to decode "The Art of Japanesse Management ".A group of scientists of McKinsey school determined the factors which influences the management of the organization, incarnated in the theory of the " 7 S " : strategy, structure, system, set of supreme values, style, skills, staff. The development of the " 7 S "theory generates a new approach over the constitutive elements of the organization: the three hard (structure, system, strategy) and the four soft (set of supreme values, style, staff, skills).The art of creating the most adequate match, the mix between hard and soft, palpable and not palpable, becomes a goal of the organizations which follows to realize excellence in the chosen activity field.

Thus, we can say that The Management of Human Resources is defined as the ensemble of the strategic and operational (planning, recruitment and staff maintaining) activities, also, the generation of an adequate organizational climate, which assures the need with Human Resources in order to achieve the organizational objectifs.

2.The management of human resources in agriculture

The contemporary approach of the management of human resources in agriculture gained new valences. The importance of the rural places stability and their extending aria in Europe, the up-growing preoccupation for the protection of the surrounding nature, causes new orientations regardless the business development in the rural area.

The management of human resources is realized based on two layouts :

-on the farm level or the agricultural unit (peasant household, familial farm, association or agricultural company);

-on macroeconomic level, regional, county level, rural community, etc.

The two levels of approaching the management of human resources are overlapping from more points of view within the operational concepts, the decision principles, within some methods and calculation techniques, etc. But, there are some specific approaches, related to the proposed goals and the modality of decision implementation, sources of finance, the structure of human resources, the level of staff instruction on economic activities, based on the volume and structure of the capital, etc.

For realizing the functions of the management of human resources in agriculture, we can use a serial of specific methods, as it follows : planning management ; management through objectives; management through budgets, management through costs; script method, simulation method, brainstorming method, delegated method, conference method.

The information picked, the methods and techniques used for determination of the efficiency of utilization of human resources, makes possible the evaluation of the impact on the development of the agricultural sector and the rural areas, generating measures of agricultural and rural policy. The limited character of the ground, generates a connection between the expenses with live and materialized work and the rational exploiting of the land fund, as well as the human resources. Based on this considerations, the measurement of the efficiency of the utilization of the human resources in agriculture, starts from it's impact within the national economy.

3.The human resources in agriculture – particularities and implications

Conceiving the agricultural production as an assembly of technological processes through which it is made the transition from the connotation of a simple result to the connotation of a resources transforming process, presuppose knowing the multitude of subsystems of the agricultural system, the understanding of the actions and reactions between them, decoding the dimensions and dynamic of them.

In approaching the classification criteria of agricultural production resources, is needed to take consideration of the following theoretic-methodological premises:

a)the agricultural production, as an activity which combines the natural processes with the economic ones, has a high level of complexity;

b)considering that, semantic, the concept of "production resource "has a larger semnification than the concept of "production factor", including it, it is natural that a serial of criteria used in the classification of production resources to be transferred to the sphere of production factors;

c)in the classification by criteria of the resources, there can be noticed the eventual interdependences and tendencies of the action directions within the complex vector system of inputs and outputs, which is the agricultural production. Practically, the intercession refers to the classification criteria of the production resources, as well as presenting the classification criteria of production factors, mentioning the manner which allows to reach these options.(Tabel 1.1).

The first classification criterion refers to the nature (content) of the resources. From this point of view, the resources of production from agriculture are classified, according to some authors, in natural resources, economic resources and social resources and, according to others, in natural, material and human resources.

Table 1.1.Classification criteria of resources and factors of production in agriculture

Nr. Crt.	RESURSE DE PRODUCTIE	
	Denumire criteriului	**Clasificare**
1	Natura (continutul) resurselor	-naturale, economice, sociale; -naturale, materiale, umane
2	Caracterul resurselor	-regenerabile (reproductibile) -neregenerabile (nereproductibile) -naturale, artificiale
3	Dependenta resurselor fata de volumul productiei	-constante, variabile -fixe, variabile
4	Volumul resurselor	-epuizabile, inepuizabile -limitate, nelimitate
5	Sursa resurselor	-proprii;imprumutate; -endogene;exogene;
6	Participarea in procesul de productie	-fixe;circulante;
6.1	Timpul de utilizare	-cu durata lunga; cu durata scurta;
6.2	Caracterul utilizarii	-proportionale;constante;
7	Importanta resurselor	-fundamentale; auxiliare;
8	Raportul fata de momentul utilizarii	-stocabile; nestocabile;
Nr. Crt.	**FACTORI DE PRODUCTIE**	
	Denumire criteriului	**Clasificare**
1	Caracterul factorilor	-naturali;economici;biologici organizatorici; -naturali;economico-organizatorici,manageriali -materiali;umani;politici -ecologico-naturali; Biologici;antropici;
2	Raportul cu volumul productiei	Ficsi;variabili
3	Participarea la procesul de productie	-monovalent;polivalent; -specifici;generali;comuni;
4	Gradul de influentare de catre om	-neinfluentabili;influentabili
5	Modul de actiune	-directi ;indirecti
6	Natura factorilor	-obiectivi;subiectivi; Ireversibili;reversibili

From the perspective of the quantitative and structural-qualitative evolution of labor resources from the agriculture of Romania,

comes into prominence another preliminary observation, namely that, "with all its specific, the evolution of labor force from the romanian agriculture follows the general tendency, worldwide, of all the countries with a developing economy, respectively we assist to an absolute deduction, as well as relative, of the labor force from agriculture.

The strong process of economic-organizational descentralisation, interceded after 1990 in the Romanian agro-alimentary economy in generally, moreover in agriculture, was impossible to do not effect considerable the structural rapports, between the different segments of the stock of labor force, moreover between the specialists and the total of active persons agriculturally occupied.

4.Statistic methods of evaluation and analysis of human resources in agriculture

The structural investigation of the holding represents a base for the purchase of data regardless the consume of labor from the UE states. Even if the member states which utilize the structural investigation of the holdings, as a data source, took in consideration the implications of the differences regardless the coverage domain between the structural investigation and the demands of the statistic of agricultural labor consume, seems that the investigation it's a better way to start. Because the investigation is not made once in a year, Eurostat can recommend it, even if only as a source of data for sustaining the annual series regardless the agricultural labor consume. If the investigation is considered an outset for the calculation of agricultural labor consume, it must, further, for the years without investigation, to be made preliminary estimations regardless the evolution of agricultural labor consume, throughout extrapolate and interpolate. For this, there are two possibilities : some member states realize a national investigation over the structure of agricultural holdings during the years without a structural investigation in holdings. Near by this, there are available data regardless the consume of agricultural labor and data regardless only the number of persons occupied into an agricultural holding. Other states doesn't make any national structural investigation, because the agriculture, in this statistics, is defined in other manner and the problems meaning the labor force correspond in a smaller extend to the regularly structural investigation in holdings, being need of a larger number of hypothesis to estimate the consume of agricultural labor. The results of the structural investigations stays at hand, usually, a period of time after the beginning of the investigation year. From here it is generated a lack of data actuality. This delay means that the estimated evolution of the consume of agricultural labor, cannot be taken directly at the end of the current year, for the year in which is done the structural investigation in holdings. The preliminary estimations for the current year should refer at the up-mentioned combination of sources and methods.

CONCLUSIONS

The analysis done until now, in the sphere of the management of human resources from agriculture, admit the emphasizing of the following conclusions:

1) The management of the human resources could be defined as a complex of measures conceived interdisciplinary, concerning the recruitment of the staff, selection, employment, utilization through ergonomic work, material and moral stimulation until the termination of the employment contract.

2) The management of human resources presuppose the continuing improvement of the employees activity to achieve the mission and the objectives of the company. The exertion of this type of management asks, as a primordial condition, that each manager to represent a model of behavioral attitude.

3) Conceiving the agricultural production as an assembly of technological processes through which it is made the transition from the connotation of a simple result to the connotation of a resources transforming process, presuppose knowing the multitude of subsystems of the agricultural system, the understanding of the actions and reactions between them, decoding the dimensions and dynamic of them.

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ANALYTICAL MODEL OF THE OPTIMAL CAPACITY OF AN IRRIGATION SYSTEM

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Key words: *irrigation system, queuing theory problem, analytical model, optimal capacity of irrigation system*

Abstract

The size and stability of yield per hectare of agricultural crops are greatly affected by climatic conditions, temperature, solar radiation, but especially the quantity and quality of rainfall, which for most agricultural crops is insufficient. Building large-scale irrigation systems is difficult in terms of investment, as well as operating costs. Claimed agricultural yields often do not emanate from a set of certain claims for each of the crops, but are only an estimate based upon empirical experience. Precise determination of these data is very difficult and without the use of exact mathematical methods and information technology would be virtually impossible. This work is dedicated to the creation of an analytical model, which would allow the determination of the optimal capacity of the irrigation system in response to microclimate and soil conditions with respect to the crops and irrigation facilities.

INTRODUCTION

The irrigation system remains the weakest part of soil management. Ignoring the water regime of soil and various crops from the beginning to the end of vegetation is a large obstacle to economic and ecological irrigation. Research in the irrigation sector has accumulated enough theoretical and practical knowledge and needs only to look for ways and methods as soon as possible to get it into irrigation practice (HENNYEYOVÁ - PALKOVÁ, 2006).
The goal of process observation in the irrigation system is the monitoring and analysis of various factors affecting the growth of crops, depending on the optimal moisture requirements of individual crops, to achieve higher productivity per area unit.

OUTLOOK ON IRRIGATION ANALYSIS SOLUTION

Description of the processes can be statistically manageable through mathematical models. A mathematical model is a simplified view of real objects by using mathematical description, usually in order to solve the problem. The problem can be solved if we have the appropriate methods. Methods and models of individual processes are classified as:

a) **Deterministic models and methods,** where values and relations between them are not random. These models are applied when examining the operations of production, distribution and production scheduling.
b) **Stochastic models and methods,** where values and relations between them have a probabilistic character. These models are used in examining particular handling operations, supply and recovery. These include models of processes in agriculture, and in irrigation management too.
Individual factors and associated sub-processes entering the irrigation system are fully stochastic in nature. Solving problems in this area requires using methods of statistical analysis and mathematical probability. An application discipline for the monitoring and optimization of the irrigation system queuing theory (QT). In this research, based on existing mathematical models of irrigation systems, a new model is created using the theoretical principles of queuing theory.
Based on the above characteristics, queuing systems can be classified by the following convention:
***A*/*S*/*n*,**

where *A* is the arrival process, *S* is the service process and *n* is the number of servers. *A* and *S* can be any of the following:

M (Markov)	Exponential probability density
D (Deterministic)	All customers have the same value
G (General)	Any arbitrary probability distribution

Examples of queuing systems that can be defined with this convention are:

- **M/M/1:** This is the simplest queuing system to analyze. Here the arrival and service time are negative exponentially distributed (Poisson process). The system consists of only one server. This queuing system can be applied to a wide variety of problems as any system with a very large number of independent customers can be approximated as a Poisson process. Using a Poisson process for service time however is not applicable in many applications and is only a crude approximation.
- **M/D/n:** Here the arrival process is Poisson and the service time distribution is deterministic. The system has n servers. (e.g. a ticket booking counter with n cashiers.) Here the service time can be assumed to be same for all customers). This corresponds to the state in irrigation systems.
- **G/G/n:** This is the most general queuing system where the arrival and service time processes are both arbitrary. The system has n servers. No analytical solution is known for this queuing system.

In agricultural practice various combinations of systems are realised based on queuing theory depending on the solution process. The standard QT process in irrigation system is defined as an N-channel system, limited resource requirements, with a priority system in operation. The number of channels the system is defined as the available pool of technical devices for irrigation, source of requirements as exact determined number of segment area units of agricultural crops, and priorities as currently requirements of individual segments on moisture in the soil.

Processing a current mathematical QT problem is a complex process that requires the use of computing technology. Optimization can rationalize that process and achieve desired results in agricultural practice.

In this analytical solution we are focused on the process involving up to 2 channel systems for exactly determining the quantity of resources to prioritise requirements.

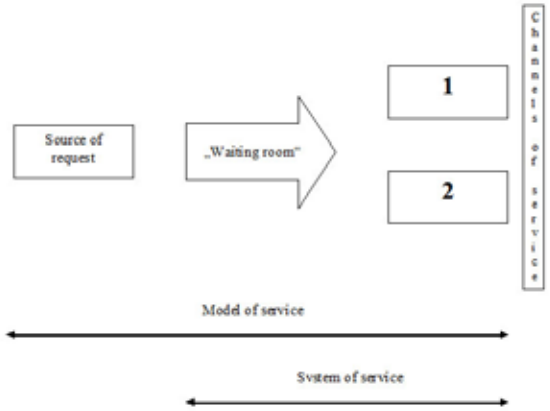

Fig. 1: The scheme of system of queueing theory (1 – Source of requests, 2 – „Waiting room", 3- Channels of service, 4 – Model of service, 5 – System of service)

ANALYTICAL MODEL OF 2-CHANNEL SYSTEM WITH A LIMITED NUMBER OF REQUIREMENTS WITH PRIORITY

In the case of the irrigation system, the queuing system consists of two service channels, which serve the requirements of current plants to supply additional irrigation. If the existing channels are not able to immediately serve the incoming requirements, they leave the system without service, or are in the waiting queue, where they await the release of a channel selected according to criteria given previously. This priority is necessary in the event that water demand is appearing for those crops which are economically important or non-delivery of irrigation with them causing great economic damage.

Stochastic elements in the case of irrigation system are:

- input queue of requirements,
- Time longitude of requirements service.

Input queues of requirements are random processes in real-time, but with non discrete requirements. Most models describe the queuing input by a Poisson stream. The probability of *k* number of requirements in time interval *t* is then determined by:

$$P_k(t) = \frac{(\lambda \cdot t)^k}{k!} \cdot e^{-\lambda \cdot t}$$

where is the parameter of arrival of requirements.

The average time of waiting in front is defined as:

T_{S1} - for segments of plants with priority in service,

T_{S2} - for segments of plants without priority in service.

$$T_{S1} = \frac{\lambda}{(\mu - \alpha \cdot \lambda) \cdot \mu}$$

$$T_{S2} = \frac{\lambda}{(\mu - \alpha \cdot \lambda) \cdot (\mu - \lambda)}$$

where

P_k - probability of the system is in the "*k*" state,

k - number of system state.

For example: $P_{1,m,n}$ indicates that in operation is a present requirement with priority and in the system there are *m* requirements with the priority and *n* requirements without priorities.

$\rho = \frac{\lambda}{\mu}$,

λ - frequency of servicing requirements,

μ - frequency of serviced requirements.

Practical solution of the analytical model using efficient information processing

In a single-channel system, importance is based on the compilation of the request queue with the priority, requirements leaving the system and their entry into the channel of service. A dual-channel system of irrigation is necessary to include the choice of channel services into a complex system of service, which will handle the requirements. In this case, there can be a situation where request is not served with first available channel of service, but according to the parameters of the channel is served with a later released channel of service, which operates more efficiently.

Another aspect of the dual channel system is the possibility of differentiation of requirements by channel of service. Therefore, the algorithms for information processing include this processing element, which contributes significantly to optimizing the output result. The following diagram is a view on the implementation of efficient information processing.

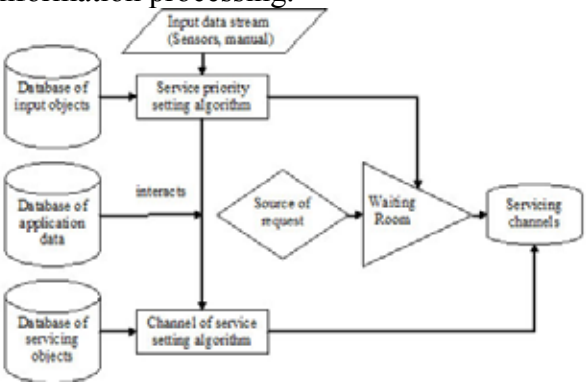

Fig. 2: The scheme of processing the analytical model

The input data stream represents data entering into the system from outside. These are inputs from measurements of soil moisture, temperature, plant life cycle, periodic and manual inputs about service device operators and others factors. The database of input objects, which consists of an object-hierarchical database of product plants, database moisture requirements of plants and priorities of the rules table, creating input to a decision-making algorithm for assigning priorities of requests and its enlistment in the waiting room. Database of servicing objects includes an object-hierarchical database of service channels, their properties and methods from which we can determine the deployment of various devices to specific requirements.

In the entire process, there are "next" application data factors, which is the result of assigning priorities to the channels adjusted according to heuristic methods of comparison previous and present data from data warehouses. Application data is the real output of the feedback of already handled irrigation operations. These data are inserted into data warehouse continuously according to the evaluation results (manually, automatically). Together, this creates the matrix of rules and factors and modifies the selection of a channel of service by heuristic analysis of previous selections.

Efficient processing of a dual-channel irrigation system selects between 2 channels of service, where coefficients are added into existing standard algorithms of irrigation models, based on the above computer analysis.
Another specific rule of the dual channel system is that it is not necessary to develop an optimal priority range of irrigation devices, but to select the channel, which is more effective.
In real practice the two-channel irrigation system not very frequent, mostly in small farms where are channels of service contains 1 mobile irrigation device and 1 stationary sprinkler with its own source of water.

CONCLUSIONS

The need addressed starts new trends in the use of computer technology for the process of irrigation. Although artificial irrigation is the perspective, the application-specific realization of the theory of irrigation on a larger scale awaits the appropriate economic, political and social conditions.
Using the model described, the following questions may be answered:

- what is the average queue length,
- what is the expected average number of simultaneously irrigated segments,
- what is the expected average number of segments, which do not require irrigation,
- what is the expected unused capacity of the irrigation system,
- what is the average waiting time in queue,
- what is the average number of requirements contained in the system,
- what are priorities of requests.

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RENEWABLE ENERGY SOURCES FOR LANDSCAPE DEVELOPMENT – PROJECT RESNET

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Key words: *lifelong learning, on-line courses, renewable energy sources, landscape development*

Abstract

Climate change and shrinking supplies of fossil energy resources mean that lately more and more attention is given to issues of environmental technologies and renewable energy sources (RES) not only at the level of national governments of EU countries but also worldwide organizations such as OECD and the UN. Using RES significantly reduces the emissions of greenhouse gases into the atmosphere, especially CO_2, which is also one of the objectives of the UN Framework Convention on Climate Change. Farmers are not only food producers but also those who can efficiently produce electricity and heat through renewable sources, but can also produce renewable energy themselves. This article deals with the RESNET project within the framework of Leonardo da Vinci - Transfer of Innovation. The project is focused on the important area - utilization of renewable energy sources, with emphasis on landscape development. The main aim of the project is to prepare an online course consisting of five modules focused on the use of renewable energy sources for landscape development.

INTRODUCTION

Climate change and shrinking supplies of fossil energy resources mean that lately more and more attention is being given to issues of environmental technologies and renewable energy sources not only at the level of national governments of EU countries but also worldwide organizations such as OECD and the UN.
Ecological aspects are some of the main reasons for the worldwide promotion of the use of renewable energy resources (RES).
Using RES significantly reduces the emissions of greenhouse gases into the atmosphere, especially CO_2, which is also one of the objectives of the UN Framework Convention on Climate Change (www.unfccc.int).
At a time of global economic crisis, however, the promotion and use of renewable sources of energy also brings a considerable economic dimension.

Support for using RES to produce electricity, heat and hot water, as well as support for using biomass energy and energy-efficient buildings brings in addition the development of innovative technologies, the transformation to an energy saving economy and considerable growth in jobs possibilities.

The farmers are not only food producers but also those who can efficiently produce electricity and heat through renewable sources, but can also produce renewable energy themselves.
Project RESNET gives an opportunity for farmers to become familiar with the knowledge from the area of using renewable energy resources and their effective uses for energy-efficient farms. Distance learning methods are used as the educational methods for improving their skills .
The project RESNET is based on the study program of the Slovak University of Agriculture in Nitra "Techniques for renewable energy sources".
Six project partners have different positions in the project depending on their experiences. The partners are concentrating on:

- agricultural and renewable energy resources:

- Slovak University of Agriculture in Nitra, Slovakia, www.uniag.sk
- MultiMedia SunShine Ltd., United Kingdom, www.mmsunshine.com

• e-learning and webhosting:
- Infoart, Bulgaria, www.infoart-bg.com

• technical sciences:
- FH Johanneum - University of Applied Science, Austria, www.fh-joanneum.at

• telematics, multimedia and e-learning:
- Swedish Telepedagogic Knowledge Centre, Sweden, www.pedagogic.com

• development of lifelong learning strategies and concepts in the agro-food sector:
- Agroinstitut Nitra, Slovakia, www.agroinstitut.sk

The main objective of the RESNET project is to create the "Institute of Lifelong Learning" for agro-sector employees. The particular aims are to create the on-line learning system and multimedia study materials focused on landscape development in the area of renewable energy sources (RES). The target groups of the project are defined as follows:

• employees of the agro-sector,
• unemployed and staff retraining,
• students of VET and universities with orientation on energetics and RES

OUTCOMES OF THE PROJECT

The Institute of Lifelong Learning (ILL, www.agroinstitut.sk/ill) as a part of Agroinstitut was created on January 1, 2009. Its main role is to optimise the possibilities to bring suitable education into the area of the agro-sector. The special use of an e-Learning educational platform facilitates much easier access to the concrete themes for large scale end-users more easily. The ILL also enables the exchange of the information between the tutor and participant of education and among the participants themselves. As a part of an educational institution of the Ministry of Agriculture in Slovakia, it is involved in the development of continual educational strategies and concepts in the agro-food sector. It will also perform the tasks connected with the professional education in secondary schools focused on agriculture and the food processing industry. The project's consortium members have long-time experiences with lifelong learning in the area of RES, counselling services in the agricultural area, using ICT and multimedia for education, development of virtual study space and distance learning. Putting together all these skills, the Institute of Lifelong Learning is able to increase the qualifications of employees in the area of agriculture and give opportunities for economic and ecological landscape development. From this point of view, the main role of Institute of Lifelong Learning is defined as follows:

• to optimize the possibilities to bring suitable education into the area of the agro-sector;
• to maintain advisory services in the agricultural sector including RES applications.

As a result of the European Union's target to achieve 20% of renewable energies in the EU's energy mix by the 2020s, opportunities for investments in RES technologies in buildings significantly increase. At present, the use of RES is not so expressive, especially in the "new" member states. For farmers, as a target group, there are not sufficient eligible study materials or appropriate forms of study. Using e-learning methods for lifelong education gives the ability to take into account specific conditions into this type of education. The content of the RESNET modules (www.resnet-project.org/e-edu) is based on the principles of renewable energy types and possibilities of their use in the area of the agro-sector with the main emphasis on landscape development. The contents can be summarized as follows:

• Solar energy
- Principles;
- Insolation measurements – methods and instruments;
- Possibilities of use;
- Thermosolar technology;
- Photovoltaics;
- Practical applications in the agro-sector.

• Water energy
- Principles;
- Hydroenergetic potential;
- Flow measuring and the power of water evaluation;
- Water engines – summary;
- Small water power stations;

- Exploitation in the landscape development and agricultural implementation.

- Wind energy
- Principles;
- Measurements and scoring speed of an air stream;
- Wind engines – summary;
- Wind electric power stations – turbines, generators, accessories;
- Wind parks in the landscape.

- Biomass
- Principles;
- Biomass forms – summary;
- Biomass exploitation – biofuels, wood, biogas;
- Biogas stations;
- The Farmer as a grower of energy-biomass and the producer of electric power.

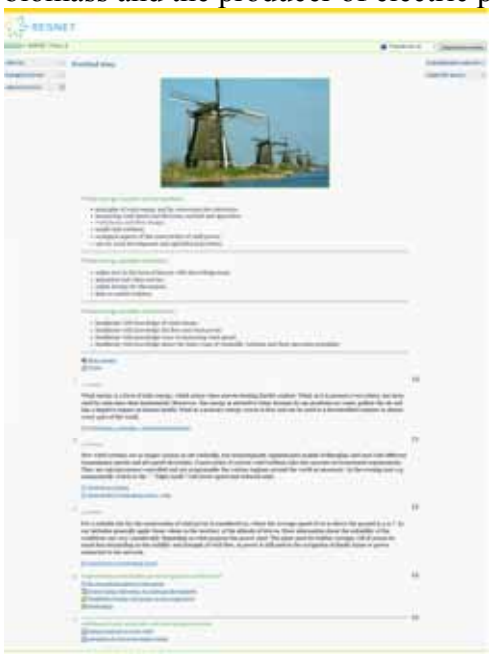

Fig.1 The Wind module

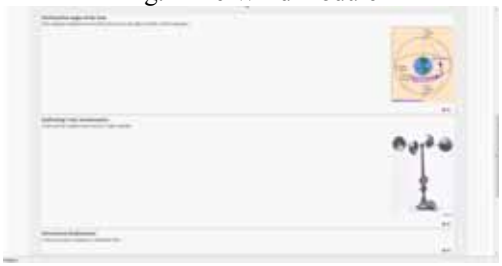

Fig. 2 Main Glossary in English language mutation

- Geothermal energy
- Principles;
- Ways of exploitation of geothermal energy – conventional and modern;
- Geothermal electric power station;
- Combined exploitation of thermal energy;
- Landscape development – energy production, growing of vegetable, agro-tourism.

Each module consists of 5 topics:

- 3 lessons:
- "Principle and measurement",
- "Technologies, constructions,…",
- "Possibilities of using in the agricultural conditions";
- final test and assignments "Using RES for landscape development";
- another study materials and interesting web links concerning the theme of the module.

The RESNET project is suggesting the edition of a multimedia study book in the area of RES that will be available in offline form as a CD-ROM or memory chip and in online form over the Internet (www.resnet-project.org/ebook) as well. Multimedia and ICT devices are used for the creation of multimedia contents.

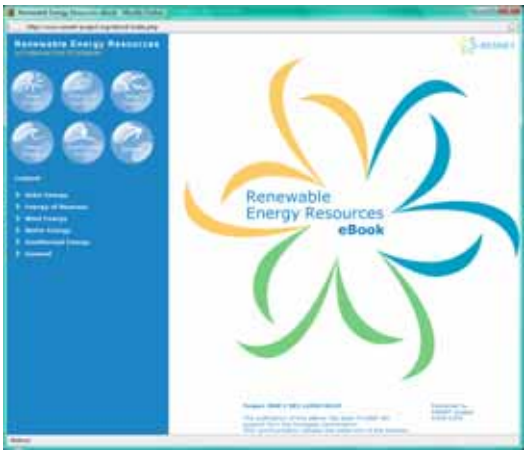

Fig. 3 Main page of RES eBook (online version)

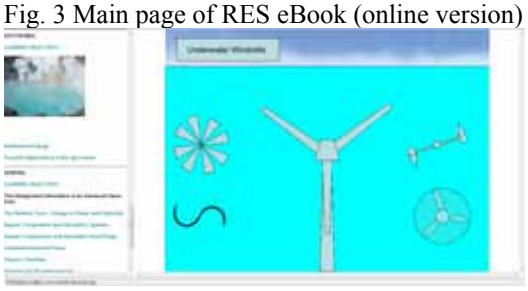

Fig. 4 Animation of underwater Windmills in eBook (offline version)

The last outcome of the RESNET project are two books/guides: ”Education Guide for Tutors” and ”Education Guide for Students” - giving the basic information how to prepare and use the online course. The publication is conceived as a practical manual for developing valuable e-learning courses in the LMS Moodle environment. Chapters focus on the possibilities to use and develop e-learning courses. It is dedicated particularly to lecturers who would like to become familiar with the methods of e-learning courses development within Lifelong Learning and in this way to develop their own professional courses in the LMS Moodle environment.
Content of “Education Guide for Tutors”:

- principle of E-learning;
- a guide on how to prepare text for online modules;
- a guide on how to prepare interactive tools;
- a guide on how to prepare self-tests;
- how to manage the time for the course.

The publication “Guide for students” is conceived as a practical manual for using the LMS Moodle environment for studying. From this material point, content of has been defined as follows:

- principle of distance learning;
- how to access the course;
- definition of activities and how to use them;
- a guide on how to manage the study time;
- a guide on how to do self-tests;
- a guide on how to use multimedia and interactive tools

CONCLUSIONS

The main aim of the project RESNET, co-financed by the European Commission, is to create “the Institute of Lifelong Learning” for agro-sector employees. Hand-in-hand with this aim is the creation of an On-line Learning Course containing five modules focused on landscape development in the area of renewable energy resources. Each of the modules will be multi-lingual – in Slovak, English and German languages. Other study materials in the form of CD-ROMs and memory cards, but also available from the Internet, include a multimedia textbook with animations, hyperlinks, graphics, audio and video sequences. The final aim is to prepare “The Education Guide for Tutors” and ”The Education Guide for Students” – manuals how to use, create and study in online courses.

ACKNOWLEDGEMENTS

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INDUSTRIAL POLLUTION AND ITS EFFECT ON GLOBAL TEMPERATURES INCREASE IN THE EARTH

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Key words: *Industrial pollution, global temperatures, effects*

Abstract

This paper aims to present some key issues about industrial pollution and its direct effects on growth in global temperatures in the Earth. Working methods used to achieve this material were: analysis of statistical data, consultation with specialised bibliography and documentation of many sources on the Internet.Research results on the degree of industrial pollution in the all countries of the world have highlighted permanently exceeding the maximum admissible concentrations of substances harmful to many plants, animals and humans. Direct effects of this pollution is visible in all regions of the Earth through climate change.Increasing global temperatures in the 21st century include: rising sea levels by 10 – 25 cm, shrinking glaciers in the mountains, reducing coating of snow in the northern hemisphere and increasing Earth temperature.

