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Cuprins:

STUDY ABOUT DIFFERENCES ON PB ACCUMULATION AMONG PLANT TISSUES

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Abstract: ***Pollution of agricultural land by heavy metals has imposed an increasingly serious risk to environmental and human health in recent years. Heavy metal pollutants may enter the human food chain through agricultural products and groundwater from the polluted soils. Progress has been made in the past decade on phytoremediation, a safe and inexpensive approach to remove contaminants from soil and water using plants. If we can find crop germoplasms (including species and varieties) that accumulate heavy metals in their edible parts, such as the leaves of vegetables or grains of cereals, at a level low enough for safe consumption, then we can grow these selected species or varieties in the lands contaminated or potentially contaminated by heavy metals. If we can find crop germoplasms that take in low concentrations of heavy metals in their edible parts and high content of the metals in their inedible parts, then we can use these selected species or varieties for soil remediation. In this study, the feasibility of the method is assessed by analyzing Pb concentrations in edible and inedible parts of varieties of maize (Zea mays) grown in Pb-contaminated soils.***

Key words: *pollution, Pb-contaminated soils, heavy metals, Zea mays, EDTA-Na2 solution.*

Introduction

With the development of industries and modernization of agriculture, soil pollution has become more increasingly serious. The heavy metal concentrations are so high in soils of many areas that they can poison the soil-plant system, degenerate the soil, and reduce the quality and products of crops. Moreover, they can threaten the health of animals and human beings upon entering the food chain. Although remediation of heavy metal contaminated sites has become a major issue in the international community, most of the traditional physical and chemical methods for the remediation are extreme in either cost or time spending. So it is difficult to remediate large areas of the contaminated agricultural soils. Scientists are finding new ways to remediate the heavy metal contaminated sites to solve the problems, but there should be no more time to wait.

Pb is a major contaminant that can influence the function of procreation and the immunity of genitalia tumour of organisms, including humans. As Pb enters the soil, it can bring a biological response making roots poisoned and causing plant death.

Because the abilities to absorb and accumulate heavy metals is different for different plant species, varieties and tissues, the feasibility using crop species or varieties with lower heavy metals accumulation capability is valuable to study for decreasing the risk of heavy metals entering the food chain from the contaminated soil. Furthermore, if a species or variety produce large inedible biomass, in which volume of heavy metals accumulated are large enough to remove the heavy metals from soil effectively, and simultaneously the heavy metal concentration in its edible parts is low enough to ensure food safety, the species or variety shall be useful for both food production and soil remediation.

Maize (Zea mays L.) has large vegetative biomass and is one of the most important crops in Romania and in the

world. The aim of this study was to find maize varieties with lower Pb concentrations in their grains that do not exceeded the maximal Pb limitation, but with higher Pb concentrations in their non-edible parts to evaluate the feasibility of the method above-mentioned.

Materials and methods

The experimental site was located in Simnic, Dolj county. The average annual temperature is 22.0°C (39°C for the highest and -3°C for the lowest) and the annual rainfall is 315 mm.

» *The tested soil and maize varieties*

The soil used in this experiment is composed of organic fertilizer, pond mud taken from the local pond and sand at the proportion 3:6:1. The organic fertilizer was made of wood bits, cotton shuck and pig dung, and composted for two months. The soil was air-dried at room temperature followed by sifting with a 2 mm sieve, and its water content is about 8%. Contents of organic matter, NH4+-N, available P, available K, and total Pb were 7.30%, 0.48%, 0.17%, 0.91% and 195.55 mg/kg, respectively, and pH value was 6.7. Twenty-five maize varieties were tested. To avoid commercial issues, serial numbers from high to low according to the Pb concentrations in the roots were used instead of names of the varieties.

» *Pot experiment*

Plastic pots with 20.5 cm inner diameter and 18 cm height were filled with the air dried soil at 5 kg/pot. Pb added (treatment) and no Pb added (control) were conducted, and three pots were cropped as replication for each variety under both the control and the treatment. As to the Pb treatment, soils of each pot were mixed with the Pb solution containing Pb (NO3)2 3.20 g, and the final Pb concentration was 595.55 mg/kg. The soils were allowed to stabilize for 10 days in a green house. To prevent Pb loss, three pots of the same treatment were put in a big box and all the water in the box was averagely re-watered into the three pots. In the end of the experiment, the average Pb concentrations were 400.15 mg/kg and 160.67 mg/kg under the treatment and the control, respectively.

On April 8th, 2007, healthy even seeds were sown into the pots at eight seeds per pot. In the 12th day and the 20th day, 2–3 seedlings and 1 seedling per pot were remained, respectively. The pots were watered to keep soil moisture, and the seedlings were fertilized with compound fertilizer (N:P: K = 15:15:15) at 8 g and 18 g per pot in the seedling and flowering period, respectively. Plant tissue samples were harvested on July 15th, 2007.

» *Sample preparation and Pb analysis*

All maize roots samples were soaked in EDTA-Na2 solution (0.01 mol/L) for 15 min to remove the heavy metals adhered in root surface and then rinsed with deionized water. After drying to constant weight at 105°C for 48 h, all roots, shoots (including core), leaves and grains (only the edible parts) samples were milled with mortar and pestle and sieved through a 100 meshes plastic sift, then airproofed and kept in refrigerator at 4°C.

Pb concentrations of all of the samples were determined with a flame atomic absorption spectrophotometer (FAAS, Buck 200AA) following HNO3-HClO4 (4:1, v/v) digestion procedures with a microwave decomposition device. All reagents used were of analytical grade.

Results and discussion

» *Pb concentrations in different tissues of the tested varieties*

Under both the Pb treatment and the control, the Pb concentrations in different tissues were roots>shoots leaves >grains (Table

1). The average Pb concentrations in the tested tissues were 210.11, 66.49, 62.08 and 0.24 mg/kg for root, shoot, leave and grain, respectively, under the Pb treatment, and were respectively 5.7, 5.9, 6.0 and 1.0 folds higher than those under the control (31.50, 9.60, 8.88 and 0.12 mg/kg).

Ranges of Pb concentrations of the tested varieties were 84.17–427.68 mg/kg in root, 25.19–109.27 mg/kg in shoot, 29.35–125.22 mg/kg in leave and 0.15–0.60 mg/kg in grain, under the Pb treatment, and they were 10.29–56.25, 2.31– 19.68, 2.59–16.20 and 0.06–0.21 mg/kg, respectively, under the control. The variations of Pb accumulation in all the tested tissues among the tested varieties were greater under the Pb treatment than under the control. The coefficients of variation (C.V.) for vegetative tissues ranged from 35% to 37%, lower than that in grain (47%).

Under the Pb treatment, there were 12 varieties with Pb concentrations in grain exceeded the maximal Pb limitation (0.2 mg/kg) of the National Food Hygiene Standard of China (NFHSC). Under the control, only 1 variety exceeded the limitation. Under the Pb treatment, the variety with the highest Pb concentrations in roots (var. No.1) had Pb concentrations in shoots and leaves for 109.27 and 93.57 mg/kg, respectively, but its Pb concentration in grains was only 0.19 mg/kg, which did not exceeded the limitation of the NFHSC. Variety No. 5 was also a noticeable variety, which had higher Pb concentrations in root, the second high Pb concentration in shoot and the highest Pb concentrations in leave and grain, indicating a high efficiency in translocation of Pb.

» *Grain biomasses of the tested varieties*

Grain biomasses of the tested varieties are shown in Table 2. Under the control, average biomass of the grains was 111 g/plant, and the highest one was variety No.4 (176 g/plant), while under the Pb treatment, the average was only 98 g/plant, 12.6% lower than that under the control. There were 22 varieties whose grains biomass decreased under the stress of Pb, and the range was 0.9% to 38.1%.Grain biomasses of the varieties No.1–3 and No. 6 that were with higher Pb concentrations in roots were significantly higher than the others under the Pb treatment. When comparing to the control, the grain biomasses of varieties No.1, No.2 and No.6 with the rather high Pb concentrations in roots had some decrease. The grain biomass of variety No.4 decreased for 5.8%, while variety No.5 had the largest decrement (38.1%). Only little variation in grain biomasses was observed, but variation in the changes caused by the Pb stress was rather great (C.V. = 88.5%).

» *Total Pb accumulation in the vegetative tissues of tested varieties*

Table 2 shows the total Pb volumes in the vegetative tissues of tested varieties. Under the control, the total Pb volumes were less than 6.45 mg/plant, and the average was 3.84 mg/plant, and total Pb volumes of varieties No.1–6 were significantly higher than others. While there was averagely six folds higher Pb volume under the Pb treatment when comparing to that under the control, and the average was 24.63 mg/plant. The total Pb volume of variety No.1 had the highest total Pb volume in vegetative tissues, and it was 51.69 mg/plant under the Pb treatment, 10.8 times of that in the control. The total Pb volumes accumulated in the vegetative tissues of varieties No.3, No.5 and No.6 were more than 30 mg/plant, and those of the other varieties ranged from 13–27 mg/plant.

Table 1

Pb concentrations in root, stem, leaf and grain of the tested maize varieties (mg/kg)

Var. No.	Root Pb treat.	Root Control	Stem Pb treat.	Stem Control	Leaf Pb treat.	Leaf Control	Grain Pb treat.	Grain Contr.l
1	427.68 [a]	34.57 [ef]	109.27 [a]	8.09 [ghi]	93.57 [b]	9.50 [defghi]	0.19 efghi	0.10 [def]
2	325.77	38.79 [de]	86.35 [c]	13.50 [b]	88.37 [c]	12.79 [abc]	0.19 efghi	0.11
3	306.81	41.16 [cd]	85.37 [c]	11.52 [bcde]	80.65 [d]	8.62	0.17 [ghi]	0.11
4	302.82	32.24 [fghi]	100.24	10.95 [bcdef]	92.52	13.58 [ab]	0.21	0.12
5	300.25	47.12 [b]	108.48	12.68 [bc]	125.22	12.61 [abcd]	0.60 [a] *	0.11
6	289.92	28.64 [ghij]	99.65 [b]	10.23 [cdefg]	95.64 [b]	8.65	0.18 efghi	0.11
7	239.81	35.40 [ef]	74.06 [d]	7.56 [ghi]	65.27 [e]	5.62 [hij]	0.26 [cde] *	0.18
8	236.97	26.53 [j]	88.60 [c]	12.55 [bc]	56.06	10.37 [bcdef]	0.29 [cd] *	0.21 [a]
9	232.66	43.90 [bc]	65.19	19.68 [a]	48.95 [ij]	16.20 [a]	0.49 [b] *	0.07 [ef]
10	218.49	25.67 [j]	53.30 [h]	7.20 [hi]	48.05 [ij]	9.78	0.47 [b] *	0.13
11	211.80 [f]	32.77 [fgh]	68.61 [e]	6.66 [i]	62.09	8.38 efghi	0.19 efghi	0.15
12	193.91	28.60 [ghij]	62.09 [g]	11.69 [bcd]	55.67	10.09 [bcdef]	0.26 [cdef] *	0.14
13	189.65	44.34 [bc]	74.09 [d]	8.65 [fghi]	48.64 [ij]	7.00 [fghi]	0.17 [ghi]	0.11
14	186.06	20.33 [k]	63.41	6.53 [i]	35.18 [l]	5.69 [ghij]	0.19 efghi	0.09 [def]
15	184.64	12.29 [lm]	25.19 [l]	2.31 [j]	29.35	2.59 [j]	0.32 [c] *	0.20 [ab]
16	163.54 [i]	36.40 [ef]	45.06 [i]	8.86	38.88	8.14 efghi	0.25 [cdefg] *	0.10 [def]
17	159.67	28.25 [hij]	56.26 [h]	9.06	41.03 [k]	8.14 efghi	0.15 [i]	0.10 [def]
18	159.31	25.08 [j]	56.37 [h]	11.06 [bcdef]	48.19 [ij]	8.69	0.24	0.09 [def]
19	156.76	56.25 [a]	40.26 [j]	6.38 [i]	46.36 [j]	9.67	0.19 efghi	0.11
20	154.25	15.85 [kl]	32.69 [k]	9.37	48.62 [ij]	5.37 [ij]	0.20 efghi	0.12
21	150.06	10.29 [m]	34.60 [k]	6.56 [i]	52.19	5.10 [ij]	0.17 [fghi]	0.06 [f]
22	144.22 [l]	28.16 [ij]	57.28 [h]	7.63 [ghi]	59.58	8.25 efghi	0.16 [hi]	0.10 [def]
23	120.27	33.04 [fg]	43.40 [ij]	9.68	48.58 [ij]	8.76	0.22	0.12
24	113.23	27.51 [j]	66.99	12.96 [b]	63.18	11.09 [bcde]	0.21	0.12
25	84.17 [o]	34.40 [ef]	65.39	8.63 [fghi]	80.13 [d]	7.21 efghi	0.15 [i]	0.09 [def]
Mean	210.11	31.50	66.49	9.60	62.08	8.88	0.24	0.12
C.V.	37.8	33.8	35.3	34.8	37.1	33.4	46.9	29.4

Notes: Different letters within the same column indicate significant difference at $p<0.05$ level according to LSD test; * Varieties that Pb concentrations in grain exceeded the maximal Pb limitation (Pbh0.2 mg/kg)

Conclusions

Pb concentrations in soils conducted in the present experiment were at light and medium contamination levels under the control and the Pb treatment, respectively. There was no Pb added artificially under the control, where the Pb was originally existed in the tested soil, indicating the widespread Pb contamination in agricultural soil. Although the Pb concentrations in grains of the tested varieties were generally at safe level, there was one variety that the Pb level exceeded the maximal Pb limitation of the NFHSC, and there were other three varieties accumulated Pb for more than 0.15 mg/kg, being rather close to the limitation. When the soil was exposed to Pb at medium contaminating level, Pb concentration in

grains of almost half of the tested varieties exceeded the limitation. This meant that Pb translocate relatively easily from vegetative tissues to grain for maize. In variety No.1, Pb concentrations in grains were 0.20 mg/kg as the Pb concentration in soil was 25.8 mg/kg, and Pb concentrations in grains were 0.44 and 0.41 mg/kg when 500 mg/kg PbCl2 and Pb (NO3)2 were added, respectively. In the irrigated fields using sewage drained, Pb concentrations in grains of maize of all three investigated sites exceeded the limitation, and the ranges were 0.673–0.886 mg/kg, 1.097– 1.746 mg/kg and 0.480–1.221 mg/kg, respectively. Therefore, a conclusion could be made that there is a high risk of

Table 2

Grain biomass and total Pb in the vegetative tissues of the tested maize varieties

Varieties	Grain biomass (g/plant)			Total Pb in the vegetative tissues (mg/plant)		
	Pb treatment	Control	Increment (%)	Pb treatment	Control	Increment (folds)
No.1	115 ab	116 cde	-0.9	51.69 a	4.37 bcdef	10.8
No.2	120 a	115 cde	4.3	41.93 b	5.05 b	7.3
No.3	116 ab	116 cde	0.0	39.13 c	5.17 b	6.6
No.4	109 bc	176 a	-38.1	41.36 b	4.41 bcdef	8.4
No.5	81 hi	86 i	-5.8	33.88 e	4.86 bc	6.0
No.6	121 a	118 cde	2.5	36.65 d	3.62 fg	9.1
No.7	88fghi	110 ef	-20.0	25.82 f	3.73 efg	5.9
No.8	95def	104 fg	-8.7	26.61 f	4.06 cdefg	5.6
No.9	94 ef	96ghi	-2.1	24.55 fg	6.45 a	2.8
No.10	92efg	122 def	-24.6	22.78 gh	3.36 g	5.8
No.11	100 cde	108 ef	-7.4	25.46 f	3.74 efg	5.8
No.12	105 cd	124 bc	-15.3	20.23 ij	3.64 fg	4.6
No.13	97def	111 ef	-12.6	21.48 hi	4.57 bcd	3.7
No.14	83 ghi	89 hi	-6.7	18.65 jk	2.45 h	6.6
No.15	90fgh	108 ef	-16.7	15.16 mn	1.22 i	11.4
No.16	120 a	132 b	-9.1	19.38 jk	4.50 bcde	3.3
No.17	91efg	108 ef	-15.7	18.82 jk	3.52 g	4.3
No.18	92efg	111 ef	-17.1	18.18 jkl	3.47 g	4.2
No.19	88fghi	96ghi	-8.3	14.99 mn	4.81 bc	2.1
No.20	104 cd	115 cde	-9.6	18.83 jk	2.37 h	6.9
No.21	80 i	104 fg	-23.1	14.06 n	0.79 i	16.8
No.22	81 hi	86 i	-5.8	18.17 jkl	3.47 g	4.2
No.23	81 hi	112 def	-27.7	13.75 n	3.90 defg	2.5
No.24	95def	97 gh	-2.1	17.90 kl	4.15 cdefg	3.3
No.25	93 ef	125 bc	-25.6	16.35 lm	4.43 bcdef	2.7
Mean	97	111	-12.6	24.63	3.84	6.0
C.V.	13.5	16.2	88.5	41.7	31.4	55.3

Notes: Different letters within the same column indicate significant difference at $p<0.05$ level according to LSD test; Increment (%): (Pb treatment/ Control-1)x100; Increment (folds): Pb treatment/Contriol-

growing maize in soil where is contaminated by Pb, although the concentration in soil is not so high.

Another risk is that when exposed to high Pb concentrations, the growth of maize changed slightly. In the present study, the biomass of grains of more than half of the tested varieties decreased only slightly under high Pb concentrations, which meant that maize still grown well when Pb contamination in soil was at a high level enough to result in grain Pb pullution. In 2006 reported a normal growth of a maize variety (No.1) when grown in the soils where 4000 mg/kg PbCl2 or Pb(NO3)2 were added. Thus, because Pb contamination cannot be easily warned from the yield change caused by the Pb contamination in soil, there is an extra risk that the maize products polluted by unknown Pb contaminations in soils.

There was great variation of Pb accumulation among the grains of maize varieties. Pb concentrations in grains of 52% of the tested maize varieties did not exceed the limitation under the 596 mg/kg Pb exposure.Differing from the most tested varieties that followed the positive correlation in Pb concentrations between grain and vegetative tissues, some varieties, such as varieties No.1–3 and No.6, were with low Pb concentrations in grains (less than the NFHSC), but with high Pb concentrations in vegetative tissues, which meant that there was low Pb translocating rate from the vegetative tissues to the grains, although the rate from roots to shoots and leaves was rather high. Therefore, we could infer that there might be a mechanism that hinders the Pb transfer from shoots and leaves to grains. The varieties are possible to be used for both maize production in the filed contaminated by Pb at certain level (fitting to the Pb accumulation in grain of the maize varieties) and bioremediation of the soils, if their genetic stability of Pb accumulation and the adoptability in multi-metal contaminated site were proved by further investigations.
Some other varieties with unique Pb accumulating characters found in this study, such as the extreme low Pb uptake (No.25), the low Pb translocation from roots to shoots and leaves (No.15), the high Pb translocation from tissue to tissue including to grain (No.5), may be useful for studying the Pb absorbing and translocating mechanisms in maize.

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INNOVATIVE STRATEGIES AND OPERATIVE MACHINES FOR SUSTAINABLE MANAGEMENT OF WEED FLORA IN AGRICULTURE AND URBAN AREA IN CENTRAL ITALY

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Abstract: ***Weed management is absolutely one of the most serious problems, both in agriculture and urban or sub-urban areas. Concerning the first case, weed control is particularly difficult when applied to organic agriculture and in general to vegetable crops, while urban areas ordinary treatments (herbicide application or mechanical mowing) are usually expensive, not very effective, dangerous and ruled by strict laws in Italy. Since 2002 the University of Pisa has been researching on innovative strategies and machines for physical weed control on the most widespread vegetable crops and in urban areas, in cooperation with the municipalities of San Giuliano Terme, Vecchiano, Livorno and Pisa. Very interesting results were achieved on spinach, cabbage, tomato and on many typology of hard surfaces located in different areas in the cities of Pisa and Livorno, concerning yield (only in agriculture), weed suppression, operative and economic parameters. Further trials in urban and sub-urban areas are ready to start in the municipality of San Giuliano Terme.***

Key words: *agriculture and urban or sub-urban areas, operative machines, hard surface.*

Introduction

Weed management is absolutely one of the most serious problems, both in agriculture and urban and sub-urban areas (Bàrberi, 2002; Peruzzi et al., 2005; Peruzzi et al., 2006; Peruzzi et al., 2007).

Concerning the first case, weed control is particularly difficult when applied to organic agriculture (according to the lack of chemical products for weed control) and in general to vegetable crops (as a consequence of the low competitive ability characterizing these kind of crops) (Bàrberi, 2002; Peruzzi et al., 2005; Peruzzi et al., 2006). Moreover the sensibility and the attention of consumers to food safety and quality has been continuously increasing during the last three years, as the organic food (especially fresh vegetables and fruits) home consumption, both in Italy and Europe (De Ruvo, 2008; van der Weide et al., 2008). Furthermore in-row hand weeding is a very common and expensive operation in organic and conventional vegetable farming as a consequence of the lack of effective specific machines (Fogelberg, 2007; van der Weide et al., 2008). Finally, vegetable crops are generally classified as "minor crops", so that there are not enough registered and effective a.i. because of the high cost of labelling (Fennimore, 2008; Fennimore & Doohan, 2008).

Concerning urban areas (that is a "critical" context considering the high and frequent human and pet presence), hard surface ordinary treatments (herbicide application or mechanical mowing) are usually expensive, not very effective, dangerous for citizens health (because of the potential presence of chemical residues or dangerous material spreading) and ruled by strict laws both in Italy and Northern Europe (Peruzzi et al., 2007; Kristoffersen

et al., 2008). For that reason there is a clear need to transfer the physical weed control technologies also in urban area in order to sensibly low environmental pollution and human risks.

Since 2002 the University of Pisa has been researching on innovative strategies and machines for physical weed control on the most widespread vegetable crops (spinach, tomato, cabbage, etc.) and in urban areas, in cooperation with the municipalities of San Giuliano Terme, Vecchiano, Livorno and Pisa. Moreover, further experiments in urban and sub-urban areas started in the municipality of San Giuliano Terme.

Materials and methods

» Researches carried out on vegetable crops

On-farm experiments were carried out in the Province of Pisa (Tuscany, Central Italy), since 2002, with the aim to test innovative operative machines for physical weed control on the most important vegetable crops characterizing the area (spinach, processing and fresh market tomato and cabbage).

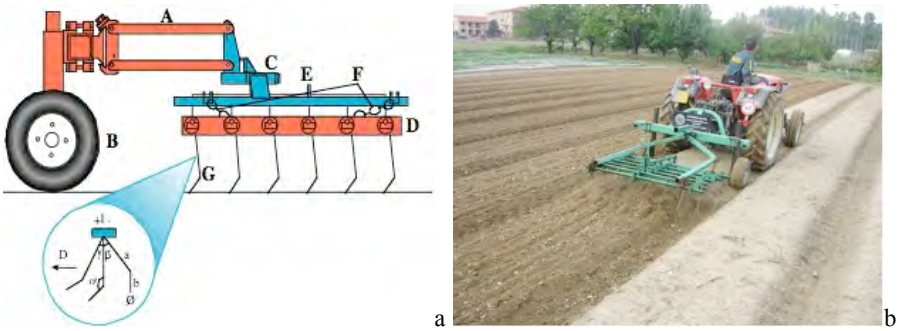
This activities were promoted and funded by the municipalities of San Giuliano Terme and Vecchiano, two important villages standing very close to Pisa, in order to sensibly reduce herbicides distribution and to preserve environment and citizens and consumers health.

» The innovative strategies and machines for physical weed control

The strategies adopted for physical weed control on vegetable crops were always characterized by the use of false or stale-seedbed technique and selective post-emergence/transplanting hoeing intervention.

False seedbed technique consisted in two or more passes with on purpose made operative machines for very shallow tillage aiming to stimulate weed emergence and control actual weed flora. Stale seed-bed technique includes also one or more thermal intervention (i.e. open flame flaming). Both the techniques aim to deplete superficial weed seedbank.

