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SUMMARY

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THE RHYNCHITIDAE AND ATTELABIDAE FAMILIES (COLEOPTERA, CURCULIONOIDEA) FROM A HISTORIC PERSPECTIVE

ANTONIE VLAD IULIANA * TEODOR LUCIAN ALEXANDRU **

* Catedra de Inginerie Montană, Facultatea de Ştiinţe Agricole, Industrie Alimentară şi Protecţia Mediului, Universitatea „Lucian Blaga" Sibiu
** Catedra de Taxonomie şi Ecologie, Facultatea de Biologie şi Geologie, Universitatea „Babeş-Bolyai" Cluj-Napoca

ABSTRACT
A large work regarding the history, both in our country and abroad, of the Rhynchitidae and Attelabidae families, hasn't been written yet.
The systematic researches of the Curculionoidea, brought, in our days, great modifications. The new achievements regarding the morphology, palaeontology, biochemistry, ethnology and taxonomy are yearly analysed by the scientific community, determining different interpretations taking into account the new data, being very difficult to find a common point of view among the systematising researchers. As a result the systematisation is in a continue development and the question is, if and when could be reached a sufficient, stable systematisation. Many of the proposed modifications have already received the agreement of the researchers, for example: advancing at the rank of family of the subfamily Rhyncholophorinae (Calandrinae), the enclosure in Curculionidae family of the Scolitidae and Platipodidae family, the disposal of the subfamily Nanophixanae in the Apionidae family.
The history of researches of the fauna emphasizes the fact that the fauna of the curculionoidea is a rich one, a normal situation in the case of this very numerous group of coleopteron. This is due to the fact that the oldest works regarding the curculionoidea are about fauna and taxonomy.
Taking into account the entire bibliographic material regarding the Rhynchitidae and Attelabidae, in our country, we could see the attestation of only 56 works of specialty, written by 28 authors during 141 years (1850-1999). From these, the most of them approached the fauna subject or the systematizing, and, a few, the biology and ecology subjects. In the most of the publications, more aspects are approached. The works written in this period comprised data referring to other families of coleopterans, as well as to more groups of insects.

KEY WORDS: historic, Coleoptera, Rhynchitidae, Attelabidae

1. THE HISTORIC OF THE SYSTEMATIC RESEARCHES

From Linné till the beginning of the 20th century all the *curculionoidea* were framed in the *Curculio* genre. Latreille, in 1807, raised the *curculionoidea*

to a family rank. Sterlin in 1883 separated them in two big groups: *Orthocera* and *Goniathocera,* taking into account the structure of the antennas. The O*rthorocera* present right antennas, having the first article short, usually, and the G*oniathocera* having folded antennas after the first article, named scapus, having a long form (Hoffmann, 1950).

At the beginning of the 20th century many tribes were transformed in subfamilies. Reitter (1916) in the volume V of *Fauna Germanica*, enumerated 11 families, and Winkler(1930-1932), in *Catalogus coleopterorum regionis palaeartica*, a number of 28 subfamilies for the same region. The order in this catalogue didn't reflect the phylogeny.

The systematisation of the *Curculionoidea* suffered, in our days, important modifications. The new acquisitions regarding the morphology, palaeontology, biochemistry, ethnology and taxonomy are yearly analysed by the scientific community, determining different interpretations taking into account the new data. As a result the systematisation establishment is in a continuous development and the question is if and when will be reached a sufficient stable systematisation.

Many of the proposed modifications had already received the agreement of the researchers, for example: the raising at a rank of family of *Apionidae* and *Attelabidae.* Others, on the other hand are very disputed, as for example the raising at a rank of a family of the subfamilies *Rhynchophorinae(Calandrinae)*, the enclosure in the *Curculionidae* family of the *Scolitidae* and *Platipodidae* families, the disposal of the subfamily *Nanophxinae* in the *Apionidae* family (Osella, 1991).

In 1982, Lawrence and Newton shared the *curculionoidea* in two big groups according to urosternidae. In the first group are comprised the families: *Curculionidae, Apionodae, Brentidae* and *Antiarhinidae*, to which the segments 3-4 of the urosternitae, are completely separated among them, they being wider, too. In the second group are the families: *Nemonichidae, Anthribidae,*

Oxycorynidae, Aglycyderidae and *Allocorynidae,* to which the species present articulated urosternitae and they are, approximately equal as width (Osella, 1991). These families, belonging to the second group are considered to be more primitive as those in the first group.

Kuschel (1985), in an inedited note among the collegues, proposed a subdivision of the *curculionoidea* in four families: *Nemonychidae, Anthribidae, Belidae, Curculionida*. Later on, there were recognized as families *apionidae* and *atelabidae.*

In the special section of the World Congress of Entomology (Vancouver, 1989), were discussed these problems, but without reaching a common point, especially regarding the problem of the subfamilies. (Osella, 1991)

Lawrence (1991) had subdivided, afterwards, the families *Attelabidae* in: *Attelabidae, Rhynchitidae* and *Apoderidae.*

As it is obvious it is very difficult to find a common point among the systematic researchers, which classified the *curculionoidea* taking into account their morphologic, biologic, ethologic and zoogeographic data.

The Italian school took into account Kuschel's proposals (1987) and Lawrence's ones, regarding the modifications in the systematization of the *Curculionidae*, with two exceptions: the *Cyladidae* family is better to belong to *Apionidae*, and the *Rhynchophoridae* family to belong to *Curculionidae.*

The German school, by Behne (1992), considered that *Apoderidae* as a subfamily of the *Attelabidae* family. This aspect we have taken over in the systematic researches.

2. THE HISTORIC OF THE FAUNA RESEARCHES

The data regarding fauna of curculionidae are rich, a normal situation in the case of this coleopteron group, which is quite numerous. This comes from the fact that the oldest works regarding *Curculionidae* are about their fauna and taxonomy.

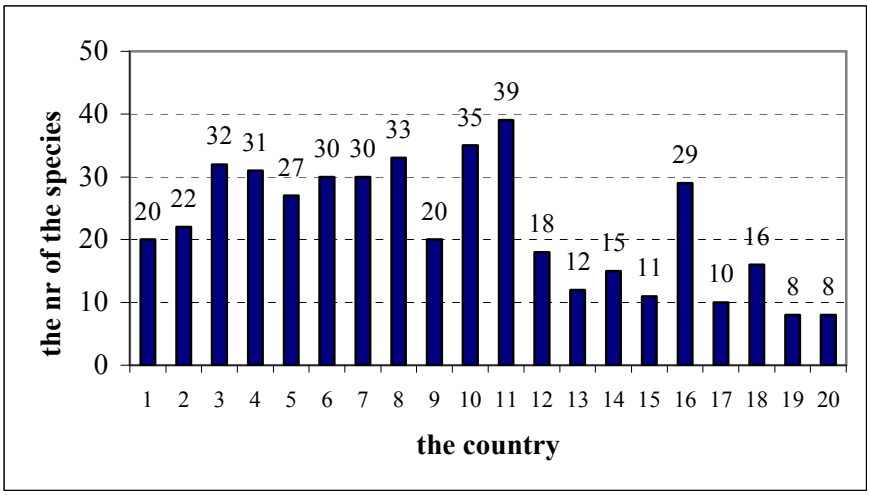
The number of the known *Curculionidae* species, worldly speaking, raised a lot as new zones had been studied. So, at the beginning of the 19th century were catalogued round 3.500 species (Latreille, 1807, quoted by Houlbert, 1922), then in a short time, the number raised to 10000 species described by Schroenherr in 1833 (quoted by Houlbert, 1922), in *Genera et Species Curculionidum.* In 1922 were known, round 30000 species, among which 4000 in the European fauna.

Nowadays are known round 50000 species (Hoffmann, 1950; Diekmann, 1974; Behne, 1992).

The data are different from an author to another, varying from 40000 to 60000 species (Osella, 1991). More exact data offers O'Brien and Wibner (1978), quoted by Osella (1991), who reported as being described till 1971, 44883 species of *Curculionoidea*, belonging to 4237 genres. The most recent estimation for *Curculionidae* is of 50000 species (Lawrence, 1991, quoted by Osella, 1991). The other families, among which *Rhynchitidae* and *Attelabidae*, have a smaller number of species, these being round 800 species.

Osella (1991) quoted the number of species *Rhynchitidae* and *Attelabidae* known in different countries, at that time: 20 species in England, 22 in Netherlands, 32 in Germany, 31 in Austria, 24 in Poland, 30 in Czechoslovakia, 30 in Hungary, 33 in Bulgaria, 20 in Spain, 35 in France, 39 in Italy, 18 in Denmark, 12 in Norway, 15 in Sweden, 11 in Finland, 10 in Carelia, 16 in The Baltic Region, 8 in Morocco, 8 in Tunisia (figure1). In Romania there have been registered 29 species.

Figure 1. The number of the *Rhynchitidae* and *Attelabidae* species in different countries.



The list of the countries: 1. England 2. Netherlands 3. Germany 4. Austria 5. Poland 6. Czechoslovakia 7. Hungary 8. Bulgaria 9. Spain 10. France 11. Italy 12. Denmark 13. Norway 14. Sweden 15. Finland 16. Romania 17. Carelia 18. The Baltic Region 19. Morocco 20. Tunisia

Among the works referring to the fauna of *Curculionidea,* we quote *Coleopterorum Catalogus,* printed under the coordination of Junk and Schenkling during 1910 and 1940. In this catalogue, different authors published fauna, zoogeographic and bibliographic data regarding the known *Curculionidea,* worldly speaking. In 1953 appeared a supplement of this catalogue under the direct coordination of Hincks and Voss, completing the data referring to *Attelabidae.*

Voss by his catalogues (1922, 1923, 1924, 1930, 1933a, 1938a, 1952, 1953, 1969) brought an overwhelming contribution to clearing some morphology and zoogeography problems of the *Attelabidae* and *Rhynchitidae* species.

The *Curculionoidea* fauna, in the proximity of the Artic Region, was largely presented by Winkler (1922-1927), in *Coleopterorum catalogus regionis palearctice.* For The Europen Fauna, we quote *Catalogus Coleopterorum*, printed in 1906 by Heyden, Reitter and Weise.

The species in Central and North-West Europe were studied by Winkler

(1930), Harde and Severa(1988) and by Zahradnik(1985). In the volume X (1981) in the series *Die Käfer Mitteleuropas*, a big work, printed during 1965 – 1983, under the coordination of the researchers H. Freude, K. W. Harde and G. A. Lohse are thoroughly approached the *Rhynchitidae* and *Attelabidae.*The data regarding those 32 species of *Rhynchitidae* and *Attelabida*e in Central Europe, comprised in *Die Käfer Mitteleuropas*, were brought to present by Lohse and Lucht in 1993.

The most numerous works are those regarding the fauna in the countries, so the *Rhynchitidae* and *Attelabidae* in Germany were dealt with in *Fauna Germanica,* by Reitter (1919), Diekmann (1974), Schotten (1994); in France by Hoffmann (1958), Tempere and Pericart (1989); In Italy by Porta (1932), Abbazzi and Osella (1996), Osella (1991); in Hungary: Endrodi (1957,1958); Bulgaria; Angelov (1961); Poland: Petryszak (1976), Stachowiak (1986), and for the species of the late Soviet Union: Ter Minassian (1950).

3. THE HISTORIC OF THE RESEARCHES OF *RHYNCHITIDAE AND ATTELABIDAE* FAMILIES IN ROMANIA

On the territory of our country, Romania, the researches regarding the systematization and fauna of the coleopteron, done during the last century, there have been made referring regarding some *Rhynchitidae* and *Attelabidae* species, this without accomplishing a large study dedicated exclusively to this group.

In Banat and Transylvania the researches have been quite numerous. So, E. A. Bielz published in 1850, for the first time, a species belonging to *Rhynchitida*e, in the magazine: *Siebenbürgisher Verein für Naturwissenschaften in Hermannstadt.*

E. A. Bieltz, again, in 1851, made the first catalogue of the coleopteron species in Transylvania, where he quoted 2 species of *Attelabidae* and 16 of *Rhynchitidae.* Although the work is an old one, having inadvertences in determination, it stays for the richness of the described fauna. The author, being

concerned more by the registration of more species, considered less important mentioning the precise spot of collecting. These kind of precise notes were lacking, too, at the completing of the fauna list published by Bielz in 1854. On the other hand, the fauna works by C. Fuss, in 1852, 1858, 1860, 1873, indicated the precise collecting spots. Fuss' most important work, which brought him the fame and put him among the great coleopteron researchers was *Verzeichnis der Käfer Siebenbürgens nebst Angabe ihrer Fundorte (The List of the Coleopteron in Transylvania and the collecting spots),* work published in 1869 in the third notebook of the volume I of the magazine *Archiv des Vereins für Siebenbürgische Landeskunde (The Achieves of the Society for the Research of Transylvania),* printed in Braşov. This work was the second catalogue regarding the coleopteron in Transylvania. There were quoted 21 species of *Rhynchitidae* and 3 species of *Attelabidae.* In 1887 and 1896 were published two more catalogues by A. E. Bieltz. The difference from the previous catalogues was that, here, were indicated the collecting spots, too.

The researches in Transylvania were continued and extended by G. Seidliz (1888).

The greatest fauna list regarding *Rhynchitidae* and *Attelabidae* (25 species), taking into account the same area, was written in 1912 by K. Petri, were brought to date the previous quotations belonging to: Bielz, Fuss, Seidlitz and of other unknown authors. In 1925 appeared a supplement to this catalogue, adding 8 species.

O. Marcu (1957) published a work regarding the Transylvanian fauna, in which were quoted 2 species of *Attelabidae.* In 1961, he also, completed the fauna list with other four species.

M. Al. Ieniştea quoted in 1975, 3 species of *Rhynchitidae,* in the" Porţile de Fier" zone (Iron Gate zone). All his quotations comprised zoogeographic data.

In Moldavia and Bucovina the first information regarding the species of these two families belonged to C. Cosmovici (1900) and to C. Hurmuzaki (1901, 1904). Regarding the coleopteron in Moldavia there were done researches by: C. A. Peneke (1928). His researches were continued and extended in Moldavia by O. Marcu (1944, 1948, 1951). Much more latter, in 1970, I. Danilă completed the fauna list with the *Rhynchitidae* and *Attelabidae.*

In Dobrogea the first information regarding the *Rhynchitidae* and *Attelabidae* families belong to A. Montandon (1887). C. A. Penecke (1931) elaborated a list with curculionoidea species in this region. There were also quoted these kind of species and the woods and the forests in the South and South-East of Dobrogea (Negru, 1957; Negru and Roşca, 1967).

In his notes, regarding the fauna in Muntenia and Dobrogea, M. Jaquet (1898, 1899, 1902, 1904) referred also to some *Rhynchitidae* and *Attelabidae* species. The studies were completed by E. Fleck (1904) and C. Ionesco (1911).

A special work was *Determinatorul coleopterelor dăunătoare şi folositoare din România (The Determinant of the Harmful and Useful Coleopteron)* published in 1951 by S. Panin. In this work were treated the common species of coleopteron, being indicated for every gender the total number known till that time in the fauna of our country. After the description of every species were also presented some brief ecologic data.

Because in Romania there are still numerous zones whose fauna of *Rhynchitidae* and *Attelabidae* haven't been researched yet, or they were rather seldom, recently have begun again the researches regarding the *Curculionoidea* (Schneider,1990; Manole,1993; Teodor, 1994; Teodor and Dănilă, 1994, 1995, 1997); Teodor and Crişan, (1996), Podlussány and Kocs, (1995). These work referred to zones in Transylvania, Danube Delta and the Northern Moldavia.

In 1999 was published by Iuliana Vlad-Antonie and L. Teodor a complete bibliography of the *Curculionodae, Rhynchitidae* and *Attelabidae* which referred

to the entire Romanian territory, approaching the following aspects: systematic, biologic and ecologic ones.

Regarding the biology, ecology, spreading and the economic importance and the control of the populations of *Rhynchitidae* and *Attelabidae* were done researches by: V. Rogojanu (1943), N. Iacob and Eftimia Gheorghiu (1964), Gr. Margărit (1967), Elena Pătrăşcanu (1973), Nicolaescu Lovineta (1975), T. Perju, B. Bobârnac, D. Bob (1976), T. Perju (1995), D. Drugescu (1983).

CONCLUSIONS

- ✓ Looking to the bibliographic material as a whole, regarding the *Rhynchitidae* and *Attelabidae*, in our country, there are 56 works of specialty, written by 28 authors during a period of 141 years (1850-1999)
- ✓ The fauna data emphasizes the fact that till 1999 was mentioned in Romania 27 species of *Rhynchitidae* and *Attelabidae.*
- ✓ Most of the authors approached fauna works-systematic and, a restrained number, of biology and ecology. In most of the works were treated more aspects.
- ✓ The works written during this period comprised data regarding other coleopteron families, even data regarding more groups of insects.
- ✓ A work in which to be comprised unitary and coherently all the aspects regarding *Rhynchitidae* and *Attelabidae* hasn't been written yet.

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IMPROVEMENT OF MANAGEMENT METHODS OF GRASSLAND BY SHEEP

BAHCIVANGI ŞTEFAN[1], STANCĂ-MOISE CRISTINA[1], RUSU MARIANA[2], POPA DOINA[2], SIMTION DANIELA[1], MOISE GEORGE[1], IANCU RAMONA[1]

„Lucian Blaga" University Sibiu[1],
ICMD Cristian-Sibiu Romania[2]

ABSTRACT:
In this period i tis strikingly enjoin that the efficacy capitaliyation with highy outcomes of forage resources, considering the crisis of substantial resources what is prognosis in the world and surely this crisis will affect our country too. From this cause the using of meadow more rational is actuality because the fact of the area which are intended of the forage base for sheep is permanently in diminution and the competition with the other species or human input of green table from the pasture, bring an increase of production with 25-35% using the modern methods relative with free pasturing, therewith applying this modern methods the pasture could restore and prevent the shading of pasture.

INTRODUCTION:

I tis strikingly necessary to efficiently capitalize with favorable economical outcomes the forage resources, considering the crisis of substantial resources hadly regenerating and avoiding the pollution the evironment. From this point of view making capital more rational out of the grassland it is actually also because the area used for the forage base for sheep is continuously in a harsh competition with the other species of animals and especially with producing cereals for the human consumption.

Taking into account how difficult is the sheep breeder to provide the forage base, i tis highly necessary to find some new methods of making capital which will provide them best conditions for pasturing the whole period of pasture.

Using different pasturing methods should also maintain the floristically

structure or to improve by a rational pasture and by removing undesirable plants from the vegetable carpet.

MATERIALS AND METHOD:

The experiment took place on natural grassland made up mostly of spices like Festuca rupicola and Festuca valessiaca, and also a number of other 28 species. The grassland, situated in the locality of Cristian-Sibiu, Romania registered residence ICDM, hes been pastured with three common snipes, by using different pasturing methods.Considering applying for different pasturing methods one has difined and enclosed an aria of 2,4 ha, respectively 0,8 ha for each group of common snipes.For enclosing the parcels one enclosed it with wire entanglement hanged on concrete pole. The pascel used in the measured pasturind system has been enclosed with the help of a mobilewire fence supported by metallic poles.

For making up the pole of the animal sone tried hsrdly for these to be homogeneous under the age aspect, bodily growth and sanitary-veterinary situation.The average age of the common snipes is of 90 days.

Experimental variants:

V1 – free pasture with a number of 10 common snipes, weighting in average 21,56 kg at the beginning of the experiment;

V2 – pasture on parceles by rotation with 15 common snipes, weigthting in average 21,60 kg;

V3 – defined pasture with 20 common snipes, weighting in average 21,65 kg.

The duration of pasture in two cycles was of 127 days.

It was in autumn of the previous year that the fetrilization of the pasture was made with 20 t/hs of manure stable, not using experimentally chemical fertilizers for the purpose of avoiding the phenomenon of polluting the grassland, thus it is planed both protecting the agro ecosystem and obtaining some biologocal carcass of high quality.

RESULTS AND DISCUTION:

Production of green mass on variants and cycles is restored in **table 1**. The out coming production from those three parceles used for thecommon snipes has been closely enough, being evently staggered on those two pasture cycles, excepting the variant 1, where 49% of producting has been obtained in the cycle 1. Free pasture has supported the preferential consumption on V1, fact confirmed bouth by the data from literature and the 12% unconsummated remainders.

At variant 2, by the rational pasture on parcels, the vegetation has provided on the whole experimental period, a different level, but reletively sufficient of green mass.

At variant 3, defined pasture, on limited portion, forced the animals to integrally consume, practically without remainders (**table 2**).

Comparind the average bodily weight(**table 4**) between theree parcels, it has as a result insignificant differences for the threshold of 5% between the variants 1 and 3 at the end of the experience. Table 1 includes the calculus of economical efficiency under the aspect of feedind at the pasture. Consumptions correlate with the total output realized,with the weight and daily average output. The values obtained calculated according to the load at ha used, the results are inverting, total quantity of output at ha being bigger at the variant 3 with 23,7% compared to variant 1 and with 6,7% compared to variant 2, difference between the variants 1 and 2 being of 15,9%.

In conclution free pasture provides a preferential flourishing (**table 3**) and higher consumption of green mass, therefore the daily average output bigger in the first phase, an dat the end of the period one change the order of hierarchy, the biggest percent of refusalt result in this system(12%).

Pasture on parcels presents an intermediary consumption between the two systems, daily averageoutput and final weight too. This system provides the need of green mass during the whole period, with 4% refusals. Defined pasture

realize more little outputs, but more eventy, forcing animals to consume almost integrally. Output values in live weight, showing the superiority of the variants with the parceled and defined pasture.

CONCLUSION:

Parceled and defined pasture presents advantages under the economical (**table 5**) aspect from many points of view like:

- the period of pasture is getting longer with 30-40%,
- one provides with plants in the best state of normal development of the precious plants from the nourishing point of view;
- the excess of green mass from the beginning of the pasture can be mown for hey;
- one conserves the labor force.

Table 1

THE GREEN-TEBLE ON VARIANT AND ON CYCLE

					Grassland products						Palit		Remnant		Imput	
					Tpr. Per.		Cicl.I		Cicl II		kg	%	kg	%	Kg	%
					ha	parc	kg	%	kg	%						
Lib.	0,8	127	4	32	18750	15000	5850	30	3268	22	2000	13	1951	13	11049	74
Tarl.	0,8	127	4	32	18680	14950	4409	29	2845	19	1000	7	615	4	13335	89
Doz.	0,8	127	4	32	18650	14922	4078	27	2943	20	-	-	170	1	14922	100

Table 2

THE GROWTH DYNAMIC OF EXPERIMENTAL LAMB

Lot	No. Sheeps	Corporal on the hoff medium and variation				
		Start exp.	1 month	2 months	3 months	4 months
		X±sx	X±sx	X±sx	X±sx	X±sx
Free	10	21,66±9,664	26,13±0,664	31,00±0,359	33,03±0,997	34,00±0,914
Tarlalizat	15	21,62±0,545	24,75±0,621	27,72±0,743	29,80±0,887	32,35±0,992
Dosage	20	21,66±0,463	24,38±0,587	26,76±0,544	27,98±0,584	30,82±0,767

Table 3

MEAN BODILY WEIGHT, INCREASE EFFICIENACY AND GREEN-TABLE CONSUMPTION IN BATCH

Lot	No. Sheeps	Medium data		Mediu age		Spor mediu		Cons. Nutr. 127 days					Cargo/ ha		Com. Cu pas.%
		An nast.	Incp. Exp.	An nast.	Incp. Exp.	Tot. kg	Day	U.N. kg m.v.	U.N. sheep/ day	U.N. kg m.v.	U.N. shee p/da y	M.V. /kg spor	Nr. cap/ha	Spor tot/ha	
Lib.	15	1,03	25,05	86	213	12,34	97	0,17	0,99	10,21	5,8	59,79	18,75	231,38	100,00
Tarl.	20	1,03	25,05	86	213	10,73	84	0,17	0,89	10,60	5,25	62,50	25,00	268,25	115,93
Doz.	25	1,03	25,05	86	213	9,16	72	0,17	0,80	11,11	4,7	65,28	31,25	286,25	123,71

Table 4

SPECIMEN COMPARISON-DIFFERENCE SIGNIFICANTHY

Lots in comparation	Corporal on the hoff medium and variation				Corporal on the hoff medium and variation			
	sd	d	t	Semnif. lui t	Sd	d	t	Semnif. lui t
Free and tarlalizat	0,820	0,04	0,049	n.s.	1,348	1,65	1,224	n.s.
Free dosat	0,769	-	-	n.s	1,193	3,18	2,666	X
Tarlalizat and dosat	0,715	-0,04	-0,049	n.s.	1,254	1,53	1,220	n.s.

Tabelul 5

ECONOMIC EFFICINTHY TO GRASLAND FEED IN DIFFERENT SISTEMS OF MUTTON PASTURAGE

Lot	Dereliction	Dereliction of grassland/ha			Total cost price/ha	Grassland/ha		Grassland imput/ha		Quantity ka/ha	Price/kg Spore
1	560	150	700	850	1410	18750	1875	11049	1105	231,38	4,77
2	560	250	800	1050	1610	18680	1868	13335	1333	258,25	4,97
3	560	350	1000	1350	1910	18650	1865	14922	14922	286,25	5,21

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THE MATHEMATICAL MODELLING OF THE ELECTROMAGNETIC INJECTION

BLAGA VASILE, TRIFA FLORIN SABIN, BARA VASILE, UNGUR PETRE, CĂTAŞ ADRIANA

University of Oradea

ABSTRACT:
The author proposes a personal model for the calculation of pressure regulator and electromagnetic injection, the volume of fuel injected in cycle and the duration of the injection with the number of rotation at the total full charge load. This kind of mode can be used in the modeling system of electronic gasoline injection moonlit or multiunit. To carry out this model it is necessary modeling engines with spark lighting cycle with gasoline injection with a model helping cycle proposed by the author.

KEYWORDS: pressure regulator, valve, pulverization, duration of injection.

1. THE OPTIMUM CALCULATION OF THE PRESSURE REGULATOR

Pressure regulator maintains constant pressure injection in supplying installation. [3; 5].

Calculation scheme of the pressure regulator is presented in figure 1.

Static balance equation of regulator membrane is given by the following relation:

$$F_a + F_{ga} = F_b \qquad (1)$$

where $F_a = K_a \cdot f$; $F_{ga} = \frac{\pi \cdot D_r^2}{4} \cdot p_{ga}$; $F_b = \frac{\pi \cdot D_r^2}{4} \cdot p_b$;

and K_a is elastic constant springs; f- spring arrow; D-diameter of the regulator membrane; F_a-power pressure of spring; F_{ga} –pressure power from manifold; p_{ga} –pressure from the manifold; p_b –gasoline pressure in masterly of the injection;

F_b –the gasoline injection power.

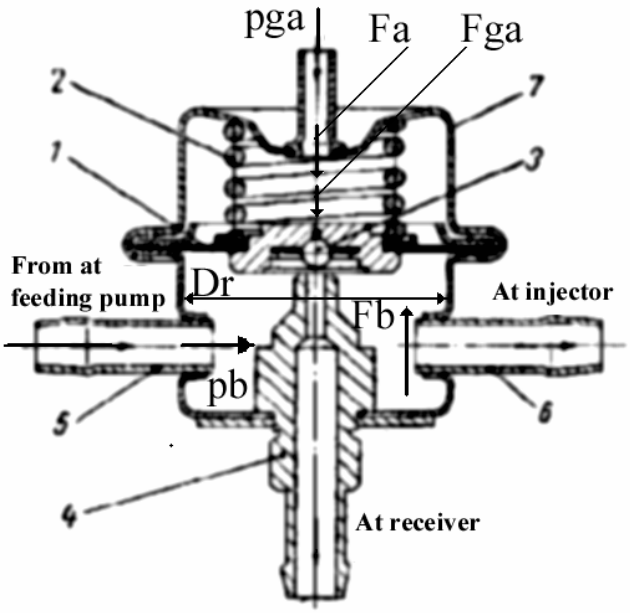

Figure 1. Scheme of pressure regulator: 1-membrane; 2- springs; 3- valve; 4- connection to the tank; 5- entrance connection; 6- exit connection; 7- housing

$$\frac{\pi \cdot D_r^2}{4} \cdot p_b = K_{a \cdot f+} \frac{\pi \cdot D_r^2}{4} \cdot p_{ga} ,$$

After the changing, relation (1) becames :

$$p_b = \frac{4}{\pi \cdot D_r^2} \cdot K_{a \cdot f+} p_{ga} ;$$

or

$$p_b = K_r + p_{ga} \qquad (2)$$

where $K_r = \frac{4 \cdot K_a \cdot f}{\pi \cdot D_r^2}$; $K_r = 1..4$, K_r being the constant regulator.

2. THE OPTIMUM CALCULATION OF THE ELECTROMAGNETIC INJECTION

The injector proposed by the author are with electronic command Renix type, with conic top needle with four holes of pulverization or Mono-Motronic with

conic top of needle with three holes of pulverization. The volume of gasoline injected in cycle is proportional with the injection pressure and the duration of injection. [3;6].

The section of the passing pulverization hole is determined by the following relation [6]

$$A_a = \pi \cdot \bar{A}_c \left[\frac{d}{2} + \left(\frac{d}{2} - \bar{A}_c \right) \right] = \pi \cdot s_a \sin\left(\frac{\beta}{2} \right) \left(\frac{d-1}{s_a \cdot \sin\beta} \right) \qquad (3)$$

where A_I-passing section offered by conic top needle; s_a-raising up needle; d_v-diameter of the needle in top zone; β-cone angle tight; d_p-sack diameter.

Raising up needle s_a is considered to be constant.

It was marked with A_I the area of the leaking section near the needle top of injector with conic top.

$$A_i = f(s_a, \beta, d) = ct;$$

$$A_i = \pi(d_p - 0{,}5\, s_a \sin\beta) s_a \sin \beta/2;$$

$$s_a = 0{,}15 \text{ mm}; \; d_p = 1 \ldots 1{,}2 \text{ mm}; \; \beta = 60^0.$$

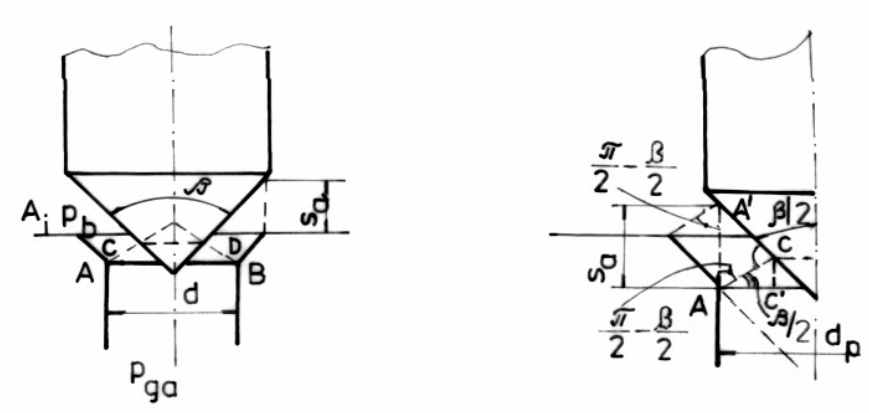

Figure 2. The calculation scheme of electromagnetic injector

Discharge of gasoline which passes the injector leaking section is calculated by the relation

$$Q_b = \mu_i \cdot A_i \sqrt{\frac{2(p_b - p_{ga})}{\rho_b}} \qquad (4)$$

where μ_I coefficient of discharge in the section offered by the needle; μ_i = 0,8 -

0,93 .Taking in consideration relation (2) we obtain

$$Q_b = \mu_i \cdot A_i \sqrt{\frac{2K_r}{\rho_b}} \tag{5}$$

where A_i is the leaking section at the injector; p_b – gasoline pressure at the entrance of injector; p_{ga} – air pressure from the manifold; ρ_b – gasoline density; K_r - constant regulator pressure; Q_b- discharge of the gasoline.

In the other hands it is known from the relation of the discharge definition, that is the leaking fuel volume during a time unit.

Maybe written

$$Q_b = \frac{V_b}{t_i} = \frac{m_{cb}}{\rho_b \cdot t_i} \tag{6}$$

From the equality of relation (5) and (6) results the duration of the injection, t_i:

$$t_i = \frac{m_{cb}}{\rho_b} \cdot \frac{1}{\mu_i \cdot A_i \cdot \sqrt{\frac{2K_r}{\rho_b}}} = \frac{m_{cb}}{\mu_i \cdot A_i \cdot \sqrt{2K_r \cdot \rho_b}}; \quad d = \frac{1}{\lambda \cdot L_o} = \frac{m_{cb}}{m_{aer}};$$

$$m_{cb} = \frac{m_{aer}}{\lambda \cdot L_o} = \frac{m_{aer}}{m_{ad}} \cdot \frac{m_{ad}}{\lambda \cdot L_o} = \xi \cdot d \cdot m_{ad}; \quad \xi = \frac{m_{aer}}{m_{ad}};$$

where ξ is the coefficient which represents the ratio between necessary air quantity for burning moor and the mixed quantity fuel accepted m_{ad}.

One obtains

$$t_i = \frac{\xi \cdot d \cdot m_{ad}}{\mu_i \cdot A_i \cdot \sqrt{2K_r \cdot \rho_b}} \text{ [s]} \tag{7}$$

where: m_{cb} is the volume of the fuel; m_{aer} – the volume of the air aspirated by the engine; m_{ad} – quantity of mixed fuel admitted; d – proportioning.

In figure 3 is represented the variation of the duration of injection t_i with the revolution and the temperature of the environment surroundings.

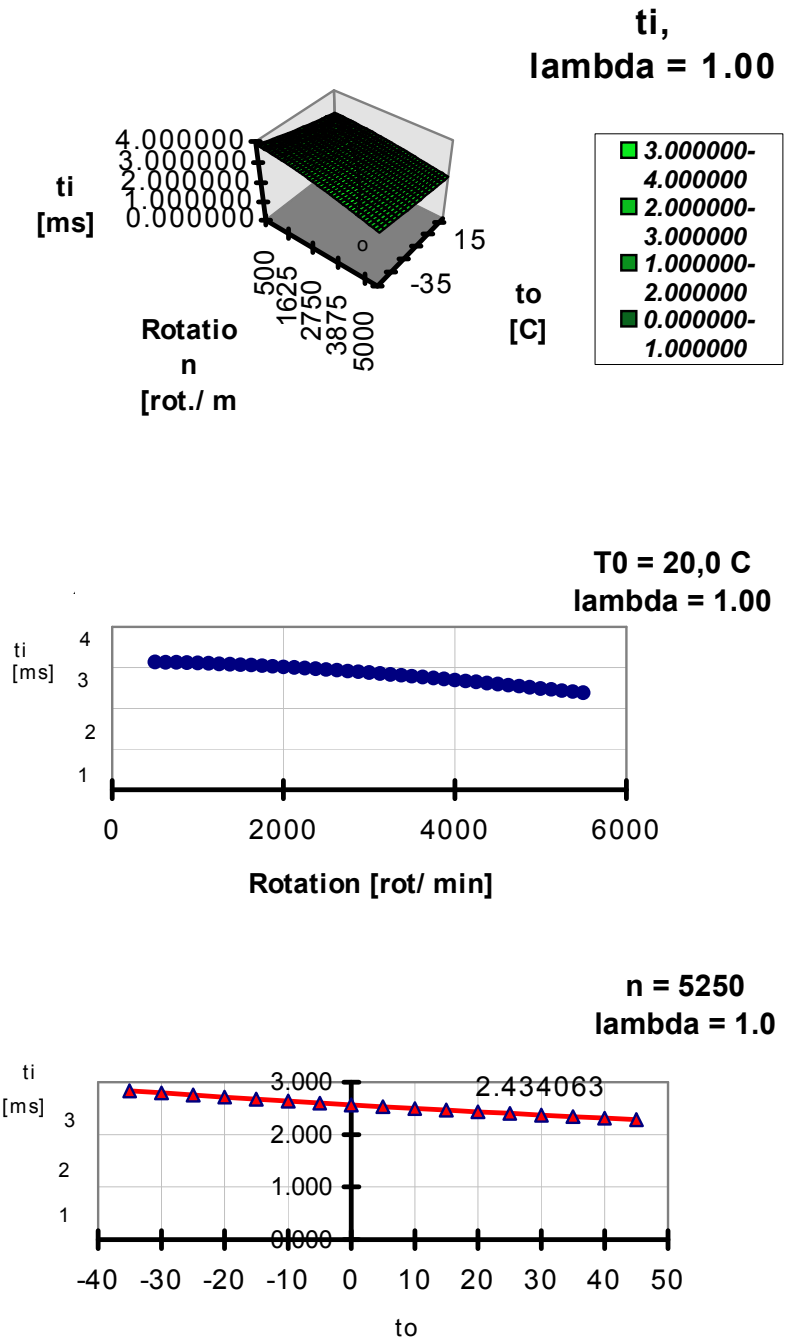

Figure 3. The variation of the duration of injection t_i with the revolution and the temperature of the environment surroundings

The working of the curled engine with lambda transmitter and catalyst, makes coefficient λ to be mentioned as close as possible to λ=1 (stoechiometric dosage).

On the base of a personal model the author realized analytic calculation of pressure in the manifold p_{ga} and the admission pressure p_a, the calculation of engine pressure regulator and the duration t_i of the electromagnetic injector.

The equation of working engine by spark equipped with electronic engine injection were determined and introduced in the calculator.

For the modeling cycle engines with spark lighting with engine injection are noticed the initial dates, pressure expression from un manifold p_{ga} and the pressure of air at the end of the admission p_a, the thermal volume charging q_{cb}, the filling efficiency η_v, the raising ratio of the pressure in α, at volum constant burning, raising ratio of the after burning volume δ, the temperature of the evacuated gasoline T_e, the coefficient of the residual burning gasoline γ_r, the temperature at the end of the admission T_a.

All these expression were analytic calculated and correlated among them in order to be introduced in the calculator. The calculator gets the command to repeat this operation till the getting of the imposed error of the engines with spark lighting parameters.

It is calculated the mechanical theoretic work proposed L_{tp}, the average pressure proposed p_{tp}, theoretical proposed efficiency and the mechanical loosing of the cycle.

The calculation of engines with spark lighting parameter, was sectioned in 10 proceedings and functions. Near the declared constant values at the beginning of the program, it is considered as initial dates, presumed to be known choosing arbitrary from the statistical dates of engines with spark lighting cycle: T_{ao}=322 K; T_{zo}=2530 K; T_{uo} =2660 K and k_{co} =1,3; k_{vo} =1,3; k_{uo} =1,2; k_{do}=1,3; k_{eo}=1,3; without them are not possible to calculate in general way all others coefficients and the other temperature and the physical seize which characterize the cycle. In this way the seize above will play the parameter role, variable will the temperature in which thermal process evaluate. These temperatures depend on the adiabatic coefficients which in fact are stability by going though many times

of the cycle until these coefficients become constant with 0,000009 error.

This exit decision from the cycle for a certain revolution is given by the diminish of the constant error of temperature T_a under 1,5 K.

3. CONCLUSIONS

It is conceived the calculation of the pressure regulator and of the electromagnetic injector. It was made the calculation of the injection duration t_i with the revolution and load which represents the model proposed by the author.

It was effectuated a engines with spark lighting program for the calculation of parameters with the gasoline injection with the under- program:

- the calculation program of engines with spark lighting parameters (depending on n and λ at t_o=-35...+45ºC and p_o=1·10^2 kPa) [3].
- the calculation program of engines with spark lighting parameters (depending on n and t_o at λ=1 and p_o=1·10^2 kPa) presented in annex B;[3].

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THE THEORY FROM CALCULATION GASOLINE INJECTION FOR THE MODEL SUGGESTED BY AUTHORS

**BLAGA VASILE, TRIFA FLORIN SABIN, BARA VASILE,
UNGUR PETRE, CĂTAŞ ADRIANA**

University of Oradea

ABSTRACT:
In this paper work is presented the fuel charging scheme for both the multipoint and monopoint injection system design by authors. The software outputs are the 3-dimensional variations between angular speed and outside temperature respectively angular speed and λ coefficient.

KEYWORDS: electronic injection, lambda**,** electric pump, revolution.

1.INTRODUCTION:

The system suggested by authors is presented in figure 1 that is a system that can be adapted to the standard DACIA motor car or the Logan car which both have the following characteristics of the engine, table. 1[4].

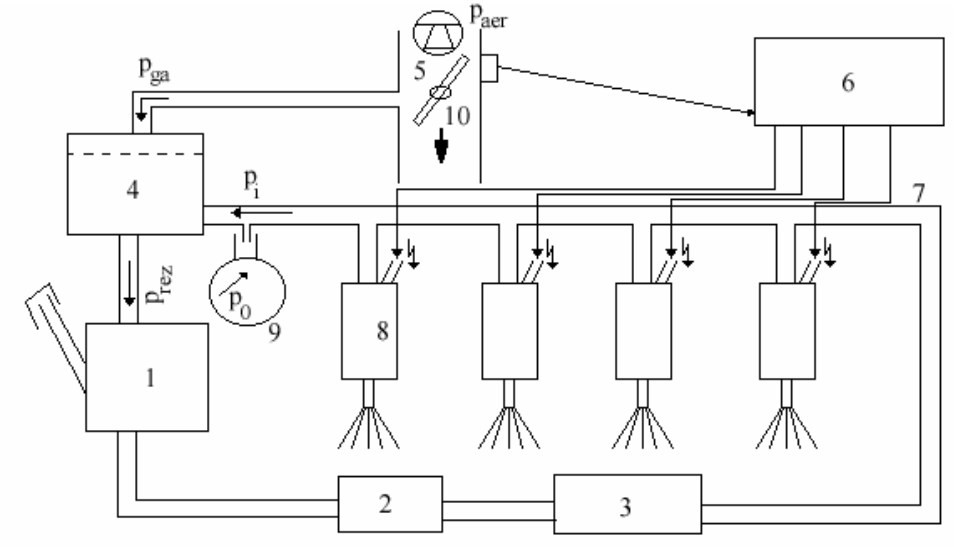
The systems main task is the correlation establishment between the mass of the engines inhaled air and the mass of the injected combustibles on cycle forming a mixture of maximum economically for the engines each workings conditions. For model of system proposed from autor was proposed one system from injection of gasoline Bosch Motronic who power for air with ultrasonor valve. It be used plate from acquisition from trial, program from acquisition from date,electrical sounder from temperature, electrical sounder from pressure, electrical sounder from revolution and position angular, analyzer from gas. It is be make one study for select excess coefficient from air $\lambda=1$ (electronic dosage).

Table 1

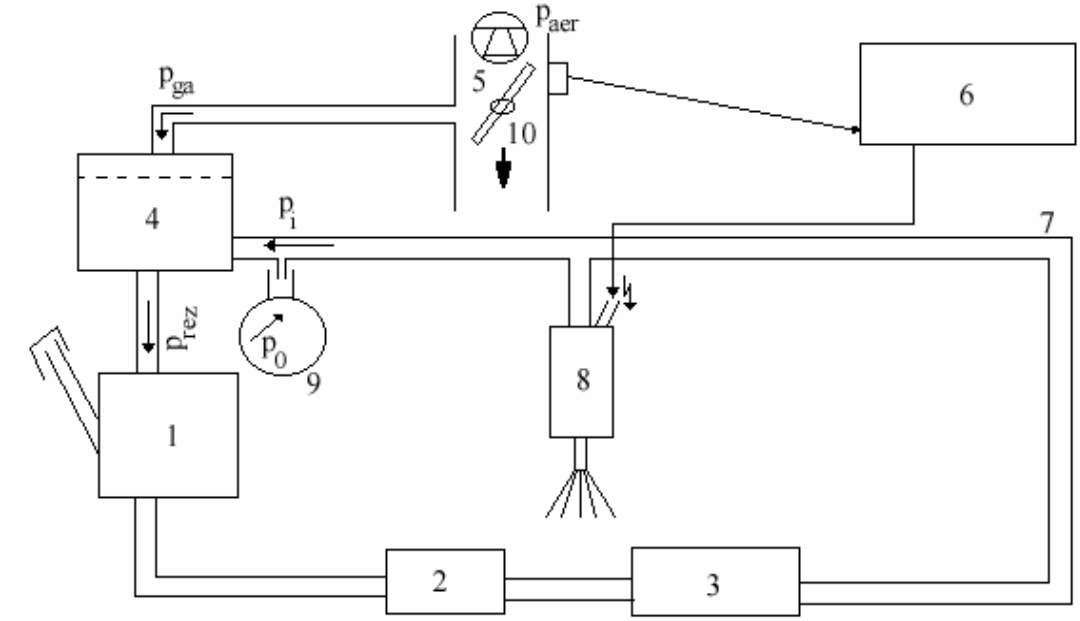
Version / Characteristics	S (standard)	T (Logan)
Engine cod	810 – 99	106 – 20
Alezage – course [mm]	73 – 77	77 – 83,6
Cylinders cm. Cubs	1289	1557
Compression rapport Compression	8,5 : 1	9,25 : 1
Combustibles	Petrol out of lead	
Feeding	Electronic injection - Mono point - Multi point	
Ralanti	750 – 800 rot/min	
The valves` game - at cold	Admission – 0,15 Evacuation – 0,20	
Lighting order	1 3 4 2	

In figure 1 is presented the combustibles feeding scheme of the Renix system, used to the molding of the system suggested by the authors.

The electric injection systems the dependance between the injected gasoline quantity on cycles at engines each work conditions and the injectors opening time establishes in adherence to the evidence stall, with control units manually operated according to the effective engine moment and the minimum polluted emissions (carbon monoxide, hydrocarbon, nitrogen, oxide) after wards this is motorized in the injection. Equipment of calculator, tabular or under variations curves form of the injectors opening time depending on rotation, having as variable parameter either the depression from the admission collector our the obturater flaps position, has to be especially precise.



a.



b.

Fig. 1 The estimation scheme of combustibles feeding suggested by the authors:

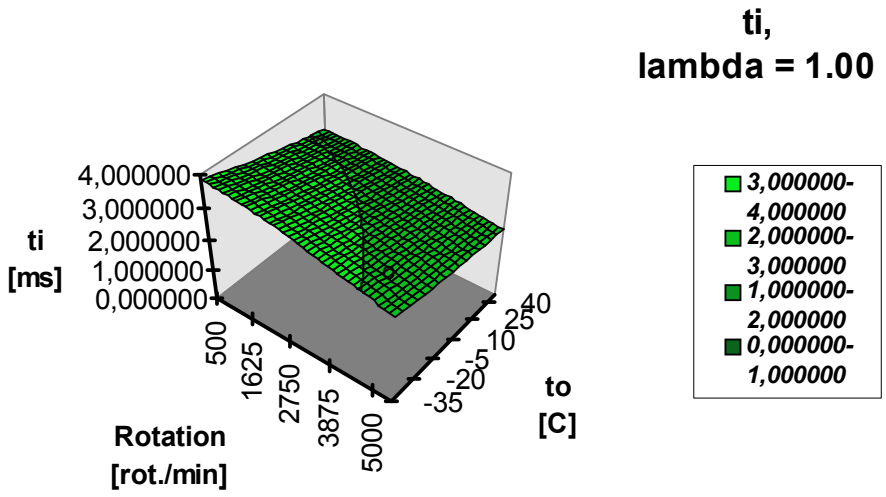
a – Renix system; b – Mono Motronic system:1– petrol tank; 2. – electric pump; 3. – electric filter; 4 – pressure regulator; 5 – debimeter (traductor for the measure of the air`s quantity); 6 – calculator; 7 – injection main line; 8 – electromagnetic injection; 9 – little lid valve for the measure of the pressure in the system; 10 – acceleration flap.

The adjustment of the injected petrol quantity on cycle for the different

engines working conditions depend on the inhaled air quantity thanks to the air debimeter which is equipped with a sounder which transmits information in regard of the airs debit to the calculator.

The air debimeter with palette and a sounder element are with an airs debimeter of Karman Vartex type that improves the engines performance. A study of the choosing of the airs excess coefficients. It is made the pressure regulator; it is molded; the pressure regulator constant it is determinate. The electromagnetic injectors molding. It is made and it is calculated the injections duration.

The molding of engine with spark lighting cycles with gasoline injection supposed by the authors is carried out by the 3-D dimensional and by dimensional parameters in two cases in figure 2 and 3.



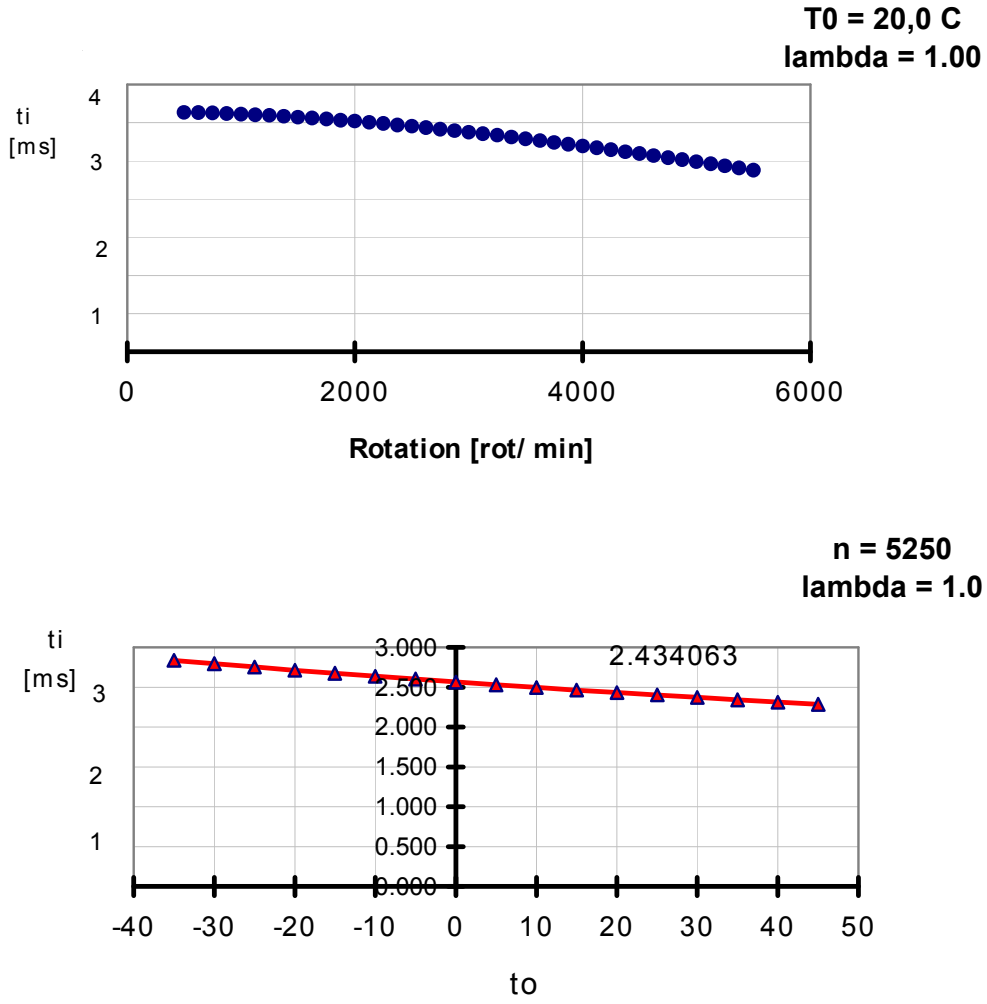
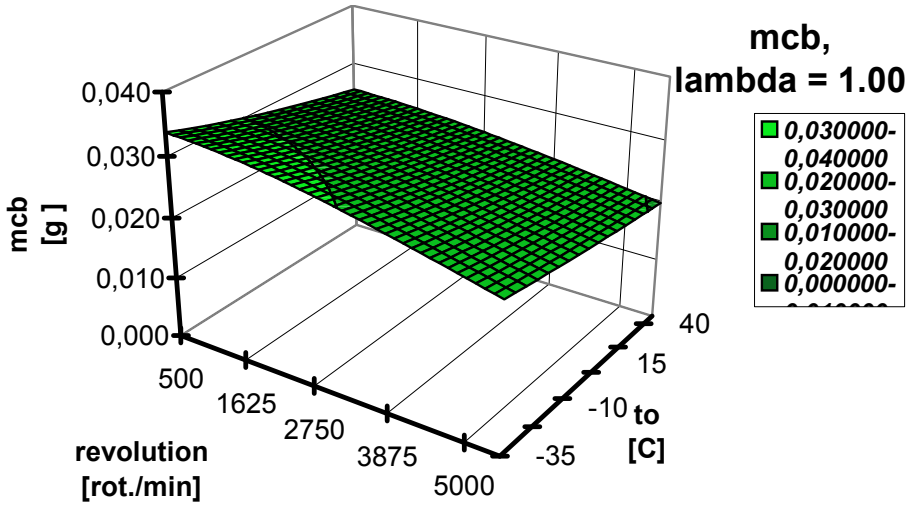


Fig. 2 The dependence on the engines rotation and the airs excess co-efficient of the injections duration for the model suggested by the authors



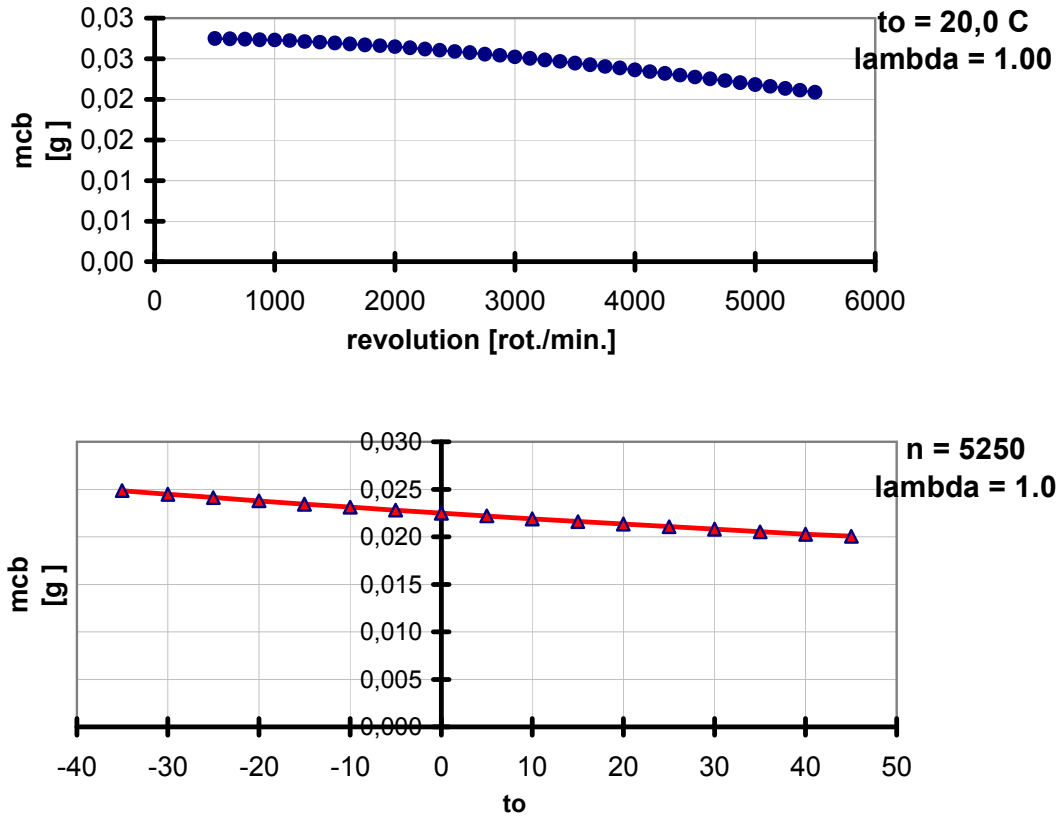


Fig. 3 The dependence of the engines rotation and the environment temperature of the combustibles mass for the authors suggested model

2. THE THEORY FROM CALCULATION

A delicate problem from point of program on the computer, adiabatic coefficient is it starting calculation, temperature in different point are unknown and the adiabatic exponents not can be determinable. For solution of this problem has been used at impose to some value, found initial more correct, who permit a cycle crossing and determination more precise temperature.