INTRODUCTION

Industrial pollution is pollution which can be directly linked with industry, in contrast to other pollution sources. **Copsa Mica** appears to be the most polluted city in Europe.
British publication *"Daily Mirror"* blame for this on the industrial platform of the city, where blacks manufactured and processed non-ferrous metals. It all started with the communists, say british journalists.
Authorities in that time have built a combined air issue a thousand times more lead than allowed international law.
Industrial platform for carbon black was closed in 1993, and the processing of lead and zinc was examined by UN (United Nations) experts and re-tech.
However – highlights british publication, the average life of seven years Copsa Mica is lower than in the rest of Romania, and the infant mortality rate is highest in Europe.
All this is happening, say those of the "Daily Mirror", in a country which from 1. January. 2007 is a member of the European Union.
However, like the Romanian authorities react slowely to a serious environmental problem, with long-term repercussions.

MATERIAL AND METHOD

This scientific paper was developed primarily based on studying a number of Romanian and international literature (see references at the end of the paper), the observation of concrete situations on the ground in the documentation of visits and consultation of numerous articles and studies from internet.
They also consulted a number of official websites of institutions cu whit direct or collateral duties in the field of environmental protection, namely: Ministry of Environment, United Nations, World Health Organization.
In this work was done studies, research and direct references of the three major centers of industrial pollution in Romania, namely: Copsa Mica and Zlatna cities, river Danube.

RESULTS AND DISCUSSIONS

Many industrial processes have led to the pollution of virtually every aspect of the biosphere: land, rivers, seas and the atmosphere. **Industrial pollution** has direct effects especially on air, large chimneys of industrial centers (chemical, petrochemical, non-ferrous metal processing, etc.) eliminate in the air clouds of smoke that cause them heavy metals

scrap, lead ash and especially dioxide and carbon monoxide.

Inventory spots for the state of the environment in Romania (taken from the official website of the Community Information NGO.RO developed StrawberryNet - Environmental Electronics Network, which promotes environmental protection, Sustainable Development and Protection of Human Rights - http://www. ngo.ro / environment / news / zcritice.html) includes the most polluted areas in our country in terms of air pollution, water pollution and soil pollution. This list was transmitted to the European Commission and include:

A. Hot spots of air pollution:

- Copsa Mica, Zlatna, Baia Mare - areas polluted mainly by heavy metals (copper, lead, cadmium), sulfur dioxide and suspended particulates originating from non-ferrous metallurgy;
- Hunedoara, Calan, Galati - areas polluted mainly by iron oxides, ferrous metals and steel dust from depositing;
- Ramnicu Valcea, Onesti, Savinesti, Stolnicul, Ploiesti - areas polluted mainly hydrochloric acid, chlorine and volatile compounds coming organize chemical and petrochemical industry;
- Targu Mures - area polluted mainly by ammonia and oxides of nitrogen in fertilizers industry;
- Braila, Suceava, Dej Savinesti, Borzesti - areas polluted mainly by sulfur dioxide, carbon disulphide, hydrogen sulphide, mercaptans, derived from the cellulose, paper and synthetic fibers.

The main industrial units generate frequencies exceeding the maximum admissible concentration of air quality parameters are: Bucharest - Automatics, battery, chemical platform Dudesti, Faur, Griro, Baneasa and Otopeni airports, Ploiesti - Petrotel, Astra Derolever, Vega, Brasov - Sofert, Bacau - CCH Letea, Turda - Cement, CTU Turda, Baia Mare - Phoenix ROMPLUMB, Craiova - SC Doljchim, CET Isalnita, Neamt - Pergodur, Constanta - Oil Terminal, Cluj - therapy; Zlatna - Ampellum, Hunedoara - Siderurgica, Oradea - Summary, Pitesti - Arpechim, Tirgu Jiu - Romcin, Braila - Celhart Chiscani, Calarasi - Siderca, Galati - Sidex, Giurgiu - Verachim, Ramnicu Valcea - Oltchim, Resita - Combination Steelworks, Copsa Mica - Sometra, Slatina - Slatina Industrial Platform, Slobozia - Amonil, Suceava - Ambro, Targoviste - COS, Targu Mures - Azomures, Timisoara - solvent, Vaslui - Moldosin; Popesti Leordeni - Danubiana, Brazi - Petrobrazi; Onesti - Carom, Borzesti - Chimcomplex; Codlea - Colorom, Fagaras - Nitramonia; Bizac - Moldocim; Savinesti - Savinesti chemical platform, Tasca - Cement, Navodari - Petromidia; Medgidia - Romcim, Ocna Mures - UPS, Paroseni - Renel FE Paroseni ; Rovinari - CET Rovinari;

B. Hot spots of water pollution:

a. Surface water. In 1999, over 81 per cent of waste water from the main sources of pollution activities in natural receivers reached untreated or insufficiently treated. Under this criterion, the most affected river basins are: Prut (100%), Ialomita and Arges (99%), see (98%) and Cris (96%).

b. Groundwater. Prahova - Teleajen is the most polluted, especially oil and phenolic compounds due to extraction activities. The following industrial units generate frequent exceeding the maximum admissible concentration of water quality are: Dej - Pulp and Paper Factory, Baia Sprie - mining, Baia de Aries - mining, Govora - Soda Works, Iasi - Penicillin and Comtom Tomesti, Tulcea - Alum, Turnu Severin - SC Turnu Severin, Targu Mures - Azomures, Constanta - port basin; Navodari - Petromidia;

C. Hot spots of soil pollution:

a. Chemical pollution: Zlatna, Baia Mare, Copsa Mica - critical areas due to presence of heavy metals, especially copper, lead, zinc and cadmium; Borzesti, Onesti, Ploiesti - critical areas by oil pollution and salt water due to oil exploitation. Pollution, affects about 0.9 million hectares, of which excessive pollution occurs on about 0,2 hectares;

b. Waste disposal: Gorj, Valcea, Alba, Covasna, Hunedoara, Maramures, Salaj, Delhi, Galati - *critical areas* due to storing tailings, scrap metal and slag, Gorj, Hunedoara, Dolj, Bihor - critical areas due to deposit the ashes of chemical processes, Ramnicu Valcea, Bacau, Dolj and Constanta - critical areas due to hazardous

industrial waste landfills, Bucharest and related areas of large cities - areas critical due to heaps of household waste. Other hot spots in terms of soil quality were identified at Borzesti - Onesti and Ploiesti - oil and salt water pollution due to oil exploitation, Brasov, Isalnita, Pitesti, Govora, Suceava, Targu Mures, Turnu Magurele and Tulcea.

The following industrial units generate frequent exceeding the maximum admissible concentrations of soil quality indicators are: Videos - Staging Petroleum; Poieni - Staging Petroleum; Holboca - CET Holboca, Slatina - Alro, Calimani - mining; Doicesti - FE Doicesti; Rovinari - FE Rovinari, Turceni - FE Turceni;

D. Hot spots with atmospheric pollution:

a. non-ferrous metallurgy: Copsa Mica, Zlatna, Baia Mare - heavy metals (copper, lead, cadmium) in conjunction with a high amount of sulfur dioxide and suspended particulates in Baia Mare;

b. chemical and petrochemical industry: organic and inorganic pollutants: Ramnicu Valcea, Onesti, Savinesti, Stolnicul - hydrochloric acid and chlorine;

c. celuzoza industry, paper and synthetic fibers: Braila, Suceava, Dej Savinesti, Borzesti - sulfur dioxide, sulfur dioxide, hydrogen sulfide and mercaptan;

d. chemical fertilizers: Arad, Isalnita, Targu Mures - ammonia and nitrogen oxides;

e. iron and steel: Hunedoara, Calan, Galati - iron oxides and ferrous metals and depositing particulates.

Five major rivers and 165 million people in 17 countries pour **pollution into the Danube River**. The river absorbs raw sewage from cities, pesticides and chemicals from farmers fields, waste from factories and bilge oil from ships. Virtually enclosed once it begins to weave its way through Europe the Danube retains most of the pollution reaching its waters. Sewage washes up on the beaches, spread disease and making the shores unsafe for residents and tourists. Nitrogen, phosphorus and other pollutants have spawned algae which have asphyxiated marine life and brought the river's once flourishing fishing industry to its knees.

Large and small industrial plants in oil refining, chemicals, pulp, paper, coal, metallurgy and refining often release pollutants into the many ancillary rivers and tributaries that feed into the Danube River. Illegal dumping of industrial and toxic wastes has often been reported by environmental organizations that attempt to monitor commercial and illegal discharges of hazardous chemicals and industrial by products into the river.

Many of the world's leading environmental agencies have long centered the focus of their attention on the continued pollution of the Danube River. Yet it was only with the fall of the East's communist regimes that scientists and government officials began to realize the seriousness of the environmental havoc which the destructive industrial policies of the former communist regimes had wrought on the Danubian watershed. Industrial pollution is especially high on the Danube because the former communist masters in Eastern and Central Europe sought lucrative short-term production gahls, often at the price of environmental degradation.

The steady degradation of the Danube's environment has severely affected the health of its residents, wreaked untold econolllic damage on the river's once thriving ecosystem, and destroyed much of the region's biodiversity. In recent years, the various governments bordering the Danube have initiated a series of long-term endeavors aimed at protecting and restoring the health of the Danubian watershed. This environmental awareness has largely been driven by the realization that a healthy watershed offers the region numerous business opportunities for many industries, including shipping, ports, energy, construction, tourism, agriculture and fisheries. Furthermore, former communist nations such as Romania, Bulgaria, Hungary and the Slovak Republic, whose heavy industries are the primary polluters of the Danube, will have to close several hundred factories in order to significantly reduce effluent discharges and toxic emissions into the Danube. Faced with deteriorating local economies and high levels of unemployment, Eastern European governments have balked at the thought of closing plants to preserve the tributary. Without

substantial levels of Western assistance, it appears that many of the new governments will only pay lip gervice to calls for an end to hazardous discharges into the Danube.

Perhaps ***one of the Danube river most prolific polluters is Romania***. As one of the East's more advanced economies during the communist era, Romania practiced an industrial policy which disregarded environmental safeguards in favor of heavy industry (particularly steel mills, paper mills and commercial fertilizers). Romanian discharges have been actively pursued by the Government of Bulgaria, where that government has repeatedly protested the industrial effluents that have flowed off of the Danubian watershed and into some of their protected river systems. Furthermore, even though Romania has adopted several bilateral and multilateral conventions on the protection of the Danubian watershed, it has continued to haphazardly discharge its industrial pollution in blatant disregard of its treaty and convention obligations. As regional tensions have mounted between Romania and its neighbors, several actions have either been taken, or are in the process of being taken against Romania in order to ensure Romanian compliance with its treaty obligations.

Romania and Bulgaria have begun to work out some of their differences amicably following continued Bulgarian assertions that the Romanian Government has continued its haphazard approach of permitting industrial discharges into the Danube The adoption of the May 15, 1993 Bilateral Convention on Environmental Protection, as well as a related treaty, the April 123, 1993 Convention on Protection of the Black Sea from Pollution have helped to establish working conflict-resolution mechanisms whereby the two nation's may settle their disputes. Bilateral Convention on Environmental Protection (Romania and Bulgaria, May 15, 1993): This bilateral convention commits the two governments to resolving environmental issues that have an adverse effect upon the national territory of the other signatory. Furthermore, it establishes a series of technical exchanges and ongoing consultative discussions between Bulgaria and Romania.

As nations have continued to pollute the Danube, the quality of living of the inhabitants of the river and its surrounding tributaries have been aMicted by a number of health related aMictions that can be directly attributed to Romanian industrial discharges into the river.

The pollution of the Danube by Romanian steel, chemicals and paper and pulp processing manufacturers along the banks of the Danube.

Thousands of years of mining and minerals processing in the **Apuseni Mountains** of Romania have caused severe environmental damage with important consequences for human and environmental health. These effects are particularly serious where the minerals industry is in close proximity to urban environments. In the town of **Zlatna**, in the Apuseni Mountains of Romania, a minerals processing plant and smelter are located within two minutes' walk of the town centre. Gaseous emissions (SO2, NOX) and fall-out of particles enriched in Pb, Zn, Cu and Cd cause acid precipitation and heavy metal contamination for more than 30 km down-wind from the smelter. Severe health problems in local communities were first reported over 15 years ago (Suciu, 1981). A subsequent environmental health study by the US Agency for International Development (USAID) identified high blood Pb levels in local children of up to 70 ug/dL and a marked increase in the incidence of chronic bronchitis due to high levels of SO2 (Billig et al., 1999). Lead shows neurotoxic effects in children when blood levels exceed 10 ug/dL (US Centre for Disease Control and Prevention).

There are no immediate low cost solutions to prevent further contamination short of moving the town, closing down the plant and carrying out a major soil clean-up programme. Any such measures are unlikely given the depressed state of the local economy and that the smelter is the main employer in the area.

In order to devise long-term solutions to the problems caused by environmental contamination, the processes of mineral breakdown, the biogeochemical mobilisation of toxic metals, the mechanisms and extent of bioaccumulation, and consequent transport via the food chain must be understood. Smoke

emissions from the smelter often sink to the valley floor enveloping the town in a heavy sulphurous mist which is occasionally accompanied by fall-out of ash containing particles rich in metals. This results in extremely high soil lead levels on the valley sides of between 50 and 4,000 ppm (Gurzau et al., 1995). Limited studies on metal accumulation in different types of soils have shown that lead is most strongly accumulated in the uppermost 'brown earth' horizon of forest soils (Preda et al., 1988). This behaviour is not common to all metals, with cadmium, another extremely toxic metal, showing highest concentrations in agricultural soils (Preda et al., 1988). Despite lead being apparently less abundant in agricultural soils, locally grown vegetables may still contain high concentrations. Turnips, cabbages and grass, for example, have been found to contain 536 ppm, 347 ppm and 1,971 ppm lead respectively (Zahan et al., 1981), largely dependent on soil type (Keul et al., 1984). The European Commission (III/5125/95 Rev. 3) has set maximum limits on lead in cereals, fruit and vegetables of less than 0,3 ppm.

Aerial pollution from the smelter also has a major impact on the mixed deciduous woodland of the area which is dominated by beech (Fagus sylvatica), hornbeam (Carpinus betulus) and oak (Quercus petraea) (eg Keul et al., 1984). Forest soils are highly acidic, down to pH 2 (Bartok, 1982). On the valley sides, 'down-wind' of the smelter, tree and herbaceous plant cover is sparse and appear's to show severe damage from sulphur dioxide and acid rain. Beech woodland around Zlatna contains only 27% of the number of earthworms found in similar, less contaminated ecosystems 30 km from the town (Pop, 1987). The reduction in abundance of invertebrates has led to a marked decrease in the number of organisms higher up the food chain including birds (Munteanu, 1982). Not surprisingly, accumulation was species dependent and correlated with distance from the polluting source. A slight improvement in air quality was noticed over a five year period as a result of the installation of a new, much higher smelter chimney. This study demonstrated the use of lichens in monitoring the effectiveness of environmental initiatives to reduce polluting emissions.

Local streams and the main ***Ampoi river*** receive contaminated water in the form of acid, and occasionally highly alkaline, smelter effluent and metal-enriched acid leachates from the roughly 1 km2 tailing heaps around the processing plant. In some areas these drain directly into local agricultural land. Mixing of heavy metal-enriched acid leachates with local groundwaters commonly results in the formation of a blanket of red-brown. This is because regional groundwaters have a naturally high pH of around 7,3 due to much of the local sedimentary rock containing carbonate. A well-known feature of heavy metal polluted waters is a low biotic diversity with the survival in abundance of just a few pollution-tolerant species.

CONCLUSIONS

1. Dozens, even hundreds of hectares of agricultural land around the industry of processing of ferrous ores are affected by pollutants emitted by heavy metals, thus jeopardizing the health of plants, animals and people, according to a study by the *National Institute for Research - Development for Pedology, Agrochemistry and Environmental Protection (ICPA).* In the area of soil was recorded in **Copsa Mica** an average amount of about 171 milligrams of lead (Pb) per kilogram of soil (mg / kg), while a pure area average amount was 15 mg / kg. In plants, Copsa Mica, the average value of Pb was 134 mg / kg, and in cow milk 0,25 mg / liter. In contrast, a control area values were 8 mg / kg, plant, and zero amount of lead in milk. Major centers has been recorded or register a significant pollution with heavy metals (lead, copper, zinc, cadmium) are **Copsa Mica, Baia Mare, Zlatna**. Although some units have taken measures to reduce pollution because heavy metals remain in soil for long periods of time, tens, hundreds and even thousands of years, the absorption of heavy metals from soil to plant will continue. Important is that the contaminated soil was not cultivated forage plants, vegetables, trees, since

heavy metals from soil to reach plant, including their edible part.

2. ***The town of Zlatna is just one of many in Europe suffering the effects of decades of chronic industrial pollution.*** Worldwide, the twentieth century has become synonymous with the sight of smoking chimneys, slag heaps, rubbish tips, illegal dumps and 'contaminated land'. Almost all of the planet's surface is contaminated to some degree by metals and other toxic substances. This depends on the type of metals present, their concentration and their bioavailability. The bioavailability of different metals is poorly understood, being not only dependent on which organisms are present but on a wide range of environmental variables. A better understanding is important not only in conserving natural habitats but also for protecting human health as metals may be accumulated/concentrated through the food web. Low cost solutions to the problems of metal contamination are therefore urgently required. To be universally acceptable, these solutions must not adversely affect local economies or threaten jobs. Natural remediation systems are likely to provide the most cost effective long-term solutions.

3. The survival of organisms in the presence of toxic metals in contaminated sites such as Zlatna depends on intrinsic biochemical, physiological and genetic properties. While it is certainly true that Zlatna has suffered intense environmental degradation, the area is also a natural laboratory for studying fundamental processes of metal mobilisation and bioaccumulation. Our studies are designed to both identify risk to human health and for working towards better natural systems for cleaning-up such metal contaminated environments.

4. Our country will need to improve management and monitoring of air quality and to finalize plans and programs in the sector. Here were approved transitional period until the end of 2007 and 2009 for emissions of volatile organic compounds in certain installations.

5. According to country report, Romania should increase efforts in the areas of horizontal legislation (basic), waste management and water quality to complete the adoption of legislation and ensure its implementation. Plans for waste management should be adopted and the recycling and recovery rates should be increased. Monitoring water quality improvements and should require action plans. To comply with European directives on this subject have been granted transition periods. Until December 31, 2018, for treatment of urban water use, until December 31, 2009 for discharge of hazardous substances and to 31Decembrie 2010 and December 31, 2015 for drinking water. Environmental, Romania will have to implement important measures to accession.

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INCREASING AGRICULTURAL PRODUCTIVITY OF THE REPUBLIC OF MOLDOVA, BY MANAGING NATURAL VULNERABILITY

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Key words: *agriculture, rural area, productivity, vulnerability, global climate changes.*

Abstract

The main objective of the research is to analyze and highlight the negative effects of the natural vulnerabilities on the agricultural productivity and to offer tangible proposal for diminishing their effect. For this purpose the key natural hazards and their impact on the agricultural productivity have been considered. As result of this research had been established that Republic of Moldova is vulnerable to a range of natural trends and hazards including erosion, landslides, drought, rain storms, hail, frost, flooding that impact on agricultural producer's revenue. Moldova's annual hazard damage averages 5-15% of national GDP. In this context, the negative effects of the climatic changes, particularly in the last years, have to be taken in consideration by the State agricultural policy for risks diminishing and productivity increasing in agriculture.

INTRODUCTION

The Republic of Moldova is vulnerable to a range of natural trends and hazards that impact on rural livelihoods, including erosion, landslides, drought, rain storms, hail, frost, flooding and earthquakes.
In view of the prominent place of agriculture in Moldova's economy, risks affecting rural areas and agriculture further undermine the country's resilience to economic shocks and setbacks.
Climate change must be not only analyzed as a separate threat, but in terms of possibilities that several key threats, especially erosion, drought and flooding may influence on agricultural productivity of the Republic of Moldova.
These include the need for reinforcement of the system of reservoirs, rehabilitation of dams in areas with flood danger, more efficient irrigation, implementation of agrosystems to improve resistance to erosion, soil quality improvement, and identification of plant species adapted to Moldova's trend toward higher temperatures and lower humidity.

MATERIAL AND METHOD

For analysis and reflection on the negative effects of natural vulnerability in agricultural productivity and the ways to mitigate them, following indicators were used: the key natural hazards affecting Moldova's rural sector and agriculture including their occurrence, impact and estimates of their damage. Were used data provided by National Bureau of Statistics, Ministry of Agriculture and Food Industry. Also, as sources of information were used various studies prepared by World Bank, FAO and UNDP experts.

RESULTS AND DISCUSSIONS

Climate change is recognized as a priority challenge that humanity is facing in the 21st century, and it is no longer a distant prospect. Some of its consequences – like increased frequency and intensity of natural hazards – are already being felt. For Moldova it has meant, most recently, the catastrophic drought in 2007 and devastating floods in 2008. Reality is such that while all countries are and will be affected by climate change, developing countries will suffer most. They tend to be more vulnerable to the adverse impacts, have fewer resources with which to adapt and to recover losses caused by extreme weather events and are in general more dependent upon the environment for their citizens' livelihoods. As a result, climate change

poses a serious threat to achieving the MDGs (Millennium Development Goals) which Moldova has committed to. At the same time, climate change can create opportunities for transforming the economy in the direction of greater sustainability, thus paving the way towards poverty reduction and the achievement of the MDGs.

The total land area in the Republic of Moldova constitutes 3,385m hectares, including 2,506m hectares (74 per cent) representing agricultural land. The total share of arable land is 73 per cent, which is one of the highest levels in Europe. Nowadays, the Government owns 23.1 per cent of total agricultural land including 100 per cent of pastures; local public administrations have 21.5 per cent, with private ownership dominating the land structure at 55.4 per cent of the total.

From 1994 to 2006 Moldovan agriculture registered one of the most dramatic declines of output of all CIS and CEE countries. Declines in livestock production have been particularly acute. Collapsing agricultural output has resulted in rural inhabitants migrating to urban areas or abroad. The main causes of the decline include low levels of investment in the sector and inadequacy of re- cent reforms. Although tariff and non-tariff trade barriers present hurdles, the main obstacles to developing Moldova's agriculture lie within its national borders. Small peasant farms, averaging 1.5 hectares, as well as farmers in the central hot semi-humid and south hot-arid zones are the most vulnerable to the types of extreme climate conditions expected to become more severe with climate change. Provision of irrigation in appropriate areas within these two zones would provide significant benefits even under current conditions, increasing yields by 1.5 to 2 or more times as compared with yields without irrigation.

In the catastrophic drought in 2007, 90 per cent of the country's territory and 80 per cent of the rural population depending on agriculture was affected by the diminished harvest. The savings and income of the rural population were lost, with total losses amounting to USD 1 billion, according to official estimates. Output of cereal crops diminished by 70 per cent compared to 2006, and the wheat harvest fell by a factor of 10. Many households were not able to maintain their livestock because of the lack of fodder. Bovine livestock diminished by one quarter, pigs by almost 50 per cent, and sheep and goats by 10 per cent and the number of poultry by 25 per cent. By January 2008, many families had to liquidate their entire livestock resulting in a loss of food sources.

As compared with the animal sub sector, the crop sub sector is directly dependent on climate conditions. But the degree of harvest exposure and capacity to adapt to climate factors depend on the agropedoclimatic zone. An agropedoclimatic zone is a geographical region characterised by specific climate factors and land characteristics. Moldova is divided into three agropedoclimatic zones and some sub-zones. The second sub-zone from the central zone and the whole southern zone are the most vulnerable to climate change.

Photo 1. Sun Flower under the drought,
R. Moldova, 2007

As national climatic projections show, these regions belong to those parts of the country where the aridity index is expected to increase the most in the next 100 years. Currently, the humidity coefficients in these areas have small values both in relative and absolute terms. In the first sub-zone, 2 to 3 droughts may occur per decade, while in the second one, the number of droughts may reach 3 to 4 during a decade. From past experience, a drought may harm 80 to 90 per cent of the grain harvest in Moldova. At the same time, soil is less fertile in these

regions compared to the other zones, which further increases potential losses from the expected climate changes.

Drought risks can be mitigated through adoption of appropriate agricultural practice and crop varieties, through improved weather forecasting and response, and through irrigation in specific limited areas. Insurance schemes may provide options for spreading risk in future.

Soils may either intensify or protect plants from the impact of global warming depending on their quality and fertility. Over 65 per cent of Moldova's fertile soils have been negatively affected by erosion, landslides and other degradation processes. Chernozem is the most important soil in Moldova, and is found on 2.510m ha, or 78 per cent of arable land. National food security depends on the quality and fertility of these soils. At the beginning of 1970, the average annual rating of soil quality across Moldova's arable lands was 70 points (on a scale from 1 to 100). According to the data from the 2008 land registry, the current average annual soil rating is 63 points (primary factors that influence the rating are fertility, soil structure, etc.). This decrease is the outcome of a range of soil degradation processes including soil erosion, landslides, decrease in humus, deterioration of the soils' structure through compaction, increase in soil salinity and soil droughts. These destructive factors diminish the land areas which can be irrigated. Such an asset is conducive to the development of conservation agriculture (CA), that provides application of modern agricultural technologies to improve production while simultaneously protecting and enhancing the land resources on which production depends. Application of CA promotes the concept of optimizing yields and profits while ensuring provision of local and global environmental benefits and services. Conservation agriculture promotes minimal disturbance of the soil by tillage (zero tillage, direct sawing), balanced application of chemical inputs (only as required for improved soil quality and healthy crop and animal production), and careful management of residues and wastes. This reduces land and water pollution and soil erosion, reduces long-term dependency on external inputs, enhances environmental management, improves water quality and water use efficiency, and reduces emissions of greenhouse gases through reduced use of fossil fuels.

Another factor of influence on the agricultural productivity are the frosts.

Severe weather events of many types affect Moldova, but the largest share of damage is caused by convective events from May to August, and by May frosts. Also, frosts of winter 2009-2010 show that affecting vineyard by low temperatures is conditioned by several factors, like: varietals resistance, readiness of the vine hub for wintering, the location plantations on different elements of relief, during of low temperatures. At the beginning of third decade of January current, based on the dates from The State Meteorology Service, have been registered the minimum of air temperature of -22-23°C in South viticulture region, - 23- 24°C in The Center and -26-28°C in the North. That mentioned temperatures were registered for the night hours, during 6-8 hours. For sure these very damaging events highlight Moldova's need for improved forecast capacity able to resolve and provide warning of sudden local events. Relatively small incremental investments, primarily in forecasting workstations, would be required for. Moldova's microclimates should be mapped to facilitate well-resolved and accurate frost warnings.

Emergency communication and disaster management information systems are deficient in Moldova, and emergency response equipment is currently absent or antiquated.

Moldova experiences severe damage from summer storms that are by nature very difficult to forecast. While the Meteorology Service can certainly improve the timeliness of its forecasts through technical measures, making use of those forecasts to achieve better outcomes will require adaptation of current approaches. In this context, data consolidation and sharing, using modern

information technologies, will be of key importance.

CONCLUSIONS

1. Given that most part of the country is located in the sub-humid zone, with frequent droughts during the plant vegetation period, it is crucial to undertake measures to adapt national agriculture to the changing climate. These measures include improving weather forecasting capabilities, protecting soil fertility, extending efficient irrigation systems and ensuring proper crop structure.
2. To achieve a positive outcome for the adaptation programs, it is necessary to devise sustainable action plans for the sector at both national and local levels.This action plans are included in national strategies and development programmes, among of this the most important are: National programme for preventing desertification, National programme for exploring new lands and increasing soil fertility in 2003-2010, National strategy for sustainable development of the agro-industrial complex of the Republic of Moldova in 2008-2015, the purpose of which is to create favorable conditions for sustainable growth of the agro-industrial sector and improve the quality of life in rural areas by improving the competitiveness and productivity of the sector.
3. An integrated risk-management approach toward Moldova's hazards will help ensure that limited resources are targeted toward investments that will safeguard the agricultural natural resource base, sustain growth, protect rural infrastructure at risk, reduce the impacts of natural hazards on poor rural farmers, and improve the productivity of land.

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EFFICIENCY OF FOUNDATION AND EXPLOITATION OF THE SUPERINTENSIVE APPLE TREE ORCHARD

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Key words: *varieties, recovery, capital investment, economic efficiency, provisional branches.*

Abstract

Efficiency of foundation and exploitation in apple superintensive orchards is greatly determined by the productivity of cultivated varieties and trees growing system. The investigations were made during the period 2003-2006 in the orchard „Codru-ST" Ltd. founded in 2000 with bench-graftings on rootstock M 9 of the varieties Gala Must, Golden Reinders and Idared. The distance between rows is 4,0 m and that in the row is 1,0 m. There were studied 4 variants of crown formation. The highest cumulated yield in the years 2003-2004 at the varieties under the study was registered at the variant V_2 - 50,04-58,44 t/ha. Respectively, in variant mentioned the capital investments at foundation, keeping up the plantation and value of production were very high. Capital investments recovery took place at all the variants under the study, but the greatest value was registered at pruning's minimalization of crown formation and designing of 2 provisional branches 123-142%. The highest economic efficiency at the varieties under the study during the years 2005-2006 was registered in variant V_2, where due to the high yield of the 41,9-46,2 t/ha t/h, production profitableness were registered 280.2-291.2%.

INTRODUCTION

Considerable capital investment recovery in the superintensive apple-tree orchards is largely determined by performance varieties and tree training system [1, 4].

The main objectives of the superintensive system of apple-tree culture are: entering the economic fructification 2-3 years after planting the orchard; rapidly increasing harvest and considerable capital investment recovery (150-160 thousand lei/ha) with the first two crops of fruit; high harvest of quality fruit with high economic indicators [3, 5].