The spring-tine harrow is the first machine utilized for stale-seedbed technique on organic spinach (Fig. 1). The working tools are 6 mm diameter J-shaped special steel spring tines placed on a modular frame in six rows. The spring tines are made up of two parts: a 25 cm long vertical segment



a b

Figure 1. (a) Diagram of the spring-tine harrow: (A) main frame; (B) supporting wheel; (C) U-shaped support; (D) modular secondary frame; (E) tine slope regulation lever; (F) chains; (G) spring tines. Detail: (d) working direction; (a) = 25 cm (b) 11 = cm; Ø = 6 mm; a = 135°; b = 45°; g = 15°; (b) spring-tine harrow at work before spinach sowing.

a b

Figure 2. First version of rolling harrow during a full-width intervention before spinach sowing (a) and second version, equipped with guidance system and elastic tines for in-row weed control, during an hoeing treatment on cabbage.

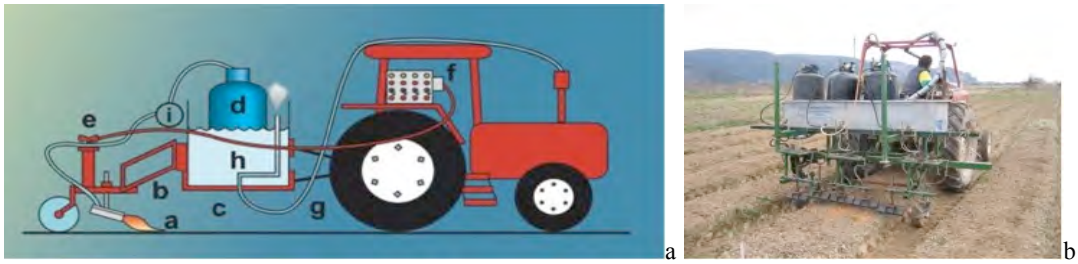


Figure 3. (a) Scheme of the flaming machine: a) burner; b) articulated parallelogram; c) hopper containing water; d) LPG tank; e) shelf on which the inflow LPG control system is located; f) electronic led panel; g) flexible pipe collecting exhaust emissions to heat exchanger h) heat exchanger i) pressure regulator and manometer.
(b) flaming machine at work before spinach emergence.

a b

Figure 4. (a) Precision hoeing for narrow inter-row spaces during a post-emergence intervention on spinach; (b) precision hoeing for wide inter-row spaces during a post-transplanting intervention on processing tomato.

and a second shorter, 11 cm long segment (sloping at an angle of 135° with respect to the vertical segment). It is possible to adjust the slope of the tines and consequently the aggressiveness of treatment by means of a on purpose lever . In this trial the spring tine harrow was set to the most aggressive regulation (+ 15°) and was used for non-selective pre-sowing treatment, at a driving speed of 8 km h-1.

The rolling harrow was projected, built, tested and patented by Pisa University. It was set up both for pre-sowing (or pre-transplanting) and post-emergence precision hoeing (for inter-row and intra-row selective weed control) interventions (Fig. 2). As a matter of fact, the last version of this machine is equipped with a hand guidance system and elastic tools for in row weed control (Fig. 2b). Working tools are spike disks (placed in the front) and cage rolls (placed at the rear), respectively mounted on two different parallel axles. The axles are connected by an overdrive with a ratio equal to 2. Spike discs till the soil very shallowly while cage rolls (rotating with a double peripheral speed) allow to separate weed seedling roots from soil. Working speed ranges from 5 to 8 km h-1 and working depth is about 4 cm.

The flaming machines have a working width of 2 m at maximum and are equipped with eight 25 or four 50 cm wide rod burners. This treatment has the advantage of controlling weeds without stimulating new emergence because the soil remains undisturbed. The machine is equipped with 4 ordinary 15/25 kg weight LPG tanks placed into an on purpose made hopper. Furthermore this machine is also equipped with an innovative heat exchange system, in order to avoid tanks cooling. The treatments were performed only in pre-sowing, pre-transplanting or pre-emergence phases, but if necessary, tomato and cabbage may tolerate post emergence selective flaming interventions (with the flame directed to the crop collar) (Fig. 3). Working speed can reach 7-9 km h-1, if LPG pressure of 0.3-0.4 MPa are used.

Concerning with post-emergence interventions, a 6-element precision hoe (Fig. 4a) was used in spinach while an operative machine for wider inter-row spaces was used in tomato and cabbage. The first machine is equipped with rigid elements bearing a 9 cm wide horizontal blade, pairs of concave discs, and two alternative kinds of elastic tines (torsion weeders and vibrating tines) designed to perform selective weed control in the crop rows. The second machine is equipped with rigid elements for inter-row cultivation (a central “foot-goose” tool and two side “L” shaped sweeps) and elastic teeth for intra-row selective weed control (Fig. 4b).

Both the operative machine are also equipped with an hand guidance system. Average working speed was usually about 2 km h-1 , while working depth was lower than 5 cm.

» *The on-farm experiments*

Trials were aimed to define, test and improve innovative physical weed control strategies and to compare them with the ordinary technique carried out by farmers within organic, integrated and conventional agricultural contexts. Experiments on spinach were carried out from 2002 to 2005 in organic or integrated farms (ordinary manual vs physical and chemical vs physical weed management) where the crop was cultivated on 1,4 m wide raised beds. In this case, crop space arrangement of innovative system was modified in order to improve the weeding effectiveness of the machines, passing from ordinary drilling on 8 rows to precision planting on 5 rows, without modifying the total number of seeds (500000 seeds ha-1 in any case).

Experiments on processing tomato, cultivated on paired-rows in conventional farms (ordinary chemical vs physical weed management), and fresh market tomato, cultivated on single rows in integrated farms (ordinary biodegradable plastic film use vs physical weed management plus alternative straw mulch), were carried out from 2006 to 2008.

Trials on two different botanical varieties of cabbage were also carried out from 2006 to 2009 in conventional or integrated cultivation contexts (ordinary chemical or mechanical weed control vs physical weed management).

The experimental design was always a randomized block. Operative machine performances, weed density and biomass and crop yield were assessed. Data were analyzed by ANOVA (with the exception of operative values) while LSD test was used for mean comparisons.

Results and discussion

Main results concerning on-farm experimental trials are shown in table 1, where some of the most important parameters are reported.

» *Starting from spinach,* significant differences were obtained on yield and weed biomass at harvest: innovative system allowed to reduce weed competitive pressure (about -50% of weed dry biomass at harvest) and increase crop yield (about +100%). Good results were also reached concerning manpower and economical parameters, according to a relevant increase of gross income.

Physical weed control also allowed a significant yield increase on processing tomato (about +15%), but in this case weed dry biomass at harvest, manpower requirement and variable costs were sensibly higher for the innovative system with respect to the ordinary one. However, gross income was considerably higher for innovative weed control system (about + 500 € ha-1).

» *In fresh market tomato,* the innovative physical weed control strategy allowed to obtain slightly, but not significantly higher yields with respect to the ordinary technique. In this case, weed biomass at harvest and manpower requirement were similar but sensibly higher variable costs were registered for ordinary farming system (due to the high cost of biodegradable mulching film).

Table 1. Main crop, weed, operative and economical parameters mean values analyzed during the on-farm experimental trials (different letters means significant differences at P<0.05. Manpower, costs and gross income were not analyzed).

Crop	Weed management system	Fresh Yield (Mg ha^{-1})	Weed dry biomass at harvest (g m^{-2})	Manpower for weed control (h ha^{-1})	Gross marketable production (euro ha^{-1})	Variable costs (euro ha^{-1})	Gross income (euro ha^{-1})
Spinach	Ordinary	5.4 b	91.2 a	26.7	8100.0	4868.0	3232.0
	Physical	10.6 a	38.9 b	19.6	15900.0	4168.0	11732.0
Processing tomato	Ordinary	55.1 b	36.7 ns	25.4	5553.9	3111.3	2442.6
	Physical	62.0 a	68.0 ns	46.4	6222.4	3254.9	2967.5
Fresh market tomato	Ordinary	19.5 ns	52.4 ns	31.0	11304.8	8500.1	2804.7
	Physical + straw mulch	22.4 ns	39.0 ns	27.6	13556.3	8276.5	5279.8
Cabbage	Ordinary	33.6 ns	0.0 ns	6.0	11760.1	6452.4	5307.7
	Physical	33.6 ns	0.0 ns	19.6	11742.5	6623.5	5119.0

Gross income was over than 2000 € higher for the innovative system with respect to the conventional one.

Concerning with cabbage, similar results were obtained in terms of yield and weed control with the two compared weed control techniques, while manpower requirement and variable costs were slightly higher in case of application of the innovative strategy. Thus, gross income was about 200 € ha-1 higher for the ordinary technique. However, these results could be really different if the "organic" product prize had been used for the production obtained by means of the innovative strategy. As a matter of fact, in this case the gross income of organic cabbage would be increased by about 2500 euro ha-1.

» Researches carried out on urban hard surfaces

Two specific two year experiments were carried out in the cities of Pisa and Livorno, in order to set up and improve physical weed control techniques on urban hard surfaces. New operative machines were built and flaming treatments were compared with the ordinary techniques adopted by the municipalities, as mowing or chemical spraying.

» *The innovative machines for physical weed control*

During the two years experiments, different kinds of operative machines were built and tested in order to satisfy the different needs of operators and municipalities.

The most simple machine is a knapsack flamer characterized by a manual lance equipped with a 15 cm wide rod burner and one LPG tank containing 5 kg of gas. This machine is very versatile and adaptable to some of the most difficult locations both in urban area (i.e. staircase) and agriculture (i.e. gardens or small fields) (Fig. 5a). The second machine is a trolley equipped with a larger tank with respect to the previous one (containing 15-20 kg of LPG) and the same manual lance connected by a 5-10 m long gas pipe. It is very suitable for all kinds of hard surfaces in urban areas and it may be also used in small farms (Fig. 5b). The third flamer is a self-propelled machine that equipped with two 25 cm wide rod burners and an hopper containing two 15-25 kg LPG tanks and hot water, heated by the exhausted gas of the engine and used to transfer thermal energy to the tanks. Its use is recommendable on medium-sized urban spaces (Fig. 5c).

A wheel-barrow self propelled machine was also built and equipped with 2 LPG tanks containing 15-25 kg of liquid gas, a heat exchanger and five rod burners 25 cm wide, placed frontally on a little frame, and one lance equipped with a 15 cm wide burner. All the burners can be easily adjusted varying height and inclination with respect to soil surface. The hand lance is equipped with a gas pipe 8 m long that is reeled by an automatic cable reel (Fig. 5d). It can be used on medium/large-sized urban spaces. A "rider" flamer, with sitting operator, was also developed in order perform treatments on very wide hard surfaces. It is equipped with four 50 cm wide rod burners, four 15/25 kg LPG tanks and a heat exchanger (Fig. 5e). Moreover, during the experiments, also the mounted flamer, usually adopted on vegetable crops, was used (Fig. 5f). In these two latter cases, high driving speeds could be used if combined with high LPG pressures, without changing treatment results, but increasing relevantly working capacity.

» The experiments

The research was carried out in the cities of Pisa and Livorno from 2006 to 2008. Experimental plots were set in five different sites in both cities. However, in the present work the results of only one site in Pisa

Figure 5. Pictures of innovative machines for flame weeding working in urban areas: a) knapsack machine; b) trolley machine; c) trimmer machine; d) wheel barrow machines; e) rider machine; f) mounted machine.

(Piazza San Paolo a Ripa d'Arno) and Livorno (Accademia Navale) are presented. Each site was characterized by different weed plant population and density, and hard surface typologies.

Flaming at low and high frequency was compared to an untreated control, mowing (4 treatments/year) in Pisa, chemical (2 treatments/year) and integrated (1 herbicide+3 flaming treatments/year) management in Livorno. Weed density was determined at the beginning of the trials and periodically thereafter according to Braun-Blanquet method (1932) and values were transformed into percentage of weed cover. For each treatment working time and LPG consumption was determined. At the end of the research total working time, total costs, Manpower Index (mean working time mean weed density) and Economic Index (mean costs mean weed density) were calculated considering an LPG price of 1.73 euro kg-1 and professional fees of 0.36 and 0.044 euro m-2 for mowing and herbicide treatments respectively.

Experimental design was a randomized block with four replications. Weed canopy data were statistically treated by ANOVA per each sampling date. In this paper just mean canopy data are shown so that ANOVA is not reported

Main results concerning weed

Table 2. City of Pisa. Piazza San Paolo a Ripa d'Arno (downtown, pavement as substrate). Estimated operative and economic parameters for innovative and conventional weed control methods on hard surfaces.

Parameter	Weed management		
	Flaming LF	Flaming HF	Mowing
Number of treatments during 1st year	11.00	20.00	4.00
Number of treatments during 2nd year	6.00	10.00	4.00
Total number of treatments	17.00	30.00	8.00
First year labour time (h/1000 m^2)	44.00	73.50	38.10
Second year labour time (h/1000 m^2)	24.60	35.50	40.30
Total labour time (h/1000 m^2)	68.60	109.00	78.40
Mean labour time/treatment (h/1000 m^2)	4.04	3.63	9.80
First year costs (€/1000 m^2)	859.19	1434.78	1440.00
Second year costs (€/1000 m^2)	447.35	669.54	1440.00
Total costs (€/1000 m^2)	1306.54	2104.32	2880.00
Mean costs/treatment (€/1000 m^2)	76.86	70.14	360.00
Weed canopy at the beginning (%)	32.98	44.89	38.29
Mean weed canopy during 1st year (%)	17.30	8.84	27.30
Mean weed canopy during 2nd year (%)	12.30	4.56	25.30
Mean weed canopy during the two years (%)	14.80	6.70	26.30
Manpower Index	0.60	0.24	2.58
Economic Index	11.37	4.70	94.68

LF, low frequency; HF, high frequency.

Table 3. City of Livorno. Accademia Navale (seaside street, packed heart as substrate). Estimated operative and economic parameters for innovative and conventional weed control methods on hard surfaces.

Parameter	Weed management			
	Flaming LF	Flaming HF	Chemical	Integrated
Number of treatments during 1st year	8.00	15.00	2.00	4.00
Number of treatments during 2nd year	5.00	7.00	2.00	4.00
Total number of treatments	13.00	22.00	4.00	8.00
First year labour time (h/1000 m^2)	71.50	99.30	20.40	30.70
Second year labour time (h/1000 m^2)	42.20	48.40	24.40	28.00
Total labour time (h/1000 m^2)	113.70	147.70	44.80	58.70
Mean labour time/treatment (h/1000 m^2)	8.75	6.71	11.20	7.34
First year costs (€/1000 m^2)	1390.73	1934.44	808.00	789.25
Second year costs (€/1000 m^2)	828.52	906.28	808.00	735.75
Total costs (€/1000 m^2)	2219.25	2840.72	1616.00	1525.00
Mean costs/treatment (€/1000 m^2)	170.71	129.12	404.00	190.63
Weed canopy at the beginning(%)	53.40	66.80	62.65	71.38
Mean weed canopy during 1st year(%)	34.86	16.00	67.66	36.26
Mean weed canopy during 2nd year(%)	16.74	6.00	60.75	38.73
Mean weed canopy during the two years(%)	25.80	11.00	64.21	37.50
Manpower Index	2.26	0.74	7.19	2.75
Economic Index	44.04	14.20	259.39	71.47

LF, low frequency; HF, high frequency.

canopy, operative costs and manpower requirements are shown in Tables 2 and 3. For both the two locations analyzed it is possible to observe a sensible decrease of flaming total costs (ranging from -40 up to -55%) and mean weed canopy relative to the 2nd year with respect to those determined in the 1st year. This is probably due to a sort of "auto-catalytic" process that cause a slow depletion of perennial weed flora aggressiveness. Thus, probably, in order to optimize weed control by flaming on hard surfaces, frequent and quick thermal treatments are needed. On the other hand, ordinary treatments costs and weed canopy were almost constant during the two years.

Moreover, manpower and economic index, that take into account operative parameters and the quality of the work (in this case weed canopy), were considerably lower in case of flaming application with respect to mowing, chemical and integrated managements.

Conclusions

The results obtained during many years of experiments carried out on farm and in urban areas emphasize that physical means and strategies can be considered an effective and a real solution for a environmental friendly management of weed flora both in agriculture and hard surfaces.

Moreover, the municipalities of San Giuliano Terme, Vecchiano, Pisa and Livorno sponsoring the realization of this long term experiments, showed a big interest for their environment, landscape and citizens health.

Finally, a new cooperation with San Giuliano Terme municipality started in 2009 in order to improve strategies and machines for weed control on hard surfaces in urban and suburban areas, with particular regard to rivers banks.

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ENVIRONMENTAL IMPACT CAUSED BY WILD BOAR (SUS SCROFA) IN CHESTNUT WOOD (CASTANEA SATIVA)

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Abstract: ***In a mountain woodland of Tuscany (Italy) characterised by wild boar presence were carried out experimental controls to evaluate damages caused by wild boar on trees, underwood, herbage and soil through comparative observations and chemical analysis of soil samples on disturbed and undisturbed areas. The results show plant damages by the barking of the trunk caused by the wild boar habitus to scratch itself and by the selective grazing of underwood species. The soil was compacted by excessive trampling with porosity loss (Aggregate stability index: 74.5% vs. 56.1%) that increased rainfall erosion. All that caused considerable loss of organic matter with decrease of C organic (2.89% vs. 1.95%) and N total (0.26% vs. 0.21%). Furthermore it has been evidenced a decrease of soil microbial (ATP microbial: 804.77 vs.237.71 ngATP/gDM; Microbial breathing: 12.98 vs. 4.90 mgC-CO2/ Kg-1d-1) and enzyme activities (total β-glucosidase: 192.12 vs. 21.71 µgPNF/ gDM*h).***

Key words: *mountain woodland, Tuscany, microbial breathing, Sus scrofa.*

Introduction

In the lasts years in Europe the number of wild boar is significantly increased, probably due to many reasons, such as: sport-hunting, increasing of the population for the lack of predators, high prolificity, high adaptability to different environmental conditions (from 0 to 2000 m/a.s.l.), depopulation of rural areas and environmental politics to protect wildlife (Erkinaro et al., 1982; Saez-Royuela and Telleria, 1986; Massei and Genov, 2004; Ruiz-Fons et al., 2008).

The population of wild boar has created many problems to the agro-forestry systems, especially in some Eastern European countries (Romania, Hungary, Poland, Slovakia), where damages are mainly on crops of corn and potatoes.

In Italy the situation is quite serious, because the wild boar has a remarkable impact on plants, animals and especially for high economic value crops such as horticultural crops and vineyards (Mackin, 1970; Andrzejewski and Jezierski, 1978; Genov, 1981; Meriggi and Sacchi, 1992; Schlet and Roper, 2003;).

Wild boars can cause many damages but in forest and woods are less evident, because impacts don't directly affect the income of farmers, but are extremely important for the negative effects on the environment.

In Western European regions, wooded areas located at an altitude between 200 and 1000m a.s.l. (fisioclimatic area of Castanetum) are devoted to the chestnut cultivation to produce fruits and woods, that was, in the last century, the main livelihood of the mountain people in Mediterranean districts. Since the end of World War II the chestnut cultivation decreased, so that favourable conditions for wild boar diffusion were presented. In autumn period, when chestnut fruits felt down there are a strong attraction for these animals, which eat these fruits up.

When stocking rate is over land

capacity, vegetable exploitation, ground compaction, rooting, bark-stripping and wallowing were revealed. These phenomena induce negative changes to the woodland ecosystem and so hydro geological erosion is possible. This study was aimed to assess the extent of vegetation and soil damages caused by wild boar in a woods of chestnut trees.

Materials and Methods

In a mountain area (Monte Pisano) of Tuscany (Italy), characterized by the high density of wild boars, an experimental trial was carried out. These non-native animals coming from Carpathians area, were introduced in the 70s for hunting. These animals have a high live weight and the behavioural characteristics are not in harmony with the environment.

The experimental area is into woods of chestnut (Castanea sativa) with a typical Mediterranean understory comprising: heather (Erica arborea), myrtle (Myrtus communis), mastic tree (Pistacia lentiscus) strawberry tree (Arbutus unedo), olive sylvestris (Olea europea) and other shrubs species. An existing fenced area in the wood inaccessible to animals as control (undisturbed area) was used.

Data on trees, understory and grass of disturbed area were collected in order to establish damages compared with the undisturbed area; so as to highlight which species were ate and which were rejected. Chemical analysis and palatability test to establish this food selection were carried out.

Samples of plants were analysed for ether extracts (resins, waxes, pigments, fat, essential oils) (AOAC, 1990), total polyphenols (hydrolysable tannins, condensed tannins) (Makkar et al., 1993), ADL fraction (lignin) (Robertson and Van Soest, 1981) and digestible energy (Noblet and Perez, 1993). Whole chestnuts, pulp and hulls were separately analysed by AOAC methods (1990), and for tannin content (Makkar et al., 1993).

Samples of soil were collected in disturbed and undisturbed area in order to evaluate alterations of the main physical, structural, chemical and biochemical parameters caused by the presence of animals (S.I.S.S., 2000; Ceccanti and Masciandaro, 2003). Data obtained were statistically evaluated by analysis of variance (ANOVA).

Results and Discussion

Environmental impact of wild boar is showed by visual comparison of undisturbed and disturbed area, where the wood understory appears changed.

Tree damages were mainly caused by excavation of the roots, rooting and bark-stripping; some trunks are scratched to get away parasites. Chestnut bark do not show damages by bites because it is not palatable due high tannin level . Chestnut seedlings, and young leaves and apexes of the underbrush, are palatable by animals and this reduces the wood natural reproduction (gamic). In fact, the wood phytocenosis is subjected to selective wild boar grazing because some agreeable shrubs were completely eaten, some were partially eaten in the younger tissues, while the remaining were completely refused (table 1).

Selective grazing depends on plant defence systems such as thorns and repellent substances. We observe that wild boars are influenced by the presence of undesirable substances such as: polyphenols (tannins), ether extract (resins, waxes, pigments, fat, essential oils) and ADL fraction (lignin, suberin).

Some plants are completely refused because of the high content of tannins in leaves (myrtle, strawberry tree and mastic tree), latex substances (tree spurge) or for particular smell (lesser calamint).

Other plants such as chestnut, heather and olive sylvestris with high ADL fractions, but lower tannins content, are grazed only in the youngest leaves and apexes. Finally, plants as bramble and black locust that have low tannin, ADL and EE were agreeable and completely consumed despite the presence of thorns.

Chestnut fruits have a chemical composition suitable for this animal with a high starch and low fiber content, while the hulls are discarded for the high content of tannins and ADL (Table 2).

The degradation of grassland depends on behavioural factors such as wallowing, rooting and trampling rather than browsing. Habits of wild boar to walk along preferential pathways cause the removal of the herbaceous layer (paths).

In our study, some areas with high stocking rate show widespread trampling and so the grass layer lack regards pathways and the whole experimental areas (disturbed).

In table 3 are reported the physico-structural, chemical and biochemical characteristics of undisturbed versus disturbed area. The heavy trampling determined soil compaction with worsening of physical and structural parameters, such as cracking area (10.23% vs. 5.35%) and aggregates stability index (74.5% vs. 56.1%).

This action lead to high damage, because of the excess of water which can not infiltrate the soil deeper layers, causing phenomena of stagnant water, resulting in a radical asphyxiation, and increasing the surface runoff.

Surface runoff causes severe erosion with removal of soil surface layer rich in organic matter, evidenced by the reduction of total organic carbon (TOC) (2.89 vs. 1.95 %), water soluble carbon (WSC) (415.14 vs. 291.73 mgC/gDM), total nitrogen (TN) (0.26 vs. 0.21%), and ammonia (3.30 vs. 2.09 µgNH3/gDM).

The degradation of the topsoil (physical structure alteration and loss of organic matter) decreased the microbial processes of humification of the vegetable and animal residues.

In fact, microbiological characteristic were depressed in the disturbed area, as suggested by decrease in microbial number and activity, reduction of microbial biomass carbon (247.05 vs. 187.21 µgC/gDM), microbial ATP (804.77 vs. 237.71 ngATP/ gDM), and microbial respiration (12.8 vs. 4.9 mgC-CO2/ Kg-1d -1).