The temperature at the finished admission T_a was to consider known as initial date and she's expression calculation it be used at the finished as equation from verify at finished the cycle

Through calculate again of adiabatic exponent on amount foundation temperature's to get from the new cycle. In this mode, through some cycle the error can be reduce upside a calculate estimate admit in a thermic calculus very

pretentious. Must be introductory simplify hypothesis that one with starting burning at finished corresponding thermic agent composition it is instantaneous beckoning that finished corresponding the excess coefficient from air λ with who are place burning combustible.

It be to achieve a experimental equipment for try the propose model by the author, gifted with device and electrical sounders necessary of modeling.

3. **THE PROPOSE CONTRIBUTIONS**

It be realize a program from calculate parameter spark ignition engines with electronic injection from gasoline with subrogates:

- the program from calculate to parameter spark ignition engines with electronic injection from gasoline (dependence after revolution *n* and excess coefficient of air λ at temperature ambient medium t_o=-35...+45ºC and pressure ambient medium $p_o=1\cdot10^2$ kPa);

- the program from calculate to parameter spark ignition engines with electronic injection from gasoline (dependence after revolution *n* and temperature ambient medium t_o at excess coefficient of air λ=1 and pressure ambient medium $p_o=1\cdot10^2$ kPa);

-the program from calculation of cycle spark ignition engines with electronic injection from gasoline.

With helping from calculate it be calculating and represent variation 3-D adiabatic and politropic coefficient, temperature and pressure in the characteristic point of cycle, coefficient from fill, dosage, measure thermal combustion of unity cylinder engine, rapport from grow of pressure in izocore combustion, rapport growth volume in post burning, the technical-economical of driving and duration injection.

It be representation 3-D variation of parameter technical-economic of model proposed with revolution engine and temperature ambient medium. It be to achieve a comparison between the calculate and measured of duration

injection and angle injection with revolution growth from at 500 at 6500 rot/min, of engine with electronic injection gasoline type Bosch Motronic. It be realization one comparison between diagram theoretic from cycle proposed by the author and diagram of engine with electronic injection of gasoline, that was obtain one the experimental installation.

The determination of pollution produce itself in conformity with principle prescription, the engine to equip with electronic injection of gasoline that it can be put in pollution standardize from Europe in vigor.

It be to effect calculation error and the correction factor face atmospheric condition from reference, on the engine electronic injection of gasoline system. For engines fitting out with propose from author it well be raise on engine stall, from foundation diagram 3-D for duration injection, angle from kindling at total load and partial load and enrichment coefficients at total load.

Investigation realized to be continue for determine mechanical loss at electronic injection of gasoline, in domain little revolution.

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ARMERIA MARITIMA SSP. ALPINA - EX SITU CONSERVATION USING *IN VITRO* TECHNIQUES

BLINDU RODICA, HOLOBIUC IRINA

Institute of Biology, Splaiul Independentei 296, Bucharest, Romania

ABSTRACT

The development of in vitro propagation method in Armeria maritima ssp. alpina allows the conservation of germplasm in this species and provide the opportunity for studies concerning to some applications like tolerance to heavy metals, synthesis of alkaloids used in medicine, production of plants for horticultural purpose without affect the natural populations. An efficient regeneration protocol by direct morphogenesis was established. The highest multiplication rate was achieved on the media variant added with BAP 1 mg/l and NAA 0.1 mg/l.

KEYWORDS: *ex situ* conservation, *Armeria maritima* ssp. *alpina*, *in vitro* techniques

INTRODUCTION

Romania has a remarkable floristically richness. According to The Romanian Red List of the Vascular Plant (Oltean et al, 1994), there are mentioned 3700 vascular plant species, belonging to different IUCN categories: 23 species are natural monuments, 74 are extinct, 39 endangered, 171 vulnerable and 1256 are considered rare species. The majority of these species (75%) are spreaded in the Carpathian Mountains. Romania has proved its interest in the conservation of biodiversity and natural areas through signing of international agreements: Berna Convention, 1979; Ramsar Convention, 1970; Sofia Convention, 1991; Rio

Convention, 1992; Habitats Directive 92/43/CEE; Aarhus Convention, 2001. In Romania, the Governmental Statement 236/4.XII.2000 regulates the state of threatened species.

The plant biotechnologies are increasingly used for *ex situ* conservation programs of a number of plant species that are endemic, endangered, vulnerable or rare (Benson, 1999). Lot of countries has already *in vitro* collections of rare plants.

The establishment of an active tissues cultures gene bank relies on the collecting, sterilization, culture initiation, multiplication, storage and evaluation of the genetic stability (Benson, 1999). The development of multiplication technologies, medium and long term-conservation associated with biochemical and molecular methods had improved *ex situ* conservation strategy. The *in vitro* culture *per se* represents a short-term conservation methods (Cachita-Cosma, 1999). Using traditional methods of *ex situ* conservation (botanical gardens) the plant species are exposed to the environmental hazards, being vulnerable to pests and dieses. *In vitro* tissues cultures methods (using controlled conditions) ensure a viable alternative for propagation and conservative of interest species (Bromwell, 1990 Engelmann, 1991, Fay 1992, Filipini et al. 1994, Engelmann, 1997, Cachita-Cosma, 1999).

Our researches are according to the objectives of the Global Strategy for Plant Conservation (GSPC):

- the development of conservation protocols
- 60% of endangered plant species to be accessible in *ex situ* collections
- 70%of genetic plant diversity to be preserved in gene banks. www.biodiv.org

A. maritima ssp. alpina represents one of the species used for the assessment and prediction of the biodiversity losses in the alpine ecosystems (www.gloria.ac). *Armeria maritima ssp. alpina* is a rare plant species in the Central and North Europe and in Latvia is being endangered (Red Data book of Latvia, 2002).

In Romania, the species *Armeria maritima* (Miller) Willd. *ssp. alpina*

(Willd.) P. Silva, (*Plumbaginaceae* family) is considered to be rare - the Red List of the Vascular Plants (Oltean, 1994) and the Red List of Vascular Plants from Romania Grasslands -annex 4. *A. maritima ssp. alpina* is a perennial species, 5-20 cm high, which can be found in the seacoasts and mountains of North Temperate Zone; occasionally grown as a ground cover. The flowering period is between June- August (Ciocarlan, 2002).

MATERIALS AND METHODS

The plant material was harvested from Bucegi Massif. The *in vitro* culture was started using mature seeds. The pre-sterilization was made using ethylic alcohol (70º) for 30 seconds, followed by the sterilization with $HgCl_2$ 0.1% for 7-8 minutes and 3 times washing with sterile distilled water. The seeds were inoculated on MS medium added with 10g/l sucrose (Murashige&Skoog, 1962). From the germinated seeds were obtained plantlets used as explants source. After 4 weeks, fragments of different plant organs (cotyledon, petiole, leaf, and hypocotyl) were cultured on different media variants. For each medium variant, 5 explants/Petri dishes in 2 repetitions were inoculated. For rooting, the shoots were detached from the explants and cultured on different media.

The variants consisted in MS basal salts according to Murashige & Skoog formula (1962) supplemented with different additives and growth factors (Table 1).

Media variants	Components														
	MS basal+B_5 vitamins	BAP (mg/l)	NAA (mg/l)	2,4-D (mg/l)	Kin (mg/l)	IBA (mg/l)	AIA ((mg/l)	2,4,5-T (mg/l)	TDZ (mg/l)	GA_3 (mg/l)	PVP (g/l)	AC (mg/l)	Adenine (mg/l)	Glutamic acid (mg/l)	Sucrose (g/l) + agar (8g/l)
M1	MS	1	0.1	-	-	-	-	-	-	-	-	-	-	-	30
M2	MS	1	0.1	-	-	-	-	-	-	-	9	-	-	-	30
M3	MS	1	0.1	-	-	-	-	-	-	-	-	1000	-	-	30
M4	MS	1	0.1	-	-	-	--	-	-	-	-	-	100	-	30
M5	MS	1	0.1	-	-	-	-	-	-	-	-	-	-	400	30
M6	MS	2	0.5	-	-		-	-	-	-	-	500	-	-	30
M7	MS	1	0.2	-	1	-	-	-	-	-	-	-	-	-	30
M8	MS	-	0.2	-	1	-	-	-	-	-	-	-	30	-	30
M9	MS	-	0.01	-	-	-	-	-	0.1	-	9	-	-	-	30
M10	MS	-	0.01	-	-	-	-	-	0.1	-	-	1000	-	-	30
M11	MS	-	0.01	-	-	-	-	-	0.1	-	-	-	100	-	30
M1 2	MS	-	0.01	-	-	-	-	-	0.1	-	-	-	-	400	30
M13	MS	-	-	2	0.25	1	-	-	-	-	-	-	-	-	30
M14	MS	-	-	-	-	-	-	3	-	-	-	-	-	-	30
M15	MS	-	-	-	0.1	-	-	1	-	1	-	-	-	-	30
M16	MS	-	0.5	-	-	0.5	-	-	-	-	-	-	-	700	30
M17	MS	-	-		-	0.5	-	-	-	-	-	-	-	-	30
M18	MS	-	-	-	-	1	-	-	-	-	-	-	-	-	30
M19	MS	-	1	-	-	-	-	-	-	-	-	-	-	-	30
M20	MS	-	-	-	-	1	-	-	-	-	-	-	-	-	30
M21	MS	-	0.5	-	-	0.5	-	-	-	0.5	-	-	-	-	30
M22	MS	-	-	-	-	-	-	-	-	-	-	-	-	-	30
M23	MS 1/2	-	-	-	-	-	-	-	-	-	-	-	-	-	10
M24	MS 1/2	-	-		-	-	-	-	-	-	-	1000	-	-	15
M25	MS 1/4	-	-	-	-	-	-	-	-	-	-	-	-	-	15
M26	MS 1/4	-	-	-	-	-	-	-	-	-	-	-	-	-	30 +gelrite
M27	MS	-	-	-	-	-	-	-	-	50	-	-	-	-	30
M28	MS	-	-	-	-	1.25	-	-	-	-	-	-	-	-	30
M29	MS	-	-	-	-	-	0.5	-	-	-	-	-	-	-	30
M30	MS	-	-	-	-	-	1	-	-	-	-	-	-	-	30
M31	MS	-	-	-	-	-	1.25	-	-	-	-	-	-	-	30

Table 1. The composition of *in vitro* culture media used in *Armeria maritma ssp. alpina*

Abbreviations: MS- Murashige & Skoog medium, (1962); B5 - Gamborg vitamins (Gamborg, 1968); BAP - benzyl aminopurine; Kin- kinetin; NAA - alfa-naftyl acetic acid; IBA - indolyl butyric acid; IAA – indolil 3 aceti acid, 2.4-D - 2,4 diclor fenoxy-acetic acid; 2,4,5 T - 2,4,5 triclophenoxiacetic acid, TDZ thidiazuron, GA_3 - gibberelic acid; Glut - glutamine, PVP - polyvinil-pyrrolidone; CA - active charcoal.

The tissue cultures were maintained in the growth chamber at 25ºC, 16/8 hours photoperiod, at 4000 lux light intensity.

For the evaluation of *in vitro* reactivity, it was registered: the rate of the responsive explants (callus and/or regeneration), the mean number of the regenerated shoots/ explant, the rate of the rooted shoots.

RESULTS AND DISSCUTIONS

In the *A. maritima* group, there are some studies on population genetics (Lefebvre et al., 1989). Previous studies based on *tissue* cultures in *A. maritima* (Mill.) Willd refers on the mechanisms of the tolerance to heavy metals (Cu, Cd, Zn, Pb) (Brewin, 2002). Until present, there are not studies concerning the *ex situ* conservation of *A. maritima ssp. alpina* using *in vitro* methods. The Institute of Grasslands and Environmental Research in Wales (IGER) had some research programs concerning the potential role of the alkaloid from thrift (*Armeria maritima*) in the treatment of some diseases like tuberculosis and leprosy. (www.scotland.gov.uk/cru/kd01/orange/sdsp.)

In our experiment, the most responsive explants were fragments of cotyledons and hypocotyls. Using different concentrations and balances of hormones, the responses were different (table 2):

- direct and indirect morphogenesis,
- induction of callus,
- rhizogenesis.

The rate of responsive explants (which differentiated shoots, roots or formed callus) varied between 10-100% (Fig 1). To improve the regeneration process, the adenine and PVP (polyvinyl pyrrolidone) were added in the culture medium. Active charcoal was used to counteract the effects of the oxidative stress.

The media variants supplemented with BAP and NAA (M1-M8) had a positive effect on regeneration rate (90-100%).

The best rate of regenerative explants (100%) was registered on M2 and M4 variants (fig.4) supplemented with BAP and NAA in 10/1 ratio in presence of adenine or PVP (fig.4). The mean number of the regenerated shoots / explants varied between 1 and 30 shoots according to the tested variants (Fig.2). After 6 weeks, the maximum number of regenerants obtained through direct morphogenesis was 40 shoots /explant on the M7 variant (added with BAP, Kinetin and NAA) (Table 2). The best rate of in *vitro* rooting of the shoots (100 %) was obtained on M29, supplemented with IAA 0.5mg/l (Fig. 3)

Media variants	Developmental processes	The rate of responsive explants	The number of regenerants/explant (min.-max.)	Observations
M1	Direct morphogenesis	90%	10-30	-
M2	Direct morphogenesis	100%	8-20	Light vitrification
M3	Direct morphogenesis	90%	1-3	Light etiolating
M4	Direct morphogenesis	100%	4-6	Light etiolating
M5	Direct morphogenesis	90%	3-5	Light vitrification
M7	Direct morphogenesis	90%	20-40	-
M9	Direct morphogenesis	92,85%	5-20	Light vitrification
M10	Direct and indirect morphogenesis	20%	-	Green calli
M11	Direct morphogenesis	87,5%	2-5	-
M12	Direct morphogenesis	50%	2-5	Light vitrification
M13	Callusogenesis Rhizogenesis	90%	-	Non regenerative red calli
M14	Callusogenesis	50%	-	Non-regenerative calli
M15	Callusogenesis	-	-	Non-regenerative calli
M18	Rhizogenesis	50%		-
M21	Rhizogenesis	10%		-
M22	Rhizogenesis	90%		-
M23	Rhizogenesis	33.33%		-
M24	Rhizogenesis	40%		-
M25	Rhizogenesis	0%		-
M26	Rhizogenesis	14.28%		-
M27	Rhizogenesis	20%		-
M28	Rhizogenesis	50%		-
M29	Rhizogenesis	100%		
M30	Rhizogenesis	0%		-
M31	Rhizogenesis	50%		

Table 2. *In vitro* culture response in *Armeria maritima ssp. alpina* on different media variants.

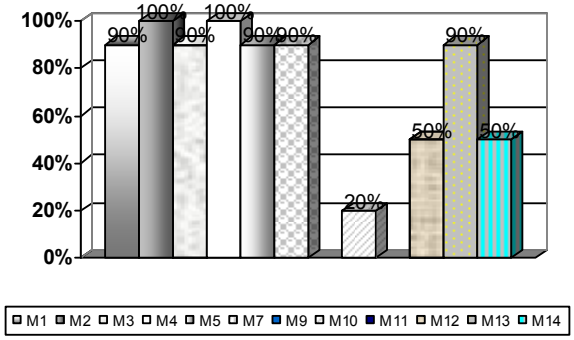

Fig 1. The rate of the responsive explants *alpina*

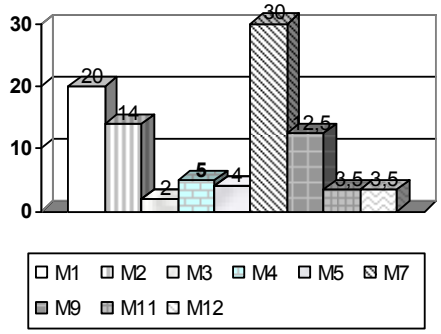

Fig 2. The mean number of the in *A. maritima* ssp. generants/explant registered on different media variants.

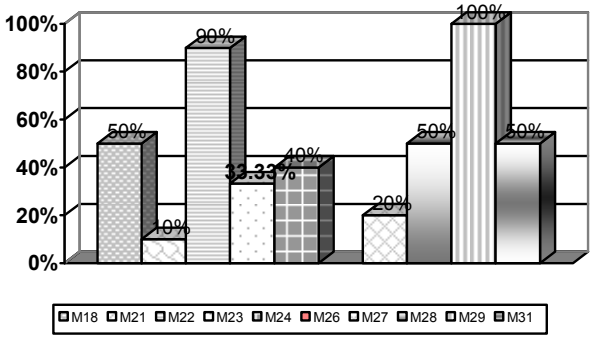

Fig. 3. The rate of *in vitro* rooting of the shoots.

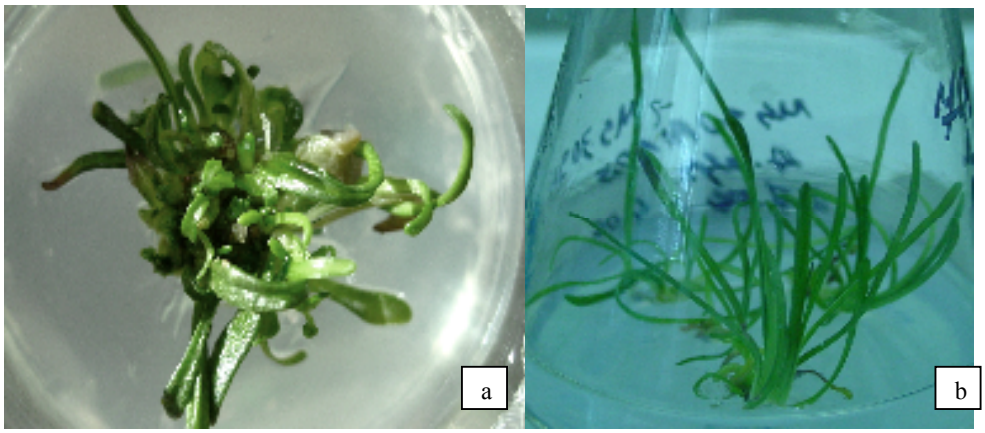

Fig. 4 *Armeria maritima ssp. alpina in vitro* culture aspects:
a - preliminary faze, b - regenerative explants.

CONCLUSIONS

- Starting from aseptic germinated mature seeds, it was established an efficient micropropagation protocol in *A. maritima ssp. alpina,* useful

for *ex situ* conservation in medium-term collections and whenever is necessary used for repopulation programs, basis research studies and for horticultural purposes;

- The optimum regeneration way is the direct morphogenesis with a good regenerative response/explant (a maximum of 40 shoots);
- The best rooting rate of the regenerated shoots was obtained on MS added with IAA (100%) and on MS without hormones (90%);

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CORRELATIONS BETWEEN THE MAIN GEOLOGICAL AND GEOGRAPHICAL UNITS OF ROMANIA

CIOBANU RODICA

rodi_ciobanu2005@yahoo.com
Natural History Museum,
Cetatii., no. 1, Sibiu, Sibiu County,
Romania, RO - 550166.

ABSTRACT:
When presenting a certain area from a geological and geographical point of view, one sets off by pointing out the main unit which includes the respective area. Since both the geographical and the geological delimitations of the main units have the same subject and use the same tools, they should lead to an almost perfect identification. However, a simple analysis of such units' points out not only the usage of different terminology by these two fields, even different from one author to another, but not even the delimitation is identical. Therefore, it is more than recommended to present both the geological and geographic perspectives related to the limits and names of the main geographical and geological units, with no intention to solve the disputes and issues brought forwards by the two Earth sciences.
In paper we hereby display the correlations between the geological and geographical units, from Romania, by grouping them according to their belonging to either of the two fields: vorland and alpine.
According to the geological definition, the vorland units, prealpine units, are situated in the outer area of the Carpathians. From a geological viewpoint, the platforms are included in the stabile units. From a geological point of view, the platforms include the following units: the Moldavian, Walachian and Southern Dobrogea Platforms; cratogenes-platforms s.l.- have only one structural level, the letter board which outcrop on wide stripes of land, for the sedimentary crust only emerges here and there, especially in the depression areas. The cratogenes on the territory of Romania ist the Central Massif of Dobrogea. The geographical units placed over the platforms are – from a geological point of view – the plateaus, the hills and the planes.
Among the alpine units, the differences between the geological and geographical units are connected to the limit between the Oriental and Meridional Carpathians, to the belonging of the Banat Mountains to the Meridional Carpathians or to the Apuseni Mountains, and also related to the nomination and the units of the Transylvanian Basin. The alpine units include the North of the Dobrogea Mountain.
The paper no intention to solve the disputes and issues brought forwards by the two Earth sciences. The differentiation which underlies the delimitation and denomination of the geographical and geological units are due to the different criteria used by these approaches. As for the palaeogeographical evolution of the Romanian territory, a common agreement between the specialists of both of these fields has always existed and keeps on existing.

KEY WORDS: main geological units, main geographical units, correlations, limits, Romania.

When presenting a certain area from a geological and geographical point of view, one sets off by pointing out the main unit which includes the respective area. Since both the geographical and the geological delimitations of the main units have the same subject and use the same tools, they should lead to an almost perfect identification. However, a simple analysis of such units' points out not only the usage of different terminology by these two fields, even different from one author to another, but not even the delimitation is identical. Therefore, it is more than recommended to present both the geological and geographic perspectives related to the limits and names of the main geographical and geological units, with no intention to solve the disputes and issues brought forwards by the two Earth sciences.

The differentiation which underlies the delimitation and denomination of the geographical and geological units are due to the different criteria used by these approaches. As for the palaeogeographical evolution of the Romanian territory, a common agreement between the specialists of both of these fields has always existed and keeps on existing.

The individualization of a natural area can be undergone between different limits according to the arguments according to which the respective delimitation was done. Although Geology and Geography[1] have the same subject of study – Earth- the quantification elements used to individualize the major units are different, with both fields relating. The geological units reflect the geological structure (tectonic, petrographyc, stratigraphic) and their evolution, in such a way that their delimitation obeys the above mentioned criteria.

The geographical units are systematic units, whose characteristics represent the result of the interaction between the system elements and the geographical – physical interfaces with the other geographical units. Even thought the geological criteria are complex, the geographical elements offer much wider possibilities to establish the limits of a geographical unit, such as:

- Althimetry and the various types of landscape,
- Hydrographic,
- The characteristics of the valley networks in a geographic unit compared to the neighboring areas,
- The climate, the vegetation and the soil,
- The geographical and people structures – the anthropic modeling often points out the limits between distinct geographical units[2].

[1] In the physical – geographical regionalization, the Geographers are faithful to the principle according to which the geographical criteria is prioritary in geographical individualizations.

[2] For example: the delimitation (morphology, location) of the localities, of the communication channels which rely on whether the physical- geographical conditions are favourable, all these can point out the limit between major geographical units

We hereby display the correlations between the geological and geographical units by grouping them according to their belonging to either of the two fields: vorland and alpine.

1. THE VORLAND UNITS

According to the geological definition, the vorland units, prealpine units, are situated in the outer area of the Carpathians. From a geological viewpoint, the platforms are included in the stabile units, seen as geological units which can be divided from the structural point of view into:

- the platforms s.s. – which include two structural levels: the folded, metamorphosed, peneplanated basement and the sedimentary crust laid discordant and transgressive, which is unfolded and displays stratigraphical lacunae. From a geological point of view, the platforms include the following units: the Moldavian, Walachian and Southern Dobrogea Platforms.

- **cratogenes-platforms s.l.-** have only one structural level, the letter board which outcrop on wide stripes of land, for the sedimentary crust only emerges here and there, especially in the depression areas. The cratogenes on the territory of Romania ist the Central Massif of Dobrogea

The geographical units placed over the platforms are – from a geological point of view – the plateaus, the hills and the planes. Throughout the alpine orogenesis the stabile/ vorland units were affected especially by vertical tectonic movements which lead to the reactivation of older faults or to the emergence of new crustal fault so that their letter board was fragmented into blocks which triggered off the emergence of higher areas and depression areas through isostasy equilibrium. That is why from a geological point of view the platforms seem relatively unitary, but from the geographical perspective they no longer display the same unity. In the outer parts of the Carpathians there are no divergences regarding the delimitation of the major units. In Table 1 we display the geological units of the vorland and the geographical correspondents.

The analysis of the above table points out a difference in respect of the geological and geographical units located in the South of the Moldavian Platform and in the North of the Dobrogea Mountain. As we have pointed out before, the individualization of the geological units is carried out mainly according to their geological evolution[3] rather than according to their current morphology, which is the reference point in geographical delimitation. The disputed area represents the border area between the east- European type of letter board and the north Dobrogea type; the latter carries on westwards under the form of some buried mountains also called the Northern Promontory of Dobrogea. Since in an actual platform area, the letter board does not have big influences upon the morphology of the landscape, the geographical unit would normally be different form the geological ones. In this sense one can notice for

[3] The classical geology, but especially in the present day one, which relies heavily on teh priciple of global tectonics, recognizes the areas with common evoluion as being part of teh same geological units.

example the frequent usage of the plateau concept for the units which are morphologically included in this landscape element – without ranking them according to their geological evolution - namely the following four units: the Plateau of Moldova, the Plateau of Dobrogea (North, South and Central area), the Getic Plateau, the Plateau of Mehedinți etc.

Table 1. Correlations between geological and geographical units situated in the outer area of the Carpathians

Main Geological units	*Geographical units*			Observations
Moldovenescă Platform	**Suceava P.**			
	Moldova Pl.			
	Bârladului P.	**Central Moldovenesc P.**		
		Tutova Hill		**Geological - *Pre- Dobrogeană D.* (interference units between East European Plate and hercinic orogen)**
		Fălciu Hill		
Valahă Platform	**C.Română**	**Buzău-Siret Pl.**	**Siret Pl.**	
			Galați Pl.	
			Râmnic Pl.	
		Ialomiței Pl.	**Vlăsia Pl.**	
			Titu-Sărata Pl.	
			Târgoviște-Ploieşti Pl.	
		Bărăganului Pl.	**Brăila Pl.**	
			Bărăgan Ialomița Pl.	
			Bărăgan Mostiștea Pl.	
		Teleorma-nului Pl.	**Burnas Pl.**	
			Găvanu-Burdea Pl.	
			Boian Pl.	
			Piteşti Pl.	
		Olteniei Pl.	**Romanați Pl.**	
			Desnățuiu Pl.	
			Blahnița Pl.	
North Dobrogea Orogen	**Dobroge a P.**	**North Dobrogea P.**	**Măcin Mountains**	
			Glacis of Măcin	
			Niculițel P.	
			Nalbant D.	
			Tulcea Hill	
			Nucari Pl. (Agighiol Pediment)	
			Glacis of North-Dobrogea	
			Babadag P.	
			Ciamurlia Pl.	*Babadag Corridor*
Central-Dobrogea M.		**Central Dobrogea P.**	**Casimcea P.**	
South-Dobrogea Platform		**South - Dobrogea P.**	**Carasu P.**	
			Oltina P.	

			Cobadin P. (Negru Vodă)	
Predo-brogea D.	**Deltaic and lagunare Dobrogea Pl.**			**geological - North Dobrogea area**
Abreviatons: D. – depression, P.- Plateau, Pl. - Plaine				

2. THE ALPINE UNITS

Among the alpine units, the differences between the geological and geographical units are connected to the limit between the Oriental and Meridional Carpathians, to the belonging of the Banat Mountains to the Meridional Carpathians or to the Apuseni Mountains, and also related to the nomination and the units of the Transylvanian Basin. The alpine units include the North of the Dobrogea Mountain (see table 1, geographical units of the Dobrogea Plateau).

The Oriental Carpathians

The Oriental Carpathians were formed as a result of the subduction processes which involved the Eastern European Plate and the Transylvanian – Pannonian subplate (the Transylvanian rift opened in Triassic and closed in the middle Jurassic) and lately the Transylvanian micro plate (the central - eastern Carpathian rift opened in the middle Jurassic). The closure process of the latter was triggered off in the Austrian orogenesis (lower Cretacic - upper albian/cenomanian) and was finalized in the laramic tectogenesis (the Cretacic - Palaeogen limit) when the crystalline margin of the Transylvanian microplate – the crystalline – Mesozoic area has overthrust the internal flisch; it was fallowed by the folding of the external flisch and of the internal molasses, and then the overrun of the latter by the external flisch. The Moldavian Plate[4], which represents the head/front of the subducted plate and which is contemporary to the birth of the stitches of the colliding plates, starts to melt when it reaches great depths in the pliocene-buglovian interval and therefore escape the acid lava to the westwards to the crystalline – Mesozoic alignment. [5]

Therefore the Oriental Carpathians are displayed in the form of a wide alignment of mountains which is made up of parallel structural – petrography units, different as age, petrography and tectonic display. One can therefore distinguish in the west the mine of the crystalline mountains – the oriental crystalline, the flisch layers which are different as age, with folded and şariate structures, on top of each other, from west to east, while as eastern border we have the sub Carpathians and the volcanic chain in the west.

The parallel structure of the Oriental Carpathians is maintained up to the Trotuş Valley and the Braşov Depression, which is the starting point for the change of the structures direction and of the geomorphologic aspect, for the

[4] The western side of the Eastern- European Plate is often rreffered to by the geographers as the Moldavian Plate.
[5] The crystallin- meszozoic area of the Oriental Carpathians is refferred to by the geographers as the *Oriental Cristallyn.*

Carpathian arch takes the shape of a curve.

The question which both the geographers and the geologists struggled to answer as a result of grand researches, was related to the belonging of the curved sector of the oriental orogen, to the position of the southern limit and to the cause of the direction modification of the oriental mountain segment.

The curve area of the Oriental Carpathians is regarded both by geologists and by geographers as being an interface area between the Meridional and Oriental structures. [6] Thus, westwards to the curve area one can find a unit whose belonging has aroused passionate discussions – the *Leaota-Bucegi-Piatra Mare Unit,* which belongs to the Orientals and moves the Oriental/ Meridionals border in the Dâmbovița Valley, according to the geologists, or which belongs to the Meridionals, with the limit between the two branches of the Carpathians being marked by the Prahova Valley, according to the geographers.

Both the geographers and the geologists agree that the Bucegi, Leaota, Piatra Craiului Mountains make up both a geological and a geographical unit.

Geologically speaking, the Bran-Braşov-Trotuş crust fault belongs to the Meridionals and is overcome by the oriental flisch, which is curved, just like them. The Leaota-Bucegi-Piatra Mare Unit which is located towards the west of the curve is similar from a petrographic point of view to the other structures of the crystalline- Mesozoic area[7] which has known a movement to the east and has overrun the units of the internal flisch during the Austrian phase (when the closure of the rift and the change in the direction of movement of the colliding plates are initiated). During the overlapping process of the internal flisch structures, the unit was affected from a tectonic perspective, thus the two synclinals separated by the Leaota crystalline were born (Piatra Craiului-Dâmbovicioara and Bucegi-Postăvaru-Piatra Mare). In the laramic phase, which is regarded to be the finalizing phase of the convergent movements of the plates, the western margin of the unit or of the nappe was overthrust by the Getic Nappe (a movement which also engaged Transylvanian structures – the Supragetic Units with a superior position from the Getic Nappe) of the Meridional Carpathians along the Iezer-Păpuşa fault (the Getic Nappe emerges from under the Supragetic Units in two klippen Codlea and Holbav). The resemblance of the Leaota Crystalline to the marginal units of the Meridionals is only natural, since both of the mountain branches have evolved in the same ”geosynclinals”.

The tectonic – structural aspect of the units in the Carpathian curve and the changed direction of the mountain branch from north-south to east–west is due to the movement of the Moesic microplate towards west–north west in the beginning of the Alpine lead to the underground pressure also of the meridional

[6] The crystallin- mesozoic area of the Oriental Carpathians and the Getic Plate have evolved in the same Central Carpathian Continental Block.

[7] The *Leaota-Bucegi-Piatra Mare Unitis* is part of the *Crystallin- Meszozoic Area*, for it is its most southern unit and stands our from a petrographic and structural point of view form the most southers layers of the flisch.

sector of the Carpathian geosynclinal. After the subduction process in the Moesic Plate has stopped, the Black Sea Micro Plate was singled out along the Călăraşi – Fierbinți alignment and it contributed to the somehow unusual evolution of the sector between Trotuş and Dâmbovița.

The Carpathian segment of the curve is bordered on the outside by the Subcarpathian sector which comprises the new units of the oriental mountains (have undergone vertical positive tectonic movements even in the Quaternary), which have the same curved aspect and are dislocated southwards the Făgăraşi Mountains and the Meridionali Carpathians, about 15 km, along the Dâmbovița Valley. Both the geologists and the geographers regard them as belonging to the Oriental Carpathians. [8] To wrap up, the geological arguments about the belonging of the Bucegi-Leaota-Piatra Mare Unit to the Oriental Carpathians are related to the geological evolution of the area, to the petrographical and tectonic structure which is similar to the other units of the Oriental that had a common evolution with this Unit.

Geographically speaking, the southern limit of the Oriental Carpathians is marked by the Prahova Valley. The geographical arguments related to the belonging of the Leaota-Bucegi Unit to the Meridionali Carpathians and which determine their eastern limit, are the following:

- it is believed that the Leaota-Bucegi Unit is the front part of the Getic Nappe, since the Leaota crystalline present in the eastern part of the unit resembles that in the - Făgăraş Mountains,
- the landscape of the Carpathians changes radically from the point of view of the altitude and the type of relief from the Prahova Valley westwards,
- the massiveness of the Bucegi-Leaota group (altitudes over 2,000 m high) compared to the other units in the curve and similar to the Făgăraş group of the Meridionals,
- the Rucăr-Bran aisle display characteristics which repeat down to the smallest detail the specifics of the Meridional Carpathians etc.

The Meridionali Carpathians

The mountains with meridional position inside the Romanian Carpathians were born in the same geosynclinal as the Oriental ones – hence the big resemblance of its components, the only difference is the fact that the subduction relations took place during the alpine orogenesis, between the Moesic Plate and the Transylvanian one. The colliding relations between the two lithosphere plates lead to the individualization of the *Danubian Autochthon* – a crystalline block broken from the Moesic Plate and respectively the *getic* and *supragetic domains* broken form the Transylvanian plate.

The closure of the Carpathian rift, which started in Austrian and finished in

[8] G.Posea (2002):" To accept that the Subcarpathians of the curve stretch as far as Dâmbovița, but the Carpathians reach Prahova is a solution which separated the unit (Subcarpații between Prahova and Dâmbovița) from its genesis."

the laramic, lead to the overlapping of the getic domain in the form of a nappe over the danubian autochthon. The overthrust process was accompanied by the engagement of some transilvanyan units – the supragetic overthrust on the getic domain.

The disagreements between geologists and geographers are connected to the belonging of the Banat Mountains to the Meridional Carpathians, according to the former, or to the Apuseni Mountains, according to the latter. The Banat Mountains are located between the Danube Valley (South), the Timiş-Cerna Corridor (Easth) and the western hills (West).

Geologically speaking, the Banat Mountains belong to the Meridional Carpathians, and represent the starting point of the huge Getic Nappe. It displays crystalline letter board of getic type (Semenic Mountains) but also of danubian type (Almăj Mountains) and sustains the post climax sediments in two synclinals: Reşiţa-Moldova Nouă and Svinița-Svinecea. Their belonging to the Meridionali can be explained from a geological point of view also through their evolution. Thus, in Triassic, the alpine evolution of the Carpathian mountains was marked by the collision between the Eastern – European – respectively Moesian Plates and the Interalpine one; it was this phase that the first carpathian – crystalline mesozoic structures emerge. It is only in the middle Jurassic that the fragmentation of the Interalpine plate into the Transilvanyan and Pannonian ones takes place, and both of the microplates, which later on evolved in different ways, take part into the colliding processes which fallow. Thus, the Banat Mountains represent a diverticulum of the Meridionals which emerged as a result of the collision between the Moesic Plate and the Pannonian microplate. The Timiş-Cerna Corridor, whose structure is connected to the geographical delimitation of the Meridional Carpathians, is the result of the badenian tectonical movements which resulted in the birth through sinking of a oblong graben.

Geographically speaking, it is believed that the southern part of the Occidental Carpathians, the Banat Mountains, belonged in the beginning to the Maridional Carpathians, thus continuing the Balkans. However the ulterior tectonic movements have determined the area to evolve in the forms of distinct blocks which are different from the other units of the Meridionals, and keep on having an evolution similar to the Apuseni Mountains whose emergence was due to the Pannonian Plate. The post laramic movements have lead to the sinking of the western limit of the Banat Mountains, just like in the case of the Apuseni Mountains. Overall, the similarities between the Banat Mountains and the Apuseni Mountains which determine their integration into the same carpathian unit, are:

- their common role and positions form the western side,
- their altitude, about 1,000 lower than the Meridional Carpathians,
- the decrease in altitude from east to west,
- the alternance of peaks and depressions,

- the topoclimatic, hypsometric and biopedogeographic unit.

Other differences between the opinion of the geographers and geologists are also connected to the Poiana Ruscă Mountains, the name of the Severin Nappe and the Getic Depression.

The Severin Nappe **–** structural genetic unit of the Meridional Carpathians which emerged in the rift opened in the middle Jurassic between the danubian and getic domains. In the closing process of the central Carpathian rift the overthrust movement of the danubian units by the getic ones took place in eocretacic, during which the sediments of the fossa- which intervened between the tow areas in the form of para-autochthon - were also engaged. The flisch structures have conserved almost entirely in the Mehedinţi Plateau, referred to by the geographers as the Mehedinţi Plateau, after the typical landscape for this particular form of relief. Geologically speaking, the Severin Flisch resembles the one of the Oriental Carpathians.

The belonging, from the geological point of view, of the ***Poiana Ruscă*** Mountains to the Meridionali Carpathians, or to the Apuseni Mountains- from the geographical point of view- to the Southern Apuseni, called by some geographers the Mureşului Mountains and to the Banatului Mountains (as their component element) is highly debated, since there are trustworthy arguments on both sides which are based on different ways to single out the Carpathian elements. Geologically speaking, the Mureş Valley marks the limit between the supragetic space and the Southern Apuseni Mountains, while the Poiana Ruscă Mountains are made up of supragetic and getic units, among which there are not overlapping relations but only relations of collision.

The Getic Depression has evolved as foreland as a result of the rising in the Austrian phase of the crystalline- mesozoic area of the Meridional Carpathians. The rising process of the southern margin of the Meridional Carpathians has caused not only the emergence of a depressionary area which has been functioning ever since the superior Cretacic until the Pliocene, but also to the downfall in steps of the northern margin of the Walachian Platform. Since the depression as such has started to work as such only in the Miocene and the mio - Pliocene deposits carry on without interruption alongside the ones of the Walachian Platform with which they shared a common evolution – therefore making the identification of its southern limit very difficult. Also, the neocretacic deposits of the depression cannot be distinguished from the ones of the getides or of the post – tectonic crust. In its current structure, the Getic Depression stretches form the Târgului Valley Region until the Danube Valley, and the contact with the Moesic Platform is done after the pericarpathian line/ fault, which is covered by the Sarmatian and Pliocene deposits and can only be found with drillings. The fault accompanies the route described by the following localities: Găeşti – south of Piteşti – north of Drăgăşani - Strehaia - Drobeta Turnu Severin. From a geographical point of view, this area includes the Getic Subcarpathians and the Getic Platform/ Plateau/Piedmont, whose name is due to

its location at the bottom of the mountains, and was the result – as current morphology- of the accumulation of the erosion materials form the mountains area, which were carried through by rivers and settled at the "foot" of the mountain.

According to the geographical definition, the ***Subcarpathians*** are typical landscape units for the foreland zone of the Carpathian mountains, where the relief typical for the tectonic structures binds with the epigenetic, petrographic relief. Although genetically speaking they are part of the mountain area, they were named this way by the geologists because they are different from the mountains from a tectonic and litho logical perspective. The Subcarpathians represent the youngest area of the Carpathian Mountains and display mio – Pliocene.[9]The internal limit of the Subcarpathians is given by the limit with the folded structures of the external Flisch (the Oriental Carpathians) and of the Danubian Autochthon (the Meridionali Carpathians) which comes across in the form of sub mountainous depressions, while the external one is given by the pericarpathian fault (the alignment in the north passes by the fallowing localities: Vicovu de Sus, Păltinoasa, Târgu Neamț, Buhuşi) for the Oriental Carpathians, and the limit with the Meridional Carpathians is not striking.[10] Both from the geographical and from the geological perspective, the limit between the Oriental and the Meridional Carpathians is represented by the Dâmbovița Valley. They are divided in the Moldavian Subcarpathians (Moldova Valley – Trotuş Valley), the Curvature Subcarpathians (Trotuş Valley - Dâmbovița Valley) and Getic Subcarpathians (from Dâmbovița Valley until the Motrului Valley). The names of the units located towards the outer regions of the Carpathians up to the vorland units- such as "subcarpathians", "the Pre - Carpathian Depression", "the pericarpathian Depression",etc - have aroused intense discussions among geographers and geologists.

The Transilvanyan Basin was a result of the alpine folding of the Carpathian units and ot their rising. Within the Carpathian units, an inner depression was individualized, which plays the role of sedimentary basin after the laramic climax and especially starting with the Badenian. The alpine unit singled towards the interior of the Carpathians is known in the geographical and geological literature under various names of depression, plateau etc. The reason behind each name is connected to the evolution of the landscape, morphometrics, hypsometrics, hydrometrics, climate elements, etc. The area whose belonging to the Transilvanyan Basin or to the Northern Apuseni we have debated, is the emerged area of Huedin-Jibou. This unit represents a high threshold between the Transilvanyan Basin itself and the Pannonian Basin and

[9] Prior to the Vallachian foldings and to the emergence of the Carpathian units up to over 1,000 m high in Quaternary.

[10] The west – east limit is conveyed by the following alignment: Apa Neagră (on Motru), Rovinari (Jiu), North of Dl.Sporeşti (between Tismana and Jiu), izvoarele Amaradia, Sineşti (Olteț), South of Băbeni (Olt), „muscele" Argeşului - Poienari (Topolog), Băiculeşti (Argeş), Muşăteşti (Vâlsan), Pietroşani (Râu Doamnei), Vlădeşti (Bratia), Boteni (Argeşel) and Malu with Flori (Dâmbovița).

has evolved like a shelf area, with continental facies of not so deep water, laid on a crystalline letter board. In this region, the stratigraphic alignment displays lateral facies variations and is included in the palaeogen – middle Miocene interval, while the letter board is of crystalline nature and emerges in the form of "patches" in the Plopiş, Meseş, Măgura Şimleu, Ţicău Mountains. The crystalline is similar to the one in the Northern Apuseni because their evolution is connected to the same Transilvanyan micro plate. The Northern Apuseni have moved along the Plopiş rift thus "sealing" the Transilvanyan Basin like a ring.

CONCLUSIONS:

This paper no intention to solve the disputes and issues brought forwards by the two Earth sciences. The differentiation which underlies the delimitation and denomination of the geographical and geological units are due to the different criteria used by these approaches. As for the palaeogeographical evolution of the Romanian territory, a common agreement between the specialists of both of these fields has always existed and keeps on existing.

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SLOT SPRAYERS USED FOR WASHING AGRICULTURAL PRODUCTS

CRISTEA ALEXANDRU

Technical University Cluj-Napoca, Faculty of Civil Engineering
25 Baritiu Street, 400027 Cluj-Napoca

ABSTRACT:
Agricultural products are washed in installations equipped with ball shower heads or zinc plated pipes with circular orifices or nuzzles, in order to remove germs which are dangerous to consumers and to decrease the products' microbiological charge. This paper presents the experimental results obtained with slot sprayers with a width/length ratio of the nozzle <0.25 for water pressures between 0.5-3.5 bar. The resulting water jet, characterized by its performance rating and spray coefficient, falls in the fine rain and fog group. The products can be washed with a continuous water sheet or a strong spray jet. Water consumption is lower than with ball shower heads with round orifices.

KEYWORDS: slot sprayers, water jet, water consumption

1. OVERVIEW

Agricultural products and technological installations in the food industry are most frequently washed by being sprayed with water. Germs which are dangerous to consumers are thus eliminated, and the microbiological charge on products and installations is reduced.

Equipment used for washing agricultural products has two or more groups of showers which wash the products that pass underneath. These showers have ball heads or they are made of zinc plated pipe provided with a number of nozzles which spray water onto the products to be washed or rinsed. They are operated at a pressure of 2 bars, which does not damage even the most sensitive products [1]. The nozzles have circular orifices, assimilated with unconnected orifices which operate under a steady load, spraying the water jet into the air [2]. The shower as a sanitary fitting for the washing installation ensures the filling of consumption points at the maximum admissible temperature and pressure

required by the technological process.

The design of the washing devices must allow the easy maintenance of orifices or sprayers – cleaning, unclogging – the fast and easy replacement of the wear part, the filters or fittings with simple common tools, such as screwdrivers and simple or adjustable wrenches.

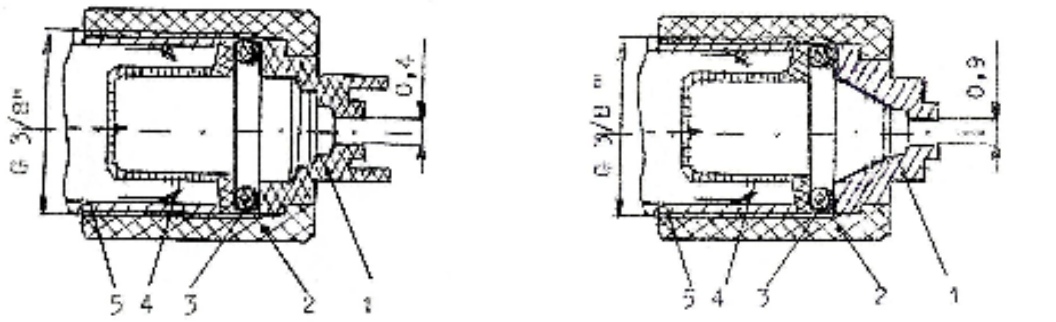
The standard design of the equipment takes functionality and safety into account, and the materials used are steel, brass, and plastic. Equipment for washing very sensitive agricultural products, e.g. leaves, can have a personalized design, with extra-fine or very fine drops whose diameter is between 1-100 microns.

2. THE MANUFACTURE OF SLOT SPRAYERS

Slot sprayers spray cold or hot water and transport the drops at a certain speed and pressure on the surface of the product or of the technological installation to be washed. As this is a complex subsystem, its design must take into account the following aspects:

- its purpose: washing agricultural products, leaves or sensitive fruit, separating rotten sections from healthy ones
- the size of the water drops: extra-fine drops of an average diameter of 1-35 microns; very fine drops of an average diameter of 50-125 microns; regular drops of an average diameter of 300-2,000 microns;
- the water can be sprayed through a slot with a section of a x b, in a stationary air stream, at a speed which varies with the pressure;
- the water under pressure comes through the calibrated slot of the sprayer and it is separated into fine drops which are transported through the air by their own kinetic energy;
- the device must be able to withstand the maximum admissible water pressure;
- the rugosity of the surfaces which come into contact with the water must be of 0.8-1.6 microns;

- it is recommended that a sediment filter be fitted before the slot, so that the latter does not become clogged with solid particles.



1a **1b**

Figure1. Two slot prayers: a. slot of 0.4 x 3 mm, b. slot 0.4 x 1.5 mm; 1 – nozzle, 2 –screwed muff, 3- O – ring, 4- filter, 5- pipe.

Figure 1 shows two slot sprayers, one made of brass, with a rectangular slot a x b = 0.9 x 1.5 mm, and the other of plastic, with a rectangular slot a x b = 0.4 x 3 mm. They both have a sediment filter made of plastic in the sleeve (2) with the section of the orifice a x b = 0.7 x 0.7 mm, and a total of 49 orifices/cm^2.

3. HYDRAULIC AND RESISTANCE CALCULATIONS

The hydraulic and resistance calculations consist in determining the flow of liquid through the calibrated slot. The relation used is [2, 3]:

$$q = \mu A \sqrt{2gp}. \qquad (1)$$

where: q is the water flow through the slot, in m^3 /s;

μ - flow coefficient;

A - the slot section in m^2

g = 9.81 m/s - gravitational acceleration

The calculation flow of a compact water sheet, along the entire length of the washing device is determined with the expression

$$q_c = n\, q \qquad (2)$$

where: q_c is the calculation flow of the washing equipment, in m^3/s;

n – the number of slot sprayers;

q – the nominal water flow through a sprayer, in m^3/s.

The resistance calculation determines the thickness *s* of the nozzle wall. The nozzle is considered a "tube with thin walls". The thickness *s* results from the relation [4]:

$$s = \frac{p_c \cdot D_i}{2(\sigma_a + p_c)} \qquad (3)$$

where: s is the wall thickness, in cm;

p_c – the calculation pressure, in daN/cm^2;

D_i - the inner diameter of the orifice, in cm;

σ_a – the admissible resistance of the material the nuzzle is made of, in daN/cm^2;

4. EXPERIMENTAL RESEARCH

The two slot sprayers were tested on an experimental installation, fig. 2, and the following was determined:

- the dispersion angle α of the water jet at different pressures;
-the variation of the water flow with the pressure;
-the intensity and fineness of the water jet;
-the uniformity of the water jet.

The liquid jet that comes out through the slot develops in the stagnant air and disperses under the action of gravitation, air resistance, and the inner forces of the liquid jet which cause turbulence in the jet. Two areas can be observed, depending on the pressure of the liquid: area 1 is compact, a water sheet whose length l decreases as the pressure rises; area 2, drop dispersion and formation, is a dispersion of liquid particles of different sizes in the air.

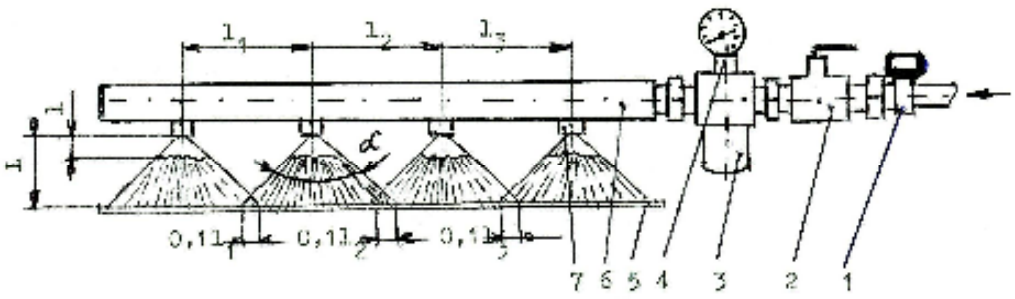
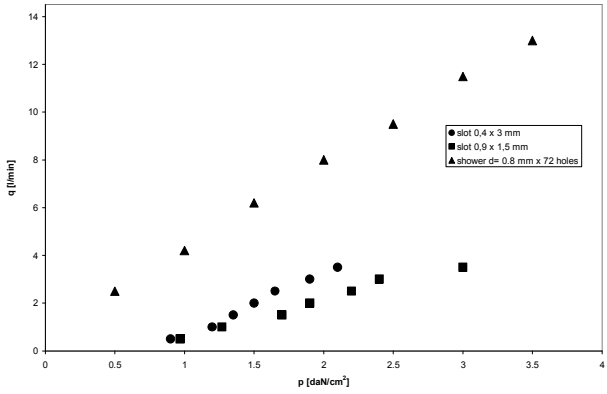


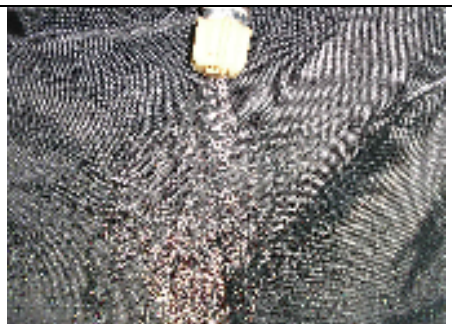
Figure 2. Experimental plant: 1 – water flow meter, 2 – tap, 3 – sediment filter, 4- manometer, 5 –tank, 6 – pipe, 7- slot sprayer.

By increasing or decreasing the distance between the sprayer and the surface to be washed, the latter can be washed with the water sheet or the liquid particle jet (fig. 3).



a.

Figure 3. Experimental results – a. variation of the water flow with the pressure, b. – water jet through the 0.4 x 3 mm slot, c. water flow through the 0.9 x 1.5 mm slot.



b.

c.

The following conclusions can be drawn from the analysis of the

experimental data obtained and the behavior of the liquid jet:

-as the water pressure increases, the length l of the water sheet in area 1 decreases, as there is a reverse proportional relation between l and p;

-as the water pressure increases, the diameter of the water drops decreases;

- the dispersion angle ά of the water jet increases with the water pressure in the device, up to a maximum value;

- a dispersion angle ά of approximately 100º can be counted on at a water pressure of 2 bar;

- the fineness of the dispersed flow determined by calculating the performance rating with the relation [5]

$$K_f = L/p \quad (4)$$

where K_f is the performance rating;

L – the working length;

p – the working pressure, in m water column;

can be included in the "very fine rain" group, as the K_f coefficient is smaller than 1;

the spray coefficient K_p, calculated with the expression [2, 5]

$$K_p = d_e / p \quad (5)$$

where K_p is the spray coefficient;

$d_e = 1{,}8 \cdot a$ [2] – the equivalent diameter of the rectangular section of the slot, in mm;

p – the working pressure, in m water column, places the water drops in the "fine rain" group, $K_p \leq 0{,}25$;

The jet sprayed in the free space of a length L=0.7 m in contact with the horizontal surface is elliptical in shape;

-the diameter of the water drops increases at the periphery of the jet.

5. CONCLUSIONS:

Dangerous germs are removed and the microbiological charge on agricultural products is reduced by washing the latter in water jet devices. Due to their width/length ratio (a/b < 0.25), slot sprayers have the following advantages, as compared to ball shower heads or showers made of zinc plated pipe with orifices or nuzzles: a very good degree of uniformity >75%; the dimensions of the water jet are stable at a constant pressure; the entire quantity of water that flows through the slot is turned into small drops (fog); the water jet can be characterized according to its performance rating and spray coefficient as fine rain, a/b < 0.25; the device can be operated with both a continuous water sheet, and a strong spray jet; lower water consumption than with ball shower heads with round orifices.