In Moldova is recommended and applied in the superintensive apple-tree orchards improved slender spindle tree training system, provides structuring crown primarily by relatively severe cuts, especially the shortening of the transfer side parting and oriented horizontally. This attenuates the entry of trees on economic growth and harvest of fruit [2].

In this regard improvement of slender spindle type crown formation in sight of stepping up the entry of the trees on economic growth, rapid growth of the crop of fruit and recovery of capital investments in the superintensive apple-tree orchards is a current problem in fruit-growing development [5].

MATERIAL AND METHOD

Experimental plot is located in the orchard „Codru-ST" Ltd. Planting was conducted in spring 2000 with the bench graftings on the rootstock M9 of Must Gala, Golden Reinders, Idared varieties. The distances between rows 4.0 m and between trees in row 1.0 m. In 2000 vegetation grafts reached about 120 cm which allowed initiation of slender spindle crown formation in four variants.

Variant 1 (control) - as recommended in force: the trunk of the trees with 50 - 55 cm and well-developed vertical few zigzag shaped axis; 3-4 frameworks 40 - 50 cm short with inclination angles of about 60^o to the vertical; the scaffold branches and above the axis at intervals of 20 cm are uniformly located radially fruit-bearing branches, after fructification fruit-bearing branches is to renew the cycle of 3 - 4 years.

Variant 2 - Crown bioconstructive base as in the control variant completed with: rational minimizing of the degree of training cuts, placement above the crown of the provisional

scaffold branches alternatively horizontalized fixed on espalier onto the row direction that gradually shortens after fructification stage, transferring them into fruit branches; forced horizontalization of vertically growing scions and branches into the free end of the crown to transfer into fruit branches.

Variant 3 - Formation of a crone is made as in variant 2 routing the fruit-bearing branches to horizontal position through lateral transfer side parting cuts.

Variant 4 - Formation of a crone basically is made as in variant 2 with the renovation of branches by division fruit-bearing to obtain scions from sleeping buds.

Plantation productivity was established in the harvesting period (2003-2006 years) for all variants taken into the study. Capital investments recovery were made by determining real expenses when was established fruit growing plantation.

RESULTS AND DISCUSSIONS

Establishment of superintensive apple orchards with high density of trees - 2500 pieces/ha and more, capital investments was considerable - 166612 lei/ha [5].

Table 1. Capital investmants volume per 1 ha for establishment of apple tree superintensive orchards, 200-2001 years

Specification	Measure unit	Quantity	Unitary price, leis	Investments, leis
Fertilizer administration :				
-organic	t	50	65	3 250
-with Phosphor	kg	650	2,75	1 788
-with Potassium	kg	500	2,10	1 050
Semi-render ploughing	ha	1	1 200	1 200
Ploughing leveling	ha	2	350	700
Stake of plot for plantation	person/day	4	50	200
Cost of planting material (graftings)	pcs.	2 500	10	25 000
Plantation with hydrophorator	person/day	15	50	750
Care of trees after plantation	person/day	8	50	400
Cost of materials and espalier installation	t	-	-	15 000
Dripping irrigation system installation	ha	1	22 500	22 500
Wire fence installation	ha	1	1 650	1 650
Other expenses	-	-	-	1 644
Sum				**75 132**

Considering that the very high cost of apple trees, grafted on rootstock M9 - 15 lei/piece or 37500 lei/ha the orchard was planted with bench-graftings and, consequently, seedling investments were reduced up to 25000 lei/ha.

Capital investment for the establishment of 1 ha of orchard, calculated with prices at that time, is about 75132 lei, including: 25000 lei cost material of the bench-graftings; 22500 lei for the drip irrigation; 15000 lei espalier installing and 11924 lei other expenses (Table 1).

The volume of investments for the maintenance of 1 ha young orchard is about 66484 lei, including by years: 2000 - 11924 lei to the grow from mass grafting one year crowned trees; 2001 - trees crowning start - 9394 lei; 2002 - 9724 lei 2003 entry of the trees on economic fructification - 17281 lei; 2004 - 18161 lei.

The amount of capital investment for the establishment and care of 1 ha young orchard for varieties and variations, taken in the study, are 141018 - 142026 lei in variant 1 and 142684 – 144226 lei in variant 2. In variants 3 and 4 the amount of capital investment does not differ essentially from variant 2.

Least significant difference on investment for varieties and variants of formation taken in the study arrive, in substance, from the harvesting costs of the fruit quantity difference (Table 2).

Table 2. Capital investments recovery in apple tree superintensive orchards according to the type of tree crown formation

Variant of crown formation	*Cumulated yield, 2003-2004 years, t/ha*	*Capital investments, 2000-2004, lei/ha*	*Value production, 2003-2004, lei/ha*	*Capital investments recovery in 2004, %*
Gala Must variety				
V1	*46.22*	*141616*	*161770*	*114*
V2	*55.83*	*143940*	*188405*	*130*
V3	*51.84*	*143140*	*181440*	*127*
V4	*51.22*	*143016*	*179270*	*125*
Golden Reinders variety				
V1	*48.80*	*142026*	*170800*	*120*
V2	*58.44*	*144226*	*204540*	*142*
V3	*56.60*	*143886*	*198100*	*137*
V4	*52.17*	*142980*	*182595*	*128*
Idared variety				
V1	*41.90*	*141018*	*146650*	*104*
V2	*50.04*	*142684*	*175.14*	*123*
V3	*47.55*	*142146*	*166.425*	*117*
V4	*46.44*	*142030*	*162540*	*114*

Varieties of trees and variants taken in the study entered the economic fructification in the third year (2003) from the initiation of crown training.

Harvest was higher in variant 2, were in the 2003 - 2004 years cumulated apples harvest, taken in the study, is 55.83 t/ha, 58.44 t/ha and 50.04 t/ha prevailing the control variant by 8.14 - 9.64 t/ha or 19-21%.

Revenue from sales of apple production in the years 2003 - 2004, calculated at the price of 3500 lei/t, in variant 2 reaches 188405 lei/ha in Gala Must variety, 204540 lei/ha in Golden Reinders variety and 175140 lei/ha to Idared variety.

The amounts shown ensure the recovery of capital investment at 136%, 142% and 123%. In the control these indices have values of 114%, 120% and 104%, or with 16-22% lower.

Given that grafts care investment to get, in the orchard in 2000, one year grafted trees without parting in the crown area, reach 11924 lei/ha which added to the cost of plant grafting – 25000 lei, make 36924 lei. This amount does not differ essentially from the cost of a year trees produced in the nursery.

Thus becomes annoying orchard establishment with mass grafting compared to the planting of one year trees, produced in the nursery. The availability of sufficient financial resources allow planting of orchard with two years trees crowned in a nursery, which enter economic fructification one year prior to those of one year uncrowned and contributes to faster recovery of capital investment.

The investigations demonstrate that in the year 2005, in the control variant the harvest of the fruits constituted at the Gala Must variety - 38.17 t/ha, at the Golden Reinders variety - 40.83 t/ha and at the Idared variety - 33.43 t/ha.

The method of crown forming have an influence on fruit production registered the highest values in 2 variant, where the fruit crop of the study varieties constituted respectively 47.15, 48.63 and 41.11 t/ha, or an augmentation with 19-23% depending on control. The fruits harvest in variants 3 and 4 is smaller in comparison with the variant 2, but superior to the control variant, respectively with 12-16%, or 9-10% (Table 3).

In 2006 year, when the trees have reached the full fructification the fruit harvest of the most variants was: 40.75-43.15 t/ha at the Gala Must variety, 40.95-43.81 t / ha at the Golden Reinders variety and 40.85-42.72 t / ha et the Idared variety. In the indicated limits, superior values were registered in the second variant that outturned the variant control after the fruit yield with 4-7%. In the variants 3 and 4 the fruit yield is approximately at the variant control.

Table 3. Average fruit production in function of the method of crown formation and trees age, t/ha

Variant of crown formation	2005 year	2006 year	Average, 2005-2006 years	In comparison with control, %
Gala Must variety				
V_1	38.17	40.75	39.46	100.0
V_2	47.15	43.15	45.15	114.4
V_3	42.47	42.37	42.42	107.5
V_4	42.10	41.15	41.63	105.5
$LSD_{0,05}$	0.55	0.95	-	-
Golden Reinders variety				
V_1	40.83	40.95	40.89	100.0
V_2	48.63	43.81	46.22	113.0
V_3	46.34	42.17	44.22	108.1
V_4	44.57	41.76	43.17	105.6
$LSD_{0,05}$	1.20	0.77	-	-
Idared variety				
V_1	33.43	40.85	37.14	100.0
V_2	41.11	42.72	41.92	112.9
V_3	37.33	41.91	39.62	106.7
V_4	37.09	41.95	39.52	106.4
$LSD_{0,05}$	1.15	0.92	-	-

Diminution of fruits yield in comparison with control variant is because, with advancing trees age, cutting were made by reduction of provisional frameworks branches, decreased the number of horizontal shoots by inclination to avoid thicken of the crowns, which reached the maximum size. Simultaneously with the entry into the full fructification the apple trees in 2005 year partially and completely in 2006 year, beginning the cutting of the fructification, which in the all variations have on the base the principle of the cycle rejuvenation of 3-4 years branches [2].

The influence of the crown formation manifests on the economic efficiency of the fruit production in the apple superintensive orchard in the early years (2005-2006) after the trees entering in the full fructification period (Table 4).

During this period, the consumption of production, calculated to 1 ha on average 2005-2006 years in variant 1, constituted 40000 lei at the Must Gala variety, 41459 lei at the variety Golden Reinders and 37628 lei at the Idared variety. The higher volume production of consumption was received in variant 2 were the valour on the studies varieties constituted respectively 41140 lei/ha, 42525 lei/ha and

38583 lei/ha. In variants 3 and 4, the volumes production of consumption is higher in compared to the variant 1, but lower than variant 2.

In the structure of the consumption of production on average by varieties, variants and years to study the more substantial weight to combating diseases and pests 32%, 14% for drip irrigation, and 29% for harvesting and thinning of the fruits.

Table 4. Economic efficiency of the fruit production in function of the o crown formation method in the superintensive apple orchard

Variant of crown formation	Income from sales of the production, lei/ha	Costs of production, lei/ha	Profit, lei/ha	Production profitableness, %
Gala Must variety				
V_1	138287	40000	98110	245.3
V_2	158025	41166	119869	291.2
V_3	148470	40606	107863	265.6
V_4	145887	40482	105405	260.4
Golden Reinders variety				
V_1	143115	41459	101656	245.2
V_2	161770	42551	119218	280.2
V_3	154892	42148	112744	267.5
V_4	151077	41824	109253	261.2
Idared variety				
V_1	129990	37628	92362	245.5
V_2	146702	38543	108159	280.6
V_3	138670	38089	100589	264.1
V_4	138570	38123	100447	263.5

The mean profit on varieties and years taken in the study in the control variant is 97376 lei/ha, and the profitableness production - 245%. The higher valour of profits and profitability have been registered in variant 2, which constituted 114750 lei/ha (282%), exceeding the control variant respectively 17373lei (37%). Lower indices of profit (107061 lei/ha) and the profitability of production (265%) occurred in variant 3, but is higher than control variant respectively 9 685 lei/ha (20%). In the variant 4 investigated indices prevailing the control variant on 9150 lei/ha or 19.5%.

CONCLUSIONS

1. The volume of the capital investments for the establishment and care of the superintensive apple orchard constituted a mean on the study varieties 141482 lei / ha. In the structure of this volume, about 33% is the cost of seedlings, 30% installing drip irrigation system, 20% artificial support installing and 8% by planting land preparation.

2. The higher indices in the recovery of capital investments, the averaged on varieties and study years of 123-142% was dated in the variant where at the base of the slender spindle crown formation is minimizing cutting and designing of two provisional scaffold branches, forced inclination into the free space of the crown of the shoots and branches with vertical growth. This crown formation increased yield and, respectively, the receipt from the fruits sale on the study varieties by 26635-33740 lei/ha in comparison to the control variant.

3. Structuring crown by minimizing the cutting degree, forced inclination of branches and shoots into space on the shaft is manifest in the first 2 years (2005-2006) after entering trees during full fructification. In this variant, the volume of production consumption was on the varieties 38543-425551 lei/ha, the profit-114750 lei/ha, the profitability of production-280,2-291.2%.

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CONDITION OF CROP FARMING AND VEGETABLE PRODUCTION IN REPUBLIC OF SERBIA AND IMPACTS OF GLOBAL CLIMATE CHANGES ON ITS FUTURE DEVELOPMENT

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Key words**:** *crop farming, vegetable production, Republic of Serbia, climate changes*

Abstract

Main goal of paper work is to present existing trends in crop farming and vegetable production in Republic of Serbia and to estimate influence of climate changes on it in near future. Analyses included production of crop farming and vegetable products from the aspects of used surfaces size, total yields and yields per surface unit. Results of crop farming and vegetable production in Republic of Serbia, achieved in period 2004-2008., indicate a direct impact of climate changes and these results tend to vary depending of drought level characterized for each observed years.
Authors point out the importance of irrigation, as agro-technical measure, which represents a way to mitigate some negative influences of global climate changes, which reflect through insufficient and uneven rainfalls, and as well a way to reach optimal quantum and continuity of over all production.

INTRODUCTION

Territory of Republic of Serbia has favourable agro-ecological conditions for crop farming and vegetable production, and therefore is necessary to determine measures which would stimulate development of production based on highly-efficient basis. However, due to changes in global climate, favourable agro-ecological conditions are not enough to reach production characterized by stability, sufficient quantities of products with certain continuity in delivery. As partial solution to this problem, imposes increase of areas under irrigation systems, what will significantly affect predictability of results of crop farming and vegetable production on territory of Republic of Serbia.

MATERIAL AND METHOD

Main data are taken from Statistical office of the Republic of Serbia, Belgrade. Most important manifestations are presented through tables, and generated with standard mathematical-statistical methods. Research is based on available data, and method applied was "desktop study". Period in focus is 2004-2008.

RESULTS AND DISCUSSIONS

Production of crop farming products - Crop farming production could be divided in two areas, production of cereals and production of industrial plants. In period observed, cereal production in Serbia was in average on area of 1,9 million hectare. In production structure, maize production is prevailing with over 63% of total area under cereals in average. Following maize in structure of production, wheat was represented with 29%, or in average 557 ha per year. Mentioned production lines were represented on slightly less then 1,8 million ha, while on the remaining areas under cereals production were barley, oat and rye *(Table 1)*. Cereals yields in observed period were characterized by significant fluctuations. Yield per unit of area had highest fluctuations in maize production. In 2007 yield per ha was 44% less then yield achieved in 2005, that in 2008 it was 49% higher. Wheat production in 2007 recorded also decrease in yield per ha, when it was 23% lower, compared to 2004. Increase in yield per ha in 2008 for 29%, points to unfavourable conditions that occurred in 2007, primarily lack of rainfalls.
Production of industrial plants, in analyzed period, was on 400 thousand hectares, with

mostly represented cultures produced: sunflower and soy. Production of sunflower was done on slightly larger areas then production of soy, resulting together in 80% of areas on which production of industrial plants took place *(Table 1)*. On the rest of the areas under industrial plants, with 16% production of sugar beet was represented, while production of colza and tobacco in total occurred on slightly less then 4%, of total areas under industrial plants.

In observed period there was significant increase in areas under colza. In year 2004 production of colza was on 1,9 thousand ha, and in 2008 production was on the area 18 thousand hectares. Reasons for this multiple increase in areas under colza, in this 5 year period, lay in the enhanced interest for production of bio-diesel. Yield of industrial plants in observed period recorded notable fluctuations. Significant decrease in yield per unit of area was recorded in production of sunflower in 2005, when compared to 2004 yield was lower for 24%, which in spite of enlarged areas affected decrease of total yield for 20%. The most unfavourable year, in observed period, for production of sunflower was 2007, when due to decrease in areas under sunflowers and significant decrease in yield per unit of area, total yield was for 35% less then in year 2008.

Vegetable production - Vegetable production in Republic of Serbia, in observed period, took place on 158 thousand of hectares in average, and had downward tendency *(Table 2)*. In the last year of observed 5 year period (2008), areas in use have shown decrease for 6,4%, comparing to 2004. Structurally, production of beans was mostly represented, taking place in 14,4% of total of areas in use in vegetable production. Then, significantly represented as following cabbage and kale (13,5%), tomato (13,1%), onion (12,3%) and paprika (12,2%).

Vegetable production is branch of agriculture with great importance in Serbia, which allows gaining high production output on relatively small area. Biggest producers are located in north part of Serbia and in central and south parts as well. Vegetable production in Republic of Serbia is characterized by small number of market orientated producers, insufficient investments in new technologies and equipment, underdeveloped market, as well as insufficient support to measures of agrarian policies[3].

Beside decrease in areas in use, significant problem represents also instability of yield per unit of area. Due to draught, comparing to 2006, in 2007 yield per ha in certain vegetables has significantly dropped. Yield of paprika per ha was 15% less, yield of tomato 18% less, while biggest decline of 60%, comparing to last year, was recorded in beans production.

Vegetable production in Republic is characterized by reducing of used areas what is not followed by more intensive production. Fluctuation in yield per unit of area and trend of decrease in areas in use caused unstable production of vegetables. Fine example should be production of vegetables in EU countries, based on more intensive technical-technological basis, and decrease in areas in use has greater intensity compared to decrease of total yield. Reasons lay in permanent intensifying of production which results in increase in yield per unit of area, which further results in total yield affected on acceptable level.

Significant problem of domestic vegetable production is dependency on weather conditions, or in other words lack of irrigation systems, which represent one of the crucial elements to stable production. In order to reach high yields of adequate quality in vegetable production, it is necessary to irrigate. All vegetables demand higher levels of soil humidity comparing to crops, due to under developed root system comparing to ground part of the plant, which transpires high amounts of water. Beside that, vegetables have high percentage of water in tissue. Most of the vegetables have under developed root system with low suction power, so it can use water from the soil only when soil is damp enough. Usually root develops in surface soil layer, where reserves of water are low and unstable. Disproportion between ground part and root system is great, with rate going as far as 10 to 26 parts of surface mass to one part of root mass[4].

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By increasing irrigation system capacity, it is possible to ensure increase of yield per unit of area, which should along stoppage of decline of areas in use, result better stability, and then increase of total yield as well[5].

Impacts of global climate changes and possibilities of adaptation - Different precipitation rate through years, and unfavorable timing in period of vegetation mostly affect yield quantities, and stability of crop farming and vegetable production. In climate conditions with uneven precipitation rate and schedule, such in Republic of Serbia, production output stands in directly dependent relation to weather conditions. Irrigation as agrotechnical measure presents one of the ways to mitigate negative impact of global climate changes.

Following benefits result from application of irrigation in production process[6]:

- Irrigation has major inflence on increase of the yield, production, and intensified agricuture production.
- Beside increase of yields in crop farming production, especialy with industrial plants, production of vegetables is intesified, ie. profitability of bussiness increases.
- Production-tehnological and economic integration is established between production of vegetables and vegetable processing, by which greater economic efficiency is achieved in bussiness.
- Yields of main field crops with irrigation systems are twice the yields of main field crops without irrigation systems.
- Changing sowing structure in favor of vegetables and idustrial plants in the irrigation system, results in much higher yield , and notable surplus of products.
- Production value of main field crops per ha in irrigation is in average 2,06 times the value of production in dry farming.
- Profit per ha in production of main field crops in irrigation is 2,01 times higher in comparison to profit achieved in dry farming.
- Profitability rate of investment increases from 3.0% to 18.4%.
- Labour productivity in production of main field crops in irrigation system is higher 1,6 times for wheat, 2,4 for maize, 1,9 for sugar beet, 2,4 for sunflower, 2,7 for soy, measured in realized production per ha per hour of total labour.
- Investment in irrigation is investment in higher production of high quality food, more economic and profitable production, higher profit and earnings.

Global climate changes will have different impact on various agriculture plant species. Also, certain regions, beside optimum level of agro-ecological conditions for agricultural production, have insufficient precipitation depending on a year. Lowland areas in Vojvodina, north part of Serbia, illustrate this being impacted by unstable, unpredictable, and varying rainfalls during vegetative period, especially from June to August. Depending on drought intensity, yields of maze for instance could decrease up to 50% compared to yields in irrigation. In years of extreme drought, yield of maize could decrease up to 80%[7].

Soil in irrigation system comes in rather small percentage, compared to total areas on which agricultural production in Republic of Serbia takes place. In Europe irrigation systems are represented in average on 30% of arable land. According to Vasić (2008) in countries surrounding us almost 1/3 of arable areas are irrigated. Romania irrigates 2,3 million ha, Bulgaria 1,2 million ha, Greece 1 million ha, Hungary 260.000 ha and Albania 390.000 ha[8]. In Serbia is around 4,2 million ha of cultivated area. Irrigation systems are installed on 190.000 ha or 4,5% of cultivated area, from which only throughout a year 75.000 ha is used, which represents 1,8% of total cultivated area. However, according to some other estimates, in 2007 mere 28.000 ha was irrigated or 0,7% of cultivated

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areas, which puts Serbia on last place in Europe. Just for comparison, in world only 250 million of ha is under irrigation systems from 1,5 billion ha of total cultivated land, or 17% of areas. Never the less, on these areas is produced 40% of total food production in the world, which once again underlines significance that water has for whole living species.

Beside irrigation systems, significant measure for lessening impacts of global climate changes represents building of field protective belts. Global changes do not impact only physical processes, but biochemical processes as well. These processes are more or less inter-dependable as we get closer to the soil where solar energy is: 1) turns to organic matter via photosynthesis; 2) is consumed on water evaporation from soil, or plants; 3) is consumed on air heating; and 4) transformed into long wave radiation. In these transformations of energy, soil with its physical, water, chemical, and microbiological characteristics greatly defines heat or water balance of earth-plant-atmosphere system. Any violation of rather sensitive balance of this system leads toward changes in heat and water balance, which represents sort of soil response on any kind of human uncontrolled action[9]. However, changes in heat and water balance of soil can be done in controlled manner, for instance by planting forest belts, by irrigation or by changes in soil characteristics via any of agro-technical measures. By planting field protective forest belt in areas where soil hardly manages to keep moistness, it is possible to reduce evaporation for up to 20%, which significantly saves water reserves. With field irrigation, it is possible to change these balances to a level when local circulation of air occurs between it and adjacent fields that aren't irrigated. Sure enough that change in stated balances can occur on regional and global level as well.

Global climate changes will bring uncertainty to great number of crop and vegetable producers. Increase in areas under irrigation systems represents imperative to stable production. This problem requires systematic work, in other words, greatly intensified subsidizing and funding of producers by Ministry of Agriculture according to their needs, and all with intention of achieving stable production.

CONCLUSIONS

Crop and vegetable production in Republic of Serbia is characterized by fluctuation of yield per unit of area, and trend of decrease of areas in use, which contributes instability of total yield.

Great problem of local crop and vegetable production is its dependency on weather conditions, precipitation rate and schedule. Increasing capacity of irrigation systems it is possible to ensure increase of yield per unit of area, which would beside stoppage of decline of areas in use, cause stabilization and further increase of total yield.

Part of areas that are under irrigation system in Serbia stay rather low and comes 1,8%, while same areas under irrigation systems in Europe take part with 30% of total areas.

To lessen impacts of climate changes, beside irrigation, field protective belts are significant since they enable to preserve large quantities of water.

Therefore it is necessary to make strategy of increase of areas in irrigation system. It is important to mention that irrigation was used as supplement agro-technical measure up to the emergence of global climate changes, while in the future it will represent mandatory measure that will surely have great impact on results of crop and vegetable production on the territory of Republic of Serbia.

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APPENDIX

Table 1 - Crop farming production in Republic of Serbia (2004-2008)

	Species	Harvested area (000 ha)	Structure of production (total=100%)	Yield	
				Total (000 t)	Per ha (t/ha)
Cereals	Maize	1.213	63,2	5.947	4,9
	Wheat	557	29,0	2.120	3,8
	Barley	99	5,2	319	3,2
	Oat	44	2,3	93	2,1
	Rye	6	0,3	14	2,3
	Total	1.919	100,0	-	-
Industrial plants	Sunflower	183	45,5	384	2,1
	Soy	139	34,6	354	2,5
	Sugar beet	65	16,2	2.922	45,5
	Colza	8	2,0	19	2,3
	Tobacco	7	1,7	11	1,5
	Total	402	45,5	-	-
Resource: Statistical office of the Republic of Serbia, Belgrade, calculation by authors					

Table 2 - Vegetable production in Republic of Serbia in lines of production (period 2004-2008)

Species	Harvested area (000 ha)	Structure (total = 100%)	Yield	
			Total (000 t)	Per ha (t/ha)
Beans	23	14,4	39	1,4
Cabbage and kale	21	13,5	296	13,6
Tomato	21	13,1	174	8,4
Onion	19	12,3	134	6,9
Paprika	19	12,2	155	8,0
Melons and Watermelons	16	10,5	250	15,1
Peas	13	8,2	36	2,8
Cucumber	9	5,6	63	7,1
Garlic	9	5,5	25	2,9
Carrot	8	4,9	65	8,5
Total	158	100	1.237	-
Resource: Statistical office of the Republic of Serbia, Belgrade, calculation by authors				

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STUDY ON QUALITY OF RAW MILK BETWEEN 2007 2009 IN CONSTANTA COUNTY

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Key words: *raw milk, total number of germ, total number of somatic cells*.

Abstract

Milk is a complex food with high nutriţional value and also an excellent nutrient medium for the development of microorganisms that can contaminate milk the whole pathway. Considering the problems we face in this area, the current study focused on quality control of raw milk. Presentation follows the work situation for processing milk and milk quality evolution during 2007-2009 in Constanta, Romania.

INTRODUCTION

Milk is a complex food with high nutriţional value and also an excellent nutrient medium for the development of microorganisms that can contaminate milk the whole pathway. Considering the problems we face in this area, the current study focused on quality control of raw milk. Presentation follows the work situation for processing milk and milk quality evolution during 2007-2009 in Constanta, Romania.

MATERIAL AND METHOD

Study followed monitoring the microbiological quality of raw milk analyzed during the 2007-2009 milk collected from dairies, the collection and individual holdings of Constanta county area. Making its determination made in food microbiology department of the Sanitary Veterinary Laboratory Constanta County.
In the period 2007-2009 were analyzed in 2825 samples, some were part of the National Strategic Program and the other part was done at the request of unity in the program's self-production units. Samples were derived from milk processing units and from private vendors who sell food products in markets.
Samples for microbiological examination has been carried out by veterinary inspectors state, with experience in this activity, subject to procedural rules required under the laws in force.
Each sample was harvested individually by labeling, package separately and sealed to prevent its replacement. The seal is placed on the evidence mentioned in the minutes of harvesting.
During 2007 2009 in Sanitary Veterinary Laboratory Constanta County has analyzed 2825 samples divided by years as follows:

- Year 2007 - 196 raw milk samples from private producers, milk raw material of 203 samples of milk processing units, 4 samples of milk raw material milk collection centers
- Year 2008 - 133 raw milk samples from private producers, milk raw material of 205 samples of milk processing units, 2 samples of milk raw material milk collection centers
- Year 2009 - 1872 milk samples for the private producers, milk raw material of 206 samples of milk processing units, 4 samples of milk raw material milk collection centers.

Microbiological control of raw milk in Constanta county area was done by evaluating the following parameters: total number of germ - NTG / ml and the number of somatic cells NCS/ ml. NTG was used to determine

horizontal method for counting micro-colony counting technique at 30° C, (SR ISO 4833:2003) and to determine the SCN of milk raw material used microscopic method (according to SR ISO 13366 1:1998) and fluoro method cytometric, a rapid method for counting of somatic cells with MK2 model's Somascop.

RESULTS AND DISCUSSIONS

In 2007 a total of 403 analyzed milk samples of raw material. These samples were collected by state inspectors veterinarians both in the strategic program of 280 samples and 237 samples in the seif. These samples were analyzed to determine the total number of germ - NTG and to determine the number of somatic cells / ml - NCS by the above methods.

Assessment of microbiological parameters was made in accordance with the legislation in force in 2007. So confrom current legislation, the corresponding samples were with a load of NTG <1.000.000 at / ml and NCS < at 400.000 / ml.

Table 1 Results of raw milk samples in the year 2007

Sample origin	NTG/ml		NCS/ml	
	Corresponding samples	Uncorrespunding samples	Corresponding samples	Uncorrespunding samples
Number of Milk processors	53	150	166	37
Milk coellecting centres	-	4	2	2
Dairy farms	29	167	135	132

In 2008 there were 340 samples analyzed milk raw material. These samples came from the 195 samples taken for strategic program and the 145 samples taken for seif.

Table 2 Results of Raw Milk Samples in the year 2008

Sample origin	NTG/ml		NCS/ml	
	Corresponding samples	Uncorrespunding samples	Corresponding samples	Uncorrespunding samples
No of Milk processors	49	156	186	27
Milk collecting centres	1	1	2	-
Dairy farms	18	115	125	8

In 2008 legislation in force requires that samples are corresponding with a load of NTG with at <1.000.000 / ml and of SCN with a load at <400.000 / ml.

Table 3 Results of Raw Milk Samples in the year 2009

Sample origin	NTG/ml		NCS/ml	
	Corresponding samples	Uncorrespunding samples	Corresponding samples	Uncorrespunding samples
No of Milk Processors	109	97	157	46
Milk collecting centres	-	4	-	-
Dairy farms	1180	492	1378	154

In 2009 the total number of samples analyzed milk samples in 2082 were raw materials. These were divided as follows: in the strategic program of - 320 samples and the - 1762 self-evidence. When România to the EU countries of raw milk microbiological evaluation was done by European standards. These conditions are: NTG at <100.000 / ml and the NCS with <400.000 / ml.