β-Glucosidase enzyme activity, which is involved in C cycle, has been found to be sensitive to soil management practices (Leirós et al., 1999, Bandick and Dick, 1999) and it has been proposed as a soil quality indicator (Ndiaye et al., 2000).

In our study a net reduction in total ß glucosidase activity was found (194.12 vs.21.71 µgPNF /gDM*h) and this situation, toghether with other parameyers involved in soil quality aspects, could lead to irreversible processes of land degradation and soil desertification (Ceccanti and Masciandaro, 2003).

Conclusions

The impact caused by wild boars depends on many factors: orography and phytocenosis characteristics of the area, stocking rate and time spent by animals in the same area.

The environmental risk is more dangerous in sloping landscapes because herbaceous ground layer and undergrowth destruction combined with soil compaction induce to hydrogeological erosion.

Botanical characteristics of phytocenosis are very important, because wild boars refuse essences with low palatability (undesiderable or antinutrient substances).

The most important system of damage control is the management of the

Table 1. undesiderable substances content (%DM) and palatability of wood essences

		Disagreeable substances (leaves and apexes)			Palatability test (feed preference)		
		Ether extract	ADL	Tannin	No	Low	High
Chestnut tree	*Castanea sativa*	4,86	17.58	7.55		*	
Heather	*Erica arborea*	4,59	30,74	9.77		*	
Tree spurge	*Euphorbia dendroides*	7,13	12.09	2.37	*		
Olive sylvestris	*Olea europea*	2.27	19.82	3.36		*	
Lesser calamint	*Calamintha nepeta*	3.95	19.48	2.96	*		
Bramble	*Rubus fruticosus*	3.65	12.78	1,59			*
Black locust	*Robinia pseudoacacia*	4.12	12.50	2.99			*
Myrtle	*Myrtus communis*	1.56	11.95	12.21	*		
Strawberry tree	*Arbutus unedo*	4.26	17.47	15.28	*		
Mastic tree	*Pistacia lentiscus*	2.44	38.50	13.50	*		

Table 2. Chemical composition of chestnut fruit and hulls

		Raw fruit	Dehulled fruit	Hulls
Dry matter (DM)	%	51.75	50.31	62.19
Crude protein	%(DM)	4.92	5.72	2.55
Crude fiber	"	10.30	2.74	31.14
Ether extract	"	1.25	1.41	0.96
Ash	"	2.48	2.66	1.40
N-free extract	"	81.05	87.47	65.35
NDF	"	36.90	34.75	65.43
ADF	"	18.75	8.47	48.85
ADL	"	9.00	3.00	30.69
Tannin	"	1.15	0.37	7.60
Digestible Energy	kcal/kgDM	2736	2848	2354

Table 3. Physical-structural, chemical and biochemical characteristics of soil

	Undisturbed Area	Disturbed Area	Significance
Total surface cracking area (%)	10.23±0.76	5.35±0.38	*
Aggregate stability (%)	74.5±8.9	56.1±7.9	*
pH	8.0±0.0	7.9±0.1	NS
Electric Conductibility (mS/cm)	0.42±0.03	0.41±0.09	NS
Total Organic Carbon (%)	2.89±0.39	1.95±0.48	*
Totan Nitrogen (%)	0.26±0.04	0.21±0.04	*
Water Soluble Carbon (mgC/gDM)	415.14±18.97	291.73±45.83	*
Ammonia (µgNH3/gDM)	3.30±0.99	2.09±0.49	*
Microbial Biomass Carbon (µgC/gDM)	247.05±13.54	187.21±24.49	*
Microbial ATP (ngATP/gDM)	804.77±16.59	237.71±23.61	*
Microbial respiration (mgC-CO_2/ $Kg^{-1}d^{-1}$)	12.8±5.7	4.9±1.0	*
Total β-glucosidase activity (µgPNF /gDM*h)	194.12±81.10	21.71±6.89	*

*: P<0.05; NS: not significant.

wild boar density (stocking rate) that it must be modulate according to the sustainability of the environment in order to recompose ecological imbalances. Usually, the main control system is sport-hunting or trapping of a pre-determined number of subjects, but the success is highly dependent on local situations and soil type. Disturbed areas were characterised by topsoil degradation, as evidenced by physical structure alteration, loss of organic matter, reduction in microbiological and biochemical activity. In Great Britain, where wild boar hunting has never been practiced, a method of contraception was applied. This method expects the administration with special equipment of contraceptive substances that make females infertile until 5 years.

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A NEW TECHNOLOGY FOR OBTAINING THE CALCIUM TARTRATE FROM VINE-PRODUCTION WASTES

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Abstract: ***This paper, a part of ECOTECH - Research Project, provides the capitalization of the vine-production wastes, by using an integral technology (without other residuals) in order to obtain very useful products such as: calcium tartrate and the tartric acid, a very useful agricultural fertilizer represented by the mehanogen - fermentated mud.This can be done by means of chemical technology combined with a biotechnology process. Our research aim wes to proper use the phsycal-chemical features of the potassium bi-tartrate as a main source of the obtaining of the calcium tartrate and finally, of the tartric acid.The proposed method for the obtaining of the calcium tartrate is a very simple one, which can be used easily in a wine-factory, with very simple equipment, for different sizes, depending on various capacities of the tartric acid sources.***

Key words: *Ecotech, calcium tartrate, tartric acid, vine-production wastes, wine-yeast.*

Introduction

This paper is a part of the research-studies done within ECOTECH - Research Project „ Non-Polluting technologies for the integral capitalization of the vine-production wastes in order to obtain very useful an eficient products".

Nowadays in Romania, in comparison with the other European countries, the vine production wastes are not used at all, being in the same time a source of pollution for the environment and also a ballast which occupies important land surfaces.

Our research –project's major objectives were the following:

- A better capitalization of the vine production wastes by using a proper and an integral technology (without other residuals), in order to obtain very useful products, such as: calcium tartrate and the tartric acid, a very useful agricultural fertilizer represented by the mehanogen - fermentated mud, making use of a chemical technology combined with a biotechnology process;
- The obtaining of non-conventional and regenerating energy source by using of a proper biotechnology process for bio-gas obtainig from the wastes of the tatrates extraction process;
- A less-polluting environment by a better use and processing of polluting wastes.

All these major and complex objectives, the aim oF our research project, represent the achievement of the European's reglementations and requirements and also improve the Romanian potential in assuring performant parteners within international technical and scientific programmes.

Materials and Methods

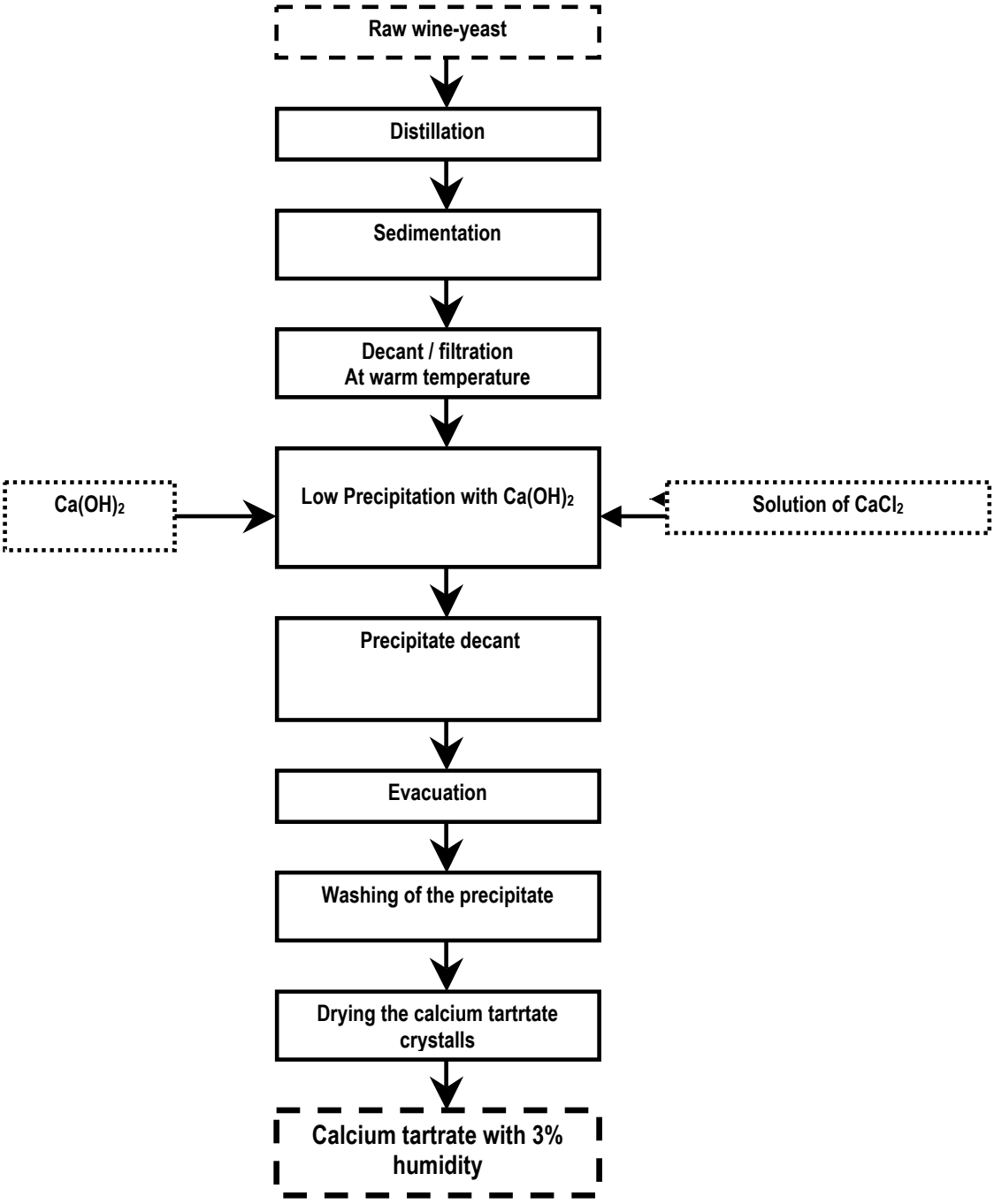
(the biological material and the method used for obtaining the calcium tartrate)

The yeast resulted from the wine production industry represents an important source for the tartric acid obtaining.

The tartric acid is an important raw material for the food industry and can successfully replace he citric acid, which is more expensive. It is also used in the textile industry(as a mordant for the textile colours),

The technological scheme of getting the calcium tartrate proposed by us is the following:

CALCIUM TARTRATE OBTAINING FROM HE RAW WINE-YEAST



in the pharmaceutical industry, within the galvanization process and also for the rigips obtaining.

The tartric ion is formed into the grape from the sugar by means of the enzymathic pathways which take place during respiration. The tartric ion solubility decreases according to the alcohol obtaining during the alcoholic fermentation; it crystallizes and precipates mixing with the yeast cells. When the alcoholic fermentation stops, the yeast mass sediments.

More than 95% from the tartric ion is provided by the wine-yeast as potassium bi-tartrate, having the next formula KHC4H4O6. Within the wine-yeast mass there are also small quantities of neutral calcium tartrate (CaC4H4O6), of neutral potassium tartrate (K2C4H4O6) and of neutral potassium and sodium tartrate (KNaH4O6).

The tartric salts content from the wine-yeast is between 1.5-6%. The dry-matter of the wine-yeast varies between 5-10%; by the pressing process the dry-matter can arrive to 30-40%. By the wine fermentation we can get a quantity of 3-6% wine-yeast, with a maximum of 12%.

The wine-yeast, rationaly preserved, loses about 40-80% of its tartric salts content during a period of 2-3 months; the tartric salts content can decrease to 0%, because of their transformation in acetic acid or propionic acid and carbon dioxyde.

Taking into account all these aspects, we have set up a new calcium tarttrate extraction method which is less polluting; this new method is followed by the appling of an anaerobic biotechnolgy process in order to neutralize the polluting substances from the residual waters.

Results and Discussion

This new method takes into accont the fact that potassium bi-tartrate has a solubility that rises with the temperature, thus when the raw material has cca. 900C, its solubility is cca. 12 times bigger than at 00C. This aspect allows the potassium bi-tartrate separation from the raw material only by a physical process, without any other chemical substances.

Within the filtrated solution the potassium tartrate separation can be done by adding calcium salts, followed by the formation and growing of the crystalls, and after that their separation and drying.

The speific chemical reactions of formation and precipitation of calcium tartrate are the following:

$$\underset{\substack{2 \times 188 \\ 376}}{2\,KHC_4H_4O_6} + \underset{\substack{74 \\ (1000\ sol.\ 8\%)}}{Ca(OH)_2} \longrightarrow \underset{188}{\mathbf{CaC_4H_4O_6}} + K_2C_4H_4O_6 + 2\,H_2O$$

$$\underset{226}{K_2C_4H_4O_6} + \underset{110}{CaCl_2} \longrightarrow \underset{188}{\mathbf{CaC_4H_4O_6}} + 2\,KCl$$

After the tartrates extraction, the yeast is used in a biotechnological process of methanogen-anaerobic fermentation in order to transform the major part of the polluting organic content in bio-gas; the residual, enriched in NPK, represents an natural agricultural fertilizerer especially for the vine-yards, from which these nutritional components come.

This new un-polluting and less costing method, which is an innovation, means an integral technology, where all the obtained raw materials and residuals can be processed in very useful products.

Conclusions

The obtaining calcium tartrate method, is a very simple one which can be successfully applied in a wine-factory with very simple equipment, for different sizes, depending on various capacities of the tartric acid sources.

The obtaining of calcium tartrate depends strictly on the raw materials sources, thus this process can't be separated from the wine production place. The main reason is the high perisability of the tartric salts, especially of potassium bi-tartrate which is the major compound (cca 90%) from the separation of the wine-yeast; thus, our proposed method pleads for this aspect.

As potential beneficiars we can nominate all the wine-production companies/institutes, due to their sub-products obtained from this specific activity, especially the wine-weast and the deposits, which represent factors of environment pollution

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ASSESSMENT AND ALTERATION OF THE SUPPLY OF SERVICES STRATEGY IN THE AREA OF AGRICULTURAL HOLDINGS AFFAIRS RUCAR-BRAN

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Abstract: ***The problem of future sources of financing development Agro is a problem common to all such areas in Romania. With regard to resources and results can be said that economic activities in tourism are represented by the farm business itself. That is significant that in the current phase of the villages in the area Affairs-Bran, predominantly through investment, was an increase in tourist activity and hence an increase in tourism demand, to achieve without a comprehensive settlement for the entire promotion.***

Key words: *tourist activity, farm business, area Affairs-Bran.*

Introduction

The strategy of the agro-touristic activities follows up the efficient capitalization of the services that can develop in the agricultural exploitations. In this framework the strategies are differentiated according to the type of preformed services, the reason why these can be structured like:

- Accommodation structure, that are found in a variety of the performed services, a reason why it is difficult to assess the number of the involved agricultural exploitation from the analyzed area, because in the Rucăr-Bran area there are exploitations that also runs outside of the classification system of the touristic units, being only partial affiliated with the association ANTREC;
- Reception structures with alimentation functions, for the situation of the agricultural exploitations with restaurant-pension, wine vaults, sheepfolds with traditional dishes etc;
- Reception structures in the agro-touristic pension with recreation functions, for which the agro-touristic services can be: the possibility to attend certain visits or even the attendance to some activities specific for the agriculture exploitation like: visiting the sheepfold, the trout farm, apiarian occupation, participation to the fabrication of some traditional products (for instance of the pressed cheese, brandy etc.), organizing of folkloric evenings, familiarization with some artisanal handicrafts (pottery, basketry etc.);
- Structures of agro-touristic information by the agency of which the services are concentrated in the centers of touristic advertising, the ANTREC center (existent in Bran commune) etc.

In this framework can be expressed strategic objectives specific for the agro-touristic activities developed in the agro-touristic exploitation from the area. If the case these are developed further with presentation under the form of programs, measures, directions of action, that have the value of politics in the development of the services in the framework of the agricultural exploitations that are differentiated for each commune.

Material and method

The implementation of the services strategy in agro-travel it imposes the knowledge of their development. That can be done through an assessment necessary for:

- Identification of the service activities' trends in the framework of the agricultural exploitation;
- Attraction of the attention with the problems connected to the agro-touristic

phenomenon at the territorial level of the area and communes;
- Change or development in the future of the agro-travel strategy depending on the aspects pointed out by the assessment process of strategy. At the area's level and in the structure of the aggregated 6 commune it has been performed an assessment of perspective concerning the agro-travel capabilities. The determinations begun from the knowledge of the real number of pensions (with allusion to those registered or not registered but functional), afterwards in the same structure it followed to know the number of rooms and places for accommodation. In table 1 are show these forecasted levels in relative and absolute values. It is possible to discuss about the following aspects:

Concerning the structure of these pensions according the housing places number, it can be observed from the total number of the housing places of the pensions, 74.46 % are pensions with a capacity of 1-5 places, 9.95 % with 21 places, 8.54 % with 11-20 places, following the level of 7.13 % for the segment with 6-10 places. In the framework of the territorial structure concerning the capacity of 1-2 places, Rucăr holds the highest number of pensions (20.03 % out of the total, and 34.96 % out of this category), and Dâmbovicioara commune the smallest number (4.22% of the total, and 5.67% from the irrespective category);
- Housing rooms for the entire Rucăr Bran area agro-tourism is valuated in prospective to 2906, following an average of 2.40 rooms/ pension.

Table 1

Perspective of the agro-touristic capabilities in the Rucar-Bran area

Territorial structure	Number of Pensions		Out of which: number of pensions according to the structure of the accommodation places				Housing Rooms				Places of Accommodation			
							Number of Rooms		Number of Rooms/ Pension		Number of Places		Average place per pension	
	number	%	1-5	6-10	11-20	over 21	number	%	number	%	number	%	number	%
Total area	1206	100.0	898	86	103	120	2906	100.0	2.40	100.0	6654	100.0	5.51	100.0
Dragos-lavele	93	7.71	91	1	1		276	9.49	2.96	123.3	566	8.51	6.08	110.3
Rucar	328	27.20	314	10	4		432	14.87	1.32	55.0	910	13.68	2.77	50.2
Dambo-vicioara	55	4.56	51	1	1	2	97	3.34	1.76	73.33	198	2.98	3.60	65.3
Fundata	80	6.63	53	6	16	5	245	8.43	3.06	127.5	502	7.54	6.27	113.7

- Concerning the number of pensions it can be shown in prospective this number will be of 1206 for the whole Rucăr Bran area. It is of mark the territorial differentiation of this total number of pensions over the 6 communes, the biggest proportion being own by the communes Bran (29.02%) and Moieciu (24.88%) from Bran area, to those can also be added the Rucăr commune (27.20%) from the subzone Rucăr.

Concerning this total number of rooms, it can be found the majority balance is own by the same three commune: Bran, Moieciu, and Rucăr, these gathering a total of 2288 rooms, that represent 78.73 % from the total of entire area. By comparison of the average number of rooms with the area average of 2.4 rooms/pension, it can be found out that only in the communes Dragoslavele, Fundata, Moieciu, and Bran it is overtaken the level of

this average, the other communes registering lower values;
- Accommodation places, considered a depth index of the accommodation capabilities, it cumulates for the entire area a number of 6654 places. Out of these the highest number it is own by the Bran and Moieciu communes, the balance being 67.29% of the total. Analyzing also the places' for entire area, it is found out their level is of 5.51 places/pension. From the analyzed localities the average of the communes Dragoslavele, Fundata, Moieciu, and Bran overshoots the level of this average.

Results and discussions

From this assembly of the projected capacity in the mentioned agro-touristic service strategy it can be derived the assessment of the agro-touristic capabilities can be performed in four significant directions: the noise level of the agro-touristic activities, looking for the tourists' needs, the variation of the touristic pressures in the territorial structure of the communes from the region, the prospective level of the tourism..

From the analysis of the agro-touristic accommodation capabilities in the Rucăr Bran area, it can be emphasized a trend of quantity nature found out through the amplifying of the pensions' number in the big communes (like Rucăr, Moieciu, Bran) and a concentration of accommodation room for the same commune, besides the problem of qualitative order emphasized through the increase of the places number per pension (found out in the communes Dragoslavele, Fundata, Moieciu, and Bran).

There are situations where the strategies suffer some alterations/ corrections according to the social economic changes that occurs al the micro and/or macro-level and micro and/or macro-territorial. The plan alteration considering the agro-touristic services is mostly determined by the following causes:
- Increasing or decreasing of the agro-touristic services request of the Romanian tourists;
- Booking or canceling at export of some agro-touristic capabilities;
- Unfavorable climatic conditions from some areas etc.

Alteration of the service performance must be known in advance by the interested agro-tourist exploitation, namely before the beginning of the season and only in special cases during the seasons. In the same time with the quantitative changes of the plan tasks, they must be assured also the corresponding conditions concerning the accommodation capabilities through:
- Existence of available accommodation capabilities;
- Quantum assessment of the services considered to be in excess;
- Possibility to supplement the work resources and of the needed expenses to the agricultural exploitation and services.

Effectively the strategies structure alterations are performed grounded on the alteration of the type of provided services, as well as of the market request.

Conclusions

The strategies and targets specific for the agro-touristic services from the Rucăr Bran area follow the efficient capitalization of the services that can develop in the agricultural exploitation. Through differentiated strategies on performed services types it frames the targets which are adapted to the touristic infrastructure: housing, reception with alimentation function, reception in the agro-tourist pensions with recreation functions, of agro-touristic information. It took place an intensification of the touristic activity, so an increase of the touristic demand, without the building of compIlete plans of advertising for the entire area Rucăr-

Bran. The six communes from the point of view of attractions, through the existence of the touristic services through similar offers, they are in competition. These are the reasons the agro-tourism must be enrolled for all communes as an essential activity in the local economy, permanently having in view the collateral economic activities (small production, handicrafts).

In this frame they have been drawn strategic targets specific for the agro-touristic services from Rucăr-Bran are as like:

- Increasing of the efficiency, attraction and competitiveness level of the developed agro-touristic activities in the agricultural exploitations (that suppose the building of strategic plans, attraction of the tourists in an organized manner through village tourism organizations), building of some association of agricultural farming with performance of agro-touristic services that could co-ordinate the activities, business development through performance of services in behalf of the agricultural exploitations with small and medium sized enterprises, concerning the processing-deliverance services, achievement of partnerships of the agricultural exploitations from Rucăr-Bran area (performed through: increasing of the homologation percent of the touristic pensions, development of the recreation facilities, intensification through the adequate abidance of the touristic services' advertising through the internet and other multimedia means);
- Diversification of the agro-touristic offer through new products/services for which they can identify as action direction the following: performance for each commune of some studies concerning the agro-touristic development potential, some projects' development in the field of services for the advertising of the most specific areas, this way can be possible to capitalize the traditional occupations, and the ancient habits, building and promoting new significant events, identifying and setting up of new touristic journeys, camps for initiation in some handicrafts, promoting of new agro-alimentary products besides those already registered, improvement of the training of the local population, and setting up of some traditional houses as agro-touristic farms);
- Facilitation of all communes in the framework of the Rucăr-Bran area as localities of touristic interest (that could be realized through: setting up of informing portals on the internet, specific for each commune; introduction of maps for the products obtained in the agricultural exploitations, conjugated on different types of costumers; introduction of urban image programs through the services performed by the exploitation's members and other facilities out of the territorial frame of the agricultural exploitation; promotion of the public-private partnership programs, as a modality to achieve the acting directions of the agro-touristic services, organizing of some thematic debates, as the business incubators with representatives of the agricultural exploitations having an agro-touristic potential, in order to generate ideas to build some new associations, development of partnerships and projects);
- Protection, preservation, and lasting capitalization of the natural patrimony and of traditional services (where can be followed problems like: preservation of the popular architecture and traditions, attraction increasing of the communes from the region paying respect to the standards and environment protection.

The assessment grounded on determinations through approximate calculations according to the levels drawn off from: statistic official data of Arges and Brasov, the questionnaires from the commune level, the prospection according to the opinions exchanges with the competent organs of the commune.