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RESEARCHES REGARDING THE VALUES OF SOME SELECTION INDEX IN A LYING-HEN LINE

CULEA C., NEAGU IULIANA, MARMANDIU A., TĂPĂLOAGĂ DANA

Faculty of Veterinary Medicine, Bucharest

ABSTRACT:
Estimates of heritability, phenotipic and genetic correlation for live weight (x_3), number of eggs (x_1), and egg weight (x_2), were obtained for 442 pullets from 21 sires families and 211 dam families. Relative importance of characters was estimated as a contribution to egg yield per hen and egg yield per kg hen. The bodily weight of the studied lying-hen line is easily under the optimum genetic bodily weight from the genetic point of view (the genetic correlation between the number of eggs and bodily weight is easy positive one +0.253). The egg weight is three times more important than the number of eggs (0.75 beside 0.27) when the selection is made for maximizing the mass of eggs produced by a hen. Using the selection for mass of eggs maximization per kg bodily weight (0.76 beside 0.15 for the number pf eggs and 0.12 for the bodily weight) the weight of egg keeps its importance.
The selection indices for breeding the two characters (number of eggs and the weight of egg) were $I_1 = x_1 + 17\ x_2$ and $I_2 = x_1 + 13\ x_2 - 4\ x_3$, that makes that the decision depend first by the weight of the egg. Using the selection by three characters, the index I_2 move more the population beside the optimum genetic bodily weight.

KEYWORDS: heritability, correlations, selection index, variance, covariance.

INTRODUCTION:

The aim of breeding a lying-hen line specialized for egg yield is to increase the egg mass produced by every hen and from the economic point of view, the mass of egg produced per each kg body weight. In the special literature there are researches which it was tryied the achieving of this problem without differentiating the relative importance of the characters, a hard-touched complex aim [1]. Later, in some researches there are differentiated the characters by their biologic importance [3].

MATERIAL AND METHOD:

In the present paper, the researches were carried out data come from testing a hen-lying line of Leghorn breed for the number of eggs (x_1), the egg weight (x_2) and bodily weight (x_3).

For calculating the genetic parameters the analyze variance method was used. There were taken in stady the data from 442 candidate chicks, grouped in 21 male-families and 211 hen-families.

The relative importance of the character was calculated by determinations analyze method by the data come from 50 candidates. Thus, there were calculated the simple, partial and multiple correlations and also the part of each character to the variation of some global indicators (y) by the following formula:

$$r_{yx_1 . x_2} = \frac{r_{yx_1} - r_{yx_2} . r_{x_1 x_2}}{\sqrt{\left(1 - r^2_{yx}\right)\left(1 - r^2_{x_1 x_2}\right)}} \text{ (partial corelations)}$$

$$r_{yx_2 . x_3} = \sqrt{\frac{r^2_{yx_2} + r^2_{yx_3} - 2 r_{yx_2} . r_{yx_3} . r_{x_1 x_3}}{1 - r^2_{x_2 x_3}}} \text{ (partial corelations)}$$

$$A_{yx_1 . x_2 x_3} = r^2_{yx_1 . x_2 x_3} \left(1 - r^2_{y . x_2 x_3}\right) \text{ (factors part)}$$

The selection indices were calculated by the classic method using the formula:

$$b \cdot \hat{F} = a \cdot \hat{G}$$

where:

$\hat{F}$ = phenotipic variance and covariance matrix

$\hat{G}$ = genotipic variance and covariance matrix

b = partial regression coefficient vector

a = relative economic values vector

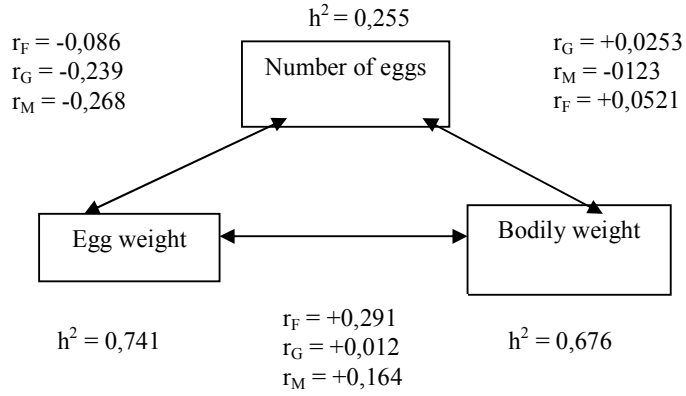
RESULTS AND DISCUSSION:

Genetic parameters - in chart 1 there are shown the genetic parameters

values for the three studied characters (number of eggs, bodily and egg weight): heritability and the phenotipic, genotipic and environmental correlation.

Chart 1

Genetic parameters of characters analyzed



The bodily weight has a high heritability (0.67) as a result of a high genetic variance in a line where there was not made special selection for this character. The correlations have a negative sense between the number of eggs and its weight and a positive sense for the other. As in other researches [2,4], how long the optimum genetic bodily weight is not achieved, it is manifested the trend that in a intensely selectioned line for the number of eggs, higher productions give plus variances. The decreasing of the bodily weight under this genetic optimum leads to the decreasing of the eggs number (so the genetic correlation between the number of eggs and the bodily weight is a positive one +0.0253).

The positive phenotipic correlation between these characters (+0.0521) is explained by the increasing of the bodily weight as a production clause due to the environment. At a proper environment the hens with a low number of eggs react by a higher bodily weight (r_M=-0.123).

The relative importance of the characters – when we select after two characters (number of eggs -x_1- and egg wight -x_2-) the global index which has to maximize is the mass of egg. The relative economic importance of these

characters is presented in table 1. Thus, the weight of the egg is three times higher as importance than the number of eggs, in this line, the two characters evoluated divergently (265 eggs mainly per year, with 54 g egg weight).

Table 1

Relative economic importance of the characters resulted by egg mass per hen

Specification	Simple correlations			Partial correlations	Contribution	Relative importance
	No of eggs	Egg weight	y	y		
No of eggs	-	0.035	0.312	0.314	0.092	0.27
Egg weight	0.036	-	-	0.276	0.246	0.75
y	0.312	0.258	0.258	-	-	-

The bodily weight was noticed when it was wished the maximization of the mass of the egg per kg alive body (table 2). From the data shown in table 2, it could notice that the weight of the egg didn't lose any importance -the presence of the alive body weight diminishing the importance of the number of eggs- thus the egg weight becomes 5-7 times greater than the other correlations.

Table 2

Relative economic importance of the characters resulted by egg mass per bodily weight

Specification	Simple correlations				Partial correlations	Multiple correlations	Contri-bution	Relative importance
	No of eggs	Egg weight	Bodily weight	y	y			
No of eggs	-	0.036	0.058	0.321	0.377	-0.108	0.141	0.15
Egg weight	0.036	-	-0.341	-0.731	0.891	0.117	0.785	0.76
Bodily weight	0.058	-0.341	-	0.108	-0.193	0.642	0.114	0.12
y	0.321	-0.731	0.108	-	-	-	-	-

The selection indices – starting from the relative economic importance and the causal compounds of the variances and covariances (table3) there were calculated the selection indices I_1 and I_2. Where the selection was made by two characters (number of eggs and the weight of the eggs) the selection index (I_1) was:

$$I_1 = 0.0218\ x_1 + 0.04203\ x_2 \text{ or } I_1 = x_1 + 17\ x_2$$

So, the decision is established depending on the weight of the egg.

În the case of selection by three characters (the first two characters and the bodily weight) the selection index (I_2) was:

$$I_2 = 0.0451\ x_1 + 0.73633\ x_2 - 0{,}1875\ x_3 \text{ or } I_2 = x_1 + 13\ x_2 - 4\ x_3$$

In this case, the index is better for the hens which produce large eggs, especially when they have a lower bodily weight.

Table 3

Variance and covariance compounds

Character	V_A	V_F	Cov_A	Cov_F
X_1	45.173	684.761	-	-
X_2	1.584	8.109	-	-
X_3	3852.118	2245.838	-	-
$X_1 - X_2$	-	-	-7.818	-0.382
$X_1 – X_3$	-	-	238.44	214.186
$X_2 – X_3$	-	-	48.7	128.462

CONCLUSIONS:

1. The bodily weight of the studied lying-hen line is easily under the optimum genetic bodily weight from the genetic point of view (the genetic correlation between the number of eggs and bodily weight is easy positive one +0.253).

2. The egg weight is three times more important than the number of eggs (0.75 beside 0.27) when the selection is made for maximizing the mass of eggs produced by a hen.

3. Using the selection for mass of eggs maximization per kg bodily weight (0.76 beside 0.15 for the number pf eggs and 0.12 for the bodily weight) the weight of egg keeps its importance.

4. The selection indices for breeding the two characters (number of eggs and the weight of egg) were $I_1 = x_1 + 17\ x_2$ and $I_2 = x_1 + 13\ x_2 - 4\ x_3$, that makes that the decision depend first by the weight of the egg. Using the selection by

three characters, the index I_2 move more the population beside the optimum genetic bodily weight.

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RESEARCHES REGARDING THE INFLUENCE OF ENVIRONMENTAL FACTORS ON RELATIVE WATER CONTENT IN APPLE LEAFS

FLEANCU MONICA, CHIŞ OVIDIU IONUȚ, GHIȚĂ FLORINA ANCA, BUTAC IONELA, GÎLCĂ MIHAELA

University of Piteşti

SUMMARY:
The present work was undertaken to investigate relationships between environmental factors and relative water content in apple leafs. For the test the relations between were used Pearson correlation coefficients. The researches were carried out at I.C.D.P. Pitesti-Maracineni between 2001-2005, with the following apple trees cultivars: Idared, Golden Delicious and Jonathan.

KEY WORDS: relative water content, light intensity, relative air humidity, air temperature and correlation.

INTRODUCTION:

Relative water content in leafs is the adequate measure of the water in plant. It may be used for establish the water cellular deficit. Although, water potential is used for water statement in plant, with relation to water transport in soil – plant – atmosphere, however it can't explain osmotic regulation. Osmotic regulation is the most powerful mechanism of cellular hydration conservation in water stress conditions, and relative water content is a measure of osmotic regulation effect. So, relative water content is the most intimate measure of water status, of cellular hydration, like a possible effect of water potential and osmotic regulation.

The method was used even before re-examination (Barrs şi Weatherley, (1962), when it was named "relative turgescence". Recent, the method wins a great recognition, it may be found thick quoted in international databases.

MATERIAL AND METHOD:

The researches were carried out at I.C.D.P. Pitesti – Maracineni, during 2001 – 2005, on Idared, Golden Delicious and Jonathan apple cultivars.

The relative water content was determinate after re-examination method of Barr and Weatherley (1962). The method is simple. We estimate the relative water content in leafs, relative to maxim water content which determine a completely turgescence.

Environmental factors in order of establish the correlations are: intensity of the light, relative humidity of the air and air temperature. These factors values were estimate in moment of determination. The intensity of the light was determinate with luxmeter, in lux. Relative humidity of the air was measured with psychrometer and express in percent. Air temperature measured with thermometer and express in Celsius grade.

RESULTS AND DISCUSIONS:

In table no. 1 are represented simple correlation coefficients (Pearson) among relative water content and intensity of the light, relative humidity of the air and air temperature, to Idared apple cultivar. We find that correlation coefficient between relative water content and intensity of the light is –0,420, the value is significant for 0,01 level.

Table no. 1

Determination correlation coefficients between relative water content in leafs (Idared apple cultivar) and some environmental factors

		Light intensity (lux)	Air humidity (%)	Air temperature (o C)
Relative water content (%)	Pearson Correlation	-,420**	,571**	-,550**
	Sig.	,000	,000	,000
	N	80	80	80

**. Correlation is significant at the 0,01 level

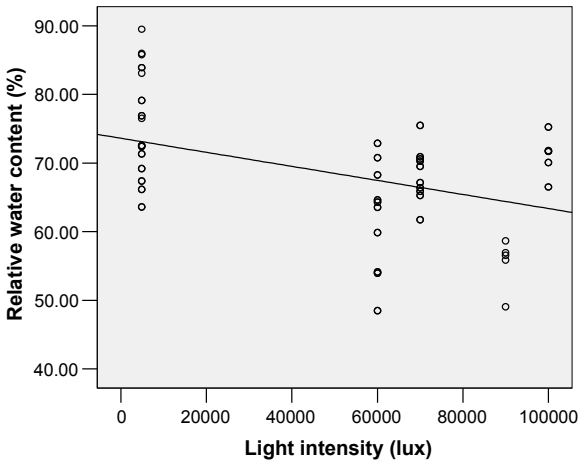

Figure 1. Correlation between relative water content (Idared apple cultivar) and light intensity

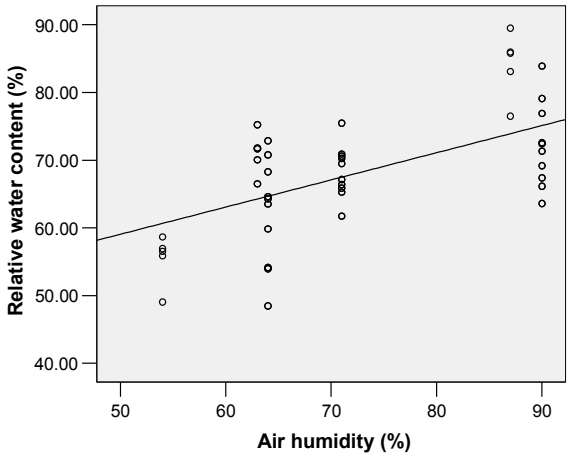

Figure 1. Correlation between relative water content (Idared apple cultivar) and relative air humidity

Regarding relative air humidity, we established a significant positive correlation between this and relative water content (Idared apple cultivar); the value of correlation coefficient is 0,571, significant for 0,01 level. Between relative water content and air temperature we establish a significant negative correlation, the value of correlation coefficient is -0,550, significant for 0,01 level.

In figures 1 – 3 are graphic-represented correlations between relative water content and studied environmental factors.

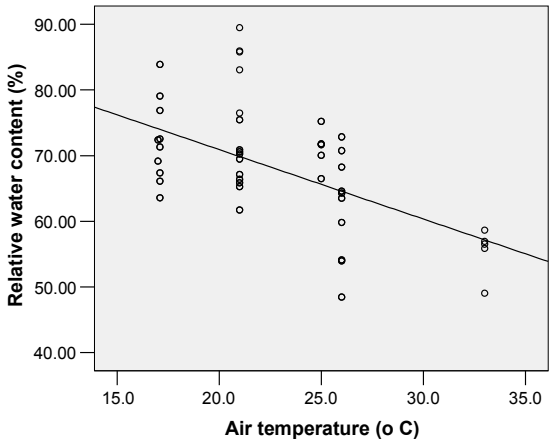

Figure 3. Correlation between relative water content (Idared apple cultivar) and air temperature

In table 2 are represented the values of correlation coefficients between relative water content in Golden Delicios apple cultivar leafs and environmental factors. We observe that value of the correlation coefficient between relative water content and intensity of the light is –0,455, significant for 0,01 level. Regarding humidity of the air, it was certifiable that, with increase of this value, increase and relative water content in leafs; the value of correlation coefficient is 0,338, significant for 0,01 level. Between air temperature and relative water content it was established a negative significant correlation; with increase of air temperature, decrease relative water content in apple leafs. The value of correlation coefficient is –0,298, significant for 0,01 level.

In figures 4 – 6 are represented also trends curves of relative water content and studied environmental factors.

Table no. 2

Determination of correlation coefficients between relative water content in leafs (Golden Delicious apple cultivar) and some environmental factors

		Light intensity (lux)	Air humidity (%)	Air temperature (o C)
Relative water content (%)	Pearson Correlation	-,455**	,338**	-,298**
	Sig.	,000	,001	,005
	N	80	80	80

**. Correlation is significant at the 0,01 level

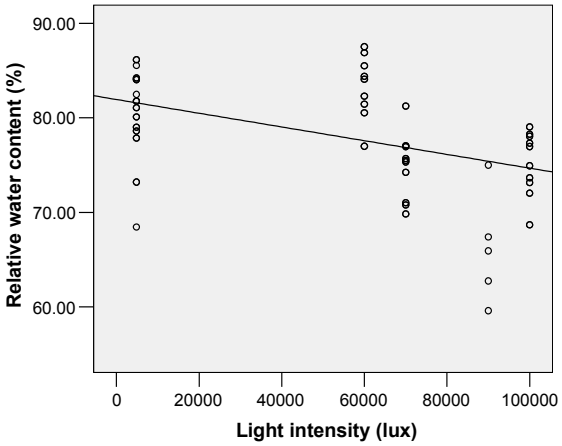

Figure 4. Correlation between relative water content (Golden Delicious apple cultivar) and light intensity

In table 3 are represented simple Pearson correlation coefficients between relative water content and environmental factors. It was certifiable that, regarding intensity of the light, this has not significant influence on relative water content from leafs to this apple cultivar, the value of the correlation coefficient is –0,062, insignificant for 0,05 level. Likewise, relative air humidity has not significant influence on relative water content, r is 0,062, insignificant for p>0,05. For Jonathan apple cultivar, between air temperature and relative water content it was not establish a correlation, the value of the Pearson coefficient is –0,185, statistically insignificant (p>0,05).

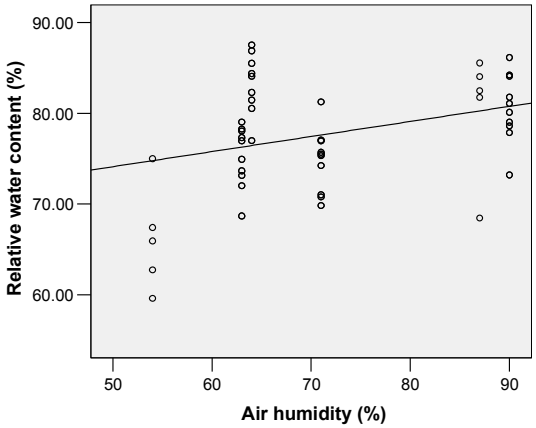

Figure 5. Correlation between relative water content (Golden Delicious apple cultivar) and relative air humidity

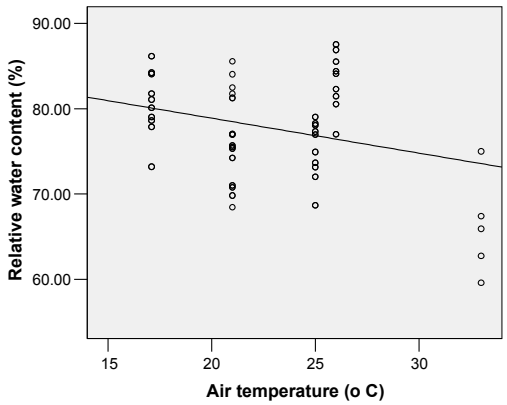

Figure 5. Correlation between relative water content (Golden Delicious apple cultivar) and air temperature

Table no. 3

Determination of correlation coefficients between relative water content in leafs (Jonathan apple cultivar) and some environmental factors

		Light Intensity (lux)	Air humidity (%)	Air temperature (o C)
Relative water content (%)	Pearson Correlation	-,062	,062	-,185
	Sig.	,568	,568	,086
	N	87	87	87

In figures 7 – 9 are represented also trends curves of relative water content, and it was established that, for all studied environmental factors, the trends are not significant.

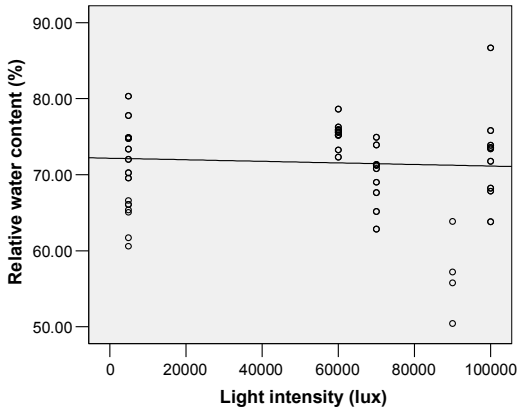

Figure 7. Correlation between relative water content (Jonathan apple cultivar) and light intensity

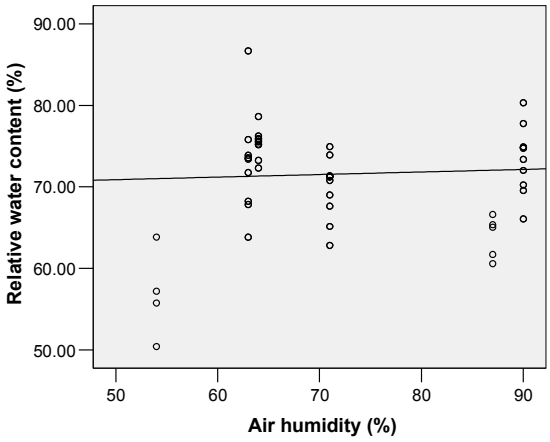

Figure 8. Correlation between relative water content (Jonathan apple cultivar) and relative air humidity

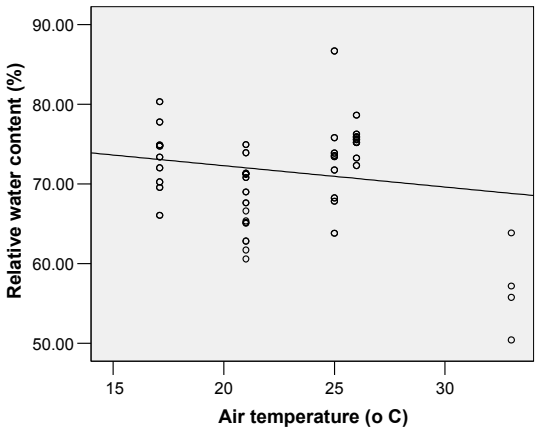

Figure 9. Correlation between relative water content (Jonathan apple cultivar) and air temperature

CONCLUSION:

- Between relative water content and intensity of the light it was established significant negative correlations, for Idared and Golden Delicious apple cultivars;
- Between relative water content in leafs and relative air humidity it was established significant positive correlations, for Idared and Golden delicious apple cultivars;

- Between relative water content in leafs and air temperature it was established significant negative correlations, for Idared and Golden delicious apple cultivars;
- For Jonathan apple cultivar, it was not established correlations between relative water content and studied environmental factors.

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LINGUISTIC RESOURCES IN UNDERSTANDING AND CREATING SPOKEN DISCOURSE

IUGA ANA – MARIA

Universitatea " Lucian Blaga " Sibiu

ABSTRACT

The demands placed on native and non-native speakers in understanding and creating coherent speech (as, for example, business presentations) are well recognized. In order to achieve a coherent interpretation, the listener must be able to interpret the semantic relations lying beneath the surface text. The speaker is primarily responsible for making these meaning networks transparent to the listener. This paper examines the roles which linguistic resources (- clause relations, lexico-grammatical cohesion and intonation choices) play to signal explicitly the underlying network of concepts, thus helping the listener to make a coherent interpretation of the discourse.

1.0. The demands on both native and non-native speakers in creating and comprehending spoken discourse are well documented (see, for example, Brown and Yule 1983; Tyler 1992). In the teaching of English for Academic or for Specific Purposes, the development of the language learner's receptive and productive skills in monologue, for example in academic lectures or business presentations, may be of considerable importance.

In order to process successfully and thereby achieve a coherent interpretation of a monologue, the listener must grasp the network of concepts and semantic relations underlying the surface text (Beaugrande and Dressler 1981). Beaugrande and Dressler draw a clear distinction between cohesion and coherence. They argue that cohesion relates only to the interconnectedness of "the components of the surface text". Coherence relates to "how the configuration of concepts and relations which *underlie* the surface text, are *mutually accessible and relevant*"(Beaugrande and Dressler 1981:3-4).

Brown and Yule (1983) claim that a text need not explicitly display any cohesive ties in order to be coherent for a listener or reader, who will be predisposed to find a coherent interpretation for a stretch of discourse within a particular context.

Halliday and Hasan (1976) consider the meaning of a text principally in terms of the cohesive relations within it. They state that "the concept of cohesion is a semantic one: it refers to relations within the text". Hasan (1984) makes strong claims about the relationship between cohesion and coherence, arguing, for example, that the greater the number of cohesive ties within a text, the more coherent it will be (see also Carter and McCarthy 1988; Parsons 1990). Halliday (Halliday and Hasan 1989) argues that cohesion plays an important but not exclusive role in creating coherence, in that it "embodies the internal semantic relationships" of a text (1989:48). The expectations established by cohesive relations then have to be matched with the expectations that the listener brings "from the context of situation and of culture" (1989:48) to create a coherent interpretation of the text.

There is no simple consensus about the relationship between underlying meanings and surface linguistic properties of a text. However, it is necessary to distinguish clearly between underlying semantic relationships and the surface cohesive features "which are available to, but not necessarily utilized by, the speaker/writer" (Brown and Yule 1983:198).

2.0. Whatever its relationship with coherence, cohesion is a feature of most spoken and written texts, but the extent and type of cohesive signals occurring may vary according to the type of discourse.

In casual conversation, the context of situation plays a vital role in the collaborative negotiation of meaning between participants. We might therefore expect a lesser reliance on formal cohesive patterning to help participants interpret the conversation coherently, and a correspondingly greater reliance on

contextual features and participant checking for meaning. In contrast, the principal characteristic of monologue, which differentiates it from conversation, is that the turn – taking machinery is suspended. The primary responsibility for creating potentially coherent discourse lies with the speaker, who must predict the likely interpretations made by the audience and create discourse that can be easily processed in real time through an auditory channel. Thus, a speaker could make greater use of the resources offered by cohesion in monologue compared with casual conversation.

Monologue shares with some kinds of written discourse the features that both are typically produced by one person and can be perceived as a textual whole. Particularly in the case of carefully prepared, rehearsed monologue, it is possible that there will be similarities in the cohesive features of both written and spoken discourse. Nevertheless, there are also obvious dissimilarities between monologue and written text. The writer creates written text for a reader who is in another time and another place; drafting and redrafting of the text occurs before the finished product is placed before the reader. In contrast, even non – spontaneous monologue is produced in real time, normally in the listener's presence and with limited opportunities for prior editing. Even the most fluent and well- prepared speaker is likely to display on-line process features which differ from those of written discourse. Moreover, from the listener's point of view, monologue presents few opportunities for reviewing the exact wording of what has been said. An overemphasis on the role of lexico-grammatical cohesion would give an inadequate picture of the linguistic resources available to the speaker. One of these is intonation, termed a "subsidiary cohesive system" by Beaugrande and Dressler (1981:76), and characterized as "among the most important of the devices that accomplish cohesion in spoken interaction" by Gumperz et al. (1984:5).

2.1. Discourses are characterized by a number of culturally recognized

patterns of organization (Winter 1977, 1986; Hoey 1983), of which Problem-Solution and Situation-Evaluation are two common examples in non-fictional discourse. Within these macrostructures, discourses are organized through the network of semantic relationships holding between the clause complexes making up a text. Winter (1986:91) terms these meaning relations *clause relations*, defined as "*the shared cognitive process whereby we interpret the meaning of a clause or group of clauses in the light of their adjoining clause or group of clauses.*"

Hoey (1983:19) amplifies this definition, focusing on the process from the point of view of the speaker/writer: "a clause relation is also the cognitive process whereby the choices we make from grammar, lexis and intonation in the creation of a sentence or group of sentences are made in the light of its adjoining sentence or group of sentences".

2.2. According to Halliday and Hasan (1976), there are two distinct types of cohesive relations: grammatical cohesion (comprising conjunction, reference, substitution and ellipsis) and lexical cohesion (comprising reiteration and collocation). Lexical items that are linked in a semantic relationship enter into cohesive ties with each other. Such cohesive ties may be formed between more than two lexical items, forming a cohesive *chain* within which the same meaning relation connects all members.

In a later study, Hasan (1984; Halliday and Hasan 1989) identifies two types of cohesive chains: *identity* chains, in which all of the members refer to the same entity, and *similarity* chains, which have different referents but are based on similarity of reference, "referring to (related/similar) actions, events, and objects and their attributes" (1989:85). Hasan's revised model of cohesion allows for the inclusion of some instantial lexical relationships, where a tie may be established by an instantial equivalent that would not necessarily be valid outside a particular text. The pragmatic aspects of lexical cohesion are more

fully discussed in Carter and McCarthy (1988).

A significant outcome of Hasan's (1984; Halliday and Hasan 1989) study is her model of *cohesive harmony*. This phenomenon occurs when cohesive chains enter into *chain interaction* whereby the paradigmatic lexical chains interact to form syntagmatic grammatical relations, particularly associated with transitivity (Halliday 1985:316). For chain interaction to occur "*at least two members* of one chain should stand in the same relation to *two members* of another chain" (Halliday and Hasan 1989:91). This relationship is shown by a short example:

so	the scientist	basically	provides	the tool
and	the engineer		uses	the tool.

We find three interacting lexical chains: the first (*scientist* and *engineer*) opposes two types of scientist: the pure and the applied. The second chain (*provides* and *uses*) sets up an instantial opposition between the activities of the scientist and the engineer. However, within Hasan's model instantial antonymy is not an acceptable sense relation. Yet *scientist* and *engineer*, and *provides* and *uses* do clearly stand in a relationship of opposition within this context, and McCarthy (1992:206) proposes an instantial relationship of *oppositeness* to deal with such occurrences. Fries (1992:87), examining the meaning relation holding between a similarly problematic set of words, argues that "*two items can be in contrast only if they can be seen as comparable in some way*". This framework of comparability is in part provided by the repetition in the third chain (of *tool*), in which the two identical items refer to the same entity. The framework is also established by the grammatical parallelism of the two clauses, since in all chains the items occupy the same grammatical slots (Actor – Action – Acted upon). The "message paradigms" (Fries 1992:82) created by the interacting chains establish a structure of parallelism and repetition or contrast which supports the

listener in processing the meaning relations in the monologue.

2.3. Spoken discourse can be differentiated from written discourse in terms of the role played by the intonation system. Barr (1990: 8) demonstrates that intonation "*can signal topic and macro-organization*".

The option of making a particular word, or to be more exact a syllable within the word, prominent (or stressed) gives the speaker the choice of indicating that the word is selected from a paradigm of alternative possible lexical choices, which Brazil terms the "existential paradigm" (1985:41). A non-prominent word is treated as if no other word could be used in that particular place within a particular context.

The intonation system offers the presenter of a monologue resource for signaling the underlying meaning relations of the monologue, by connecting together parts of the text. The system of tone choice allows the speaker to indicate the relative newsworthiness of different elements of the message.

It is reasonable to assume that in any monologue the speaker aims to create a spoken text, which the audience can interpret coherently; in so doing, the speaker can draw on a range of linguistic resources that build up a cohesive text.

3.0. It is clear that the speaker can draw on the system of lexico-grammatical cohesion and intonation to signal explicitly clause relations, which make up the overall discourse pattern. The speaker has a very flexible resource in the intonation system to signal meaning/clause relations. Hasan (Halliday and Hasan 1989:95-96) stresses the importance of educating students to "talk about" their selected topics in a coherent and a connected way. To take the example of teaching presentation skills for business purposes, novice presenters could be sensitized to the role of clause/meaning relations in the construction of a monologue through exposure to examples. Students should be encouraged to

consider the role of intonation choices to signal the meaning/clause relations, which are set up within the text.

For the novice presenter, particularly if non-native speaking, it would be helpful to acquire an understanding of and practice in exploiting the typical features of oral presentations, which play an important role in making more transparent for an audience the network of coherence underlying the surface text.

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STUDY ON SOME VEGETABLE OILS RICH IN ESSENTIAL FATTY ACIDS - OMEGA 3, OMEGA 6

MĂRCULESCU ANGELA[1], HANGANU DANIELA[2], PINTEA ADELA[2], VADUVA MIHAI[1], DUMITRU MARIANA[1], CRĂCIUN ISABELA[3]

1. University „Lucian Blaga" Sibiu, 2. University for Medecine and Pharmacy „Iuliu Haţeganu" Cluj-Napoca, 3. „Larex" Laboratory Sibiu

ABSTRACT:
This paper makes a study on vegetable oils obtained from sea buckthorn (Hippophae rhamnoides) fruits and from wheat germs, oils valuable for their complex chemical composition in essential fatty acids and vitamins. It was realized a comparative study on these vegetable oils obtained through Soxhlet extraction and supercritic fluids extraction.
Through analysis of physic- chemical – free acidity parameters, peroxid index, it was distinguished the fact that extraction with supercritical CO2 is much superior, being completely eliminate the risks of peroxydation, polymerisation, thermic degradation or remains of extract solvents in oils. Through gas- chromatography , it was studied the content of fatty acids, distinguishing the essential fatty acids such as: in sea buckthorn oil omega3 1,0 5% and omega6 5,22 % and in wheat germs oil omega3 8,54 % and omega6 57,03%. The report in which the two essential acids are in studied oils is the ideal report indicated by food doctors for daily consumption (omega3/omega6 = cca 1/5).

1. INTRODUCTION:

The scientific importance of this study is justified by the very actual informations from the speciality literature, which emphasize the bigger and bigger impact of using fatty acids in human nourishment and in cosmetic products. Thre is a large variety of food supplements and cosmetic products which contains essential fatty acids omega 3 (linolenic acid with 3 double bindings) and omega 6 (linoleic acid with 2 double bindings) coming esspecially from fish oil. Unfortunately, in present time, the fish and other marine animals have a high mercury content, that is why nourishment doctors

reccomand finding other sources of linoleic acid (omega 6 with 2 double bindings) and linolenic acid(omega3 with 3 double bindings). The vegetable oils represent an important sourse of these biologic active substances, this being the reason why we make this study on sea buckthorn oils and wheat germs oils. (1)

A very important problem of unsaturated and poly-unsaturated fatty acids – from which belong the essential acids too- is represented the easiness with which they can form peroxides- very dangerous substances, generating free radicals, responsable of producing different forms of cancer.

The preservation in optim parameters of essential fatty acids is achieved by adding antioxidant substances, between which vitamin A and carotenoids (Pro-vitamin A) are the most used- vitamins which exists both in sea buckthorn oil and in wheat germs oil, thus realizing a self- conservation. Another important aspect must be emphaseized: in dayly consumption there must be a certain report between the two essential fatty acids : the linolei acid (omega 6) must not be consumed in a bigger proportion than 6, 7 %, reported to the linolenic acid (omega 3).

2. MATERIAL AND METHOD:

In order to make this study we used dry and fined sea buckthorn fruits (humidity 10,8%) and wheat germs, also dried and fined (humidity 12,5 %) The oil extraction was accomplished by 2 methods:

- extraction with Soxhlet solvent in laboratory (solvent ethylic ether)
- extraction with supercritical CO_2 on pilot installation

For essential fatty acids dosage from oil samples extracted with the 2 methods, we used the gas- chromatography analysis.

It was used for analysis the ISO method (3), which contain the realizing of methil esthers of fatty acids and their gas- chromatography analysis.

The gas- chromatography analysis experimetal conditions were:

- coloumn Innowax 30 m x 0,32 mm x 0,15 μm;
- mobile phase : helium
- temperatures: injector: 220^0C; detector : 240^0C; column: 160^0C, time 1 minute, then temperature rises up to 250^0C with a rate of 3^0C/minute, but temerature of 250^0C was mentained for 10 minutes.
- detector: ion in flame (FID);
- injection: 0,2 μl for each sample

The separate components identification on cromathographic column was realized over the value of retension time of each component, and the quantity dosage was realized through determination of surface area of cromathographic drops, using an intern standard (2).

3. RESULTS AND DISCUTIONS:

After the analysis we made, we identified the fatty acids in the 2 oils and we made quantity dosage. In fig. 1 and fig. 2 are presented gas-chromatograms for wheat germs oil, respectiv sea buckthorn oil, both of them extracted with supercritical CO2 on the pilot installation from The Technical Food College Sibiu.

In fig. 3 and fig. 4 are presented the fatty acids profile for the 2 oils obtained through the two extraction technologies.

After making these analysis, we can certainly afirmthat both wheat germs oil and sea buckthorn oil contain essential fatty acids omega 3 and omega 6 in samples extracted with supercritical CO2 and in samples extracted with solvents. According to the diagrams presented in fig. 3 and 4, the concentration do not sensible variate after the extraction method.

At wheat germs oil, the content of linoleic acid - omega 6 – varies between 55 – 57 % and linolenic acid - omega 3 - varies between 7,8 - 8,54 %.

At sea buckthorn oil, the content of omega 6 varies between 4,08 - 6,99

% and linolenic acid - omega 3 - varies between 0,95 – 1,08 %.

Making the report between the content of essential fatty acids **omega3/omega6,** we obtain the value of ideal report in which these acids must be consumed in nourishmnet, which is cca. 1/6, 1/7.

Also, from the analysis over these oils, it was realized that htey contain enough big quantitesthe two vitamins: pro-vitamin A (carotenoid) and vitamin E (tocoferoli). (4).

Analising all these aspects, we achieve how perfect combinated are the biologic active substances in vegetal products.

For quality characterisation of the two oils, we determined the peroxide index and free acidity index. The results emphasized a certain increase of these parameters at samples extracted through Soxhlet method.

After these analysis, we can appreciate the fact that the oils obtained through extraction with supercritical liquids are much superior of those extracted through Soxhlet method. Through Soxhlet extraction, the product is in permanent contact with aer and wxtraction takes place at solvent boiling temperature (cca 78^0C). Under these conditions, appear degradations of oils through forming of per-oxides and free acids- substances with high potential of toxicity, their consumption having severe repercurssions over human health.

2. CONCLUSIONS:

Sea buckthorn oil and wheat germs oil are important sources of essential fatty acids and through the complex composition of lipo-soluble vitamins with anti-oxidant character, these oils have the great advantage of time preserving.

From the extraction technology point of view, we can appreciate that the technology of extraction with super-critical fluids is superior over the extraction with solvents, giving the oils a superior quality. Through this

technology are avoided the risks of per-oxidation, polimerization or thermic degradation of some chemical components from oils composition.

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Fig 1 Gas-chromatograme of fatty acids extracted from wheat germs

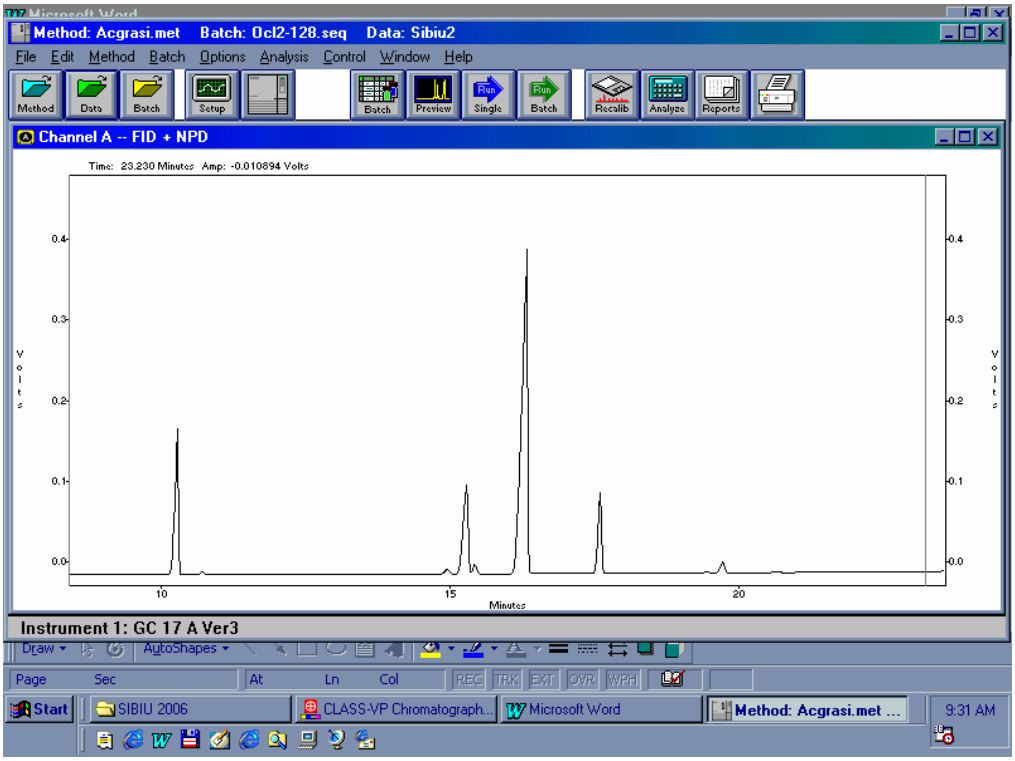


Fig.2 Gas-chromatograme of fatty acids extracted from sea buckthorn oil

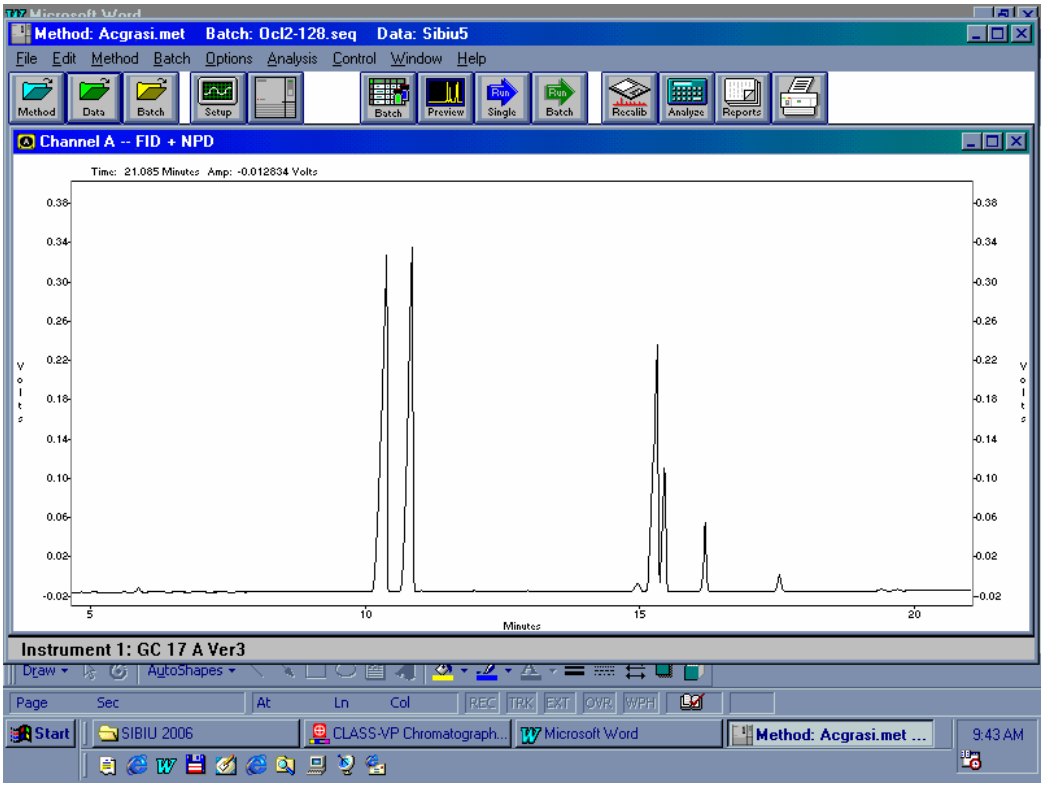
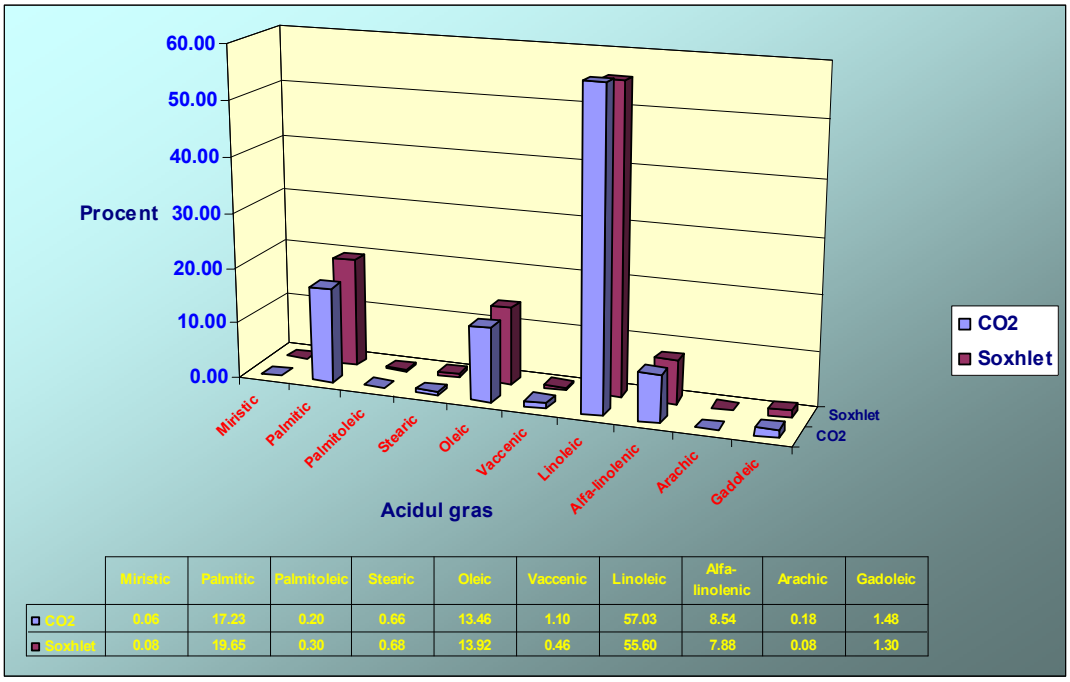
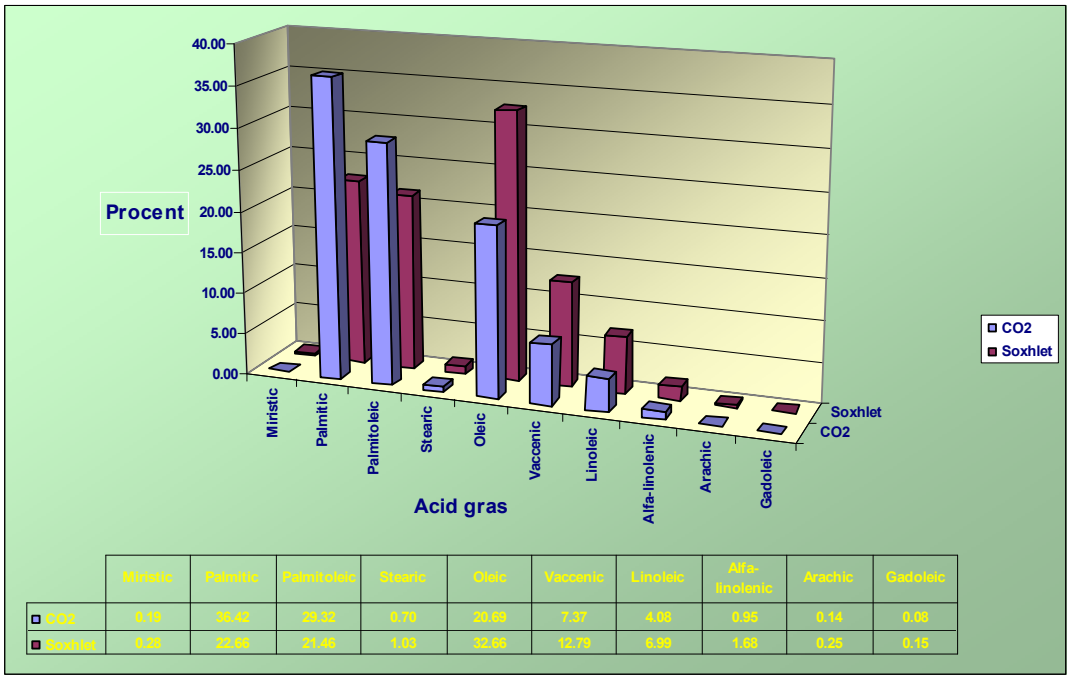


Fig. 3. Profile of fatty acids for wheat germs oil



	Miristic	Palmitic	Palmitoleic	Stearic	Oleic	Vaccenic	Linoleic	Alfa-linolenic	Arachic	Gadoleic
CO2	0.06	17.23	0.20	0.66	13.46	1.10	57.03	8.54	0.18	1.48
Soxhlet	0.08	19.65	0.30	0.68	13.92	0.46	55.60	7.88	0.08	1.30

Fig. 4. Profile of fatty acids for sea buckthorn oil



	Miristic	Palmitic	Palmitoleic	Stearic	Oleic	Vaccenic	Linoleic	Alfa-linolenic	Arachic	Gadoleic
CO2	0.19	36.42	29.32	0.70	20.69	7.37	4.08	0.95	0.14	0.08
Soxhlet	0.28	22.66	21.46	1.03	32.66	12.79	6.99	1.68	0.25	0.15

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THE EMBRYO TRANSFER (MOET) AND THE BULLS SELECTION ON COLLATERALS FAVOURS FACTORS OF GENETIC PROGRESS?

II. THE ESTIMATION OF GENETIC PROGRESS EXPECTED BY MOET APPLICATION AND BULLS SELECTION ON COLLATERALS (SISTERS AND HALF-SISTERS)

MARMANDIU A.*, RĂDUCUȚĂ I.*, MARMANDIU CARMINA, PÎRVU MONICA***, CUSTURĂ I.*, STANCIU MIRELA****, VLAD I.***

*University of Agriculture and Veterinary Medicine, Bucharest; **Secondary school „Ioan Petruş", Otopeni; ***University of Veterinary Medicine „Spiru Haret", Bucharest; ****University „Lucian Blaga", Sibiu.

ABSTRACT:
The results of the simulation suggest that the MOET breeding programes which are using bulls selection on the basis of sisters and half-sisters, represents a viable alternative to classic programs, especially nonadays when the activity of bulls selection on progenyes faces withs serioris problems in Romania. The plus of genetic progress possible because of the MOET$_{sisters+half-sisters}$ aplication is about 34% over CLASIC$_{IA}$. This superiority points out the positive influence that MOET has upon bulls dams (increases the selection intensity and the generation genetic responce), and the one hand, points aut the positive effect of MOET application and bulls selection on sisters and half-sisters upon the acceleration of the genetic progress rate of the cows, by reducing the interval between generation (-2 years on bull dams; -3.62 years bull bulls and –0.15 years on dam bulls).
MOET$_{sisters+half-sisters}$ provides better genetic progress that the one obtained through the developing of a MOET program testing bulls by the descendants (ΔG=+11%). Regarding the high costs emplied by the application of MOET in combination with bulls selection on progenyes, breeding program regarding MOET application on bull dams, wich supplies bulls selection on sisters and half-sisters, is an alternative that is worth taken in consideration, if an smaller accuracy of bulls selections it is tolerate (r_{BB} = -35%).
A MOET program with bulls selection on sisters and half-sisters is better that MOET program wich apllyies to the selection only on sisters, because it has a superior genetic efficience (ΔG=+10%). This superiority results from the improvement of accuracy selection bull bulls owing to the into on the sisters, but also on the half-sisters (r_{TT}=+21%), wich increases the reply of selection on bull bulls and dam bulls with the same (+21%).

KEYWORDS: multiple ovulation and embryo transfer (MOET), genetic progress, bulls selection on sisters and half-sisters.

INTRODUCTION:

The results communicated by various authors (Land, 1975; Nicholas şi

Smith, 1983; Colleau, 1992, 1998; Smith, 1987, 1988; Ruane, 1989; Villanueva, 1995 etc.) prove that by the application of the embryotransfer preceeded by the bulls dams supraovulation, there is a increased number of the products obtained from the donnor cows which constitute the MOET nucleus. Marmandiu (2004) establishes that if from each bull dam are annually taken 16, 20, 24, 28, 32 or 36 viable embryos, by transferring those to the same number of cows (50% the gestation rate) there can be obtained approximately 6, 8, 10, 12, 14 or 15 products/donnors annually. Assuming that there is an equal report between sexes half of the decendents will be males and half females. By applying the collaterals selection, according to the the donnor cows prolificity, each young bull will have 3, 4, 5, 6, 7 or 8 sisters and the number of the families they are retained from will be equal to that of the bull dams nominated donnor cows. By applying the embryo transfer each young bull that is a candidate for the selection will have besides his sisters and paternal and maternal half-sisters which he should consider in estimating the breeding value.

A cause of the mistrust and of breeding scepticism in genetic efficiency of bulls selection on collaterals, is represented by the diminuation of the accuracy selection bull bulls compared to the classical breeding programme. The results of our research proved that, indeed, MOET application on bulls dams way combined with bulls selection on sisters is beneficiary for this selection category (it increases the selection intensity and the genetic progress per generation), but affects bull bulls way, mainly due to the selection accuracy reduction.

The usage of both the information about sisters and of half-sisters should increase the evaluation accuracy of bull bulls and to improve the genetic progress per generation and also the bull bulls contribution to the achievement of the annual genetic progress. Starting from this hypothesis, during this study there has been estimated the genetic efficiency of MOET usage for bull dams under the conditions of bulls selection application on the basis of medium achievements achieved by their sisters and half-sisters.

MATERIAL AND METHOD:

In order to achieve the previous goal there was applied the mathematic modelation and the character followed during the selection was represented by the milk quantity. The modelation condition and the calculation formula of the genetic progress parameters per generation and annually are identical with those presented in the MOET method which uses only bulls selection on sisters (I). The only difference is represented by the accuracy estimating relation of the bull bulls selection that takes into consideration both sisters and also the young bulls half-sisters .