Study comparing the three years is noted that the number of samples analyzed, both in milk processing establishments and in case of individual holdings increased significantly with Romania's EU accession and implicitly along with the implementation of European legislation. Comparative studies are presented in tables 1,2 and 3.

CONCLUSIONS

In the period under study, they examined a total of 2825 milk samples collected from raw material units within the county of Constanta. Of these, 1186 (41,9%) samples were inadequate to NTG parameter and the parameter 306 (10,8%) NCS. After Romania's EU accession number of milk samples analyzed material progressively increased from one year to another in case of milk processing enterprises and private holdings.

Between 2007 and 2008 the number of inadequate samples was higher than those

corresponding to attempt NTG in all units from which samples were harvested. In 2009, the greatly increased number of milk samples from raw material private holdings. This was due to implementation of European legislation. Besides the increased number of samples has improved significantly and milk quality.

In terms of determining NCS-ului it can be concluded that the physiological status of dairy cows is appropriate, considering that 90% of the samples analyzed had adequate results.

To improve the microbiological quality of raw milk is necessary to enforce the rules of hygiene required by HACCP program unit, and training of personnel working in units of production and milk processing.

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THE SIGNIFICANCE OF ALTERNATIVE FUELS IN AGRICULTURE IN TERMS OF GLOBAL CLIMATIC CHANGES

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Key words: *Climatic changes, agriculture, environment, alternative fuels*

Abstract
Mitigation of climatic changes implies some activities designed in a way to slow down and reduce total effect of climatic changes. In series of these activities, very important role have cleaner productions, so called „green economies", through which is realized reduced participation of anthropogenic factor in ecosystem health disturbance and provide further economic development of a man, which is not in conflict with the environment. Therefore is important that each gesture toward the production of alternative fuels aims to support positive development of agriculture, while it reduces or eliminates, in the same time, existing pressure on bio-diversity, water and soil. The goal of the paper is to point out that, except obvious energetic effects, the alternative fuels got and used in agricultural production have a significant role in the environment preservation. In this paper were used reviewing methods of domestic and foreign literature, arrangement and analysis of collected data.

INTRODUCTION

There are evaluations that the agriculture emits directly around 9% of total GHG quantity [10]. This research goal is to point out to the consequences of harmful effects, which modern agriculture has on the environment, as on local, as well as on global scale. We are also trying to indicate on the fact that agricultural sustainability can be achieved by introducing the alternative fuels into production processes of all agricultural activities, like as by activating the renewable resources from the agriculture, which can be used for production of such fuels.

MATERIAL AND WORKING METHODS

In this paper was described the effect of modern agriculture on global climate changes and significance of fossil fuels substitution with alternative forms of energy. The paperwork is structured in two parts. In the first part, under title "Condition and tendencies of harmful emissions in agriculture in EU 27 countries", is given a review of agriculture's and other sectors' participation in total harmful emissions in ten-years-lasting period on the level of EU 27 member-countries. In the second part, "Opportunities and significance of bio-fuels production from agricultural resources in the Republic of Serbia" is given the review of potentials and significance of bio-fuels production out of biomass, i.e. agricultural production of the Republic of Serbia, along with use of relevant domestic literature (data in domestic publications which refer to production potentials of alternative fuels in agricultural sector of RS). Special importance was given to biomass potentials, because they were also the biggest. In the paper were used reviewing methods of domestic and foreign literature, arrangement and analysis of selected data.

RESULTS AND DISCUSSIONS

The modern agricultural practice realizes both negative and positive effect on the environment. While on the one hand, it sustains natural balance in eco-system, by growing some plant kinds and animal species, on the other hand it creates harmful products by various activities. Those negative effects include polluted waters and land by nitrates, phosphate compounds, pesticides and pathogens, degradation of habitats and loss of the species. The agriculture emits massive quantities of „glass house" gasses. Some of those emissions were local, small and relatively rare, while others permeate in some forms of production and were represented on global scale.

Condition and tendencies of harmful emissions in agriculture in EU 27 countries. Data of International Panel for Climate Change/IPCC (2007) showed that direct emissions in agriculture had increased

for 27% in period 1970-1990 [7]. Only in EU 27 countries in 2006, the agriculture was significantly contributed to increase of „glass house" gasses emission. However, by combustion of fuels, but also other activities, the agriculture has participated with 10,2 % in total net emission of harmful gasses of these countries, where had created 1,7% net and 1,6% of total gasses emission, by combustion of the fuels [10]. Except fuel combustion, the use of nitrogen compounds in agriculture does strong pressure on eco-systems. There comes to deposition of acid substances in the ground and in waters, which causes changes in land structure and additional harmful effects on the crops and water eco-systems. According to data of European Environment Agency in 2006, the agriculture directly emits around 9% of total GHG, which is for 1,4%% less in regard to those in 1990 [10]. Out of that, 5% of the emission is nitrogen - oxides, which appear by using nitrogen mineral fertilizers and by exposition of organic fertilizers, while around 4% of the emission is methane which appears as a consequence of livestock (ruminants) digestion, as well as by manure exposition (Table 1).

Table 1: Greenhouse gas emissions by sector, EU-27[10]

Greenhouse gas emissions by sector, EU-27 (%, based on data in million tonnes CO_2 equivalent)		
	1990	2006
Total emissions	100	100
Energy use excluding transport	62,8	60,4
Transport	14,0	19,3
Agriculture	10,6	9,2
Industrial processes	8,6	8,1
Waste	3,9	2,9
Solvents / other	0,2	0,1

Source: [10]

The evident fact is that, in last several years, the EU has been at the head of a battle against the climatic changes. The member-countries set aside significant assets and try hard to decrease GHG emission in different sectors.
The data in the table point out to a fact that the agriculture of the EU is among three the biggest polluters of the environment, so it is more than obvious that such system of agricultural production became unsustainable.
By all appearances, the points in Kyoto Protocol were effective, because there had come to decrease of harmful emissions in all sectors in 2006, in regard to basic 1996, on EU 27 level. However, there are more and more of those who think that the Protocol has set modest goals, which by could not achieve significant changes and that the limits for the biggest polluters should be stricter. Serbia has ratified Kyoto Protocol in 2007[11]. The industrial countries in the world has been obliged by this Protocol, in period 2008-2012, to decrease their emissions of gasses approximately for 5,2% in regard to a referent year 1990. Developing countries, among which is also Serbia, do not have an obligation to quantificational decrease of GHG emission.
According to the report of the third working group of International Panel for Climate Change (IPCC), among measures which could decrease harmful emissions from agriculture, we can count the following:

- Improved managing the land and pastures in order to increase deposition of carbon in the ground,
- Renewal of arable peat and degraded land,
- Improved methods in livestock breeding and managing fertilization in order to decrease CH_4 emission,
- Improved techniques of nitrogen fertilizers application for decrease of N_2O emissions,
- Purposeful energetic crops in order to substitute fossil fuels by alternative,
- Improved energetic efficiency, which would decrease the energy consumption for 20% etc.

Nevertheless, this group's participants point out that there is no universally applicable list of procedures for mitigation of negative effects in agriculture, but also point out that each package of measures should adjust to practice and kind of agricultural production on local and regional level.
One of the methods for agriculture to harmonize its further development with environment requirements is the production of alternative forms of energy, so called, bio-fuels. The existing trends show that there was achieved important technological progress in using renewable sources of energy. The production costs of energy from these sources decrease very fast and

[10]Total emissions were 5 143 million tonnes of CO_2 equivalent for the EU-27; figures do not sum to 100 % due to rounding.

[11] „Official Gazette of RS" No. 88/07

have accomplished economic sustainability. The most competitive and economically sustainable energy, for time being, is the one got from the biomass, wind and hydro-energy [3].

Opportunities and significance of bio-fuels production from agricultural resources in the Republic of Serbia. The goal of the Republic of Serbia is as following: the proportion of bio-fuels and other renewable fuels in the market should be at least 2,2% [13] in regard to total fuel consumption in traffic, according to energetic content. According to data of the Ministry of Mining and Energetics, energetic potentials of renewable sources of energy in RS are estimated to over 4,3 million tons of toe annually, out of which 2,7 million toe annually is in biomass utilization.

Table 2: Energetic potentials of main crops' residues in the RS

Culture	Area	Yield	Total residue	Residue for applying in energetic purposes
	1000ha	1000t	1000t	1000t
Wheat	484,6	2.156,4	2.156,4	1.012,4
Barley	93	409,2	327,3	199,6
Rye	8,5	14,1	15,5	4,4
Maize	1.259	6.295	6.924,5	1.485,9
Sunflower	186,6	391,8	979,5	333,1
Soya	145	319	638	259,3
Rape	17,6	58	174	35,6
				3.330,3
Total 11.215,2				1.023.000 toe

Source: [2]

As one of the basic resources for bio-fuels production, the biomass from agricultural residues and purposeful energetic crops could be important bio-energetic deposit, but also significant factor in decreasing harmful gasses emission. It should be pointed out that growing of energetic crops requires less pesticides and mineral fertilizers, which are main polluters in agriculture.

Table 2 clearly shows that only by using crop production's residues, which simply burn, could produce annually the energy in amount of 1.023.000 toe[12]. In this way should decrease not only the emission of harmful gasses, which derive from combustion of fossil fuels in various production processes in agriculture, but also save significant assets spent on fuels import.

Use of energetic crops for production of alternative fuels. Except use of the residues, Serbia has potentials to increase areas under oleaginous plants (currently are growing on 668.800ha), and also by organization of sowing structure, to renounce 350.000ha of those areas just for growing of energetic crops. Depending on oleaginous plant's kind, which would grow in this area, the expected production of bio-diesel, as one of alternative fuels, is different and shown in the following table. Described sowing structure of oleaginous plants shows that, depending on culture selection and production capacities, the production in Serbia could amount from 141.750 to 250.600 t of bio-diesel annually, which by would significantly decrease the consumption of fossil fuels.

Table 3: Possibilities for production of bio-diesel in the Republic of Serbia, depending on crops

Structure of sowing	Possibilty of biodiesel production (t)
100 % of rape	212.800
70 % rape + 30 % sunflower	224.140
50 % rape + 50 % sunflower	231.700
30 % rape + 70 % sunflower	239.260
100 % sunflower	250.600
100 % soya	141.750

Source: [13]

Fruit and livestock production as potentials of alternative fuels production. Except crop production, the fruit production, too, represents important resource base for getting alternative fuels. The residues of fruit cutting, as well as replacement of old trees and seedlings with new, could be used in energetic purposes and estimate on around 1.119.300 tons, and their energetic potential estimates on 605.000 toe. Taking into consideration also livestock breeding intensity in Serbia, the evaluation is that usable energetic potential of animal waste is 42.240 toe per a year.

One of the priority programs which induce in draft of „*Development Strategy of the Republic of Serbia till 2015"*, is use of NRSE (new renewable sources of energy) and new energetically efficient and ecologically acceptable energetic technologies and equipment for use of energy. However, although exists significant potential of renewable sources of energy, they are still mostly unused regardless it is about small and relatively simple objects for energy production. Nevertheless, the firm "Victoria Oil" deals with production of bio-diesel. The basic products of this factory are

[12] One ton of oil equivalent amounts 41.868 GJ, i.e. 41.868 milliard Jouls, or Ws., or 11.63 MWh

crude and refined oils and protein pellets. The crude oils are used as a raw material for production of refined oils and bio-diesel, depending on needs. The annual production amounts around 5.000 tons, but the capacities are far more significant, actually 100.000 tons of bio-diesel. Although there are numerous requirements from EU market for bio-diesel repurchase, its production in the factory was suspended. In order to continue with the production of bio-diesel, as well to increase number of such factories in the country, it is necessary adequate and stronger support to development of alternative sources of energy.

CONCLUSIONS

1.The agriculture of the Republic of Serbia has no significant participation in appearing of the climatic changes, but could be important factor in their decrease, through production of alternative sources of energy from own sources.
2.Our country's wealth in biomass is enormous and would completely satisfy needs for alternative energy, and could be made surplus, too. With increased participation of domestic renewable energetic resources and diversification of sources and directions of supplying energy would highly contribute to sustainable socio-economic development of the country, first of all, to sustainable development of our agriculture.
3.There would be opened additional activity for our economy by introducing energetically efficient, economically sustainable and ecologically acceptable technologies for using renewable sources of energy, aiming to decrease the consumption of import energy substances and realize additional production of energy, with significantly lower negative influence on the environment.

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CLIMATE CHANGE, RIVER FLOWS AND THEIR IMMINENT IMPACT ON PAKISTAN'S ECONOMY

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Key words : *Climate Change, river flows, water availability, glacial retreat, economy*

Abstract

21st century is the century of water and most perilous risk associated with the management of water resources is the Climate Change. Climate change is a burning issue of global concern and so are its impacts. Water is a lifeline for an agrarian economy like Pakistan. Since last few decades, climate change has seriously hampered the natural resource management and country-wide water conservation in the country. Major rivers are mainly fed by melt water of mountain glaciers which serve as water banks for fulfilling the water demands of growing population. Water resources of the country are under great stress due to climate variability. Alarming glacial retreat under the abruptly changing climate is resulting into reduction in river flows leading to decline in per capita water availability. This paper confers the recent variation in river flow pattern induced by climate change and its associated socioeconomic impacts. It will also assess the imminent socio-economic impacts of climate change.

INTRODUCTION

Global climate change is expected to hit hard South Asian economies, with greater dependency on agriculture and water resources. It will have serious impacts on monsoon patterns, frequencies and intensities of rain spells on temporal and special scale and melting of glaciers. Unchecked depletion of glaciers will reduce water availability; the communities will either have to adapt to use less water or bring water from farther a field at greater cost; agriculture will be affected badly resulting in low productivity; lower river flows will cause reduction in Hydal power generation. As a result power shortage will affect the economic and social life of the communities (IPCC, 2007).

Climatic extremes lead to change in all components of the global freshwater system. The average temperatures & precipitation are expected to increase in general in many river basins. The increased average temperature of the surface of Earth (15.4°C) may further rise by 1^{o} -3.5^{o} C by the year 2100. During 20th century mean sea level rose by 0.17 meters (approx. 7 inches) and by 2100, it is expected to rise between 0.18 to 0.53 meters or approx. up to 1.75 feet (UNFCCC, 2007).

Pakistan is susceptible to face more intense water needs under projected warming where more than 95% fresh water is utilized for irrigated agriculture (Pimental et al., 1997). Continued flow from the rivers of the Indus Basin fulfills the country's water requirements and sustains hydroelectric power generation capacity. Pakistan is placed in the list of hot spots with high vulnerability to abrupt climate change (Schubert et al., 2007) where anticipated temperature increase is likely to alter the hydrologic cycle; it may reduce water resource availability to a large extent.

The water economy is lifeline for an agrarian country like Pakistan. Climate change shaped by global warming is induced by climate change and their associated significant impacts on national economy. This effort endeavours to carry out scrutiny of the melting the glaciers; country's major source of freshwater resources. With a very low natural resource base, Pakistan is facing the challenge of meeting the water needs of a mounting population. Water scarcity and power crisis are major concerns associated with the worsened water situation (Piracha & Majeed, 2008).

The current research activity involves the analysis of river flow pattern in Pakistan under the changing climatic conditions. It will discuss the regional experience of extreme weather events secondary information available on the interface of various national and international organizations involved in managing river flows and climatic change. At the national level, most of the available data relates to Pakistan Meteorological Department, Ministry of Environment etc as well as the interrelated research articles. Available information has been analyzed to assess in general the impact of climate change on river flows in Pakistan.

MATERIAL AND METHOD

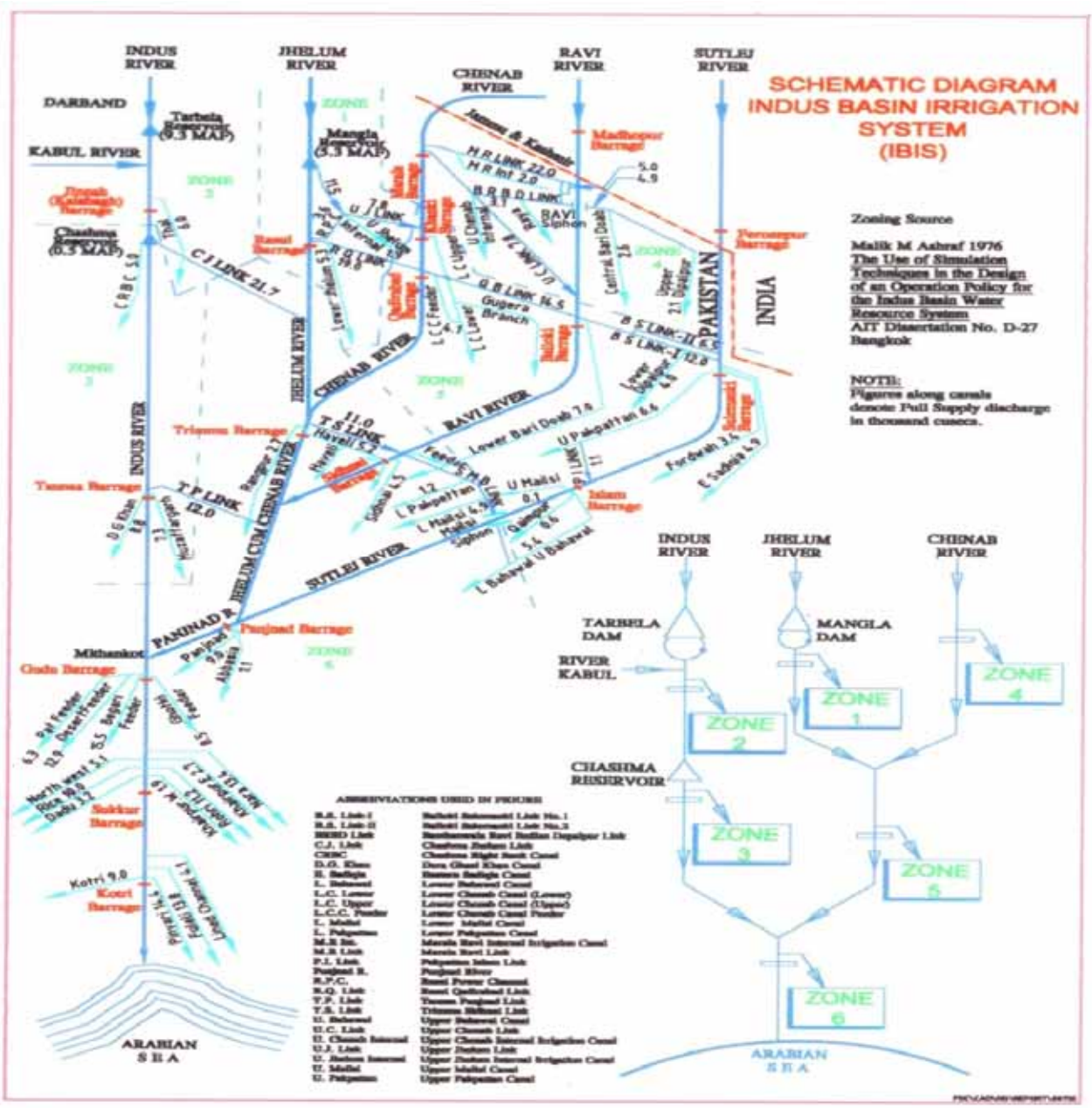
The reports of different organizations including Asian Development Bank, World Bank, NDMA, FFC, IPCC, UNFCCC, UNEP, etc. and different government departments of Pakistan including Federal Flood Commission (FFC), National Disaster Management Authority, etc. and relevant publications of scientists were collected and reviewed keenly in order to extract the secondary data and requisite information in order to elaborate the variables under consideration and to further workout the correlation among same variables.

Climate change is a dynamic environmental change at a massive scale in the form of alterations in precipitation, temperature and weather patterns due to anthropogenic emission of greenhouse gases into the atmosphere (UNEP, 2008). 4th Assessment Report of IPCC-2007 predicts that during this century (21st century) climate change will put great stress on fragile ecosystems and lead to water and food shortages. River flows are the main source of water supply in Pakistan for fulfilling the domestic, industrial and irrigation water needs of the people. Annual water availability of all the major rivers is 142 MAF whereas the annual canal withdrawals are 104 MAF. Water availability at farm gate is 106 MAF comprising 62 MAF of surface water and 44 MAF of groundwater (GOP, 2008). The Indus River system supports the agricultural water supply for a population of 130 million people besides contributing about 45% of the electrical energy for Pakistan (Jilani et al., 2007). A schematic diagram of Indus river system is presented above (Tariq, 2009).

Natural resources like agricultural land; water and forests etc sustain Pakistan's rural population estimated over 60 percent of total population. Of the estimated environmental degradation cost of Rs. 365 billion per year (equal to 6% of GDP), 50% is attributed to illness and premature mortality caused by air pollution, 30% to waterborne diseases due to inadequate water supply, sanitation and hygiene whereas remaining 20% to reduced agricultural productivity due to soil degradation (World Bank, 2006).

Over the 20th century, global average temperature increased by 0.74°C and comparatively warming of land areas was more than the oceans. Future predictions suggest that temperature in south Asian region will increase from 0.4ºC to 2ºC in the year 2070 (IPCC, 2007). In Pakistan, temperature increases are attributed to excessive deforestation and desertification. Summer temperatures of May and June have significantly increased during the four decades and particularly so during the warmest decade of 1990-1999. A general cooling by 0.1 to 0.3˚ C in rural towns and a warming of 0.7˚ C in cities was observed during this period besides an increase in

precipitation at a number of locations by 10 to 30%. An overall increase in precipitation of 44% at Quetta, 35% at Islamabad, 39% in Lahore and 37% in Peshawar was noted whereas a decrease of 38% in Karachi (Beg, 2006).



Pakistan is at increased risk of flooding, erosion, mudslides and GLOFS (Glaciers Lake Outburst Floods) where the intensification of monsoon activity, alarming glaciers retreat, and/ or synchronization of both is likely to result in natural disasters particularly in northern areas. Himalayan glaciers are the main source of country's water resources and their depletion will jeopardize the livelihood of millions of population. The acute water shortage will result in longer drought and land degradation by 2050s (UNFCCC, 2007).

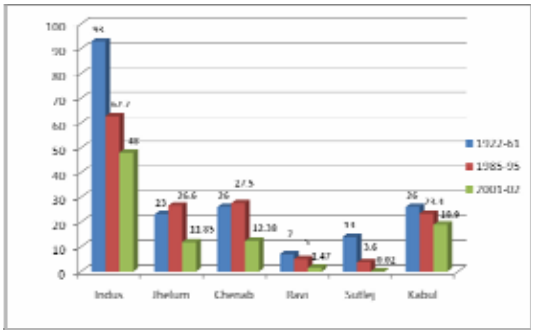
The impacts of climate change may exacerbate the economic losses, poor law & order situation in Pakistan. There is a danger of deterioration of social structure which ultimately will compel the masses for migration to relatively safe and rich locales, states or nearby countries. The conflicts on

trans-boundary water distribution may lead to international war (Schubert et al, 2007).

Flow of many rivers in the Hindu Kush-Himalaya is dependent upon the glacier melt during the summer season (Barnett et al., 2005). There is likelihood of disappearance of these glaciers due to rapid glacier melt caused by the higher temperature and as a result river flows are likely to decrease in many regions (IPCC, 2007).

Pakistan is has all kinds of resources, especially the water resource. The Indus Basin system in Pakistan comprises of the main Indus River and its five tributaries namely Jhelum, Chenab, Ravi, Kabul and Sutlej joining the Indus from the east. River inflows are generated by glacier melt, snowfall, rainfall and runoff which play their role at different scales of time and area. Indus River system, being the major water source, is the lifeline for country's development. Six main rivers supply water to the entire Indus Basin System. The rivers have their origin in the higher altitudes and derive their flows mainly from glaciers/ snowmelt and monsoon rains. Pakistan's glaciers namely, Siachin, Hispar, Biafo, Batura, Baltoro, Barpu and Hopper etc are the greatest collection of glaciated land on the surface of earth (FFC, 2008).

Indus River flow is mainly generated through glacier melt whereas Chenab and Kabul rivers contain combined water from glacier melt and snowmelt. Jhelum River is mainly fed by snowmelt and rainwater under summer monsoon system. Glaciers contribute 60-80 % in generating the total flow of River Indus, upstream of Tarbela Dam and 30-50% for River Kabul. Rainfall contributes 30-35 % in generating the total flow of River Indus upstream of Tarbela Dam, with 65% for River Jhelum above Mangla and 20-30% for River Kabul. Snowfall contributes 5-10 % in total flow of River Indus upstream of Tarbela Dam with 35% for River Jhelum above Mangla and 20-30% for River Kabul (PANCID, 2008). Variability in flow pattern of major rivers in Pakistan is presented in Figure 1.



Data Source: [Jilani et al., 2007]

Figure 1 Historical Reduction in River Flows (in MAF) of Pakistan

It is obvious from the above stature that River Kabul has also undergone a reduction of around 27% over the period from 1961 to 2002 while flow of three major rivers i-e river Indus, Jhelum and Chenab has decreased around 50% due to melting of their feeding glaciers and variations in rainfall & snowfall pattern caused by consistently warming climate during the same period. In Pakistan, Ice cover of Batura glacier had reduced from 98 km2 in 1992 to 81km2 in the year 2000 whereas ice-free patches had increased from 25 km2 in 1992 to 42km2in the year 2000. There is decrease of about 17 km2 in Batura glaciers during the period from 1992 to 2000. Biafo Glacier, the 3rd largest glacier in the Karakorum is situated in the Baltistan area of Ladakh.This glacier feeds Barldu River, which joins the Shigar River falling ultimately into the Indus River. Snow and ice cover measured 92.807 km2 in 1992, had reduced to 86.25 km2 in 2002. Rate of retreat of Siachen glacier is 31.5m per year (Jilani et al., 2007). Different glaciers feeding in Chenab River have retreated at the rate of 6.81 to 29.78 m/year (Bajracharya et al., 2009).

As a result of decreased fresh water availability in rivers and growing population, per capita availability of water in Pakistan is continuously decreasing since 1951. In 1951, against the population of approximately 34 million, about 5260m^3 water was available per person to meet this annual demand. Gross per capita water availability declined to 2200 m^3 in early 1980, followed by further decrease up to

1350 m^3 in 2001. In 2010, around 1100m^3 per-capita water was expected to be available to a population of above 167.72 millions. For 2025, decline in annual per capita water availability has been predicted up to 858 m^3 (Ahmed et al., 2003).

Pakistan experienced the worst drought of the history from 1998 to 2002 triggered by the history's strongest El Nino event. Baluchistan, Sindh and Southern Punjab were the worst hit areas where thousands of animals died, thousands acre of orchards were badly damaged and a large number of people migrated to neighbouring regions putting enormous pressure on natural resources of less affected areas. Worst flood of the 20th century in River Jhelum was observed in 1992 followed by history's worst drought of 1999-2000. During the last sixty one years in Pakistan, the total losses ascribed to floods include more than 7,963 deaths in around 100,654 villages affected adversely whereas cumulative financial loss due to past floods exceeds Rs 385 billion (FFC, 2008).

Thatta and Badin Districts of Sindh were seriously damaged by cyclone of 1999 where 0.6 million people were affected besides the loss of 202 lives. Cyclone Yemyin in 2007 hit 26 districts of Baluchistan and Sindh and resulted into widespread losses and damages. Approximately 2.5 million people were affected; 400 deaths were reported including 142 deaths in Karachi. Vulnerable low-lying regions in Sindh allow cyclone surges extend fairly to some distances inland. Intense winds normally accompany cyclones and they cause widespread damage (GOP, 2008).

Lai Nullah has experienced extreme flood years of 1981, 1988, 1997 and 2001. Flood event of 2001 was ever largest among the recorded events and a national disaster. A total of 74 human lives were lost, about 400,000 people were affected, 742 cattle head perished, 1,087 houses were completely and 2,448 partially damaged. Estimates indicate a damage/loss of more than USD 0.25 billion to infrastructure, Government and private property (Ahmed, 2007).

Rapid melting of glaciers may lead to catastrophic flood events known as Glacier Lake Outburst Floods (GLOF). Glacial lakes are potentially very hazardous. In Pakistan, 2420 glacial lakes are identified in the HKH region covering a total area of almost 126 Sq. Km. Among these identified glacial lakes, 52 are declared as potentially dangerous glacial lakes. These potentially dangerous lakes can burst anytime and cause flash floods due to which continuous risk prevails for the downstream inhabitants. Himalaya's glaciers are retreating on faster rate that may trigger GLOF phenomena threatening the life and property of people inhabiting downstream. Recent landslides in Hunza Valley have created an artificial lake stretched in reach of 11.5 kilometers with 220 ft depth along the course of Hunza River and downstream locales which are under the serious threat of dam burst failure (GOP, 2008).

According to National Institute of Oceanography (NIO), Pakistan, the sea level at Pakistan's coastline shows an increasing trend of 1.1 mm/year which is well within global average range of 1.7±0.5 mm/year for the 20th Century. Coastal strips of South and South East Asia are predicted to be more vulnerable to climate change. Inadequate fresh water flows in deltaic region pose major threats to aquatic life of the area. The intensity of sea water intrusion is increased by sea level rise. Sea level rise is also endangering coastal wetlands and mangroves for being hit by extreme tropical cyclones, tsunamis and storm surges etc. In Pakistan, seawater intrusion is swallowing rich aquatic ecosystem of mangroves found in the Indus Delta. These mangroves provide food and shelter during larval stages of the life cycles for some 80% of the commercial fish species caught from water.

RESULTS AND DISCUSSIONS

Pakistan is facing a number of environmental challenges due to accelerated

economic and demographic changes. One of the major implications of the climate change for the country is receding of mountain glaciers, causing reduction in river flows for irrigation, agriculture and other sub-sectors of water like hydropower, fisheries and forestry. This loss of fresh water resources is badly affecting socioeconomic condition of the people through highest price inflation of food grain (wheat and sugar), power load shedding and huge loss to life & property etc besides creating increased sense of insecurity on or after natural disasters and extreme weather events.