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GETTING THE CHICORY (CICHORYUM INTYBUS) AND MEDICINAL AND AROMATIC PLANTS CONCENTRATE - A WAY OF SUPERIOR CAPITALIZATION OF THE INDIGENOUS PLANTS

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Abstract: ***This paper presents a way of better yield for the Cichorium intybus (mainly), blended with some indigenous medicinal and aromatic plants in order to obtain a flavored soluble natural concentrate that can successfully be used within the sanogenetic nutrition as biostimulative soft drinks. The special rich chemical composition of chicory: inuline, glycoides, poliphenols, sugars, proteins, lipids, superior terpenoides, vitamins (C, B1, B2, B5), minerals (K, Na, Mg, P, Fe) it is the main reason for its use in the food and pharmaceutical industries. The natural concentrate of chicory, blended with medicinal and aromatic plants, it has a trophic, biostimulative, energizing, and choleretic action, and it can be used for the preparation of soft drink, fruit juice, syrupus; it has a delicious taste and the pleasant flavor is given by the roasted chicory, medicinal and aromatic plants within the product recipe. The technological process doesn't involve much energy consumption, it is simple and economical and can be performed using the current equipment of the food industry; it doesn't require a special previous preparation and it may be easily controlled concerning the quality of the raw material and finished product during the technological flow.***
The industrial concentrate production enables the superior capitalization of some indigenous vegetal raw materials at high quality, high taste, and low cost as food products.

Key words: *Cichoryum intybus, aromatic plants, biostimulative soft drinks, inuline (polyfructozan).*

Introduction

In the last years the preoccupation with the development of the technologies for getting some substitutes for coffee or of the modified coffee considerably increased world widely, this was increasing the interest for chicory and other substitutes of the natural coffee.

The very special and interesting chemical composition of the chicory (Cichorium intybus), containing, besides a high content of inuline (polyfructozan), biter coumarinic glycoides, superior terpenoids, phenolic acids, proteins, fats, and vitamins shows a large range of compounds with potential to be used in alimentation or in the pharmaceutic industry, that added more interest concerning this plant.

This study, that is grounded the invention of the professors Paul Ştefănescu and Elena Ştefănescu (from UBB), it relates to a natural concentrate for refreshments, established from soluble extract of roasted chicory, water, mixed with a palette of indigenous medicinal and aromatic plants.

The soluble chicory concentrate, associated with plants natural extracts, it confers to the drink the qualities mentioned above and the ecological self preservation.

Materials and Methods

(biologic material used)

The natural concentrate of chicory, medicinal and aromatic plants is made with a trophic, biostimulating, energizing, and

coleretical action (it stimulate the secretion of bile). The concentrate can be used per se, blended with other alimentary products (fruit juices, syrupus, milk, creams etc.) or solved in mineral water or soda, fruit juice etc.

The aromatic plant contained in the product's receipt have pharmaco-dynamic actions: they reduce the thirst sensation, stimulate the gastric juice secretion, so that a lasting cure it concurs for the organism invigoration, for an improvement of its general state.

concentrate of roasted chicory,
- crystallized sugar or sweeteners,
- alimentary citric acid,
- alcoholic extract from a mixture of indigenous aromatic and medicinal plants,
- ethanol 96;
- drinkable water or distilled water.

Results and Discussion

In the next table are shown the organoleptical and physical-chemical characteristics of the concentrate of chicory and indigenous medicinal and aromatic plants:

A. Organoleptical Characteristics						
crt.no.	**Specification**					
1.	Aspect	Liquid opaque, ropy, sticky, without fermentation or mouldiness evidence				
2.	Color	Dark brown				
3.	Taste – Flavor	Specific: sweet-bitterish-sourish with a predominant flavor of caramel-citric and mint, blended in a very pleasant aroma				
4.	Precipitate	Free				
B. Physical-chemical Characteristics:						
No.	**Specification**		**M.U.**	**Values**		
				average	minimum	maximum
1.	Dry stuff		%	72.0	70.2	72.7
2.	Carbon hydrate, out of which		% d.s.	44.0	40.8	46.4
	Fructose		% d.s.	21.0	17.4	25.
	Sucrose		% d.s.	18.0	12.0	28.0
3.	Aminoacids-amide		% d.s.	13.0	11.3	16.6
4.	Betaine		mg % d.s.	1.0	traces	2.0
5.	Mineral compounds out of which: Potassium Calcium		 % d.s. % d.s.	 0.8 0.2	 0.5 0.1	 1.0 0.3
6.	Bitterish index		%	65.0	45.0	70.0
7.	Solubility in water at 70°C		%	99.0	97.0	100.0

The technologic process, simple, not costly from the technical or economical point of view, it can be achieved with the current used equipment in industry, without a long term previous preparation, allowing an exact and efficient quality control on the technological flow, to the raw material or end product.

The concentrate it is obtained from the following raw materials:
- roasted chicory as a hydrosoluble natural

Conclusions

The concentrate is obtained in conditions of economic efficiency, from a raw material easy to find, and it allows the obtaining of a various range of refreshments drinks having good gustative properties and a refreshing, energizing action, balancing the ions exchange at the cellular level, diuretic, coleretical and action of increasing the motility, carminative action, stimulating the metabolizing process of lipids, methionine

and creathinine, with a good stability in time.

The concentrate defines itself through the following physiological and therapeutic effects:

» It is an energizer due to the high content of sugars;

» It has an action of increasing the motility and a hydrocoleretical action due to the esculine and its by-products;

» It has hepatic-renal, diuretic, and depurative properties due to the phenolic acids and pepsids from the chicory;

» It has a stimulating action for the gall bladder and intestinal smooth muscles;

» It is not toxic;

» It has a vitaminize action due to the vitamin C from the used indigenous medicine plants;

» It is aseptic and antiperspirant, quality given by the fluid extract from the used indigenous medicine plants;

» It stimulates the detoxification of nitrogen from the nucleotides catabolism or from urea, due to the alantoine content and of the betaine traces from the sweeteners;

» The natural extracts from the medicinal and aromatic plants give to the product carminative, stomahical and lightly aseptic qualities.

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POLLUTION IN AGRICULTURE

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Abstract: ***20% of all Europe's underground waters are polluted, according to a report conditioned by the "European Agency for Environment". In the West Europe 15% of the population doesn't have direct access to tape water (drinking water) that is according to the safety standards; meaning it has excess of bacteria, being not good for consume. In the East of Europe 30% of the people are confronted with this problem.***

Key words: *reduction of the pollution, nitrates, European Agency for Environment.*

Introduction

The problem of the relationship between man and environment is not new. This emerged in the same time with the first human being communities, because the man with the intelligence and creator spirit that define it, wasn't pleased with his nature like it was, and he courageously and tenaciously begun its conversion according to his needs.

Multiplying itself ceaseless, the human race added to the natural landscape new sights, transforming swamps into fallow lands and fertile hollows, sterile counties in green grass oasis, it created new varieties of cropping plants and domesticated wild animals. Until this point the natural balance didn't suffer only, perhaps, on very narrow areas that couldn't affect the assembly.

The turn came once with the industrial revolution and especially with the new technical scientific revolution.

In a word, the modern science and technique, increasing without limits the man's power, raised in average the life level from everywhere. But the back side of the contemporary industrial civilization, of the material progress, it was and it is the environment deterioration. Due to the economic development impact they were polluted more or less serious the soil, water and air, they disappeared or they are in curs of extinction many species of plants and animals, and the man is confronted in its turn with different diseases caused by the pollution, phenomenon that encloses today all the countries and continents. Its effects are felt even in Antarctica. It was calculated that along a decade the deviations of the civilization caused to the natural environment damages larger than in a millennium.

At the beginning of the Neolithic Era, only about 10 million men acted about nature with primitive tools, which practically didn't let visible traces. At the middle of the last century, so not to long after the beginning of the industrial revolution, the number of the population reach one billion people, but the environment deterioration wasn't yet a priority, except some perimeters from some occidental countries – starting with England – that were the first passengers in the "industrialization train", thanks first of all to the steam machine.

Materials and Methods

Pollution as a global problem is the appanage of the XX century, more exactly of the last decades, when the world population increased from 5 to 6 billion inhabitants. Are they many, are they a few? Is their number a really "demographic pressure" over the environment? These are questions that already concern the demographers, economists, medical doctors and other specialists, as well as the politicians.

The problem that concerned the experts along the time actually was if it is possible to provide enough food to the population, and only in the last decades they focused the attention with an aspect that proved to have the same significance: the degradation of the environment through pollution, erosion and other phenomena, due to the action, with or without will, of the man, process that affects not only the possibilities to find food, but also other aspects of the human existence, beginning with the health.

There is no doubt the soil is the most precious capital at man's discretion for the fulfillment of its needs and aspirations. Finally, at least until the invention of the artificial photosynthesis, we all depend on the thin and productive horizon from the Earth's surface, where from they are extracted all the resources necessary for life. One of the great paradoxes is the man trends to endanger the life's spring with the force of ignorance, greed, negligence or other causes.

In the same time, while the modern techniques allow to introduce in the productive circuit millions hectares of field considered inactive for ever until yesterday, in parallel other millions hectares already in production become inappropriate for cultivation, also owe to the man's action.

Since the man begun to fight against nature, the wastes' surface increased with a billion hectares and the process progresses in an accelerated rhythm. It is appropriate to add that each year tens of millions of hectares of productive soils are "devoured"by roads, plants, and cities.

Since the first primitive axe ridded down the first tree, the forests lost a half of their surface, while the human kind multiplied itself by hundreds and even thousands time. The forests destruction to which it is owed the stability and quality of men's life three fundamental elements – soil, air, and water – resulted along the time in catastrophic effects. The forest has a significant part in the affixation of the relatively thin substrate of the fertile soil, the germination environment of the vegetative mass.

The massive deforestations buried under sand dunes blooming civilizations not only in the North of Africa, but also in Asia, and in some sides of Europe they brought the exposure of the mountains and hills near to the disaster.

The Reafforestation is still a word to new and its effects are too weak to redeem a multi millenary mistake that caused the extinction of a half of the planet's trees. Sure, in this concern the calculations are very precarious. However we turn to some of them that detached haw big is the approximation tells us something. At the end of the Roman Empire, the Iberia was covered by vigorous forests from Biscay until the Gibraltar strait, and could have about duplicated population by comparison with the present one, when it remains only about 5% from the former forests.

Out of the soil protection, the forest exercises the most powerful purifying action with the air, absorbing the carbon dioxide and returning it as oxygen. Out of the 14-16 billion tons of carbon dioxide released every year in the atmosphere through the burning of the fuels, plus those coming from the humans and animal respiration, two third are absorbed by the forests, those "green lungs" of the Earth to whom we owe so much.

Not less significant is the forest's function as a regulation factor of the rivers' courses. Also, the forest is designated to assure the requests of recreation and tourism, more and more stringent in the conditions of the modern life, the biophysical ambience indispensable to the balneary and climatic localities, the preservation of many fertile animal and plant species very useful etc.

In one word, without enough forests, the development and finally the life itself are not

possible. Nowadays, when the forests fill about one third of the land (about 4 billion hectares), world widely there emerged the opinion that is the minimum necessary beneath which the human kind cannot allow itself to drop. In the condition when there are to recover many and old mistakes concerning the forest, when a single car, for each 1000 km consumes the oxygen sufficient for a man one year, and the unbound rivers make much more damages eroding without any compassion what it remained from the soil fertility, the irrational exploitation of the forest resources became a too expensive luxury.

The palette of the soil degradation sources is vast, but the most visible part and accessible to anyone understanding it concerns the accumulation of a huge quantity of all kind of residues. The image of the waste deposits around the plants and the imposing garbage production from the urban centers are only two aspects of this harmful phenomenon.

Garbage existed all the time, but this notion, as many other, it substantially altered the content. For the village traditional homes and so for the rural localities, the garbage mean about exclusively unused vegetative remnants by the life stock that decomposed in a few months, and during the winter or spring they have been spread on the field for fertilizing. It exists practically a whole natural recycling that developed about in the same manner in the urban environment, where in the peripheries the life stile was about the same with the one from the country sides.

In a very different way are the facts in a world of vertiginous industrialization and urbanization, when two of the five inhabitants already live in the cities – by comparison with one from seven at the beginning of the XX century. In addition they proliferate the big and very big cities, reaching over 200 cities with population over one million of inhabitants. After approximated calculations, each inhabitant from the European cities "produces" more than 1.5 kg of garbage a day, and in USA about three times more. Usually the garbage path ends at the city's periphery, in the existing excavations or in barren, where it accumulates in huge dumps accepted as unavoidable easements, polluting the soil, air, and the underwater. Worse is a significant part of this garbage, especially the plastic material, they are extremely resistant at the bacteria action and practically do not recycle in a natural manner.

Even one hundred years ago, the rudimentary discharge of the waste begun to be a serious problem in the very urbanized areas from Occident,. In 1870 in England, and in 1892 in Germany, for the big cities it has been implemented the garbage incineration, with a partial capitalization of the heat to produce steam and electric power. The incineration system spread and improved a lot, opting for the centralized burn in big plants, more convenient for the big cities.

It remains not only the care for the salubrity insurance in the urban perimeters and in their neighborhood. Today the tractors' ploughs frequently bring to the soil surface plastic bags and tin cans, primary on the arable fields around the urban centers, and also elsewhere. The presence of these discharged objects and of many others it is unfortunately met also in the mountains breaks, along the riversides or seaside, everywhere the bourgeois "evades" in the nature without gives up even for a short time to the home commodities and the reflex gesture to throw the garbage.

Through the burning of 8 billion tones of conventional fuel annually it is thrown in the atmosphere about one and a half billion tones of ashes, dust and gases.

Besides the fuels burning – coal, oil, wood, natural gases – corresponding problems also make other industries, especially chemical, metallurgical, some machine building brunches a.s.o. – like the circulation of the cars, planes, trains, ships etc.

Making abstraction by some industrial units placed in nature, the gross of the atmospheric pollution comes from cities, because the apparition of the industry either take place in cities or subsequently creates cities. So, the first victims are the citizen. they already exist a appreciable amount of "ecologic hells", urban perimeters where the industrialization toxins made themselves felt through combined effects: corrupt air, noise, overcrowd. In such places – like the cities Sao Paolo, Ciudad de Mexico, Detroit, Calcutta, Los Angeles, New York – the morbidity percent of the respiratory system, including the lung cancer, is a few times bigger, also registering other different risk factors for the human's health, not only for those who live in the city.

Approaching this problem, the experts consider that besides the reduction by all means of the pollution sources and, if possible, even the total discharge of some of them, the air recovery is impossible to imagine without the crucial help of the green areas.

If the air, like it is, it can be breath for the moment everywhere for free, not the same thing happened with the drinkable water, that for the citizen has a price from some time, an increasing one. Because the water, the second element in order of the human's emergencies, it became also after the air an industrial product. Near by the big cities and industrial units emerge huge plants for the natural water "treatment", through decantation, filtration, sterilization etc.

At the first sight is seems paradoxical to talk about the need for assure the water supply on a planet that has so much water, enough to overflow itself with a 3 km depth layer. The problem is 97% of the globe's water is salted, and from the difference of 3% the majority is in glaciers. It result the world population has at its disposition for the individual consumption and for its economic activities around 1% from the fresh water, irrespectively that from rivers, lakes, and some underground waters.

Even so, it could be more than generally enough, but like for other chapters of natural capability, the water is spread very inequable over the Earth surface, and a large part of it is already much polluted.

On the general picture of the pollution, the proportion of the used waters – refuse water and industrial water – it is overwhelming. If at the air pollution, the symbol image is given by the "holed" trees because the "acid rains", namely the pollution, at the water's pollution the characteristic expression could be considered the "black tide", so the pollution practically is going on with oil in the world's seas and oceans, having catastrophic effects on the sea flora and fauna.

The main causes of the pollution are the agriculture and industry as it has been shown in a communication of the Environment European Agency. Until 10-20 years ago, the Europe's waters were more polluted. Until 1993, for instance, only 30% out of the continent lakes were clean enough to swim safely in them.

Today about 90% of them are good for swimming. That was firstly due to the fact the industrial and refuse waste are no more thrown in the water anyway, but they are initially cleaned. Unfortunately in the agricultural activities didn't register too much improvement. The used fertilizers for the plants' cultivation still pollute the rivers and lakes with nitrates in a very large proportion.

Results and Discussion

» *Nitrates*

The accumulation of nitrates in vegetables and water designed for human consumption, it is harmful beyond certain limits.

The nitrates (NO3) are the Nitrogen combinations with the Oxygen that are not harmful, but they become harmful when they are reduced in nitrites (NO2), either between harvest and consumption or in the man's digestive tube under the bacteria action. The nitrites cause respiratory difficulties, especially for the new born children, and dizziness.

The nitrates accumulation in vegetables comes from the unbalance between the absorption of the nitrates from the organic manure and the irrigation water and their transformation in proteins at the leaves level. Their absorption is superior for the own consumption of the plants, and subsequently they accumulate in roots (carrots, red beet, turnips), in the shanks and petiole (spinach, some beet species), and in leaves (green salad, spinach etc.)

Performed studies in France, Switzerland, Austria, and the Low Countries they show the nitrates percent from the planted vegetables by the biologic agriculture is generally lower than those from the vegetables obtained through the conventional methods. The difference is much evident during the spring and summer when the days are longer and the light intensity higher. On the contrary, the difference slurs during the winter.

The greenhouse vegetables are harvested during the winter is problematic because the limiting agent is the day light and although whatever fertilizing system could be used, the nitrates content in the greenhouse harvest is higher than in the field. Indeed the most important agent in the nitrates accumulation is the light intensity; the more powerful it is, it accumulates less nitrates in vegetables. So, it is recommended to eat field vegetables and to avoid the greenhouse vegetables.

In France comparative tests emphasized the fact that the biologic salads had often a really high content of nitrates (more than 1000 mg/kg nitrates), but they contained about 30% less nitrates than the salads from the conventional harvest; in average the percent diminish with 40% by comparison with the same conventional products.

Finally, the nitrates content varies not only because the season, but it depend on the cultivated variety: some varieties contain a larger quantity of nitrates than others.

The soil moisture must, as much as possible, maintained constant until the harvesting. For instance, if at the salad the land is dried and, with a few days before the harvesting, it is strongly irrigated, the culture becomes in this case a nitrates "pump".

However, even countries with an old civilization meet nowadays a degradation of the environment, connected to the methods so called "modern" of the intensive production. Out of the soil erosion, catastrophic in the old steppe areas transformed in monocultures of cereals, the use of considerable quantities of nitrates as fertilizer, and of the pesticides, it causes a strong pollution of the soil, water, and even of the outlandish areas from the intensive cultures.

Out of the aquatic environment pollution with nitrates derived from the soil over fertilization, these environments are also polluted through the household and some alimentary industrial effluents, loaded with organic fermentable matter.

This way the underground waters and sometime the surface waters from numerous regions of the Occidental Europe, they have a high nitrates content (for instance some underground and surface waters from France

contain until 9 mg/l equivalent of nitric nitrogen, that it is the maximum authorized by the World Health Organization).

The fact is not singular. In our country, in many region from Baragan or Dobrogea, the drink water is far to be potable, being brackish, calcareous or with flavor of insecticides. We don't want to mention now the rivers nearby the oil refineries, or the Valea Jiului, where the river water has the coal color.

This week the Public Health Authority Mehedinti presented the results o a report concerning the water quality from the public wells and from the distribution chain – it is shown in an article from the newspaper Evenimentul Zilei, No. 5034/ August 23, 2007.

In the article it is written the following: It was found the water from the centralized installation has a nitrates concentration about 3 times higher than the maximum allowed limit of 50 mg/l.

Concerning the public wells, the situation is worse: the nitrates concentration is even 6 times higher than the allowed limit.

The Public Health Authority checked this month 2,092 public wells from the county, from 350 were taken water samples. According to the performed analysis, the water is not drinkable in all the checked wells.

According to the Mehedinti prefect, in 17 communes, having about 100 villages, there are heavy problems concerning the water quality, even though in many cases they run modern chlorination stations.

But at the measures chapter the county and local authorities summarize only workshops and warning with posters on each well about the existent risks for the people who use them.

"We performed this inventory; we sounded the alarm, but for the remainder is in charged the county council and local authorities. The mayors are the ones who can do the life better for the locals", it sustain the Mehedinti prefect's advisor. The local authorities say they don't have the needed funds to drill very deep draw wells.

» *reduction of the pollution in agriculture*

The Ministry of Environment and Waters Management initiated the Program of the Pollution's Reduction in Agriculture, financed EUR 50 million borrowed from the International Bank for Reconstruction and Development.

The EUR 50 million will finance the pollution reduction through interventions with nutrients from punctual and diffuse sources, and through the dissemination of the needed information to increase the degree of public self-consciousness of the problem.

"The pollution problem with nutrients begins from the farm level, namely from the inadequate management and use of the manure in agriculture, a reason why we consider the implementation of this program as a measure of a major significance for the protection of the underground waters, and of the surface waters, and implicit for the life protection. We implement the Program for the Pollution Reduction with Nutrients, a program through which we wish to familiarize the public with the existent problems, and to support the small farmers in the adoption of the Code of Good Agricultural Practices", it declares the State Secretary in the framework of the Environment Ministry.

The pollution problem that derives from the agriculture, it is very weakly known and taken into consideration. The agriculture has a major contribution at the waters pollution, an important function being those of the nutrients (especially of the nitrogen and phosphorous).

Studies performed in the framework of the Environment Program for the Black Sea, it demonstrates that more than a half of

the Danube's nutrients quantity derives from agriculture.

The program of reduction of the pollution with nutrients will be implemented in the 255 vulnerable areas found at the level of whole country. The 255 vulnerable areas show high pollution values with nitrates from agricultural sources. Using of some large quantities of fertilizers in order to maintain the production at high levels caused the arable land degradation in these areas. The soil fertility degradation doesn't affect only the agricultural production, but even the security of the produced aliments.

The program is a continuation of the pilot program Pollution Control in Agriculture, and it will overtake the successful measures tested in its framework. The pollution control in agriculture has been financed by the Government and the World Bank, and it is implemented in the Calarasi County.

As like in the case of the program for the pollution control in agriculture, the Program of Pollution Reduction with Nutrients will promote the use of the compost, manure that is not harmful for the environment. Besides, a study performed by the Institute for the Research of the Life Quality, it shown the managers of the companies and agricultural association from the area where it is implemented the program for the pollution control in agriculture, it considers the compost use is better than those of the fertilizers because of many reasons: the compost is not pollutant for the environment, it is cheaper and available in the area as a consequence of garbage platform foundation in each commune.

» The soil nutrients
are defined as different elements existent in soils that are essential for the plants' growth. The needed nutrients in large quantity are called macronutrients (C, O, H, N etc.) and those needed in a small quantity are called micronutrients (Fe, Zn, Mg, Cu etc.).

When the nutrients reach the water in large quantities (especially compounds of the Nitrogen and Phosphorous), they concur for the water pollution. The performed studies in the framework of the Environment Program for the Black Sea, it demonstrate that more than a half of the nutrient from the Danube derive from the farm level, namely form the inappropriate use of the manure in agriculture.

Conclusions

The environment pollution is the most important problem of the XXI century. It is possible to say the pollution emerged at once with the man, but it increased and diversified parallel with the society development. At the ground of the pollution are different factors, out of which the most important are:

- Urbanism;
- Industrialization;
- Motorization;
- Chemistry;
- Demographic density.

The pollution emerges then as a spin-off of the civilization, that doesn't limit only inside of an enterprise, of a small collectivity, and it encloses cities, areas inside of a country, and even area concerning very large regions, becoming an international issue.

The actual situation it is referred to the uncontrolled implementation of the technologies in the industrialized countries, but the pollution emerged more and more powerfully in the countries in development.

As a consequence it emerged the necessity of an intervention for the saving of the present and future population, through prevention and control measures of the environment pollution. Those need a multidisciplinary cooperation between the different branches of the technique and they cannot be efficient but only if they ground on

scientific criteria.

In our country it isn't yet too late to control the pollution, this way being possible to avoid the mistakes of the very industrialized countries, trough measures that favour the environment self defense, the ecologic balance good for the human health.