RESULTS AND DISCUSSION

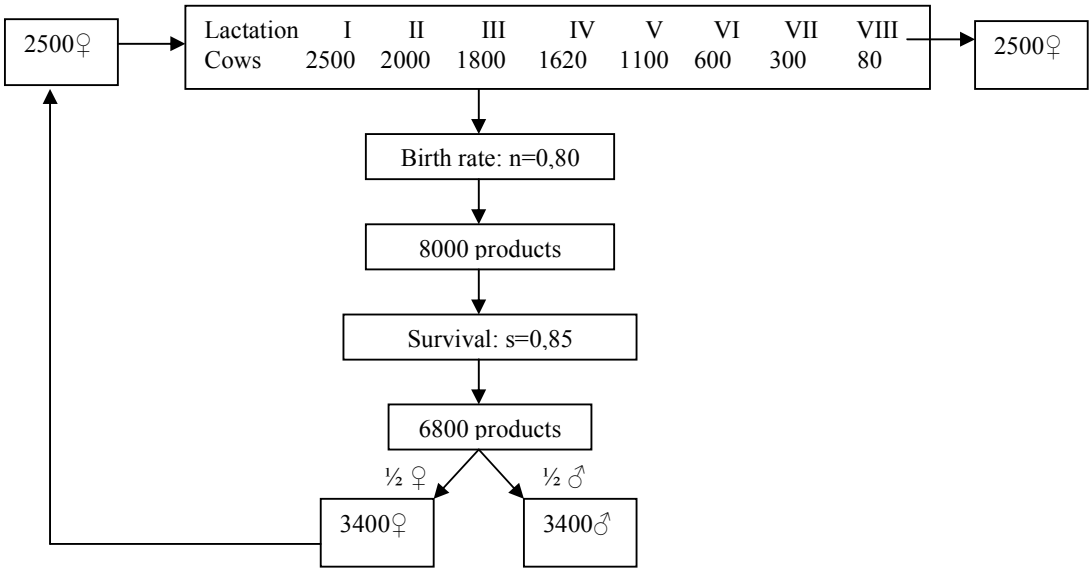
1. The age structure of the active population is presented in the table 1

There have been taken into consideration cows eliminations due to the age after the medium exploitation duration. This age structure confirms the exploitation duration proposed by the modelation hypothesis:

$$d = \frac{500 \cdot 1 + 200 \cdot 2 + 180 \cdot 3 + 520 \cdot 4 + 500 \cdot 5 + 300 \cdot 6 + 220 \cdot 7 + 80 \cdot 8}{2500} = \frac{10000}{2500} = 4 \, years$$

2. The graphic model of population regarding the female replacement from proper breeding

Figure 1



3. The graphic model of the population regarding the males replacement (bull bulls)

Figure 2

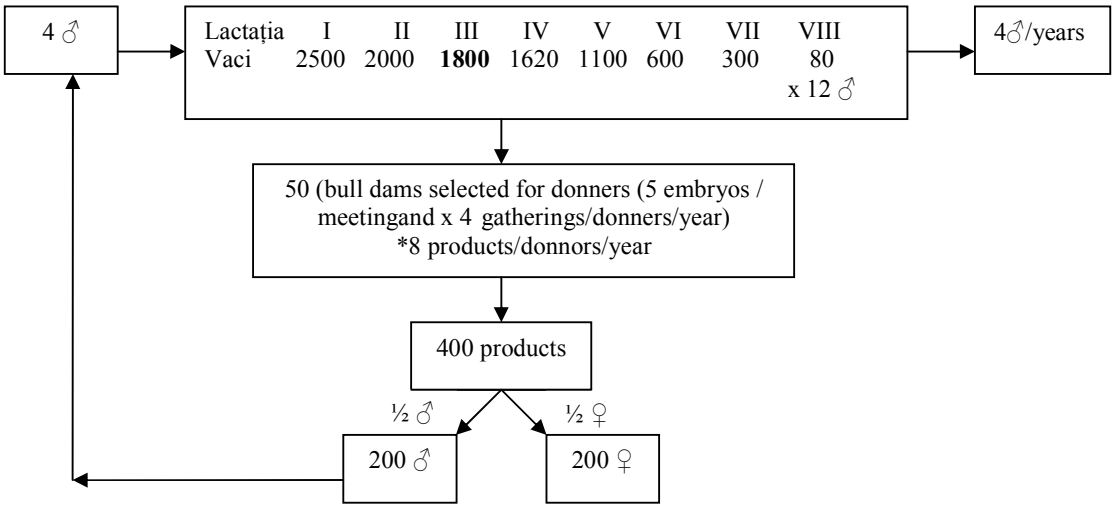


Table 1

The age structure of the active population

Lactation		I	II	III	IV	V	VI	VII	VIII	Total
Cows number		2500	2000	1800	1620	1100	600	300	80	10000
Frequency		25	20	18	16,2	11	6	3	0,8	100
Annual reform	Nb.	500	200	180	520	500	300	220	80	2500
	%	20	8	7,2	20,8	20	12	8,8	3,2	100

4. The selection response on bull dams way -BD- (donnor cows)

In order to compare the results with those obtained in the MOET way with bulls selection on sisters, there was imposed the same condition for the replacement young bulls to be retained annually among the best ones 2% males produced by the best dam bulls donnors selected among the cows at the third lactation. Just like in the previous variants that applied the embryo transfer (MOET with bulls selection on descendents and MOET with bulls selection on sisters), the donnor bull dams are selected only among the cows having three known lactations (1800 females), the selection criterium being represented by the milk quantity achieved on normal lactation. To avoid the exaggerate growth of inbreeding, the utilization period (poliovulation and gathering) of the donnors in MOET programme was limited to one year, but there is the possibility of the exploitation for 2 or 3 years without side effects above the ciclicity of the female reproduction function or among embryos viability. By poliovulation and the donnor gathering for one year after their nominalization as bull dams, the generation interval will be the fourth medium age, that is 5.5 years (2.5 years = the age at the first birth; 3.5 years = the age at the second birth; 4.5 years = the age at the third birth; 5.5 years = the age at the moment of entering the MOET nucleus, of poliovulation and gathering for one year → 5.5 years/1 year = 5.5 years). By hormonal treatment the donnor is supraovulated and gathered 4 times at three months interval and within a session there are prelevated 5 viable embryos. Doing this, there can be obtained annually from one single donnor 20 viable embryos (the 1st and the 2nd quality), transferable to the cows selected as receptors. By achieving a gestation percent at the receptor cows of 50% and a bull survival rate of 85%, annually will be obtained from each bull dams donnor approximately 8 products (4 males and 4 females). Knowing that a donnor produces annually 4 bulls and every year they must be retained for the reform replacement 4 bulls (2% of the most valuable produced by the donnor cows) it means that ther must be nominated 50 bull dams embryo donnor annually.

Taking into account the fact mentioned above there results the following values of the genetic progress parameters on bull dams way:

-the retaining proportion: according to the scheme 1 $p_{BD} = \frac{50}{1800} = 0{,}0278$

- *the selection intensity*: $i_{BD} = 2{,}2977$

- *the selection accuracy* - bull dams being nominated on the basis of medium performances achieved at the first three lactations, the accuracy will be:

$$r_{A,\bar{P}_{BD}} = h \cdot \sqrt{\frac{m}{1+(m-1)R_e}} = 0{,}5 \cdot \sqrt{\frac{3}{1+(3-1)\cdot 0{,}4}} = 0{,}6455$$

- *the genetic progress per generation*:

$$R_{BD} = r_{A,\bar{P}_{BD}} \cdot i_{BD} = h \cdot \sqrt{\frac{m}{1+(m-1)R_e}} \cdot i_{BD} \cdot \sigma_A = 0{,}6455 \cdot 2{,}2977 = 1{,}4832\sigma_A$$

5. <u>The genetic progress achieved by the dam dams (DD) selection</u>

-*the retaining proportion*: according to the scheme 1:

$$p_{DD} = \frac{10000/4}{10000 \cdot 0{,}80 \cdot 0{,}85/2} = \frac{2500}{3400} = 0{,}7353$$

- *the selection intensity*: $i_{DD} = 0{,}4452$

- *the selection accuracy*: $r_{A,P_{DD}} = h = \sqrt{h^2} = \sqrt{0{,}25} = 0{,}5000$

- *the genetic progress per generation*: $R_{DD} = r_{A,P_{DD}} \cdot i_{DD} \cdot \sigma_A = 0{,}5000 \cdot 0{,}4452 = 0{,}2226\sigma_A$

6. <u>The selection response on bull bulls (BB) way</u>

- *the retaining proportion* (fig.3): the 50 cows nominated as bull dams are insemination with the best 4 bull bulls that activate within the MOET nucleus. There was chosen the hierarchic mixing system where the donnor is seeded with the sperm of the same bull at each of the four gathering meetings and in order to assure the products contemporaneity, all the embryos are transferred after the last session. Thus, 25% (12.5) from the cows will be insemination with the bull 1, 25% (12.5) cows with the bull 2, 25% (12.5) with the bull 3 and 25% (12.5) with the bull 4. By transferring the 20 viable embryos to the same number of receptor cows, from each donnor are obtained 8 products (4 veal males and 4 veal females). Each young bull does not candidate individual to the selection but brothers and half-brother families with a breeding value estimated on the performance of the same sisters and half-sisters, so equal for all family members. This aspect must be taken into consideration when the retaining proportion of bull bulls is calculated. Being nominated as bull dams 50 cows will result 50 families, each family being made of 4 veal males and 4 veal females. In order to avoid the inbreeding growth, from each brother-sister family there is retained one single bull and each bull candidate will have 4 sisters (the same mother and father) and 46 half-paternal sisters (11.5 family of father x 4 veal females /family).

The generation interval on bull bulls way and dams bulls will be the medium age of the bull in the year of its usage at reproduction after the selection on the performance basis (milk quantity) achieved by sisters and half-sisters. When sisters and half-sisters will produce milk for male testing, young bulls will have their own age, meaning 18 months + 9 months + 10 months = 37 months. There are necessary 2-3 months for the proper selection, the gathering and the seminal material spreading from the selected ones, so the result is of 39-40 months. Thus, the generation interval for males will be $T_{BB;DB}$ = (3.33 + 4.33 +

5.33)/3 = 4.3 years.

Taking into account what we have mentioned before, the result is the following *selected proportion*: $p_{BB} = \frac{4}{50} = 0{,}0800$

- *the selection intensity*: $i_{BB} = 1{,}8583$
- *the selection accuracy*:

$$r_{A,I} = h \cdot \sqrt{\frac{n}{4 \cdot d}\left\{\frac{d-1}{4+(n-2)h^2} + \frac{(d+1)^2}{4+[n(d+1)-2]h^2}\right\}} =$$

$$0{,}5\sqrt{\frac{4}{4 \cdot 12{,}5}\left\{\frac{12{,}5-1}{4+(4-2)\cdot 0{,}25} + \frac{(12{,}5+1)^2}{4+[4\cdot(12{,}5+1)-2]\cdot 0{,}25}\right\}} = 0{,}5153$$

- *the genetic progress per generation*: $R_{BB} = r_{A,I} \cdot i_{BB} = 0{,}5153 \cdot 1{,}8583 = 0{,}9576\sigma_A$

7. <u>The selection response on dams bulls (DB) way</u>

Just like in the case of the bulls using only the information about sisters, the achieved genetic progress on dam bulls way will be equal with the one estimated on bull bulls way.

$$R_{DB} = R_{BB} = 0{,}9576\sigma_{A.}$$

8. <u>The annual genetic progress (ΔG)</u>

- in standard genetical deviations (σ_A):

$$\Delta G_{\sigma_A} = (R_{BD} + R_{DD} + R_{BB} + R_{DB})/(T_{BD} + T_{DD} + T_{BB} + T_{DB}) = (1{,}4832+0{,}2226+0{,}9576+0{,}9576)/$$

$$(5{,}5+5{,}5+4{,}3+4{,}3) = 3{,}6210/19{,}6 = 0{,}1847\ \sigma_A$$

- in absolute values (Kg): $\Delta G_{kg} = \Delta G_{\sigma_A} \cdot \sigma_A = 0{,}1847 \cdot 500 = 92{,}37$ Kg
- in relative values (%): $\Delta G_{\%} = \Delta G_{\sigma_A} \cdot CV_A = 0{,}1847 \cdot 12{,}5 = 2{,}31\%$

9. <u>The annual genetic progress (ΔG) obtained in MOET variant with the bulls selection on sisters and half-sisters versus CLASSICAL$_{IA}$ variant, MOET with bulls selection on descendents and MOET with bulls selection on sisters</u>

- to the CLASSICAL$_{IA}$ variant with bulls selection on descendents (the size of the active population 10000 cows; structure 40% Elite: 60% Testing):

$$\Delta G_{\sigma_A} = (0{,}1847 - 0{,}1385)/0{,}1385 = +33{,}36\%$$

$$\Delta G_{kg} = (92{,}37 - 69{,}25)/69{,}25 = +33{,}36kg$$

- to the MOET variant with bulls selection on descendents (the active population size 10000 cows; structure 40% Elite:60% Testing):

$$\Delta G_{\sigma_A} = (0{,}1847 - 0{,}1665)/0{,}1665 = +10{,}93\%$$

$$\Delta G_{kg} = (92{,}37 - 83{,}26)/83{,}26 = +10{,}93kg$$

- to the MOET variant with bulls selection on sisters:

$$\Delta G_{\sigma_A} = (0{,}1847 - 0{,}1679)/0{,}1679 = +10{,}00\%$$

$$\Delta G_{kg} = (92{,}37 - 83{,}94)/83{,}94 = +10{,}00kg$$

10. <u>The participation degree of the fourth ways of selection to the achievement of the annual genetic progress in the MOET with bulls selection on</u>

sisters and half-sisters comparatively with the CLASSICAL$_{IA}$ method and the MOET with bulls selection on descendents, respectively on sisters (table 2)

Table 2

The contribution of the selection categories at the achievement of the annual genetic progress (%)

Way	MOET$_{SISTERS+HALF-SISTERS}$	MOET$_{SISTERS}$	MOET$_{DESCENDENTS}$	CLASICAL$_{IA}$
DD	(0.2226 : 19.60)/0.1847 ≈ 6	(0.2226 : 19.60)/0.1679 ≈ 7	(0.2226 : 23.37)/0.1665 ≈ 6	(0.2226 : 25.37)/0.1385 ≈ 6
BD	(1.4832 : 19.60)/0.1847 ≈ 41	(1.4832 : 19.60)/0.1679 ≈ 45	(1.4770 : 23.37)/0.1665 ≈ 38	(1.0983 : 25.37)/0.1385 ≈ 31
BB	(0.9576 : 19.60)/0.1847 ≈ 27	(0.7924 : 19.60)/0.1679 ≈ 24	(1.5662 : 23.37)/0.1665 ≈ 40	(1.5662 : 25.37)/0.1385 ≈ 45
DB	(0.9576 : 19.60)/0.1847 ≈ 26	(0.7924 : 19.60)/0.1679 ≈ 24	(0.6265 : 23.37)/0.1665 ≈ 16	(0.6265 : 25.37)/0.1385 ≈ 18

The investigation results are comparable to those presented by other authors that estimated the MOET impact upon the rate of the genetic progress within the breeding cows programmes. Thus, Leitch and his colleagues (1994) establish that "juvenile" MOET scheme which imply bulls selection on ascendants and collaterals (sisters and half-sisters) assures the biggest annual genetic progress ($\Delta G = 0.104\sigma_A$), followed by "adult" MOET schemes ($\Delta G = 0.092\sigma_A$) and by CLASSICAL programmes based on mere artificial insemination and on bulls selection by descendents ($\Delta G = 0.081\sigma_A$).

By modeling different selection programmes applied to milk cows, Smith (1988) estimates the following values of genetic progress for the milk production character: 1.5% in the case of a CLASSICAL bull testing on descendents programme, 1.8-2.4% by applying a breeding programme with "adult" MOET nucleus and 2.6-3.5% in the variant of a "juvenile" programme with MOET nucleus.

In 1992, Colleau analized the genetic efficiency of the breeding schemes that apply the embryo transfer and established that all the modern breeding programmes allow the enlargement of the annual genetic progress with 5-30% compared to the CLASSICAL programmes based on mere artificial insemination.

CONCLUSIONS:

1. The results of the simulation suggest that the MOET breeding programes which are using bulls selection on the basis of sisters and half-sisters, represents a viable alternative to classic programs, especially nonadays when the activity of bulls selection on progenyes faces withs serioris problems in Romania. The plus of genetic progress possible because of the MOETsisters+half-sisters aplication is about 34% over CLASICAL$_{IA}$. This superiority points out the positive influence that MOET has upon bulls dams (increases the selection intensity and the generation genetic responce), and the one hand, points aut the positive effect of MOET application and bulls selection on sisters and half-sisters upon the acceleration of the genetic progress rate of the cows, by reducing the interval

between generation (-2 years on bull dams; -3.62 years bull bulls and –0.15 years on dam bulls).

2. MOETsisters+half-sisters provides better genetic progress that the one obtained through the developing of a MOET program testing bulls by the descendants (ΔG=+11%). Regarding the high costs emplied by the application of MOET in combination with bulls selection on progenyes, breeding program regarding MOET application on bull dams, wich supplies bulls selection on sisters and half-sisters, is an alternative that is worth taken in consideration, if an smaller accuracy of bulls selections it is tolerate (r_{BB} = -35%).

3. A MOET program with bulls selection on sisters and half-sisters is better that MOET program wich apllyies to the selection only on sisters, because it has a superior genetic efficience (ΔG=+10%). This superiority results from the improvement of accuracy selection bull bulls owing to the into on the sisters, but also on the half-sisters (r_{BB}=+21%), wich increases the reply of selection on bull bulls and dam bulls with the same (+21%).

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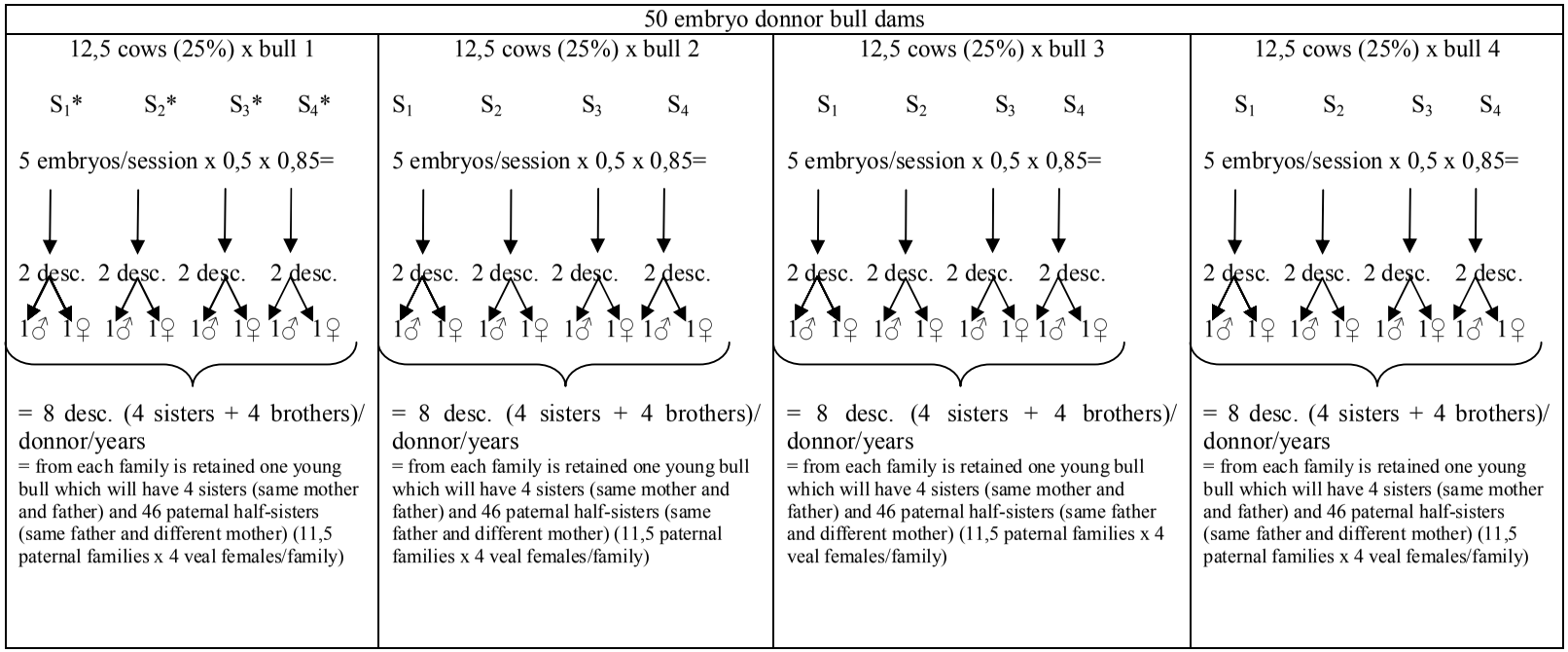
Figure 3

The mating scheme of the cows that are embryo donnor bull dams with bull bulls to obtain MOET products



* S_1, S_2, S_3, S_4 represent the poliovulation inducing sessions and of embryo gathering from the donnor cows.

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THE EMBRYO TRANSFER (MOET) AND THE BULLS SELECTION ON COLLATERALS FAVOURS FACTORS OF GENETIC PROGRESS?

I. THE ESTIMATION OF GENETIC PROGRESS EXPECTED BY MOET APPLICATION AND BULLS SELECTION ON COLLATERALS (SISTERS)

MARMANDIU A.*, MARMANDIU CARMINA, RĂDUCUȚĂ I.*, PÎRVU MONICA***, CULEA C.*, NEAGU IULIANA*, CUSTURĂ I.***

*University of Agriculture and Veterinary Medicine, Bucharest; **Secondary school „Ioan Petruş", Otopeni; ***University of Veterinary Medicine „Spiru Haret", Bucharest.

ABSTRACT:
Owing to the improvement of the prolificity of bull dams through MOET (8 produces/year), each bull-calf competing in the selection, will have 4 sisters and so the selection will become possible because of the informations provided by its sisters. The application of MOET in combination with bulls selection on collaterals (sisters) allows a anuual genetic progress ΔG=2.10% (0.1679σ_A). Comparatively with the classic variant based on a simple artificial insemination, but also on bulls selection on progenyes, MOET in association with bulls selection on sisters increases the annual genetic progress with about 21%. This superiority results from the increasing responce to the selection regarding dam bulls, but most of all it results from the reduction of the interval between generation through bull bulls (from 7.92 to 4.43 years) and bull dams (from 7.5 to 5.5 years).
The results of the investigation suggests a light superiority of the MOET variant with bulls selection on sisters, in comparation with the MOET variant on bulls selection on progenyies (ΔG=+0.84%). This is caused by the reduction of the interval between generations through bull bulls (from 7.92 to 4.3 years) and dam bulls (from 4.45 to 4.3 years) and at the same time it is caused by the increasing response to the selection regarding to bull dams. However, these two advantage „affected" the intensity and most of all, the accuracy of bull bulls selection, which reduced with about 12%, respectively about 46% and the responce to the selection on progenyes reduced about 49%, as a result.

KEYWORDS: multiple ovulation and embryo transfer (MOET), genetic progress, bulls selection on sister

INTRODUCTION:

For a long period of time, within the classical breeding programme, the progenies test was considered the ideal method of selection, the one that decides the final reproductive value hierarchy. The decision is fully justified because the

bull breeding value for the selection is obtained on the basis of the regression between its additive genetic value and the medium performance of its descendants. The authors who have recommended the widely usage of the bulls testing on descendents, have also taken into account the main advantage of the method, that is the accuracy selection development, but they have ignored the other factors on which the selection effect depends on (selection intensity and especially the generation interval). The descendents selection has many disadvantages: it is a late method due to the fact that the parents'selection can be achieved only when there are known the descendents performances, increasing the generation interval (the annual genetic progress is lowered); it can reduce the replacement necessary due to the longer reproduction usage of some valuable reproductors; it complicates the interpretation of the measured genetic progress causes, because within the reproduction there are used simultaneously both the selected on descendents parents and their sons that are selection candidates, but who have already been selected on ascendants, own performances; there are required substantial financial efforts that increase the costs on the achieved genetic progress unit (Drăgănescu and Grosu, 2003). When taking into account all these complications that accompany the bulls testing on descendents thre must be a reconsideration and a reevaluation of the alternative selection method.

Within the milk cows breeding, there wasn't paid the same attention to the ascendants selection methods and on the relatives selection as the descendents selection mainly due to the reducing selection accuracy. Once with the apparition and the perfectioning of the MOET reproduction biotechnology, there is a change in the ameliorators optics in favour of the alternative selection methods. In fact, the first studies (Land and Hill, 1975; Nicholas, 1979; Nicholas and Smith, 1983; Smith, 1988; Sandu, 1995) that anticipated the embryo importance transfer in the increasing rhythm of the bulls genetic improvement, pointed out the replacement of the bulls testing on descendents with that on the ascendants and the collaterals.

The collterals selection is competing only with the descendents selection and at most with the one on the ascendants (that is not competitive). The collaterals selection seems to be cheaper than that on the descendents because it does not impose the bulls maintenance during the period of the waiting for the results without being used. At the same time thre is the possibility for it to generate a smaller inbreeding than the bulls selection on decendents (difficult problem for the programmes that apply MOET), because the families size variance is smaller. The collaterals selection is preferable to that on the descendents when the descendents testing increases the a lot the generation interval or influences negatively the selection intensity. These two disadvantages represent a very important characteristic of the classical breeding programmes, they being able to be eliminated by the usage of the MOET reproduction biotechnology and of the additional biotechnics ("in vitro" fertilisation, the cloning, the embryo and the sperm sexing) (Marmandiu, 2004).

The specialists'general opinion is that the main advantage of the breeding programmes that use the embryo transfer is represented by the reducing of the generation interval. This can be decreased substantially especially at the bulls by giving up the descendents testing and the estimation of the breeding value on the basis of the ascendants and the collaterals performances. By using MOET on the bull dams the reproductive rate increases substantially so there would be numerous families of maternal sisters and half-sisters that complete the information from the paternal half-sisters obtaind by artificial insemination.

From the genetic efficiency point of view, the results communicated by various authors (Nicholas, 1979; Nicholas and Smith, 1983; Smith, 1988; Colleau, 1992, 1998; Leitch, 1994 etc.) prove the clear advantage of the bulls selection on collaterals and compared to the classical one based on mere artificial insemination and on the bulls testing on descendents that sustain the proposal of replacing the descendency test. There are ameliorators that obtained bad results on the bulls selection on collaterals and who oppose to the idea of bull testing on descendents. Nowadays, at the international level, the specialists' opinions are shared with a relative ambiguity regarding the opportunity of the bull selection on collaterals application. Starting from this reality and taking into account the difficulties within the bulls selection after descendents in Romania, we consider it necessary the investigation of the utility regarding the bulls selection on collaterals application in the local dairy breeding.

MATERIAL AND METHOD:

The genetic efficiency of MOET application was estimated by modelation on bull dams way in a bull selection programme using only the information about sisters. For each selection category (bull dams, dam dams, bull bulls, dam bulls) there was calculated the retaining proportion, the selection intensity, the selection accuracy and the selection response on generation (R), and finally taking into account the generation intervals corresponding to these ways of selection, there was predicted the annual genetic progress (ΔG), expressed in standard genetic deviations σ_A), in absolute values (kg) and in relative values (%). There was estabilished the participation degree for each of the selected category at the achievement of the total genetic progress.

The used parameters in making the calculations were: active population size=10000 cows; average duration of exploitation of reproduction cows=4 years old; average duration of exploitation in bulls=3 years old; in the active population, 12 bulls will be used to maintain the inbreeding at a low level; birth rate in the active population=0.80; surviving to the first calving=0.85; age at the first calving=2.5 years old; calving interval=1 year; annual losses of 20% till the second calving and of 10% from the second to the third calving, when the bull dams will be nominalisated (number of lactation/cow=3); average performance of the population before the selection=4000 kg milk; phenotypic variability coefficient= 25%; phenotypic standard deviation σ_p=0.25 x 4000=1000 kg;

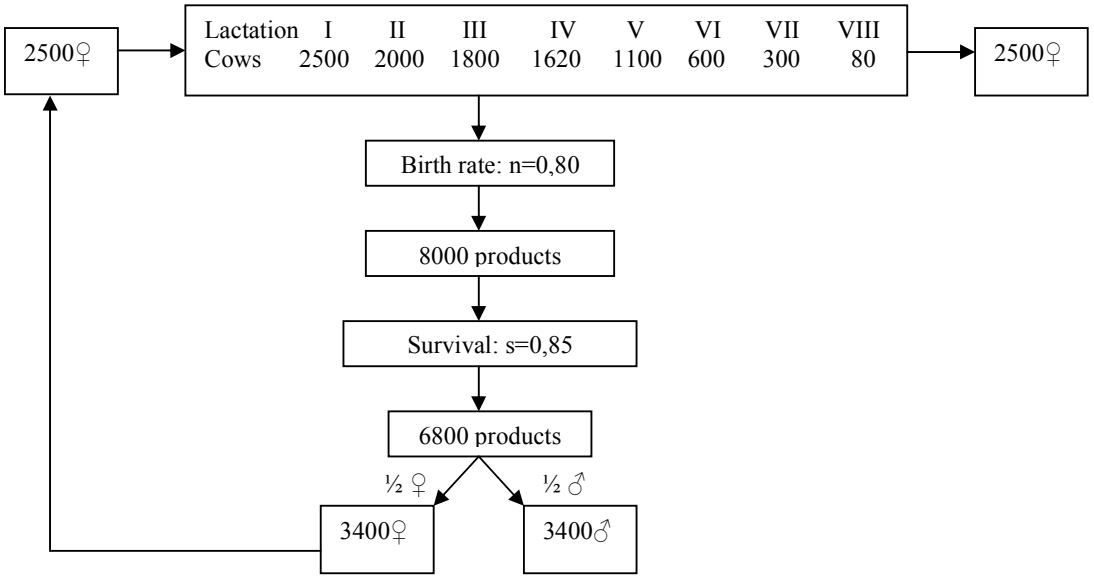
genetic standard deviation σ_A=h x σ_p = 0.5 x 1000=500 kg; heritability for the milk quantity h^2= 0.25; repeatability of the milk quantity R=0.40.

RESULTS AND DISCUSSIONS:

1. *The age structure of the active population* – the estimation of the genetic progress parameters was preceded by the establishment of the number and the cow frequency from the active population at different lactations (table 1).

2. *The graphic model of the population regarding the replacement of the reproduction cows*

Figure 1



3. *The graphic model of the nucleus regarding the bulls replacement (bull bulls)*

Figure 2

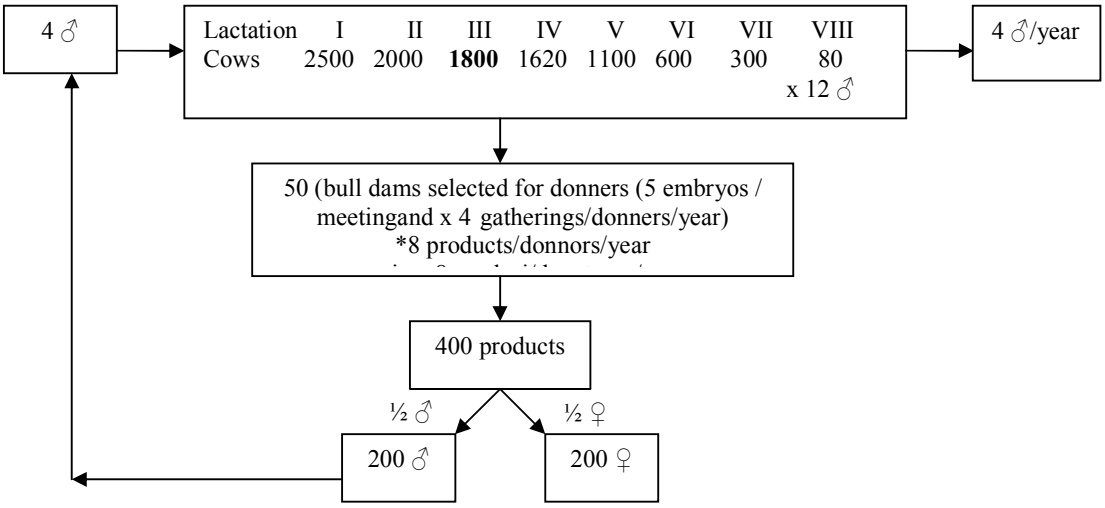


Table 1

The age structure of the active population

Lactation		I	II	III	IV	V	VI	VII	VIII	Total
Cow number		2500	2000	1800	1620	1100	600	300	80	10000
Frecquency		25	20	18	16,2	11	6	3	0,8	100
Annual reform	Nb.	500	200	180	520	500	300	220	80	2500
	%	20	8	7,2	20,8	20	12	8,8	3,2	100

4. The genetic progress achieved by the bulls dams (BD) selection

Considering that a donner is poliovulated and gathered for one year, 4 times in 3 months and that during a session there are orelevated 5 viable embryos, it means that annually there can be obtained 20 embryos of first and second quality from one single donnor. The usage period of the cows as donnors was limited at one year in order not to increase very much the inbreeding. By transferring the 20 embryos to the 20 receptors cows, by achieving of a gestation rate of 50% and of a procent of survival of 85%, there will be annually almost 8 products from each bull dam included in the MOET programme. According to the mendelian laws, half of the descendents will be bulls, so that from each bull dam thre are obtained annually 4 bulls potentially selection candidates.

Within the active population there are annually retained 4 bull bulls from the best 2% young bulls produced by the bull dams that donate embryos and twhich are chosen from 1800 females at the third lactation (fig. 2). The bull dams are selected only among the females with three closed lactations because the selection criterium is the milk quantity appreciated at the first three lactations and the donnors are poliovulated one year after the elimination from the normal reproductive circuit. By knowing that a donnor produces annually 4 young bulls, there are retained annually 50 cows bull dams donnors which will be the MOET nucleus. Bull dams cows being used as donnors one year after nominalization, the generation interval will be the medium age the fourth, meaning 5.5 years.

- *retaining proportion*: according to the scheme from point no.2:

$$p_{BD} = \frac{50}{1800} = 0{,}0278$$

- *the selection intensity*: $i_{BD} = 2{,}2977$

- *the selection accuracy* - bull dams being nominated on the basis of medium performances achieved at the first three lactations, the accuracy will be:

$$r_{A,\bar{P}_{BD}} = h \cdot \sqrt{\frac{m}{1+(m-1)R_e}} = 0{,}5 \cdot \sqrt{\frac{3}{1+(3-1)\cdot 0{,}4}} = 0{,}6455$$

- *the genetic progress per generation*:

$$R_{BD} = r_{A,\bar{P}_{BD}} \cdot i_{BD} = h \cdot \sqrt{\frac{m}{1+(m-1)R_e}} \cdot i_{BD} \cdot \sigma_A = 0{,}6455 \cdot 2{,}2977 = 1{,}4832\sigma_A$$

5. <u>The genetic progress achieved by the dam dams (DD) selection</u>

- *retaining proportion*: according to the scheme 1:

$$p_{DD} = \frac{10000/4}{10000 \cdot 0{,}80 \cdot 0{,}85/2} = \frac{2500}{3400} = 0{,}7353$$

- *the selection intensity*: $i_{DD} = 0{,}4452$

- *the selection accuracy*: $r_{A,P_{DD}} = h = \sqrt{h^2} = \sqrt{0{,}25} = 0{,}5000$

- *the genetic progress per generation*: $R_{DD} = r_{A,P_{DD}} \cdot i_{DD} \cdot \sigma_A = 0{,}5000 \cdot 0{,}4452 = 0{,}2226\sigma_A$

6. <u>The genetic progress achieved by bull bulls (BB) selection</u>

- *the retaining proportion* (fig. 2): due to the fact that from a bull dam by embriotransfer there can be obtained 8 products (half males, half females), it means that each young bull candidate to selection will have 4 sisters. When calculating the retaining proportion, thre must be taken into consideration that each young bull doesn't participate individually, but brother families with a breeding value estimated on the basis of the performance of the same sisters, so equal for all the family members. In order to avoid the inbreeding growth, from each brother family will be retained one young bull. 50 cows are nominated as bull dams, there will be 50 families. The generation interval will be the medium bulls age during the usage year, after the selection on sisters. When sisters will

produce milk for testing, the young bulls will be of their sisters'age, that is 18 months+9 months+10 months=37 months. There are necessary 2-3 months for the proper selection, the gathering and the spreading of the seminal material from the selected ones, so there are finally 39 (40) months (approximately 3.33 years). So, the generation interval at males will be TBB;DB=(3.33+4.33+5.33)/3=4.3 years. Taking into account the ones mentioned above, there is the following

- *proportion of the selected*: $p_{BB} = \frac{4}{50} = 0{,}0800$

- *the selection intensity*: $i_{BB} = 1{,}8583$

- *the selection accuracy*:

$$r_{A,\bar{P}_s} = h \cdot 0{,}5 \cdot \sqrt{\frac{n}{1+(n-1)0{,}5h^2}} = 0{,}5 \cdot 0{,}5\sqrt{\frac{4}{1+(4-1)\cdot 0{,}5 \cdot 0{,}25}} = 0{,}4264$$

- *the genetic progress per generation:*

$$R_{BB} = r_{A,\bar{P}s} \cdot i_{BB} = h \cdot 0{,}5 \cdot \sqrt{\frac{n}{1+(n-1)0{,}5h^2}} \cdot i_{BB} \cdot \sigma_A = 0{,}4264 \cdot 1{,}8583 = 0{,}7924\sigma_A$$

7. *The genetic progress achieved by dam bulls (DB) selection* - the answer to selection achievable by dam bulls way will be equal with the one estabilished by bull bulls way: $R_{DB} = R_{BB} = 0{,}7924\sigma_A$.

8. *The annual genetic progress (ΔG)*

- in standard genetical deviations (σ_A):

$$\Delta G_{\sigma_A} = (R_{BD} + R_{DD} + R_{BB} + R_{DB})/(T_{BD} + T_{DD} + T_{BB} + T_{DB}) = (1{,}4832+0{,}2226+0{,}7924+0{,}7924)/$$

$$(5{,}5+5{,}5+4{,}3+4{,}3) = 3{,}2906/19{,}6 = 0{,}1679\ \sigma_A$$

- in absolute values (Kg): $\Delta G_{kg} = \Delta G_{\sigma_A} \cdot \sigma_A = 0{,}1679 \times 500 = 83{,}95$ Kg

- in relative values (%): $\Delta G_{\%} = \Delta G_{\sigma_A} \cdot CV_A = 0{,}1679 \times 12{,}5 = 2{,}10\%$

9. *The annual genetic progress obtained in MOET variant with bulls selection on sisters versus CLASSICAL$_{IA}$ method and MOET method with bulls selection on descendents*

-to the CLASSICAL$_{IA}$ programme with bulls selection on descendents (the size of the active population 10000 cows; structure 40% Elite: 60% Testing):

$$\Delta G_{\sigma_A} = (0{,}1679 - 0{,}1385) / 0{,}1385 = +21{,}23\% \; ; \; \Delta G_{kg} = (83{,}95 - 69{,}25) / 69{,}25 = +21{,}23 kg$$

-to the MOET programme with bulls selection on descendents (the active population size 10000 cows; structure 40% Elite:60% Testing):

$$\Delta G_{\sigma_A} = (0{,}1679 - 0{,}1665) / 0{,}1665 = +0{,}84\% \; ; \; \Delta G_{kg} = (83{,}95 - 83{,}26) / 83{,}26 = +0{,}84 kg$$

10. The participation degree of the fourth ways of selection to the achievement of the annual genetic progress in the MOET with bulls selection on sisters comparatively with the CLASSICAL$_{IA}$ and the MOET methode (table 2)

Table 2

The procentual contribution of the selection categories at the achievement of the annual genetic progress

Way	MOET with bulls selection on sisters (%)	MOET with bulls selection on descendents (%)	CLASICAL$_{IA}$ with bulls selection on descendents (%)
DD	(0.2226 : 19.60)/0.1679 ≈ 7	(0.2226 : 23.37)/0.1665 ≈ 6	(0.2226 : 25.37)/0.1385 ≈ 6
BD	(1.4832 : 19.60)/0.1679 ≈ 45	(1.4770 : 23.37)/0.1665 ≈ 38	(1.0983 : 25.37)/0.1385 ≈ 31
BB	(0.7924 : 19.60)/0.1679 ≈ 24	(1.5662 : 23.37)/0.1665 ≈ 40	(1.5662 : 25.37)/0.1385 ≈ 45
DB	(0.7924 : 19.60)/0.1679 ≈ 24	(0.6265 : 23.37)/0.1665 ≈ 16	(0.6265 : 25.37)/0.1385 ≈ 18

CONCLUSIONS:

1. The MOET application at the bull dams allows practicing of a bigger selection intensity on this way and the growth of the selection response per generation. At the same time, due to the prolificity improvement of the nominated cows as bull dams (8 products/year), each young bull that is candidate to the selection will have more sisters (4) and thus the selection based on the information provided by these sisters becomes possible.

2. Compared to the CLASSICAL method based on mere artificial insemination and on the bull testing on descendents, MOET associated with bull selection on collaterals (sisters) increases the annual genetic progress with approximately 21%. This superiority is due to the increasing response to the selection on bull dams way and especially on the reducing the interval between selections on bull bulls (from 7.92 to 4.43 years) and dam bulls (from 7.5 to 5.5 years).

3. The investigation results suggest a slight superiority of the MOET method with bull selection on sisters to the MOET with bull selection on descendents, the cause being the reducing interval between generations on bull bulls ways (from 7.92 to 4.43 years) and bull dams (from 4.45 to 4.30 years) and also the increasing response to the selection caused by bull dams way. These

two advantages have "affected" the intensity and the accuracy of bull bulls selection that descresed with approximately 12%, respectively 46% and thus the selection response per generation (R_{BB}) reduced with 49%.

4. In the case of applying MOET in the cows breeding, the replacement of the bulls selection on descendents with that on the collaterals (only on sisters) does not seem efficient, only the embryos transfer integration within the classical breeding programmes. The results are according to the tendency developed at mondial level of applying the MOET biotechnology on bull dams way and of maintaining bulls selection on descendents.

5. The applying of a MOET programme with bulls selection on the basis of their sisters' performance can be a classical alternative when the reducing of the generation interval is essential, when a more reduced accuracy of bull bulls selection is tolerated, when it is difficult to assure the contemporaneity condition for daughters of the candidate bulls or when the testing costs of the bulls on descendents are very big.

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THE PREDICTION OF THE GENETIC PROGRESS ACHIEVABLE THROUGH THE APPLICATION OF THE EMBRYO TRANSFER (MOET) IN THE BULLS SELECTION PROGRAMMES ON PROGENYES

MARMANDIU A.*, PĂUNESCU ILEANA*, RĂDUCUȚĂ I.*, MARMANDIU CARMINA, CULEA C.*, NEAGU IULIANA*, PÎRVU MONICA*****

*University of Agriculture and Veterinary Medicine, Bucharest; **Secondary school „Ioan Petruş", Otopeni; ***University of Veterinary Medicine „Spiru Haret", Bucharest.

ABSTRACT:
The results of the investigation proves that implementing the reproduction biotechnology in the breeding programmes that applies the bulls selection on progeny is good for the genetic progress. Compared to the classical method (artificial insemination), the MOET application to bull dams enriches significantly the female prolificity (approximately 8 times), it reduces substantially the cows necessity nominated as bull dams (it reduces the ratio retaining with 74.5%), it increases the selection intensity and also the genetic response per generation with 34.5%. MOET grows the bull dams contribution to the achievement of the total genetic progress (+7%) and by shortening the generation interval with two years (T_{BDMOET}=5.5 years, to T_{BDIA}=7.5 years) it grows the annual genetic progress with 20% (ΔG_{MOET}=0.1665 σ_A a to ΔG_{CLASIC}=0.1385 σ_A). Having a standard deviation for the 500 milk quantity, the MOET offers an annual genetic progress of 83.25 kg to 69.25 kg in the case of the breeding programme CLASSIC$_{IA}$.

KEYWORDS: multiple ovulation and embryo transfer (MOET), artificial insemination, genetic progress, progeny test; active population, breeding programme.

INTRODUCTION:

The classical breeding programme of milk cows which is originated in the work of Robertson (1950) (quoted by Drăgănescu C., 1979) limits its genetic efficiency to maximizing the genetic progress on bulls, because by practicing the artificial insemination the growth of bulls selection intensity is possible and also their rational usage for reproduction. This programme based on the mere application of artificial insemination, does not allow the cows growth to the achievement of the total genetic progress due to the low reproductive rate. The MOET application to bull dams confers the significant development of the products number on donnors, which creates the premise of the intensity growth, of the answer to selection in this way and the growth of the annual genetic progress.

MATERIAL AND METHOD:

The possibility and the utility of MOET implementation in a breeding programme that applies the bull selection on descendents was investigated by modelation. Considering that bull dams which donate embryos are chosen only from the cows that make up the nucleus (The Elite group from the Robertson plan) it can be said that the considered way is a scheme of breedind with a MOET hybrid nucleus (Marmandiu, 2004). There have been completed the first threestages of modelation and the used parameters in making the calculations were: active population size=10000 cows; structure of active population=40%Elite: 60%Testing; average duration of exploitation of reproduction cows=4 years old; average duration of exploitation in bulls=3 years old (in the Elite group); in the active population, 12 bulls will be used to maintain the inbreeding at a low level; birth rate in the active population=0.80; surviving to the first calving=0.85; age at the first calving=2.5 years old; calving interval=1 year; one daughter or a male could be obtained either from the three cows in a year, either from a cow during three years (in the variant without MOET); annual losses of 20% till the second calving and of 10% from the second to the third calving, when the bull dams will be nominalisated (number of lactation/cow=3); average performance of the population before the selection=4000 kg milk; phenotypic variability coefficient= 25%; phenotypic standard deviation σ_p=0.25 x 4000=1000 kg; genetic standard deviation σ_A=h x σ_p = 0.5 x 1000=500 kg; heritability for the milk quantity h^2= 0.25; repeatability of the milk quantity R=0.40.

During the first stage there was estimated the genetic progress expected by the application of the artificial insemination and of the bull selection on descendents and ultimately the possible selection effect by using MOET at bull dams was predicted.

RESULTS AND DISCUSSIONS:

A. The prediction of the expected selection effect by application of the artificial insemination in a classical breeding programme ($CLASSIC_{AI}$)

In order to estimate the genetic progress it was established in the first place the age structure of the active population (table 1) and there were established the main stages of the selection programme regarding the bulls descendents:

Table 1

The number and the cow frequency at different lactation periods

Lactation		I	II	III	IV	V	VI	VII	VIII	Total
Cow number		2500	2000	1800	1620	1100	600	300	80	10000
Frecquency		25	20	18	16,2	11	6	3	0,8	100
Annual reform	Cap.	500	200	180	520	500	300	220	80	2500
	%	20	8	7,2	20,8	20	12	8,8	3,2	100

1. The estabilishment of the active population growth - MP=10000 cows. As it is known, the population growth influences directly the inbreeding and indirectly the selection effect on variability, which affects both the selection differential and its precision, especially in the case of familial selection.

2. The division of the active population in two groups - Nucleus and Testing. A part of the cows (the best ones) are used for choosing the bull dams. This part of the active population that makes the Nucleus is seeded with material coming from the best bulls of the Romanian Friesian breed, already selected on descendents. The other part of the active population (less valuable) makes the Testing and its purpose is to produce the daughters on which the descendent bulls will be tested. The frequency of each group in the structure of the active population must be optimized, because their size influences differently the selection effect. For the growth of the active cow population it was considered the Elite structure (40%) and the Testing (60%), established as being optimized by Robertson and Rendel (1950).

3. The estabilishment of the optimum number of daughters for each selected bull - the total possible number obtained in the Testing group represents the testing capacity (T) and it can be set according to the reproductive population and of its demographic characteristics (birth and survival). The same testing capacity can be set either with a great number of small families, or with a small number of big families. Due to the fact that the population size is limited, there is a contradiction between the family number and their size, which is translated through an opposition between the intensity selection (the number of families) and the accuracy selection (the family size), which is solved through an optimization. Robertson (1957) (quoted by Drăgănescu C., 1979) proposes that it should be considered the "testing report" -K- in solving this problem, meaning the report between the testing capacity (T) and the small number of bull families from which the males would be retained (S) for avoiding inbreeding, meaning K=T/S. Starting from this testing report, Robertson (1957) proposes the following formula:

$$n = 0{,}56\sqrt{\frac{K}{h^2}} = 0{,}56\sqrt{\frac{T}{S \cdot h^2}}\,.$$

Considering an exploitation period of the reproduction bulls in the 3 years nucleus, the testing group size of 6000 cows, the birth of 80% and the survival

85%, the result is a testing capacity $T = \frac{6000 \cdot 0,8 \cdot 0,85}{2} = 2040$ daughters obtained during an year (the calculations were made during an year).

On the basis of the testing capacity there was calculated the right number of daughters for each selected candidates bull (n), with the relation $n = 0,56\sqrt{\frac{T}{S \cdot h^2}} = 0,56\sqrt{\frac{2040}{4 \cdot 0,25}} \approx 25$ daughters, where S represents bull fathers (bull bulls) used for artificial insemination in the Nucleus, and h^2 represents the heritability of the milk quantity.

4. The estabilishment of the bull numbers that can be tested (N_{tt}): the following relation is used $N_{tt} = \frac{T}{n} = \frac{2040}{25} = 81,6 \approx 82 / year$

5. The estabilishment of the bull dams number - considering that a cow can produce within an year 0.34 young bulls (0.80 birth x 0.85 survival/2), it results that a male can be produced either by a cow during an three year, or by three cows during an year. Due to the fact that the selection plan is created on an year in order to obtain the 82 bulls that can be tested annually, there should be 246 bull dams (82 bulls x 3 bull dams).

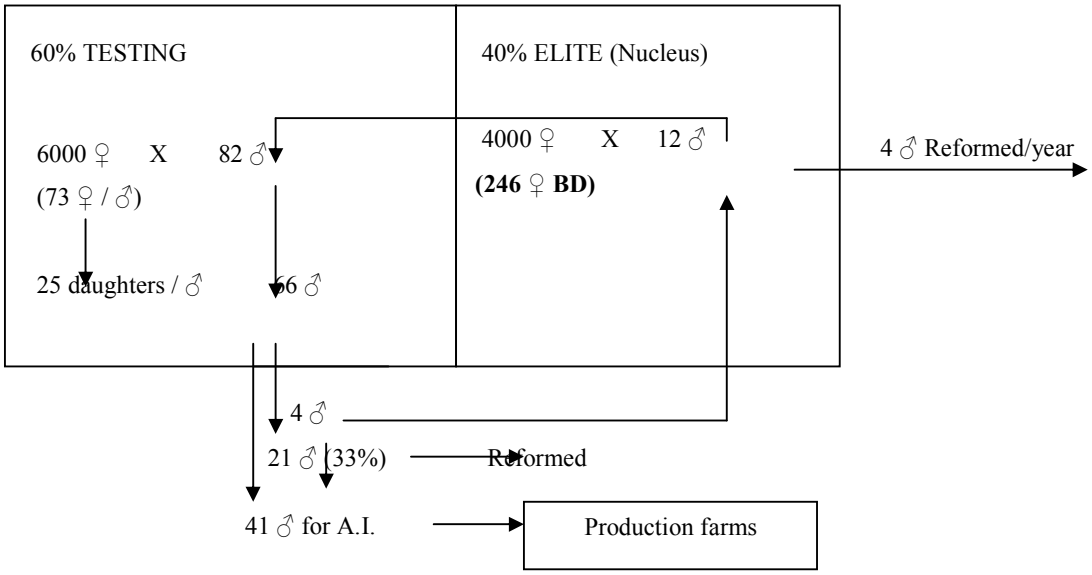
6. The establishment of the place where the selected bull daughters control is achieved - the testing can be done in special farms or in the native farms. We considered the second option due to the following facts: the testing in resorts involves greates expenses; due to the artificial insemination application the genetic differences among farms disappear, there is no bull-farm interaction, meaning that the valuable-proven bulls from a farm will keep the same place in other farms too; 20-40 daughters tested in origin farms offer the same selection accuracy just like 20 daughters controlled in special farms (Drăgănescu, 1979; Drăgănescu and Grosu, 2003; Georgescu, 1998).

7. The establishment of the bull number that end the testing - it is taken into account the damages from the expecting period. From the 82 bull candidates 80% will end the testing, respectively 66.

8. The breeding value estimation of the candidates - here are considered the fenotipical information given by the daughters. The mathematical relation is the following: $A = \frac{n \cdot r \cdot h^2}{1 + (n-1) \cdot t}\left(\overline{P}_F - \overline{P}_{CF}\right)$ (Drăgănescu C., 1979 ; Drăgănescu C. and Grosu H., 2003).

9. The estabilishment of the tested bulls destination - after the estimation of the breeding value for each bull there is set the destination. Thus, the best bulls (4) will replace the reform of the bull bulls, the last 33% (21 bulls) are reformed and the rest (41) will be used within the artificial insemination within the production farms.

10. The making of the technological drawing of the selection plan:



11. The answer estimation for the selection

***11.1 The answer estimation for selection (R) according to the four selection categories*:**

a) The way dam dams (DD)

- ratio retaining: $p_{DD} = \frac{10000/4}{10000 \cdot 0,80 \cdot 0,85/2} = \frac{2500}{3400} = 0,7353$
- intensity selection: $i_{DD} = 0,4452$
- accuracy selection: $r_{A,PDD} = h = \sqrt{h^2} = \sqrt{0,25} = 0,5000$
- genetic response per generation: $R_{DD} = r_{A,PDD} \cdot i_{DD} \cdot \sigma_A = 0,5000 \cdot 0,4452 = 0,2226\sigma_A$

b) The way bull dams (BD)

- retaining proportion: $p_{BD} = \frac{246}{2200} = 0,1118$

Lactation	I	II	III	IV	V	VI	VII	VIII
Cows	1000*	800	720	648	440	240	120	32

2200

4000 females (nucleus)/4 years (the medium exploitation duration) = 1000 main pairs

the selection intensity.

- selection intensity: $i_{BD} = 1,7015$
- selection accuracy: $r_{A,\bar{P}_{BD}} = h \cdot \sqrt{\frac{m}{1+(m-1)R_e}} = 0,5 \cdot \sqrt{\frac{3}{1+(3-1)\cdot 0,4}} = 0,6455$
- genetic response per generation:

$$R_{BD} = r_{A,\bar{P}_{BD}} \cdot i_{BD} = h \cdot \sqrt{\frac{m}{1+(m-1)R_e}} \cdot i_{BD} \cdot \sigma_A = 0{,}6455 \cdot 1{,}7015 = 1{,}0983\sigma_A$$

c) The way bull bulls (BB)

- retaining proportion: $p_{BB} = \frac{4}{66} = 0{,}0606$
- selection intensity: i_{BB} = 1,9811
- selection accuracy:

$$r_{A,\bar{P}_D} = h \cdot 0{,}5 \cdot \sqrt{\frac{n}{1+(n-1)0{,}25h^2}} = 0{,}5 \cdot 0{,}5\sqrt{\frac{25}{1+(25-1)\cdot 0{,}25 \cdot 0{,}25}} = 0{,}7906$$

- genetic response per generation:

$$R_{BB} = r_{A,\bar{P}_D} \cdot i_{BB} = h \cdot 0{,}5 \cdot \sqrt{\frac{n}{1+(n-1)0{,}25h^2}} \cdot i_{BB} \cdot \sigma_A = 0{,}7906 \cdot 1{,}9811 = 1{,}5662\sigma_A$$

d) The way dam bulls (DB)

- genetic response per generation:

R_{DB} = % Nucleus (Elite) $\cdot R_{BB} = 0{,}4 \cdot R_{BB} = 0{,}4 \cdot 1{,}5662 = 0{,}6265\sigma_A$

11.2. The annual genetic progress estimation (ΔG):

- in standard genetical deviations (σ_A):

$\Delta G_{\sigma_A} = (R_{DD} + R_{BD} + R_{BB} + R_{DB})/(T_{DD} + T_{BD} + T_{BB} + T_{DB}) =$

=(0,2226+1,0983+1,5662+0,6265)/(5,50+7,50+7,92+4,45)=3,5136/25,37=0,1385 σ_A

- in absolute values (Kg): $\Delta G_{kg} = \Delta G_{\sigma_A} \cdot \sigma_A$ = 0,1385 x 500 = 69,25 Kg
- in relative values (%): $\Delta G_{\%} = \Delta G_{\sigma_A} \cdot CV_A$ = 0,1385 x 12,5 = 1,73%

B. The prediction of the expected selection effect by embryos transfer application (MOET) in a progenyes bull selection programme

In order to estimate the genetic progress there has been estabilished the age structure of the active population (similar with that presented in the simple artificial insemination variant -table 1-) and there have been followed the same stages of the bull selection on descendents. Because of the fact that the embryo transfer was applied only on bull dams, their are differences towards the anterior variant only with respect to this selection category (the cow number selected bull dams, the selection intensity, the response to selection) and the annual genetic progress. It is also modified the participation rate of the four selection ways (bull bulls, dam bulls, bull dams, dam dams) to the achievement of the total genetic progress.