In Pakistan, environmental degradation cost is Rs 1.0 billion per day (World Bank, 2006) which is likely to increase significantly due to unproductive natural resource planning and ineffective conservation measures for environment protection. Some people raise the concern that climate changes naturally and the nature will adjust the changes in global climate as it had been in the past. It is true that the Nature has remained quite resilient with climate variations in the past. However, the anthropogenic loads on our environment have substantially increased since the Industrial Revolution. This blemished abuse with the climate has exceeded beyond the natural balance of climate improvement and earth's polluted climate system is losing its natural resilience to cope with the climate variations.

Higher temperatures associated with global warming result into increased glacier melt. River flows are likely to increase in short term due to de-glaciations process but the contribution of glacier melt will gradually decrease over the next few decades due to global warming. Glaciated regions like Hindu Kush-Himalaya and the South-American Andes melt and drain into various rivers, which are regulated by glacier-melt water during the summer season. Higher temperatures are generating increased glacier melt and there is danger of drastic decrease in landmass of these glaciers. Numerical model simulations for Northern Hemisphere glaciers show reductions up to 60% by 2050 (Schneeberger et al., 2003).

Reduction in hydroelectric power generation due to reduced inflows in major rivers has resulted into unbearable increase in electricity bills for poor masses. Shortage of surface waters has increased dependency on groundwater aquifers. As a result, mechanical means of extraction of groundwater involve excessive use of other energy sources. Subsequently costs of alternate energy sources like CNG, petrol oil etc have also increased putting tremendous stress on domestic, commercial and industrial level. Adverse impact of this massive exploitation of society is likely to increase poverty rate which will subsequently further increase environmental degradation besides increasing the vulnerability to climate change.

CONCLUSIONS

Climate change is in general a detrimental outcome of the global warming. In Pakistan, water sector emerge as the most vulnerable to climate change crisis. There are so many hydrological implications of global climate change already evident in the country. The melting of Himalayan glaciers is adversely affected by the global warming and eventually resulting in significant reduction of river flows in the long run & per capita water availability. Subsequently, the people are facing crisis of power load shedding leading to industrial failure, high inflation rates of food grain crops due to the shortage of water supply for human & industrial consumption. Pakistan has also experienced devastating extreme weather events like heavy rainfall, floods, cyclones, landslides, and dam burst disasters resulting into huge socio-economic losses besides loss of human lives.

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CLIMATE CHANGE: AN OBSTACLE TO ACHIEVE MILLENNIUM DEVELOPMENT GOAL OF PAKISTAN

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Key words : *Climate Change, MDGs, Pakistan*

Abstract

Being a party to the United Nations Frame Work Convention (UNFCC), Kyoto Protocol and UN Millennium summit, Pakistan has to fulfill all the obligations of these multilateral environmental agreements (MEAs). Today climate change is the center of the environmental talk due to the severe environmental impacts and increasing concerns of the developed world. Pakistan is also a victim of the negative impacts of the climate change in spite of its negligible contribution to the green house gas (GHG) emissions. Pakistan is an agricultural country that would be supporting 350 million people up to 2050. 67.48% of its population is living is rural space and majority of them earn their livelihoods directly or indirectly from agriculture. Climate change has resulted in water scarcity, changes in land use patterns, increased frequency of drought and floods, changed precipitation patterns, etc. that ultimately affect the agricultural production and hence economy of the country. Regional climatic models showed that the production of major cereal crops has reduced by 15-20% while crop rotation and cropping patterns have undergone severe disturbance. Livestock production is decreasing 20-30% and range lands are over stressed by the scarcity of water and drought like conditions. Forest cover is reducing while Pakistan is already among forest/ tree resource-poor countries. As seven millennium development goals are associated either directly or indirectly with economic growth and up gradation of poor rural masses, the decreasing agricultural condition has put a question mark to achieve these goals.

INTRODUCTION

Climate change is illustrated by change in statistical distribution of weather over long period of time. The United Nations Framework Convention on Climate Change (UNFCCC or FCCC) (1992) and Kyoto Protocol (KP) under UNFCCC aim to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system(1). Pakistan has signed and ratified the UNFCCC and Kyoto Protocol. The Millennium Development Goals(MDGs) were drawn from the Millennium declaration at the end of the earth summit that was adopted by 189 nations-and signed by 147 heads of state and governments during the UN Millennium Summit in September 2000. The MDGs sketch the main developmental challenges that world has to face and set out the targets that have to be achieved till 2015.

Pakistan having one of the oldest civilizations of the world: the Indus valley is a transition economy, location is the South Asia with most important geographical dimensions. Its geographical coordinates are 30 000N and 70 000 E. It has total area of 796,095 Km and a population of 174,578,558. 64% of its population is living is rural space and agriculture is main source of livelihood (2). Agriculture contributes 24% to its GDP and 70% to its foreign exchange. The major part of rural population depends either directly or indirectly on agriculture.

Pakistan is divided into four climatic zones: North eastern Pakistan (that includes northern Punjab and northern sub-

mountainous region), Sub-tropical Continental lowlands (planes of Punjab except northern sub-mountainous part), Sub tropical coastal strip (arid marine region), and Sub tropical continental highlands (extremely arid desert of northern part of Pakistan). Pakistan has two major cropping seasons "Rabbi Season" and "Khareef Season", crop yield in either of two depends upon the river water or rainfall.

Pakistan contributes very little to the GHG emissions as compared with the developed countries or other economies in transition like India and China, but remains severely impacted by the negative impacts of the climate change. Some of the major impacts are land use change, altered cropping patterns, changes in rain fall patterns, increase in CO_2 that has severely affected the agriculture sector. That is, in return having negative impacts on rural economy. So it has become difficult to achieve MDGs under these circumstances.

MATERIAL AND METHOD

Data was collected from different departments including Pakistan Meteorological Department, Water and Power Development Authority (WAPDA), Provincial Agricultural Departments, Statistical Division, Federal Flood Commission of Pakistan and United Nations Development Program for Pakistan (UNDP). The data collected from different sources, for different variables regarding climate change and MDGs was analyzed in an integrated manner in order to workout the correlation between climate change and achieving of MDGs for Pakistan.

RESULTS AND DISCUSSIONS

In Pakistan two-thirds of the total population is rural, as are more than two-thirds of the poor (4). Only half the rural population is farmers and all among them do not possess sufficient land to reach above the poverty line. The other half is rural non-farm. The rural non-farm population, among which poverty is concentrated, produces non-tradable goods and services, meaning goods for which the only market is local one. Farmers spend half of their incremental income on the rural non-farm sector (6-8). Thus, a rise in farm income drives demand for the large, employment-intensive, non-tradable, rural non-farm sector. Agricultural growth in Pakistan has been well below potential over the past several years despite an unusually favorable set of physical resources, including vast irrigated areas. In consequence, rural incomes are growing little, if at all, and poverty reduction has virtually halted. The agricultural GDP growth rate in Pakistan was only 1.5 percent in 2007, significantly lower than the population growth rate (9). Climate change vulnerability is one of the most important reasons for slow growth. Following are the facts caused by the adverse climatic change:

Land Use Statistics

Land use statistics showed that the total arable land of Pakistan has decreased from 31.11 to 30.32 million hectors between the years 1998-2007; while a minor increase in forest area 3.62 to 4.22 million hectors were observed for the same time period (10). In spite of modern means of agriculture, we have failed to provide the food and stuff to the population that is growing at the rate of 2.16 % (11).

Water Availability

There are two main sources of water for industrial and domestic use i.e. river water and melting of glaciers. Indus River is the main source of water for Pakistan. While the average annual flow for the Indus showed that it had decreased from 93 million acre feet in the year 1961 to 48 million acre feet in the year 2002.

It has been estimated that rainfall pattern in south Asian region will change in a range of 5% to 50% by the year 2070. Rainfall pattern will follow a decreasing trend in monsoon shadow zones where monsoon does not reach at present. Also the winter precipitation is expected to decrease in volume. This will probably shift peak river flows from spring to winter in many areas

due to early snow melt with lower flows in summer and autumn (12). Whereas the overall water availability for two main cropping seasons of Pakistan i.e. Kharif and Rabi season has just increased from 122.15 million acre feet to 137.80 million acre feet between the years 1997-2006.(13).

Temperature and Change in CO_2 Concentration

IPCC (2001) data indicates an average increase in temperature of 0.6 °C in 20th century while projects indicate an increase of 1.6-5.8 °C by the end of 21st century. Situation is more alarming in South Asia where the temperature will increase by 3 degrees and up to 5-6 degrees by the end of the century. CO_2 in the air was 383 ppm in 2001 which is supposed to increase up to 550ppm in 2050 (14).

Climate Change and Millennium Development Goals

Pakistan contributes very little to the overall GHG emissions, but remains severely impacted by the negative effects of the climate change. Recent ranking by Maplecroft of the UK places Pakistan at 28th amongst those that will be most severely affected. But since 22 of those countries are in Africa, Pakistan is ranked amongst the top ten outside Africa. Being a predominantly agricultural economy, Pakistan is extremely vulnerable to the climate change. Pakistan is an agriculture supplier that feeds vast populations of its own and of neighboring countries like Afghanistan, as well as the Middle East and several Central Asian Republics.

The agriculture in the whole of the Indus Valley is under threat, resulting in direct and Indirect impacts on agriculture that could cost billions of dollars. This threat translates into direct impacts to over 100 million people and indirect impacts to the entire burgeoning population of 180 million, which is projected to increase to 240 million by 2035(15).

Goal 1: Eradicate Extreje poverty and Hunger

Extreme poverty and hunger exist when income or consumption of an individual falls short of attaining minimum food and non-food need required to perform daily activities of life. Extreme poverty, hunger and malnutrition appear to have increased with the economic stagnation during the 1990s. Indicators on hunger also show a similar increase. While the prevalence of underweight children under 5 years of age increased from 40 percent in 1990 to 41.5 percent in 2000-01, the prevalence of food poverty in term of proportion of population below minimum level of dietary energy consumption increased from 25 percent in 1990-91 to 30 percent in 2000-01.

The increase in poverty may be accounted due to decrease in the agricultural production as in southern Pakistan yields of major cereals are predicted to decline by 15-20% by year 2040 as indicated by Regional Climate Change Models. Moreover, in the northern area minor improvements in yield is due to increased duration of growing period. Livestock production predicted to decline by 20-30%, creating crises in milk, meat and poultry supplies and pushing prices beyond reach of the average Pakistani. Plant diseases, weeds and insect attacks will increase considerably, resulting in major crop losses (16).

Increase in income or decrease in the poverty rate serve as backbone to fulfill the remaining MDGs like: GOAL 2: Achieve Universal Primary Education, GOAL 4 Reduce Child Mortality, GOAL 5 Improve Maternal Health, and GOAL 6: Combat HIV/AIDS, Malaria and Other Diseases.

The poorest part of the society is more vulnerable to diseases, facing high rates of child mortality and poor maternal health mainly due to low literacy rate and unavailability of resources. So as shown by the table, it is evident that by an increase in poverty it has become extremely difficult to achieve the other goals.

Goal 3: Promote Gender Equality and Women Empowerment

When it comes to climate change, population does matter, particularly for countries like Pakistan with an annual growth rate of 2.69 percent (the sixth most

populous country). As poor families struggle to survive, environmental degradation is going to be more pervasive. Long-term sustainable development goals are disregarded in favor of immediate subsistence needs, leaving vulnerable communities, especially women, at the mercy of climate. Increased use of wood for fuel, abusive use of land and water resources, in the form of overgrazing, over fishing, depletion of fresh water and desertification- are common in rural areas of Pakistan. In developing countries like Pakistan, women are already suffering disproportionately; as a consequence of climate change. Local environmentalists estimate that 70 percent of the poor, who are far more vulnerable to environmental damage, are women. Therefore, women are more likely to be the unseen victims of resource wars and violence as a result of climate change. While women are the main providers of food in Pakistan, they face barriers to the ownership and access to land. 67 percent of women are engaged in agriculture related activities but only 1 percent own land. When hit by the negative impacts of climate change, women lose at the same time their livelihood means and their capacity to cope after a disaster. As a result of climate change, domestic chores such as collecting water and firewood become more burdensome and time consuming. As girls commonly assist their mothers in performing these tasks, there is less time left for school or any other economic activity.

The recent data shows that, due to climate change, major crop yield in Pakistan has declined by 30%, employing 43% of the labour forces, majority of them are females (17).

Goal 7: Ensure Environmental Sustainability

Pakistan is among the countries which will be hit hardest in near future by effects of climate change even though it contributes only a fraction to global warming. The country is witnessing severe pressures on natural resources and environment. Pakistan is the 12th most vulnerable country in the world to environmental degradation, would cost five percent of the GDP every year. Climate experts in the country are hinting at severe water scarcity saying that water supply, already a serious concern in many parts of the country, will decline dramatically, affecting food production.

Data processed at the Pakistan Institute of Oceanography shows that sea level rise along Pakistani coast is about 1.1 mm which is resulting in the risk of erosion, flooding, inundation and displacement of wetlands, lowlands and salination of the ground and surface water.

A shift in the location of different biomasses is likely under the changing trends of the precipitation. A change in species composition has also been observed. An increase in the concentration of atmospheric CO_2 has significant impacts on both plants and ecosystems. Temperature and CO_2 interact to affect the photosynthesis and plant growth. Likelihood of the extreme events like floods and droughts is increasing continuously.

In nutshell, climate change could hamper the achievement of many of the Millennium Development Goals (MDGs), including those on poverty eradication, child mortality, malaria, and other diseases, and environmental sustainability. Much of this damage would come in the form of severe economic shocks. In addition, the impacts of climate change will exacerbate existing social and environmental problems and lead to migration within and across national borders of Pakistan.

CONCLUSIONS AND RECOMMENDATIONS

Above sketched picture is really drastic and Pakistan has to fight against climate change as well as against poverty and slow economic growth. Climate change is not such an issue that cannot be fought alone. Pakistan has to raise voice against it at international forums as well as international assistance is required in battle against

climate change. Moreover, Pakistan is required to change its economic, educational and environmental polices. It needs to invest more in research field in order to provide solution to high-stress agriculture. With the help of international assistance Pakistan needs to develop highly trained men power and hi-tech equipment to tackle the emergency situations caused by the climate change. Awareness should be raised among the folks especially in students and farmers against environmental challenges. A practical and long term road map should be prepared for sustainable agricultural growth, saving ecological zones and preparing the masses to fight against climate change challenges.

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ROLE OF EDUCATION IN REDUCTION OF CLIMATE CHANGE NEGATIVE IMPACT ON AGRICULTURE AND RURAL LANDSCAPE

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Key words : *education, agriculture, rural development, climate change, Slovak Republic*

Abstract

Objective of this presentation is to introduce (in a context of approved governmental and resort measures and in a context of training needs research) a system of education and training in connection with problem of agricultural production adaptation to climatic change. Training system focuses on following topics: timing of activities in agriculture, selection of crops and species, control of pests and diseases, effective water management, land management, agricultural activities diversification including renewable energy sources.

INTRODUCTION

Objective of this presentation is to introduce (in a context of approved governmental and resort measures and in a context of training needs research) a system of education and training in connection with problem of agricultural production adaptation to climatic change. Training system focuses on following topics:timing of activities in agriculture, selection of crops and species, control of pests and diseases, effective water management, land management, agricultural activities diversification including renewable energy sources.

MATERIAL AND METHOD

This presentation starts from approved resort documents, from "Lifelong Learning Strategy in Agricultural Resort 2007 – 2013" and from the "Training Needs Analysis in Agricultural Resort" study.

RESULTS AND DISCUSSIONS

There are several expert training institutions and organisations (performing training activities, besides the others) entering the training system within the agricultural resort.

First area involves institutions under the funding function of the Ministry of Agriculture of the Slovak Republic:

- Agroinstitut Nitra
- National Forest Centre - Institute for Forest Consulting and Education Zvolen focuses on training of employees within the forestry.
- Institute of Postgraduate Education of Veterinary Surgeons in Košice deals with further vocational training of veterinary surgeons.

Within the vocational high schools network, secondary level of vocational training in agriculture is ensured by more than 60 vocational high schools with study disciplines focused on agriculture, food industry and veterinary sciences.

Slovak Agricultural University in Nitra with its 6 faculties, The University of Veterinary Medicine and Pharmacy in Košice and Technical University in Zvolen cover the area of university education.

The Slovak Chamber of Agriculture and Food, craft unions and nongovernmental organisations focusing their activities on rural development also contribute to the training within the agricultural resort.

Agroinstitut Nitra, state enterprise belongs to crucial subjects in a field of lifelong learning which help to increase the competitiveness of companies and individuals on a base of improving the competence and knowledge level of groups of employees. Improving the competences is a priority and a necessary requirement especially in relation to new technologies, difficulty of agricultural engineering and necessity of reaching high efforts together with preservation of ecological, hygienic and qualitative parameters of production. Competence increase tightly concerns also the adaptation of agricultural production to the climatic changes running.

Agroinstitut Nitra, state enterprise with more than 40 years tradition is among the most important training institutions in a field of vocational training within the agricultural sector. Following the priorities and needs of the Ministry of Agriculture, the training is primarily focused on the implementation of EU policies and regulations into the agricultural practices, sustainable rural development, renewable energy, the production quality and safe food and more.

In 2008, there has been a conclusive increase in the number of graduates caused by the necessity of training aimed at the implementation of the EU regulations and standards, so called cross-compliance to the agricultural practice. Other training activities for which the interest increased were focused at organic farming and training for work requiring the exercise of professional competence.

Agroinstitut Nitra implements training activities accredited by the Ministry of Education of the Slovak Republic, when the graduates receive a certificate with a nationwide basis.

From the perspective of organizational form, a daily training is the most used form of training, implemented with two forms of termination – the final exam in front of an exam commission and a final test. Agroinstitut Nitra, state enterprise realized annually about 200 educational activities with a number of 9000 participants. Currently there are 80% of the educational activities supported through the Rural Development Program of the SR 2007 - 2013.

In the field of external cooperation, Agroinstitut Nitra, state enterprise participates in international projects dealing with 5, 3 of which are focused on renewable energy sources (RESNET) and effective water management (AQUANET, ECO-DIAGNOSTIC).

Focusing on some important topics like compulsory European regulations and directives or economical aspects of agricultural entities, we realise that the renewable energy sources are among the important tools reducing climate changes progress. In connection with this fact, Agroinstitut developed several training projects focused on renewable energy sources and their usage.

RESNET project (On-line learning modules for renewable energy resources for landscape development) was developed through the *Leonardo da Vinci*, a subprogram of the *Lifelong Learning Programme* to satisfy the demand for an easy access to a complex training material in a field of renewable energy sources.

Project started on 1st October 2008 and it will finish on 30th September 2010.

The main objective is to create the "Institute of Lifelong Learning" for agro-sector employees. The particular aim is to create the on-line learning system focused on landscape development in the area of renewable energy sources (RES). The system will open opportunities for human resources development in agricultural situations. The project plans to complete 5 online modules – Solar Energy, Water Energy, Wind Energy, Geothermal Energy and Energy of Biomass and prepare further study materials in the form of a CD-ROM multimedia textbook with animations, hyperlinks, graphics etc. E-learning methods, ICT devices, LMS system and virtual study space (e.g an EVO system) will be used as educational methods and devices. The modules are being prepared in cooperation with the partners who are

actively involved in the area of education in agriculture and renewable energy sources (RES).

CONCLUSIONS

1.Through flexible training system, Agroinstitut Nitra, state enterprise continually ranks in the current portfolio of education and training activities for foreign projects based on priorities and direction of the agricultural resort.
2.Training activities focused on diversification of agricultural production and renewable energy sources belong to the training priorities.
3.Rural Development Plan of the Slovak Republic 2007 – 2013 is used for training activities creation and implementation.

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STUDY OF GOOSEBERRY VARIETIES PRODUCTIVITY ON NEW CULTIVATE CONDITIONS

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Key words: *gooseberry, variety, yield, cultivate conditions, Republic of Moldova*

Abstract

This article presents the results of our investigations during the 2002-2006 about the gooseberry varieties introduced in the Republic of Moldova, their studies the productivity on new cultivation conditions. According to research conducted established that, as productivity, species can be classified into four categories: low, medium, high, very high. Low productivity was established in variety Grushenca - 1.2 t / ha. Varieties with medium production 3.5 - 2.0 t / ha are: Zenit, Someş, Orlionok, Finik. Productive varieties with high fruit production limit of 5.5 up to 4.2 t/ha are Şcedrîi(5,5), Smena(5,2), Ruski(5,0). Highly productive varieties, with an output of more than 6 t / ha are Severnîi captain, which exceeded the approved varieties (blank) - Donetski krupnoplodnâi(6,8), Donetski pervenets(6,6) and other varieties that : Puşkinski(6,8), Kolobok(6,7), Resistent de Cluj(6,3).

INTRODUCTION

Climate change in recent years have negatively impacted on all fruit species, but mainly on species with shallow roots location, such as strawberries and some fruit bushes that without irrigation, not withstand high temperatures , which passed 50 º C ground.

The root of barberry is better developed than the blueberry. Some roots penetrate more than 2 m in depth, because of this, plants have a greater resistance to temporary drought than other shrubs trees.

Some roots penetrate more than 2 m in depth, because of this, plants have a greater resistance to temporary drought than other shrubs trees. Therefore barberry can be planted on the higher places, and less damp. If the water deficit shrinks sharply fruit size, yield is reduced accordingly [5]. Mineral substances, water and environmental factors are optimal within their favourable action on the running of plant physiological processes and the harvest. If, when the level of these factors do not fall within the optimum, they become a source of stress which causes diseases and physiological disorders. Lack of soil water for relatively short periods of time (2-12 days), depending on the species, has drastic consequences on plants, due to redistribution of water from their tissues and roots [1]. Penetration into deep root system allows a range of barberry environmental adaptation of this culture and a greater resistance to drought of sorts, [6], [7].

MATERIAL AND METHOD

The investigations concerning the productivity and the quality of the goosbery fruits cultivate on the new climaterical conditions were made on the propriety of the experimental field of the Institute of Researches in Horticulture over the 2002 – 2006 years, with the soil type chernozem. The first objectives of the investigations were the multiply the productivity and obtaining high quality gooseberry fruits. There were studied 19 varieties in which entered: Donetski pervenet, Donetski krupnoplodnîi, the plantation distances - 2,5 x 1,00m.

RESULTS AND DISCUSSIONS

We haven't varieties created for our conditions. Varieties introduced new cultivation conditions studied, other than those for which they were created, may be

adjusted differently, may have a higher harvest or fruits may be a better or vice verso. This will determine the outcome of scientific research. Gooseberry is particular about soil moisture and air, especially during the period of flowering and fruit growth is required 400-450 mm rainfall uniformly distributed [3]. Climatic conditions at the amount of rainfall and temperatures that were exposed Gooseberry varieties studied are presented in Tables 1 and 2. Climatic conditions for agriculture in Moldova are difficult and risky. The last ten years have been drought and high temperatures. Drought has affected plants during different periods of development (Table 1 and 2).

Table 1. Climatic conditions, rainfall quantity (mm) in Republic of Moldova

Month	Mean 1891-1980	Mean 1995-2001	2002	2003	2004	2005	2006	Mean 2002-2006
I	**33**	**33**	***16,7***	56,1	87,8	37,9	38,6	47,4
II	**33**	**32**	***1,8***	22,6	97,9	111,4	18,4	50,4
III	**31**	**32**	58,7	***12,4***	31,0	14,8	89,1	41,2
IV	39	43,1	30,6	34,9	28,0	49,5	36,6	35,9
V	52	37,8	***10,4***	20,6	75,0	75,8	97,1	55,8
VI	72	52,6	60,1	21,6	***11,0***	104,8	81,6	55,8
VII	64	61,9	133,4	***17,4***	101	17,6	53,0	64,5
VIII	49	54,0	80,6	27,4	25,6	150,9	67,7	70,4
IX	38	81,1	47,1	52,7	69,6	**4,9**	57,8	46,4
X	34	53,8	84,2	62,1	33,4	**11,0**	***13,6***	***40,7***
XI	42	60,0	76,2	***9,9***	72,3	48,1	***9,7***	***43,2***
XII	36	42,4	***18,2***	38,7	***19,3***	33,6	***1,0***	***22,2***
Sum /an	**523**	**550,5**	**618,0**	**376,4**	**651,9**	**660.3**	**560**	**573**
Sum III-X	**379**	**415,9**	**505,1**	**249,1**	**374,6**	**429.3**	**491,5**	**410**
Sum IV-VI	**163**	**133,5**	**101,1**	**77,1**	**114,0**	**230,1**	**215,3**	**147,5**

Action drought manifested through their influence on fruit size and quality, quantity, production, etc. Annual average rainfall for the years 1891-1980 (523 mm) was lower than the years 1995-2001 (551 mm). Rainfall during the years 2002-2006 in the centre of our country ranged between 376.4 and 660.3 mm (Table 1). Rainfall during the growing season ranges from 249 to 505 mm, and rainfall in the period of flowering and fruit growth until maturity is less than 101-230 mm, which isn't sufficiently to obtain high quality fruit and production. Moisture deficit in critical periods of development of fruit, gooseberry bush and high temperatures in these periods decreases the production of fruit and its quality affects the differentiation of fruit buds and harvest next year. According to data presented in Table 2 the highest monthly average temperatures were set in 2005, since May 16.5 ºC and ending with October, the temperature has dropped below 17.2 º C compared to annual average of 10,1-10,4 ° C, the highest temperature was in July 27.7 º C while the annual average reached values 21,4-22,6 º C. The lowest annual average temperatures were in 2003.

Table 2. Climatic conditions, temperature (ºC) in Republic of Moldova.

Month	Mean 1891-1980	Mean 1995-2001	2002	2003	2004	2005	2006
I	-3,5	-2,5	-1,9	-3,0	-3,8	1,2	-6,4
II	-2,2	1,4	4,9	-5,5	-0,4	-2,7	-2,9
III	2,6	3,6	7,2	1,0	5,4	2,3	2,6
IV	9,7	10,9	10,4	8,5	10,8	10,5	10,9
V	15,9	16,4	17,9	11,6	14,8	16,5	15,6
VI	**19,4**	**20,6**	**20,1**	**21,2**	**19,3**	18,6	19,7
VII	**21,4**	**22,6**	**24,3**	**21,6**	**21,7**	**27,7**	**22,1**
VIII	**20,7**	**21,8**	**21,3**	**22,6**	**21,1**	**21,8**	**22,2**
IX	16,0	15,8	16,6	15,6	15,9	**18,3**	**17,1**
X	10,1	10,4	9,5	9,9	11,4	**17,2**	12,1
XI	4,1	4,0	6,5	5,4	5,2	4,6	6,4
XII	-0,8	-1,9	-4,8	0,4	2,1	1,2	3,3
Mean /an	**9,45**	**10,2**	**11,0**	**9,04**	**10,29**	**11,43**	**10,2**
Mean III-X	**14,50**	**15,3**	**15,9**	**13,9**	**15,05**	**16,61**	**15,29**

Productivity of the gooseberry bush is 1.5-2 kg on the 4-5 years after planting, 3-6 kg/bush - in the coming years, can obtain a haverst-5.8 t/ha, and sometimes depending on the variety-12-15t/ha[2].

Gooseberry is a culture that can provide a substantial profit when the harvest is greater than 2.0 t/ha. Crop varieties with a 4,0-6,0 t/ha are productive ones 2,0-4,0 t/ha - average production and the lowest of 2.0 t/ha - low productivity [4].

Approved varieties in Moldova are: Donetski krupnoplodnâi and Donetski pervenets (Photo 1 and 2).

Research on productivity of gooseberry varieties during the years 2002-2006 allowed to obtain the results displayed in table 3. According to the results presented, yields from the third year after planting was insignificant except Severnîi captain variety, who reached a harvest of 10.6 t/ha.

Photo1.Gooseberry variety Donetski krupnoplodni

Table 3. Studies of fruits production of some gooseberry varieties

Varieties	Production, t/ha , on 3-rd year					Mean t/ha
	2002	2003	2004	2005	2006	
1.Donetski krupnoplodni	-	0,8	7,6	11,6	8,8	**7,7**
2.Donetski pervenets	-	0,8	6,8	8,1	8,0	**6,6**
3.Ruski	1,2	5,1	2,0	5,8	6,4	**5,0**
4.Grushenka	0,2	0,4	1,6	1,7	2,0	**1,2**
5.Zenit	1,7	2,5	3,6	6,2	7,2	**3,5**
6.Ciorni negus	1,4	3,3	2,8	3,8	2,0	**2,4**
7.Kolobok	2,2	6,1	6,8	9,6	7,2	**6,7**
8.Smena	2,3	3,2	5,3	6,5	6,0	**5,2**
9.Rezistent de Cluj	1,3	7,2	7,8	8,8	6,4	**6,3**
10.Captivator	1,7	3,4	8,8	6,8	2,8	**4,7**
11.Somesh	2,6	2,3	3,6	4,0	3,6	**3,3**
12.Orlionok	0,9	4,3	0,8	4,0	3,2	**2,8**
13.Sadko	2,4	2,9	4,4	7,2	6,8	**4,2**
14.Scedrâi	1,7	2,0	8,2	8,4	5,6	**5,5**
15.Lascovâi	0,4	-	3,6	2,4	2,0	**2,1**
16.Pushkinskii	3,4	3,0	3,2	6,0	9,6	**6,8**
17. Severnîi capitan	10,6	10,0	20,8	17,4	14,4	**14,6**
18. Finik	1,7	-	-	4,6	2,4	**2,8**
19.Ledenets	0,4	-	1,2	-	4,8	**2,6**
The limite of variation	***0,2-10,6***	***0,8-10,0***	***0,8-20,8***	***0,4-13,0***	***2,0-14,4***	***1,2-14,6***

Photo 2.Gooseberry variety Donetski pervenets

Thereafter production is growing most varieties except for varieties that have been negatively affected by the new conditions of cultivation. In 2005 the maximum production achieved in most varieties this year but still fell the largest amount of atmospheric precipitation (annual amount of 660 mm and 230 in regular training and increase fruit, currant bush), but were those higher temperatures, which influenced the next harvest with a slight decrease in susceptible varieties under cultivation in November. The conditions of 2004 were favourable and allowed to obtain a maximum harvest - 20.8 t/ha. According to the results obtained varieties studied can be classified into four categories of productivity: low, medium, high, very high. The first concerns categories of variety is Grushenca which bear no moisture deficit, weak fall fruit supplied with water harvested was-1.2 t/ha. Varieties of whom a mid production from 3.5 up to 2.1 t/ha are: Zenit, Somesh, Orlionok, Finik. Productive varieties that have produced fruits from 5.5 up to 4.2 t/ha are Şcedrîi, Ruski, Smena. Highly productive varieties with a higher production than 6 t/ha are: Severnîi captain, Donetski krupnoplodnâi, Donetski pervenets, Puşkinski, Kolobok, Resistent de Cluj.