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INTEGRATION IMPACT ROMANIA OVER THE AGRICULTURE AND FOOD INDUSTRY LASTING DEVELOPMENT

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Abstract: ***For Romania a lasting development means management and essential natural resources preservation as soil, water, plants, animal genetic resources, environment, and orientation for the next generation, agriculture and food sphere development about the European Union market, as well as institutional preparation for getting the European funds. For a lasting development it is very important the quantitative and qualitative food safety that requires a new food policy accordingly to an agricultural policy and, in the same time, with a community policy of reconciliation between economy and environment using a new development manner to sustain the human progress in the future.***

Key words: *Food Industry, European Union market, Commune Agricultural Policy, SAPARD program.*

Introduction

Romania adheration to the European Union will cause a series of positive and negative effects over the economy, but the adheration impact over the economy will not be felt over night, it emphasize the Business Media Group officials. At the macroeconomics level the European integration should bring a rapid change of the internal output and an economical increase in the first 5-7 years after the integration, higher than in the countries old EU members.

Taking as an example, the states that adhered in 2004, we can appreciate after the adheration that the prices, salaries and inflation can register an impulse, subsequently following to draw to the normal levels.

The experts sustain the positive adheration effects will be felt in the following 2-3 years after the adheration through the improvement of services, of the health and education system or through the setting up of some efficient markets.

Concerning the adheration impact over the brunches, it is observed the fact that out of the 19 analyzed divisions, about a half will feel the adheration effect after the first year from the integration.

Among these divisions are the leasing, small and medium sized enterprises, telephony, internet, hardware industry, software industry etc. at the opposite side there are brunches that will feel the adheration effect after 3 years (e.g. the capital market, baking industry, and tourism or HR industry) and for a longer period, 5 years, as like it is the agriculture case.

The Romania's adheration impact to the EU with the domestic industry will be able to be felt after 2 years after the adheration moment. The greatest challenge will be the increasing of the competition and efficiency so that the companies from Romania to be able to face the competition coming from the European Community. As an adheration effect, it is possible a rise of the pay packet costs (noticeable in 6 months to 2 years), a relative decrease of the population's payment capability, that will cause a stagnation of the industrial products request. The adheration impact with the agricultural markets and the incomes of the central and East European countries it is difficult to assess. Indubitable are the negotiations results that allow the occurrence of some potential evolutions of the markets in this area. So, following the

study of the impact with the agricultural markets and income of the central and East European Countries, the General Direction for Agriculture of the European Union reached in 2002 the following conclusions:
- Chicken production could increase as a consequence of price escalation after the adheration;
- Pork production will decrease with 0.9-1 million tons in regard to the current production;
- Cereal production will increase with about 92-97 tons, namely 10-14 million tons more than in the case the adheration didn't occur;
- Implementation of the direct payment circuit will cause a redistribution of the field designated to the cereal and oleaginous crops, so stimulating these crops.

This way it will be registered an increase of the cereal prices and especially of the strong wheat, having a positive effect over the production profitability; the live stock will increase will increase, especially due to the beef production influence that will mainly be entailed by the setting up of the milk quotas. The milk quotas will mainly affect the production orientated towards the market, while the subsistence sector (of the self consumption) will generally be unaffected.

Materials and Methods

» Implementation effects with the agriculture and food industry

The implementation effect of the Commune Agricultural Policy in Romania must be analyzed from more angles. The agricultural producers will have to obey the quality standards, sanitary and phytosanitary rules of EU if they want to get in the market (either domestic or EU market). Certainly the imposed conditions to the producers will be tough. Not paying respect to these conditions will cause the propagation of the existing situation: without paying respect to the EU standards the farmers will not be able to sell the obtained products and so they will not achieve the needed financial resources for the farms' capitalization and for the standards' implementation.

The obtained output will not be able to be used but for self consumption, and the emerged benefits from the agricultural products' prices escalation (due to the fact the intervention price is superior to the current prices level of the Romanian market) will not be able to be capitalize because the FEOGA will purchase only products that are according to the EU standards. This way the financial capability of the agricultural producers will remain poor and they will be not able to sustain the implementation costs of the ACP standards.

The ACP will surely have a significant effect with the Romanian agriculture also due to the predominance of the arable area in the total amount of the agricultural area (63%), due to the predominance of the private property (63% out of the agricultural area is a private property), and due to the low average size of the agricultural exploitations (about 2 ha). The most part of the costs bound to the Romania's adheration to EU concerning the agriculture and the agricultural policy, it comes from the competition and the low development degree of the Romanian agriculture by comparison to the Community standards.

The sanitary and phytosanitary rules represent an other problem of the Romania alignment to EU. The most affected by the implementation of the new standards of quality and sanitary and phytosanitary rules will be the small sized agricultural exploitations. In these conditions it is necessary the start of an identification program for the sustaining of the semi self consumption farms, those of small size that can become viable. This step will impose a category of "compulsory investments"

needed for the entrance of the Romanian agriculture in competition, and for the conditions' building for the capitalization of the incomes benefits from the EU member status.

The main adhering costs can be grouped as it follows: Romania's alignment to ACP also included the redefinition of the Romanian agriculture sustaining system on efficiency criteria and of condition to stimulate the increase of the agricultural exploitations' size. Having in view the sustain mechanism adopted by Romania (similar to the European one) it supposes sustain instruments through price, are obvious the budgetary involvements in terms of costs. In the field of agriculture the institutional building is just at the beginning. There are judgments according to whom the process begun at once with the building of SAPARD Agency and of the institutional mechanisms for the program implementation. On their turn, the afferent costs for attending the SAPARD program can be measured in terms bounded to the co-financing obligations size from the Romania's side, as well as in costs bounded to the low degree use of these funds, and to the delays in the development of the program, quantifiable as losses for the Romania's agriculture. Spreading along the time of these costs has as a deadline the adheration moment (year 2007). The institutional building process is developing and already had as effect the building of some new institutions, needed for the management, after adheration, at national level of the ACP (e.g. the Information Net of Agricultural Bookkeeping, Romanian Agency for Food Safety, etc.). These costs will progressively diminish until 2007, the deadline until when the institutional building must be accomplished.

Instead, after 2007 will emerge new costs bound to the maintenance and running of these new institutional structures, according to the EU requests. Costs with the adoption and implementation of the quality standards for the agricultural and processed products, of the quality certification systems, of the sanitary and phytosanitary rules, etc.

The associated costs for these activities implementation consisted in:

- at the microeconomic level, especially due to the assertion to the manufacturers of some quality and production standards higher than the currently existing;
- at the macroeconomic level, following the need of specific legislation adoption, of products quality certification framework building etc. due to the fact the largest part of the agricultural production it is obtained in the framework of the private agricultural exploitations (91% of the cereal crop in the year 2002), it can be assess the most of the implementation costs of the sanitary and phytosanitary standards provided in the ACP they will be at the level of agricultural small size exploitations. The cost elements associated to the ACP implementation will be directly supported by the agricultural manufacturer, and especially by those with small size exploitations. That means the most relatively affected will be the small farmers owing to their reduced economic capability that doesn't allow them the simultaneous implementation of ACP standards and the production's upgrade.The recent assessments show the fact that, for the period 2004-2007, the whole expenses for the development of the institutional framework, including those intended to rise the products' quality standards and to help for the fulfillment of the sanitary and phytosanitary norms, they will run to EUR 538.02 million, out of which about 80% only for the veterinary sanitary direction.

» *Implentation costs of the commune agricultural policy*

In the very next period they it become visible a series of costs bound to the implementation of the new costs, by the need to, achieve at the domestic and regional level, some institutional redefinition as well as costs at the microeconomic level, entailed mainly by the features of the agriculture sector and rural environment from Romania. Additional, the achievement of the member status by Romania it will imply funds disposal from the Community budget in order to support this policy. These amounts, that should be wholly transferred from the Community budget, they will be wholly disposable only since 2013, with it is assessed the national contributions of the new members will reach the maximum established limit. This conclusion presumes the fact that Romania will has to assure own financing resources to implement the ACP specific provisions at least until 2013.

The infrastructure improvement effects will be felt on a long term (3-10 years). The most affected by the EU adheration will be the food industry and retail industry, and the most favoured will be the brunches with a large export potential that benefit of small costs (generic medicine industry, oil and refining industry, car and spare parts industry, rough material manufacturers).

Romania integration in EU will bring benefits in a few directions, while other directions will take down.

With benefits: trade and investments

Among the benefits is the development of the trading activities, a sustainable economical growth, the increasing of the foreign investments, resulted widely due to the EU funds infusion.

The losses will be registered especially in the direction of the small and middle sized enterprises, of agriculture and food industry.

Integration in the EU will affect the undertakers who didn't develop the quality management systems or the environment standards. The first priority targets followed up through the Romanian Government Program for the period 2004-2008 follow and widely overlap the ACP targets. These are the productivity increasing in the agricultural area and of the food products quality, increasing of the agricultural manufacturer incomes and the lasting development of the rural area without damage the environment, with the aim to build a competitive sector, able to answer to the requests imposed by the joint market.

The assumed responsibility by the Romanian Government is one that supports the agricultural production inside the limits of the available budget resources; besides the recognition of these supporting policies (weak, in our opinion, due not only to the limited budget resources but also to the low interest for agriculture as a general trend), the Romanian Government officially regards it implements a policy of agriculture privatization and reconstruction, that unfortunately it is implemented very slowly. Despite this, one of the positive measures taken is the liberalization of trade with agricultural products.

The lasting development strategy has a essential part in the EU policy, being outlined in the long term targets of the Lasting Development European Strategy from Göteborg.

The analysis of the Romania's current situation shows the need for acceleration of the restructuring and modernizing process in agriculture, rural development and fishing, having in view their economic and social significance for the insurance of a integrated and lasting economic development of the rural area.

The lasting development of the rural area grounded on the implementation of

integrated economic systems that have to be implemented in the rural areas, aiming the support of some non-agricultural activities designated to absorb the excess of labour force, and to embroil in a larger manner the youth in activities of manufacturing, services, agro-tourism, planting/harvesting forest fruits, sericulture, and apiculture).

The new agriculture coordinates lead to the research involvement in the lasting development of the territories, and in the lasting alimentary systems, observing the quality and safety terms.

The mobilization of the agricultural technical education, the continuous formation, experimental and applied research activity, social and vocational integration will concur in a decisive manner for a lasting development.

In the agricultural higher education the number of mixed research units will concur to the particularization of the lasting development concept.

It will be assigned a special attention for the permanent information of the rural population concerning the lasting development measures, and its attraction as an active attendant into the actions performed with this purpose.

Also in the future the ministry will keep its part of the lasting development policy maker, and it will survey the effects of this policy.

Together with its partners – the peasants, vocational organizations, co-operatives, agro-alimentary enterprises, service companies, associations, the ministry will have to maintain a tight collaboration that highlights the lasting development stake.

This moment the ground occupation of the peasants is the agriculture. However there are some signals of the reorientation of the activities towards alternative sources of income. It is about no-agricultural activities (e. g. agro-tourism and the traditional handicrafts), that could be conditions for the absorption of the labour force surplus, and to insure the economical social stability.

Results and Discussion

The development of the rural area and the increase of attraction for investors will be supported through the orientation of the investments towards:

- Promotion of some non-agricultural activities concerning the development of the handicraft activities, micro-enterprises (wood processing, hand-made objects confection, ceramics, tailoring, embroidery, hosiery, processing of skin, bulrush and willow, traditional music instruments), of hardware equipment and software products designed for the productive process, making of the specific touristic information spots, development of the market chains for the traditional products (souvenirs).
- Stimulation of the agro-tourism and of the "green tourism", irrespectively of the following kind of activities in this area: building up of the infrastructure at small scale, as like the information centers and orientation spots for tourists, recreation infrastructure that offers access to the natural areas, development and placing of the touristic product market related with the tourism, building and modernizing of the rural touristic pensions.
- Support for the building up and development of the micro-enterprises with a view to facilitate the partnerships among the undertakers, and to develop the structure of the economy.
- Development of the ground services for the population from the economic and agricultural brunches as like: rural and forestry infrastructure (hygienic-sanitary services, dwelling accommodation, profiled education facilities, libraries), communal roads that insure the link between villages, branching at the electric power supply of

those establishment that develop the activity in agriculture; villages connection to the distribution chain (without however being branched the establishments).

- Renewal and development of the villages, preservation and reconstruction of the rural patrimony.
- Upgrading of an integrated regional economy.

The diversification of the rural economy over the primary activities is a key problem for the progress of every rural development policy, especially for Romania that asks for a strict coordination with the parallel urban development policies. In the coming years the rural area capability to maintain or create labour places will have a major impact with the unemployment rate and/or of the migratory flow.

The development of the rural areas will result in the reduction of the differences between rural and urban, the absorption of the labour force from the rural environment in non-agricultural directions (services, agricultural products industrialization, agro-tourism etc.), infrastructure development etc. in the same time, the rural development is one of the foreground field of the Romania agricultural policy for the next years, that is in agreement with the ACP priorities.

For the rural development Romania get EUR 2.3 billion plus more EUR 0.8 billion for the project financed from the structural funds (FEOGA Orientation).

The growth of the agricultural production will mainly be actuated by the prices increment of the agricultural products after the adheration, including through the subvention system that will be a strong stimulus for the agricultural manufacturers. In the framework of the negotiations, concerning the agricultural surface, the basis eligible surface for the subventions is of 7 million ha. During the negotiations it has been given a special consideration to the stock rising too. For this area they have been obtained subvention for all kind of live stock where there are intervention diagrams in EU too, while their level is lower to those asked by Romania. Some negotiations of the quotas' levels are not fulfilled; they will be automatically diminished at the real production level. So, it is strictly necessary an increase of the competitiveness and especially of the productivity. Supplementary they have been obtained much more transition periods and arrangements in negotiations grounded on reasons given by the manufacturers who presented plans of modernizing and refreshing of the agricultural exploitations. Some of them will offer a supplementary time to the producers and manufacturer from the processing area of milk, meat etc. in order to fulfill the Community standards.

The free circulation of the agricultural products and the Community mechanism of the price indemnification. However for that the Romanian products must comply with the EU quality, sanitary and phytosanitary norms, and only the production units EU accredited (List A) will be able to sell products on the European market. For a part of the production units it has been agreed, in the framework of the common position Document, a grace period for reconstruction and modernizing (List B), but if they will not be able to fulfill the standards, they will have to close their gates in the very next day after the deadline.The building and development of the market mechanisms. The building of some institutions similar to those of EU as like the development of the vocational associations function, will play a very significant function for the markets running and management by the agency of a better management and control, this way causing the emergence of some benefits for the producers as well as for the consumers (matters concerning the alimentary safety, and also more reasonable prices).

Conclusions

(Financial support of the Romanian agriculture from the Community budget)

Romania will receive EUR 4 billion for the period 2007-2009, plus about EUR 800 million, assessed as financed from structural funds.

The new legislation concerning the feed and food hygiene will also be implemented in countries out of EU. For all the aliments it is implemented the general principle according to which the product fulfills the European or equivalent standards.

Supplementary, according to the in force agreements, to export in EU product of animal origin, the country must by accepted for the adequate stuff. They are kept the lists at the EU level and of the countries and institutions from where the imports are allowed. The countries and institutions approved in this way are known as "listed". In order to be listed, a country from outside of EU must give assurance it doesn't not exist any standardization of the manner how the assurance is given. The assurances are randomly checked by the Alimentary and Veterinary Office of the European Community. According to the EU legislation, these controls cover now only the veterinary and alimentary divisions in the third countries. The law extends this office's function in order to involve also the examinations from the food and plants health area.

The third country that intend to export goods in EU will have to give all the needed information concerning the general set-up and the management of the sanitary control systems operated by the appropriate authority of the third country. This information can be linked with the national checking results developed on the products intended for export in EU, as well as the written registration of this checking performance.

The lasting development is drafted as a reconciliation necessity between the economy and environment. On the new development path designed to support the human progress far in the future.

In the framework of the lasting development an important function is the alimentary safety or the population's consumption needs the fulfillment from the point of quantitative and qualitative point of view it needed the adoption of a new alimentary policy, correlated with the agricultural policies and, in the same time, according with the Community acquis that follows up:

- production of enough aliment as volume, structure, and quality, in order to satisfy the alimentation needs;
- easy access to the necessary food for the population's integration, including the under-privileged one, the mixing of the equity criteria with those of economical efficiency in production and food capitalization, trending to the continuous improvement of the efficiency
- obtaining of agro-alimentary products as much as nutritional composite, clean, of quality, aligned to the international standards.

The fulfillment of the population's alimentary needs depends not only by the existence of the food resources but also by the solvable request of the population, as a consequence of the Gross Domestic Product and the level of the food costs.

The lasting development of agriculture, implicit under the aspect of alimentary safety, it becomes more obvious as a consequence of the adoption without any restraint by the European Union member states.

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APPRAISAL OF THE GENETIC PERFORMANCE AT SOME NEW SOY BEAN CULTIVARS OBTAINED AT FUNDULEA RESEARCH DEVELOPMENT NATIONAL INSTITUTE

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Abstract: ***The article displays the study of the genetic performances appraisal at the soy bean cultivars Columna, Neoplanta, Triumf, Danubiana, Onix, Romanesc 99, during the period 2004-2008.***

Key words: *Glycine max, soy bean, appraisal of the genetic performance, lipids/protean content in beans, features of peculiarity, resistibility against specific.*

Introduction

The studies performed in the framework of our research were necessary for the adequate choose of some soy bean cultivars with valuable features as an efficient mean for their maximal capitalization of the production and quality potential in a given research area. The modern cultivars are produced in a scientific system by breeders that work in the state or private sector. They have a high production level and emphasize genetical uniformity. Because of the high genetical diversity, the chosen cultivars by us are o maximal significance for the breeding works. The cultivars researched by us are the ground of a modern agriculture capable to insure the alimentary security that came from such an important species. Known by us since only 133 years, the soy bean imposed itself from the alimentary point of view as well as industrial.

The researched genotypes concurred for the ecosystems stability and they continue the ground of the soy bean evolution in our country through the delivery of the primary genetic material towards the modern scientific breeding. Virtually, the researched cultivars are uniform enough, and the values of their bean harvests are not to far from the general mean.

The thoroughness of the interaction cognition among the natural environment agents and the plants, the studies' development in the physiology and biochemistry fields, the contraction of the of the plant's stress degree are conditions that grounded this article.

Having in view the fathomed knowledge of these cultivars, this article proposed itself the following targets:

a. definition of the cultivars' behavior and of the genetical performances in the ecological condition from the Fundulea Research Development National Institute.

b. capitalization of the qualitative potential through the rating of the beans' chemical composition in proteins and fats.

c. determination of some crop peculiarities of the planted cultivars.

Materials and Methods

(biologic material used and the working methods)

The studied soy bean genotypes belong to the species Glycine max (L) Merr., subspecies mansurika Enk. Hey have been taken for study 6 cultivars: Columna, Danubiana, Neoplanta, Onix, Romanesc 99, and Triumf. These cultivars come from different geographic area, having variable phenotype, physiologic and technologic actions, but interfacing as productive value. These cultivars' characteristics and features are specific to the irrespective cropping areas. The field experiments have been performed using the randomized blocks method in 3 repetitions. The study has been performed

along 3 consecutive years. 2006-2008.
The cropping technology was similar to those currently practiced in normal production. The soy bean has been planted when the minimum temperature 8°C, around April the 15th. The planting density was of 45 germinating seeds/m2 or 450,000/ha, the germination capacity being of 88%. It came forth a seed quantity of 55kg/ha. The water requirements were relatively high even from the germination, and it has been used the irrigation during all the 3 years of research.
The setting of the appropriate moment of the seeds' harvest has been performed grounded on the experiments analysis, when the water content was 15-16%. The harvest occurs mostly at the beginning of September, at full maturity, when 75% of the pods turned brown. The seed were hard, and they have the characteristic color and shine for the cropped cultivar.

The study has been performed in the competition field from the Fundulea Research Development National Institute. These have the following technical characteristics:
- planting interval between rows: 70 cm
- establishment year of the competition field: 2006;
- number of the germinating seeds /m2: 45;
- number of plants for each repetition: 100;
- soil type: cambic chernozem;
- field gradient: 0.2%;
- display of the experiment: south;
- irrigation: along the florescence phase until the wax phase.

They have been performed morphological observations, physiological and technological appraisals of the soy bean cultivars that make the object of the PhD thesis.

The cultivars study has also in view the emphasizing of their characteristic features, stability, and homogeneity.

» *The morphologic features* were the following:
- at the stem: the bush shape, kind of growth, high of the plant (cm), the color of the pubescence color on the main stem (on the median third at the blooming), number of knars per plant, number of beans per pod, number of branches, length of the internods, insertion high of the first pod;
- at the leave: leaflets shape and color;
- at the flower and fruit: color of the flower and pod, shape and color of the bean and hilum.

» *The analyzed physiological features* were the following:
- resistance against dropping, shaking, bacteriosis and downy mildew;
- group of maturity;
- length of the vegetative period.

At the soy bean physiology they were studied the chlorophyll pigments, auxins and the photosynthesis.

» *The technological features* concerned the number of nodes per plant, number of pods per plant, number of beans per pod, production of beans per plant, harvest of beans per ha and the 1000 beans weight.

The technological description had also in view the qualitative aspects of the bean harvest like the protean content and lipids content.

The quantifications were performed at 20 plants from each repetition. The comparative analysis of the results was obtained in the 3 years of research.

For these features they have been found mean values, regression and the correlation coefficient. The statistics concerning the obtained bean harvest per ha have been analyzed on the 4 repetitions according to the article written by Săulescu N.A. and Săulescu N. N. (1967) – Experiment Field, and Ticulescu D., Elena Biji, (1975)

– Applies statistics in the agricultural enterprises economy.

The irrespective observations and quantifications partially correspond to the marks asked by the State Institute for testing and Homologation of the Cultivars, Bucharest.

Results and Discussion

- The drought resistance was good at all cultivars.
- The falling resistance was very good at all cultivars but Romanesc 99 it was only good
- The shacking resistance was very good at all cultivars but at the Romanesc 99 it was only good
- The resistance against bacteriosis was good

5.	Characteristics of the cultivar that will be reported (number of brackets refers the corresponding character from the Table of Characters)			
	Characters	Expression Level	Cultivars, Examples	Note
5.1.	Plant: hairs color on the main stem (on the median third at blooming)	Grey reddish	Apache, Alaric, Talon Maple Glen, Chandor, Paoki	1 [ ] 1 [ ]
5.2. (11)	Flower: color (at full bloom)	White Purple	Chandor, Cresir, Toreador Fransoy 242, Imari, Apache	1 [ ] 2 [ ]
5.3. (17)	Bean : color of the hilum	Gray Yellow Light brown Dark brown Imperfect black Black	Spot, Major, Apache Maple, Arrow, Imari, Talon Kingsoy, Argenta, Baron Fransoy 242, Aurelia, Leman Wells. Kader, Folio	1 [ ] 2 [ ] 3 [ ] 4 [ ] 5 [ ] 6 [ ]
5.4.	Plant: type of maturity	Very early Very early to early Early Early to average Average Average to tardy Tardy Very tardy	Trump, Soleo, Kola, Carla Chandor, Apach, Labrador Canton, Queen, Aurelia Kador, Kingsoy, Alaric Wiliams	1 [ ] 2 [ ] 3 [ ] 4 [ ] 5 [ ] 6 [ ] 7 [ ] 8 [ ] 9 [ ]

for all cultivars except the Danubiana and Romanesc 99 where it was moderate.
- Getting of maximum harvests depends on the expression level of the prolificacy elements: number of nodes and of pods on the main stem, the average number of pods at node, number of beans in the pod, protein and oil content
- The studied cultivars through the PhD thesis have a high productivity level, superior qualities, and they show genetic uniformity. For these reasons their technological data are not far from the average.
- Average number of nodes per plant (linked to the bean crop) it varies from 7 to Onix to 10 for Ganubiana and Triumf.
- 1000 beans weight varies from 165g to Romanesc 99 to 190 to Danubiana.
- Average number of pods per plant (linked to the bean crop) it varies from 15 for Onix to 19 for Danubiana and Triumf.
- Number of beans per pod has an average value for each cultivar about constant around 2.8.
- Due to the variable number of nodes and pods per plant, the bean crop per plant has a much larger interval.
- The limit differences for 5%, 1%, and 0.1% are irrespective of 0.418, 0.558, and 0.726. the first limit difference of 5% amounts to 11% of the general mean crop, the second of 1% amounts to 15%, and the third of 0.1% amounts to 19% of the same crop.
- Concerning the beans crop per ha, Danubiana and Triumf from the year 2007 obtained the positive distinct significant mark.
- Danubiana for the year 2006 and Triumf for the year 2008 received the positive mark.
» Romanesc 99 received the negative mark in the year 2006.
- The other variants on cultivars and years didn't receive marks and from the statistical mathematics point of view they can be considered about equal to the mean.
- The bean crop / hectare on years of research fluctuated around some values contained between 3.683 t/ha for the year 2008 and 3.938 t/ha for the year 2007, the experiment mean being of 3.813 t/ha.
- The protein content had the value of 40% for Columna and Danubiana, 39% for Neoplanta and Triumf, 41% for Onix and 42% for Romanesc 99.
- The oil content was 20% for Danubiana and Ro,amesc 99, 21% for Columna and Triumf, 22% for Neoplanta and 19% for Onix.