The estabilishment of the bull dams necessary - the nominated cows as bull dams on the basis of the medium performances appreciated at the first lactations, will be taken out from the reproductive circuit for an year. During this the donnors are multiovulated and 4 times picked, in 3 months time. Taking into

consideration that are obtained 5 viable embryos at a harvest, which are transferable (the first and the second quality), a result frequently obtained on world level, but also in our country and achieving a gestation percent of 50% at the receptive cows, a survival lambs percent up to the testing of 85%, it results that annually can be obtained approximately 8 products from a donnor (5 embryos/meeting x 4 harvest meetings/year x 0.5 gestation percent x 0.85 bull survival percent=8.5 descendents). We have approximated less not to influence the final result favourably (the 0.5 difference up to nine is not effectively obtained). Considering the sexes report 1:1, it means that half of the products will be males and thus, 4 descendents bulls of the same donnor will be annually tested. Knowing that 82 bulls can be tested, it results that 21 bull dams must be nominated every year (82 bulls candidates : 4 bulls per donnor).

The estimation of the response to selection (R) according to the four selection categories:

a) The way dam dams (DD)

- ratio retaining: $p_{DD} = \frac{10000/4}{10000 \cdot 0,80 \cdot 0,85/2} = \frac{2500}{3400} = 0,7353$

- intensity selection: $i_{DD} = 0,4452$

- accuracy selection: $r_{A,PDD} = h = \sqrt{h^2} = \sqrt{0,25} = 0,5000$

- genetic response per generation: $R_{DD} = r_{A,PDD} \cdot i_{DD} \cdot \sigma_A = 0,5000 \cdot 0,4452 = 0,2226\sigma_A$

b) The way bull dams (BD)

- retaining proportion: the 21 donnors are chosen among the females that constitute the Nucleus. Knowing that the medium duration of cows exploiting at reproduction is of 4 years, it results the following structure on cow lactation that make up the Elite group (Nucleus):

Lactation	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**
Nucleus cows	1000*	800	720	648	440	240	120	32

Considering the fact that are nominated as bull dams, the cows with three full lactations are multiovulated and harvested one year, the donnors will be chosen only from the 720 cows that are at the third lactation. Thus, the retaining proportion of bull dams will be: $p_{BD} = \frac{21}{720} = 0,0285$

- selection intensity: $i_{BD} = 2,2882$

- selection accuracy: $r_{A,\bar{P}BD} = h \cdot \sqrt{\frac{m}{1+(m-1)R_e}} = 0{,}5 \cdot \sqrt{\frac{3}{1+(3-1)\cdot 0{,}4}} = 0{,}6455$

- genetic response per generation:

$$R_{BD} = r_{A,\bar{P}_{MT}} \cdot i_{BD} = h \cdot \sqrt{\frac{m}{1+(m-1)R_e}} \cdot i_{BD} \cdot \sigma_A = 0{,}6455 \cdot 2{,}2882 = 1{,}4770\sigma_A$$

c) The way bull bulls (BB)

- retaining proportion: $p_{BB} = \frac{4}{66} = 0{,}0606$

- selection intensity: i_{BB} = 1,9811

- selection accuracy:

$$r_{A,\bar{P}_D} = h \cdot 0{,}5 \cdot \sqrt{\frac{n}{1+(n-1)0{,}25h^2}} = 0{,}5 \cdot 0{,}5\sqrt{\frac{25}{1+(25-1)\cdot 0{,}25 \cdot 0{,}25}} = 0{,}7906$$

- genetic response per generation:

$$R_{BB} = r_{A,\bar{P}_D} \cdot i_{BB} = h \cdot 0{,}5 \cdot \sqrt{\frac{n}{1+(n-1)0{,}25h^2}} \cdot i_{BB} \cdot \sigma_A = 0{,}7906 \cdot 1{,}9811 = 1{,}5662\sigma_A$$

d) The way dam bulls (DB)

- genetic response per generation:

$R_{DB} =$ % Nucleus (Elite)$\cdot R_{BB} = 0{,}4 \cdot R_{BB} = 0{,}4 \cdot 1{,}5662 = 0{,}6265\sigma_A$

The annual genetic progress estimation (ΔG):

- in standard genetical deviations (σ_A):

$\Delta G_{\sigma_A} = (R_{DD} + R_{BD} + R_{BB} + R_{DB})/(T_{DD} + T_{BD} + T_{BB} + T_{DB}) =$

=(0,2226+1,4770+1,5662+0,6265)/(5,50+5,50+7,92+4,45) = 3,8923/23,37 = 0,1665 σ_A

- in absolute values (Kg): $\Delta G_{kg} = \Delta G_{\sigma_A} \cdot \sigma_A$ = 0,1665 x 500 = 83,25 Kg

- in relative values (%): $\Delta G_{\%} = \Delta G_{\sigma_A} \cdot CV_A$ =0,1665 x 12,5 = 2,08 %

The MOET superiority towards the CLASSICAL$_{AI}$ variant:

$\Delta G_{\sigma_A} = (0{,}1665 - 0{,}1385)/0{,}1385 = +20{,}22\%$

$\Delta G_{kg} = (83{,}25 - 69{,}25)/69{,}25 = +20{,}22kg$

The participation rate of the four selection categories to the genetic progress achievement in MOET compared to the CLASSIC$_{AI}$ variant (table 2):

Table 2

The percentual contribution of the selection categories to the annual genetic progress achievement

Way	MOET (%)	Total (%)	$CLASIC_{AI}$ (%)	Total (%)
Dam dams	(0.2226 : 23.37)/0.1665 ≈ 6	44	(0.2226 : 25.37)/0.1385 ≈ 6	37
Bull dams	(1.4770 : 23.37)/0.1665 ≈ 38		(1.0983 : 25.37)/0.1385 ≈ 31	
Bull bulls	(0.5662 : 23.37)/0.1665 ≈ 40	56	(1.5662 : 25.37)/0.1385 ≈ 45	63
Dam bulls	(0.6265 : 23.37)/0.1665 ≈ 16		(0.6265 : 25.37)/0.1385 ≈ 18	

CONCLUSIONS:

1. The investigation results prove that the reproductive biotechnology incorporation MOET within the breeding programmes that applies the bull selection on descendents represent a viable solution from the genetic efficiency point of view.

2. Compared to the CLASSIC programme (artificial insemination) the MOET application to bull dams, when maintaining the bull selection on descendents improves the female prolificity (of approximately 8 times), it reduces significantly the cows necessity nominated as bull dams (it reduces the retaining proportion with 74.5%), it grows their selection intensity and also the selection response per generation (R_{BD}) with 34.5%.

3. MOET grows the bull dams contribution to the total genetic progress achievement (+7%) and by the shortening the generation interval with approximately 2 years (T_{BDMOET}=5.5 years, to T_{BDAI}=7.5 years) it grows the annual genetic progress with approximately 20%. Having a standard deviation for 500 kilos of milk quantity, MOET suggesta an annual genetic progress of 83.25 kilos, to 69.25 kg in the case of the $CLASSIC_{AI}$ breeding programme.

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THE AVIFAUNA OF BASIN GOLEŞTI

MESTECĂNEANU ADRIAN[1], CONETE DENISA[2], GAVA RADU[1]

[1]Muzeul Județean Argeş, [2]Universitatea din Piteşti

ABSTRACT
The Basin Goleşti together with the basins: Vidraru, Oieşti, Cerbureni, Zigoneni, Vâlcele, Bascov and Piteşti form the series of basins built after 1960 on the valley of River Argeş in order to produce electric energy and to supply water to various objectives of the area. The apparition of those large surfaces of water led to the anthropisation of the natural landscape of the valley of River Argeş and caused changes in the qualitative and quantitative structure of the ornithofauna of the area.

MATERIAL AND METHOD:

The Basin Goleşti is placed in the High Plain of Piteşti, in the South-West of the Piedmont Cândeşti (Fig. 1). It borders an agricultural field belonging to locality Ştefăneşti (village Goleşti) on the left shore and a forestall surface belonging to parish Oarja on the right shore. It is partially surrounded by a highroad restricted to traffic and bounded for a long distance by a highway which also crosses it at its end from the upstream together with a railway. The dam being 32 meters high and having a 8 km long crowning and built on craggy and uncraggy rocks was inaugurated in 1983. It creates behind it an accumulation having a volume of 78,5 millions m^3 and a surface of 680 ha.

Regarding the climate, the researched area is placed at the border of the hill continental climate and plain continental climate. The average annual temperature varies around 10 ^oC and the average rainfalls vary between 600 and 700 mm/year. During the winters having a strong continental influence, at the

beginning of January, an ice bridge covers the river and 75-85% of the water surface of the basin freeze. The slow silting allowed the appearance of the typical pound vegetation but only on small surfaces upstream (reed, bulrush, alders, willows etc.).The methods used were the itinerary method and the observation from fix point, walking along the basin and stationing indifferent points in order to observe both the aquatic avifauna and the avifauna from the border zone. Qualitative and quantitative determinations of the species were made. Thespecies were identified both visual and auditory. The observations were effected in different weather conditions, at different hours and months. Binoculars and field glasses were used.

RESULT AND DISCUSSIONS:

As a result of the researches effected in the zone of Basin Goleşti from 1990 to the present, 115 species of birds were observed. They belong to 14 orders (Table 1): **Gaviiformes** (1 species), **Podicipediformes** (2 species), **Pelecaniformes** (2 species), **Ciconiiformes** (5 species), **Anseriformes** (15 species), **Falconiformes** (6 species), **Galliformes** (2 species), **Gruiformes** (2 species), **Charadriiformes** (16 species), **Columbiformes** (2 species), **Cuculiformes** (1 species), **Coraciifomes** (2 species), **Piciformes** (4 species) and **Passeriformes** (55 species). 51 species (44,34%) are dependent on wet lands. Among them, Black-throated Diver (*Gavia arctica*), White Stork (*Ciconia ciconia*), Shelduck (*Tadorna tadorna*), Black-tailed Godwit (*Limosa limosa*), Marsh Sandpiper (*Tringa stagnatilis*) were seen quite rarely in the area. The rest of 64 species (55,65%) come here for food in different period of the year or they could be found in the border zone.

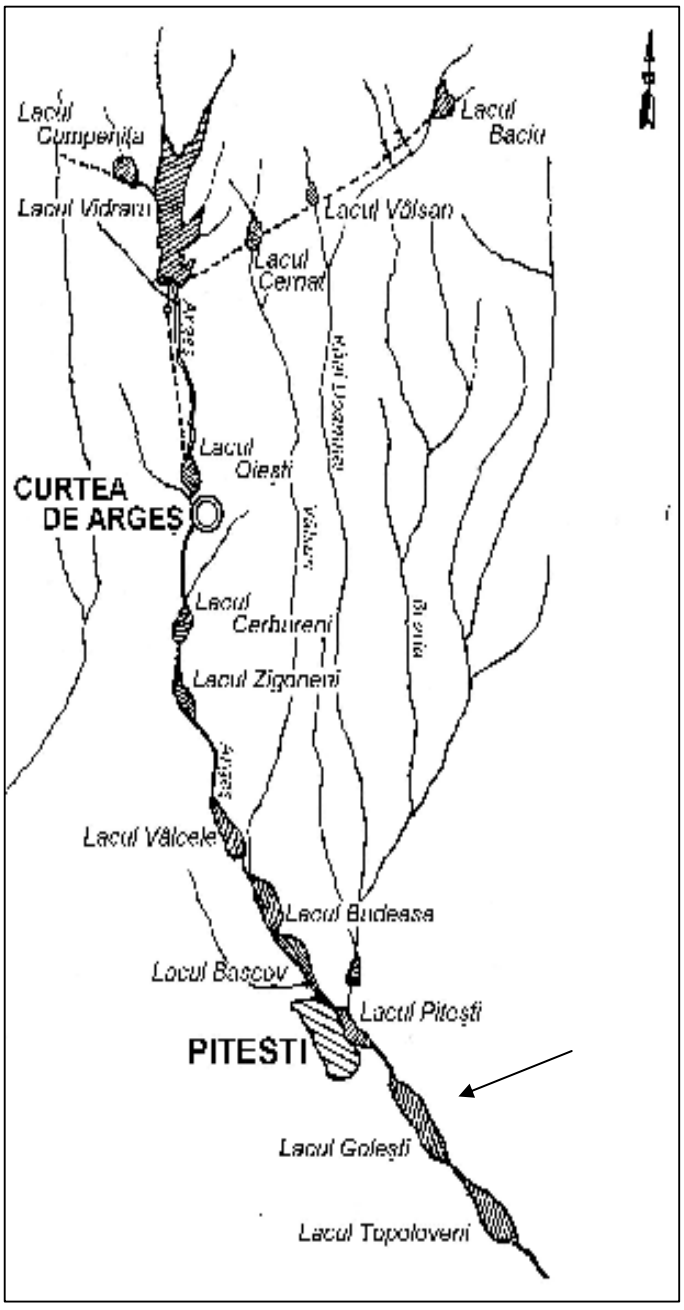

Fig. 1 - Bazinul mijlociu al râului Argeş cu amplasarea lacului Goleşti

Table 1

The bird species observed in the basin zone

No	Species	Breeding	*Phenology in Romania*	Biogeographic origin	SPEC List	*BIRDS DIRECTIVE*
1	*Gavia arctica* *	Nc	Oi	S	SPEC 3	AI
2	*Podiceps cristatus**	Nc	Ov, Ri	Tp	Non SPEC	
3	*Tachybaptus ruficollis* *	Sc	Ov, Ri	E	Non SPEC	
4	*Phalacrocorax carbo* *	Nc	Ov, Ri	Tp	Non SPEC	AI
5	*Phalacrocorax pygmeus* *	Nc	Ov, Ri	M	SPEC 1	AI
6	*Ixobrychus minutus* *	Pc	Ov	E	SPEC 3	AI
7	*Egretta garzetta* *	Nc	Ov	M	Non SPEC	AI
8	**Egretta alba** *	Nc	Ov, Ri	Ch	Non SPEC	AI
9	*Ardea cinerea* *	Nc	Ov, Ri	Tp	Non SPEC	
10	*Ciconia ciconia* *	Nc	Ov	E	SPEC 2	AI
11	*Cygnus olor* *	Nc	Mp	E	Non SPEC E	AII/2
12	*Cygnus cygnus* *	Nc	Oi	S	Non SPEC E	AI
13	*Anser albifrons* *	Nc	Oi	A	Non SPEC	AII/2, AIII/2
14	*Anas platyrhynchos* *	Sc	Mp, Oi	Tp	Non SPEC	AII/1, AIII/1
15	*Anas penelope* *	Nc	P, Oi	S	Non SPEC E	AII/1, AIII/2
16	*Anas querquedula* *	Sc	Ov, P	Tp	SPEC 3	AII/1
17	*Anas crecca* *	Nc	P, Oi, Ov	Tp	Non SPEC	AII/1, AIII/2
18	*Anas clypeata* *	Nc	P, Ov	Tp	SPEC 3	AII/1, AIII/2
19	*Tadorna tadorna* *	Nc	Ov, Ri	Mo	Non SPEC	
20	*Netta rufina* *	Nc	Ov, Ri	M	Non SPEC	AII/2
21	*Aythya marila* *	Nc	Oi	A	SPEC 3	AII/2, AIII/2
22	*Aythya fuligula* *	Nc	Oi, Ov	S	SPEC 3	AII/1, AIII/2
23	*Aythya ferina* *	Pc	Mp	E	SPEC 2	AII/1, AIII/2
24	*Bucephala clangula* *	Nc	Oi	S	Non SPEC	AII/2
25	*Mergus albellus* *	Nc	Oi	S	SPEC 3	
26	*Buteo buteo*	Nc	Mp	Tp	Non SPEC	
27	*Accipiter gentilis*	Nc	S	Tp	Non SPEC	
28	*Accipiter nisus*	Nc	S, Oi	Tp	Non SPEC	
29	*Circus aeruginosus* *	Pc	Ov, Ri	Mo	Non SPEC	AI
30	*Falco subbuteo*	Pc	Ov	Tp	Non SPEC	
31	*Falco tinnunculus*	Sc	Mp	Tp	SPEC 3	
32	*Perdix perdix*	Sc	S	E	SPEC 3	AII/1, AIII/1
33	*Coturnix coturnix*	Sc	Ov	E	SPEC 3	AII/2
34	*Gallinula chloropus**	Sc	Mp	E	Non SPEC	A II/2
35	*Fulica atra* *	Sc	Mp	Tp	Non SPEC	AII/1, AIII/2
36	*Vanellus vanellus* *	Sc	Ov	Mo	SPEC 2	AII/2
37	*Charadrius dubius* *	Sc	Ov	Mo	Non SPEC	
38	*Limosa limosa* *	Nc	P, ?Ov	Mo	SPEC 2	AII/2
39	*Actitis hypoleucos* *	Pc	Ov	Tp	SPEC 3	
40	*Tringa ochropus* *	Nc	P	S	Non SPEC	
41	*Tringa glareola* *	Nc	P	S	SPEC 3	AI
42	*Tringa nebularia* *	Nc	P	S	Non SPEC	AII/2
43	*Tringa stagnatilis* *	Nc	P, Ov	Mo	Non SPEC	
44	*Himantopus himantopus* *	Nc	Ov	Mo	Non SPEC	AI
45	*Larus cachinnans* *	Pc	S	Tp	Non SPEC E	AII/2
46	*Larus canus* *	Nc	Oi	S	SPEC 2	AII/2
47	*Larus ridibundus* *	Pc	Mp	Tp	Non SPEC E	AII/2
48	*Larus minutus* *	Nc	P, ?Ov	S	SPEC 3	
49	*Sterna hirundo* *	Pc	Ov	E	Non SPEC	AI
50	*Chlidonias niger* *	Pc	Ov	E	SPEC 3	A I
51	*Chlidonias hybridus* *	Sc	Ov	M	SPEC 3	A I
52	*Streptopelia turtur*	Sc	Ov	E	SPEC 3	AII/2
53	*Streptopelia decaocto*	Sc	S	M	Non SPEC	AII/2
54	*Cuculus canorus*	Sc	Ov	Tp	Non SPEC	
55	*Alcedo atthis* *	Sc	Mp	E	SPEC 3	AI
56	*Upupa epops*	Pc	Ov	E	SPEC 3	
57	*Picus viridis*	Sc	S	E	SPEC 2	

58	*Dendrocopos major*	Sc	S	Tp	Non SPEC	
59	*Dendrocopos syriacus*	Sc	S	M	Non SPEC E	AI
60	*Dendrocopos minor*	Pc	S	Tp	Non SPEC	
61	*Galerida cristata*	Sc	S	Mo	SPEC 3	
62	*Alauda arvensis*	Sc	Mp	Mo	SPEC 3	AII/2
63	*Riparia riparia*	Sc	Ov	Tp	SPEC 3	
64	*Hirundo rustica*	Sc	Ov	Tp	SPEC 3	
65	*Delichon urbica*	Sc	Ov	Tp	SPEC 3	
66	*Anthus trivialis*	Nc	Ov	E	Non SPEC	
67	*Anthus campestris*	Sc	Ov	Mo	SPEC 3	AI
68	*Anthus spinoletta*	Nc	Ov	Ti	Non SPEC	
69	*Motacilla flava*	Sc	Ov	Tp	Non SPEC	
70	*Motacilla cinerea* *	Nc	Ov, Ri	E	Non SPEC	
71	*Motacilla alba*	Sc	Ov	E	Non SPEC	
72	*Lanius collurio*	Sc	Ov	E	SPEC 3	AI
73	*Lanius excubitor*	Nc	Mp, Oi	Tp	SPEC 3	
74	*Oriolus oriolus*	Sc	Ov	E	Non SPEC	
75	*Sturnus vulgaris*	Sc	Mp	E	SPEC 3	AII/2
76	*Garrulus glandarius*	Sc	S	E	Non SPEC	AII/2
77	*Pica pica*	Sc	S	E	Non SPEC	AII/2
78	*Corvus monedula*	Sc	S	E	Non SPEC E	AII/2
79	*Corvus frugilegus*	Sc	S	E	Non SPEC	AII/2
80	*Corvus corone cornix*	Sc	S	E	Non SPEC	AII/2
81	*Corvus corax*	Nc	S	Tp	Non SPEC	
82	*Troglodytes troglodytes*	Pc	Ov, Ri	E	Non SPEC	
83	*Acrocephalus schoenobaenus* *	Sc	Ov	E	Non SPEC E	
84	*Acrocephalus palustris* *	Sc	Ov	E	Non SPEC E	
85	*Acrocephalus scirpaceus* *	Pc	Ov	E	Non SPEC E	
86	*Acrocephalus arundinaceus* *	Sc	Ov	E	Non SPEC	
87	*Sylvia atricapilla*	Sc	Ov	E	Non SPEC E	
88	*Sylvia communis*	Sc	Ov	E	Non SPEC E	
89	*Sylvia curruca*	Sc	Ov	E	Non SPEC	
90	*Phylloscopus collybita*	Sc	Ov	Tp	Non SPEC	
91	*Muscicapa striata*	Sc	Ov	E	SPEC 3	
92	*Oenanthe oenanthe*	Sc	Ov	Tp	SPEC 3	
93	*Saxicola torquata*	Sc	Ov	Mo	Non SPEC	
94	*Phoenicurus ochruros*	Sc	Ov	Mo	Non SPEC	
95	*Erithacus rubecula*	Sc	Ov, Ri	E	Non SPEC E	
96	*Luscinia megarhynchos*	Pc	Ov	E	Non SPEC E	
97	*Turdus merula*	Sc	Mp	E	Non SPEC E	AII/2
98	*Turdus philomelos*	Sc	Ov	E	Non SPEC E	A II/2
99	*Turdus viscivorus*	Pc	Mp	E	Non SPEC E	A II/2
100	*Parus palustris*	Sc	S	E	SPEC 3	
101	*Parus caeruleus*	Sc	S	E	Non SPEC E	
102	*Parus major*	Sc	S	E	Non SPEC	
103	*Aegithalos caudatus*	Sc	S	Tp	Non SPEC	
104	*Sitta europaea*	Sc	S	Tp	Non SPEC	
105	*Passer domesticus*	Sc	S	Tp	SPEC 3	
106	*Passer montanus*	Sc	S	Tp	SPEC 3	
107	*Fringilla coelebs*	Sc	Mp	E	Non SPEC E	
108	*Fringilla montifringilla*	Nc	Oi	S	Non SPEC	
109	*Carduelis chloris*	Pc	S	E	Non SPEC E	
110	*Carduelis spinus*	Nc	Mp, Oi	E	Non SPEC E	
111	*Carduelis carduelis*	Sc	S, Oi	E	Non SPEC	
112	*Carduelis cannabina*	Sc	Mp	E	SPEC 2	
113	*Emberiza schoeniclus* *	Nc	Mp	Tp	Non SPEC	
114	*Miliaria calandra*	Sc	Mp	E	SPEC 2	
115	*Emberiza citrinella*	Sc	S	E	Non SPEC E	

Legend:
Species: * - species dependent of the wet lands, **Breeding**: **Nc** – species nonbreeding, **Pc** – species probably breeding, **Sc** – species certainly breeding, **Phenology in Romania**: **Ov** – summer visitors, **Oi** – winter visitors, **Mp** – partial migratory, **S** – sedentary, **P** – passage visitors, **Ri** – scarce during winter, **?** – uncertainly, **Biogeographic origin**: **S** – Siberian, **Tp** – Transpalearctic, **E** – European, **M** – Mediterranean, **Ch** – Chinese, **A** – Antarctic, **Mo** – Mongol, **Ti** – Tibetan, **SPEC List**: **SPEC 1** – species belonging to SPEC 1 category, **SPEC 2** – species belonging to SPEC 2 category, **SPEC 3** – species belonging to SPEC 3 category, **Non SPEC** – species belonging to Non SPEC category, **Non SPEC E** – species belonging to Non SPEC E category, **Birds Directive**: **AI** – species belonging to Annex I, **AII/1** – species belonging to Annex II/1, **AII/2** – species belonging to Annex II/2, **AIII/1** – species belonging to Annex III/1, **AIII/2** – species belonging to Annex III/2.

Among the identified species, 39 (33,91 %) are nonbreeding (Nc), 16 (13,91%) are probably breeding (Pc) and 60 (52,17%) are certainly breeding (Sc) (Fig. 2, Table 1). Among the species living in the wet lands, 30 are nonbreeding (58,82%), 9 species are probably breeding (17,64%) and 12 species are certainly breeding (23,52%). The samall number of certainly or probably breeding species is accountable because of the rather reduced surface covered with vegetation of swamp. The lack of this type of vegetation is caused by the chamfered or rocky and rather steep shores and it leads to a lack of places for shelter, for breeding and feeding.

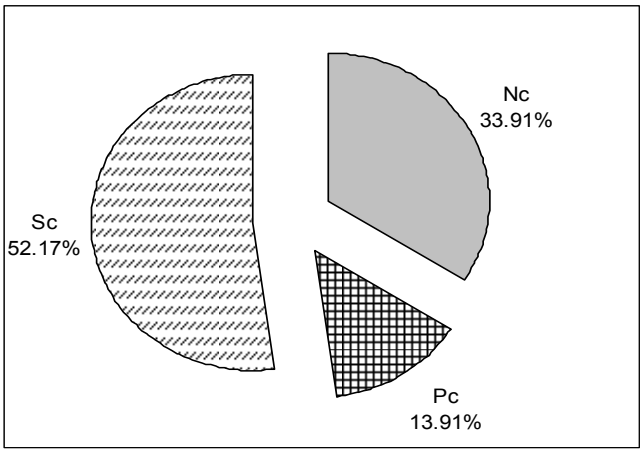

Fig. 2. The observed species distribution in accordance with the breeding

In accordance with the phenologic preponderance for our country (Fig. 3, Table 1), 52 species (45,22%) from the total number of species observed are summer visitors (Ov), 26 (22,61%) are sedentary (S), 19 (16,52%) are partial migratory (Mp), 9 (7,83%) are winter visitors (Oi) and 9 (7,83%) are passage visitors (P). adding the summer visitors and the sedentary species and those partly migratory, we realise that the summer avifauna of the zone consists of 97 species, while the winter avifauna which consists of the winter visitors and the sedentary species and some of the partly migratory species is poorer, having maximum 54 species. However, in passage and during winter, the lake represents an important point for thousands of migratory birds or winter visitors.

Some of the species of passage come in the autumn migration even in July, August (*Larus minutus*, *Limosa limosa*, *Tringa nebularia*, *Himantopus himantopus* etc.) while others could be seen in the spring migration until (*Anas crecca*, *Circus aeruginosus*, *Acrocephalus palustris* etc.). In winter, the most numerous visitors which come exclusively in winter are Tufted Duck (*Aythya fuligula*), and also a great number of Mallard (*Anas platyrhynchos*), Coot (*Fulica atra*) and Yellow-legged Gull (*Larus cachinnans*), coming from the North and having here small resident populations.

Depending on their biogeographic origin (Fig. 4, Table 1), as we expected, 49 species (42,61%) have an European origin (E), 32 species (27,83%) have a Transpalearctic origin (Tp), 12 species (10,43%) have a Siberian origin (S), 12 species (10,43%) have a Mongol origin (Mo), 6 species (5,22%) have a Mediterranean origin (M), 2 species (1,74%, *Anser albifrons* and *Aythya marila*) have a Arctic origin (A), 1 species (0,87%, *Egretta alba*) has a Chinese origin (Ch) and 1 species (0,87%, *Anthus spinoletta*) has a Tibetan origin (Ti).

In accordance with the SPEC category, (Species of European Conservation Concern) (Fig. 5, Table 1), 1 species (0,87%, *Phalacrocorax pygmeus*) belong to SPEC 1 category (European species globally threatened), 8 species (6,96%) belong to SPEC 2 category (species concentrated in Europe but having an unfavourable status of preservation), 32 species (27,83%) belong to SPEC 3 category (species which are not concentrated in Europe and which have not a favourable status of preservation), 22 species (19,13%) belong to Non SPEC E category (species which are concentrated in Europe and which have a favourable status of preservation) and 52 species (45,21%) belong to Non SPEC category (species which are not concentrated in Europe and which have a favourable status of preservation).

In accordance with the Birds Directive regarding the preservation of wild birds (Fig. 1, Table 6), 57 species belong to Annex I (AI), 9 species belong to Annex II/1 (AII/1), 22 species belong to Annex II/2 (AII/2), 2 species belong to Annex III/1 (AIII/1) and 8 species belong to Annex III/2. Special safety measures of protection regarding the habitat in order to ensure the surviving and the reproduction in their area of distribution had been provided for the species that belong to Annex I.

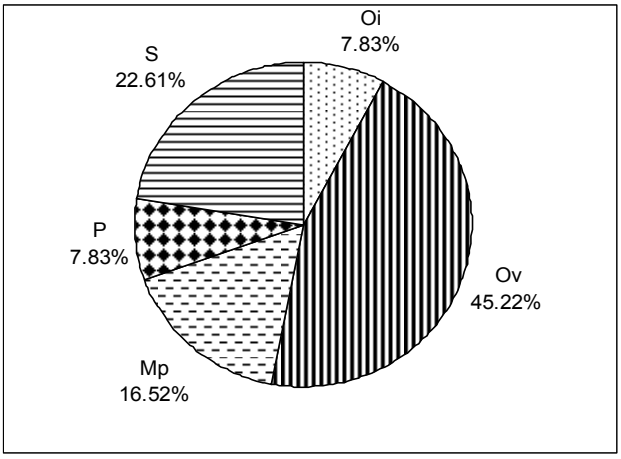

Fig. 3. The observed species distribution in accordance with their phenology

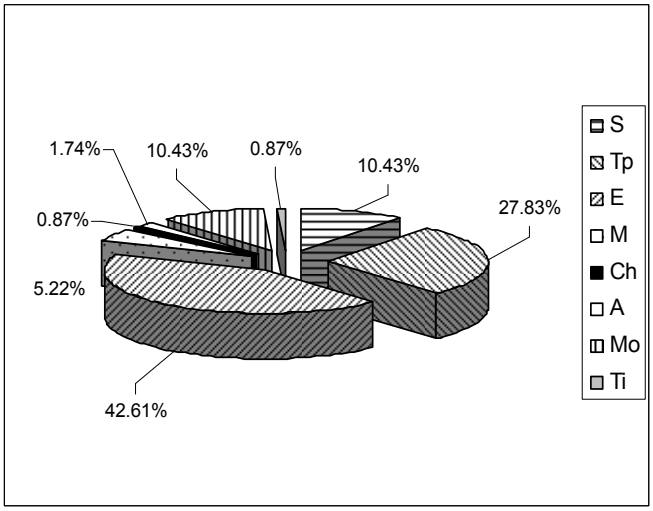

Fig. 4. The observed species distribution in accordance with the biogeographic origin

CONCLUSIONS:

The avifauna from the zone of Basin Goleşti is rather rich. It consists in 115 species, 51 of them being dependent of the wet lands. The Black-throated

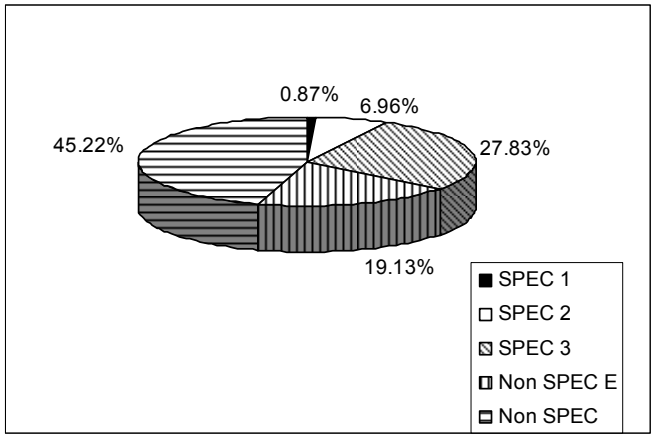

Fig. 5. The observed species distribution in accordance with the SPEC category

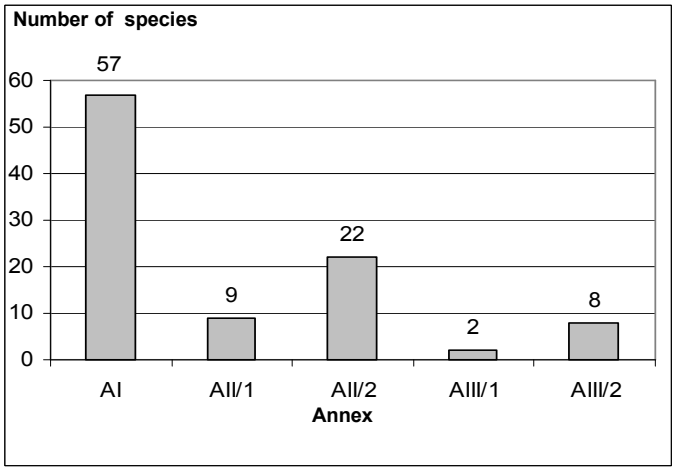

Fig. 6. The observed species distribution in accordance with the Birds Directive

Diver (*Gavia arctica*), the White Stork (*Ciconia ciconia*), the Shelduck (*Tadorna tadorna*), the Black-tailed Godwit (*Limosa limosa*), the Marsh Sandpiper (*Tringa stagnatilis*) are some of the species which rarely come in this area.

The majority of the identified species are breeding. Although, a small number of certainly and probably breeding species related to wet lands were

observed. This is accountable because of the rather reduced surface covered with vegetation of swamp, which is a place for shelter, for breeding and feeding for many birds.

However, the number of species which could be met in summer is almost double in comparison with those met in winter. On the other hand, the number of individuals grows very much in winter as a result of the great number of Mallard, Coot and Yellow-legged Gull coming from the North.

The European and Transpalearctic species are prevalent.

The Pygmy Cormorant (*Phalacrocorax pygmeus*) belong to SPEC 1 category, being a globally threatened species and 8 species being concentrated in Europe but having an unfavorable status of preservation.

57 species are included in Annex I of the Birds Directive, because they are object of the special measures of preservation regarding the habitat in order to ensure their survival and reproduction in their area of distribution.

Despite of the high anthropic pressure, caused by the pollution of the water, by grazing and huntering, by the building of the highway and of the railway next to it, Basin Goleşti represents an important place for the birds and we suggest it should be declared an area of avifaunistic importance.

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THE ROLE OF FLAVONOIDS AS ANTIOXIDANTS

MOISE GEORGE

„Lucian Blaga" University of Sibiu

ABSTRACT:
The present paper is a study about the role of quercetin and other flavonoids as antioxidants. Also is presented the mechanism of flavonoids metabolism pathways.

KEY WORDS: quercetin, flavonoids, antioxidants, mechanism

INTRODUCTION:

Numerous studies have demonstrated in vivo effects of flavonoid components from fruits and vegetables on various measures of oxidative cellular damage.

Antioxidants are compounds that protect cells against the damaging effects of reactive oxygen species, such as singlet oxygen, superoxide, peroxyl radicals, hydroxyl radicals and peroxynitrite. An imbalance between antioxidants and reactive oxygen species results in oxidative stress, leading to cellular damage. Oxidative stress has been linked to cancer, aging, atherosclerosis, ischemic injury, inflammation and neurodegenerative diseases (Parkinson's and Alzheimer's). Flavonoids may help provide protection against these diseases by contributing, along with antioxidant vitamins and enzymes, to the total antioxidant defense system of the human body. Epidemiological studies have shown that flavonoid intake is inversely related to mortality from coronary heart disease and to the incidence of heart attacks.

ANTIOXIDANT CAPACITY OF FRUITS AND VEGETABLES

Reactive oxygen species from both endogenous and exogenous sources may be involved in the etiology of diverse human diseases, such as coronary

artery disease, stroke, rheumatoid arthritis, and cancer. Diets rich in fruits and vegetables are associated with a reduced risk for these pathologies (1–3), and protection has often been attributed to antioxidant vitamins such as vitamin C, vitamin E, and _-carotene. Although fruits and vegetables are primary sources for these "nutrient" antioxidants, other dietary components may also be important protective agents. Flavonoids are plant polyphenolic compounds ubiquitous in fruits, vegetables, and herbs. Flavonoids are primarily categorized into flavonols, flavones, flavanols, flavanones, and anthocyanidins. The daily intake of flavonoids in Western countries has been estimated to be between 0.5 and 1.0 g (4) but likely is much lower than this.

Flavonoids are polyphenolic compounds that are ubiquitous in nature and are categorized, according to chemical structure, into flavonols, flavones, flavanones, isoflavones, catechins, anthocyanidins and chalcones. Over 4,000 flavonoids have been identified, many of which occur in fruits, vegetables and beverages (tea, coffee, beer, wine and fruit drinks). The flavonoids have aroused considerable interest recently because of their potential beneficial effects on human health-they have been reported to have antiviral, anti-allergic, antiplatelet, anti-inflammatory, antitumor and antioxidant activities.

The hydrophilic antioxidant capacity of fruits and vegetables has been determined using the oxygen radical absorbance capacity assay. In general, the hydrophilic antioxidants account for more than 85% of the total antioxidants in fruits and vegetables, and antioxidant capacity of different fruits and vegetables may differ by a factor of 20-fold or more. This might suggest, from a standpoint of protecting against oxidative events in the body, that fruits or vegetables that have a higher antioxidant capacity should be more effective.

The oxidation of low-density lipoprotein (LDL) has been recognized to play an important role in atherosclerosis. Immune system cells called macrophages recognize and engulf oxidized LDL, a process that leads to the formation of atherosclerotic plaques in the arterial wall. LDL oxidation can be

induced by macrophages and can also be catalyzed by metal ions like copper. Several studies have shown that certain flavonoids can protect LDL from being oxidized by these two mechanisms.

In some fruits, anthocyanins make a major contribution to the total antioxidant capacity. Dietary intake of anthocyanins may exceed 200 mg/d in individuals consuming several servings of fruit, but the "usual" intake is likely much less. The flavonols, and in particular quercetin, are ubiquitous in fruits and vegetables and contribute to antioxidant capacity. However, in some fruits or vegetables, there may be more than 100 compounds that can be separated by HPLC that can contribute to the measured antioxidant capacity. Thus, by narrowing our focus to a few compounds in this review, we may not be considering the full potential of fruits and vegetables.

The capacity of flavonoids to act as antioxidants depends upon their molecular structure. The position of hydroxyl groups and other features in the chemical structure of flavonoids are important for their antioxidant and free radical scavenging activities. Quercetin, the most abundant dietary flavonol, is a potent antioxidant because it has all the right structural features for free radical scavenging activity. The proposed pathways of quercetin absorption/metabolism is presented in figure 1.

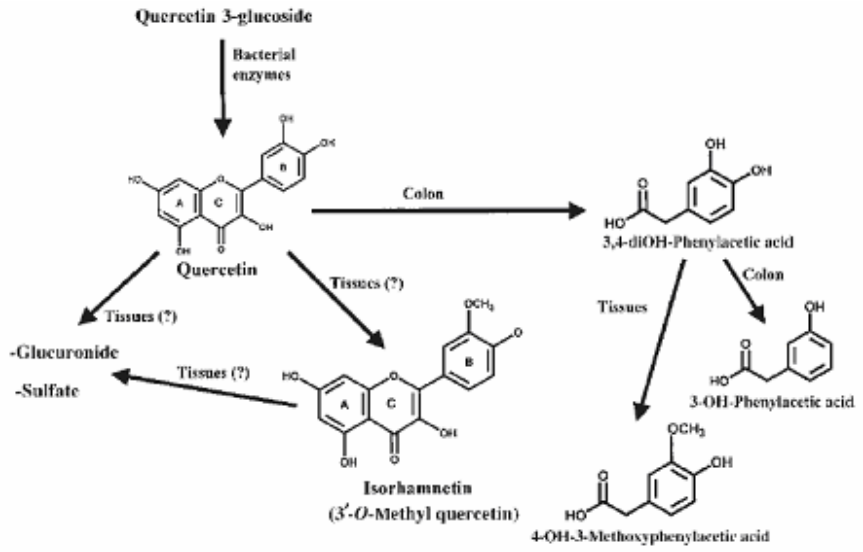

Fig. 1. Proposed pathways of quercetin absorption/metabolism.

To assess the antioxidant activity of the prenylated flavonoids, we-in collaboration with LPI researchers-evaluated the capacity of these flavonoids to inhibit the oxidation of LDL by copper. The antioxidant properties of the prenylflavonoids were compared to those of quercetin (a flavonol), genistein (the major isoflavone in soy), chalconaringenin (a non-prenylated chalcone), naringenin (a non-prenylated flavanone), and vitamin E. The possible interaction of xanthohumol, the major prenylchalcone in beer, with vitamin E to inhibit LDL oxidation induced by copper was also examined. The observation that prenyl groups are important in conferring antioxidant activity to certain flavonoids may lead to the discovery or synthesis of novel prenylated flavonoids as preventive or therapeutic agents against human diseases associated with free radicals. Our encouraging results with xanthohumol suggest that this prenylchalcone should be further studied for its antioxidant action and protective effects against free radical damage in animals and humans.

Some common pathways of metabolism of flavonoids are emerging that can affect in vivo antioxidant capacity. Methylation in the 3-position of both cyanidin 3-glucoside and quercetin will decrease the antioxidant capacity of the metabolite. Further conjugation with glucuronide or sulfate may also affect antioxidant capacity depending on the position that is conjugated. Even though quercetin is conjugated during the absorption process, the conjugates still seem to retain antioxidant activity. Measurement of in vivo antioxidant effects of a single flavonoid compound appears to be difficult except at fairly high consumption rates. With whole foods, antioxidant effects may be more easily demonstrated, and the mixture or synergy between compounds in foods may have added benefit.

QUERCETIN AND OTHER FLAVONOLS AS ANTIOXIDANTS

The flavonol quercetin (3,3_,4_,5,7-pentahydroxyflavone) is one of the most abundant dietary flavonoids and has been one of the most frequently studied flavonoids. Data on the quercetin content of foodstuffs are limited, but

the available data suggest a range of 2–250 mg quercetin/kg wet weight in fruits; 0–100 mg/kg in vegetables, with onions being especially high (200–600 mg/kg); 4–16 mg/L in red wine; 10–25 mg/L in tea; and 2–23 mg/L in fruit juices (35, 36). However, the extent of absorption of flavonoids such as quercetin is a critical issue relative to the many alleged health effects. Quercetin and other flavonoids have been shown to modify eicosanoid biosynthesis (antiprostanoid and anti-inflammatory responses), protect low-density lipoprotein (LDL) from oxidation (prevention of atherosclerotic plaque formation), prevent platelet aggregation (antithrombic effects), and promote relaxation of cardiovascular smooth muscle (antihypertensive, antiarrhythmic effects). In addition, flavonoids have been shown to have antiviral and anticarcinogenic properties.

CONCLUSIONS:

It is clear that under in vitro assay conditions, both anthocyanins and flavonols clearly can function as antioxidants. However, in vivo, anthocyanin absorption appears to be at least an order of magnitude lower than for the flavonol quercetin. Whether anthocyanins get into cells or into an appropriate subcellular compartment in sufficient concentrations to affect metabolic processes is not known. In animal models, dietary anthocyanins at relatively high doses (1–2 mg/kg diet) are protective against oxidative stress. In humans, anthocyanins appear to have some vasoprotective effects, but whether these are the result of antioxidant mechanisms is not clear.

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THE INFLUENCE OF GRASSLAND ON THE STRUCTURE AND THE ACTIVITY OF CARABIDAE CAPTURED IN THE YEAR 2005 IN THE NATURAL RESERVATION "DUMBRAVA SIBIULUI"

MOISE- STANCA CRISTINA (cristinamoise1@yahoo.com),
TANASE MARIA (maritanase@yahoo.com)

"Lucian Blaga" University of Sibiu ROMANIA

ABSTRACT:
In this paper I present new data concerning the structure and the activity of epigeous entomofauna in the Natural Reservation, the oak forest "Dumbrava Sibiului". The material was collected during the period between April till September in the year 2005 They were captured 275 samples of Carabidae and they were identified 21 species of the genus Carabus.

INTRODUCTION:

The researche concerning the structure and the activity of the epigeous entomofauna, based on a capturing system with the traps type „CV-Braşov" were started in 1974 in a frame of a sugar beet biocenosis. During the years this system has been extended to the other agro forestry biocenosis following the same model from Brashov.

In the Natural Reservation „Dumbrava Sibiului" was collected a rich material of insects, inclusive coleopteran by transivanian germans specialists, in the last century.

The collections of Coleoptera are presented in the present in the Natural History Museum in Sibiu. Reserches on the epigeous entomofauna in the perimeter of the „Dumbrava Sibiului" were made also in the year 1999 by the author (Ciochia V., Stancă-Moise C, 2000).

In this paper I present the results obtained in the year 2005 about by

means of the soil traps type "CV-Braşov", of an epigeous artropodofauna from the oak forest „Dumbrava Sibiului".

In the present paper are presented the structure of entomofauna and also interpretation concerning the abundance, dominance, fenology from ecological and etological point of view.

MATERIAL AND METHOD:

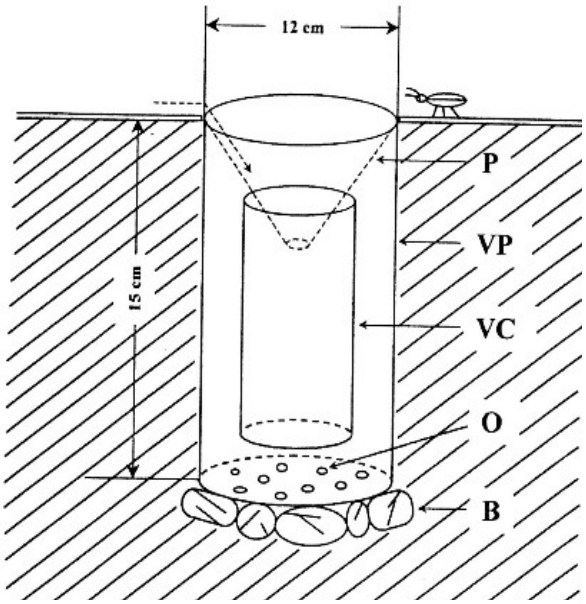

Fig. 1. Trap type "CV.-Braşov"

In the oak forest with bushes "Dumbara Sibiului", placed near the Sibiu city in was installed a trap/set in the period between the end of the April and the end od September 2005, on circumference of a circle with radius of 12,5 m. All the 12 traps type "CV.-Braşov" (fig.1) delimited o surface of 981,25 m^2.

The traps were geographical oriented, in the sense of the hour hands having the numbers between 1-12, beginning with the traps disposed toward North.

Every trap was composed of plastic transparent bottles, having two dimensions (2 l and 1 l). The first bottle of 2 l was sectioned at half length and it was called „protector bottle". In its botton were made some orifices in oder to avoid the collecting of the water from the rainfall.The second bottle of 1 l colled „protector bottle" with a smaller capacity contained water with nonodoriyed detergent that must be not repellent for insects. That was in the „protector bottle".

The both bottles that composed together the trap, were intoduced in a hole excavated in soil, and then the soil was aranged at the level of the trap, because

the epigeous entomofauna shall not avoid this place.

On the opening of every „protector bottle" was installed a funnel obtained through the sectioning the neck of the botlle of 2l.

The diameter of the collecting orifice was of 12 cm, having a possible surface for capturing of 226,08 cm^2, with 29,37% from circumference aria was of 981,25 m^2.

In order to make some interpretations were made a series of the statistic calculus.

The captured material was collected periodical, in the bags with were introduced into alcohol until the end of the study period then the collected material was pinned and identified.

RESULTS AND DISCUTION:

The epigeous entomofaunna in general, and in the collecting area in special is much poor comparative with the first decades of the XX century, because of the big trans formations happened during the years through antropisation, pollution because of the human activity, etc. The epigeous entomofaunna was collected in the period of 180 days. In this paper I present only species of Carabidae.

The collected material represented by 278 samples was identified, the majority of 97,5 % belongs to Ord. COLEOPTERA with families *Carabidae* (49,17%), *Scarabeidae* (20,39%), *Staphylinidae* (16,58%), *Siliphidae* (11,17%) and *Elateridae* (2,69%) end also Ord. DERMAPTERA from Fam. *Forficulidae* (2,5%).

Between the taxons, I identified the presence of 21 species of *Carabidae* belonging to the genus *Carabus,* with a total of 246 samples.

In the present paper are studied only the species of *Carabidae* collected; the other families of *Coleoptera* will be the subject of another paper.

Further on I present the identified species of Carabidae that were

collected:

ORD. COLEOPTERA

Fam. *Carabidae*

1. *Carabus gigas* Creutz

3 ex. 15.09.2004, C_9; (Lc= 33mm); Rare species, can live more that 3 years (Harde, Severa, 1984) R_t: Carnivorous but also entomophagous. The captured samples are smaller dimensious. About speading in Romania, there is a quotation by Panin from the Cibin Mountains and Turnu Roşu, zones not to far from the forest "Dumbrava Sibiului".

2. *Carabus coriaceus* Lederlaufkäfer

2 ex. 15.05.2004, C_2, 3 ex. 17.05; C_{12}; 2 ex. C_9 17.05; (L_c= 30-40 mm). It is more active in the first part of the night, can live 2-3 years it is carnivorous, entomophagous, has a series of races and subraces.

3. *Carabus depressus*

1 ex. 27.04, C_1, 2 ex. C_8 27.04; 1 ex. 27.04 C_{12}; (Lc =18-28 mm).The winges are not regular, with metallic reflection, it is carnivorous, entomophagous, has a series of races.

4. *Carabus violaceus* Goldleiste

8 ex. 17.05, C_{11}; 5 ex. 4.06 C_5; 2 ex. 15.08 C_{12}; 1 ex. 19.09 C_8 şi 3 ex. C_3; (L_c= 22-35 mm). It is present in the majority of the woods from the plain till the mountain and alpin region. R_t: it is carnivorous, entomophagous, has a series of races and subraces.

5. *Carabus intricatus* Blauer Laufkäfer

3 ex. 22.08, C_5; 1 ex. 25.08 C_7; (L_c=24-36 mm). R_t: carnivorous, entomophagous.

6. *Carabus ullrichi* Germ.

3 ex. 23.04; C_3; 1 ex. 12.05; C_{11}; 2 ex. 29.07; C_9. It is often found in the dried leaves in the forest and under the moss, specially in the deciduous tree forest. R_t: carnivorous, entomophagous, is more active during the day.

7. *Carabus monillis scheidleri* Panzer

2 ex. 4.06; C_2 şi 6.07; C_{12}. (L_c=30 mm). One sample has black tarses. Can be found under the leaves, trees and brauches. It hunts only during the night. Some authors (Harde, Severa, 1948) consider this subspecies as a species. *C. monillis* has many subspecies, races and subraces because of its large areal . R_t: carnivorous, entomophagous.

8. *Carabus nemoralis*

1 ex., 29.05, C_2; (L_c= 30 mm), its size is like *C. hortensi*. It is a rare species especially in the mountain yones. It prefers dried leaves and different places under the stones, trees, carnivorous, entomophagous.

9. *Carabus cancellatus* Körnerwarze

1 ex., 17.05, C_7; 2 ex. 15.09, C_5; 6 ex. C_9; (L_c=17-32 mm). It is found under the leaves and trees. R_t: carnivorous, entomophagous.

10. *Carabus auratus* Goldlaufkäfer, Goldhenne

3 ex. 29.04, C_3; 2 ex. 15.07, C_7; 1 ex. 18.08, C_2 (L_c=17-30 mm). It is present in the majority of the deciduous tree forest. R_t: carnivorous, entomophagous.

11. *Carabus silvestris* Bergwald-Laufkäfer

10 ex., 6.04, C_7(1 ex.); 17.05, C_1 (2 ex.); C_7(1 ex.), C_{11}(1 ex.); 29.05, C_4(4 ex.), C_{12}(1ex.); (L_c= 11-16 mm). It is active especially in the first part of the night. R_t: carnivorous, entomophagous, has a series of races and subraces.

12. *Carabus caraboides* Körniger Schaufelläufer

3 ex. , 29.04, C_5; 4.06, C_2; 5.07, C_4; (L_c=12,5-20 mm). In the words, under leaves, it prefers wet yones. R_t: carnivorous, entomophagous.

13. *Harpalul latus* L

2 ex., 29.04, C_5; (L_C=10 mm). It prefers the light woods and sand oils, a common species. R_t: during the springtime eats seeds but also different little animal and insects, imago and larvae. Mixophagous.

14. *Pterostichus niger* Schall.

34 ex., 22.04, C_3 (3 ex.); C_5(1 ex.); C_{11}(1 ex.); C_{12} (1 ex.); 29.04; C_1(2 ex.); C_7(1

ex.); 17.05; C_3(1 ex.); C_5(2 ex.); C_{10}(1 ex.); 23.05; C_4(2 ex.); C_5 (1ex.); C_6(1 ex.); 4.06; C_2 (1ex.); C_3(2 ex.); C_4(2 ex.); C_{11}(1 ex.); 19.05; C_5(1 ex.); 5.07, C_9(2 ex.); C_{11}(1 ex.); 13.09, C_8 (1 ex.); 15.09; C_6(2 ex.); C_7(3 ex.); C_9(10); (L_c=20-21 mm). In is found from the plain till the montains yones, in woods, gardens, river meadows. It the surroundings of Cluj (Teodoreanu, 1961) the species was collected from IV-IX, it is a frequent species, also in the oak and beech tree forests, it is present also in the agricultural cultures (potatoes, sugar beet). R_t: zoophagous.

15. *Pterostichus melanarius* L

39 ex.; 6.04, C_7(2 ex.); 23.04; C_5(2 ex.); C_7(2 ex.); C_{11}(2 ex.); 29.04; C_5(1ex.); C_7(2 ex.); C_8(1ex.); C_9(1 ex.); C_{12}(1ex.); 6.05; C_5(4 ex.); C_7(3 ex.); 18.05; C_2(2 ex.); C_5(4 ex.); C_7(3 ex.); C_{12}(1 ex.); 29.05; C_4(3 ex.); C_7(1 ex.); C_8(1 ex.); 5.07; C_6(2 ex.); C_9(1 ex.); (L_c = 11-13 mm). It prefers deciduous tree forest, being a caracteristique species for the beech tree forest, in the dried leaves (Teodoreanu, 1986). R_t: zoophagous.

16. *Pterostichus oblongopunctatus* F.

31 ex.; 6.04; C_7 (1 ex.); 23.04, C_6(1 ex.); C_7(3 ex.); C_{12}(2 ex.); 29.04; C_5(1 ex.); C_6(2 ex.9; C_7(1 ex.); C_8(1 ex.); C_{12}(3 ex.); 18.05; C_1(1 ex.); C_6(2 ex.); C_7(4 ex.); C_{10}(1 ex.); C_{11}(2 ex.); 20.05, C_{11}(1ex.); 4.06, C_3(1 ex.); C_8(2 ex.); 15.09; C_2(2 ex.). (L_c=15-17 mm). Species frequent in the agricultural cultures especially in the plain, in the culture of potatoes, and sugar beet between IV-IX. R_t: zoophagous.