CONCLUSIONS

Study of the gooseberry varieties introduced in Moldova and the results obtained allowed

to establish that the varieties can be classified as productive in four categories: low, medium, high, very high. The first category refers the variety Grushenca with low productivity - 1.2 t/ha. Varieties which gave a mid-production of 3.5 to 2.0 t/ha are: Zenit, Somesh, Orlionok, Finic. Varieties that have produced fruits in the limit of 5.5 up to 4.2 t/ha are productive: Şcedrîi, Ruski, Smena. Highly productive varieties, with an output of more than 6 t/ha are Severnîi captain, which exceeded the approved varieties (blank) - Donetski krupnoplodnâi, Donetski pervenets and other varieties that: Puşkinski, Kolobok, Resistent de Cluj.

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THE CONTROL OF THE MILK DISTRIBUTED IN SOME SCHOOLS FROM HUNEDOARA CITY BY„MILK AND HORN-SHAPED ROLL"PROGRAM.

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Key words : *milk, quality, sensorial, physic-chemical, pupil*

Abstract
The purpose of this work was monitoring the milk from guvernamental program „Milk and horn-shaped roll" in 01.10.2008 - 01.12.2008 period in three schools from Hunedoara city (School 1, School 2 and School 3). We studied the sensorial and physical-chemical properties of these samples. According to this study, the milk is generally respecting the quality standards.

INTRODUCTION

Milk is the complet food and the best to be assimilated by animal (mamalian) organisms. Milk contributes to growth and development of the organism and supports children health. This „white blood" is recommended to all persons: young or old, healthy or ill etc [1-2].
„Milk and horn-shaped roll" program [3] was a controversed subject since 2002 year untill now. In Romania this program was implemented according to Union Europe – where a similar program developped during 30 years, encouraging milk consumption in schools. Remains the question if this program was accomplished its mission. The first advantage of this program is the decrease of school abandon.
Statistically speaking, children were not very satisfied with this breakfast. The opinions were divided, depending to area (urban or rural), social class, age etc. For the perspective, this program may be replaced by „After school" programs [4-5].
Some nutritionists consider that milk and horn-shaped roll program should be diversified, because the children health nutrition requires also fruits and vegetables.
For the producers is very benefic to be a contracting part of the project because they can sell a constant volume daily. Simultaneously, the producers are bound to deliver a good milk. According to mass-media, the producers frequently infringed the law.
For the school session 2008-2009, there were allocated from the state budget 436.598.000 lei, in other words 125 million Euro approximately. The funds are assigned to those 2.109.000 pupils from the classes I-VIII and to those 308.929 children from the kindergartens with normal program.
A very important aspect concerning the quality of the distributed milk is the keeping procedure. As the milk producers mention, the keeping temperature for the milk should be $20^{o}C$, having in view that the milk is ultra-pasteurized (UHT).

MATERIAL AND METHOD

With the aim of milk analyzing, from the milk destined to children consumption in schools we collected from 10 to 10 days milk samples from three schools situated in Hunedoara.The milk was analyzed sensorial and physical-chemical. Thus, we appreciated the aspect, colour, the consistence, the taste and smell of the milk, for each sample. We determined also the density of the milk, degree of impurity, acidity, grease content, the control of the high pasteurization. There was verified also the mass, packing up, marking of the milk samples, the microbial charging by reductase test. To determin density by areometric method, we used the thermolacto-densiometer

and made the density corrections by adding or subtraction of 0,0002 from the final value for each supplementary degree, or minus degree related to 20ºC. This determination was made only for the temperatures situated in the interval 20±5ºC.The acidity was tested by acido-basic determination of the milk sample with NaOH 0.1N in the presence of alcoholic fenoftalein 0.1%. The acidity calculation (in Thorner degrees) was achieved by the relation:

$$A(^oT)=\frac{\frac{V_{NaOH}}{V_{milk}}\cdot 100}{},$$

where: V_{NaOH} – represents the volume of NaOH 0.1 N used, in ml;V_{lapte} – the volume of milk taken to analyse, in ml;100 – expression factor for 100 ml of milk.

The impurity degree was established by centrifugal method. The grease content of the samples was determined by acido-butirometric method using sulphuric acid concentrated (d=1.817) and iso-amilic alcohol (d=0.81). The samples were centrifugated 5 minutes at 1000 ratations / minute.

The control of high pasteurization was achieved by Dupouy reaction, using peroxide 3% and guayacol 2% and appreciating the developed colour. The microbial charge of the milk samples has been determined by the reductase's test using blue methylene and appreciating the bleaching time.

RESULTS AND DISCUSSIONS

The sensorial analysis of the samples didn't remark deviations from the actual norms. Thus, the milk presented itself as an homogeneous liquid, without visible impurities or sediments, being white with a slight yellow shade, uniform, fluid consistence, pleasant taste and smell, soppy, typical for milk, with a gentle taste of boiled, without foreign taste or smell. It was observed an exception at 10.10.2008, the milk had slightly tartish taste and modified consistency.

From physico-chemical point of view, the analyzed milk presented the parameters according to table 1. Density of analzyed milk (see. fig. 1) was situated in legal admited limits (min. 1.029 g/cm^3) except the samples received from: School 1 at 10.10.2008 (was not determined the density because the milk presented flocons), 20.11.2008 (1.0284 g/cm^3) and 01.12.2008 (1.0284 g/cm^3);School 2 at 20.11.2008 (1.028 g/cm^3) and 01.12.2008 (1.028 g/cm^3); School 3 at 20.11.2008 (1.028g/cm^3) and 01.12.2008 (1.028 g/cm^3).

The acidity (see fig. 2) of the samples generally framed in the legal values, the highest deviation being registered at the samples from the School 1, on 10.10.2008 (A=26^{o}T). Over 20^{o}T were found to the samples coming from:School 1 at 01.10.2008 (A=20.27^{o}T) and 01.12.2008 (A=20.015^{o}T); School 2 at 20.10.2008 (A=20.05^{o}T), 30.10.2008 (A=21.02^{o}T), 20.11.2008 (A=20^{o}T) and 01.12.2008 (A=20.125^{o}T);School 3 at 01.12.2008 (A=20.05^{o}T).

The acidity values under 19^{o}T were registered at the samples received from: School 1 at 30.10.2008 (A=18^{o}T) and 20.112008 (A=18.05^{o}T);School 2 at 01.10.2008 (A=17.05^{o}T); School 3 at 01.10.2008 (A=17.05^{o}T). The values between 15-21^{o}T are considered to be normal for consuming milk [1].

The fat content (see fig. 3) of the analyzed samples varied significantly from the limit mentioned on the package – 1,8%. Values under this limit we registered at the samples received from: School 1: 1.792% (01.10.2008), 1.792% (10.10.2008), 1.79% (10.11.2008) si 1.77% (01.12.2008); School 2: 1.796% (01.12.2008); School 3: 1.79% (01.10.2008), 1.794% (10.10.2008) si 1.76% (20.11.2008). The highest fat content – 1,828% was found at samples received from School 2 at 20.10.2008.

The impurity degree of the milk was in all cases "0" on a scale from 0-3, being considered to be the best quality.High pasteurisation proved to be corresponding in at every analyzed samples. The reductase test situated the milk in the microbiological quality I – corresponding to very good milk quality concerning the microbial charging.

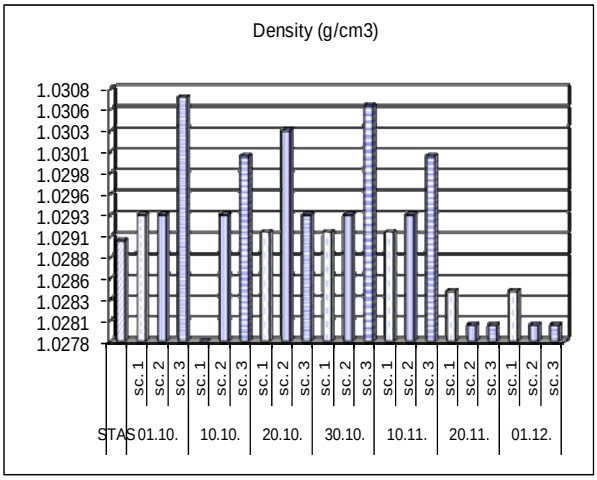


Fig. 1 *– Density of analyzed milk samples*

	STAS	01.10. 2008			10.10. 2008			20.10. 2008			30.10. 2008		
		sc. 1	sc. 2	sc. 3	sc. 1	sc. 2	sc. 3	sc. 1	sc. 2	sc. 3	sc. 1	sc. 2	sc. 3
Density (g/cm^3)	**1,029**	1.0293± 0.0001	1.0293± 0.0002	1.0307± 0.0001	-	1.0293± 0.0006	1.03± 0.001	1.0291± 0.0008	1.0303± 0.0004	1.0293± 0.0008	1.0291± 0.0003	1.0293± 0.0005	1.0306± 0.0002
Acidity (ºT)*	**19**	20.27± 0.134	17.05± 0.05	19.07± 0.08	26,0± 0.173	19,07± 0.35	19.02± 0.296	19,1± 0.114	20.05± 0.0187	19.12± 0.151	18±0.13	21.02± 0.13	19.05± 0.08
Fat (%)	**1,8**	1.792± 0.033	1.816± 0.019	1.79± 0.0244	1.796± 0.032	1.808± 0.026	1.794± 0.011	1.826± 0.016	1.828± 0.013	1.816± 0.005	1.81± 0.007	1.814± 0.011	1.806± 0.008

	STAS	10.11.2008			20.11. 2008			01.12. 2008		
		sc. 1	sc. 2	sc. 3	sc. 1	sc. 2	sc. 3	sc. 1	sc. 2	sc. 3
Density (g/cm^3)	**1,029**	1,0291± ~0.0007	1,0293± ~0.0006	1,03± ~0.001	1,0284± ~0.0008	1,028± ~0.0006	1,028± ~0.0002	1,0284± ~0.0003	1,028± ~0.0005	1,028± ~0.0007
Acidity* (ºT)	**19**	19.15± ~0.81	19.25± ~0.05	19.5± ~0.25	18.05± ~0.014	20± ~0.011	18.015± ~0.35	20.015± ~0.142	20.125± ~0.0005	20.05± ~0.081
Fat (%)	**1,8**	1,79± ~0.032	1,8± ~0.011	1,82± ~0.006	1,8± ~0.012	1,81± ~0.015	1,76± ~0.016	1,77± ~0.032	1,796± ~0.036	1,826± ~0.06

Fig. 2 *– Acidity of analyzed milk samples.*

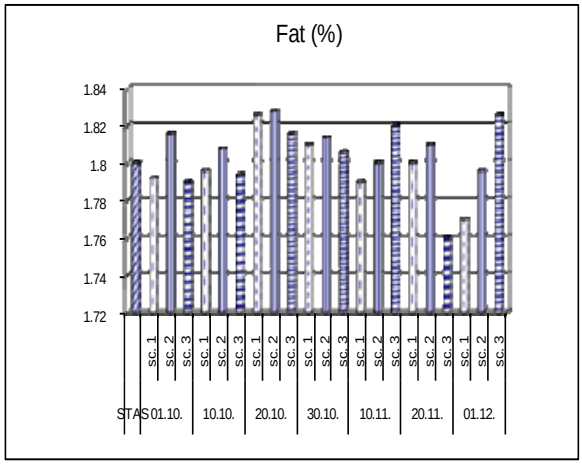
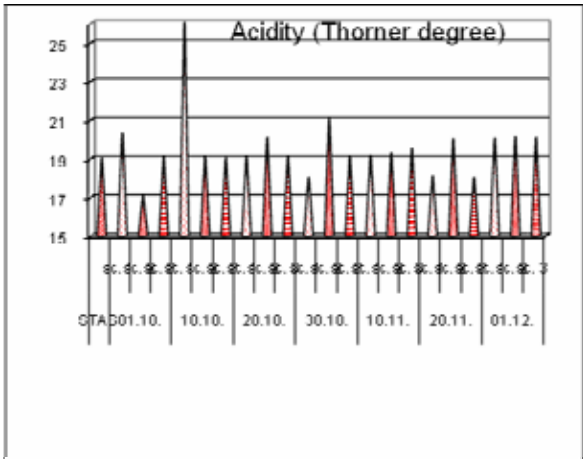


Fig. 3. *Fat content of analyzed milk samples*



CONCLUSIONS

1.From sensorial point of view, the analyzed milk presented normal parameters, according to the actual standards; there was un exception, the milk drawn from School 1 at 01.10.2008;
2.Milk density was situated under admitted limit to 28.571% from the total of the analyzed samples;
3.From chemical point of view we have found also small deviations. We observed at 8 average sample sets a smaller fat content reported to the 1,8% mention from the package, representing 38,095% from all samples. The acidity was situated in the admitted limits with the mentioned exception from 01.10.2009.
4.Concerning the microbial charging, the analyzed milk had a very good quality;
5.The volume of milk in Tetra Pack packages was 200□15 ml;
6.The marking of the samples in the period 01.10.2009-10.11.2009 was according to the actual norms, the producer and distributor being S.C. SIMULTAN SRL; in the period 20.11.2009-01.12.2009 on the packages was written only the distributor SC. SOLE MIZO SRL, the producer missing;
7.Despite the critical articles from the media, we found the analyzed milk from the 01.10.2009 - 01.12.2009 having good parameters, generally situated in the legal limits; of course, there were some exceptions, but not of the dimensions sustained by the media. We can do this statement only for the parameters analyzed in our work.
8.The schools contributed also to the conservation of the milk quality by ensuring their own refrigerating equipments; however on the package was mentioned that the products may be kept at the ambient temperature.
9.Those three scholar units were daily supplied with milk from the distributors, when other educational units were receiving the milk only once or twice in a week (mainly to the countryside).

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PROSPECTS OF DEVELOPMENT OF AGRICULTURE AND RURAL AREAS IN THE CONTEXT OF GLOBAL CLIMATE CHANGES. SUSTAINABLE DEVELOPMENT IN EUROPE - EUROPEAN STRATEGY FOR 2010-2013 IN SUSTAINABLE AGRICULTURE TAKING ACCOUNT OF CLIMATE CHANGE

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***Key words**: sustainable development, rural development, climate changes, farmers*

Abstract

The paper aimed to accentuate the importance of the rural development and the impact of the climate changes on rural development and agriculture. Rural development is one of the most complex issues nowadays focused on achieving a balance between the preservation of rural conditions and the trend of modernization. Sustainable agriculture refers to a long term action which seeks to overcome problems and limitations faced by agriculture and society in general. In this paper we talk about methods and instruments released for the farmers by the European Union for the agriculture and rural development. Achieving the challenge for a sustainable rural and agriculture development can be achieved in terms of adapting to the major current global challenges: global climate changes, drastic restriction of biodiversity species of organisms, processes of degradation, erosion and soil pollution, diminishing water resources.

INTRODUCTION

The issue of rural developement is one of the most complex nowadays, which means „acomplishing a ballance between the preservation of the economic, ecological and social – cultural rural areas, on one side, and the trend of "modernization" of the rural life, on the other side. Rural development is at the confluence between the trend of expansion of urban areas, aggressive development of industry at the expense of the rural areas and the requirement to maintain as far as possible, its current dimensions.
Sustainable agriculture refers to a long-term action which seeks to overcome problems and limitations faced by agriculture and society generally.

MATERIAL AND METHOD

More than 56% of the 27 EU Member States population live in rural areas, which cover 91% of European territory. This gives to the policy of rural development a vital importance. Livestock and forestry remain key factors for land usage and natural resource management in rural areas of the European Union, representing at the same time, a platform for economic diversification in rural communities.
Therefore, strengthening the rural development became a priority for the Union.
Rural development measures can be used in particular to encourage innovation in water management, production and usage of renewable energy sources, protect biodiversity and approaching the attenuation of the climate changes and the adaptation to them and to encourage favorable solution for all parties in competitiveness and environmental protection. To promote the full usage of innovation, a support should be available for innovative operations on new challenges.

European Union rural development policy aimed to solve the problems that our rural areas are facing and exploiting their potential.

European Union agreed in early 2008 the local implementation of The National Rural Development Program (NRDP) and, starting then to today have been attracted funds of over 742 million euro. Only 198 million are money following the project submission for creating and modernization of the farms, renovation of villages, for encouraging tourism activities and the foundation of groups of producers, the rest being given to farmers working in disadvantaged areas as an additional direct payments.

European funds are a relief to farmers in Romania, given that farmers are decapitalized and banks are reserved in supporting this sector. European Union aims to correct the unbalance in European agriculture, knowing that the future agriculture must be a modern agriculture based on agriculture policies that regard also the environmental protection.

Romanian farmers dispose of 8,8 billion euro for the rural development until 2013 trough The Payment Agency for Rural Development and Fishery. The process of accessing the money ensues hardly, in the last three years only about 8,4% of this money actually reached the pockets of the farmers.

Rural development is one of EU priorities, such that over 6 billion euro will finance European agricultural actions trough The European Agricultural Fund for Rural Development following three directions:

1. Improving the competitiveness in agriculture and forestry;
2. Environmental and rural areas protection;
3. Quality of life and diversification of rural activities.

So far in Romania so far 121 was the most requested, over 4,500 farmers submitting applications for funding the scheme which has allocated an amount of 884 million euro. Most of the money were attracted for exploitations modernization, about 122 million euro are at farmers which mean 13,8% of the amount.

2010 will be a peak year for NRDP, because it can be attracted 3 – 4 million euro, if it will provide easier financing.

Thawing the credits is needed, trying to find actions to attract farmers, such as preferential interests, especially since this year the allocation is changing and will decrease with 10% the irredeemable contribution from the European Union.

European Union is concerned that many European regions are threatened by the desertification do to dramatic climate changes in the last 10 years.

Thus, European funds such as EAGGF - Guidance, European Regional Development Fund and European Social Fund (for recovering the less developed areas), supporting funding for:

a) Forestation, diversification, improving stands crops;

b) "Opening" sales markets for forest products.

If forestation (planting and maintenance) are ensured starting at 185 euro/ha up to 725 euro every year, depending on the exploitations type. To protect and maintain forests against fires are given between 40 and 120 euro/ha annually.

Also, keeping in sight the environmental protection, agro – environmental measures allow farmers to benefit by an aid between 100 and 1000 euro/ha, these measures are:

a) Reducing the usage of the fertilizers and products for the plant's health;
b) Conversion of the cropland into grass land;
c) Reduction of the livestock per unit of fodder area;
d) Natural environment protection;
e) Increasing the local species threatened by extinction;
f) Withdrawal on long-term (20 years) of agricultural land for the establishment of natural parks or water protection;
g) Closing down cultivations to allow the entrance of the public for spending their free time and amusement;

h) Training farmers for environmental protection;
i) Improving environmental quality (1500 euro per person per exploitation for 5 years);
j) Animal's welfare (500 euro per year per animal);
k) Usage of the 100% recyclable packaging for food packing.
Common Agricultural Policy - CAP – founded in 1962, is the oldest and most integrated of European policies. But, after 30 years of "honest services", has been proved inadequate to modern agricultural production and trade requirements and it became the subject of some serious reforms.

RESULTS AND DISCUSSIONS

The new CAP reform introduces a new element: adoption and compliance with environmental protection and respect for the rural areas.
The experience created by "mad cow disease", made CAP seek to ensure the European citizen consumers about the safety and quality of supplies and also about respecting the environment.
Thus, was created the European Food Safety Authority (EFSA), which came into operation in 2002 in Brussels, and has strengthened the legal principles adopted in November 2003.
Regulation of GMOs (genetically modified organisms) - information about the presence of GMOs should be submitted in the food chain and kept for a period of 5 years.
All these factors carefully designed in European policies, attempt to reduce pollution by 2020, the risk factors of carbon emissions by 80%.
The Parliament and the European Council created the framework for a cooperation regarding a sustainable development in rural areas, these decisions applying to the countries in European Union and the countries of Central and Eastern Europe. This framework is an actual plan called "Agenda 21".
Achieving rural development and sustainable development can be done by adapting to the greatest global challenges nowadays: global climate changes, drastic restriction of biodiversity species of organisms, processes of degradation, erosion and soil pollution, diminishing water resources.
Global climate changes manifested by increasing average temperature, and rainfall condition changes, have led to an increase of arid areas worldwide, in recent decades,.
After the last Commission report, published in December 2004, emissions of greenhouse gases in the EU in 2002 were 9% lower than in 1990.
EU wants to keep the work with this, so, in March 2005, European ministers of environment have proposed that the developed countries to consider reducing emissions corridors from 15 - 30% by 2020 and 60 - 80% by 2050.
The European Community has limited use of certain hazardous substances such as chloro - fluoro – carbons or CFCs used in aerosols and large refrigeration facilities.
European Agreement concerning the reduction of ozone at ground level requires Member States to meet drastic targets in 2010. It should be avoid to exceed 120 miligrame/m^3 for more than 25 days a year.
To reduce the negative impacts of climate changes is necessary to introduce issues related to climate and climate changes in water resources development agenda at national level. This statement was made at the opening ceremony of the 3rd international conference on climate and water (The Third International Conference Climate and Water), held in Helsinki, Finland, 3-6 September 2007.
Climate Change Conference in Copenhagen which took place in December this year has proved to be a disappointment. The Pact, hardly adopted, requires participating states to reduce emissions of greenhouse gases, "in order" to limit global warming to below 2 ° C - the threshold beyond which climate changes would likely to get out of control. Thus, developed nations could significantly reduce emissions, in a measurable way. Developing countries are expected to limit

their emissions and report the results recorded every two years, with "provisions for analysis and international consultations". The most important result of the conference is that developed countries have agreed to pay 30 billion dollars (21 billion euro) over the next three years and 100 billion dollars (70 billion euro) by 2020, for financing projects in poor states supporting efforts to promote clean energy and adaptation to drought, raising sea levels and other climate changes. EU committed to provide quick initial funding worth 7.2 billion euro (from a total of 21 billion). The amounts would come from different sources, public and private.

CONCLUSIONS

Climate changes may lead to a pronounced increase in poverty and undermine sustainable development, in particular in least developed countries. Efforts to reduce the effects of global climate change may enhance the overall development prospects in part by decreasing the risk of negative impacts of climate change.

On long term, the measures required for prevention and mitigation of climate change include reforestation programs, reducing pollution, restoring and upgrading anti-erosion works and expansion of planning and improvement of sandy soils, etc. However, population education and awareness on environmental protection are major requirements in developing adaptation strategies to climate change.

Sustainable development also requires a better understanding of the climate system, with the ability to predict future climate changes and their potential impact on climate variability, socio-economic and environmental activities.

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THE MOST IMPORTANT ENVIRONMENTAL IMPACT OF THE PRODUCTION OF AGRICULTURAL PRODUCTS

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Key words : *environmental impacts, materials, energy, ISO 14001*

Abstract

Industrial agriculture is heavily dependent on energy, large amounts of water and other scarce natural resources. Reductions in the use of energy, water and other raw materials along with waste minimisation and elimination, whenever and wherever possible, should be highest priority. The most important environmental impact of the production of agricultural products is the use of chemical pesticides and herbicides. This may unintentionally lead to the pollution of soil, water and air, and has negative effects on flora and fauna. As well as the pure environmental issues, safety and health aspects play an important role. For many, the answer is an Environmental Management System (EMS) - a framework for managing environmental impacts.

INTRODUCTION

Many elements of human society and the environment are sensitive to climate variability and change. Several factors directly connect climate change and agricultural productivity: average temperature increase; change in rainfall amount and patterns; rising atmospheric concentrations of CO2; pollution levels such as tropospheric ozone; change in climatic variability and extreme events. [11] Environmental Performance Evaluation (EPE) ensures that any business can continually monitor and improve environmental performance. [3] As well as reducing harmful environmental impacts, an EMS can reduce costs, improve efficiency and give a competitive advantage. [9]

MATERIAL AND METHOD

ISO 14001 is based on the methodology known as Plan-Do-Check-Act (PDCA) PDCA can be briefly described as follows:
1) *Plan* - establish the objectives and processes necessary to deliver results in accordance with the organization's environmental policy;
2) *Do* - implement the processes;
3) *Check* - monitor and measure processes against environmental policy, objectives, targets, legal and other requirements, and report the results;
4) *Act* - take actions to continually improve performance of the environmental management system. The following matrix identifies the environmental effects, distinguished into (raw) materials, energy and (toxic) emissions, during the life cycle of agricultural products: preparation of the soil, sowing and planting, fertilisation, irrigation, crop protection, harvesting, storage and ripening, packaging, transporting, use and waste.

RESULTS AND DISCUSSIONS

Human health, agriculture, natural ecosystems, coastal areas, and heating and cooling requirements are examples of climate-sensitive systems. Rising average temperatures are already affecting the environment. Some observed changes include shrinking of glaciers, thawing of permafrost, later freezing and earlier break-up of ice on rivers and lakes, lengthening of growing seasons, shifts in plant and animal ranges and earlier flowering of trees. Global temperatures are expected to continue to rise as human activities continue to add carbon

dioxide, methane, nitrous oxide, and other greenhouse (or heat-trapping) gases to the atmosphere. [11] Today more than ever, environmental performance is a crucial issue for the success of any business. Organizations of all kinds (company,corporation, firm, enterprise, authority or institution, or part or combination thereof, whether incorporated or not, public or private, that has its own functions and administration) are increasingly concerned with achieving and demonstrating sound environmental performance by controlling the impacts of their activities, products and services on the environment. They do so in the context of increasingly stringent legislation, the development of economic policies and other measures that foster environmental protection. The operations of an organization can have a variety of characteristics. [2] Even though using of natural resources, the cultivation of agricultural products can still be very environmentally unsound. However, the ecological costs of agricultural gains have been considerable. Industrial agriculture is heavily dependent on energy, large amounts of water and other scarce natural resources. ISO 14001 is an internationally accepted standard that sets out how can go about putting in place an effective EMS. The standard is designed to address the delicate balance between maintaining profitability and reducing environmental impact. ISO 14001 is suitable for any organization - whatever their size or sector - looking to improve its environmental impacts and meet environmental legislation. [9] Agriculture is highly sensitive to climate variability and weather extremes, such as droughts, floods and severe storms. The forces that shape our climate are also critical to farm productivity. Human activity has already changed atmospheric characteristics such as temperature, rainfall, levels of carbon dioxide (CO2) and ground level ozone. The scientific community expects such trends to continue. While food production may benefit from a warmer climate, the increased potential for droughts, floods and heat waves will pose challenges for farmers. Additionally, the enduring changes in climate, water supply and soil moisture could make it less feasible to continue crop production in certain regions. [11] Environment is surroundings in which an organization operates, including air, water, land, natural resources, flora, fauna, humans, and their interrelation. Environmental objective is overall environmental goal, consistent with the environmental policy, that an organization sets itself to achieve. Modern agriculture has increasingly replaced the environmental services built into earlier agricultural systems by using industrial inputs (machinery, synthetic fertilisers and pesticides). Agriculture is a major user of land and water resources yet needs to maintain the quantity and quality of those resources in order to remain viable. [4] During the next 50 years, which is likely to be the final period of rapid agricultural expansion, demand for food by a wealthier and 50% larger global population will be a major driver of global environmental change. Should past dependences of the global environmental impacts of agriculture on human population and consumption continue, 10^9 hectares of natural ecosystems would be converted to agriculture by 2050. This would be accompanied by 2.4- to 2.7-fold increases in nitrogen- and phosphorus-driven eutrophication of terrestrial, freshwater, and near-shore marine ecosystems, and comparable increases in pesticide use. This eutrophication and habitat destruction would cause unprecedented ecosystem simplification, loss of ecosystem services, and species extinctions. Significant scientific advances and regulatory, technological, and policy changes are needed to control the environmental impacts of agricultural expansion. [7] The steps within the production process:

1) Preparation of the soil - The soil is, together with water and climate, one of the most important requirements for agriculture.

The land used in agriculture needs to be prepared before the crop can be sown: 1. *(raw) Materials:* chemicals (e.g. methyl bromide); agricultural machinery (e.g. plough); 2. *Energy:* (human) energy to drive the machinery; 3. *(Toxic) emissions:* chemicals (methyl bromide causes depletion of the ozone layer).

2) Sowing and planting - After the soil is prepared, the crop can be sown or planted. The sowing can also take place at a different location like a nursery or greenhouse, where the seedlings or cuttings are cultivated in a more controlled environment: 1. *(raw) Materials:* seeds and plants; machinery; 2. *Energy:* (human) energy to move the machinery.