Conclusions

In the framework of the performed study concerning the six soy bean cultivars the following conclusions resulted: the genetic characteristics are valuable due to the accomplished benefit, emphasized through agronomic characteristics (resistance against the biotic, non-biotic stress factors, and other elements that affect the productivity), biochemical (high content of proteins and fats, and superior technological features. Sometimes these characteristics are found only in some local populations, and they could also be transferred to other modern cultivars.

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THE ROMANIAN AGRICULTURE AFTER THE FIRST TWO YEARS OF EUROPEAN UNION MEMBERSHIP

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Abstract: ***EU membership starting January 1, 2007 is by far the main political and economic event Romania experienced since 1989. An important number of political achievements and economic progress aiming at fulfilling the conditions for accession occurred during the last two pre-accession years, 2005 and 2006. After accession, economic growth continued, but Romania experienced, as other new member states, a slowing pace of development, a reversion of the appreciation trend of the national currency, a reversal of the deflation trend and an increase in prices. The international economic crisis did not hit yet severely the country, but its first waves could be felt already by the end of 2008. Huge efforts for adaptation to EU requirements have been made in the agricultural sector, and in 2008 only some results have been seen, since the terrible heat and draught in 2007 resulted in very low crop productions and pushing up the domestic agrifood prices, as well as the imports.***

Key words: *EU membership, agri-food prices, agri-food trade.*

Introduction

» *recent macro-economic developments*

EU membership starting January 1, 2007 is by far the main political and economic event Romania experienced since 1989. The last two pre-accession years, 2005 and 2006 meant an important number of political achievements and economic progress.

In the last years before accession, Romania's yearly growth rate has been spectacular: more than 5% yearly in 2001-2006, with the highest value in 2004 (+8.5%).

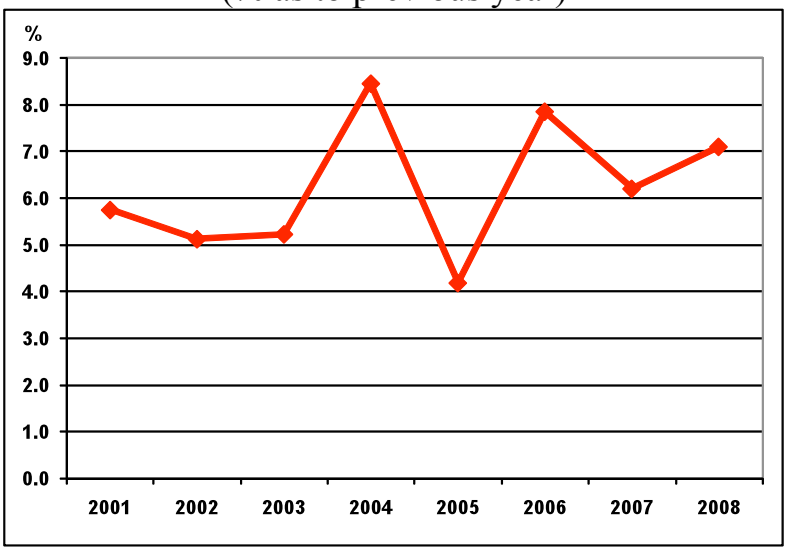
The pace slowed down in 2005, to 4.1%, mostly due to disastrous flooding that heavily affected agriculture and infrastructure, but growth resumed in 2006, to reach 7.7%, that is higher than the EU itself during the same period, and then down to 6.2% in 2007 (the severe draught pushed down GDP by 2%). In 2008, the growth rate climbed again, to 7.1%, despite the first signs of the world economic crisis (figure 1). This substantial macroeconomic growth was driven by similar factors as in 2006, such as: the rapid expansion of foreign direct investment, increased labor productivity and a continued strong consumption surge, under an improved European economic environment, until the start of the crisis.

The negative contribution of net exports of goods and services to economic growth increased markedly (from -4.6% in 2005 to -6.4% in 2006, -8.7% in 2007, and -7.0% in 2008). The contribution of agriculture has been strongly positive to the GDP formation (+21.4% in 2008, as compared), due to its intensely increased activity volume in 2008.

Despite the fact that the average level of labor productivity increased in Romania in 2000-2006, it still is just a fraction of the EU one: in 2008, labor productivity per worker in Romania was just 45% as compared to the EU level (29% in 2000) (figure 2 and 3).

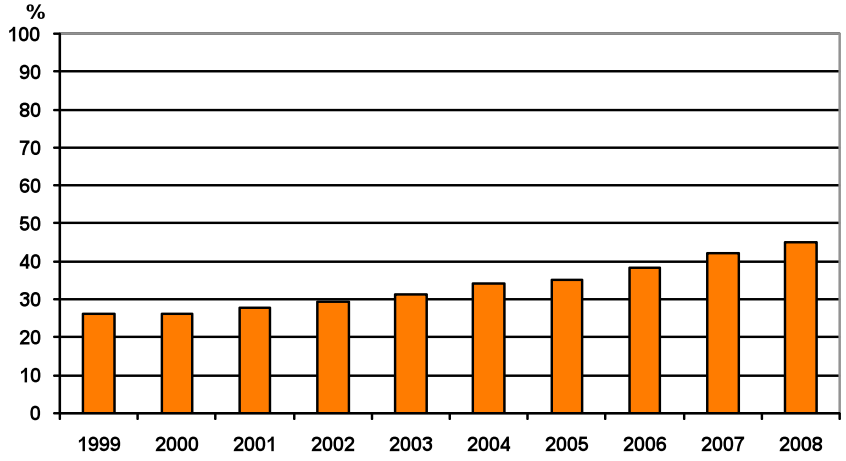
Similarly to the previous years, the chief driver of GDP dynamics was gross fixed capital formation, (12.6% yearly growth in 2005, 16.1% in 2006, 28.9% in 2007, and +19.3% in 2008, significantly

Figure 1: Romanian economic growth
(% as to previous year)



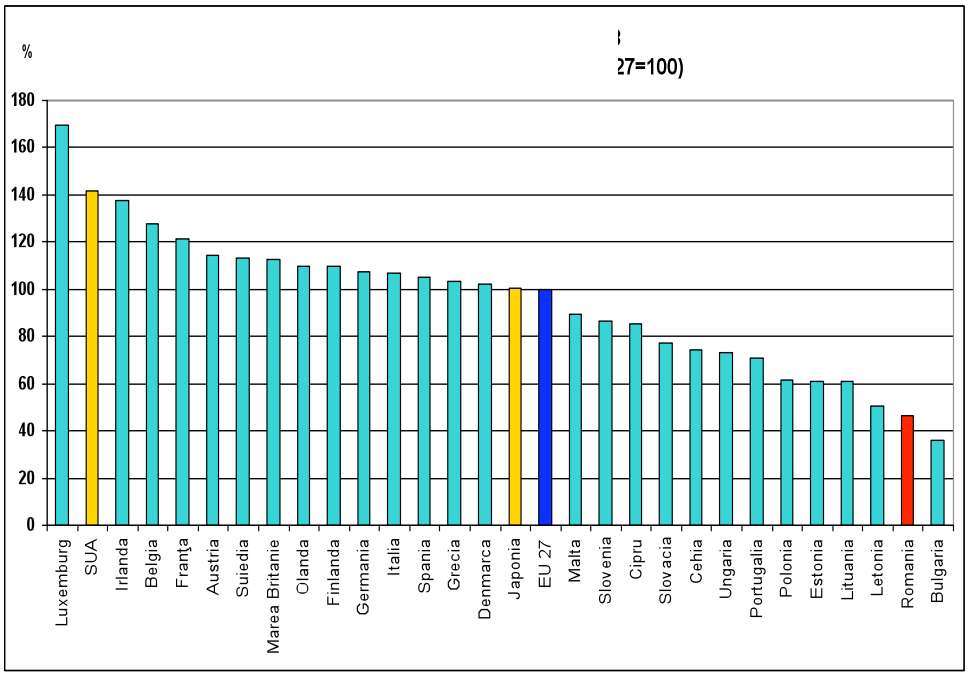
Source: data from National Institute of Statistics

Figure 2: Labor productivity expressed as GDP/capita (EU27=100)



Source: data from National Institute of Statistics

Figure 3: Labor productivity in 2008 (GDP, PPS/employed worker; EU 27=100)



Source: data from National Institute of Statistics

higher than the GDP growth itself).

Final consumption growth increased again in 2008, but at a definitely slower pace as compared to 2007 (clouds of crisis showed at horizon), with the annual pace of increase of private consumption decreasing strongly from an extreme 19.3% in 2007, 12.6% in 2006 and 9.1% a year earlier. This was fuelled in part by the start of real estate market collapse, by far the highest in 2007 (a little bit "too explosive"), together with sudden strict conditions imposed by the commercial banks to consumer loans demand in the fourth quarter of 2008.

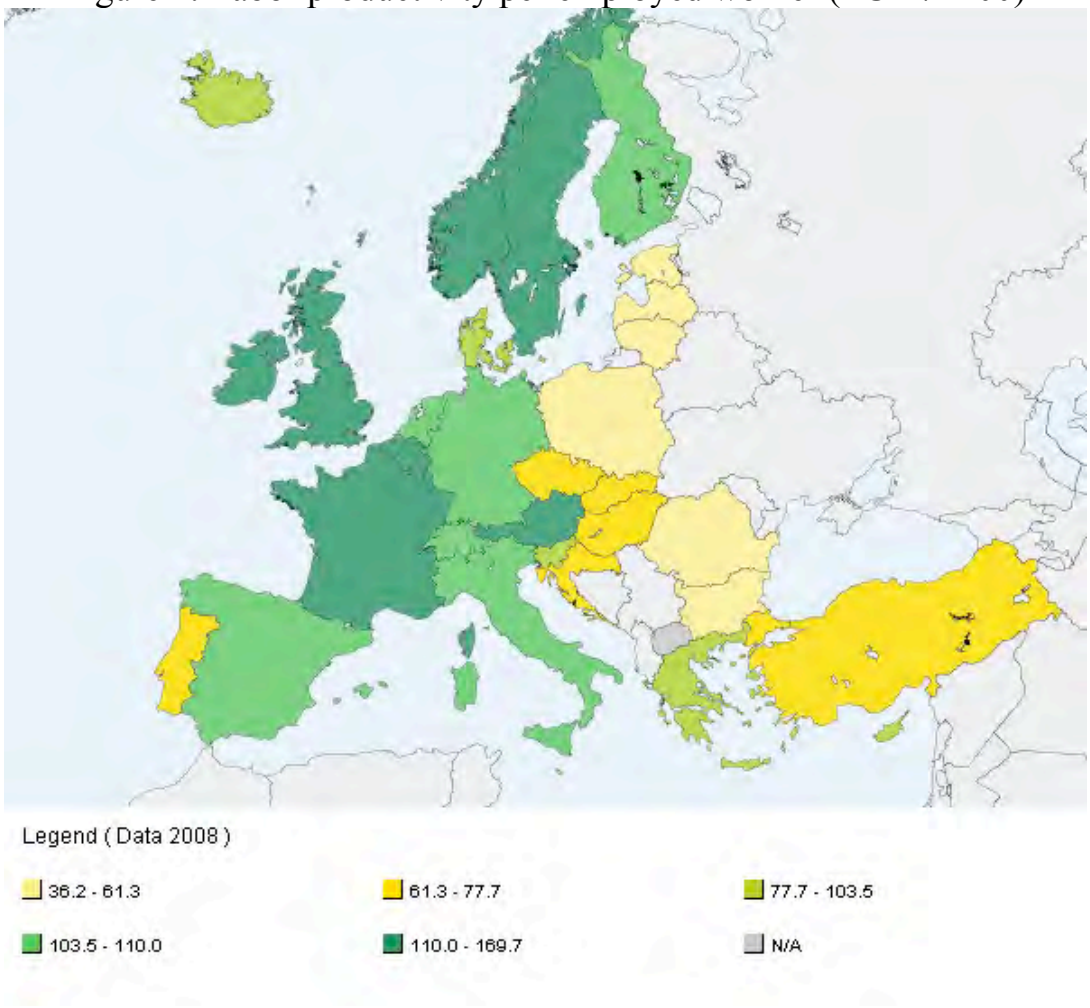
In Romania, GDP/capita (PPS) increased since 2001, thus slowly reducing the gap to the average EU-25. Yet, in 2006, last pre-accession year, GDP per capita was just 34% of the average EU-25 (20% in 2000), by 1% higher than Bulgaria and by 13% than the last one in the Member States-hierarchy (Latvia).

The map in figure 4 is showing that labor productivity per employed worker (expressed as GDP in PPS) varies widely across Europe: less than half of the EU 27 average in Romania, Bulgaria, Poland and the Baltic countries; and half to ¾ in Czech Republic, Slovakia, Slovenia and Portugal.

The contribution of agriculture to the GDP decreased slowly during the last years: 13.3% in 2001, down to 8.5% in 2005, 8.1% in 2006 and 6.4% in 2007, and 7.2% in 2008 (figure 5). As a comparison, EU-25's agriculture contribution to the GDP was 1.9% only in 2006.

The year 2008 has been fairly good as compared to 2005 and 2007, thus putting yields on the good side: x 2.5 times higher for wheat & rye, x 2.13 times higher for sunflower seeds, almost double for maize.

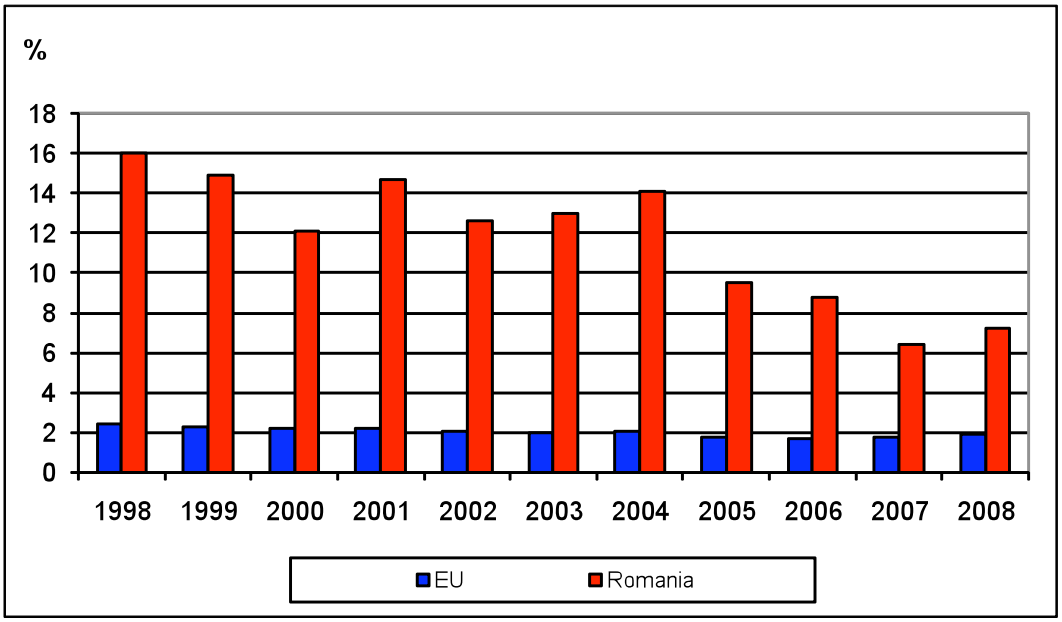
Figure 4: Labor productivity per employed worker (EU 27=100)



Source: Eurostat

Although partially compensated by foreign remittances of Romanian workers temporarily migrated abroad, valued at Euro 3-4 billion yearly (unofficial data say even 7 billion), the current account remained almost constant in 2007-2008 (16.88 billion EUR), accounting for 12.3% of GDP in 2008, against 10.3% in 2006 and 8.7% in 2005. The EUR 22.7 million trade deficit, whose share in GDP has been 16.6% in 2008 as compared to 17.6% in 2007, and 9.8% in 2005, weighed heavily on the current account deficit. The trade gap reduced as compared to 2007, due to the slowing growth rate of imports and increasing exports. The appreciation of the national currency versus EUR and USD that started in 2005, continued during 2006 and the first half of 2007, reaching the lowest level in July 2007 (3.13 RON/EUR) (-23% as to 2004) and reversing the trend, thus reaching 3.99 by the end of December 2008. The exchange rate to USD followed a similar trend, with a minimum of 2.28 RON/USD in July 2007 (-30% as to 2003, the year of the highest exchange rate level), and up to 2.84 end December 2008. In terms of income policy, the increase in gross minimum wage was moderate in 2008 as to last year: from

Figure 5: Agricultural contribution to GDP in Romania



Source: data from National Institute of Statistics

EUR 130 to 135. However, the relevance of this measure to the whole economy wage dynamics is questionable, given that: (i) for the second year in succession, the increase in gross minimum wage in the private sector – stipulated in the national collective labor agreement – was larger, and (ii) pay rises in the budgetary sector exceeded the whole-economy average. During the last four years, Romania's economy continued to show a good performance in terms of disinflation and economic growth.

The National Bank of Romania focused on the continuation of disinflation by consolidating the results of inflation targeting strategy. After 16 years of transition, finally the annual inflation rate went down to a one-digit figure in 2005 (9.0%), and disinflation continued in 2006 (6.6%) and in 2007 (4.84%). Yet, disinflation came to a stop in July 2007 (CPI =3.39), and started increasing again up to 6.3% (CPI December 2008 as to December 2007).

Despite that consumer price increased continuously in 2002-2005, the pace slowed down every year. In 2005-2008, the relatively high CPI for services resulted from significant increases in utilities prices (heating, electricity, gas, water, fuel) since their prices should align to the EU prices soon after accession.

The average inflation rate in the EU-27 has been 3.16% in 2007, thus half as in Romania. Nevertheless, the EU-member countries that registered in 2007 a higher inflation rate than in Romania are: Latvia (14.0%), Bulgaria (11.6%), Estonia (9.7%), Lithuania (8.2%), and Hungary (7.4%). The lowest inflation rates were registered in the Netherlands (1.57%) and in Finland (1.93%).

The unemployment rate continued its decreasing trend started in 1999: in fact, the increased economic activity in the last few years accelerated the pace of unemployment reduction, consequently, in 2005 it halved as compared to 1999, going down to 5.9%. In 2006, registered unemployment rate was

5.2%, and even lower in end-December 2007: 4.1%. Yet, disparities all over the country are still strong.

Materials and Methods

(specific developments in the agricultural sector)

The period 2002-2007 registered major variation in crop output, due to extreme variations of weather conditions.

The unfavorable weather conditions hit the southeast Balkan and Danube-basin region, and were particularly extreme in Romania in summer 2003, when cereal production in Romania reached its lowest level in almost 40 years, as a result of both poor yields and shrinkage in the harvested area, reducing winter grain production to levels that turned the country into a net importer throughout the marketing year.

In 2004, an exceptionally good agricultural year, grain production was quite high, in fact more than double production figures from last year's drought-devastated crop. Therefore it covered the domestic demand and traders could start exporting again in the second half of the year.

While in early summer 2005 the production forecasts promised to be quite high as well, huge rainfalls produced floods that destroyed large cultivated areas, damaging also the road and railway infrastructure. Although the grain production was a little lower than in 2004, it still covered the domestic demand and provided some exportable surpluses.

The 2003 draught did not affect too much the oilseeds production, rather due to good yields, the production increased as compared to 2002, the same for vegetables.

On the contrary, the excessive moisture and the floods in 2005 and 2006 affected the potato and vegetables production, since in the small households which are the main producers; these crops are generally located closer to rivers. Yet, prolonged draught affected all crops in 2007.

Winterkill in January 2006 and floods in spring affected roughly 100,000 ha, resulting in a decrease in area under grains as well as lower yields. On the other hand, warm and dry weather favored oilseeds, sugar beets, potatoes and vegetables, which gave higher productions as to 2005, due both to increase of areas and higher yields.

The unusual and extremely mild and dry winter, together with severe lack of precipitation in the spring generated a high water soil deficit, resulting in poor plant development and low yields. Even rapeseed, which covered an area four times higher than in 2006, produced only 65% of the expected output. For the autumn-harvested crops (sunflower, maize, sugar beet, potatoes, vegetables etc.), the extremely hot and dry summer worsened the vegetation conditions, resulting in even more severe production losses. Wheat production reached in 2007 about 3 million tones (for a yield of 1.6 t/ha, which is less than half of the 2004 yield, and far lower than 2.97 t/ha in 2005 and 2.75 t/ha in 2006. Despite the fact that wheat quality is good, the total wheat production is not enough to cover the domestic consumption needs, thus forcing wheat imports in autumn 2007 and winter 2008.

Low output of coarse grains, barley, oats, but mostly maize resulted in increased prices and insufficient supply for animal feeds. Frequently, farmers harvested maize early, in order to feed their animals and reduce the losses due to extreme drought.

In 2002-2003 the animal inventories showed a generally increasing trend, while in 2004 the numbers have slightly decreased. For 2005, the changes have been insignificant, except for sheep and goats, for which the inventories increased by 6.2%. In 2006, inventories increased slightly, by 2.5% for cattle, 2.8% for pigs, 5% for

sows, 1.3% for sheep and goats. The poultry inventories decreased slightly, by 1.8%, due to some emergency slaughtering imposed by the occurrence of several focars of avian influenza. By the end of 2007, there was a slight decrease in animal inventories, due to combined factors: pig slaughters increased as well as to 2006 due both to increased demand, less available and more expensive feed. In poultry inventories, the occurrence of several focars of Avian influenza (although far less than in 2006) imposed again emergency slaughtering.

The meat production showed an upward trend in 2001-2003, and then diminished significantly - mostly pork and poultry (by 12%, and 14% respectively) in 2004 as compared to 2003, most probably due to the severe drought in the summer of 2003, which dramatically raised feed prices. The production started recovering in 2005, due to higher feed supply and production subsidies.

The unfavorable weather conditions seemed not to have much of an influence on the total milk farm production (dairy cows, buffalo cows and sheep), which increased continuously since 2000. Yet, the number of cows and heifers producing milk for the quota is expected to half until 2013, along with a substantial productivity gain.

Results and Discussion

(Prices of agri-food products)

In the first year of membership, there was a general upward trend (+8%) of agri-food products prices, as reported by other new member states in their first year after EU accession. As compared to December previous year, the CPI for food products in December 2008 was 106.0, lower then total CPI (106.3), thus proving the fact that food products reduced the influence of the upward trend of prices of services.

In 2008, edible oils, pulses, and milk had registered the highest price increase (+18.1%, +16% and respectively +11.6%). On the contrary, prices for products such as potatoes and vegetables decreased significantly (-5% and respectively -2%), while products such as meat, sugar and bread showed a moderate price change (around the average ~6%).

Although price remains the main underlying factor in shaping their behavior, domestic consumers are shifting to higher quality products. As a consequence, about 40% of locally produced poultry meat is sold chilled, rather than frozen. Important investments have been made in branding and better packaging the products.

The low wheat and barley productions in 2002, 2003 and 2006 are reflected in the prices paid to farmers by processors or wholesalers. Early 2004, the prices for grains were almost double as compared to 2002 prices, reason for which the state put on the market grains from the state reserve to stop the prices from rising. Nevertheless, the low grain and oilseeds yields of 2007, together with an increased demand from the biofuels industry pushed up the prices, doubling them as compared to 2006.