17. *Platynus assimilis* Payk.

49 ex.; 6.04; C_6(3 ex.); 23.04; C_1(2 ex.); C_7(3 ex.); 29.04; C_8(7 ex.); 6.05; C_8(9 ex.); 17.05; C_5(1 ex.); C_6(3 ex.); C_7(2 ex.); 28.05; C_1(2 ex.); C_4(2 ex.); C_9(3 ex.); 5.06; C_7(2 ex.); C_8(10 ex.); (L_c=11-14). It prefers the wet places, forest, under the dried leaves, moss, under the stones, near the river. R_t: predatory, entomophagous.

18. *Agonum fuliginosum*

1 ex.; 29.04; C_8; (L_c= 7mm). It prefers wet places, forest, orchards, agricultural cultures under the stones, dried cow dung, dried leaves, near the river (Panin, 1951, Ciochia, 1984). R_t: zoophagous.

19. *Anisodactylus binotatus* F.

2 ex. 18.05; C_6; (L_c: 9,5mm). It prefers the open plances especially in the oak beech tree forest, alder tree, but also in the agricultural cultures (Teodoreanu, 1988, Ciochia, 1992).

20. *Lonicera pilicornis* L.

2 ex.; 6.05; C_9; (L_c= 8mm). R_t: entomophagous.

21. *Zabrus tenebrioides* Getreidelaufkäfer

23 ex.; 25.04; C_2(2 ex.); C_5(1 ex.); C_7(2 ex.); 18. 05; C_1(1 ex.); C_3(2 ex.); C_{12}(3 ex.); 1.06; C_{11}(1 ex.); C_{12}(1 ex.); 12.07; C_2(2ex.); C_5(1 ex.); C_{10}(2 ex.); 17.08; C_1(2 ex.); C_4(1 ex.); C_8(2 ex.). (L_c=12-15 mm). It prefers the light forest and sand soils, mixted forest, on the soil, under the dried leaves, branches; it is a common species. R_t: entomophagous.

CONCLUSIONS:

The position of my experiment was at about 400-500 m distance from the agricultural cultures and hay fields, the orientation towards North and the compact forest towards East and South. The special collecting 44,93% were made by the traps towards South and 25,43% towards East, and in North zone N 18,02% and West 16,62%.

Analyzing the results I can affirm that insects were moving in their daily activity from South and East, towards North and less towards West; also, in their move they have a certain way that they keep it, because only so we can explain why the traps towards North especially and then towards West the captures were lees numerous. The coleoptera that were moving towards North and West falled down in the traps and they have not any more the possibility to cam back on their way.

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RESEARCHES REGARDING THE SETTING UP OF A SELECTION INDEX IN A SWINE POPULATION

NEAGU IULIANA, CULEA C., MARMANDIU A., TĂPĂLOAGĂ DANA

Faculty of Veterinary Medicine, Bucharest

ABSTRACT:
The genetic determinism of the three studied characters expressed by the heritability coefficients value, is strong for the slight of lean and intermediate for the weight at 181 days and the average daily gain. In the studied population it could notice a very strong genotip correlation between the bodily weight at 181 days and the average daily gain. But, the genotipic correlation between the weight at 181 days and the slight of lean is low and negative. The selection index assure a better hierarchization of the boar and permit the simultaneous selection of these for the three characters.

KEYWORDS: selection index, breeding value, heritability, genotipic correlation.

INTRODUCERE:

The selection index on many characters is the method to a simultaneous selection for all the characters that determine the aim of selection, by including all the information regarding the breeding value of each character in a unique value which expresses at the highest level the global breeding value of the candidate to selection. The value of the selection index is calculated for each selection candidate and then it follows the keeping to reproduction in a decreasing order of the obtained values, corresponding to the proportion of the restraints.

MATERIAL AND METHOD:

The study was realized by the performances obtained from the own

performances testing of 970 individuals in Duroc breed, owing to 97 families of paternal half brothers-half sisters. The average size of the families was 10 individuals. The characters which entered the structure of the index were:

- bodily weight at 181 days (x);
- average daily gain during the testing period (y);
- slight of line (z).

The average performances for the 3 characters recorded by the studied livestock are shown in table 1.

Table 1

Average performance of the analyzed population

Character	U.M.	n	$\overline{X} \pm S_{\overline{X}}$
Bodily weight at 181 days	Kg	97	82.12 ± 2.05
Average daily gain during the testing period	G	97	652.47 ± 5.89
Slight of line	Mm	97	21.88 ± 0.58

The working method was the one used and synthetised in the previous papers [1,2,3,4], being calculated the genotipic and phenotipic variances and covariances, and after these there were estimated the coefficients of heritability and the genotipic correlations.

For setting up the selection index there were established the partial regression coefficients, starting from the relation: $b\hat{p} = a\hat{G}$

$\hat{p}$ = phenotipic variance and covariance matrix

$\hat{G}$ = genotipic variance and covariance matrix

b = partial regression coefficients

a = relative economic values of the studied characters.

RESULTS AND DISCUSSION:

During the first stage, there were estimated the values of the heritability coefficients of the studied characters (table 2). It could notice that in the analyzed population of Duroc, the weight of 181 days and the average daily gain

have a lower genetic determinism, presenting an intermediare heritability. But, the slight of lean is characterised a strong genetic determinism. Generally the obtained values are fromed within the limits of the values for other populations, in the same breed or other breeds, shown in the special literature.

Table 2

Heritability coefficient values of the studied characters

Character	$h^2 \pm S_h^2$
Bodily weight at 181 days	0.275 ± 0.073
Average daily gain during the testing period	0.311 ± 0.088
Slight of line	0.759 ± 0,099

The phenotipic, genotipic and environmental correlation among the three characters are presented in table 3.

Table 3

Phenotipic, genotipic and environmental correlation values

Couple of characters	$r_P \pm S_{rp}$	$r_G \pm S_{rG}$	r_M
Bodily weight at 181 days x Average daily gain	0.755 ± 0.012	0.729 ± 0.065	0.785
Bodily weight at 181 days x Slight of line	-0.114 ± 0.023	-0.125 ± 0,133	-0,142
Average daily gain x Slight of line	-0.257 ± 0.018	-0.178 ± 0,146	-0.378

From the data shown in this table resulted that in the analyzed population there is a very strong positive correlation, so genotypic, phenotipic and environmental one between the weight at 181 days and the average daily gain. But, between the weight at 181 days and the slight of lean and also between the average daily gain and the slight of lean it could notice low and negative genotipic, phenotipic and environmental correlations.

For assuring the simultaneous breeding of the weight at 181 days, the average daily gain and the slight of lean it was elaborated a selection index which includes the three studied characters.

The selection index was set up by the genotypic and phenotipic variance and covariance values, specific for this population. Regarding the relative economic value, each character has the some value:

$$a_1 = a_2 = a_3 = 1$$

The values of the determined partial regression coefficients werw thw following:

- for the weight at 181 days, $b_1 = 1.289$
- for the average daily gain, $b_2 = 0.397$
- for the slight of line, $b_3 = -5.885$

There were written with „x", „y" and „z" the phenotipic values of the three studied characters. The selection index structure set up on the three characters base is the following:

$$I_{xyz} = 1.289x + 0.397y – 5.885z$$

Applying this index in the analyzed population it was established its values for each boar, on the average performances of its descendants, after this being decreasingly ordered the 97 boars.

CONCLUSIONS:

1. The genetic determinism of the three studied characters expressed by the heritability coefficients value, is strong for the slight of lean and intermediate for the weight at 181 days and the average daily gain.

2. In the studied population it could notice a very strong genotip correlation between the bodily weight at 181 days and the average daily gain. But, the genotipic correlation between the weight at 181 days and the slight of lean is low and negative.

3. The selection index assure a better hierarchization of the boar and permit the simultaneous selection of these for the three characters.

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NUTRITIVE VALUE OF SOME NEW VARIETIES FOR PERENNIAL GRASSES

OPREA GEORGETA, BREAZU I. AND BĂLAN MIRONELA

Grassland Research - Development Institute Brasov

ABSTRACT:
Research was carried out in the breeding field at Research and Development Institute for Grasslands Brasov (ICDP) at the 540 m altitude, during the 2003-2004, on a chernozem soil, with a pH(H2O)-5,8, profile texture is clayey sound ground with a medium exchangeable phosphorus (41 ppm) and well suplied in exchangeable potassium (164 ppm). Experimental variants have been harvested on plots of 6 sq.m. in four replications. The nutritive quality of the new varieties which belong to herbage grasses (meadow fescue, tall fescue, red fescue, orchardgrass, perennial reygrass) were tested for crude protein, cell wall constituents, organic matter digestibility and milk feed units during primary growth (full heading) and regrowth. Mean results showed differences among the species and varieties for CP, NDF, DMO and milk feed units contents, excepting Tedi cv .for red fescue and Măgura cv. for perennial reygrass during primary growth. At third cut the varieties had higher contents in crude protein, OMD and MFU and lower in cell wall constituents. The forage quality of evaluated species demonstrates significant differences bewtween cultivars due to its different earliness.

KEYWORDS: cell wall constituents, grasses, nutritional characteristics, varieties

INTRODUCERE:

Creating of new perennial grass varieties in frame of Breeding Programme requires the study of nutritional characteristics such as: chemical composition, digestibility, nutritive units for more efficient utilisation of forage to obtain the high animal performances. The quality of forage changes with advancing in maturity influencing the efficient utilisation in animal nutrition. This aspect is explained by stem elongation and inflorescens development,during primary growth. Such development reduces leaf to stem

ratio, enhances proportion of lignified tissues in herbage and impairs its quality mainly through reduction of digestibility, crude protein and nonstructural carbohydrate contents. The herbage quality of grasses during primary growth has been the subject of many studies (Cop, 2006, Jeangross et al., 2002, Oprea 1998, Paoletti et al.,1996, Razec, 1998).

The purpose of this paper is the evaluating of nutritive value of new registered varieties, at the first and third cycles.

The work was made as a part of the research project AGRAL no.310/2004.

MATERIAL AND METHOD:

The research was carried out in breeding field of ICDP Brasov, situated at 540m altitude, during 2003-2004. The experimental variants were harvested on 6 m^2 plots, in four replications, at full heading during primary growth and the regrowth. Five perennial grass species and six new varieties were studied under nutritional aspects concerning to crude protein, cell wall constituents, organic matter digestibility. Crude protein was determinated by Kjeldahl method, cell wall constituents by detergents analysis Van Soest (1963), organic matter digestibility using the pepsin digestion *in vitro* by Tilley and Terry technique (1963). The milk feed units were calculated by equations of Todorova and Kirilov (2002).

RESULTS AND DISCUSSION:

Results from the first cycle are given in Table 1.

Crude protein content varied between 7.38-12.88%; Măgura cv. had the lowest value, while the Tedi cv.had the highest value; the other grass varieties had medium values, 9-10% CP.

Cell wall constituents had high values at the late stage of vegetation: 63-71% NDF, 35-40% ADF, 3% lignin, excepting Măgura cv. which had 4.75%

lignin. Cellulose varied between 32-35% and hemicellulose had values of 27-29%. High values in structural carbohydrates had negative effects on the digestibility and energy value of forage.

Table 1

Chemical composition, digestibility and energy feeding value of new perennial grass varieties at the first growth cycle

Specie	Variety	CP	NDF	ADF	Lignin	Cellu-lose	Hemicel-lulose	OMD	MFU
Festuca pratensis	Postăvar	10.26	64.13	35.67	3.75	31.92	28.46	69.14	0.56
Festuca arundinacea	Adela	9.54	64.37	36.05	3.37	32.68	28.32	67.04	0.48
Festuca rubra	Tedi	12.88	68.08	38.26	3.81	34.45	29.82	57.47	0.38
Dactylis glomerata	Magda	9.64	65.14	38.10	3.38	34.72	27.04	65.38	0.39
	Simina	10.31	63.07	35.95	3.23	32.72	27.12	67.54	0.47
Lolium perenne	Măgura	7.38	68.21	40.68	4.75	35.93	27.53	63.82	0.34

CP-crude protein, NDF-neutral detergent fibre, ADF-acid detergent fibre, OMD- organic matter digestibility, MFU- milk feed units

Coeficients of organic matter digestibility varied between 57.47-69.14%. Tedi cv. had the lowest values (57.47%) and Postăvar cv. had the highest values (69.14%) due to the earliness of varieties: Tedi is an early variety and Postăvar medium late; harvesting after two weeks from heading determinated a decrease of protein value, an accumulation of vegetal fibres and a declin with 8-10% of the digestibility. Energy value per 1 kg DM of the grass forage decreased with the advancing in plant maturity. So, milk feed units per 1 kg DM had low values due to the late stage of harvesting with negative consequences under the efficiency in animal nutrition.

At the regrowth (Table 2) the nutritive parameters of varieties attained the optimum contents for a quality forage.

Table 2

Chemical composition, digestibility and energy feeding value of new perennial grass varieties at the third growth cycle

Specie	Variety	CP	NDF	ADF	Lig-nin	Cellu-lose	Hemicel-lulose	OMD	MFU
Festuca pratensis	Postăvar	14,41	53,11	27,32	2,67	24,65	25,79	79,30	0,82
Festuca arundinacea	Adela	12,94	53,31	26,75	2,04	24,71	26,56	80,71	0,82
Festuca rubra	Tedi	16,47	58,69	29,19	2,84	26,35	29,50	77,38	0,73
Dactylis glomerata	Magda	13,30	58,99	32,26	3,94	28,32	26,73	73,05	0,66
	Simina	10,90	56,90	30,57	3,97	26,60	26,33	74,53	0,75
Lolium perenne	Măgura	14,49	51,50	26,59	2,83	23,76	24,91	79,73	0,86

The crude protein content riched the values between 13-16%: Tedi cv. had the highest content of 16.47%; Adela and Simina cv. had the similar contents of 12.9%. The contents in total pariental fibres were low: 51-58% NDF. Măgura, Postăvar and Adela varieties had the values under the limitative value of 55%. Lignocellulose contents (ADF) were low at all varieties of *Festuca pratensis* and Măgura cv. of *Lolium perenne* (26-29%). The varieties of *Dactylis glomerata* had the ADF values between 30.57- 32.26%. Lignin content varied between 2-3%, cellulose 23-28%, with 5-12% lower than the first cycle of vegetation. Hemicellulose contents were lower of 24-29% comparing with the first harvesting. Coefficients of organic matter digestibility attained higher values with 10-20% than the first cutting, unlike the varieties of *Dactylis glomerata,* which were with 7-8% higher than the first stage of growth. Nutritive value was over 0.8 at Postăvar, Adela and Măgura varieties, the other had the value about of 0.7. At this stage of vegetation, Postavar, Adela and Măgura varieties had the nutritional parameters at optimum level for obtaining of high animal performances. Harvesting at the same time and different stage of growth make difficult the comparation between varieties. Postăvar, Adela and Măgura

varieties, with later development gained in quality. Tedi, Magda and Simina varieties having an early growth suffered a declin of nutritional characteristics. Tedi cv. had the highest values in crude protein at the two stage of growth comparing with the other cultivars due to the leaves abundance, being a variety with preponderance for turf. At regrowth, the nutritive parameters of Măgura cv. were superior to the other varieties, followed closely by varieties of *Festuca pratensis* and *Festuca arundinacea.*

CONCLUSSION:

1. Nutritive value of the five pernnial grasses and six new registered varieties, differs in function of specie and precocity. At the primary growth (full heading), nutritional characteristics had the optimum value for the animal requirements.

2. At regrowth, the quality index, especially crude protein content and digestibility had high values, suitable of a quality forage which to ensure high animal performances.

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NUTRITIVE VALUE OF NEW ROMANIAN PEA CULTIVARS USED IN BROILER FEEDING

PÂRVU MONICA*, MARMANDIU A., DINU CRISTINA*, STANCIU MIRELA*****

*University Spiru Haret, Faculty of Veterinary Medicine Bucuresti
**USAMV, Faculty of Veterinary Medicine Bucuresti
***University Lucian Blaga Sibiu

ABSTRACT:
The nutritive value and efficiency of energy and protein utilisation was assessed for two, high protein Romanian pea cultivars (Diana and Vedea), in an experiment on Rock cockerels. The experiments of energy and protein balance were conducted on 4 groups (2 groups for each of the two cultivars) x 20 birds each, with 10 and 20% level of inclusion of each pea cultivar in a standard diet. The corrected metabolisable energy (ME_C) was calculated with the formula of Whittemore (1983) adapted for poultry (Burlacu, 1996). The digestible energy (DE), available protein (AP), retention protein (Pr), deaminated protein (DP), urine energy (UE) and deamination energy (dE) were also determined. The nutritive value (by kg DM) was 12.25 MJ ME_C and 250 g digestible crude protein for Diana cultivar and 12.30 MJ ME_C and 255 g digestible crude protein for Vedea cultivar.

KEY WORDS: nutritive value, peas, Rock cockerels.

INTRODUCTION:

Pea is a source of protein used more and more in poultry feeding, replacing partially the soybean meal.

By a continuous improvement and selection, new cultivars with higher protein contents were obtained, such as Diana and Vedea. Our study aimed To determine the nutritive value of the two cultivars and the energy, protein and amino acid balances.

MATERIAL AND METHOD:

The experiment used 90 Rock cockerels with an initial weight of 716.8 ±

30.9 g. Ten cockerels were slaughtered in the beginning of the experiment and the remaining 80 were alloted to 4 groups of 20 birds each. The birds were kept in individual digestibility cages under conditions of neutral temperature. The experiment lasted 4 weeks (4 x 80 energy and protein balances).

Four diets (El, E2, E3, E4) were tested, 2 for each cultivar (El and E2 for Diana), E3 and E4 for Vedea). The basal diet consisted of corn, extracted soybean meal, fish meal, DL-methionine and a vitamin-mineral premix; 10% and 20% peas was added to the control (El, E3) and experimental (E2, E4) diets.

The nutritive value was calculated as the difference between the two diets with two levels.

The following parameters were recorded throughout the experiment: daily feed intake, weekly weight gain, protein, amino acid and energy digestibility (4 days/week). The chemical composition (dry matter, protein, ether extracts, ash) and the energy content were determined by comparative slaughtering.

The feeds, faeces any body mass were analysed chemically with the method of Weende and calorimetrically with and adiabatic calorimeter; sugar was analysed with the polarimetric method, starch was analysed with the method of Bertrand, the amino acids were analysed by ion exchange chromatography, the uric acid was analysed with the indirect method of *Terpstra* and *Hart* (1974).

The corrected metabolisable energy (ME_C) was calculated with the formula of Whittemore (1983) adapted for poultry by Burlacu et al. (1996).

$$ME_C = DE - [UE + deam.\ E + 6.8\ (BFM - 0.1) + 1.45\ S]$$

where:

DE (kJ/kg DM) = digestible energy;

UE (KJ/kg DM) = urine energy = 5.85 x deam. P, g;

deam.P (g/kg DM) = deamination protein = g DCP — g Pr;

where: DCP = g digestible crude protein;

Pr - g protein retained by the body = AP x ef AA;

where: AP g = (available protein) = g DCP x BV;

ef AA= efficiency of using the available amino acids = 0.837;RV

where:

AAd = digestible amino acids at minimum level; *x* - g

amino acids in 100 g meat protein;

deam.E (kJ/ kg DM) = 4.9 x deam.P;

BFM (g) = bacterial fermentescible matter;

S, g = sugar.

RESULTS AND DISCUTION:

The chemical and calorimetric composition of the diets expressed in kg DM was: 246 crude protein (CP) and 18.99 kJ GE (El), 244 g CP and 18.64 kJ GE (E2) for Diana cultivar and 250 g CP and 18.93 kJ GE (E3) and 248 g CP and 18.90 kJ Ge (E4) for Vedea cultivar.

The chemical composition and caloricity of Diana cultivar expressed in g/kg DM and kJ was: 263 g CP, 29 g ether extractives (EE), 45 crude fibre (CF), 19.09 GE and 19.98 Lys, 3.10 Met, 7.78 His, 21.45 Arg, 31.50 Asp. ac, 9.72 Threo, 12.72 Val, 9.3 Isoleu, 19.08 Leu, 12.75 Phenilal, 5.05 Tryp. The corresponding values for Vedea cultivar were: 269 g CP, 8 g EE, 36 CF and 18.85 kJ GE; 19.13 Lys, 3.3 Met, 2.8 Tryp, 11.0 Threo, 25.7 Arg, 7.2 Hist, 20.9 Leu, 14.5 Isoleu, 14.1 Phenilal.

The digestibility coefficients of protein were similar for both variants (95%); the digestibility of energy was 76.0% (Diana) and 76.9% (Vedea).

Birds performance during the experiment was the following: average daily weight gain (g/bird/day) = 48.65 (El), 49.56 (E2), 50.56 (E3), 52.93 (E4); feed conversion ratio (kg/kg) was 2.18 (El), 2.22 (E2), 2.08 (E3) and 2.03 (E4)**.**

Comparing the results on the chemical composition it may be observed that both Diana and Vedea cultivars have a higher protein content than the

commercial-type pea (263 and 268 g/kg DM respectively, compared to 220 g/kg DM). The content of the main aminop acids: lysine (19.98 and 10.13 g/kg DM) and methionine (3.10 and 3.30 g/kg DM), was also higher. The digestibility coefficient of the protein (95%) and energy (76 and 76.9% for Diana and Vedea cultivars respectively) was also better (Burlacu et al., 1996).

The value of the available protein (AP), 46.25 g in Diana cultivar and 49.98 g in Vedea cultivar, although higher than in the commercial type (41.2 g), was rather low, however, due to the low biological value (0.185 and 1.08 respectively), result of the low methionine content (lowest content from all the amino acids forming the protein of both cultivars). Thus, the nutritive value of pea cultivars was only 12.25 and 12.30 kJ ME_C /kg Dm, which although higher than in the commercial type pea (11.22 MJ), was lower than in other leguminous (Burlacu 1993).

The average daily gain and the feed conversion ratio recorded throughout the experiment were also supported by an experiment conducted in parallel under production conditions on 600 broilers fed during the second growth period on a diet in which 43.4% of the soybean meal was replaced: 41.16 g daily weight gain and 2.12 FCR.

CONCLUSIONS:

The Diana and Vedea pea cultivars do not differ significantly as their nutritive value (12.15 and 12.30 kJ ME_c/kg DM) but they differ from the commercial type pea.

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THE EFFECT OF BACTERIAN HEMICELLULASE USED IN BROILER PRODUCTIVE PARAMETERS

PÂRVU MONICA *, DINU CRISTINA *, MARMANDIU A .,**
STANCIU MIRELA ***

*University Spiru Haret, Faculty of Veterinary Medicine Bucuresti
**USAMV, Faculty of Veterinary Medicine Bucuresti
***University Lucian Blaga Sibiu

ABSTRACT
This paper studies the effect of bacterian hemicellulase on the nutrient digestibility and performance of Rock cockerels (second growth period) fed on barley-based dieis. It was found that the organic matter and crude fiber digestibility increased significantly when 1000 ppm bacterian hemicellulase were added to the diet. Performance was similar and the average daily feed intake and the feed conversion ratio decreased when the enzyme was added to the diet.

KEYWORDS: broiler, hemicellulase, gain

INTRODUCTION:

Due to the physiological peculiarities of digestion in poultry, the degree of utilization of high crude fiber forages is low. Therefore, several forages (barley, triticale) are used restrictively according to age and species. Generally, growing poultry uses to a lower degree these forage resources, frequent unwanted disorders of the digestion process appearing due to the low absorbtion of nutrients among which cellulose.

Barley is a cereal less frequently used in the diets for poultry, due to the absence of xantophyl pigments and to the presence of β-glucans (soluble polyosides) which make it less nutritive. In order to better use barley, several

enzymes must be modified (Broz, 1994) improving the processes of digestion and implicitly the food conversion ratio.

The purpose of the present paper was to study the digestibility coefficients and productive parameters obtained after feeding on barley-based diets treated with bacterian hemicellulase produced in Romania.

MATERIALS AND METHOD:

The digestibility experiments used Rock broiler aged 28 days, divided into two groups with 8 replicates each. The birds were housed in digestibility cages which allow the daily measurement of ingesta and excreta.

The experiment was conducted in an environmentally controlled room, under neutral thermal conditions (20°C), during a period of 14 days.

The initial average body weight was 878.75 ± 73.86 g for group E1 and 874.38 ± 91.67 g for group E2.

The birds had free access to food, a monodiet based on barley, soybean meal and yeast (Table 1). E_2 received additionally 1000 ppm bacterian hemicellulase (in the vitamin-mineral premix).

The forage and the excreta were analysed chemically and calorimetrically according to the standard methods (Burlacu, 1991).

Table nr. 1

Diet structure

	E1	E2
Barley	68.8	68.8
Soybean meal	26	26
Yeast	2	2
Calcium carbonate	1	1
Dicalcium phosphate	1	1
Salt	0.2	0.2
Vitamin-mineral mix	1	-
Vitamin-mineral mix + bacterian hemicellulase	-	1
TOTAL	100	100

RESULTS AND DISCUSSION:

The final body weight was established at 1836.25 ± 115.29 g in E1 and 1870.63 ± 127.54 g in E2, which accounts for an individual average daily gain of 39.20 g in group E1 and 40.58 g in group E2 (table 2). No significant differences were noticed between the two groups.

The average daily intake of compound feed was 118.57 ± 12.69 g per bird in group E1 (not treated with hemicellulase) and 109.04 ± 15.08 g per bird in group E2 (treated with hemicellulase), the differences being ensured statistically ($p \geq 0.5$).

The results obtained are consistent with the findings of other researchers (Fodge 2004, Broz 2004). The food conversion ratio (kg CF/kg gain) was 3.03 ± 0.25 in group E1 and 2.69 ±0.11 in group E2, the difference being ensured statistically ($p \geq 0.5$).

Table nr. 2

Broiler performance

	E1	E2
Initial weight (g)	735.75 ± 73.86	734.38 ±91.67
Final weight (g)	1836.251115.29	1870.63 ± 127.54
Daily gain (g)	39.20	40.58
Feed intake (g/bird/day)	118.57 ±12.69	109.04 ± 15.08
Feed conversion (kg CF/kg gain)	3.03 ± 0.25	2.69 ±0.11

Comparing the digestibility coefficients of the diets used in the experiment, we observed an improved digestibility of the organic matter (from 71% in E1 to 75% in E2) and especially of the fiber (20% and 27% respectively).

The droppings of the group not treated with bacterian hemicellulose were very wet because the β-glucans were not hydrolised, the birds lacking the specific digestive enzymes (Larbier 1994).

CONCLUSIONS:

The influence of the bacterian hemicellulase upon barley-based diets was investigated in digestibility experiments conducted on Rock cockerels (29 to 56 days of age).

The digestibility of the organic matter and of crude fiber improved significantly when 1000 ppm bacterian hemicellulase were added to the diet.

The average daily consumption of food and food conversion ratio were influenced favourably by the treatment with hemicellulase.

The droppings of the group treated with bacterian hemicellulase had lower water content, influencing thus the enviroment of the experimental room.

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SOME ANTIBIOTICS EFFICACIOUSNESS IN SOME SEPTIC AFFECTIONS TREATMENT OF THE DIGESTIVE TRACTUS IN SWINE

PĂUNESCU ILEANA CORNELIA, MARMANDIU A., DOBREA MIMI, TĂPĂLOAGĂ DANA

Veterinary Medicine Faculty Bucharest

ABSTRACT:
Antibiotics are known to present remarkable antibacterian properties, but not all of them could be used in therapy, because they don't achieve the properties which condition their use- low toxicity beside the macroorganism, a balance level into the organism, the posibility of adsorbtion, difusion and releasing which not afect significantly the antimicrobian action and also the organism. It could say that the antibiotics used in medicine are less toxic than sulphamides but the last ones are active in the APAB presence, cell detrituses, infectious being efficacious in lower concentrations than other antiinfectious substances, sulphamides and antiseptics.In the unit where the experiments were carried out there were diagnosticated the next septic afflictions of the digestive apparatus: neonatal colibacilosis, transmissible gastroenteritis, viral enzootic darrhoea, prolipherative enteritis and pig salmonelosis.

KEY-WORDS: colistin sulphate, gentamicin, oxytetraciclin, tiamutin

INTRODUCTION:

The medication consisted of: Colistin sulphate injectable solution, Gentamicin 10% injectable solution, Oxytetraciclin 20% HP hydrosoluble powder and Tiamutin 45%- grains. The unit of development the experiments is a specialised one for pigs breeding, it has been carrying a scienific research in the field of this species breeding and it has a complex structure, it has not got the whole technologic chain from forrages factory to slaughtering house.

MATERIAL AND METHOD:

The experiences regarding the antibiotic pharmacotherapy in some septic

affections of the digestive tractus in swine were developed during November-Decembre 2005 and January- February 2006. It was carried out the animal examination using the main clinic methods of diagnosis, which were correlated with the results of the analyzes effected in the unit's laboratory. For giving a definition to the pathologic frame and to the establishing of the different morbid entities incidence there were also effected anatomo-pathologic and epidemiologic investigations. To asses the results there were taken into consideration some stages in animal life, and a series of factors that could negatively influence the health status; the stages in study were: the suckling piglet enteropathies, the ones of youth pigs and the fattening pigs. The neonatal colibacilosis was diagnosticated in the maternity and it affected a large number of individuals: the affected piglets refused to suck, they had diarrhoea and were very dehydrated. Using the antibiograms (chart 1 and 2) realised by micropills method (diffusion method), the election medicine was Colistin.

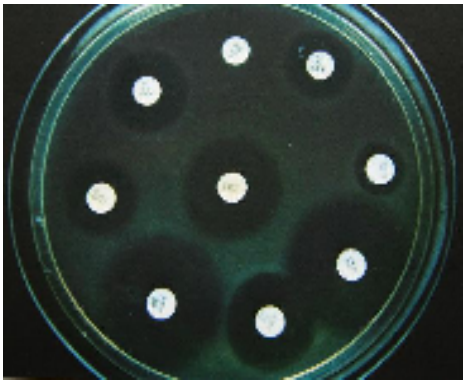

Chart 1. Antibiogram on Escherichia coli strain

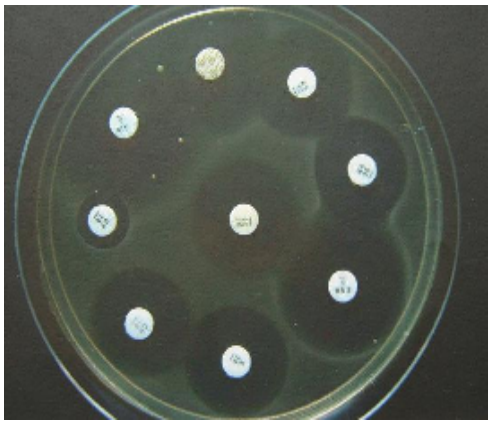

Chart 2. Antibiogram on Escherichia coli strain

In a compartiment, it was diagnosticated the transmissible gastroenteritis and all the animals were slaughtered. these presented vomisments, diarrhoea with watery faecals and hard smell. There were carried out tests by immunofluorescensis and smears from the intestinal mucous tissues.

After slaughtering the whole livestock, the compartiment and the equipment were strougly disinfected with Vircon product then the boxes were flamed and whited.

During December 2005- January 2006 it was diagnosticated the viral enzootic diarrhoea into maternity boxe. The animals preffered the bedsore, had vomisments and watery diarrhoea. The whole livestock was sanitated and the compartiment strougly disinfected.

The colibacilar diarrhoea affected a piglet livestock and the diarrhoea, the animal were sad and they had a delay in growth. It was noticed that the disease appeared after the change of the forreges receipt. There were carried out bacteriologic exams which were completed by antibiograms. Colistin and Gentamicin were the preffered antibiotics.

A small number of animals was diagnosicated with proliferative enteritis which evoluated non-symptomatic. After examinations and the antibiograms there were used as therapy the Oxytetraciclin 20% PS and Tiamutin 45%.

In a fattening box, the salmonelosis was developed, it had a stationar character due to the fact that the disease developed non-symptomatic, seldom appearent linic signs. Following the antibiogram it was applied the therapy with Oxytetraciclin and Colistin (Chart 3 and 4).

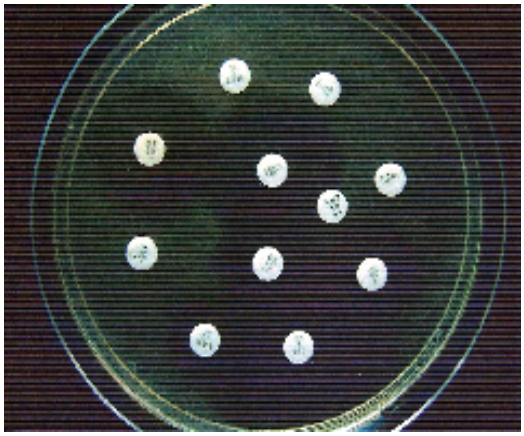

Chart 3. Antibiogram on Salmonella strains

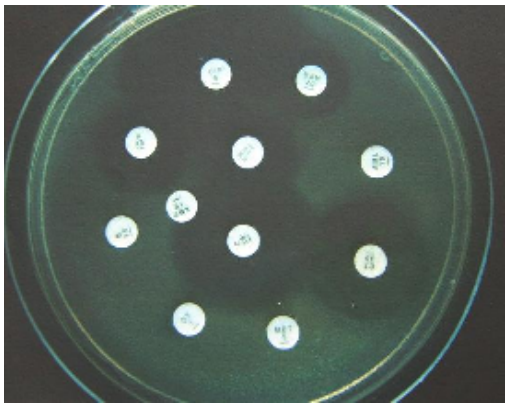

Chart 4. Antibiogram on Salmonella strains

In table 1 there are shown the administering ways, the number of administering and the used medicine ways.

Table 1

Used medicines posology

Medicine	Way of administring	Lenght of treatment	Dose „prodie,,	Obsevations
Colisin S	i.m.	3	1ml/10kg	Inj. sol.
Gentamicin 10%	i.m.	5	2ml/50kg	Inj. sol.
OTC 20% p.s.	p.o. in drinking water	5	150g/100 l	Hydrosoluble powder
Tiamutin 54%	p.o. in drinking water	5	10g/75l	Grains

RESULTS AND DISCUSSIONS:

In the case of some transmisible gastroenteritis and also enzootic diarrhoea, knowing the high propagation level of the disease, it was imposed the

slaughtering of the whole livestock, till now not being used any eficacious treatment for these morbid entities. The global therapeutic effects obtained by the experimental lots were shown in a table (table 2).

Table 2

Pharmacotherapeutic effects of the used products, on groups, used medication

No.	**Morbid entity**	**Used medication**	**Treated**	**Mortality**
1	Neonatal colibacilosis	Colistin S	69,67	30,33
2	Colibacilar diarrhoea	Colistin S Gentamicin 10%	85,80	14,20
3	Prolipherative enteritis	OTC 20% PS Tiamutin 45%	92,54	7,46
4	Salmonelosis	OTC 20% PS	85,72	14,28
5	Transmissible gastroenteritis	Assanated effectives		
6	Viral enzootic diarrhoea	Assanated effectives		

CONCLUSIONS:

1. In the case of the neonatal colibacilosis, lately diagnosticated due to the time passed for receiving the laboratory analyzis (diagnosis and antibiograms) the results obtained with Colistin S could be considerated good, 69,67% treated and 30,33% mortality.
2. The treatment with Colistin S and Gentamicin 10% in piglets diagnosticated with colibacilar diarrhoea could be considerated as good results, the treated percentage being 85,80% and 14,20% mortality.
3. In the prolipherative enteritis diagnosticated in this unit, good therapeutic results were obtained with Oxitetraciclin 20% PS and Tiamutin 45%, these meant 92,54% treated cases and 7,46% mortality.
4. In the experimental goup where Oxytetracicline 20% PS was used for treating the salmonelosis, there were obtained good results, 85,72% treated cases and 14,28% mortality.
5. Using the above mentioned products confirmingly the carried out antibiograms, significantly reduced the economic bases in the unit, by their efficaciousness and also by the fast curative treatment.

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THE BIOLOGY OF THE SPECIES *Cyclops strenuus* (Fisher, 1851) IN THE DOPCA LAKE - BRASOV COUNTY

PACIOGLU OCTAVIAN

Institute for Research and Development for Grasslands - No. 5, Cucului Street, Brasov Town, Brasov County, Romania
Tel : 040721.189125 ; 040268.415263
e-mail : pacioglu@yahoo.com

ABSTRACT:

The presence of the copepod species Cyclops strenuus in water lakes is well known. The lack of information regarding its ecology , biology and distribution along Romania reclaims the existence of several studies to elucidate this problem. This study reveals some new aspects regarding the ecology and biology of this copepod species; the results were concluded after a monitoring of the variance of the structural (especially) and functional parameters during a period of ten years. This species is very important in the functionality of Dopca storage lake ecosystem due its large density, increasing directly with the alga biomass and particulate and dissolved organic carbon . Its practical importance results primarily because this species is dominant in the zooplankton community through biomass, being an important link in the food web for fishes of an important economical value..

KEY WORDS: Cyclops strenuus, biology of the species, monitoring, population density, copepod, Dopca lake

INTRODUCTION:

The species *Cyclops strenuus* is a copepod from the Family Ciclopidae remarked since the XIX- th century in the scientific literature, the first well known copepod with an established taxonomic key. Although it's taxonomy, world wide distribution and general information on this species does exist , data regarding it's biology, ecology and distribution along Romania, are not at all known . *Cyclops strenuus* is a very important species, in what concerns the fundamental functionality of Dopca lake, being a key-stone taxon. On the other hand, this species, being dominant throughout biomass in the zooplankton community, beside water flies, rotifers and Gastrotrichi, is a very important link in the food web for fishes of a great economical value. This study describes, on the base of a ten years monitoring, realised by the System of Waters Management –Brasov county, some hypotheses on the biology and ecology of this species. The structural and the functional parameters estimated in this study

are: relative density of individuals / l of water, enrolling the individuals in age classes in every analysed section, the type of spatial distribution, the biomass in wet substances, indexes of frequency in the interspecies relationships with the other species from the zooplankton community, correlated biomass and density of this species with the variation of the phytoplankton parameters, along with the particulate organic carbon.

MATERIALS AND METHODS:

In this study were analysed different sections of Dopca reservoir , sections usually analysed by the System of Waters Management –Brasov county, in the annual campaign, in every season when is monitored the county's waters quality, using the saprobiological method. The results are then written down on biological analysis certificates along with the physic-chemical and bacteriological analysis certificates to Ministry of Environment and Waters Management to be accounted in the annual synthesis. From these certificates, starting with the year 1995, since when this storage lake had the right to use property, until 2004, information was used to quantify the variation of population densities for the species *Cyclops strenuus*, on age classes in every analysed section. In every year, the samples were taken three times / year (+ / - a month comparing with the previous year), with exception in winter . The samples were taken due to a standardise cylinder (bathometer) for picking up the samples from depths in lake waters, suspended in to a boat by a trillium. From different depths were taken different volumes of water, from 50 l on the surface until 10 l on the bottom of the lake. The water volume is filtered then by the zooplanktonic net and concentrated to a volume of 10 ml. After the conservation of the samples, the next step is the microscope observations, using Kolkwitz counting cells; by two counting is estimated an average density of the individuals /ml of water. Counting the rate between identified individuals number and the volume of water samples taken and the volume concentrated due the zooplanktonic net, is estimated, in the limits of admitted errors, an average of the density per one l of water. Starting from these parameters, is estimated also the average biomass in wet substances /l. The others populations parameters are estimated starting from the average values of densities and biomasses. The analysed sections were the following:

1. Tower barrage to surface
2. Tower barrage, photic zone (witch varied over the years between 30 cm until 150 cm) measured with the Secchi disc; because of the little spatial differences between the sections 1 and 2 the graphics and comments were realised together
3. Tower barrage, 5 m in depth
4. Tower barrage –bottom of the lake (witch varied over the years between 6-8 m) depending on rainfalls and seasons

5. Middle of the lake, to an average distances between the borders approximately equal, to the surface
6. Middle of the lake- bottom, with a depth varying between 7-10 m
7. The place where the lake ends, (upstream barrage) and where takes place the mixture between the water lake and the courant water coming from the effluent.
8. The river Big Valley, the principal lake effluent

RESULTS AND DISCUTIONS:

This study tried to catch not only the monitoring of this species, but also data concerning the age classes and spatial distribution, population density, interspecies relationships, and their position in to a lake ecosystem. The data are real, and unfortunately are not hiding a "beautiful "distribution, that can be statistically analyzed in the matter of obtaining relevant information in the limits or admitted errors. All the ideas are hypothetical and it remains to be seen if they will be confirmed or not.

Tabel 1.

Distribution on age classes for *C. strenuus* individuals on the sections tower barrage surface and photic zone

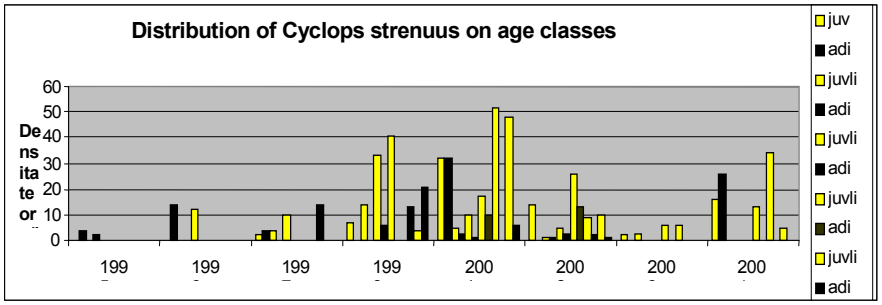
	Tower barrage surface						Tower barrage photic zone					
Months	VI		VII		X		VI		VII		X	
	Juv.	Ad.	Juv.	Ad.	Juv.	Ad.	Juv.	Ad.	Juv.	Ad.	Juv.	Ad.
1995	0	4	0	2	0	0	0	0	0	0	0	0
1996	0	14	0	0	12	0	0	0	0	0	0	0
1997	2	4	4	0	10	0	0	0	0	14	0	0
1998	7	0	14	0	33	6	41	0	0	13	4	21
2001	32	32	5	3	10	1	17	10	52	0	48	6
2002	14	0	1	1	5	3	26	13	9	2	10	1
2003	2	0	3	0	0	0	6	0	6	0	0	0
2004	16	26	0	0	0	0	13	0	34	0	5	0

The reason of cumulating the two sections (tower barrage section surface and photic zone) is given by the little difference in depth between these two sections; the motivation of the photic zone is given by the development of the phytoplankton dominated by Dynophyta (the species Ceratium hirudinella and Peridinium bipes and P bipes var. tabulatum).

The adults average density in the surface barrage zone and photic zone is almost 4 individuals /l with a standard deviation of approx. 27; juveniles average density (either they are in the stage of orto or metanauplius, or copepodits, have been considered like part in the same age range) is approx. 9 individuals /l with a standard deviation equal to 63 ,in the limits of the admitted error of 20%, taking into account the size of the both age ranges plots that are to 48 subunits (so representative).

Figure 1:

Distribution of *Cyclops strenuus* on age classes (adults and juveniles) in the tower barrage surface and photic zone



Without using any special statistical tool, only by comparing the average with the standard deviation, it can be observed that this species has a grouped spatial distribution.

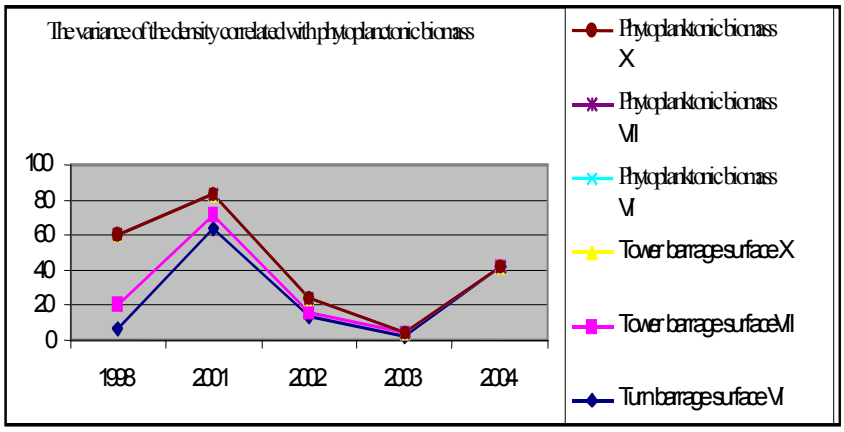
The average density of juveniles is twice bigger than the adults, explainable by their r-type reproductive strategy, with a big numbers of eggs /clutch and a high stress level, due the exposure to predators, but also parasites. Their reproductive strategy is a successful one, at least until 2004, in the last 5 years.

Data interpretation shows a direct and clear correlation between the development and variation of *Cyclops strenuus* density on one hand with the phytoplantonic biomass variation, and on the other hand with particulate and dissolved organic carbon in the two sections: tower surface section and tower photic zone. This zone is the most relevant concerning the fact in this section the phytoplankton development is maximum in numeric and biomass abundance.

This reveals two conclusions: it explains why in the years 1998 and 2001-2004 *Cylops strenuus* density and biomass, either they are adults, copepodite or naupli, increased significantly comparing the period 1995-1997; on the other hand it reveals a poliphagous, opportunistic species, witch density varies very much in time and space like a successful taxon, even a pioneer one; it can eat alga species (either we speak about Dinophyta, Diatoma or Clorophyta) or it can be detritivorous, consuming particulate organic carbon or by filtering the dissolved one from pelagic or deep water. Extrapolating, it can be supposed that the entire population from Dopca storage lake suffers the same modifications and, with little variation it is confronting the same fluctuations in the hole water landscape.

Fig 2:

The variance of density of Cyclops strenuus individuals correlated with phytoplanktonic biomass



In the middle of the lake, the adults and juveniles density is much lower than in barrage sections. This thing is due to the sudden decrease of the phytoplantonik biomass to low values, the concentration values for particulate organic carbon remaining approx. the same like those from the barrage sections. Both, the adult and the naupli stages presents a grouped spatial distribution. Because in the barrage area and especially in the photic zone the phytoplanktonic biomass is much bigger than in the middle of the lake, it can be presumed like normal the migration of the Cyclops strenuus individuals to the food source. In conclusion, one hypothesis is saying that this species is consuming in the first place the alga, being a herbivore, than a detritivorus. It remains to be seen if the next experiments and studies will sustain this fact. Amazing is the appearance in 1996 in this section of a great number of offspring, 135 metanauplius. The values of phytoplantonic biomasses and organic carbon concentration are missing, so the explanation of such abundance is not directly explainable. Maybe, the high temperature favoured the accelerated embryos and post embryos development.

In the same matter, in the middle bottom of the lake section, both the juveniles and the adults present a grouped spatial distribution. Very interesting is the fact that in this area with a lower temperature and phytoplantonik development, also like the dissolved oxygen, the individuals density is bigger than to the middle of the lake-surface. There are two possible explanations: one is due to the intra and inter species competition, this population from the bottom of the lake prefers consuming particulate organic substances , founded here to a very high concentration (thing sustained by the values of the biochemical consume level of oxygen in 5 days, that reaches at this level a concentration maximum of 4,5 mg/l, witch means a big amount of seston sedimented on the bottom of the lake.) The origin of this detritus is coming from organic

substances transported by the rainfalls, leafs and dead animals who reaches here by gravity; also the dead alga by rapid decomposition eliberate to this level significant amounts of organic substances, N and P, limiting factors in the development of *Cyclops strenuus*, and for zooplankton species in general. The other explanation is due to the day and night vertical migration in the water column of zooplankton species. It is known the fact that different zooplankton species migrate in the water column of lakes during the day light, in order to avoid predators.

Resembling to other sections, at the tower barrage depth of 5 m and bottom, the species presents a spatial grouped distribution, with an average value of juveniles superior to those of adults. If we think that at least in frequency, the species is outnumbered by water-flies and rotifers , representing a very serious competition, it appears like elementary the fact that this species prefers this level for feeding with seston and alga, with a lower density comparing with the surface; on the other hand is can be presumed the fact that juveniles prefer much more to stay during the day on the bottom of the lake comparing with adults, that due to a different food spectrum and behavior are able, and prefer to swim do different depths.

In the section end of the lake, excepting the year 1997, juveniles density is much bigger comparing with the adults. In this area it takes place the mixture between the river and lake waters, so an increased dissolved oxygen concentration. It appears the hypotheses that besides food, the juveniles *could* prefer a higher concentration of oxygen necessary to their post embryo development. Spatial distribution is grouped.

To the level of the river "Valea Mare ", the existing data suggest an extreme pauvreness in what concerns the presence of *Cyclops strenuus* population, exempting the year 1996, when there were found an average density of 30 individuals / l. Because their presence have never repeated again, it can be concluded that they were present only by accident; from above information it exists the possibility for the species *Cyclops strenuus* to prefer ponds and deep lakes, with a vertical development of the plankton. The powerful currents, the dissolved oxygen in higher concentrations enhance with the detritus much lower than in water mass might be limiting factors for these species. Remarkably, the water flies and rotifer species were found in lower quantities in the Valea Mare River, the principal effluent of storage lake Dopca.

CONCLUSIONS:

The conclusions after this ten years monitoring are the following:

1. The species *Cyclops strenuus* presents a spatial grouped distribution. Comparing the average density with the standard deviation, it can be observed that the juveniles and the adults are grouped, allowing them to feed witch alga more efficient, if than would be randomised in water. The same distribution allows them to escape from the predators, knowing the fact that such a

distribution helps the individuals to resist better to predators attack.

2. Monitoring the lake evolution in time, comparing the years 1995-96, in 2003-2004 their density increased significantly. This model is showing a successful reproductive strategy, r-type, with a great amount of eggs and offsprings , and a reproductive cycle periodic at least twice a year. With a big probability their first cycle develops in spring, around April, with a quick embryo development, and in the scenario of an increasing temperature of the water (25 degrees in July) is ideal for a quick post embryo development. The majority of nauplii were been found in June, witch means the first eggs are deposed at the beginning of the spring. In the observations made in 1997, there have been found juveniles in March , but there is also the possibility to be "resistance eggs", witch are blocking over winter the embryo development in early stages. The presence of the juveniles in October proves the existence of a species with a very active reproductive cycle, along the hole year, exempting the winter. There was observed only a mixture between different age ranges, over the entire year.

3. Monitoring the lake, it can be observed that in 1994 there were been identified, qualitatively, *Eucyclops serrulatus,* and *Diacyclops bicuspidatus,* besides *Cyclops strenuus*. In this period were already beginning the administrative works for the right to use in property the storage lake. The lake was oligotrophic, being connected with the Big Valley river. In this ten years period, only in 1995, Eucyclops serrulatus showed up. In rest, the species *Cyclops strenuus* is the only one that seems to be dominant in this lake. Judging after the trophic evolution of the lake, due the fact the barrage had modified the current power and in conclusion the seston quantity increased in time, the oxygen concentration modified also a little beat but significant, becoming a limiting factor in the development of other copepod species. It can be concluded that *Cyclops strenuus* is a resistant taxon, opportunistic, for who the increasing of dissolves oxygen concentration does not represent a barrier in its existence. The quantity of organic substances (feeding also with organic detritus) has represented also a sure source in eliminating the other species, having in the same time a very large ecological spectrum.

It exists also the possibility that the species *Eucyclops serrulatus* vanished not due to environment parameters modification, because it is a very tolerant species , but due to the disappearance of macrophytes, the principal habitat for these species. This species lives in leafs, and mosses and is not an excellent swimmer like *Cyclops strenuus* , but a component of the benthic community; this observation represents a contra argument to the hypothesis with the surpassing the ecological habitats.

4. In what concerns the inter specific relationships, in the Dopca's zooplankton community, *Cyclops strenuus* is outnumbered by the other species, but dominant throughout its biomass. The average density of individuals from all the species in zooplankton community (ciliates, rotifers,

water-flies and copepods) is approx. 59 individuals /l and with a biomass equal to 0,223 mg/l wet substances. Between these, the Cyclops strenuus has a frequency of 6,7 individuals / l, and with a biomass of 0,101 mg/l wet substances, witch means a fraction of 45,3 %. So, Cyclops strenuus population, especially the adults, by their biomass are dominant, but outnumered by density. Throw their dimensions and biomass represent a real competition in the food web with water-flies, and especially with rotifers, the most reach group in species.

5. The role of every population is to represent a link in the food, energy and information net flows, by direct and indirect relations. Due their proliferation, huge amount of eggs/clutch, dominance in biomass and food source for the other links (especially fishes), the *Cyclops strenuus* populations become a very important link in the fluxes mentioned above; on one hand, beside rotifers and water –flies (less ciliates) are controlling the phytoplankton community, and on the other hand in the web net represent one of the most important key species.

Throw their excretes, Cyclops individuals eliminate in water important amounts of N, P, under the form of ammonium, urea and incompletely dissolved amines, who are entering in the biogeochemical cycle, helping to the normal functionality of the Dopca lake ecosystem. From the food net point of view, Cyclops strenuus is herbivorous feeding on alga, but consume also particulate organic carbon. The saprobiological index for Cyclops strenuus is oligo- β mesosaprob, meaning an indicator of a water in the second step of drinking quality, being in the same time an indicator by its population density that the lake water quality in the last ten years started to degraded.

These conclusions are the results of the researches in Dopca storage lake, the motivation being that the biology and the ecology of these widespread species is still unknown. The researches are still incipient and it remains to be seen in the future if they are eligible or not.

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CONSIDERATIONS REGARDING THE STUDY OF POLYMORPHOUS STRIPS OBTAINED TROUGH THE RAPD TECHNIQUE APPLIED TO SEVERAL FAMILIES OF *ANGELICA ARCHANGELICA* L

POP MIHAI RADU

"Lucian Blaga" University, Sibiu

ABSTRACT

Obtaining new genotypes, superior to the existent ones, requires creating new genes combinations, more adapted to the environment conditions and to the agro technical conditions in which the new generations will be cultivated. The number and value of these combinations are in direct dependence to the diversity and value of the available genes.

The purpose we proposed was initiating a species improvement program for Angelica archangelica L., using conventional and unconventional methods (RADP). Such a solution became possible after accumulating new knowledge concerning reproduction, heredity and species variability.

To study thoroughly the aspects concerning the genetic variability of Angelica archangelica L.'s selected genotypes we used several possibilities offered by: extracting DNA, amplification and electrophoresis of DNA and applying the RAPD technique.

KEYWORDS: *Angelica archangelica* L., RAPD, lengths of amplifying products.

INTRODUCTION

The *Angelica archangelica* L. species, cultivated and used in Northern Europe since the XIVth century, represents a true "gold mine" for the phytotherapy applications, nowadays having angelica crops almost in all European countries. *Angelica archangelica* L. is a medicinal and aromatic species used in medicine and the food industry. (BOBIȚ DANA & co.,2002).