3) Fertilisation - Because soils often lack the right kind and amount of plant nutrients for the best crop results, the farmer must supply such missing nutrients. In many parts of the world fertility needs are met by the use of inorganic chemical fertilisers: 1. *(raw) Materials:* fertilisers; machinery; 2. *Energy:* (human) energy to move machinery; 3. *(Toxic) emissions:* phosphate; nitrogen; dangerous to human health; disturbance of eco-systems. ISO 14001 covering environmental management are intended to provide organizations with the elements of an effective environmental management system that can be integrated with other management requirements and help organizations achieve environmental and economic goals. [2]

4) Irrigation - All regions of the world show an overall net negative impact of climate change on water resources and freshwater ecosystems. Evaluating these impacts is challenging because water availability, quality and streamflow are sensitive to changes in temperature and precipitation. Other important factors include increased demand for water caused by population growth, changes in the economy, development of new technologies, changes in watershed characteristics and water management decisions. [11] Agriculture disrupts all freshwater systems hugely from their pristine states. The former reductionist concept of pollution was of examining individual effects of particular substances on individual taxa or sub-communities in freshwater systems, an essentially ecotoxicological concept. It is now less useful than a more holistic approach that treats the impacts on the system as a whole and includes physical impacts such as drainage and physical modification of river channels and modification of the catchment as well as nutrient, particulate and biocide pollution. The European Water Framework Directive implicitly recognizes this in requiring restoration of water bodies to 'good ecological quality', which is defined as only slightly different from pristine state. [1] Irrigation is one of the uses of water in agriculture. Water is, together with soil and climate, one of the most important requirements for agriculture: 1. *(raw) Materials:* water; irrigation system; 2. *Energy:* energy to move water; 3. *(Toxic) emissions:* water; salt. All farms use water. Water is essential for a wide range of activities on the farm (crop irrigation, machinery washing...). The pressures on our water resources are growing. Climate change will only add to these pressures. Saving water at home, in the garden, or at work takes very little effort. Our population is increasing and we are all using more water. Water demand already exceeds supply in many parts of the world. The key is for everyone to reduce personal wastage. [4] The largest impacts would be on freshwater and marine ecosystems, which would be greatly eutrophied by high rates of nitrogen and phosphorus release from agricultural fields. Aquatic nutrient eutrophication can lead to loss of biodiversity, outbreaks of nuisance species, shifts in the structure of food chains, and impairment of fisheries. [8]

5) Crop protection - Crop must be protected against plagues, diseases and pests. Once a crop has been established, the farmer is immediately threatened with crop losses due to a variety of pests. In recent years, the negative impact of pesticides on nature and environment get more attention. Pesticides

can often be replaced by non-chemical methods or by chemicals that are less damaging to the environment: 1. *(raw) Materials:* pesticides; 2. *(Toxic) emissions:* pesticides (harmful to human and environment). International standardization is a basic element in intention to create an international quality providing system. Standard, ISO 22000, will be an active tool in the hands of food producers, which will make possible production of health protected food and on that way number of diseases aroused by biological disabled food consumation will decrease. [5]

6) Harvesting - When the crop has been developed successfully, it can be harvested. This can be done mechanically or handcrafted: 1. *(raw) Materials:* harvesting machines; 2. *Energy:* (human) energy.

7) Storage and ripening - The onset of ripening, which marks the end of the growth of the agricultural products, especially fruits, and the start of its senescence, is controlled by hormones: 1. *(raw) Materials:* chemicals (methyl bromide, phosphine, organo-chlorides), water; 2. *Energy:* hot air; hot water; cold; heat; 3. *(Toxic) emissions:* chemicals. Potential exporter to the EU market need to comply with EU legislation in the part which relates to production and placement of fruit and vegetables. These requirements are based on consumer health and safety, genetically modified foods, food additives, Maximum Residue Levels-MRLs, organic produce, packaging, marking, labelling and environmental. [6]

8) Packaging and transporting - Exported and imported agricultural products are usually transported in single-use transport packaging. The trade of agricultural products usually generates a considerable amount of (transport and sales) packaging waste such as boxes, trays and plastics: 1. *(raw) Materials:* packaging material (paper, plastic, etc.), transporting means (ships, trucks, planes); 2. *Energy:* fuel; 3. *(Toxic) emissions:* ink, waste materials and chemicals, CO2.

9) Use - Agricultural products are mostly used as food. They can be eaten raw, but they can also be cooked, baked, stewed and more: 1. *(raw) Materials:* food; *Energy:* fuel; 3. *(Toxic) emissions:* CO2. Continually ascending commercial exchange in the world under strong influence of more and more enegetic requiremnets of customers for higher quality of products levels, set a task to International organization for standarization ISO to standarize the thorough quality system. HACCP, as an assembly of measures of food protection is based on prevention and control of critical points. [5]

10) Waste - Remains of food, such as peelings, seeds, stalks and crusts are thrown away and dumped or burned: 1. *Energy:* burning or dumping; 2. *(Toxic) emissions:* toxic gases. ISO 14001 can provide cost savings through the reduction of waste and more efficient use of natural resources such as electricity, water and gas. [2] The recent intensification of agriculture, and the prospects of future intensification, will have major detrimental impacts on the nonagricultural terrestrial and aquatic ecosystems of the world. The doubling of agricultural food production during the past 35 years was associated with a 6.87-fold increase in nitrogen fertilization, a 3.48-fold increase in phosphorus fertilization, a 1.68-fold increase in the amount of irrigated cropland, and a 1.1-fold increase in land in cultivation. Based on a simple linear extension of past trends, the anticipated next doubling of global food production would be associated with approximately 3-fold increases in nitrogen and phosphorus fertilization rates, a doubling of the irrigated land area, and an 18% increase in cropland. These projected changes would have dramatic impacts on the diversity, composition, and functioning of the remaining natural ecosystems of the world, and on their ability to provide society with a variety of essential ecosystem services. [8] Data collected from monitoring and measurement can be analysed to identify patterns and obtain information. Knowledge gained from this information can be used to implement corrective and preventive action.

Key characteristics are those that the organization needs to consider to determine how it is managing its significant environmental aspects, achieving objectives and targets, and improving environmental performance. The organization should be able to demonstrate that it has evaluated compliance with the legal requirements identified to which it has subscribed. [2] The tradition in agriculture has been to maximize production and minimize the cost of food with little regard to impacts on the environment and the services it provides to society. As the world enters an era in which global food production is likely to double, it is critical that agricultural practices be modified to minimize environmental impacts even though many such practices are likely to increase the costs of production. [8] Poorer nations are generally more vulnerable to the consequences of global warming. These nations tend to be more dependent on climate-sensitive sectors, such as subsistence agriculture, and may lack the resources to buffer themselves against the changes that global warming may bring. [11]

CONCLUSIONS

1. Even though using of natural resources, the cultivation of agricultural products can still be very environmentally unsound.
2.The chemical inputs of industrial agriculture pollute the air, find their way into streams, and accumulate in ground water supplies.
3. The management and the employees should be aware of the environmental impacts.
4. ISO 14001 is suitable for any organization – whatever their size or sector.
5. Environmentally sound production implies that all types of resources, along the entire product life cycle, should be used as optimally as possible to reduce environmental impacts.

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INVESTIGATIONS ON THE USE OF COLOR IN THE MARKETING OF MILLING PRODUCTS

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Key words: *wheat flour marketing, package, colour, RGB additive model, marketing communication, ImageJ,*

Abstract

44 representative packages for the range of flours available on the Romanian market, and 31 formal presentations (advertisements in written press, as well as the first page of the presentation site) have been scanned, and the images have been processed by means of a specialized computer software (ImageJ), in order to analyze how color is used in the structure of certain elements of packaging aesthetic and design, but also in the communication strategies of companies.Our results showed that as regards the colors used in making packaging, the most common colors are based on red. The color red has been used mostly in the forms of communication based on printing or online (posters, advertisements, home site). In case of packaging, the use of colors has been achieved following models that include clear pairs: red - green or green - blue, while in formal presentations the amount of red increases with the amount of blue and green, the amount of blue increases with red and green, and the amount of green increases with red and blue. There has also been evidenced another significant trend, namely the shades of blue decreasing with turnover increasing. Otherwise, companies with higher turnovers used smaller amount of colors based on blue in the color composition of packaging, and even smaller quantities of green. The colors which have been least affected by the turnover value were those based on red.

INTRODUCTION

A brand may be achieved in words or in combined pictures. It is noted that the brands represented in words are used more often because it is easier to read and memorize them. Besides the brand symbol, the color is certainly the second important item in identifying the packaging in the international context [1].
Certain studies have suggested the significant influence that color has on behavior. *Harry Wohlfarth, Catharine Sa*t on the one hand, *Rose H. Alschuler and Berta Weiss Hattwick* on the other hand, showed the significant influence that color has on children's behavior [2,3]
Choku Akashi (1986) demonstrated by the results of his research, that red is often perceived as being active and in certain circumstances, it may be correlated with aggressiveness. *Faber Birren* associated the division of spectrum in warm and cold colors with human personality [4]. Red colors tend to increase muscle tension, stimulate the autonomic nervous system, while green and blue relax the tension. These direct connections exist between brain and body, reactions taking place independently of thought or deliberation. (*Birren '55*). Similarly, *Jaensch* found that people can be grouped into two categories: those who are more sensitive to the hot end of the solar spectrum and those who are more sensitive to the cold end [5].
Experiments carried out by *Newton* and confirmed by the Young-Helmholtz theory, showed that retina of human eye contains

three types of cone receptors, each being sensitive to a certain range of waves of light: Long or Red receptors (sensitive to red light, which have long wavelengths, 500nm-700nm), Green or Middle receptors (sensitive to green light, with average wavelengths of 450nm-630nm) and Blue or Short receptors (sensitive to blue light with short wavelengths, 400nm-500nm) [6].
In practice, the description of any color in the visible spectrum means its notation, representation or specification by three numerical color parameters, which define a set of tristimulus values, as color perception in the human brain is determined by three types of sensitive to light receptors, which transmit three signals to the brain for each color in sight. A tristimulus value, directly or indirectly expresses the extent to which primary RGB colors combine to form a new color, and implicitly the characteristics of those color stimuli which are sensitive to SML wavelengths, corresponding to these primary color components.
The additive RGB color model is defined on the property of different wavelengths light radiations to combine additively, in order to form a new color; the model is called additive color model. Any combination of light radiations falling directly on the human eye can be described by the additive RGB color model; that is why this model is used by most light emitting equipments for determining the values (R, G, B), which compose each reproduced color[7].
The most common implementation method of the additive RGB color model, used since 2006 for PC monitors, has 24 color bits and 8 color / pixel bits, or 256 digital levels / channel (28 = 256); that is the reason why the number of possible colors that may be represented by this model is limited to 256G x 256B x 256R = 16.7 million colors, which is approximately the number that human eye can distinguish[7].
The main objective of our research is the analysis of how color is used in the communication strategies of milling companies on the Romanian market (print ads, posters, presentation websites), and how the color is promoted in the structure of certain aesthetic and design elements of marketed products packaging.

MATERIAL AND METHOD

We analyzed 44 representative packages, for the range of flours available on the Romanian market, coming from 15 producers in the field (Dobrogea S.A., Băneasa, Titan, Galmopan, Farinsan, Panimon, Vel Pitar, Boromir, Pambac, Sam Mills, Panalim, Moara Landolt, Moara Domnească, Pic and Pan Grup).
The structure of the assortment for the studied colored packaging, sorted on types of flours, is shown in figure 1.

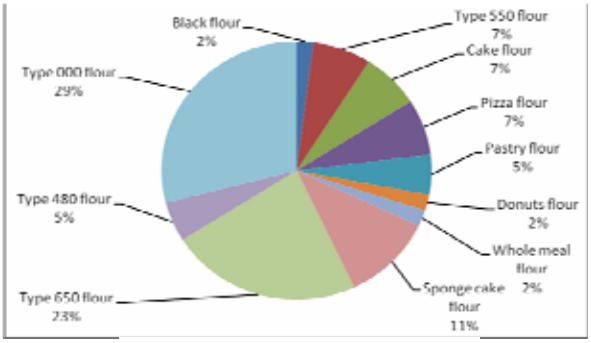

Fig.1. The structure of the assortment for the analyzed colored packaging

We have also studied 31 formal presentations (print ads and first page of the presentation site) for the following companies: Titan SA, Galmopan SA, Pambac SA, Vel Pitar SA, Royal Mill, Panimon, Panalim, Sam Mills and Farinsan SA.
The visible part of packages (the accessible side of consumer's perception on the shelves), the internet ads and websites of companies, have been processed using a computer specialized software, developed by National Institutes of Health (USA), in order to analyze the medical images: ImageJ.
For achieving our objectives, we used those program options which assess the construction of analyzed image colors, starting from the three primary colors, Red,

Green and Blue. Basically, the program achieves a specific histogram for each color, in case of each image, or in case of selections from the image: the possible values for each primary color (from 0 to 255) are listed on the *x* axis of coordinates and the number of identified pixels is listed on the *y* coordinate axis. So, the program calculates average quantities of red, green and blue, as well as the associated standard deviations (figure 2).

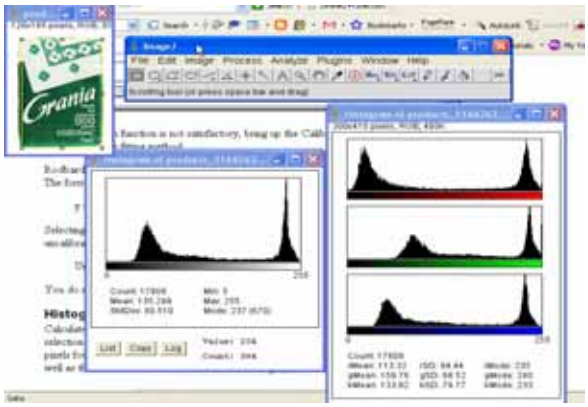

Fig.2. Image analysis, performed using the program ImageJ, for Grania Cake flour

Results have been interpreted with the methods of statistical mathematics (dispersion analysis and regression), using StatSoft professional program, Inc. (2007). STATISTICA (data analysis software system), version 8.0. www.statsoft.com.

RESULTS AND DISCUSSIONS

Table 1 shows the variability estimates for the main color parameters broken down in RGB system, for the studied packages (n = 44).

Table 1. Estimates of variability for the 44 packaging for the selling of investigated milling products

Parameter	X±s	CV %
Overall average	153.880 ± 57.680	37.483
R (red)	175.080 ± 57.650	32.928
G (green)	153.900 ± 64.130	41.670
B (blue)	134.140 ± 68.090	50.761

We notice that, regarding used colors, the most common colors are those based on red, followed by green and blue.

Table 2. Estimates of variability for the 31 investigated formal presentations

Parameter	X±s	CV %
Overall average	165.900 ± 63.600	38.336
R (red)	198.900 ± 57.300	28.808
G (green)	164.200 ± 70.100	42.692
B (blue)	138.100 ± 75.100	54.381

Red was the color that has also been most intensely used in the forms of communication, expressed in print or online (posters, advertisements, main page of the site), as shown in table 2.

As regards the coefficients of variability, associated to the average values of investigated color parameters, there have been determined similar values for both assessed samples.

We noticed that the amount of shades, in which red color prevailed, has been significantly higher (figure 3) in case of the print media advertising and presentations, and in case of the first page of promotion website. The *t* value (Student test) is 2.572 (significant), for the pairs of averages associated to red color and nonsignificant for other pairs.

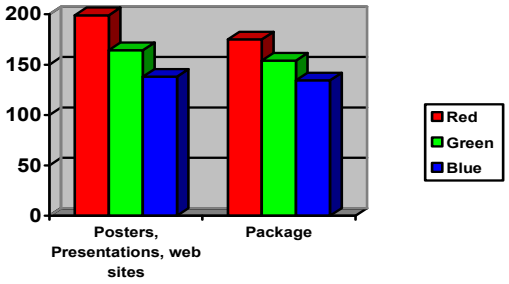

Fig.3. Average values of color parameters for the two studied samples

Table 3 presents the correlation coefficients and their significance, in the case of the investigated color parameters of packages.

We can notice that, in case of packaging, the overall value has increased very significantly, on account of increasing all three primary colors. This is natural, taking into consideration the method we used.

Table.3. Correlation coefficients and their significance, for the color parameters of studied packaging

	Overall average	R (red)	G (green)	B (blue)
Overall average	1.00			
R (red)	0.69***	1.00		
G (green)	0.83***	0.47***	1.00	
B (blue)	0.63***	-0.03	0.39**	1.00

*significant (p<0.0500), **distinct significant (p<0.0100), *** very significant (p<0.0010)

However, there have been emphasized some characteristic aspects. Thus, increasing the amount of color derived from red, has been associated with a corresponding increase of the amounts of color derived from blue (figure 4).

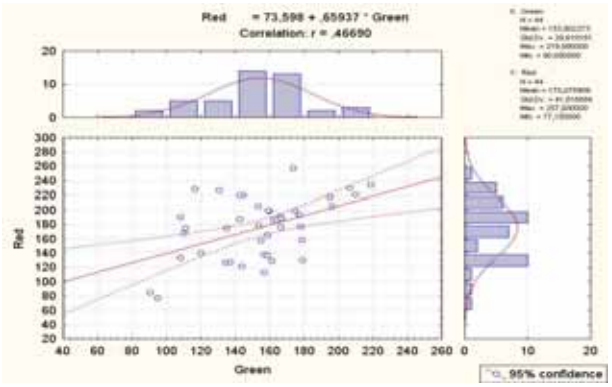

Fig.4. Regression between R (red) and G (green) in investigated packaging

The observation can be made for the pair of colors Green - Blue, for which a positive distinctly significant correlation has been determined (r = 0.39).
The results obtained from the correlation analysis regarding the communications having other presentation forms (print media, online, etc.) are presented in Table 4.

Table 4. Correlation coefficients and their significance for the 31 investigated formal presentations

	Overall average	R (red)	G (green)	B (blue)
Overall average	1,00			
R (red)	0.68***	1.00		
G (green)	0.93***	0.55**	1,00	
B (blue)	0.89***	0.34*	0.81***	1.00

*significant (p<0.0500), **distinct significant (p<0.0100), *** very significant (p<0.0010)

We can see that the number of established significant correlations is much higher in this case than in the previous case. Basically, all three colors are interconnected and register significant changes, depending on one another. In case of packaging, the colors behaved according to the pairs: red - green or green - blue for communications; the more complex nature of the construction of colors is highlighted in colors interconnection. Thus, the amount of red increases with the amount of blue and green, the amount of blue increases with the amount of red and green and the amount of green, with the red and blue amount (figure5).

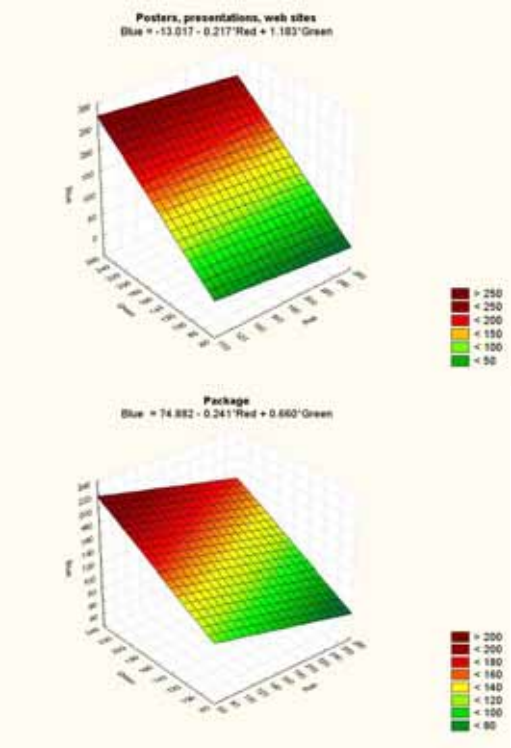

Fig.5. Modeling behavior of the three color parameters,one depending on the other, for the two investigated samples

In order to investigate how colors are used within the class represented by packages for flour, depending on the type and destination of flours, we separately analyzed 28 packages, representing packages of flour type 000 (13 pieces), flour type 650 (10 pieces) and flour for cake (5 pieces). Results are presented in table 5.

Table 5. Estimates of variability for the packages designed for marketing of the flours type 000, flours type 650 and cake flours

Parameter	X±s	CV %
Flour type 000		
Overall average	147.710 ± 33.040	22.368
R (red)	177.480 ± 45.690	25.744
G (green)	145.630 ± 35.740	24.538
B (blue)	120.680 ± 44.77	37.101
Flour type 650		
Overall average	166.360 ± 21.070	12.664
R (red)	187.850 ± 42.170	22.448
G (green)	165.850 ± 24.950	15.041
B (blue)	145.550 ± 26.910	18.491
Flour for cake		
Overall average	157.840 ± 14.400	9.121
R (red)	169.09 ± 57.370	33.926
G (green)	162.780 ± 7.550	4.638
B (blue)	152.970 ± 14.690	17.251

Table 6. The significance of the difference between the color parameters, in case of packages for 000 type flours, 650 type flours and cake flours

Parameters	Flour 000	Flour 650	t
Overall average	147.7	166.36	1.555 ns
R (red)	177.5	187.85	0.560 ns
G (green)	145.6	165.85	1.524 ns
B (blue)	120.7	145.55	1.548 ns
Parameters	**Flour 000**	**Flour for cake**	**t**
Overall average	147.7	157.84	0.633 ns
R (red)	177.5	169.09	0.327 ns
G (green)	145.6	162.78	1.640 ns
B (blue)	120.7	152.97	2.297 ns
Parameters	**Flour 650**	**Flour for cake**	**t**
Overall average	166.36	157.84	0.807 ns
R (red)	187.85	169.09	0.723 ns
G (green)	165.85	162.78	0.357 ns
B (blue)	145.55	152.97	0.568 ns

As seen from the two tables (5 and 6), there is a tendency to use mainly red based colors for the flours type 650, but, as the tests of significance indicate, this trend is not significant.

Table 7. Overall average and average values of the parameters R, G and B for the two investigated samples, analyzed by companies

Company	Packaging			
	Overall average	R (red)	G green)	B (blue)
Sam Mills	143.00	128.00	148.00	155.00
Baneasa	163.00	218.00	162.00	110.00
Titan	166.,00	191.00	173.00	134.00
Boromir	138.00	151.00	137.00	126.00
Dobrogea	168.89	186.07	164.95	155.63
Galmopan	144.48	168.31	133.87	131.02
Farinsan	157.26	194.30	150.61	136.24
Pambac	133.69	151.12	132.64	117.30
Pangrup	152.76	153.59	152.85	151.79
Company	**Formal presentations**			
	Overall average	**R (red)**	**G (green)**	**B (blue)**
Sam Mills	188.74	225.95	194.06	146.180
Baneasa	174.92	176.01	179.45	169.29
Titan	161.27	209.84	152.20	121.89
Boromir	167.83	217.21	169.22	117.10
Dobrogea	134.58	159.90	123.84	120.17
Galmopan	139.06	206.17	106.66	104.31
Farinsan	219.49	226.81	224.21	209.94
Pambac	133.55	168.92	152.05	98.90
Pangrup	193.56	221.34	194.41	164.72

One can say that in terms of packed product destination, or its quality characteristics, there is not a clear correlation with the predominant color of the packaging.

Table 7 presents the results obtained by discriminating the color analysis, both in terms of packaging and in terms of formal presentations, regarding the companies in the field.

We can conclude from the table that for certain companies (Sam Mills, Boromir, Dobrogea Farinsan), the color parameters have different values for packaging, compared with formal presentations, although the differences are nonsignificant for the two samples (Fig. 7). This suggests that the structure of communications is based on different formats, in terms of how color is used. However, the achieving of these differences is not structured and there is no rule, because there have been identified no significant correlations between parameters R, G and B of the two samples (table 8).

Table 8. Correlation coefficients between the parameters Overall average, R, B and G of the two samples

Packaging / Formal presentations	Overall average	R red)	G (green)	B (blue)
Overall average	0.120 ns	-0.230 ns	-0.010 ns	0.380 ns
R (rosu)	0.050 ns	-0.370 ns	-0.030 ns	0.370 ns
G (green)	0.170 ns	-0.140 ns	0.100 ns	0.320 ns
B (blue)	0.200 ns	0.300 ns	0.080 ns	0.120 ns

One of the issues that concerned us, was the identifying of a homogeneous behavior of market operators regarding use of colors, depending on the size of the company or its activity. Finally, we chose as global indicator the overall turnover (million euros). Since the turnover we found in our press studies derived from management statements, that are sometimes contradicted by other opinions, we preferred to consider the conveyed values as significant, in order to position the respective companies on a scale from 1 to 9. Therefore, correlation analysis we realized was not based on parameters, but on the correlation coefficients of the ranks (table 9).

Table 9. Correlation coefficients of Speraman ranks, for the color parameters of packaging, presentations and turnover of companies in the milling market

Parameters	Average	R (red)	G (green)	B (blue)
Turnover (million euro)	-0.616	-0.283	-0.633	-0.666

Table 9 shows that there is a significant trend of decreasing the use of shades of blue, with increasing turnover. Otherwise, companies with higher turnovers used a smaller quantity of colors based on blue, and even smaller quantities of green, in the color composition of packaging. The colors which were least influenced by the turnover value were those based on red.

CONCLUSIONS

1. We could see that in terms of the colors used in the construction of packaging, the most common are those based on red. Red was also the color most intensely used in the forms of print or online communication (posters, advertisements, the main page of the site);
2. If the print ads and print presentations, in first page of the website promotions, etc., the amount of shades in which red prevailed, was significant higher than for packaging;
3. In the milling packaging market, increasing the color amount derived from red color has been associated with a corresponding increase of the quantity of color derived from blue. The same thing could be observed for the color pair Green - Blue, for which we found a positive distinctly significant correlation (r = 0.39);
4. In case of packaging, the colors behaved according to the pairs: red - green or green – blue; in case of communications, the more complex nature of their construction is highlighted by the interconnection of colors. Thus, the amount of red increases with the amount of blue and green, the amount of blue increases with the amount of red and green, and the amount of green increases with amount of red and blue;
5. Although there is a tendency of mainly using colors based on red for the flours type 650, this trend is not significant. In terms of the destination of the packed product, or its quality characteristics, there is not a clear correlation with the predominant color of the packaging;
6. Companies with higher turnover, used in the composition of colors for packaging, a smaller amount of colors based on blue and the smallest quantities of green. The least affected colors, by the value of turnover, were those based on red;
7. There is a significant trend of decreasing the use of blue shades with increasing turnover. Otherwise, the companies with higher turnovers used a significantly smaller amount of colors based on blue, and much smaller quantities of green, in the color composition of packaging. The least affected colors by the amount of turnover, were those based on red.

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PRODUCTIVITY OF FACTORS IN AGRICULTURE OF ROMANIA AND THE EUROPEAN UNION - A RETROSPECTIVE COMPARATIVE

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Key words**:** *labour productivity, agriculture, production factor, economic indicators*

Abstract

This paper focuses on examining the position of agricultural sector in Romania from the viewpoint of the productivity of used production factors in EU – 27 countries comparison. International comparison, during the period 2000 -2009, shows that Romania is considerably lagging behind the EU -27 countries in the productivity of labour, but is rather competitive in productivity of the fixed and variable capital.
This is based on the past data on relevant indicators related to the EU – 27 countries. The results will be a milestone in the knowledge of how the labor productivity has evolved over the farming. Knowing the real level of labor productivity of Romanian agriculture and especially the causes of this level the benchmark for economic policy.

INTRODUCTION

Agriculture was one of the first sectors of the economy to receive the attention of the European policymakers. Article 39 of the Treaty of Rome on the EEC (1957) set out the objectives for the first common agricultural policy (CAP): these were focused on increasing agricultural productivity as a way to ensure a faire standard of living for the agricultural community, stabilising markets and ensuring security of supply at affordable prices to consumers.
The current reform of the CAP indicates that in a long term, the support of production will decrease, and the CAP will be aimed at motivating the land holders, land owners and land leasers to secure the landscape stewardship, in other words, the maintenance of land by agricultural or other activities that preserve the landscape quality.
As far as Europe as a whole is concerned, despite the mentioned direction of public policies, the competition between countries, regions and individual producers for another income will continue. These incomes will supplement their incomes from public funds with incomes from sale of agricultural commodities produced in commercially oriented agricultural and food-processing facilities.
It is very unlikely that the CAP reform will succeed in eliminating the profit motivation in individual behaviour or the need for increasing the subsistence sources of households. One can hardly expect that the hobby farms of middle class and men of means will take up the landscape management only.
Most probably also in the future the farmers decision whether to continue agricultural activity or not will be determined by the volume of income attained. Income generation will go on depending on the efficiency of utilisation of resources [3].

MATERIAL AND METHOD

The paper uses standard indicators of economic statistics and of the Economic Accounts for Agriculture (EAA): value of production at basic prices, output of agricultural industry (activities of agricultural sector), intermediate consumption, gross value added, fixed capital consumption, net value added. Also other indicators have been used, such as the amount of labour input expressed by the Annual Work Unit (AWU), utilized

agricultural area (UAA), etc. The period analyzed in this study is 2000-2009. As a source of information, the database EUROSTAT 2009, and the database FAO were used. Mainly the significantly deviating values of production (caused by price and subsidy disparities) may rise doubts about the correctness of assessments of the productivity and efficiency of production factors based upon those data.

RESULTS AND DISCUSSIONS

The role of agriculture in national economy is best characterised by the share of agriculture in GDP, which is shrinking all over the world. The highest role of agriculture in GDP can be observed in Bulgaria (14%), Romania (13%) and Lithuania (8%) in 2003, whereas other NMS countries had a share of 3-5%, according to World Bank (2009). After EU accession, shares in all cases decreased, though largest falls can be seen in countries with originally high values (Bulgaria and Romania 8% and 4%, respectively) [1].