The annual price pattern for raw milk for processing shows strong appreciation in fall and winter and depreciation in summer. Nonetheless, farm-gate prices constantly increased from one year to the next. The farmers claim that these prices are very low, and there is no too much of an incentive to increase the raw milk sales to processors. On the other hand, processors incur high collection costs, since most of the supplying farms are small-sized, with poor hygienic and cooling conditions and facilities and scattered in the territory.

Conclusions

The main changes in the agricultural policy occurred in 2007-2008 were focused on the setup and start of activity of the main common market institutions and organizations, destined to disburse the CAP support, together with the support from the national budget.

In 2007, only support from the national budget have been disbursed; from the CAP budget, just support for the winegrowing started to be distributed to farmers, all the other measures of support started early 2008.

The National Rural Development Program for 2008-2013 has been approved in Brussels only in late February 2008; therefore disbursements can start only in 2009. Nevertheless, the calls for projects are already open starting in April 2008.

In the past 6 years Romania saw an exceptionally economic growth, of more than +5% yearly, most likely the highest in Central and Eastern Europe, in an international context of decreasing growth pace.

As compared to the 30% inflation target for 2001, the real inflation rate in 2005 decreased first time after 1990 at a one-digit number and at down more to 4.9% in 2007. Agricultural output contributed largely to the economic growth, due to good outputs in several years, but also diminished its contribution to the general growth trends in exceptionally bad years. A more clear definition of support policies, together with longer-time application and higher amounts of support had as well a positive impact.

From the perspective of the continuing economic growth, the financial policies tried to stimulate savings, investments and exports. The general fiscal level decreased significantly, by the introduction of the flat tax rate, thus stimulating the private investments, new SME-s emerged. Important FDI entered Romania in the last 7 years, and modern retailing exploded. Private consumption and consumption credit boomed as well.

There is much more to do, mostly in agricultural sector in terms of institutional building for CAP implementation, but huge efforts of on-going adaption are currently made in all the areas of the Romanian economy.

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ELABORATION THE VITICULTURE FENOCALENDAR

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Abstract: ***The researches insided in the Viticol Research Center of Drăgăşani, since the 1977-1998 followed up a sequencetial knowing of daily bioritm of the dried substance accumulation on the trunk which depends on thermal radiation (observations, remarks, determinations, analyses: the usually temperature, the active temperature and the operative temperature) for the main fenophases, stades and the fenologichal microstades on a side and the elaboration technological viticol optimized fenocalendar (FTVO).***

Key words: *daily bioritm, thermal radiation, viticulture fenocalendar.*

Introduction

The improvement of the process knowledge of the vegetative growing and the harvests yielding in viticulture formed world widely in the last half a century the object of intense specialty research (Kondo 1955, Huglin 1958, Lazarevski 1961, Negrul 1964, Pouget 1963, 1965, Julliard 1966, Bouard, Pouget 1971, Condei, Ciolacu 1992) in order to achieve their leading through shaping and simulation (Condei and colab. 1992, Cazacu 1992) with a view to the numeric shaping and simulation or for the optimizing of the wine-growing technology through the implementation of the agro-phyto-technical sequences at the optimum phenoclimatic moments (Baggiolini 1952, Eichhorn, Lorenz 1977, Lancashire 1991, Tardea, Dejeu, 1995 also quoted by Fregoni 1998).

The phenoclimatic studies and research have been mainly performed on the cultivar Crâmposie selecţionată/ Kober 5BB, but also on other vine-bearing cultivars, following-up the accumulation of the dried stuff on vine stock and the elaboration of the optimized technologic viticultural phenocalendar (OTVP).

The research concerning the process rhythm of the growing and intrabud and extrabud formation was performed along the vegetative and generative biologic cycle, on period, phases and phenologic stages, using the established methodology for the biophysics research (phenoclimatic).

Materials and Methods

(viticultural ecosystem)

The approach in a new vision the older or newer experimental data obtained in Drăgăşani Station, concerning the accumulation by grape vine of the nutritive stuff with a major function in nutrition, it allowed the elaboration of the conceptual pattern of the grape vine growth and fructification, and to establish the daily accumulation rhythm in the vine stock of the dried stuff, Nitrogen, Phosphorous, and Potassium.

Carrying out a permanent stuffs exchange with the natural or technologically altered environment, by the agency of the physiological and metabolic process, the grape vine shows itself as an "ecologic subsystem" integrated in the win-growing ecosystem, but in the same time as an opened "bio-energetic system" with „input-output" of energy.

Table 1

No.	Phase/ phenologic stage	Calendar Period	Dominant morpho-physiologic process	Dominant biochemical process
1	2	3	4	5
1	Summer bud	May-October	Organogenesys of the primary bud (active, dormant) Diferentiation of the fructification buds (intrabud)	Biosynthesis of the growth bio-regulator substances (auxines or inhibitors)
2	Winter bud	November-December-March	Diferentiation of fructification buds (intramugural) Slow vital process	
3	Before blooming	April-June	Vegetative growth of the sprouts and inflorescences Differentiation of the floral organs	Biosynthesis of the plastic and energetic substances
4	Blooming	June	Blooming and the fertilization of the flowers	Biosynthesis and translocation
5	After blooming	June-July/August	Growth of the grapes and bobs	Biosynthesis of the organic acids (proteic substances)
6	Maturation of the grapes and wood	July/August-October/November	Dough ripeness and maturation of the grapes Maturation of the wood	Biosynthesis of the sugars (anthocians, aroma)

Table 2

Evolution of the pheno-climatic relation during the vegetative period

No.	Phenophase and interphase	Dominant morpho-physiologic process	Thermic step (active limits cumulated Σ°C)	Daily average rhy thm of the dried stuff accumulation (limits mg/sprout)
1	2	3	4	5
1	Weeping	Physiologic start, beginning of the sap circulation	42-90	1-2
2	Burgeoning	Intrabud growth	90-250	2-18
3	Breaking of buds	Beginning of the extrabud growth	250-287	18-30
4	Breaking of buds - blooming	Growth of the annual organs (phase I)	287-842	30-1040
5	Blooming	Blooming	842-1217	1040-2080
6	Blooming – dough-ripeness	Growth of the annual organs (phase II)	1217-1382	3100-980
7	Dough-ripeness - maturation	Grapes and wood maturation	1382-3614	2940-200
8	Leaves falling	Migration of the reserve substances in the multiannual organs	3614-3660	200-100

Results and Discussion

1. Cultivar Vinifera / stock: Crâmpoşie selecţionată / Kober 5BB, Victoria, Călina, Italy.
2. Semi-high leading: Lenz Moser, Guyot on the stem.
3. Plantation age: 20 years (1978).
4. Kind of soil: brown eumesobasic and brown argilopluvial pseudorendzinas.
5. Viticultural year: 1997 / 1998.
6. Daily average temperature (7°°, 13°°, 19°°, 24°°).

- Annual average temperature: 11,3 °C
- Minimum absolute temperature: -16,0 °C
- Maximum absolute temperature: 37,7 °C
- Annual temperature: 1995ºC
- Annual precipitations: 664 mm

Conclusions

The obtained results refers to:

- Bio-climatogram of the viticultural year 1997 / 1998;
- Distributive and cumulative evolution of the sprout growth;
- Distributive and cumulative evolution of the dried stuff in inflorescence-grapes;
- Bio-physycs relation between the active termic gradient or phenologic evolution and

the dried stuff accumulation on the sprout (wood, leaves, grapes);
- Evolution of the grape vine's organs, photografic replaid, on cycles, periods, phases and phenologic-component stages;
- Notational and codification original systems of the phenologic stage and microstage folded the Optimised Technologic Viticultural Phenocalendar (OTVP).

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OLD AND NEW FOOD SUPPLY CHAINS AND THEIR RELATION WITH THE NEW RETAIL FORMS

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Abstract: ***The structural changes in the whole Romanian agrifood sector occurred after 1990 induced major changes in the functioning and flows of the food supply chains. The globalization and concentration of retail, the conversion of supply-oriented production to demand-driven food chains, and the increasing importance of quality grades and standards, have had a huge impact upon primary producers in Romania and their linkages to the market. While the international supermarkets chains are inducing processes of standardization in order to create uniform efficient sourcing structures, the national organizational modes of supply remain diverse and fluid. The producers' organizations are still weakly represented and hence not able to influence significantly the organization of supply. The paper is studying the changes occurred in the food supply chains and is trying to identify possible solutions to bring the Romanian farmers closer to be integrated in the modern types of retail.***

Key words: *Food Supply Chains, Traditional trade, Modern Retail, Romania.*

Introduction

Political and economic reform in Romania has been slower than elsewhere in CEE, and as a result the country joined the EU at the last enlargement, together with Bulgaria, in January 2007. Romania is a relatively poor country by Central Eastern European (CEE) standards, and there is a clear wealth gap with the 2004 new member states. However, the country is still wealthier than other Balkan states such as Macedonia, Bosnia and Herzegovina or Serbia and Montenegro. With more than 22 million inhabitants, Romania has a relatively large population by CEE standards. Romania is the fourth-largest consumer market in Central & Eastern Europe after Russia, Ukraine and Poland; the number of inhabitants in Romania is roughly half as big as in Poland and twice as big as in the Czech Republic or Hungary. Some 10% of Romanians live in the capital Bucharest and its suburbs, making it the country's undisputed number one cultural and economic centre, while 45% of the national population lives in rural areas.

In terms of economic growth, since the return of economic stability in 2000, real GDP growth rates have been solid and stable, ranging from 4.2% to 8.5% in all years since 2001. The economic reforms have progressed, unemployment has fallen (to around 5.8% in 2008), consumer price inflation has fallen continuously as well and had reached single digit levels by 2005 (table 1). All this resulted in an increase in population's incomes, and the population did some catching up in terms of consumption. High expectations were in place for the next few years, but the global crisis affected Romania as well starting 2009.

Consumer spending in Romania is quite low (less than 50%) by EU standards, nevertheless, the country is wealthier than other Balcan states such as Macedonia, Bosnia & Herzegovina or Serbia & Montenegro. Wealth in Romania is somewhat below the standards achieved in other NMS, but it still is the "more interesting" consumer market thanks to its much larger population.

Table 1. Selected economic indicators, 2002-2004

	2001	2002	2003	2004	2005	2006	2007	2008
Inhabitants (million)	22.41	21.79	21.73	21.67	21.62	21.58	21.54	21.52
GDP (million EUR) (at official exchange rate)	44,865	48,637	52,569	61,030	79,746	97,787	123,681	136,845
GDP / capita (PPS) (EU27=100)	27.8	29.4	31.3	34.1	35.0	38.3	42.1	45.8
GDP (% of real growth)	5.7	5.1	5.2	8.5	4.2	7.9	6.2	7.1
Consumer price inflation (%)	34.5	22.5	15.3	11.9	9.1	6.6	4.9	7.9
Indices of household final consumption / capita (PPS) (EU27=100)	33	35	35	40	42	46	48	50

Sources: Romanian National Institute of Statistics, Eurostat

Materials and Methods

» *Changes in food chains*

The exit of the Romanian agrifood sector from the centrally-planned economy model was marked by the disappearance of the large production units (the ex-state farms and cooperatives), along with the emergence of small agricultural producers. At the same time, the very different pace of privatisation and restructuring of large upstream and downstream units generated severe disruptions along the previously established functioning of the agrifood chains.

The normal market rules all along the road from the producer to the consumer encountered many difficulties in setting up, due to inconsistencies in approaching the reforms. Hence, strongly distorted market relationships occurred between small, uninformed and non-performant producers and the increasingly exigent consumers' demand.

The globalization and concentration of retail, the conversion of supply-oriented production to demand-driven food chains, and the increasing importance of quality grades and standards, have had a huge impact upon primary producers and their linkage to the market. Under these conditions, a misbalance appeared, inhibiting the producers' commercial appetite and stimulating the production for self-consumption. Hence, a coherent restructuring of the chains didn't take place; moreover, some monopolistic enclaves appeared (intermediate and final distribution).

The changes in agriculture are complex, dynamic and much more diverse than we would expect looking at the global trends of supermarket dominance. While these supermarkets induce processes of standardization and harmonization in order to create uniform efficient. The agrifood chains, as circulation channels from the producer to the consumer, changed as follows:

a) Ex-cooperatives – dismantled in 1991-1992; about 4,5 million small-size private agriciultural households resulted (table 2).

b) Ex-state farms – finally privatised (mixed capital, state and private) end 2002; some went bankrupt, many separated in smaller units, but they were basically the background for the current large units.

Table 2. Change in the number of farms, 2005-2007

	2005	2007	2007/2005	
	number	number	number	%
Individual households	4,237,889	3,913,651	-324,238	-7.7
Agricultural units (legal bodies)	18,263	17,699	-564	-3.1
Total	4,256,152	3,931,350	-324,802	-7.6

Source: data from Agricultural Structural Surveys, 2005, 2007

The two last agricultural structural surveys (2005 and 2007) showed a reduction in the number of farms, both individual households and legal bodies (table 2). In 2007 only 9608 farms (0.24%) used more than 100 ha, while the average size (of all the Romanian farms) was 2.38 ha.

Since the early years of transition, the different "stages" of the agrifood chains have changed, privatized, restructured and modernized at very different paces. Moreover, the excessive fragmentation of land put the farmers (small agricultural producers which are the largest majority) at great disadvantage versus the upstream and downstream parts of the agrifood chains: the input suppliers, wholesalers, processors, retailers, which are generally of much larger size. Since among the agricultural producers the idea of association is still unpopular (even after 20 years since Romania exited the centrally-planned economy), their negotiation power in the agrifood chains is severely disbalanced, to their disadvantage.

Inconsistent and ever changing agricultural policies, price controls (until 1997), export restrictions, high import taxes, high inflation, slow or incomplete reforms, lack of capital and effective support, and the economic fall until 2000 have created and perpetuated significant blockages in the establishment and development of competitive markets. In the present decade, the better economic environment due to the economic growth created better opportunities for agricultural producers, but the road to achieve competitive and well functioning agrifood markets is still long to go.

c) The collection / storage units used to be completely state-owned; they were demonopolised and subsequently privatised with many difficulties by 1999. Currently, they are concentrating large storage facilities; on the other hand, the small size farms mostly lack such facilities, and no associations for that purpose are in place to cover somehow that problem.

d) The food processing units used to be completely state-owned as well; many went bankrupt and disappeared, some have been restructured and subsequently privatised by 2000. Many new processing units were established, initially small-sized; some of them developed into medium-size units, other were taken over by larger domestic or foreign investors, and new large units were established either as joint ventures or FDI from international companies (Cargill, Danone, Hochland etc). Although a little later, the processing sector developed significantly, and now it is the second-best developed and modern stage in the agrifood chains.

e) The distribution sector saw the most spectacular development. The state-owned distribution units disappeared in the first years after 1990, and they were replaced by many new private distribution units.

During the pre-transition period (prior to 1990), the domestic trade sector was mostly state-owned (81.3%), and only a small share (18.7%) was co-operative

(handicraft and consumption co-operatives, located mainly in the rural area). The private trade was forbidden (except some agrifood products that were being sold in peasant markets in urban areas and in periodical fairs and markets in the rural areas). The state-owned food retail sector included in the urban areas included specialized shops, mixed shops and kiosks in the peasant agrifood markets.

The food retail specialized shops (grocery, milk and fresh dairy products, meat & meat products, fish) belonged to a state-owned commercial company. The specialized shops for milk were selling fresh drinking milk and a very narrow range of fresh dairy products only (yoghurt, and, during summer, ice-cream). Fruit and vegetables were sold in specialized shops only and in kiosks in the peasant agrifood markets, belonging to a second state-owned company, which was dealing with these products only. Only in the case of bread and baking products, about half of the shops belonged to the processing enterprises.

The mixed food shops (some of them with self service, but in large towns only) were selling grocery, beverages, meat and meat products, and dairy products (including butter, white and yellow cheese). Co-operative shops were operating in rural areas and in small towns and were selling both food and non-food products.

The retail sector has been the quickest to restructure and privatize in the whole economy. Several conjectural factors contributed significantly to this process: the increased autonomy of the production enterprises (which were no more obliged to sell to specific customers), the emergence of the private production sector, the price liberalization, the freedom of circulation abroad, the relaxation of the foreign trade legislation (discontinuation of the import bans and very low import tariffs). The new emerged private retail units were mostly kiosks or small shops, due to the lack of capital and of premises, as well as to unclear ownership structures and processes. Even so, the number of retail units doubled in just a few years (1994 as to 1992) (table 3). The ownership structure changed quickly: in 1994, already 77% of the total number of retail units was privately owned, while the number of public-owned and co-operative shops dropped by one third each. In 2006, 99.98% of the shops were privately owned. The number of shops continued to increase until 2006 (but at a significantly slower pace than in the first years of transition), and after the EU accession started to decrease, along with the explosive development of the modern retail (super and hyper-markets).

Table 1. Number of shops, by types of ownership

Year	Total	Private
1989	63,084	0
1991	80,324	22,169
1992	136,543	84,488
1993	149,755	101,748
1994	179,502	137,947
2003	135,072	133,439
2004	135,003	134,933
2005	148,427	148,378
2006	148,902	148,861
2007	144,685	144,670

Source: Romanian National Institute of Statistics

In the mid-90's one did see the development of the privatized small shops into small independent supermarket formats rather than the emergence of retail chains with domestic capital. These were the basis for the early foreign investment in larger supermarkets. By mid-90s, local domestic independent small-format supermarkets emerged in the big towns (many of them with foreign investment). The very first modern supermarkets emerged in Bucharest,

and were joint-ventures ("La Fourmi", with Lebanese capital, opened in 1991 and "Mega-Image", with Greek capital, which opened four supermarkets in 1994). In 1996, Metro international chain opened the first cash and carry. Subsequently, other international chains invested in Romania and opened supermarkets, cash and carry, discount stores and hypermarkets.

The globalization and concentration of retail, the conversion of supply-oriented production to demand-driven food chains, and the increasing importance of quality grades and standards, have had a huge impact upon primary producers and their linkage to the market. Under these conditions, a misbalance appeared, inhibiting the producers' commercial appetite and stimulating the production for self-consumption. Hence, a coherent restructuring of the chains didn't take place; moreover, some monopolistic enclaves appeared (intermediate and final distribution). The changes in agriculture are complex, dynamic and much more diverse than we would expect looking at the global trends of supermarket dominance. While these supermarkets induce processes of standardization and harmonization in order to create uniform efficient sourcing structures, the organizational modes of supply remain diverse and fluid.

According to a study of "Planet Retail", the cumulated market share of the first 20 large retailers in Romania has been about 28% (end 2006), the remaining 72% of the retail sales being channeled through traditional shops and small domestic local networks, each unit having market shares lower than 0.1%.

The year 2007 has been an excellent one for large retail networks operating in Romania: they expanded very quickly (opening over 150 new facilities and making many acquisitions); the largest companies saw even 2-digit figures receipts growth rate (table 4).

The forecasts show an expansion of the modern retail to 41% market share in 2013, while their receipts are likely to increase several times. There seem to be two main instruments for the spectacular modern retail expansion:

(i) opening new stores (either building new facilities or purchasing old ones) in densely populated urban areas, and

(ii) expanding to smaller-sized towns. Both instruments are still doing their job, since in large towns there is still some demand not covered by the existing facilities (proved by the quite long waiting periods of time at the cashiers' desks in the afternoon and weekends). However, this "extra demand" is likely to be covered in a few years. On the other hand, opening new super and hypermarkets in smaller towns will most likely be a success at the beginning, but saturation level is probably going to be reached in a limited period of time.

The driving factors in this respect would be:

- The largest group buying regularly from super and hypermarkets achieved is that of persons aged 18-45 years, with "white collar"-type jobs, and medium income. In smaller towns, this group is relatively smaller than in bigger towns, due to limited employment opportunities.
- The presence of "traditional trade" forms (small shops, minimarkets) is beneficial for elderly people or young teen-agers that do not have access to a car (location of super and hypermarkets is generally not in downtown or in heavily populated areas). The traditional shops are located always "nearby", immediately accessible, and allowing also "emergency-type" purchases (a loaf of bread or a few beers, a bottle of milk etc.).

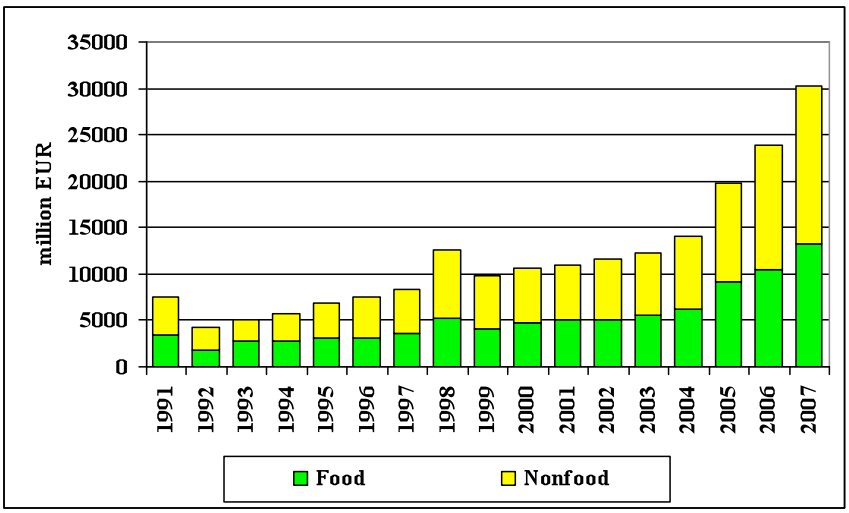
- The most important part of traditional market that will still be present in Romania at least on medium-term is the "wet" markets for fresh fruit and vegetables. They are a well known and familiar presence in both large and small towns. In the last 10 years these "wet markets" have been constantly in the attention of the local authorities, and passed through important modernizing (private and public investment) processes (new facilities, mostly special buildings, with storage facilities, water for cleaning the fresh products, selling locations to rent for long term by producers etc.). This type of market is likely to go on, since it is supplied with products by small agricultural producers and small wholesalers and importers. They are flexible, adaptable to quick changes in the demand, they supply the market with very traditional and specific national or regional products (that are never produced by large-sized farms, either foreign or domestic) and are producing/collecting/selling small quantities of fresh fruit and vegetable, so preserving the best quality and freshness for their products. By contrast, fresh fruit

Table 4. Top 10 retailers in Romania, by turnover (2007)

Rank	Retail network	Turnover (million EUR)		Variation 2007/2006 (%)	Number of shops (15.04.2007)
		2006	2007		
1	Metro	1428	1506	5.4	23
2	Selgros	628	778	23.8	17
3	Carrefour	561	688	22.6	11
4	Billa	283	355	25.6	28
5	Real	82	346	321	15
6	Rewe	89	240	170	52
7	Auchan	19	130	582	5
8	Plus	81	120	47	52
9	Artima	78	97	24.7	21
10	Interex	58	91	57.6	11
	Total	5314	6357	-	-

Source: "The Market" Journal, Bucharest, no. 42/2008

Figure 1. Retail sales of food and non-food goods, 1991-2007



Source: Romanian National Institute of Statistics

and vegetables in the large retail chains are mainly imported, pre-packaged, and by the nature of the business, they have to pass through longer (in terms of time) supply chains, so their freshness is debatable. Last, but not least, at better quality and freshness in the wet markets, price are comparable with those in hypermarkets.

- The main issue is that despite this spectacular expansion of modern retail, it seems that the "traditional trade" will not be eliminated (replaced), but it is likely that they will continue taking more than half of the total agrifood sales. All that contributed as well to the fact that non-food retail sales expanded more as compared to food retail, while the share of food & beverages in the Romanian family budget was more than half in the last 20 years (figure 1).
- The normal market rules all along the road from the producer to the consumer encountered more difficulties in setting up, due to inconsistencies in approaching the reforms. Hence, strongly distorted market relationships occurred between small, uninformed and non-performant producers and the increasingly exigent consumers' demand.
- To transact with the rapid rise and dominance of supermarkets, producers need to get bigger (either individually or collectively) to both improve the technical quality (product specifications) and functional quality (their capacity to provide long lines of consistent quality produce). For selling to that specialized wholesaler, the farmers' products are to achieve a wide and strict quantity of grades, standards and other conditions demanded by the dedicated wholesaler.So which would be the real benefit for the small farmer producers to sell their products to dynamic markets? One reason could be the generation of family income, while another one could be the market security.
- The establishment and development of competitive markets is one of the core issues Romania is facing with. The associations or the professional/inter professional producers' organizations by products or groups of products are relatively weakly represented and cannot have a decisive influence in supply organization.