The progress and the thoroughgoing study in biochemistry and molecular genetics have allowed perfecting the deliberately intervention techniques on the

Angelica archangelica L. species, trough the unconventional methodologies offeres by biotechnology and genetic engineering.

Discovering structures and cellular functions, correlations between the nuclear genes, cytoplasmathic and properties for *Angelica archangelica* L., have created the premises for elaboration and perfecting methodologies and techniques adequate for utilisation of the genetical resources of the plant. (POP, 2006)

The viable results obtained in the currently presented research demonstrate the opportunity of their thorough study and encourages us to continue working in this direction.

MATERIAL AND METHOD

For the RAPD (*Random Amplifield Polymorfhic DNA*) analysis we obtained vegetal material in green house conditions, space given to us by the Nottingham University, The "plant Sciences" department, and in the afferent laboratory we realized the analysis.

The method of DNA isolation using CTAB is simple, quick and allows DNA isolation with a sufficient quality for different applications like: PCR, RAPD, RFLP.

To amplify DNA, we intended to use 40 decaamperes (OPA, OPAA and OPC) which were bought from Promega company – MADISON WI USA.

To prevent contamination with foreign DNA, the reaction mix was realised at the sterile air flux table, on ice. For the beginning we prepared the mix "master mix" in a final volume of 8µl * 11 (the number of species DNA tested), which contains 1 µl 10x PCR buffer, 1 µl 25 mM $MgCl_2$, 1 µl 2mM dNTPs (annex 1), 0,25 µl *Taq* Polimerasis (SIGMA), 1 µl primer and 3,75 µl sterile water (MANUELA DORDEA & co., 2003).

We put the reaction volume in 11 miniependorf tubes and the DNA was amplified in a termocycler Perkin Elmer 480.

The thermo cycler was programmed for an initial cycle of 5 minutes at 94^{o}C, followed by 40 cycles of a minute at 94^{o}C, 1 minute at 36^{o}C and 2 minutes at 72^{o}C, followed by the last cycle at a temperature of 72^{o}C, for 8 minutes and then we kept the samples at 4^{o}C until the moment we realized the electrophoresis in gel (POP & co., 2005).

The migration happened in agarosis gel with a 1,5% concentration, in an electrophoresis tampon Tris-acetate (TAE). On one of the ends of the gel, in all cases was migrated in parallel a scale of 1 kb DNA ladder (New England Biolabs, UK Ltd.). The electrophoresis was programmed at 2,5 V/cm for 180 minutes. The gel obtained was examined at a UV transluminator, fitted with a photo camera to keep the image, using the Imager Appligene software (Imager Appligene, Chester-Le-Street, UK).

RESULTS AND DISCUSSIONS

The results expected following the amplification of the obtained DNA from the ten chosen families of *Angelica archangelica* L. and from the local „De Cristian" population, using the previously reminded primers, were materialized by the polymorphic strips that turned up. From the total of 40 primers used in our research only from 28 we obtained amplification products that could be further analysed and interpreted.

Using the 28 primers led to obtaining a number of **172** polymorphic strips, realising an average of **6,14 strips/primer**. This result is superior to the one obtained by WATANABE &co. (1998), of 4,8 strips/primer in a research carried out on 21 cultivation which belonged to several species of the *Angelica* type, living in China.

The genomic DNA of each family determines different PCR products, allowing the identification of the DNA polymorphism and implicitly the indentation of the different analysed families.

In the image that shows the polymorphic strips obtained with the OPC-2

primer (fig.1) were situated as dimension to oscillate between 6000 pb and 700 pb. We can distinguish at the DNA samples obtained from families G_4, G_5 and G_7 a strip which is specific to these, with a length of approximately 6000 pb.

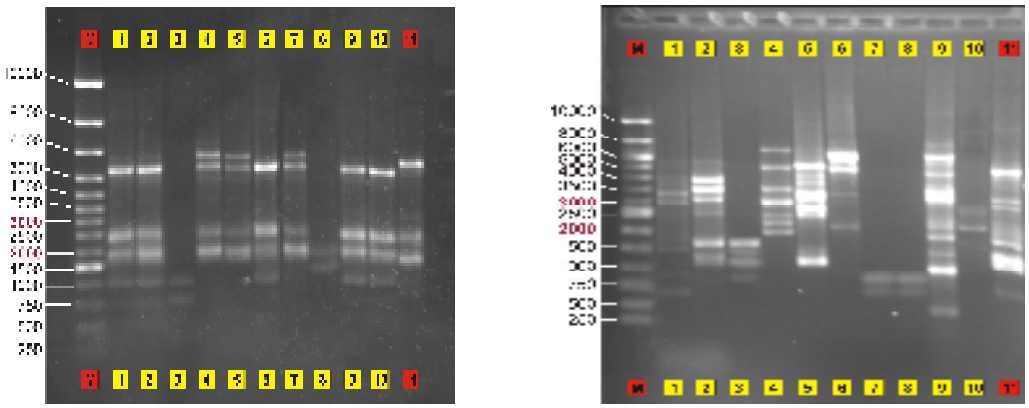

Fig 1 – The amplification products obtained with primers OPC – 2 and OPC – 15

From among the primers that determined getting some polymorphic strips with a high frequency from the *Angelica* type species studied, we noticed the primer OPC-2, with an amplified segment, 1800 pb in length, that we can find present at 9 families and at the "De Cristian" population (fig 1). Another amplification product with a length of approximately 2500 pb is present in almost all genotypes, except families G_3 and G_8.

The number of amplified segments varied with the tested perimeter. Thus, from the OPC primers category, the highest number of polymorphic strips was 14 from the primer OPC-15, strips that were present at all the tested families (fig1). With this primer we obtained amplifying strips with the most varied dimensions and states in the same time the differences existent at DNA level among the tested genotypes. The smallest segment, with the dimension of approximately 300 pb, as well as the biggest segment, with a dimension of 7000 pb are found only at the G_9 family. The only obvious resemblance, which can be

established following the results obtained with this primer are between families G_7 and G_8. These families present two amplifying products with the same size, of approximately 850 pb and 600 pb. At the opposite pole is primer OPC-3 with only 2 strips.

If primer OPC-15 shows many differences between the studied genotypes, OPC-6 highlights the most differences between the two, an aspect which leads us to the conclusion that in order to have a conclusive image, following the RAPD analysis, is good to use a big number of primers.

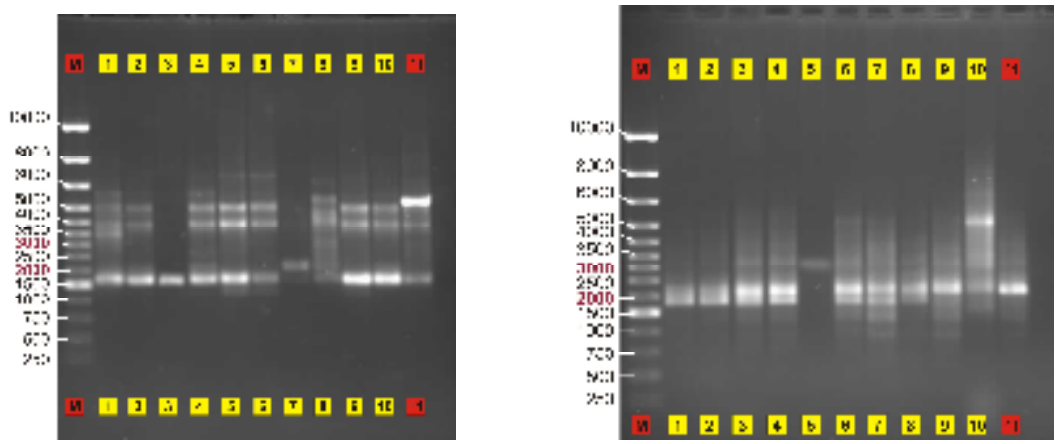

Fig 2 – Amplifying products obtained with primers OPC-5 and OPA-3

The OPC-5 primer highlights the G_7 family, which represents one strip with a lengthof 2000 pb that we cannot find at other families (fig 2)

At the other two groups of primers, OPA and OPAA, the results were less obvious. In these groups, the highest number of strips, as well as the most obvious polymorphism was given by the OPA-3 primer (fig 2). The majority of the amplifying products obtained with OPA primers were in form of strips with approximate lengths of 1800 pb to 2200 pb. The exception was two amplifying products with lengths of approximately 3200 pb and 5000 pb. The first is noticed at the G_5 family and is the only one this family presents, and the second belongs to G_{10} family.

In what concerns the OPAA-19 primer, it produced strips which show a certain approach to other families. Here we can use as example families G_2, G_3 and G_5, each presenting 4 amplifying products that resemble as dimensions. Interesting is the fact that for the G_9 family and the "De Cristian" population, the number of strips was much bigger compared to the other samples, thus enabling us to establish resemblances between the two genotypes. This matter can draw our attention over the bigger genetic distance between the G_9 family and the other families.

CONCLUSIONS

Out of the 3 categories of primers decameres used, OPA, OPAA and OPC, the OPC primers were the most notable because of the high number of primers with relevant results as well as the high percentage of amplifying products. At the OPA and OPAA category, out of the 10 primers we used only at 6 and respective 4 we could obtain gels with segments of amplified DNA. At the OPC category primers, out of the 20 used, 18 were efficient, the number of amplified strips being considerably increased.

A series of polymorphic strips were present at all the *Angelica archangelica* L. families amplified with the 28 RAPD primers, while a series of strips were specific only to certain families, fact which highlights the major differences at genetic level between these selected families.

The utility of a oligonucleotidical primer to determine the genetic relationships in a family cluster of the species *Angelica archangelica* L. is linked to the genom's degree of coverage by the PCR amplifying products generated.

The maximum genetical diversity resulted following the intraspecific hybridisations at the *Angelica archangelica* L. species, can be expected when we will use as genitors families that have a small number of common amplifying products. The best example can be given by families G_5 and G_{10} on one side and

G_8 and G_9 on the other.

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THE GROUPING OF SOME *ANGELICA ARCHANGELICA L.* FAMILIES WITH HELP OF DENDROGRAM OBTAINED BY RAPD TECHNIQUE

POP MIHAI RADU, SAND CAMELIA, BARBU C.H.

"Lucian Blaga" University of Sibiu

ABSTRACT:
Angelica archangelica L. species represents a floristic rarity, is declared endangered species, its harvesting from spontaneous flora not beeing permitted (CRĂCIUN et al., 1976; PÂRVU, 1991). For obtaining vegetal material for industrialization, this is realized by cultivation of the species.
Modern ameliorating has the tendence to enrich scientific , using methods that will permit the acceleration of process and accuracy by diminuation of his probabilistic character. Using of molecular markers is inscribed in the same tendency, wich consists in one of the most efficient methodes wich offers an important opportunity in analizing, administrating and using of genetic variability through RAPD technique.

KEYWORDS: *Angelica archangelica* L., RAPD, dendrogram.

INTRODUCTION:

Regarding anterior research of *Angelica archangelica* L species, some authors consider that the more extended origin zone is situated in Eurasian boreal zone, to Central Russia, from where the greatest part of Europe was naturalized (LARWLESS, 1992). Other authors consider it originative from Syria, from where it spreadded in cold european climate (BOWN, 1995). PĂUN et alii (1986) think that *Angelica archangelica* L. is an Eurasian species, met from Siberia to Island, and POTLOG şi VINŢAN (1983) consider it originating from north of Europe.

The introduction in culture of *Angelica archangelica* L. species will be an important accomplishment in the line of durable developpement, offering an income source to the farmers in the mountain area and maintaining its

biodiversity and charm, responding to european demands in this field, which Romania will have to respect after joining European Union (BOBIȚ DANA et al., 2002)

The used biological material, the population "De Cristian", especially heterogeneous, with big amplitudes of variation under the aspect of morphological characteres, made the effectuation of some selection works regarding this genotype possible.

Within improvement works, developped in Brasov and Sibiu, 10 important femilies of *Angelica archangelica* L., were identified, noted with G_1-$G_{10,}$ under cantitative and calitatrive aspect, compared with populația "De Cristian" population (POP, 2006).

The reasearch pointed out the fact that biological characteristics of *Angelica archangelica* L. species have major impact both on the improvement method and on the culture technique and production of seed. Because of this we set the goal of studying the genetic variability of selected families.

MATERIAL AND METHODS:

For obtaining vegetal material from wich DNA was prelevated, we took seeds from the 10 selected families and from local population „De Cristian" from wich little plants used for prelevating ADN were obtained.

DNA prelevation was realized after the protocol described by AUSUBEL et al.(1990), using the CTAB method.

For appling RAPD technique, the amplification of DNA was produced. Very good results were obtained with decameric fuses (with ten nucleotides) wich were purchased from Promega – MADISON WI USA company.

The amplification was realized with a termocycler wich was programated for an initial cycle of 94^{o}C for 5 minutes, followed by 40 cycles of 1 minute at 94^{o}C, 1 minute at 36^{o}C and 2 minutes at 72^{o}C, followed by the last cycle at a temperature of 72^{o}C, for 8 minutes and then preserving the samples at 4^{o}C until

the moment of the electrophoresy in gel (POP et al., 2005)

The electrophoresy was programmed at 2,5 V/cm for 180 minutes. The gel, after migration, was maintained in a solution of bromură de etidiu, with a concentration of 0,5 µl/ml, on an agitating apparatus with a continuous movement of 150 rot./min. for 20 minutes. The gel prepared in this way was examined in an UV transiluminator, scheduled with a photo camera for preserving the image, using the programme Imager Appligene (Imager Appligene, Chester-Le-Street, UK)

RESULTS AND DISCUSSIONS:

The results followed after the amplification of DNA, obtained from the ten selected families of *Angelica archangelica* L compared with the local „De Cristian" population, through utilisation of primers, materialized in the apparition of polimorphic bands. The studied families were grouped favorable to their degree of genetic approach or distance.

Analyzing the polimorphic bands obtained through RAPD technique the dedrogram was made (see fig.1) wich shows the way the analized families can be grouped after the distance or approach of the analized families that shows clearly the difference between the DNA resulted from the families of *Angelica archangelica* L and the DNA coming from "De Cristian" population.

Between the ten families of selected angelica, reading the dendogram, lead to their separation in four classes, one wiit 4 families and three with 2 families each. This separation shows the existence of one remarcable genetical polimorfism.

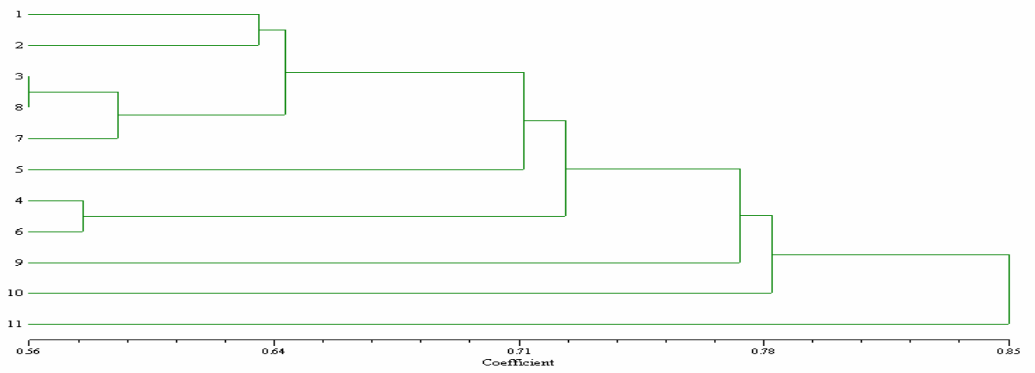

Figura 1 Dendrograma familiilor şi populației de *Angelica*, analizate cu ajutorul tehnicii RAPD

The built dendogram shows that the analysed samples can be grouped in five separate sub-groups:

- the sub-group of 1 and 2 families
- the sub-group of 3, 8, 7 and 5 families;
- the sub-group of 4 and 6 families;
- the sub-group of 9 and 10 families
- the sub-group of „De Cristian" population;

Based on the dendogram analysis we can say that between the families of the species *Angelica archangelica* L an important degree of genetical polimorfism exists.

Due to the fact that in our analysis we used DNA from the selected families of *Angelica archangelica* L. And also from the „De Cristian" population, the waited results were supposed to lay between the two poles, wich is in the proximity between the local population and any other family, theoretically, beeing the the least in this case. This thing can be noticed from the dendogram constructed on the laboratoty results, fact that confirms in a way the veracity of the RAPD technique, and on the other way the corectness of the application of the work protocols.

The dendogram shows clearly the difference made between the DNA

resulted from the *Angelica archangelica* L. families and the DNA coming from "De Cristian" population.

CONCLUSIONS:

In the present study, it is distinguished that the ten selected families are totally different from the De Cristian population, the last beeing placed to a significant distance from the rest of samples taken into study.

It can be foreseen, interpreting these results, that the cross-breeding between the families of *Angelica archangelica* L. species won't encounter dificulties, creating the posibility of genetical diversification of the improvement material.

The dendogram anaysis makes us conclude that for distinguishing the cross-breeding posibilities at the *Angelica archangelica* L. species, an aid consists in appling the RAPD technique.

The maximum genetical diversity, resulted from intrespecifical cross-breedings in the *Angelica archangelica* L. species, can be expected in case of using as genitors families belonging to different sub-groups, with a coefficient of genetical distance as big as possible.

The best example can be expressed through the G_5 şi G_{10} families on one way, and through the G_8 şi G_9 families on the other way .

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RESEARCH CONCERNING THE INSIDE CLIMATE OF THE CATTLE SHELTERS

SÎRBU MARCELA, TĂNĂSESCU IOANA, BOCA S.

USAMV, Cluj-Napoca
The Faculty of Animal Breeding and Biotechnology,
Mănăştur Street, no. 3-5, Cluj-Napoca, România
marcelaminervasirbu@yahoo.com

ABSTRACT:
This paper work presents a case study about the development and exploitation cattle farm from Oradea. Analyzing the obtained milk production, we have considered necessary the knowledge of the microclimate conditions where evolve the technological processes which are specific to animal husbandry. The researches have a span of three years. The performed partial results render the amounts of CO_2 and the air streams speed, values which were registered in half-open shelter, the shelter which is not technically remote and which was fated for the cattle (dairy and youth). The shelter was built after a model very much used in USA.

KEY WORDS: airstreams speed, noxious concentration, half-open shelter

INTRODUCTION:

In the last decade, the animal breeders from our country build the half-open shelters for cattle. Actually tendency is to change the thermical remote shelters with the half open that are not remote, where the animals take the food at discretion. This tendency determines us to study the milk productions and the environment conditions of the cattle.

Our studies are part of the CEEX Contract 6108/2005," Data base integrate application for adapting and restructuring of natural and artificial environment protection factors in agricultural and animal breeding farms". We have studied this shelter, chasing the way that the building answers at the development technologies and at the microclimate conditions.

MATERIALS AND METHODS:

The shelter belonging to the development and exploitation farm called Casa Felix, Oradea, has 30x60 m and a roof height of 3.50 m. It has no walls, just a tall parapet of 1.20 m on sides. The free space between the parapet and the roof is covered, in cold periods, with a tarpaulin. On the shelter ends, the frontal walls are made of sheet iron mounted on a wooden structure.

The 1 m gap between the ridge and the wall helps appropriate natural ventilation. The animals are free to roam inside the shelter, having the rest area in stabs (dairy cattle) and in collective boxes (the youth).

The research, started in the summer of 2006, extend to three years period. In the present paper we are showing just partial results. In the period when we started the research, July 2006, we have followed the air stream speed variation and noxious concentration (CO_2) belonging to the dairy cattle and youth shelter.

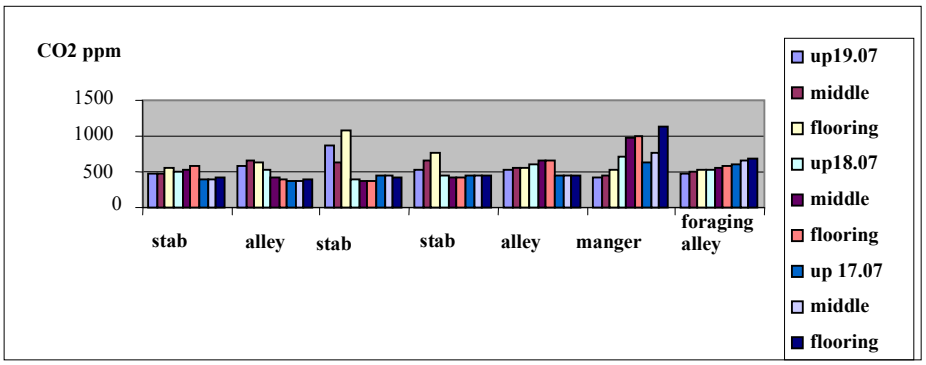
The measurements were registered on different interest levels, both in length and height. We followed the variation of studied parameters in different stages of the technological feeding process, manure evacuation, rest and we've observed the way in which these activities influence the microclimate.

Along with the shelter recordings we measured the same parameters in the farm and the surrounding areas observing the impact on the environment.

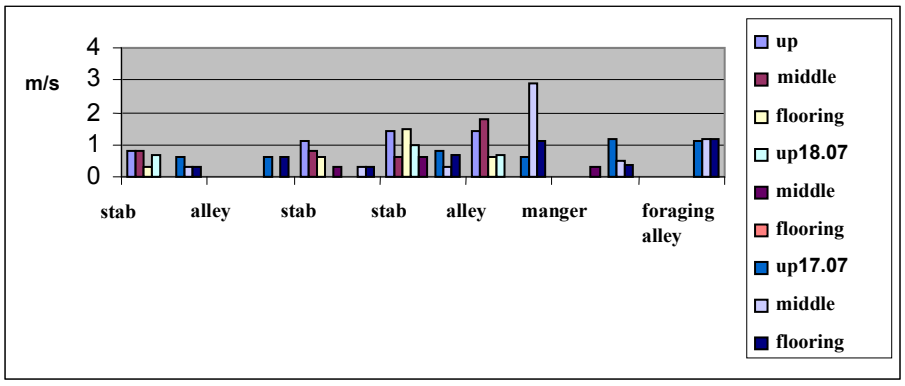
The recordings were done using the equipment belonging to the construction discipline, a multifunctional TESTO, which allows the measurements, and stocking of data and also the download and processing on a computer.

From the data, we selected the characteristic values of interest for the summer season, which we present in the table bellow.

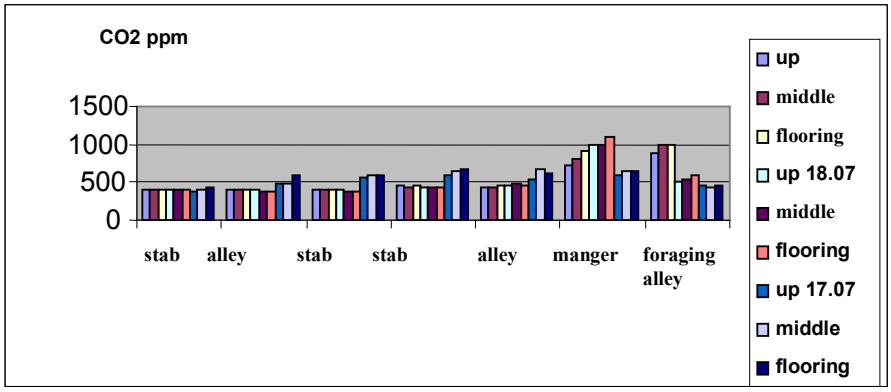
S.	Technological stages	Air streams speeds [m/s]		CO_2 concentration [ppm]	
		Inside the shelter	Inside the farm	Inside the shelter	Inside the farm
1.	Dejections evacuation Rest – Foraging	0 – 1.5 0 – 1.2	0.60	380 – 1100 350 – 650	370
2.	Dejections evacuation Rest – Foraging	0 – 1.5 0 – 2.9	0.70	382 – 1119 360 – 1001	323
3.	Dejections evacuation Rest – Foraging	0 – 1.0 0 – 2.2	0.80	370 – 1205 340 – 680	355
4.	Dejections evacuation Rest – Foraging	0 – 1.3 0 – 2.9		354 – 750 330 – 518	
5.	Dejections evacuation Rest – Foraging	0 – 1.1 0 – 2.5		360 – 560 330 – 548	
6.	Dejections evacuation Rest – Foraging	0 – 1.1 0 – 2.5		350 – 600 333 – 522	



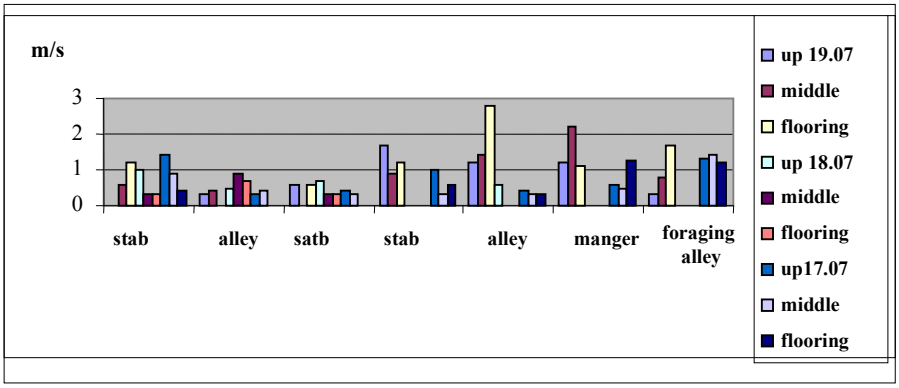
The variation of CO_2 concentration
Section 2, at 20 m from the frontal wall



The variation of air stream speed
Section 2, at 20 m from the frontal wall



The variation of CO_2 concentration
Section I, at 10 m from the frontal wall



The variation of air stream speed
Section I, at 10 m from the frontal wall

The data from the first table and from graphics presented on top, indicate values of the CO_2 concentration three times higher than the others from the inside of the farm.

The maximum value of CO_2 concentration, of 1205 ppm, was registered in the middle of the shelter, during manure evacuation stands between the limits for bovine species.

The half open shelter allows a permanent ventilation, showing a good efect on noxius concentration, which is demonstrated by the high airstream speed. In the most sections of the shelter were registered high airstreams speed (2.9 m/s), values which exceed the recommended limits.

The empty spaces, uncovered during summer, from the sides walls, allows

a quick air ventilation at once with the noxes evacuation.

CONCLUSIONS AND RECOMMENDATION:

- The milk production of 6200 l / lactation, were not influenced by the existing microclimate in the summer of 2006.
- The farm doesn t present any danger to the enviroment.
- CO_2 stands between the limits due to high airstreams speed.
- Ona transversal wall of 1.60-1.80 m height completed with panels till the roof.
- The wind speed can be reduced with a vegetal protection or with other constructions, if there are nit any particular relief shape aroun the shelter.
- Also we can use exterior protection panels from wood, 20-30 cm wide, placed at 2-4 cm, 3.50 height, gripped by wooden pillars. This pannels reduce considerably the wind speed.

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*** www.milkproduction.com

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THE ANALYSIS OF EXCESS AND SCARCE RAINFALL PERIODS IN SIBIU USING THE SPI METHOD

SPANU SIMONA*, BARBU MIHAELA**

*"Lucian Blaga" University of Sibiu, ** Clinicaly Hospital of Sibiu

ABSTRACT:
Employing the SPI method makes it is possible to determine and characterize the excess and scarce rainfall periods, by using a normal distribution of the values.
The purpose of elaborating this method was that of associating a single numerical value to the rainfall quantity, thus making it possible to compare it with other rainfall quantities, from regions having different climates. The variation of the SPI allows us to make an analysis of the rainfall quantity for the time interval for which we have data. It has the advantage of providing information regarding the relation between the excess rainfall quantity and the normal one.
For using the SPI, Sibiu weather station has been chosen, because this station has uninterrupted weather observations dating as far back as 1851, so that the condition of the long and homogeneous range of data is met.

Key words: deficit, pluviometrical surplus, standardized precipitation index

METHODOLOGICAL ASPECTS:

The standardized precipitation index (SPI) is used for defining the droughty events and for studying the way of manifestation in space of the meteorological droughts. Standardizing the precipitation quantity also allows us to compare the results regarding the intensity of the droughts for weather stations that have different pluviometrical regimes.

The standardized precipitation index has been formulated in 1993 by T. McKee, N. Doesken and J. Kleist from the Climatology Centre in Colorado, U.S.A. This is an indicator that is used for defining and monitoring the droughts. Based on this index it is possible to assess the severity of the drought for a particular time scale, by taking into account the monthly precipitation quantity. At the same time, it is possible to determine and characterize the periods with pluviometrical surplus, having a normal distribution of the values.

The index is calculated using the cumulated occurance probability of a certain quantity of precipitation at a certain weather station. The probability of a rainfall quantity to be less than or equal to the average of the range of data begins somewhere around the value of 0,5. The probabilities that are less than 0,5 indicate a serious negative deviation from the average, and the higher ones

indicate a positive deviation. Practically, the smaller the cumulated probability of a rainfall quantity is, the more important the droughty event it indicates, and the higher the cumulated probability of a rainfall quantity is, the greater the positive precipitation anomaly.

The purpose of elaborating this method was that of associating a single numerical value to the precipitation quantity, thus making it possible to compare it with other rainfall quantities, from regions having different climates. From a technical point of view, SPI is the number of standard deviations with which the observed value diverges from the average value of the range, for a variable with normal distribution. But the atmospheric precipitation does not have a normal distribution and that is why a transformation is first applied, in order for the newly obtained value of the rainfall quantity to follow a normal distribution.

The SPI has been created in order to highlight the possibility that, at the same time, for certain time scales there might be situations with a pluviometical surplus, while for other time scales the respective rainfall quantity to enter in the category of droughty periods. This thing is hard, if not impossible, to notice with the help of other indexes, which makes it difficult to take decisions regarding the management of the droughty periods and that of the situations with pluviometrical surplus.

The temporal scale represents the number of the months on which the index calculation stretches and it lasts until the end of the month for which the calculation is made. This forms a very important parameter, because of the fact that some processes are very rapidly affected by the evolution of the atmospheric factors. Examples in that direction are the humidity conditions in the soil, because for the agriculture in arid and semiarid areas the relevant scale is that of one or two months.

Other processes react to greater temporal scales, usually of a few months, as for example the drying out or flooding of the superficial springs, ponds or small rivers, the increase or decrease of the ground water level on a local scale, or of the level of small barrier lakes.

But there are processes that have much greater temporal scales of reaction, even of several years, as for example the water level increase or decrease rate in the big barrier lakes, in the water bed and in the natural lakes of considerable dimensions.

According to the criteria that define the droughty or moist periods for whichever of the temporal scales used, a droughty interval begins when SPI continually has negative values and reaches an intensity of -1,0, or below. The droughty interval ends when the SPI values become positive. Each droughty interval has a time span that is defined by the moments of beginning and ending, as well as an intensity for every month that belongs to it. The positive sum of the SPI for all the months in the respective interval can be called “the magnitude of the drought”.

In the same way, an interval is considered as being droughty if the value

of the SPI is continually positive and reaches an intensity of +1,0 or more, and the sum of the intensity of all the months in the respective time span is known under the name of "the magnitude of the rainy interval". The rainy interval ends when the value of the SPI becomes negative.

In order to analyze the SPI values for different time intervals and for periods with pluviometrical surplus, several parameters have been taken into account: the number of rainy periods with a pluviometrical risk caused by the surplus, the length of the period with a pluviometrical risk caused by the surplus, the SPI magnitude for the periods with a pluviometrical risk caused by the surplus, and the maximum intensity within each rainy period that has been identified.

The length of the period with a pluviometrical risk caused by the surplus represents the number of consecutive months in which the value of the SPI is greater than or equal to 0,01 and during which it is reached or exceeded at least once the SPI value of 1,00 (the pluviometrical risk is manifested only during the intervals in which the SPI value reaches or exceeds ±1,00).

The magnitude of the rainy period represents the positive sum of all the individual SPI values from a rainy or droughty period that may present a risk.

The maximum intensity represents the highest or lowest SPI value of the analyzed rainy or droughty period.

The identification of these parameters shows an increase in the length of the periods and the decrease of the maximum intensity together with the increase of the time interval that is being analyzed. Therewith, it can be noticed an increase in the number of months in which excess rainfall is concomitantly produced, as the temporal resolution expands. In the analyzed time intervals, for the low risk, the surplus domain is registered with higher frequencies than the deficit one, while for the high risk, the situation is reversed in most of the cases. The difference between the two categories of risk does not exceed a few percents, these having values much under those of the normal domain.

This index can be calculated for each of the months in the range of data of a particular weather station, as well as for a number of preceding months: 1,2,3,…,12,…,24,…48, according to the interval that presents interest.

The analysis of the intervals with pluviometrical surplus and deficit using the SPI method

For using the SPI, Sibiu weather station has been chosen, because it is necessary to have a range of data of at least 30 consecutive years, the recommended range being the one longer than 60 years, without any missing values. The interval with rainfall measurements allows for the distribution of the rainfall quantity to be effectively represented through a mathematical function of cumulative probability.

The number of the rainy and droughty months that have been produced concomitantly at the scale of the whole Cibin hydrographic basin varies from

one interval to another, without being able to determine the existence of a direct correlation with the length of the time interval.

Thus, based on a long range of observations of the rainfall in Sibiu, it can be determined what the probability is for the rainfall to be lower or at most equal to a certain quantity. Should the recorded precipitations offer a small probability regarding the cumulated function, than this would indicate a possible droughty interval. On the contrary, if the precipitations determine a great probability regarding the cumulated function, this would account for the excess rainfall.

The longer the period used for calculating the distribution parameters, the more likely it is to obtain more accurate results. The long time interval (1851-2005) during which observations of the precipitations in Sibiu have been continually made has allowed the highlighting, with the help of SPI, of droughty and rainy periods.

The SPI values may be interpreted as such:

- high values of the SPI, close to 3, represent an interval with abundant rainfall
- average values of the SPI, close to 0, represent an interval with normal rainfall
- low values of the SPI, close to -3, represent an interval with reduced rainfall, or even a possible period of drought

It should be taken into consideration the fact that the rainfall excess or deficit determined by the SPI is relative and depends on the characteristics of the area.

For Sibiu weather station, it has been chosen JFM (January-February-March) from the period 1851-2005, for the 3-month SPI diagrams with the total quantity of precipitations from that interval.

For the 6-month interval, SPI refers to the cumulated values of the precipitations from ONDJFM (for example, from October 1851 to March 1852), values that have been rendered graphically, while the values of the SPI for 12 months are presented in the third diagram.

The SPI method also permits the determination of certain long term fluctuations, especially when using high resolutions.

The index is often used to study the drought “in situ” or on a regional scale, because it gives the possibility to analyze the frequency, length and intensity of the phenomena. The intensity can be appreciated directly, based on the SPI values: values close to 3 indicate the occurrence of a rainy pluviometrical event, values close to 0 indicate a normal pluviometrical event, and values close to -3 indicate a droughty event, for the period taken into consideration.

The SPI variation gives us the possibility to make an analysis of the rainfall quantity, for the time interval for which we have data. It has the advantage of offering information regarding the relation between the excess or scarce rainfall quantity and the normal one. SPI is recommended when studying

the manifestation way of the meteorological droughts.

Calculating the SPI for a short period of time (3 months)

From the analysis of the rainfall values for 3 months, it can be noticed the presence of indexes that reach the value of -3, which is characteristic for the extreme drought, in 1860, 1866, 1872, and the most severe drought of the XIXth century was registered in 1883. Until 1986, SPI has not reached the value of -3 again, but in 2000 it exceeded -3,5, which marks an exceptional drought. As for the situations with a surplus, the exceptional maximum was reached in 1851, when SPI reached the value of 4. The chronicles of the time registered that the Cibin flooded and reached the Stairs Passage, which is situated at around 800 m from the current course of the river. Since then, indexes that exceeded the value of 3, which are characteristic for extreme pluviometrical events, have been registered in 1913 (SPI is of 3,5). The periods known for their catastrophic floods, respectively 1970, 1975, 1986, 1991, reach or barely exceed the value of 2.

At Sibiu weather station it can be noticed a high annual frequency of the short term rainfall deficit (SPI $\leq$-1), that reaches 75%. The occurrence of the long term droughts is a regional characteristic which is due to the atmospheric circulation factors. The frequency between 60-65% is characteristic for Hârtibaciu Plateau, which has in its Western side frequencies within 65-70%. For the space of the Sibiu Depression the frequency grows to 70-75%.

The calculation of the SPI on a short term implies the calculation of the index for each month of the year. Thus, a SPI value is determined based on the rainfall quantity in the last *n* months. For example, the 3-month SPI value for the month of May 2000 has been calculated based on the total monthly rainfall from March 2000 to May 2000. This allows with ease to choose the season for which the study of the evolution of the short term drought is needed.

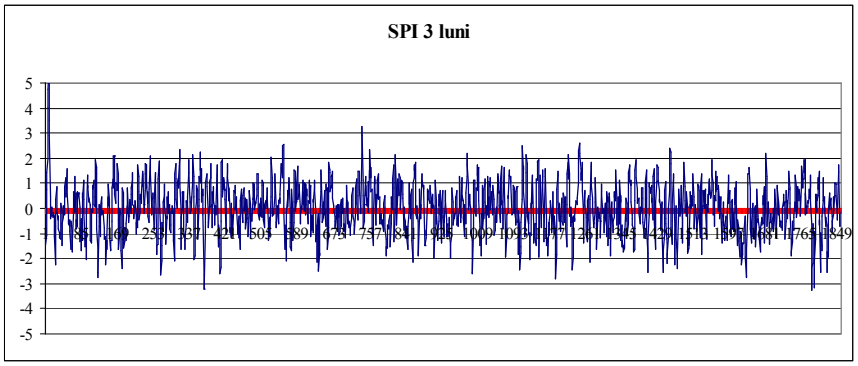

Fig. 1 SPI variation for the 3-month interval (JFM) at Sibiu weather station (1851-2005)

Calculating the SPI for an average period of time (6 months)

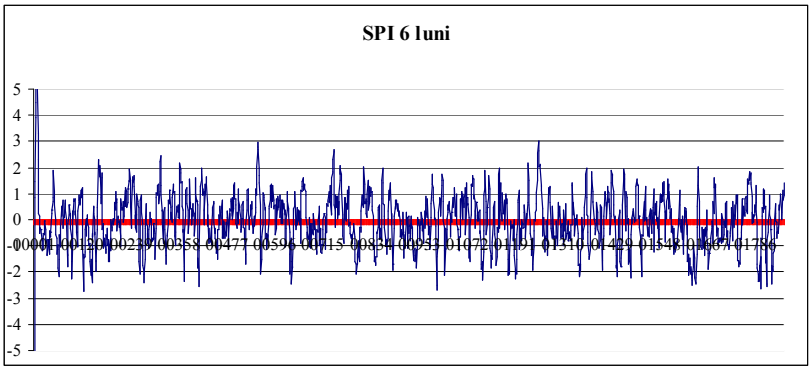

Fig. 2 SPI variation for the 6-month interval (ONDJFM) at Sibiu weather station (1851-2005)

As for the SPI variation for an average period of time, respectively 6 months, the highlighted droughty periods are those of 1872-1875, 1905, 1962, and again 1986 and 2000. Excess rainfall have occurred in 1851, then in the interval 1867-1872, 1887 (when SPI reaches the value of 3), and then between 1910-1916 SPI reaches the value of 2,5. Values of the SPI that are equal to or slightly higher than 2 have also been registered in 1955, 1970, 1972, 1975, and 1998.

Calculating the SPI for a long period of time (12 months)

By analyzing the SPI long term variation, respectively that for 12 months, the spectacular values of the drought move towards the end of the XXth century, when between 1986 and 1991 the value of the SPI reaches -3.

Values of excess rainfall are recorded between 1872-1878, 1883-1888, 1899-1905, when SPI reaches the value of 2, and then between 1910-1916 it grows up to 2,5. The SPI value reaches again the threshold of 2 in 1943, and after that, between 1945-1953 it is recorded a long period with drought which, altough it does not exceed -2 is severe due to the time span. Beginning with 1970 the SPI becomes positive and varies between 1 and 1,5 until 1986, moment that is followed by a long and accentuated droughty period. The SPI becomes positive again only in 1997.

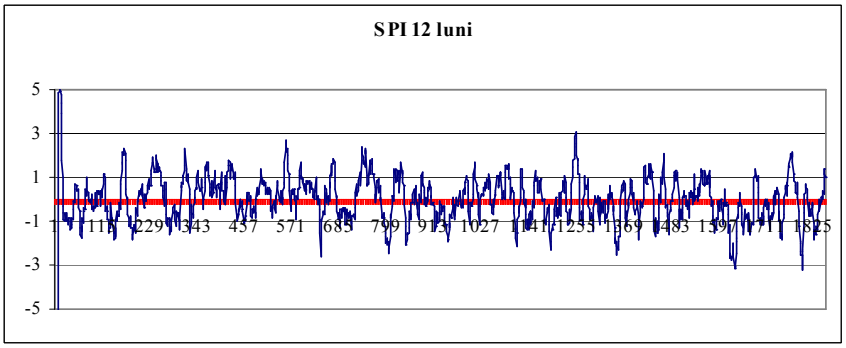

Fig. 3 SPI variation for the 12-month interval (JFMAMJJASOND) at Sibiu weather station (1851-2005)

CONCLUSIONS:

The use of SPI has good results for the identification of certain situations with a pluviometrical deficit or surplus in the range of data of a particular weather station. In this case, the advantage of SPI is that it can be used with much better results than those provided by the rainfall quantities measured for the spacial analysis of the droughts and of the periods with pluviometrical surplus, due to the fact that it gives the possibility to compare the different weather stations situated in different climatic or subclimatic regions, without taking into consideration that there may be different normal rainfall values. This is due to the fact that, by using the SPI, the rainfall quantities are already nominated and the quantity from a certain time interval is compared with the average. Thus, there can be compared the rainfall quantities of the two areas with different rainfall characteristics in order to show the severity of the drought conditions or that of the excess rainfall, because the comparison is being made starting from the normal rainfall quantity.

The advantage of using the SPI is that, while other methods, like the method of the deviation from the average, indicate the numerical magnitude of the variation (for example, more with 30mm or less with 50mm) without mentioning the factor they refer to, SPI indicates the statistical magnitude of the deviations from the average.

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http://climate.atmos.colostate.edu/standardizedprecipitatio.shtml

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THE ANALYSIS OF SCARCE RAINFALL PERIODS IN CIBIN HYDROGRAPHICAL BASIN USING THE SPI METHOD

SPÂNU SIMONA*, BARBU MIHAELA**

*„Lucian Blaga" University of Sibiu, ** Clinicaly Hospital of Sibiu

ABSTRACT:
The standardized precipitations index is an indicator used for defining and monitoring the droughts.
The ISP for periods of up to 3 months represents indicators for the short term droughts, the SPI for 6 and 12 months is an indicator of the droughts with an average time span, and the SPI for 24 and 48 months is used as an indicator for the long term droughts.
For using the SPI, Sibiu weather station has been chosen, because it is necessary to have a range of data of at least 30 consecutive years, the recommended range being the one longer than 60 years, without any missing values. Sibiu weather station has uninterrupted weather observations dating as far back as 1851, so that the condition of the long and homogeneous range of data is met.
The SPI is recommended for studying the manifestation way of the meteorological droughts.

Key words: deficit, pluviometrical surplus, standardized precipitations index

METHODOLOGICAL ASPECTS:

The standardized precipitations index (SPI) is used for defining the droughty events and for studying the way of manifestation in space of the meteorological droughts. Standardizing the precipitation quantity also allows us to compare the results regarding the intensity of the droughts for weather stations that have different pluviometrical regimes.

The standardized precipitations index is an indicator used for defining and monitoring the droughts. Based on this index it is possible to assess the severity of the droughts for a particular time scale, by taking into account the monthly precipitation quantity. At the same time, it is possible to determine and characterize the periods with pluviometrical surplus, having a normal distribution of the values.

The index is calculated using the cumulated occurance probability of a certain quantity of precipitation at a certain weather station. The distribution of the rainfall quantity from a weather station is represented by a cumulated probability function. In this case, the probability of a rainfall quantity to be less than or equal to the average of the range of data begins somewhere around the

value of 0,5. The probabilities that are less than 0,5 indicate a serious negative deviation from the average, and the higher ones indicate a positive deviation.

Practically, the smaller the cumulated probability of a rainfall quantity is, the more important the droughty event it indicates, and the higher the cumulated probability of a rainfall quantity is, the greater the positive precipitation anomaly.

From a technical point of view, SPI is the number of standard deviations with which the observed value diverges from the average value of the range, for a variable with normal distribution. But the atmospheric precipitation does not have a normal distribution and that is why a transformation is first applied, in order for the newly obtained value of the rainfall quantity to follow a normal distribution.

THE ANALYSIS OF THE INTERVALS WITH PLUVIOMETRICAL DEFICIT USING THE SPI METHOD

The SPI has been created in order to highlight the possibility that, at the same time, for certain time scales there might be situations with a pluviometical surplus, while for other time scales the respective rainfall quantity to enter in the category of droughty periods. This thing is hard, if not impossible, to notice with the help of other indexes, which makes it difficult to take decisions regarding the management of the droughty periods and that of the situations with pluviometrical surplus.

A droughty interval begins when SPI continually has negative values and reaches an intensity of -1,0, or below. The droughty interval ends when the SPI values become positive. Each droughty interval has a time span that is defined by the moments of beginning and ending, as well as an intensity for every month that belongs to it. The positive sum of the SPI for all the months in the respective interval can be called “the magnitude of the drought”.

The use of SPI has good results for the identification of certain situations with a pluviometrical deficit in the range of data of a particular weather station. The advantage of using the SPI is that it indicates the statistical magnitude of the deviations from the average.

The magnitude of the rainy period represents the positive sum of all the individual SPI values from a rainy or droughty period that may present a risk.

The maximum intensity represents the highest or lowest SPI value of the analyzed rainy or droughty period.

Usually, the periods of up to 3 months represent indicators for the short term droughts, the SPI for 6 and 12 months is an indicator of the droughts with an average time span, and the SPI for 24 and 48 months is used as an indicator for the long term droughts.

The number of the droughty months that have been produced concomitantly at the scale of the whole Cibin hydrographic basin varies from one interval to another, without being able to determine the existence of a direct

correlation with the length of the time interval. For using the SPI, Sibiu weather station has been chosen, because it is necessary to have a range of data of at least 30 consecutive years, the recommended range being the one longer than 60 years, without any missing values.

The longer the period used for calculating the distribution parameters, the more likely it is to obtain more accurate results. The SPI values may be interpreted as such:

- high values of the SPI, close to 3, represent an interval with abundant rainfall
- average values of the SPI, close to 0, represent an interval with normal rainfall
- low values of the SPI, close to -3, represent an interval with reduced rainfall, or even a possible period of drought

The periods of time that present interest when it comes to analyzing the precipitations are: OND (October-November-December) or JFM (January-February-March) for the 3-month SPI diagrams with the total quantity of precipitations from that interval.

For Sibiu weather station, the 3-month SPI value is calculated for the rainfall quantity from January, February, and March.

For the 6-month interval, SPI refers to the cumulated values of the precipitations from ONDJFM (for example, from October 1851 to March 1852), values that have been rendered graphically, while the values of the SPI for 12 months are presented in the third diagram.

Calculating the SPI for a short period of time (3 months)

From the analysis of the rainfall values for 3 months, it can be noticed the presence of indexes that reach the value of -3, which is characteristic for the extreme drought, in 1860, 1866, 1872, and the most severe drought of the XIXth century was registered in 1883. Until 1986, SPI has not reached the value of -3 again, but in 2000 it exceeded -3,5, which marks an exceptional drought.

At Sibiu weather station it can be noticed a high annual frequency of the short term rainfall deficit (SPI $\leq$-1), that reaches 75%. The occurrence of the long term droughts is a regional characteristic which is due to the atmospheric circulation factors. The frequency between 60-65% is characteristic for Hârtibaciu Plateau, which has in its Western side frequencies within 65-70%. For the space of depression the frequency grows to 70-75%.

The calculation of the SPI on a short term implies the calculation of the index for each month of the year. Thus, a SPI value is determined based on the rainfall quantity in the last *i* months. For example, the 3-month SPI value for the month of May 2000 has been calculated based on the total monthly rainfall from March 2000 to May 2000. This allows with ease to choose the season for which the study of the evolution of the short term drought is needed.

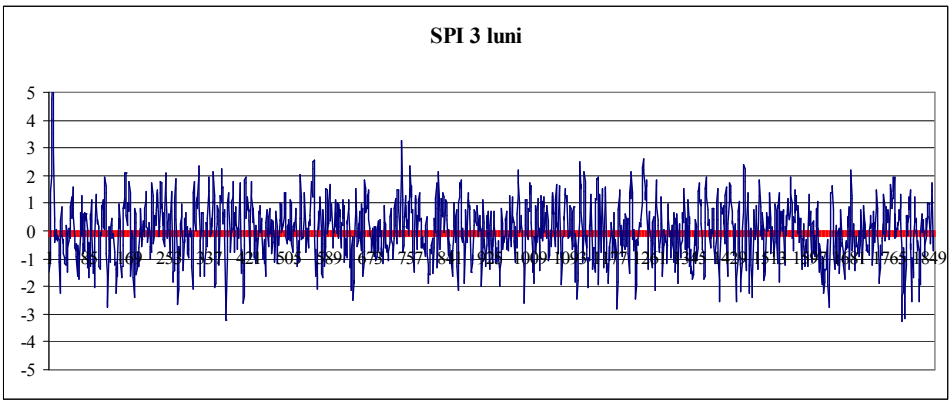

Fig. 1 SPI variation for the 3-month interval (JFM) at Sibiu weather station (1851-2005)

Calculating the SPI for an average period of time (6 months)

As for the SPI variation for an average period of time, respectively 6 months, the highlighted droughty periods are those of 1872-1875, 1905, 1962, and again 1986 and 2000.

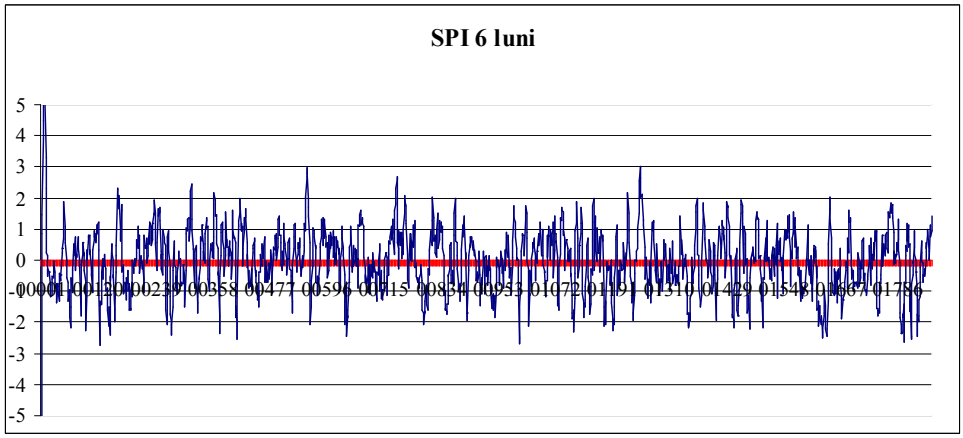

Fig. 2 SPI variation for the 6-month interval (ONDJFM) at Sibiu weather station (1851-2005)

Calculating the SPI for a long period of time (12 months)

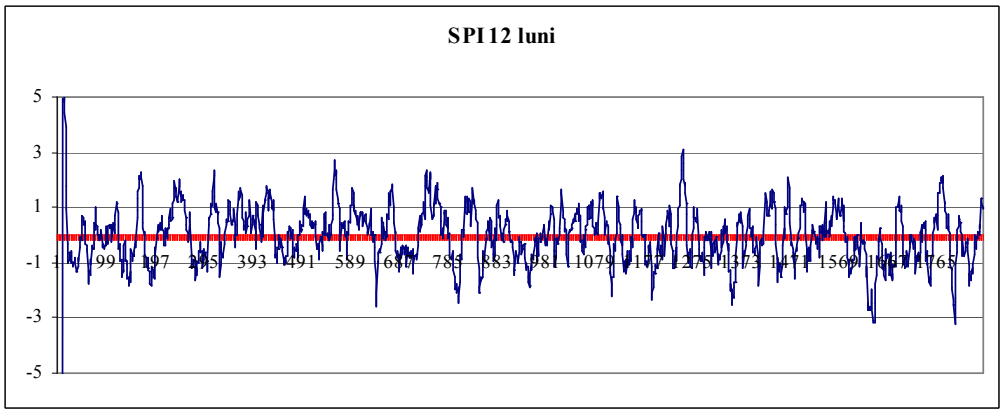

Fig. 3 SPI variation for the 12-month interval (JFMAMJJASOND) at Sibiu weather station (1851-2005)

CONCLUSIONS:

The SPI index is often used to study the drought "in situ" or on a regional scale, because it gives the possibility to analyze the frequency, length and intensity of the phenomena. The intensity can be appreciated directly, based on the SPI values: values close to 3 indicate the occurrence of a rainy pluviometrical event, values close to 0 indicate a normal pluviometrical event, and values close to -3 indicate a droughty event, for the period taken into consideration.

By analyzing the SPI long term variation, respectively that for 12 months, the spectacular values of the drought move towards the end of the XXth century, when between 1986 and 1991 the value of the SPI reaches -3. Between 1945-1953 it is recorded a long period with drought which, altough it does not exceed -2 is severe due to the time span. Beginning with 1970 the SPI becomes positive and varies between 1 and 1,5 until 1986, moment that is followed by a long and accentuated droughty period. The SPI becomes positive again only in 1997.

The SPI variation gives us the possibility to make an analysis of the rainfall quantity, for the time interval for which we have data. It has the advantage of offering information regarding the relation between the excess or scarce rainfall quantity and the normal one. SPI is recommended when studying the manifestation way of the meteorological droughts.

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CONSIDERATIONS REGARDING THE ROLE OF TOURISM IN RURAL DEVELOPMENT

STANCIU MIRELA*, SANISLAV MIHAI, TURCU DIONISIE MARIAN**, POMOHACI MARCEL**, SPANU SIMONA***

"Lucian Blaga" University of Sibiu
*Faculty of Agricultural Sciences, Food Industry and Environmental Protection, Department of Mountain Engineering
**Faculty of Sciences, Department of Physical Education and Sport

ABSTRACT:
A certain number of elements allow the rural tourism to have a strategic function in the process of transition that Romania faces, with special reference to the objectives of the rural world.
This "emerging sector" may be considered as being a dynamic element in the durable development politics, also having a key role when it comes to making a choice regarding the decentralization, the development of the society and the international cooperation.

KEY WORDS: rural tourism, durable development.