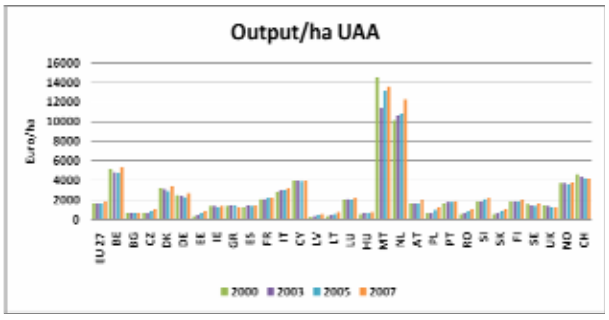
Agricultural production development is one of the key indicators of assessing the impact of accession. First of all, as can be seen on Table 1, there are very significant differences regarding the level of agricultural output per hectare among the countries. This indicator varied between 300-15000 euro/ha in the years analyzed. The highest value of agricultural output is observable in Malta and Netherlands (723% and 650% of EU-27 average in 2007), while lowest values show up for Latvia and Bulgaria (30% and 34 % of EU - 27 average in 2007) in all years analyzed. The value of agricultural output in Romania is 56% of EU - 27 averages in 2007.

Table 1: Value of agricultural output per UAA in EU -27 at basic prices (euro/ha)

Country	2000	2003	2005	2007	2007/2000 (%)	% of EU – 27 in 2007
EU 27	1615	1700	1707	1890	117	100
BE	5117	4877	4776	5387	105	285
BG	607	613	637	648	107	34
CZ	664	689	811	1019	153	54
DK	3167	3095	2919	3391	107	179
DE	2517	2394	2280	2733	109	145
EE	384	508	651	849	221	45
IE	1357	1368	1329	1397	103	74
GR	1360	1421	1439	1330	98	70
ES	1219	1446	1358	1483	122	78
FR	2122	2109	2153	2269	107	120
IT	2798	3064	2966	3239	116	171
CY	4081	3972	3917	4059	99	215
LV	299	373	433	571	191	30
LT	338	481	573	771	228	41
LU	2002	2074	1979	2176	109	115
HU	550	623	682	746	135	39
MT	14517	11398	13210	13659	94	723
NL	10168	10639	10822	12294	121	650
AT	1661	1705	1675	1961	118	104
PL	677	728	946	1233	182	65
PT	1654	1741	1786	1908	115	101
RO	542	727	906	1057	195	56
SI	1894	1883	2089	2254	119	119
SK	559	699	841	1006	180	53
FI	1881	1887	1924	1947	104	103
SE	1544	1524	1369	1666	108	88
UK	1428	1352	1236	1295	91	69
NO	3740	3687	3674	3759	101	199
CH	4644	4383	4281	4163	90	198,9

Source: Own calculations based on Eurostat and FAO (2009)

Figure 1: Agricultural output per AWU



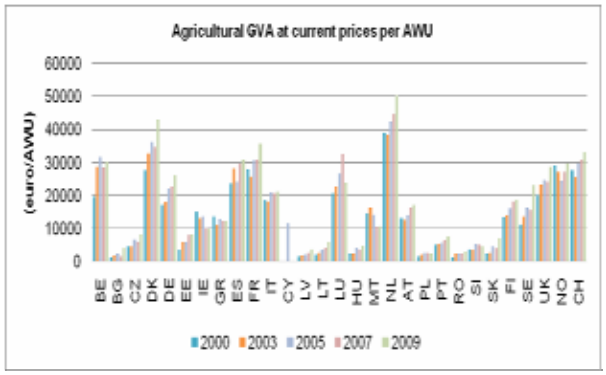
Source: Own composition based on Eurostat (2009)

The productivity of land is directly proportional to its natural fertility, variable inputs into land and labour input. In many countries, the inputs of variable capital substitute the deficit of natural fertility, and for reason their productivity in very low.

Another measure closely linked to agricultural production performance is productivity.

There is another indicator showing agricultural productivity: gross value added. This indicator per AWU is worth to be calculated to obtain a deeper insight to agricultural output issues.
Netherlands, Denmark, France, Spain, Belgium, Italy came up with the highest GVA/AWU values in the period 2000-2009 (values between 50.000 – 17.000 euro/AWU), while Bulgaria, Latvia, Lithuania, Hungary, Poland and Romania with the lowest in all years analyzed (values between just 1300 – 2400 euro/AWU). Majority of NMS countries experienced values between just 1000-5000 euro/AWU.

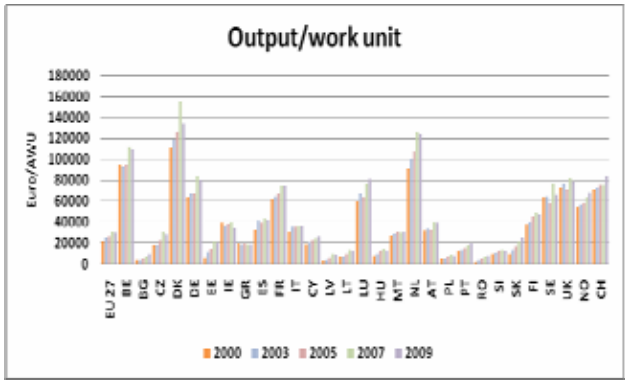
Figure 2: Agricultural GVA at basic prices per AWU



Source: Own composition based on Eurostat (2009)

The result of measurements of the productivity of labour, fixed and variable capital are illustrated by follow figures.

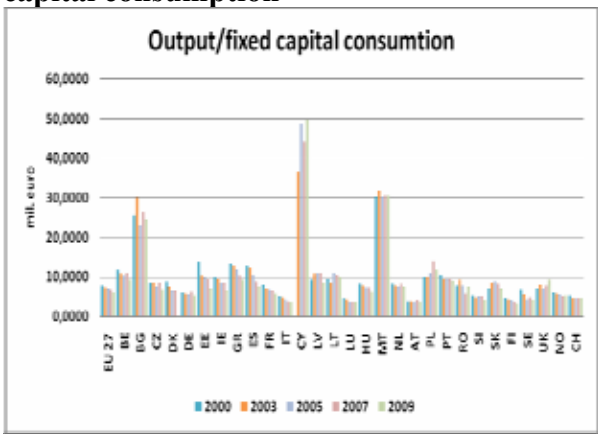
Figure 3: Agricultural output per AWU



Source: Own composition based on Eurostat (2009)

Within Europe, the highest value of labour productivity is reached by the Netherlands, Denmark and Belgium which show the highest level of capital inputs. The productivity of labour in Romania is the lowest of EU -27 countries, but it is rise to year at year.
The productivity of fixed capital in Romania is higher than in other European countries, which have a relatively low availability of labour but high availability of fixed capital.
On the other hand, the productivity of intermediate consumption in Romania is comparable with the EU 27 countries, and for example, it is higher than in Austria and Germany.

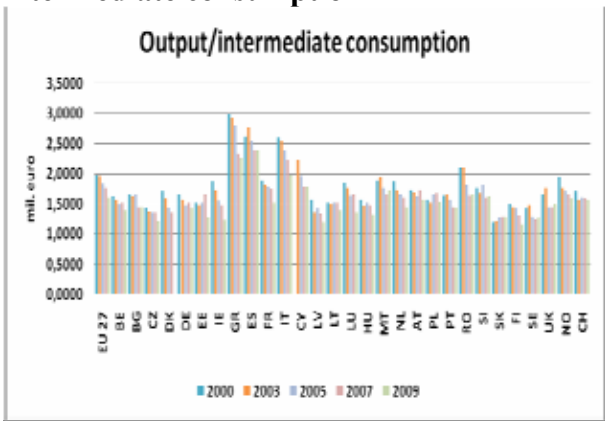
Figure 4: Agricultural output per fixed capital consumption



Source: Own composition based on Eurostat (2009)

The highest value of productivity of the intermediate consumption is shown in the Greece, Spain and Italy. On the contrary, Bulgaria, reach lower values of production despite high capital investments.

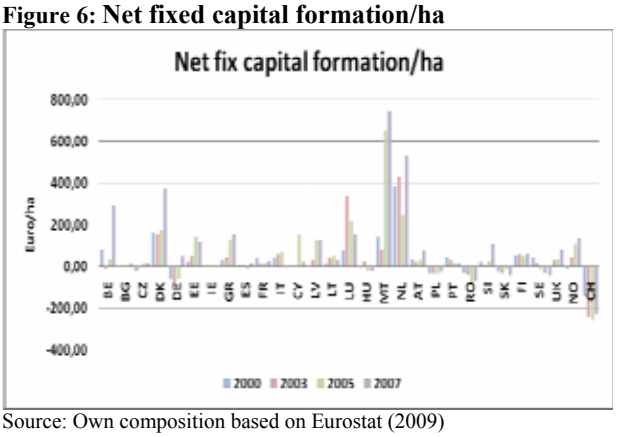
Figure 5: Agricultural output per intermediate consumption



Source: Own composition based on Eurostat (2009)

This fact can be explained by the adverse, even unfavourable natural conditions of production in these countries, where high inputs of intermediate product substitute the low natural land fertility. Although the inputs and also production in the Norway are very high, this country reaches proximately the same productivity level of intermediate consumption as Romania.
The high inputs of fixed and variable capital (facilitated by the EU support policy) in many member countries are depressing the net value added generated by the sector. This would become negative if support is eliminated in countries such as Finland, Sweden, Norway and the United Kingdom. The example of countries such as the Netherlands, Denmark, Greece, Spain, Italy, France, Belgium, points out a relatively high efficiency of capital investments linked with low labour inputs.
It looks that the countries with higher variable and labour inputs are less successful in the income generation than countries with the highest values of fixed capital consumption. The higher creation of net value added in this countries enables also a higher level of fixed capital formation. Comparison of net fixed capital formation in the individual countries is illustrated figure 6.

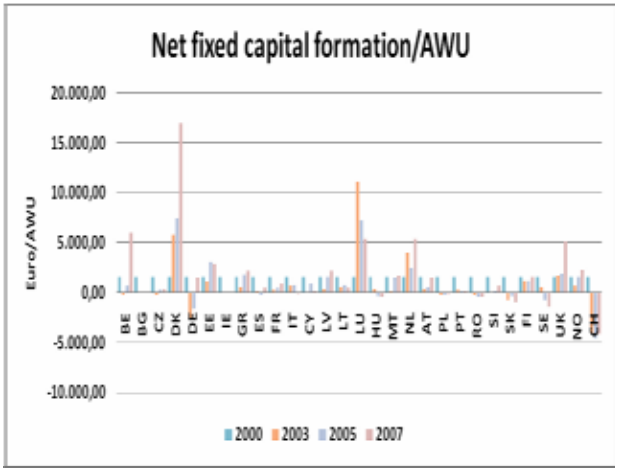
Figure 6: Net fixed capital formation/ha



Source: Own composition based on Eurostat (2009)

The countries with intensive agriculture usually provide for an extended reproduction of fixed capital, of example Netherlands and Denmark where the net fixed capital formation reached the value of 527.69 – 370.77 euro/ha in 2007. A surprisingly high fixed capital net formation is reached by Belgium (83.41 euro/ha in 2000 at 290.04 euro/ha in 2007), Greece (28.94 euro/ha in 2000 at 153.33 euro/ha in 2007), Estonia (20.16 euro/ha in 2000 at 116.59 euro/ha in 2009), Slovenia (21.78 euro/ha in 2000 at 111.54 euro/ha in 2007), Norway (-13.68 euro/ha in 2000 at 135.44 euro/ha in 2007).
The highest negative value of fixed capital net formation is shown by Hungary (-4.54 euro/ha in 2000 at -20.85 euro/ha in 2007), Romania (-31.38 euro/ha in 2000 at -70.73 euro/ha in 2007) and Slovakia (-25.95 euro/ha in 2000 at -44.36 euro/ha in 2007).

Figure 7: Net fixed capital formation/AWU



Source: Own composition based on Eurostat (2009)

The highest value of fixed capital net formation per AWU is shown by Denmark, Luxembourg, Netherlands, Estonia, Greece and UK.

CONCLUSION

Based on the findings analysis, it seems that from the viewpoint of income generation, the most important are high investments into variable inputs linked with relatively low labour inputs.
The labour and land productivity has increased measurably, indicated by the agricultural output per hectare and per worker.

In Romania, taking into account the number of employed population and the production value obtained, the labour productivity in agriculture is far below the EU countries over agriculture. Thus, calculated based on the total value of agricultural production, the factors which influence the productivity of labour are the following:

1. The productivity of land is in average, of 2.9 times in 2000 year at 1.7 times in 2007 year lower than that recorded in the EU 27;
2. The productivity of labour is in average, of 9.7 times in 2000 year at 4.2 times in 2009 year lower than that recorded in the EU 27;
3. Productivity of fixed capital consumption exceeds the EU average - 27 and is higher than in Germany, Austria, Italy, and UK. In comparison with Romania, the highest values are achieved by Bulgaria (3.3 times) and Slovakia (3.5 times).
4. Productivity of intermediate consumption is higher than the EU average - 27 (1.5 times in 2000 year and 1.03 times in 2009 year) and the smaller of Greece, Spain and Italy, (from 1.5 times in 2000 and 1.4 times in 2009 year).

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LIGHT REGIME IN APPLE PLANTATIONS IN FUNCTION OF FOLIAR FERTILIZATION

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Key words: *Apple, solar radiation, foliar fertilizer*

Abstract

Light regime was studied in the variety Golden Delicious grafted on M 26, led after slink spill located within the meaning N-S. 4x2 m planting distance measurements were made clear during the 7 to 17 o'clock to 2 o'clock on each height of 0.7 m, 1.5 m and 2.5 m of the ground surface.The intensive apple orchards with row orientation purposes N-S, during the day, the eastern row of trees receiving 51.5%, 28.2% crown center and the west 45% of the total radiation. Shade covers a larger area in the morning and evening hours, but is worse at 13 when the sun is in zenith. Light regime in the orchard was determined by the intensity of solar radiation incident on the volume and internal structure of the canopy. Planting apple trees driven by time thin, lying between growth and fructification, allows interception of 20.4% of the total light intensity of radiation.

INTRODUCTION

One of the main ecological functions of ecosystem fruit growing is a facility energy conversion increased of solar radiation in chemical energy related in fruit, a series of research carried out in State Agrarian University of Moldova have as object at the fruit bioenergetics systems [4, 8, 7, 3, 6, 9; 10, 5; 1,2]. The system of light through agrophitotehnie can be infinitely adjusted in an orchard in order to intercept all solar energy photosynthetic active substance.

MATERIAL AND METHOD

The investigations were conducted in 2009 in the apple orchard firm "Zubreşti" SA, planted with grafted trees aged 1 year Zubreşti village, district Străşeni. Establishment of plantation has been carried out in spring 2003 with the Golden Delicious variety, grafted on M26 rootstock. Planting distance of 4x2 m. Fruit trees are driven by slink spill rows located from north to south. Light regime was studied in the upper and lower row of trees in the sunny and shaded row at various heights, and interval times within a day with pyranometer Universal M-80 and GSA-1 galvanometer. Reading of it made in late July, in fine from 7 am until 17 o'clock after each 2 hours, when the leaf area reaches maximum size and solar radiation is highest. Measurements were made in the crown center along the central axis and the crown area hook height of 0.7, 1.5 and 2.5 m from ground surface in the center plane of symmetry of the crown and 0.5 m away from him towards the direction of the lines [4; 12].

Table 1 Type of mineral fertilizers, the concentration and the performance of foliar treatments.

Nr.	Period performance foliar treatments	Variant, nutrient concentration,%			
		V1 control	V2	V3	V4
Urea $(NH_2)_2CO$					
1	When 75% of the flowers have fallen	Water	0.4	0.5	0.6
2	When the fruits have a diameter of 10-12 mm	Water	0.7	0.8	0.9
3	When the fruits have a diameter of 25-30 mm	water	1.0	1.1	1.2
Poly- Feed					
4	When fruits are ripe stage	water	0.1	0.1	0.1
Calcium chloride $CaCl_2$					
5	With 4 weeks before harvest	water	0.5	0.6	0.7

Light intensity in crown was determined by foliar fertilization of trees (Table 1). For leaf nitrogen fertilization was used as Urea with 46% active substance, consuming 1000 liters per hectare in that concentration. The first treatment was applied after flowering (75% of the flowers have fallen) in a dose of 0.5%, second - when fruit were 10-12 mm in diameter in a concentration of 0.8% and the third - when fruits were diameter of 25-30 mm.In treatment 4, during ripen stage fruit, Poly-Feed product to use a dose of 0.1% having constituted the report 19:19:19 NPK nutrients and micronutrients 6 (Fe, B, Mn, Zn, Cu, Mo). In treatment 5, with 4 weeks before harvesting the fruit, we used calcium chloride concentration of 0.6%.

RESULTS AND DISCUSSIONS

Among environmental factors, light is one of the most important factors as the source of energy that causes organic production. The driving of the tree greatly influences the amount of solar energy captured by leaves. The main factors are determinants of the lighting system geometric shape and size of the trees crown, leaf area density and structure, subject to particular training associations foliage variety / rootstock, environmental conditions and applied technologies, how the sitting and planting distances, driving and cutting system. (4,6, 10).

Analyzing the distribution of light in the crown of Golden Delicious apple varieties, grafted on M26, in the day, we find that the crown is subject illumination light intensity and foliar fertilization (Fig. 1). Analyzing the data presented that the version control at 7 o'clock, at a height of 0.7 m from the surface, is better illuminated the eastern and central crown (0,12-0,20 cal/cm^2 x min) . At the height of 1.5 m above the ground observed the same legitimate at the same height of 0.7 m. At 2.5 m height from the ground all parts of the crown are illuminated well and receive the same amount of solar energy (0,24-0,26 cal/cm^2 x min).

At 9 o'clock, the sun above the horizon height increase radiation output areas of the crown increases in all. Mean while, the smallest amount of solar radiation falls from height 0,7-1,5 m above the ground in the west (0,07-0,12 cal/cm^2 x min) and in the central (0.07 -0.15 cal/cm^2 x min) for the crown. At the top of the crown all parties are well lit (0,39-0,47 cal/cm^2 x min).

Analyzing the distribution of solar variations with foliar fertilizer application, we find that it varies analog version control. In the morning hours (7-9) regardless, the application of foliar fertilizers, solar radiation intensity in the eastern and western crown rise from the bottom to the top.

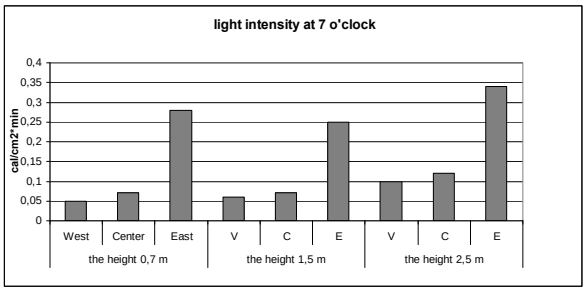
At 11 o'clock all areas have been illuminated better crown. Eastern crown receive more solar energy (0,56-0,70 cal/cm^2 x min) compared to the west (0,15-0,33 cal/cm^2 x min) and the crown center (0,11-0,28 cal/cm^2 x min).

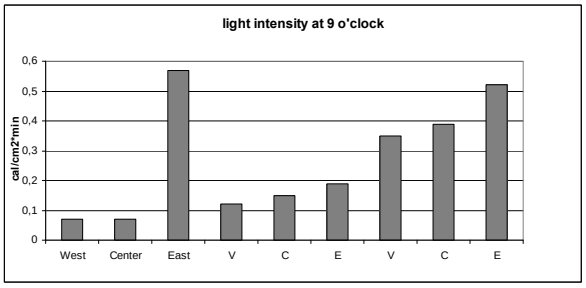
At 13 o'clock, while the top of the crown, receiving the direct solar radiation unhindered 0,89 -0.99 cal/cm^2 x min at 0.7 m above the ground eastern crown horse receives 0,39-0,49 cal/ cm^2 x min, or 49.5%, the west 0,36-0,52 cal/cm^2 x min, or 52.5%, and the center crown 0,27-0,38 cal/cm^2 x min or 38.3% of solar energy. At 13 o'clock overall vegetative crown illuminates the best and least vary the intensity of light in the east to the west. The interpenetration crown of areas of interior adjacent axis and lighting-less.

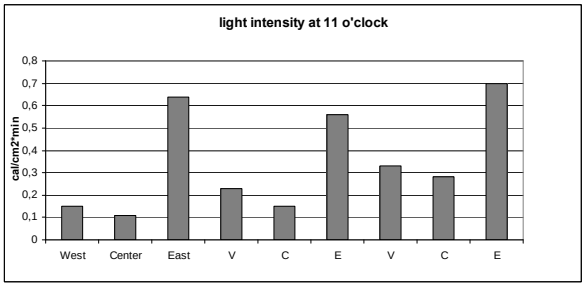
At 15 o'clock the solar radiation is highest in the west (0,29-0,94 cal/cm^2 x min) and eastern (0,15-0,78 cal/cm^2 x min) for the crown. The amount of solar radiation in the center of the crown is 0.23 min cal/cm^2 x min 0.7 m from the ground up to 0.80 cal/cm^2 x min high 2.5 m. The variant with foliar fertilization observed in the distribution of solar radiation principle crown areas, set for version control.

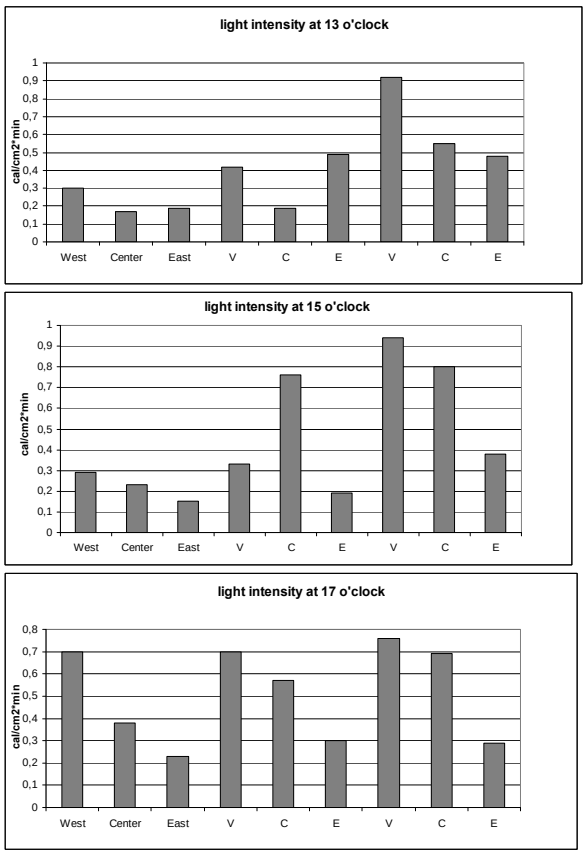
At 17 o'clock the west of all vegetation receives 0,70-0,76 cal/cm^2 x min and less central part (0,38-0,69 cal/cm^2 x min) and eastern (0,23-0.30cal/cm^2 x min) the crown.

Analyzing the distribution solar radiation in the crown during the day (Fig. 2) shows that the intensity of solar radiation increases as height gradually increases from the sun above the horizon at 7o'clock to 13 o'clock and there after gradually decreases with decreasing height of the sun to horizon. In the vertical plane of the crown, its height, and increasing penetration of solar radiation in the crown of the tree 0.7 m above the ground to tree crown, as the day, receiving 30%, from 1.5 m - 38.3% and 2.5 m - 79.7% of the total radiation.Analyzing the distribution of solar radiation in the crown during the day, we find that all the vegetation in the eastern row of trees receiving 48.8 to 51.5%, crown center from 26.3 to 28.2% and the west 41 to 45 % of total radiation (0.99 cal/cm^2 x min).



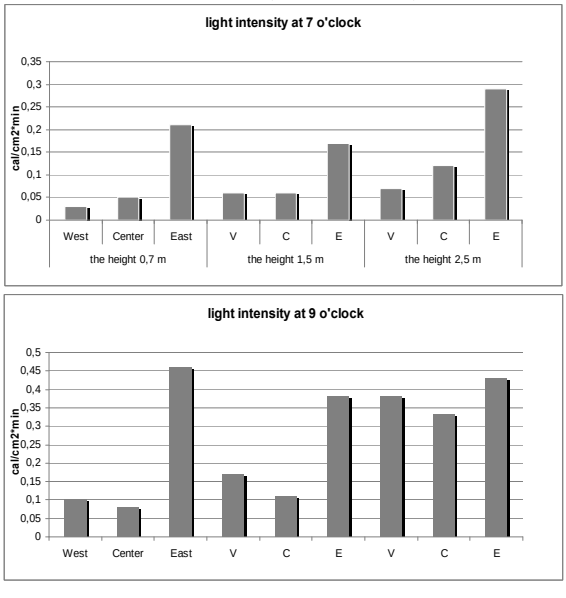


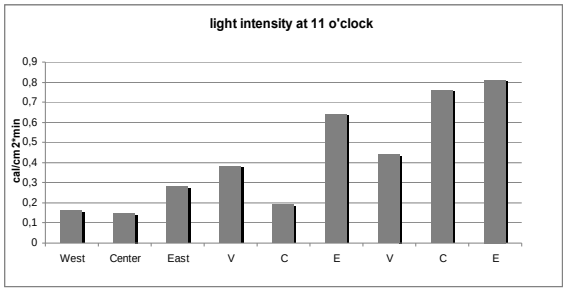


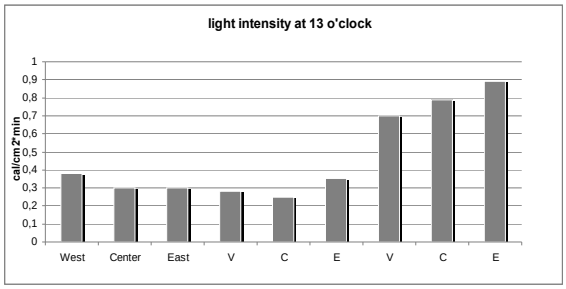


A) Control variant

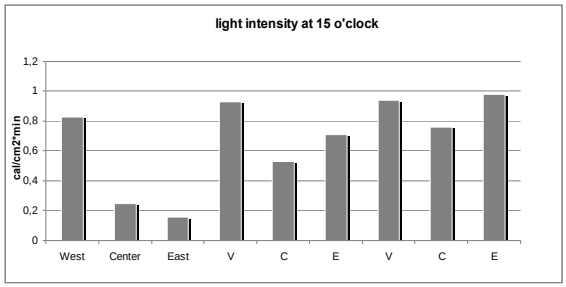
Fig. 1: Crown light regime in Golden Delicious apple variety,
Grafted on M26, aged 7 years depending on foliar fertilization (Zubreşti, 2009)

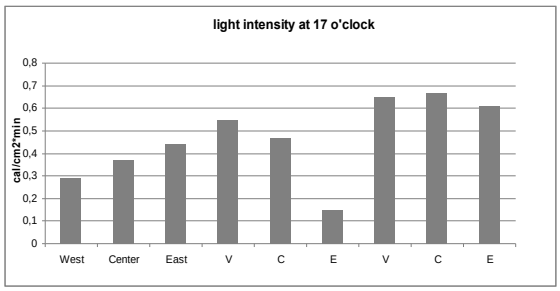






This explains the fact that intensive orchards, where trees on crown form continuous line, all those they receive sufficient radiant energy. From this arise, the plantations of trees led by thin time, the amount of radiant energy that is all vegetative exceed the lower threshold of photosynthesis and allow formation of a physiological balance for growth and fructification.





B) variant 3

The dynamic range between the lines and shading of solar radiation entering the crown practically was not affected by foliar fertilizer application. Thus, at 7 o'clock in the crown of trees penetrated 23% of the total light. As the angle of incidence of the decrease in sun light falling downward and the amount of solar radiation on the shadow projected by the crown.

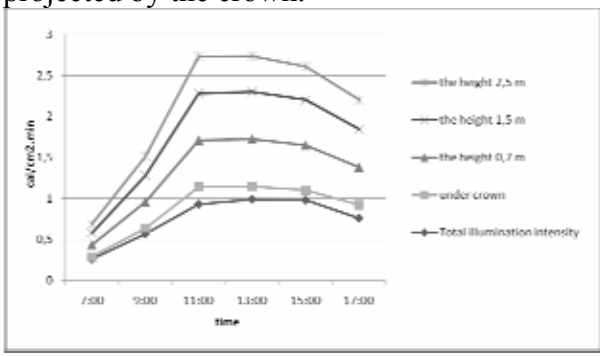


Fig.2: Dynamics of the solar system in the crown of the apple variety Golden Delicious,grafted on M26, aged 7 years depending on foliar fertilization (Zubreşti, 2009)

The amount of solar radiation through the whole vegetative ground arrived at the tree between the hours of 9- 11 o'clock is 81.7% of the energy it receives top crown. Minimum of solar radiation on the shadow projected 17.1% was recorded at 13,1% when the sun is in zenith. Solar afternoon arrived at the assembly ground vegetation is 20.4% of total energy.

CONCLUSIONS

1. The Intensive apple orchards with row orientation purposes NS, during the day, the eastern row of trees receiving 48.8 to 51.5%, Crown Center from 26.3 to 28.2% and the west 41 to 45 % of total radiation. Shade covers a larger area in the morning and evening hours, but is worse at 13 when the sun is in zenith.
2. Light regime in the orchard was determined by the intensity of solar radiation incident on the volume and internal structure of the canopy. Planting apple trees driven by time thin, lying between growth and fructification, allows interception of 51.5% of the total light intensity of radiation.

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