» *Marketing orientation of the Romanian family farms – facts and integration problems*

As the structural reforms did not targeted the restructuring of down and upstream sectors in accordance with the needs of the small individual holdings, the input and output markets were not fitted to farmers' requirements. The declining trend of agricultural production and gross value added increased both the relative and absolute gap among Romanian agriculture and the Member States one. The excessive agricultural land fragmentation is a major hamper in family farms productivity, if we take into account that they are producing an estimated 3/4 of the total crop output of the sector level.

Most farmers are involved in subsistence agriculture and only a small number obtain a product surplus that could be sold. This situation is leading to a slow-down of the implementation of agricultural policies, strategies and projects aiming to increase the life level of this population segment. Still, the low life level and the incapacity to modernise and develop the small farms resulted in a large share of on-farm consumption.

A very low share of family farms[1] are producing mostly for market. Of the total number of family farms, 77% are producing only for their own consumption (while they are using 52% of the total agricultural area they are farming), 21% are selling the occasional output, and just 2% are producing mainly for selling (while using 7% of the

total agricultural area their group is farming) (figure 2).

[1] *For this paper, the term "family farm" will be used as the equivalent of "individual household" ("exploatatii individuale" as they are called in the Romanian Statistics), as opposed to the agricultural legal units.*

As opposed, of the total number of legal agricultural units, 32.6% are producing for on-farm consumption, while using 21% of the agricultural area their group is farming), 19.8% are selling occasionaly the output and less than half (47.6%) are producing for selling only (while using 60% of the agricultural area their group is farming) (figure 3).

Results and Discussion

The marketing channels for agricultural products is poorly developed. The lack of marketing structures able to integrate farmers, processors and sellers in strategic alliances has major negative effects upon the agrifood products markets. The large number and diversity of producers poses really big problems regarding supply of adequate volume of standardized products, able to meet the requirements of the market. On the other hand, the presence of very many small individual households, unable to supply large and standardized agrifood products required by modern retail, is increasing the already important role and share of the wet (peasant) markets in agrifood products distribution.

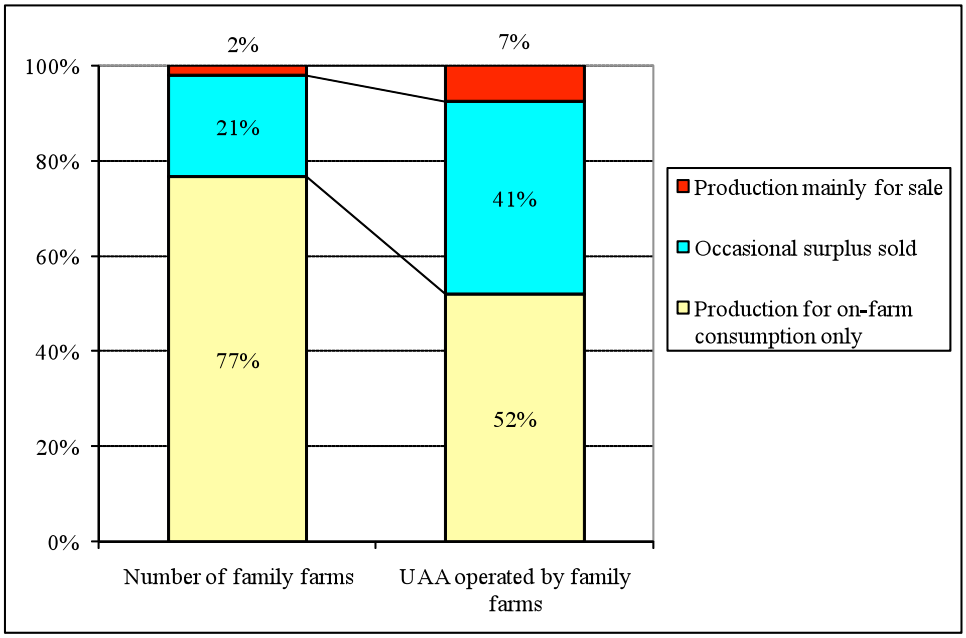
As a consequence of the distorted structure at farm (household) level, the supply of the peasant family farms is, to a great extent, extremely fragmented into small and heterogeneous batches - that except for certain cereal and livestock products – go mainly to local, relatively isolated markets, while more than 70% of the family farms producers are not included in an organized system of marketing. It is worth mentioning that neither in the case of other types of farms is the supply adequately organized. The associations or the professional/inter professional producers' organizations by products or groups of products are relatively weakly represented and cannot have a decisive influence in supply organization. As regards demand, the situation is quite opposite, as it is concentrated in the hands of an extremely low number of processing operators, often having a local monopoly position.

At the same time, low income consumers provide an important refuge for farmers who have not been able to adapt to the demands of agrifood restructuring. While supermarkets in Romania have aimed at medium and high-income families, low-income families have provided a large informal "unregistered channel" for farmers, encouraged by a tax system that tends to favor a black market. Lower income families will have the tendency to buy cheaper produce from the wet market, while the role of the government in ensuring basic food safety in these traditional markets should be addressed.

It must not be omitted another constraint, namely a rudimentary and completely insufficient material and informational infrastructure. Furthermore, there is an extremely low connection to world markets, with quite an obvious negative impact. Therefore, competitions (if any) between the market operators is one way (it mainly exists in the field of supply) and consequently it is extremely unbalanced to the detriment of farmers, that are less favored as regards economic power, negotiation ability, information degree, compared to the processing units for agricultural products.

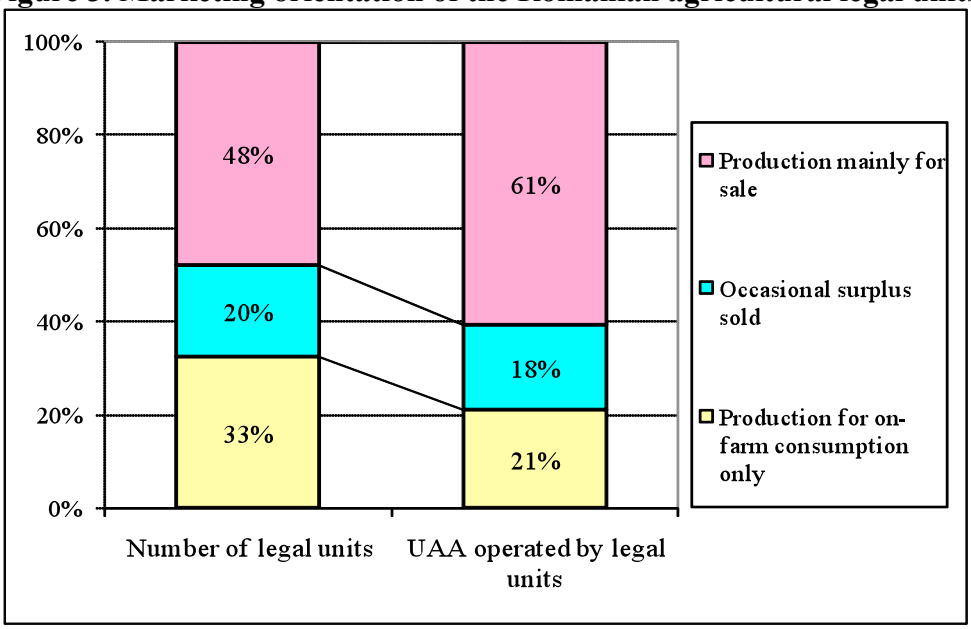
Besides the above-mentioned issues, it is worth mentioning that the signals that

Figure 2. Marketing orientation of the Romanian family farms



Source: Agriculture Structure Survey 2007, INS, 2008

Figure 3. Marketing orientation of the Romanian agricultural legal units



Source: Farm Structure Survey 2007, INS, 2008

can be transmitted by the present markets are quite "pale" and rather frequently distorted. The lack of adequate market signals, amplified by the relatively low perception possibilities at the level of the large mass of farmers, make them continue to evolve in a world with an extremely high degree of incertitude, in which the allocation of resources follow quite traditional patterns of distribution by activities/products that many times do not comply with markets requirements.

Conclusions

» *The process of restructuring and modernization of the traditional chains shows the following features:*

- The expansion of modern retail formats is inevitable: as consumers'personal disposable income raises, the range, quality and convenience of the produce becomes attractive.
- Competition within the retail sector itself will drive prices down putting pressure on producers and market intermediaries; the failure to adequately convey price information to producers means market intermediaries can potentially extract higher profits.
- To transact with the supermarkets, producers need to become stronger (either individually or collectively, by getting associated) to both improve the technical quality (product specifications) and functional quality (their capacity to provide long lines of consistent quality produce).

» *Possible solutions for the establishment and development of competitive markets and food chains by products/groups of products.*

In our opinion, the following could bring a favorable contribution to the establishment and development of competitive markets and of food chains by products:

- supply organization through the development of rural cooperation in the taking over, acquisition, processing and sale of agricultural products. The emergence and development of modern rural cooperation in our country, in conformity with the operation principles and the organization modalities practiced in West-European countries is conditioned both by the adoption of Rural Cooperation Law (Law of agricultural cooperatives) and by a financial support from the part of the public power in the initial stage of cooperatives establishment for the establishment of production and marketing infrastructure[2] ;

[2]*The generalized pauperization in the rural areas and the absence of production and marketing infrastructure can be an acceptable reason for this support in the initial stage of agricultural cooperatives establishment.*

- establishment and consolidation of forward and futures markets, as well as of stock markets;
- facilitation of establishment and consolidation of farmers' professional associations by products/groups of products;
- promoting a set of actions/measures for demand demonopolization through the entry of new private operators on the market; smooth operation of transactions on the grain markets and of cash flows implicitly from farmers to silos, and finally to traders and commodity exchanges through creating necessary conditions for the implementation of warehouse receipts system; development of marketing infrastructure; promoting Romanian products on the international markets; consolidation and development of commodity exchanges, etc;
- development of contract-based relations on longer term between farmers and processors; establishment of common enterprises along different links in the agrifood chain;
- actions meant to provide market transparency increase, in the first place

through the creation of an information system regarding specialized markets; this should include data to be made available for farmers in a systematic manner and through the intermediary of the National Agency of Agricultural Consultancy (ANCA);
- establishment of market control system as regards quality standards and product origin control.

As well, a detailed investigation on the issues related to the establishment and development of financial markets in the rural area/having an impact in the rural area is needed, as a main constraint to farm operation (under the conditions of farmers' decapitalization and of the extremely low possibilities of capital formation).

For the operation of these markets, the following would be necessary:
- facilitating the enlargement of commercial banks operation area in the rural area through: funding certain studies/projects on the opportunities/restrictions and planning the financial situation of branches that would be established by a private bank in the rural area; elaboration of adequate technologies for providing financial services to farmers, small and very small enterprises in the rural area; (direct/indirect) financial support for the establishment of a network of branches/ pilot operating points in the rural areas;
- regulating the conditions that would facilitate the establishment of small commercial banks with local coverage;
- supporting the establishment and development of mutual credit in agriculture;
- support to improve the supply and quality of insurance services (for harvests and/or farmers' incomes) by the establishment and development of mutual insurance system implicitly;
- leasing market development for capital goods;
- facilitating the capital flow increase in the rural area through the establishment of the legal framework providing the possibility of non-banking financial intermediaries' involvement in providing the necessary resources to farmers;
- facilitating the creation of a functional system of crop establishment funding on the basis of forward and futures contract and of the development of stock market and of its derived instruments.

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FORMS OF INTEGRATION AND THE EVOLUTION OF MARKET SERVICE ACTIVITIES IN AGRICULTURAL HOLDINGS

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Abstract: ***Although the service activities of the farms faced many problems, it is expected to know in the next period (2009-2025) these mutations Very positive, both quantitative and qualitative circumscribing the option of the fundamental policy of integration into European economic and global levels. A mutation also implies, above all, the orientation through the appropriate policies and strategies of all service activities for the rural market integration in the European single market.***

Key words : *rural market, European single market, agricultural exploitations*

Introduction

Nowadays in the world the services exhibits an intense modernizing process, assessed as a real „revolution of the services". But this kind of process is the result of action, with a significant ampleness, of the market's formative agents and of the services function and place alteration in the rural area.

Material and method

The services integration concept in the framework of the agricultural exploitations, it represents a mutual adjustment of the agricultural production system, allowing it to reach a balance. The structure inside of such system can be considered evolutional only when the relations established among the activities that compound it (of production and services), are stable for a long period of time and generate perceptible effects at a agricultural exploitation level, as well as at the level of the services providers. So, the trend in the evolution of the services concerning the end period of the XX century and the beginning of the XXI century, it marked a series of trends of the services evolution from thee agricultural exploitations:

- Increasing in a superior rhythm of the services offer, especially in the post-revolutionary period related with the other sector's offer;
- Association, irrespectively dissociation of the goods and services offer;
- Increasing of the function and significance of the quality in the services area;
- Differentiated dynamics on categories of services.

Increasing in a superior rhythm related with the offer of the other sectors it represents a trend registered on the Romanian market as well as on the international market. The development of the third sector has been favoured by the general development of the economy, which had positive effects with the life level that finally determined the emergence and the diversification of the social need for services. This trend is supported by:

- Increasing of the proportion of the employed population from 31.1% in 1996, to 34.09% in 2002 and 37.2% in 2004;
- Balance of the services with the building of the gross domestic product in Romania, it increased from 44.8% in 1999 to 45.3% in 2004;
- Balance of the agriculture, hunting and forestry it decreased from 13.3% to 12.8% in 2004;
- Balance of the industry increased from 24.8% 1999 to 25.1% in 2004;
- Balance of the civil engineering increased from 1.4% in 1999 to 6.0% in 2004;
- contribution of the services to the

accomplishment of the gross added value registered an increasing trend in 2003, by comparison with the year 1999, in the developed countries as well as in the East European countries. For instance, Austria (from 66.8% to 67.5%), France (from 71.6% to 73.6%), Germany (from 68.4% to 70.3%), Latvia (from 68.6% to 70.9%), Hungary (from 61.7% to 66.1%), Bulgaria (from 55.9% to 58.6%), Romania (from 50.8% to 58.1%) etc.

An overview of the agricultural exploitations' functionality, it emphasizes the integrator diapason of services. However it is possible to be distinguished different phases of degrees of economic integration in the framework of the agricultural exploitations, diversity depending on the reached level in the performed costs of the tariffs and the coordination of the economic policy from the agriculture. The achieved progress through different form of agricultural production integration it correlated the integration agricultural exploitation ↔services to the knowledge and building of a balance concerning the following aspects: assembly of the commune agricultural policies, motion liberty of the agriculture's product/service market, harmonization of the national legislation in the agro-alimentary area, the existence of some commune institutions where the agricultural exploitation and the services providers transfer some attributions of economic nature.

Through these considerations, the limitation of the integrated assembly agricultural exploitation ↔ services, it can be structurally replied through the following forms:

a) Horizontal integration, by which it has in view the producers' organization prevailingly on cooperative basis. This form it represents a partnership between the producers/providers of services, with the aim to raise the production's efficiency, the trade and the consumption. This organizing takes place either through the splitting of different stages of the agro-alimentary production system by different groups (individual agricultural exploitations, associations, companies, etc.), or through the use in common of the technical and technological production apparatus. Synthetically it can be shown through this integration form it is unified, under a unique authority, the same kind of activity.

b) Vertical integration, it means either the cooperation of the individual agricultural exploitation with the industrial and commercial units, or the existence of more cooperatives with commune interests and targets, but which effectuate different activities, the integrator being a natural/ judicial person who performs different activities and has decisional mandate. In the framework of this integration form they can be assigned: the ascendant of up-river integration, when the same authority monitories the agriculture production, services and supplying, especially through the agency of the production facilities market with which the agriculture supply itself; the descendant integration, when the same authority monitories the agricultural production, services supplies, and the capitalization activities on the market of the agro-alimentary products;

c) Total or complete integration, when the same authority monitories through the market mechanisms the production/ services by the agency of the production, supply, and capitalization from up-river and downstream. In the current stage, these activities which are frequently integrated in the framework of a channel, they are also known under the name of "agrobusiness";

d) Integration through contractual form of the production. This form doesn't have up-river or downstream supervision means of the agricultural production, but

it insures the supervision through the agreements settled with certain intermediary economic agents in the area of services supplying, delivery, industrialization or commercialization of the agro-alimentary products.

Results and discussions

It results the services involvement in the framework of the integrated system it means the building of some economic assemblies larger in the local agro-alimentary systems by the agency of which can be allowed: enlargement of the work division channel at the level of the agricultural exploitation, local, zonal etc., and the improvement of the work efficiency; freedom and mobility of using the production facilities designed to the production/services activities; differentiated commercial treatment observing the origin and/or de designation of the production facilities.

The material resources represent the assembly of the resulted material goods from a production process, with the aim to get new goods and services designed to the market (final consumption).

Here from it results the services alongside of the needed material resources for a good development of the production process from the agricultural units, they are differentiated depending of the attending activity, so:

a) For the vegetal production, the most significant services are those of mechanization, chemistry, pest control, irrigations, etc., and the material resources also with special significance are: the selected seeds of material for planting; insecticides and pesticides; fuels; agricultural machines and equipment; devices, etc. For the zoo technical production the most significant services are those of operating, providing of the zoo-veterinary services alongside the material resources like: races and lines of life stock, forage; medicines of zoo-veterinary use; materials for cleaning maintenance in the facilities; agricultural machines and equipment; device for supplying water of forages; other devices, etc.

b) For the agro-alimentary production (of agricultural products processing), the most significant are the commercialization services (carrying out/ delivery), as well as the material resources like: agricultural products designated for processing; pigments and other auxiliary materials; individual packages of the alimentary products; fuels; devices (manufacturing lines); transportation means, etc.

From here it results the services market from agriculture it represent the meeting place, more or less abstract, of the request with the offer of services, the first category being represented by the beneficiary (agricultural exploitations), and the second one by the services providers, place where the price is establish in the most of the cases through negotiations.

The material resources market represents all the selling-purchase between the suppliers (productive units of the material resources and the intermediaries), and the beneficiaries (agro-alimentary units), needed to assure the continuance of the production process or trade).

As opposed to the goods consumption market, the services market from agriculture has a series of particularities, out of which the most significant are the following:

a) *Geographic features*, it refers to the dispersion in the territory of the rural population, that finally leads at the situation when at a services request mass similar to that from the urban environment, to be more difficult the managing of some services offers capable to cover this request, irrespectively the approach of the request bearers by an services offer as diversified

as possible. This phenomenon materialized itself in small units, with a reduced number of workers, in average smaller than in the urban environment, and of course with a weaker endowment. The deep transformations that occur in the rural environment will accelerate the attenuation process of some services from the rural environment of the services from the urban environment.

b) *Economical social particularities* emphasize especially the request of services specific for the rural environment. Many of them are determined by the existence of the agricultural exploitations, as well as by other tradition in consumption. An important part of these requests will be permanently satisfied in the rural population houses. As it is framed in these particularities, they can be mentioned the following characteristics:

- the services market from the rural environment can be defined also through a series of zonal particularities, determined by the development degree of different counties, by the traditions in consumption, by the proportion of the services request covered in the framework of the agricultural exploitation etc;
- the services market is more concentrated, finding a lower amount of providers and purchasers, for some services we can talk even about monopoly or oligopoly of the provider (for instance the irrigation providers).
- the request of services results from the request from the end consumers, that it generates the need of a complex study of the services request performed with the assistance of the, beginning from the request of the end products obtained from the services provided by the agro-alimentary enterprises.
- the impulse of the services' purchaser is more rational, it has a technical economic reason, it grounds the framing of the main services carrying out in the practiced technologies in the productive units (agricultural exploitation, units with judicial personality etc. beneficiary of these inputs), framing in technical parameters, taking into account the secondary services;
- the commercial transactions for the service carrying out need a time grading they developing in experts teams, being analyzed all the conditions of the offer besides the internal resources of the services. The additional costs carrying out during the negotiations, they compensated through the economic effects such as: performing of superior efficiency, lower specific consumption, low costs; superior quality of the material resources (and consequently of the end products), higher selling price of the end products etc.
- In the conditions of the crossing towards the market economy, the services market characterized itself through the fact tat both the providers and the bearers of the request are autonomous economic agents. For this reason the circuit of the services carrying out has an opened (free) characteristic, but with a specific system.

c) Transformation process of the rural services market. The existence of some particularities of the services rural market given the urban market, it is firstly determined by the difference between the village and the city. They can be structured elements, considered as causes, from the dynamics of the perspective of this transformation process of the services market from the rural environment:

- Working conditions, structure and the way of achievement of the incomes modify etc., reason why the services request has in this case a decisive characteristic, and it form the object of some economic agreements also decisive;
- Migration process of the request towards the urban centers is a phenomenon that accompanies also the migration of the

goods request. The nature and the size of the services offer from the rural environment it is influenced also by the fact a long standing period the main source of the labour force recruitment it was the attraction of the private manual workers with a low qualification and thus capable to perform a limited range of works;

- Policy of the carried out product (service) has as a main feature a crooked request from the request of the end consumption, which makes this policy developed by the services carrying out to adapt themselves to the production technologies from the beneficiary enterprise (the offer adapt itself to the request). For the agriculture, the organic characteristic of the production it determines a self-production, greatly of some services I the framework of the agricultural exploitation. In this sense it is important the managers (decisions structures) to ground in the framework of the enterprise the purchasing decisions of different services, taking into account the purchasing cost, and the positive effects, in chain, of some good quality products use (for instance the acquisition of selected seeds from Semrom or Unisem etc.);
- Concerning the price policy for services, the prices are greatly influences by the main making expenses. Those in the sense that although the services tariffs form on the market dependent on request and offer, the production cost of the tariffs) has a higher balance in the total of the tariff in case of the material resources by comparison with the consumption goods (ore otherwise said, the profit margin is smaller);
- For some services of the agricultural exploitation there is a support of the state budget through different approaches like: coupons to purchase seeds, fertilizers, mechanical labours; subsidized interest for the acquisition of equipments etc.;
- Develop of the modernizing process concerning the urbanity condition from the rural environment. It can be mentioned the strong penetration process in consumption of the domestic appliances and other goods of long term use and the urbanization action of the rural localities. All this amplify the dynamics of the services request both through the deformation of the services request and the emergence of new requests of services (housing, utilities purchasing, transports inside and outside of the locality etc);
- In the distribution policy it must be remembered that in the case of the services the distribution channels are short, with poorer intermediary links or without intermediation, the channel being in the most cases producer-beneficiary. Also the channels being narrow (the channel widen towards the beneficiary). The

The distance cover by of some categories of services can be very long, existing cases when there is only one provider of services or distributor in all the country;

- Concerning the promotional policy, for the services this is mostly accomplished through advertising. It can be mentioned the attraction power of the urban centers that is amplified by some consumption habits. For the intermediary services, the promotional policy is performed through leaflets, posters, catalogues where they are depicted the product technique characteristics through commercial representatives, fairs, exhibitions, practical demonstrations etc. in the case of the services performed by specific technical means, the practice demonstration are made obligatory either at the producer, or by the beneficiary with the aim to find their utility.

Conclusions

For the implementation of the governmental programs in the post-adhering period, concerning the range of integration services it is necessary the demarcation through:

- Defining and assessment of the agricultural exploitation specific needs and targets , as well as the building o an adequate integration plan for the exploitation profile;
- Explanation of the integrator environment through the analysis of the social, economic, and politic environment for each kind of agricultural exploitation;
- Particularizing of the services market requests in the actual economic context, tacking into account the offer and request of services from the market framework;
- Adapting of the services at the requested patterns in the agricultural exploitations;
- Information of the partners from the market framework concerning the services request, and some regulations.

From here it comes out the rural services will concur for the expansion of lasting links among the activity departments of the economy, this being accomplished through a good cooperation between the consumers and services providers. A balanced and flexible fiscal policy can support these targets.

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