The numerous functions of the rural tourism:

One may choose to engage in such an activity for numerous reasons, thus making the rural tourism one of the instruments of the durable rural development, especially since it has the following characteristics:

- it proves that the rural area is not limited strictly to agriculture, or to activities that involve the mere production of goods, and that it also has unexploited potential resources which allow the diversification of the local economical structure, as well as the creation of new jobs;
- it is wanted and implemented by the local people and it is based on keeping and rendering profitable the local environmental resources, as well as the historical, cultural, economical and human resources;
- it is based on significant investments for mobilizing, getting involved and training the local entrepreneurs;
- it represents an activity that involves services – which are quite rare in the rural area – and is based to a large extent on the development

of the society (associative life), as well as on that of the small and middle-sized enterprises;

- it creates the conditions for carrying out micro-projects, but also involves the idea of network, thus supporting from the very beginning the cooperation and the exchange of experience; besides, the activity itself is based on circulation and meeting;
- the rural tourism appeals to the notion of country (having the meaning of region) or territory, without relying on an administrative division, but instead being based on a geography related to the coherence of the tourist activity; thus, it opens new perspectives in what the regional development and the trans-frontier cooperation are concerned;
- the rural tourism allows a global/integrated approach of the local/regional development; it also makes the connection with many other sectors/aspects (pluridisciplinarity): training, territory planning, equipments and infrastructure, valorizing the culture and heritage, environment protection, setting up associations, local autonomy, local craftsmanship and commerce, etc.

Complementary beneficiaries:

The emergent character of the rural tourism (in other words, the fact that it rises to the surface from an environment to which it is no stranger), as well as the steps foreseen, require a large participation of the different categories of beneficiaries:

- rural populations: tillers, craftsmen, merchants, local entrepreneurs and local development associations, as well as those people whose jobs are related to the rural tourism;
- local and regional collectivities that will benefit from the economical impact and from the development dynamics caused by the rural tourism;
- those in charge of the associations that coordinate the activities related to the rural tourism; these associations are organized either on a territorial basis or according to a set of activities;
- corporations or tourism agencies that specialize in activities related to the rural tourism.

During all the stages of this activity, a special attention should be paid to bringing forward the young people and the unemployed who live in those regions, as well as to enabling the professional reconversion of the personnel from the rural world, who is the victim of the reorganization that has occurred in certain domains.

For example, the drastic reductions of personnel in the mining sector affect a number of people from the rural areas, who are denied the possibility of reconverting in similar activities.

Domains of intervention for the rural tourism:

The definition given and the role that the rural tourism has bring forth a large number of possibilities of intervention, as for example:

- defining the content, organizing and animating the training activities that are designed for the people involved and for the project promoters (hosts, tourism entrepreneurs, clerks and local authorities), as well as for the coordination and training associations and organizations.
- assistance in creating rural tourism activities (that have to do with animation, circuits, guides, festivities, etc.) in domains such as nature and heritage discovery, sport and leisure activities (going hiking, riding horses, skiing, etc.).
- setting up local/regional steering and coordination structures that are meant to bring together private and public partners, as well as local and national ones (among other things, for booking places, for taking care of the publicity, for creating tourist circuits, for designing the guides offers).
- building up the infrastructure and the equipments for the targeted villages in order to help develop the tourism (among other things, offering support for improving the tourist accommodation conditions).
- designing activities in tourism-related sectors, such as processing the agricultural products, local commerce and craftsmanship, management of the natural heritage, as well as of the historical, cultural, and architectural ones, environmental protection and territory planning.
- planning certain events and designing certain instruments that are meant to inform, to increase the people's receptivity, to take care of the publicity, and of the experience exchanges that are destined for an audience made up mainly of specialists and that have as target the complete launch of the rural tourism in Romania.
- organizing the publicity campaign/ the launch of the selected areas in the field of tourism, having in mind different categories of potential clients, that come both from inside and outside the Romanian borders (installing publicity banners, signs, other means of information).

The preceding considerations and remarks encourage us to overcome the idea of a divided tourism development.

The pluridisciplinary character of tourism and the fact that it is complementary with numerous other fields of activity are explained by the necessity to take into consideration certain matters such as the protection of the sites and of the environment in general or the connection that the tourism has with the system of education and that of the professional training.

All these issues lead to the necessity of a more integrated intercession, one that suggests a tendency towards a decentralized or regional tourism development. It is well known the fact that in many of the Central and Eastern European countries (PECO – Pays d'Europe centrale et orientale), the state organization and the tardiness that can be seen in the privatization of the tourism sector are a real drawback.

According to these points of view, tourism presents great importance and may even have a strategic role in Romania's so-called "transition" process.

Following the example of the European Union, tourism may be viewed as an essential sector for the economical development of PECO, since "it represents an undeniable social component that contributes to the acknowledgement of the diversity (of cultures, of places, of lifestyles) and to the diminishing of the regional differences."

As it has been noted by the European Parliament, tourism is too often tackled solely from an economical point of view, although it is known that "it has started to play an important role in defining the fundamental concept of European citizenship."

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TAXONOMICAL SPECTRUM AND DISTRIBUTION OF SNOUT BEETLE SPECIES (COLEOPTERA: CURCULIONOIDEA) FROM THE ARIEŞ RIVER BASIN AND THE UPPER COURSE OF THE SOMEŞUL CALD RIVER

TEODOR LUCIAN ALEXANDRU[*], ANTONIE VLAD IULIANA[**]

[*] Catedra de Taxonomie şi Ecologie, Facultatea de Biologie şi Geologie, Universitatea „Babeş-Bolyai" Cluj-Napoca
[**] Catedra de Inginerie Montană, Facultatea de Ştiințe Agricole, Industrie Alimentară şi Protecția Mediului, Universitatea „Lucian Blaga" Sibiu

SUMMARY:
Taxonomical spectrum and distribution of snout beetle species (Coleoptera: Curculionoidea) from the Arieş River basin and the upper course of the Someşul Cald River. *Generally, the ratio of snout beetle families, subfamilies and tribes from the studied area, resembles the ratio of the same families, subfamilies and tribes in Romania. Only subfamily Apioninae, and consequently by family Apionidae are represented in a higher percentage in the Arieş River basin than in Romania, and are very poorly represented in the upper course of the Someşul Cald. In both areas the best represented tribe is Otiorhynchini and especially the species from genus Otiorhynchus. In the entire researched area, the best represented snout beetle species are those with palearctic distribution (18%), followed by eurosiberian species (17%) and by european species (15%). The snout beetles had the highest diversity in hayfields and coppices, followed by pastures, mixed deciduous trees forests, mixed forests of deciduous and coniferous trees, and spruce forests. The snout beetle species with the widest distribution were: Otiorhynchus (Elechranus) remotegranulatus Stierl., O. (Lolatismus) antennatus Stierl., O. (Prilisvanus) gemmatus (Scop.), Nedyus quadrimacultus (L.), Protapion apricans (Hbst.), P. fulvipes (Fourcroy), P. trifolii (L.), Larinus (Phyllonomeus) jaceae (Fabricius), L. (Larinomesius) obtusus Gyll., Orcestes (Salius) fagi (L.), Isochnus populicola Silfv., Sitona (s. str.) sulcifrons (Thunbg.), S. (s. str.) lineatus (L.), Phyllobius (Dieletus) argentatus (L.), P. (Nemoicus) oblongus (L.), P. (Parnemoicus) viridicollis (Fabricius), P. (Metaphyllobius) pomaceus Gyll., Donus oxalidis (Hbst.), D. comatus (Boh.), Scleropterus serratus (Germ.), Plinthus (s. str.) tischeri (Germ.), Deporaus (s. str.) betulae (L.), Ceratapion (Acanephodus) onopordi (Kirby), Polydrusus (s. str.) picus (Fabricius), P. (Chlorodrosus) amoenus (Germ.), Eusomus ovulum Germ. and Sciaphilus asperatus (Bonsd.). The high number of snout beetle species identified here (431) and their different distribution in the studied stations and ecosystems proves the great ecologic diversity of the researched area.***

KEYWORDS: snout-beetles, taxonomical spectrum, distribution, Arieş River basin, upper course of the Someşul Cald River, Romania.

INTRODUCTION:

This paper continues the series of our publications about the snout beetle species from the Arieş River basin and the upper course of the Someşul Cald River (Teodor, 1993; Teodor & Crişan, 1996; Teodor, Crişan, Popa & Cojocneanu, 1999; Crişan, Popa şi Teodor, 1999; Teodor, Crişan & Seffer, 2000; Teodor, Crişan & Nistor, 2001; Teodor & Crişan, 2002; Teodor, Crişan & Beldean, 2002; Teodor & Crişan, 2004; Teodor & Vlad-Antonie, 2005 a, b). Before our studies, we only had few data about snout-beetles of this area, and these referred to only 23 species from the Arieş River basin (Csiki, 1916; Petri, 1912, 1925/1926; Marcu, 1957; Endrödi, 1960, 1969, 1970; Teodoreanu, 1986) and to only 8 species from the upper course of the Someşul Cald River (Endrödi, 1960). Recently, snout-beetle fauna from the Arieş River basin began to be studied even by others, 87 species (Kocs & Podlussány 1999).

MATERIALS AND METHOD:

The biological material was collected between 1991 and 2000 in the stations from the Arieş River basin and in 1998 and 1999 in the stations from the upper course of the Someşul Cald River.

We collected quantitative and qualitative samples in collecting points from 56 locations, 19 of which located in the upper basin of the Arieş River, 22 in the middle basin of the Arieş River, 10 in the lower basin of the Arieş River and 5 located in the area of the upper course of the Someşul Cald River.

The collecting of the snout beetles was done mainly by mowing the vegetation with the entomological net. By means of this method we collected both qualitative and quantitative samples, performing a number of 50 or 100 mows/ sample, according to the specific conditions of each studied station. We also collected samples by shaking the canopy of the trees and shrubs, using the

umbrella net, and to collect the species from the soil or the litter layer, we used Barber traps or we sifted the litter and the superficial layer of soil. We also made observations regarding the snout beetles on their host plants, some of the species being collected directly from these plants.

RESULTS AND DISCUSSIONS:

In the Arieş River basin, from the 51 studied stations, we collected a total number of 12064 individuals that belong to 411 species, from the superfamily Curculionoidea.

In the area of the upper course of the Someşul Cald River, in the five studied stations, we collected a total number of 1656 individual that belong to 51 Curculionoidea species. Of this 51 species, 31 are also found in the area of the Arieş River springs.

Generally, the ratio of snout beetle families, subfamilies and tribes from the Arieş River basin and of those from the upper course of the Someşul Cald River resembles the ratio of the same families, subfamilies and tribes in Romania. The exception is represented only by subfamily Apioninae, and consequently by family Apionidae, which, as we already stated, are represented in a higher percentage in the Arieş River basin than in Romania, and are very poorly represented in the upper course of the Someşul Cald River, where the spruce forest, which is predominant in the area, does not offer suitable conditions for the development of the host plants for the species of Apioninae. For the same reason, species of subfamily Lixinae and of tribe Tychiini are missing from the upper course of the Someşul Cald River, species which are generally well represented in Romania, as well as in the Arieş River basin. In fact, the species from these groups are also missing, or are poorly represented in the spruce forests from the Arieş River basin. Also, the high altitude and the colder climate does not favor the species of these groups, as well as some species from other groups, which explains the higher number of snout beetle

species found in the lower basin (296) and middle basin (291) of the Arieş River, compared to the upper basin of the Arieş River (156 species) and the area of the upper course of the Someşul Cald River, with only 51 species. On the other hand, the high altitudes, colder climate, the rocky substrate – especially limestone, the presence of large areas covered with woods, including spruce forests, favor the species from other subfamilies, mostly those from tribe Otiorhynchini and especially those from genus *Otiorhynchus*. This fact explains why tribe Otiorhynchini is the best represented tribe, both in the Arieş River basin – of which two thirds are located in mountain area, and in the upper course of the Someşul Cald River – located entirely in the level of the spruce forests.

At the same time, the relief of the area that we studied made possible the presence of numerous species of mountain and sub-alpine snout beetles, of which some are generally rare, and others are frequent at high altitudes but are rare or absent from hilly and plane areas. This is an explanation for the significant number of rare and very rare species of snout beetles that we identified in the area, as well as for the identification in this area of species which are new for the fauna of Transylvania, and even of species which are new for the fauna of Romania.

Zoogeographical distribution of the studied species of snout beetles

From the zoogeographical point of view, the snout beetle fauna from the Arieş River basin and the upper course of the Someşul Cald River is very diverse, the 431 snout beetle species belonging to 23 zoogeographical categories.

In the entire researched area, the best represented snout beetle species were those with palearctic distribution (18%), followed by eurosiberian species (17%) and by european species (15%). A significant percent is also recorded for species with west-palearctic distribution (6%), as well as for holarctic species, followed by european-west-central-asian and north-mediterranean species, each with 5%. Other species belong to the following categories: alpino-carpathian,

south-east and central-european, euroasian, carpathian endemic species, european-west-asian, central-european, and south-palearctic, each with 3%. In a percentage lower than 3%, we found south-east, central and east-european, central and est-european, carpathian-balkanic, boreo-mountainous, european and north-american species, as well as species with disjunct areas: north-mediterranean and central-asian, boreo-alpine and species with mountain-insular area.

The zoogeographical spectrum of snout beetle species from the middle and upper basin of the Arieş River is very similar to the zoogeographical spectrum of the entire researched area, with only few differences regarding the percentage of each zoogeographical category. In the lower basin of the Arieş River we did not find any species with disjunct area, and some of the others have a different ratio compared to the general zoogeographical spectrum.

The zoogeographical spectrum of the upper course of the Someşul Cald River presents a lower number of zoogeographical categories, each with percentages which are very different from the general zoogeographical spectrum.

Alpino-capathian species and carpathian endemic species present significant percentages in the upper course of the Someşul Cald River (17%, and 11%) and in the upper basin of the Arieş River (7%, and 5%), compared to the middle basin of the Arieş River (4%, and 2%), and especially compared to the lower basin of the Arieş River (1%, and 2%). The different proportions of alpino-carpathian and carpathian species result from the differences in relief and vegetation in each researched area.

Distribution of snout beetle species in the Arieş River basin and the upper course of the Someşul Cald River

The snout beetles identified by us is the the Arieş River basin and the upper course of the Someşul Cald River had a different distribution in the studied locations and ecosystems.

In general, the highest number of species and of individuals was found in coppices, followed by natural meadows and forests, and the lowest number of species was found in forage cultures, on rocky areas, on the plateau with shrubs and in the sub-alpine meadow. It can also be noticed that the coppices presented a high number of species in all four areas. Still, the highest number of species was recorded in the coppices from the lower basin of the Arieş River (186 species), followed by the middle basin (119 species), the upper basin (58 species) and the area of the upper course of the Someşul Cald River (22 species). The hayfields and pastures were very abundant in species in the middle basin of the Arieş River, followed by the lower and the upper basin of the Arieş River, then by the upper course of the Someşul Cald River. Among the forests, we mention the mixed forests from the lower basin of the Arieş River (150 species), exceeding by far the other forests. Significant differences regarding the number of snout beetle species can also be noted between the different spruce forests. Thus, spruce forests from the upper course of the Someşul Cald River (39 species) are more abundant in snout beetle species than those from the upper basin of the Arieş River (22 species), and especially than those from the middle basin of the Arieş River (only 16 species).

The snout beetle species with the widest distribution were:

- In the upper basin of the Arieş River: *Otiorhynchus (Elechranus) remotegranulatus* Stierlin, 1861, *Larinus (Phyllonomeus) jaceae* (Fabricius, 1775), *Phyllobius (Dieletus) argentatus* (Linné, 1758), *P. (Nemoicus) oblongus* (Linné, 1758), *P. (Parnemoicus) viridicollis* (Fabricius, 1792), *Scleropterus serratus* (Germar, 1824) and *Protapion fulvipes* (Fourcroy, 1785);
- In the middle basin of the Arieş River: *Nedyus quadrimacultus* (Linné, 1758), *Orcestes (Salius) fagi* (Linné, 1758), *Donus oxalidis* (Herbst, 1795), *Phyllobius (Nemoicus) oblongus* (L.), *P. (Dieletus) argentatus* (L.), *P. (Metaphyllobius) pomaceus* Gyllenhal, 1834, *Protapion*

apricans (Herbst, 1797), *P. trifolii* (Linné, 1768), *Deporaus (s.str.) betulae* (Linné, 1758), *Larinus (Larinomesius) obtusus* Gyllenhal, 1836, *L. (Phyllonomeus) jaceae* (Fabricius), *Polydrusus (s. str.) picus* (Fabricius, 1792), *P. (Chlorodrosus) amoenus* (Germar, 1824), *Eusomus ovulum* Germar, 1824 and *Sciaphilus asperatus* (Bonsdorf, 1785);

- In the lower basin of the Arieş River: *Protapion apricans* (Hbst.), *P. fulvipes* (Fourcroy), *Sitona (s. str.) sulcifrons* (Thunberg, 1789), *S. (s. str.) lineatus* (Linné, 1758), *Ceratapion (Acanephodus) onopordi* (Kirby, 1808), *Isochnus populicola* Silfverberg, 1977 and *Nedyus quadrimacultus* (L.);
- In the upper course of the Someşul Cald River: *Otiorhynchus (Lolatismus) antennatus* Stierlin, 1861, *O. (Prilisvanus) gemmatus* (Scopoli, 1763), *Donus comatus* (Boheman, 1842) and *Plinthus (s. str.) tischeri* (Germar, 1824).

None of the species was present in all 56 researched locations, and some of the snout beetle species were identified only in one location.

By analyzing the quantitative data on the snout beetle species in the researched area results that the largest part of the snout beetles had their absolute abundance, relative abundance and frequency very low, since these species are represented in the ecosystems they populate by a small number of individuals. But, in each ecosystem, there were species with more numerous populations that had higher absolute abundance, relative abundance and frequency.

The most abundant snout beetle species were: *Nedyus quadrimacultus* (L.), *Orcestes (Salius) fagi* (L.), *Isochnus populicola* Silfv. *Protapion apricans* (Hbst.), *Protapion fulvipes* (Fourcroy), *P. trifolii* (L.); *Otiorhynchus (Elechranus) remotegranulatus* Stierl., *O. (Lolatismus) antennatus* Stierl., *O. (Prilisvanus) gemmatus* (Scop.), *Larinus (Phyllonomeus) jaceae* (Fabricius), *L. (Larinomesius) obtusus* Gyll., *Phyllobius (Dieletus) argentatus* (L.), *P.*

(Nemoicus) oblongus (L.), *P. (Metaphyllobius) pomaceus* Gyll., *P. (Parnemoicus) viridicollis* (Fabricius), *Polydrusus (s. str.) picus* (Fabricius), *P. (Chlorodrosus) amoenus* (Germ.), *Eusomus ovulum* Germ., *Sciaphilus asperatus* (Bonsd.), *Sitona (s. str.) sulcifrons* (Thunbg.), *S. (s. str.) lineatus* (L.), *Ceratapion (Acanephodus) onopordi* (Kirby), *Deporaus (s.str.) betulae* (L.), *Scleropterus serratus* (Germ.), *Donus oxalidis* (Hbst.), *Donus comatus* (Boh.) and *Plinthus (s. str.) tischeri* (Germ.).

CONCLUSIONS:

- In the 56 studied stations from the entire area, we identified a total number of 431 species from the superfamily Curculionoidea, of which 411 species in the Arieş River basin and 51 species in the upper course of the Someşul Cald River
- From the zoogeographical point of view, the predominant snout beetle species from the researched area have palearctic distribution (18%), followed by euro-siberian species (17%) and European species (15%).
- None of the species was present in all 56 studied stations, and part of the snout beetle species was present only in one location.
- Some species had numerous populations in some ecosystems, and had high abundance and frequency, but had a small number of specimens in other ecosystems, and had low abundance and frequency.
- The snout beetles had the highest diversity in hayfields and coppices, followed by pastures, mixed deciduous trees forests, mixed forests of deciduous and coniferous trees, and spruce forests.
- The high number of snout beetle species identified here (431) and their different distribution in the studied stations and ecosystems proves the great ecologic diversity of the researched area.

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THE IMPORTANCE OF HORSES IN THE EVOLUTION OF MANKIND

TURCU DIONISIE MARIAN, SANISLAV MIHAI, TODOR RAUL

University "Lucian Blaga", Sibiu
The Faculty of Science

SUMMARY:
The ancient world, the bedrock of culture and the creator of the Olympic Games is by all means a novelty. In the paper we wish to develop we try to outline the importance of the horse viewed not only as means of transportation but much more than that.

Key words*:* horse, antiquity, wagon, archeology

We find out that in the year 1730 B.C. the 1300 year reign of the dynasties of Egypt ended, due to the constant attacks from "the lords of the foreign lands" also known under the name of hiks (hicsosi). The whole region of the Nile was unexpectedly invaded by warriors in battle wagons. Day and night their horses clattered all over the streets, market places, even in the sumptuous yards of the Pharaoh. According to the Holy Bible, this period coincides with the presence of Saint Josef in Egypt, as he was sold by Arabian merchants.

Wall paintings and bas-reliefs show Josef as a great figure who "travels in the second wagon" next to the Pharaoh himself.(Gen 41:43)

These "lords of the foreign lands" were the first who brought to Egypt the wagon. They are also known to be the first to use this wagon in ceremonies.

The ceremonial wagon pulled by healthy horses was in a way as nowadays Rolls Royce. The first horse belonged to the ruler, the second one to the prime minister.

The Bible tells about a land called Mitami, in the northern parts of

Mesopotamia. The inhabitants greatly cherished the horse. Probably the first derby must have taken place there. There are so many libraries full of guides and manuals about raising horses, training, taming, a special kind of literature. For the aristocrats of the time, horses mattered more than humans. Egypt had borders with this land and many times they had encounters in the battle wagons. An interesting thing for us could be a certain letter written on papyrus addressed to a teacher (Amnn em Ofet) by his student (Pai- Bes) who describes the lives of jews who spent their days in captivity in Egypt. "… I arrive in Pi Ramses, beloved by Amon, and I find it wonderful. A unique, glamorous city. Ra, the God who founded Teba , designed this city according to same plan. To live here means to be happy. Everyday people get fresh food, the waters are full of fish, pastures are rich in grass and fruit and vegetables taste like honey. The inhabitants grow oat, wheat, onion, apples, olives, figs and pomegranates. The sweet wine of Kenkeme has no rival. The Nile gives them salt. The ships come and go without resting. People get everyday fresh meat. They are happy to live here. I heard nobody complaining. Common people live like kings. Come to celebrate the sky ant the beginning of all seasons".

The archeological discoveries and the Bible confirm an interesting episode when another creature- the camel- penetrates history as a participant in battles. It is said that " gangs of nomads riding on camels attacked the land of Israel, plundering, setting fire, slaughtering…they were numberless and they came on their camels to lay waste(Jud. 6:3). For many years Israel was plundered . Sometimes a new thing serves as a weapon of destruction. In this case the weapon against the Israelites was the tamed camel.

The tamed camels were a novelty for the Antiquity. But people seem to have ignored this. The Egyptian writings don't mention anything related to the taming of camels, therefore we'll never know when did it start. A certain fact, though, leads us to a general conclusion: beginning with the second century B.C, the camel is first mentioned in writings and from that moment it appears more

often. No doubt that all attacks with animals were frightening.

Another interesting aspect from Antiquity and told by the Bible is the scene of fight between the Pharaoh Ramses the Second and philistinians. The battle involved horses. For this fight, Ramses hurried to get prepared as well as he could: " we gathered the best troups that Egypt had. The wagons have the best riders. The horses fly ready to step on the ground of another lands".

The chronicles tell only the story of success: " his troups were like the bulls in a fight. The horses looked like hawks among helpless birds".

A huge bas-relief displays fragments of the fight 3000 years ago. The Egyptian wagons rushed into the armed carriages. A real slaughter among women and children followed. The horses hoofs step on piles of bodies. The Egyptian soldiers plunder.

The Bible tells us more stories about the importance of horses , thing later confirmed by the archeological discoveries made during the times of King Solomon. The number of stables was bigger and bigger. Judging by the way the stables were built we can observe the care for horses. The royal stable was huge; it had over 450 individual docks. It is said that " Solomon gathered wagons and horses. He had 1400 wagons and 12000 riders, all placed in Jerusalem, near the emperor."

The impressive outcomes of digging reveal a clear image of a prosperous age of Israel. In one of the stables deep down under the rocks of Jerusalem's walls, the crusaders tied their horses, after conquering the Holy City (by Godfrey de Boulogne), 2000 years after Solomon. Solomon considered horses and wagons as merchandise. Israel had the power over these goods(I, Kings, 10.28,29). Egypt was the most important provider of wagons " a bunch of merchants went to buy as many as they could…they considered- a horse makes us 600 silver coins richer".

The Egyptian wheelwrights were the best in manufacturing two-wheeled wagons, ready for fighting and hunting. The hard wood had to be

brought from Syria. According to the Bible, a good wagon worth 4 horses price. The horses were brought from Egypt and Koa- a land placed by the rich Mediterranean side. After the fall of the kingdom of Mitami, this land was inhabited by horse breeders . Later, Herodotus mentions that people brought better horses from Cilicy. (Cilicia).

Therefore we conclude by saying that horses have always been partners of men, in battle, races, transportation being of priceless help.

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TURNING DORNA BASIN'S ANTHROPIC TOURISM POTENTIAL INTO ACCOUNT, BY INTENSIFYING THE AGRI-TOURISM ACTIVITIES IN THE AREA

UNGUREANU DĂNUȚ

Training and Innovation Center for Development in the Carpathians – CEFIDEC Vatra Dornei

ABSTRACT:
The human component is more and more part of Dorna depression's tourism patrimony, due to its diversity, originality and even uniqueness, at national or even world level. On the other hand, one can notice a concentration of this patrimony on this Carpathian intra-mountain depression, developed even from the Middle Ages as a "country" with crystallized social-economical structure.
The cultural-historical tourism objectives are the result of a long and continuous inhabiting of Carpathian territory, when, gradually, a material civilization, organically integrated with the one of the surrounding areas, has taken shape and become unique. These objectives has been classified by years and by initial functionality. Most of the times, their conservation degree is inverse proportionally wit the age.

KEY WORDS: agricultural tourism, Dorna depression, anthropic potential

INTRODUCTION:

As time goes by, agri-tourism has more and more followers: on one hand there are the people who want to spend their vacations in nature and on the other there are the people (investors or simply farmers) who offer agri-tourism services.

Exceptional landscapes, traditions and customs that are still preserved in the mountain villages, the crafts that are waiting to be passed on to the new generations, together with the Romanian hospitality, the traditional cuisine and the farm's natural products, all these are strong points that attract tourists and generate sustainable development of the rural areas.

Dorna area, blessed by God, has all these wonders and attracts, year after year and season after season, foreign and Romanian visitors who, once they're here, promise to come back.

MATERIAL AND METHOD:

The investigations covered Dorna Basin. The alternatives for social-economical development of the area will take the possibilities to perform agri-tourism in as many farms as possible into account, developing traditions, crafts and culture.

Data has been gathered in the field and based on polls filled in by farmers, decision-makers and specialists from Dorna Basin, when they attended the training courses organized by CEFIDEC Vatra Dornei; from the statistical data existing at Suceava County Division for Statistics, ANTREC Bucovina branch, Tourism Information Center, the museum of nature sciences and the museum of ethnography, Vatra Dornei.

RESULTS AND DISCUSSIONS:

The oldest evidence showing Dorna depression's inhabiting date from the age of unpolished stone, later, the territory being owned by daco-geți. The evolution, with continuos economical and social relationships, with a permanent exchange of values and governed by many influences from various nations (Romans, tatars and later Austrians) that we got in touch with led to edification, during the next centuries, of a characteristic complex material culture, represented by vestiges that synthesize the interference, as well as by a social-economical life of an ancestral dacic traditionalism that can even be noticed today, in traditional crafts.

The social-cultural objectives of tourism interest can be grouped, by their specificity, in: architectural monuments, historical objectives, centers of folklore and popular art, museums and memorial houses.

Among the ***architectural monuments*** one can notice *the churches and the monasteries.* Worth noticing are the churches made of wood that represent the quintessence of the long evolution of wood civilization, characteristic to the Carpathian regions. Such churches can be found in Iacobeni and Gheorghiţeni villages, the latter dating from the XVIIIth century.

Other famous churches, due to their age and architecture, are: „Sfantul Nicolae" church in Broşteni, built during the reign of Petru Şchiopul (1586); „Adormirea Maicii Domnului" church in Rarău, built in the XIXth century by Balş family; Cârlibaba church; Piatra Tăiturii small and secluded convent, Panaci commune.

The most important religious tourism objectives in Vatra Dornei are the Catholic church, built in 1908; „Adormirea Maicii Domnului" church built in 1678; the Jewish Temple built in 1908 and, more recently, „Sfânta Treime" Cathedral built in 1991.

Most of the ***historical objectives*** are concentrated in Vatra Dornei. Downtown there is the City Hall's Florentine building - „the Communal Palace" - built between 1896 and1897. Nearby there's the monument dedicated to the Romanian heroes who died in the first World War (1914-1918), built out of white marble. Here, there is also a cross built out of black marble, a tribute to the heroes who died in December 1989.

In the city's park there is the Casino's building, designed by an architect from the Royal Court in Vienna and built in 1885 (today, it is being refurbished), the building at the water spring, the "Sentinel", the Park Villa. The park is filled with statues of: Mihai Eminescu, I.L. Caragiale, Mihail Sadoveanu, Ciprian Porumbescu, George Enescu, Alecu Russo.

Not far from these statues there is the new spa building. The Baroque style give these buildings a special look. Close to the city's park there are some newer hotels: Bradul, Călimani, Intus, with all the facilities: pool, gymnastics room, etc.

Other buildings in Vatra Dornei are: the Postal Office; the railway station, built in 1910; headquarters of the Mining Enterprise, „Vasile Lițu" high school, „Lăpuşneanu" Inn, Belvedere Villa, Cembra Villa (1985), „G.T. Kirileanu" library, built in 1901.

Other important historical monuments can be found in Cârlibaba - „ Bogdan Vodă's Obelisk" that shows the place where, in 1359, Bogdan Voda, coming from Maramures, got off the horse to rest. On the left bank of Bistrita river, at the bottom of Barnarel mountain, there are the ruins of Chilia Inn, built during the reign of Alexandru Lăpuşneanu.

All these monuments are harmoniously combined with monuments of modern architecture representing cultural and social institutions organically integrated into the old urban centers.

Rural material and spiritual cultures.

The dominant economic profile left a mark on the look of the rural settlements whose farms are the reflections of the functions, by their physiognomy, the construction material used, the farm's components and the way the farms are grouped together.

The rural mountain settlements used the wood as dominant construction material, as well as other materials, such as stone and later bricks.

The rural activities have a influence on the development of a certain type of farm whose components have a precise destination and functionality and their size, shape and location within the farm generate many local variants.

In this context, one can notice the typically pastoral farms, with all the elements grouped on the four sides: dwelling, outbuildings, stables and spaces to keep the fodder.

Within the farm, the dwelling, built in a specific Bucovinean architectural style, stands out. Being located in a mountain area, many of the dwelling are built of wood, some of them have two floors, many rooms, with beautiful decorations on the outside, harmoniously combined. Sometimes, these

decorations go all around the house just like a girdle (this is the case of the houses in Ciocăneşti, Dorna Candrenilor).

The wooden houses, most of them having beautiful balconies with gorgeous decorations, have the walls painted in white (Argestru village).

The ornaments mentioned above, applied on the snow-white walls, generate an almost perfect harmony with the delightful surrounding environment. The local craftsmen who make these wonderful works of popular art get their inspiration from the sewing that can be found on the embroidered peasant shirts and skirts. The carpets in Ciocanesti present beautiful pastoral scenes and the area's animals, especially deer and stags. The predominant colors, uniquely combined, are light brown, black or green and sometimes blue, yellow or pink.

In Ciocanesti, but also in Poiana Stampei and Iacobeni there are *craft workshops* for painting eggs and for sculpting wood. This craft is practiced by every member, from the oldest to the youngest and this a sign that the popular art will be passed on from one generation to the other.

In this Intra-Carpathian depression, occupations with old traditions, although strongly influenced, are preserved. Among them we can mention *grazing*, which practically covers the entire mountain area, and the tools specific to this occupation, which are necessary to perform this activity.

Another activity with roots deep into the history is *the pottery,* which is still preserved in its traditional form, from the points of view of technique, burning and the natural colors used, in a small number of localities: Chiril, Crucea, Todireni.

Processing the textiles (wool, flax, hemp) and leather, to get clothes (Dorna Candrenilor, Şaru Dornei, Ciocăneşti, Cojoci) as well as *wood processing* are characteristic occupations, spread in the entire Dorna Country (Dorna Arini, Iacobeni, Panaci, Şaru Dornei etc.)

The folklore and ethnographical centers are numerous in this depression,

from popular songs and dances to the clothes, type of house and farm, house appliances and ancient customs. All these are represented miniaturally in the museum of ethnography, Vatra Dornei.

The permanent ethnographical exhibition set up in the great building of the City Hall gives a complex and convincing picture on the richness of the traditional Bucovina mountain civilization in general and the richness of Dorna area in particular.

The attraction point is represented by the three traditional interiors, set up in such a manner as to look beautiful but still to respect the area's ethnographical reality.

The architecture is represented by the scale model pf a traditional house specific to Dorna area, dating from the XIXth century. The model has been brought from Cosna village. The scale model is supported by a few authentic architectural elements: poles and verandah small gates, wooden bolts for fixing the wooden tile on the roof. The small verandah gate is decorated, using astral symbols as decorative elements.

Ceramics is very good represented through objects specific to 2 major centers: Rădăuți and Marginea, and to a less known center - Păltinoasa.

Interior fabrics – carpets, rugs, towels made out of wool, hemp and cotton, offer a very refined chromatic show. In this sector both more than a hundred years old and newer creations are exhibited.

Wood art is very good represented because in the mountain area most of the men know how to handle a hatchet and other tools specific to this craft. Thus, here we can find many tools brought from villages such as Neagra-Şarului, Panaci, Dorna Candrenilor, Coşna, Poiana Stampei, Ciocăneşti, Cârlibaba.

The popular costumes are classified by the four ethnographical areas: Dorna, Câmpulung-Moldovenesc, Gura Humorului and Rădăuți. Being an interference area, in Dorna area one can notice influences from Ardeal,

Maramureş, Harghita and Neamț area.

The wedding traditions are represented by the wool headkerchief worn by the people who go from door to door and invite everybody to attend the wedding. Also, we can mention the bride's coronet, made from natural flowers.

The winter customs still have their authenticity..

Traditional interiors. This part of the exhibition reproduces the way in which a peasant room is organized in Dorna. The oven has been reproduced at natural scale and so has been the holiday table (used for weddings, christening, dedication day), bottom drawer or the dish shelf.

The pine tree's road is a thematic exhibition that pays tribute to Dorna's raftsmen. All the phases are reproduced, from woodcutting to rafting.

Scale models have been made, starting from the oldest type of rafts – with wood tie bands and to the newest one.

Grazing. In this exhibition the items are carefully selected, representing various stages: sheep hair-cutting, going up the mountain and so on. Most of the items are original. In a corner, one can watch a natural scale fire place with a hook on which a cast-iron kettle for making soft cow cheese is hanging.

The new creation Here one can find woven materials, costumes, wooden items, all actual. Turning the raw traditional material into account (wool, cotton, wood) this creation bears the mark of the new. Thus, women and men's shirts do not use vivid colors, instead they use colors that are more sober. As far as the ornaments are concerned, nowadays the floral motives replace the geometrical ones.

The natural environment that inspired the creations of the people living in Dorna depression is represented at *the Museum of Natural Sciences,* in Vatra Dornei. This museum has been established in 1957. Here, two aspectes are presented: the area's richness of flora and fauna and the cynegetics. Also, issues regarding the environment protection are displayed.

The first hall shows us species protected by the law: edelweiss

(Leonopodium alpinum), rose bay (Rhodondendron cotski), papucul doamnei (Ycipripedium calceolus), etc. We can also find other species, such as: roua cerului (Drosera rotundifolia), columbine (Aqvilagiu vulgaris), lily, arinul pieptănat, cădelnița.

Rare or very rare animal species are also exhibited: black eagle (Aegypius monoclu), extincted a long time ago in Romania; huck (Hucho hucho), apercailie, little owl, raven. All these are declared as being monuments of nature.

With regard to fish, here we can find the salmonoids: huck, trout, rainbow trout, barbel, broad snout that lately has invaded the mountain waters. The amphibians are represented by the following species: salamander, triton, water salamander, etc. The crawling reptiles are represented by three species: mountain lizard, rattle snake and the house snake.

The birds are presented by classes:

- Daylight birds of prey: kie, screaming eagle, serpent eagle, hawk, etc;
- nighttime birds of prey: winter eagle owl, mop head, owl;
- species that feed on insects but also seeds: great martin, woodpecker, larger spotted woodpecker, sky lark, jackdaw, magpie, forfecuța , mountain cock etc.

The mammalians are represented by: hedgehog, mole, field rat, squirrel, hare. Next we can find panels showing a family of wild boars and deer and a beautiful stag attacked by a pack of wolves.

The last hall displays species of predators: wolf, fox, bear; small carnivorous animals: badger, weasel, ermine, marten, beach marten, otter.

The hunting is displayed on the ground floor. Here we can see a mammoth tusk , an elk horn, a European bison skull extinguished 200 years ago. One can also see deer and stag trophies, furniture made out of deer horns: table, chairs, hallstand and clothes made out of animal fur and leather.

All these objectives (architectural and historical monuments, museums,

memorial houses) represent unique tourism attractions. But, besides all these objectives, very appealing are festivals organized in various periods of the year. In February there is the Snow's Festival and many popular and folk groups are invited to perform on stage. In June we have the music festival for children and teenagers - Muzritm. In September there is the traditional „Căsuța din poveşti" festival of puppets and in October „Ion Luca" national festival of popular theatre. Between 25 and 38 December we have the festival of winter customs called „Porniți plugul feți-frumoşi".

CONCLUSIONS:

The concentration of elements of material popular culture in some of the settlements located in well inhabited geographical areas, as well as the growing importance for tourism of the anthropic tourism fund, which attracts wider and wider categories of persons and especially foreign tourists, raise the question of organizing the tourism village. This type of village would have an important role in the preservation and protection of the anthropic tourism fund.

Maintaining the population with specific rural economical preoccupations contributes to preserving the fund already built and to passing on the traditions from generation to generation. Thus, a contribution is made to the preservation of ethno-folkloric ambiance.

An important role in keeping and preserving the cultural and historical values is to be played by the museums, which, at their turn, become cultural and educational objectives. Through them we can get in touch with the patrimony of some geographical regions with a great folkloric, ethnographic and historical potential.

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MSP: MAÎTRISE STATISTIQUE DES PROCESSUS
SPC: STATISTICAL PROCESS CONTROL

VULC SILVIA
Grupul Şcolar de Construcţii Maşini Sibiu

RESUME:
La MSP est une méthode destiné aux moyennes et grandes séries. Son application sur des petites séries peut poser des problèmes (mais elle est possible et de plus en plus utilisée). Elle est fondée sur un retour rapide d'informations du processus vers le processus. Si l'analyse de l'échantillon nécessite plusieurs heures, cela peut être un obstacle important à l'éfficacité de la méthode. La MSP est un grand pas en avant vers la conformité de l'ensemble de la production. Toutefois elle ne garantit pas le zéro défaut. La maîtrise des variations suppose que la mesure soit fiable.

I. GÉNÉRALITÉS

La pratique de la MSP peut être suscitée par la préoccupation d'utiliser aux mieux l'outil industriel dont on dispose (accroître la compétitivité par la constance de la qualité des produits, réduire les coûts de non-qualité, optimiser les contrôles ...) on peut-être imposée par le client (grande entreprise, donneur d'ordre ...).

La MSP est un mode de gestion qui conduit à se rendre maître de son outil de production pour satisfaire les besoins du client, en agissant à temps sur les facteurs techniques et humains responsables de la qualité.

Le but Maîtrise Statistique des Processus est, à partir du contrôle des produits, de piloter les paramètres du processus qui ont une influence sur la qualité du produit.

La démarche part de l'idée qu'une non-conformité sur le produit est la conséquence d'une anomalie sur le processus et on contrôle les produits pour

suivre le processus afin de pouvoir intervenir immédiatement en cas de dérive.

La stratégie qualité des entreprises est passée de la stratégie de détection à la stratégie de prévention.

Schématiquement, on peut distinguer 3 âges dans l'évolution du Management de la Qualité:

- **L'âge du tri**

Les produits sont contrôlés, les bons sont acceptés et les mauvais sont rejetés.

- **L'âge du contrôle**

Des contrôles sont effectués en cours de fabrication sur certaines caractéristiques du produit afin de permettre les actions correctives dès que les écarts par rapport aux objectifs sont décelés.

- **L'âge de la prévention**

Des dispositions systématiques sont prises dès la conception, puis dans la réalisation pour obtenir une qualité plus régulière et plus économique.

L'application de la MSP repose sur deux concepts de base qui sont:

- Le suivi et le pilotage par „cartes de contrôle" (travaux de Shewhart dés les années 30)
- La mesure des capabilités (années 70 dans l'industrie automobile américaine)

II. CONCEPTS GÉNÉRAUX

2.1. Variabilité et sources de variation

Le processus de production fluctue en permanence. Il n'est jamais absolument stable. Nous distinguerons deux types de variabilité et leurs causes:

a. Les causes ou sources aléatoires de variation (causes communes)

Ce sont les nombreuses sources de variation: attribuables au hasard, d'effet individuel faible, toujours présentes à des degrés divers dans les processus de fabrication. Ce sont par exemple:

- les jeux mécaniques nécessaires au fonctionnement d'une machine
- les variations au sein d'un même lot de matière première, etc. ...

Les variations induites individuellement par chacune des causes communes étant faibles, il est dificile de les identifier, de les qualifier et de les éliminer. Ces variations obéissent globalement à des lois de probabilité connues: en général la loi normale.

b. Les causes ou sources assignables de variation (causes speciales)

Ce sont les facteurs de variation peu nombreux, identifiables, d'effet individuel important, sounent irreguliers ou instables qui viennent perturber un procédé de fabrication. Ce sont par exemple:

- la rupture d'un outil ou d'un composant du procédé
- les défaillances humaines
- des „points durs" dans un mécanisme
- les variations d'un lot de matière première à un autre

2.2. Vocabulaire de la MSP

a. Processus maîtrisé

On dit qu'un processus est maîtrisé lorsque sa variabilité dans le temps n'est due qu'à des sources aléatoires de variation. Cet état n'est pas l'état d'un processus de fabrication livré à lui-même, mais résulte de l'élimination une à une des causes assignables de variation. Aussi longtemps que le processus demeurera maîtrisé, il demeurera prévisible, avec des avantages évidents en matière de constance de la qualité, de productivité et donc de coûts.

b. Processus non maîtrisé

On dit q'un processus est non maîtrisé lorsque sa variabilité montre la présence de causes assignables de variation. Cet état n'est pas un état désirable pour le processus puisqu'il devient imprévisible et qu'assurer la constance de la qualité est impossible ou nécessite des coûts supplémentaires.

c. Aptitude d'un processus

L'aptitude est aussi appelée „**Capabilité**".

Un processus sera déclaré „apte" s'il a démontré, pour les caractéristiques sélectionées, qu'il était capable de produire pendant une période suffisamment longue, avec un taux théorique de non-conformité inférieur aux exigences internes à l'entreprise. L'aptitude d'un processus à produire conformément aux spécifications ne prend pleinement son sens que si le processus est stable dans le temps, c'est-à-dire maîtrisé.

2.3. La démarche MSP

Cette démarche a comme origines:

- la recherche des paramètres influents du processus (causes potentielles de dérive)
- la recherche des caractéristiques importantes du produit (qui caractérisent les variations inadmissibles du processus) et comme finalités:
  - la suppression des causes assignables
  - la réduction des effets des causes communes

En passant par:

- la vérification de l'aptitude du processus à réaliser les produits conformément à leurs spécifications
- le suivi continu de sa variabilité et donc de son aptitude à reproduire un produit et répéter cette reproduction
- l'analyse de sa variabilité

2.4. Limitations de la MSP

La MSP est une méthode destinéaux moyennes et grandes séries. Son application sur des petites séries peut poser des problèmes (mais elle est possible et de plus en plus utilisée). Elle est fondée sur un retour rapide d'informations du processus vers le processus. Si l'analyse de l'échantillon nécessite plusieurs

heures, cela peut être un obstacle important à l'éfficacité de la méthode. La MSP est un grand pas en avant vers la conformité de l'ensemble de la production. Toutefois elle ne garantit pas le zéro défaut. La maîtrise des variations suppose que la mesure soit fiable.

2.5. Les outils

L'outil central de la Maîtrise Statistique des Processus est la **carte de contrôle.**

Les outils associés sont:

- pour l'identification des paramètres influents et des caractéristiques importantes:
  - les **A.M.D.E.C.** moyens de production et produits (Analyse des modes de défaillance, de leurs effets et criticité)
  - les plans d'expériences
- concernant la carte de contrôle:
  - les techniques statistiques
- concernant la suppression des causes assignables:
  - les méthodes de résolution de problèmes.

2.6. Les changements de culture à l'origine de la MSP

Le passage du % au ppm: nous sommes passés d'un raisonnement fondé sur des pourcentages de pièces non-conformes, vers une notion de pièces par million non-conformes (ppm). Comment détecter dans un lot de 1000 pièces contenant 0,1% de pièces défectueuses la pièce défectueuse? Les méthodes utilisées vont du contrôle à 100 % à un contrôle statistique par échantillonnage mais n'assurent pas toujours 100 % de pièces bonnes. En effet, même un contrôle à 100 % ne peut assurer 100 % de produits conformes.

L'ensemble de la logique de contrôle qui prévalait dans nos entreprises s'effondre, il faut inventer autre chose:

La MSP permet d'assurer une qualité optimum par l'utilisation de l'outil statistique en donnant les moyens aux opérateurs de réaliser une production centrée, de dispersion la plus faible possible.

Les objectifs de la MSP sont les suivants:

- donner aux opérateurs un outil de pilotage des machines
- formaliser la notion de capabilité d'un moyen de production
- faire le tri entre les situations ordinaires et les situations extraordinaires qui nécessitent une action.

2.7. L'auto-contrôle

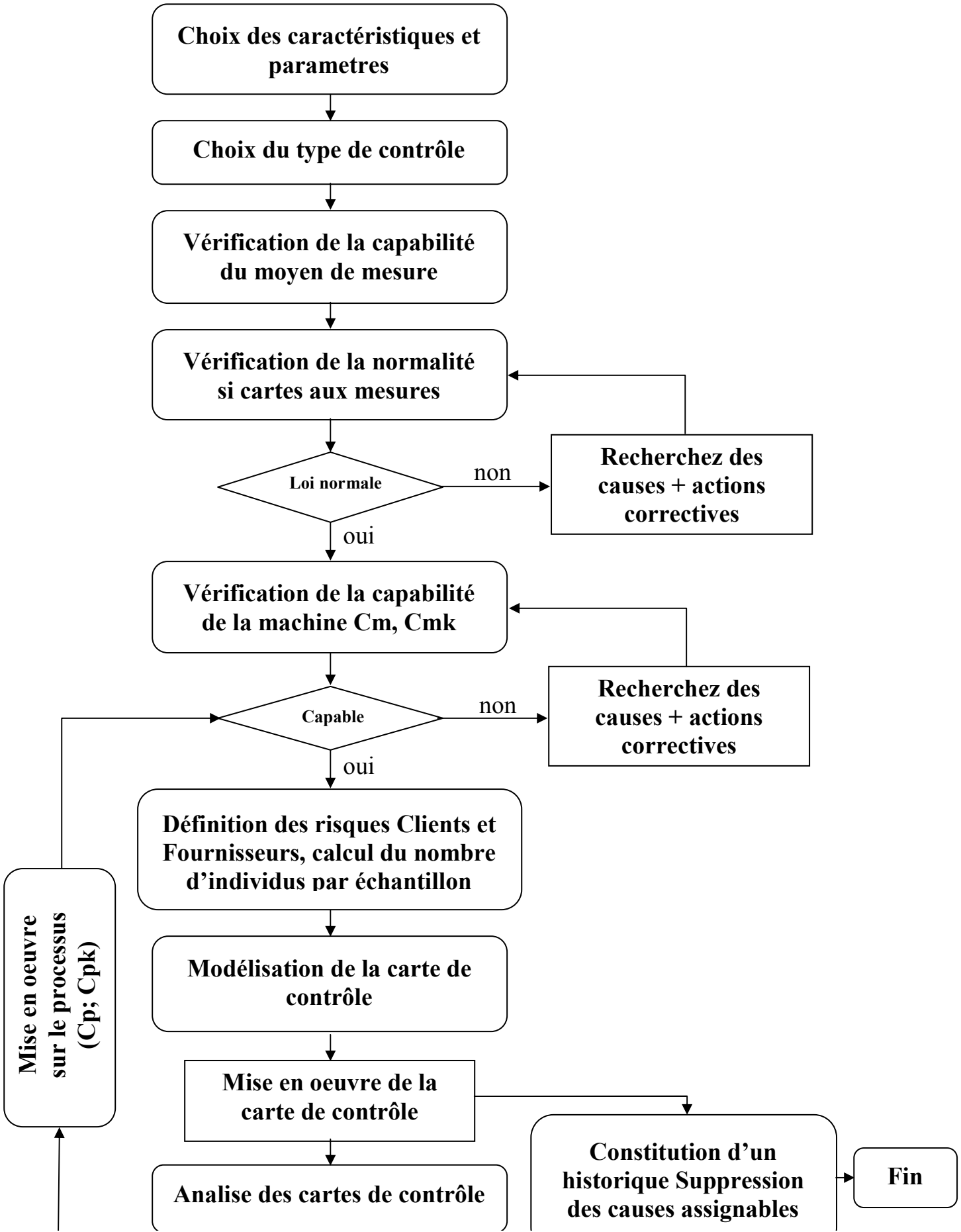
Depuis plusieurs décennies, l'auto-contrôle a fait son apparition dans nos entreprises. Cependant, il n'a pas encore supprimé le contrôle de réception et de nombreuses entreprises pratiquent ce type de contrôle faute de pouvoir faire confiance à un auto-contrôle préventif dont le but est de prévenir l'apparition des non-conformités. Ce contrôle se situe sur le machine de production afin de réduire le plus possible le délai entre la détection d'une dérive et l'action.

Un des principes de base de l'auto-contrôle est la détection des dérives. Le travail de l'opérateur consiste à vérifier en permanence si les variations observées sur le produit sont attribuables aux causes communes (il ne faut pas intervenir) ou à une cause spéciale (nécessité d'une intervention).

Les moyens de l'auto-contrôle:

- Moyens en compétences techniques: l'opérateur doit avoir les compétences nécessaires pour être capable d'analyser les situations, prendre les décisions qui s'imposent et réagir sur le processus.
- Moyens en capabilité: le moyen de production doit avoir des performances compatibles avec la qualité requise. Il faut déterminer de façon précise la capabilité des moyens de production
- Moyens en méthodes et outils de mesure: pour vérifier la cohérence entre les moyens de contrôle et la qualité demandée pour vérifier la

Logigramme de mise en oeuvre de la Maîtrise Statistique des Processus



- cohérence entre les moyens de contrôle et la qualité demandée doit être géré de façon efficace par une Gestion des Moyens de Mesure.
- Moyens en méthode de pilotage: chaque opérateur doit être familiarisé avec les techniques statistiques de pilotage des processus industriels telles que l'utilisation des cartes de contrôle accompagnées de leur journal de bord.
- Moyens en délégation de décision: l'auto-contrôle ne peut s'épanouir que dans le cadre d'un management participatif. L'opérateur doit disposer de la responsabilité de l'auto-contrôle. La responsabilisation des opérateurs ne peut être efficace que si le management a mis en place l'environnement nécessaire.

L'autocontrôle est un moyen:

- De rendre responsable chaque acteur en lui faisant faire l'essentiel du contrôle qui était effectué auparavant par des contrôleurs spécialisés
- De mieux maîtriser la qualité en permettant une réaction immédiate au défaut

L'autocontrôle doit permettre en outre:

- D'améliorer la motivation du personnel et de le sensibiliser à la notion de rentabilité
- De réduire les coûts de non-qualité par la détection et correction rapide des défauts.

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INFLUENCE OF THE ANTHROPIC FACTOR UPON ENVIRONMENTAL CONSERVATION

PURDOIU ŞERBAN

UASVM Bucharest

ABSTRACT

To avoid the discrepancies between economists and ecologists, the solution lies in eco-economy that, by definition, presupposes meeting the ecological principles, environmental factors, as well as adopting policies and strrategies that combine the respective country's economic development and its environmental protection and conservation. However, adopting such an economy will affect human life from all the viewpoints: lightening, food, transportation. Therefore, human beings must become aware of the importance of eco-economy and bring support for such an economy to function. Romania is a poor country in transition and to draw a gold-resource exploitation project which mutilates the mountains, damages the environment and human community, etc. 18% of the business means the most evident loss for Romania, and its profitability is questioned even for higher percentage.

KEY WORDS: ecology, environmental protection, eco-economics, strategy, viability.

The ecologists understand the planet's life-supporting ecological processes: photosynthesis, the nutrient cycle process, the water circuit in nature, the relationship between plants and animals. Nature is based on a balance related to soil deterioration and recovery, tree death and regeneration, etc. Also, in nature, body residue is another body's life support, and raw materials and residues have the same starting point. Although this is well-known by human beings, the world's decision-makers have adopted development strategies overlooking or even neglecting the environment-supported, or even higher (quite fragile), production. Economists should become aware of the fact that natural ecosystems provide several environmental services whose price should be determined and introduced within the circuit of the market-existinf prices, even though the assessment of the environmental service can only be approximated. Also, governments should not subsidise the economic activities that are highly consumers or wasters of natural resources, destroying the environment and using a well-organised information system that does not affect the market signals.

A significant part of the current economic sectors (energy, mining, car-making, food) will find no place within ecoeconomy unless non-polluting production technologies are adapted. Thus, an

important share of the present-day active labour force will lose their jobs; however, workers will be able to find a job in the new industries (bicycle-making, fish farming, wind-farm constructions, hydrogen production, etc.) that will occur as a result of meeting the ecological principles.

Adopting ecoeconomy is not sudden; it presupposes a long-term process that will convince population that this type of economy is beneficial for the society. Economic restructuring implies a series of tools facilitating gradual passing to ecoeconomy.

One of these instruments consists in the pollution taxes which should be increases simultaneously with decreasing income taxes. A market providing correct ecological information will also include the ecosystem value in the product price, thus leading to the disappearance of the necessity to increase these taxes. Also gradually, the state subsidies provided for the polluting economic activities will be reduced, together with the mandatory introduction of the nonpolluting technologies.

The ecocertification of the economic products and commercial licencing will also belong to this field. Thus, the government establishes the quantitative limits allowed for economic activity while the market determines the licence price. Contrary to the economic licences, environmental taxes imply governmental decision upon the ecologgically destructive price of the respective activity, whereas the market establishes the amount.

However, this ecoeconomy cannot be imposed by one single country while all the others countries of the world preserve their current economy type. Countries should work together worldwide since environmental issues do not arise exclusively in one specific country (e.g. air pollution is a cross-border issue, like the pollution of the rivers that cross several countries). Even the economies currently building up a market economy, such as Romania, must adapt their transitional process to the development of an environment-based economy. Thus, it is paramount to protect the natural factors, to achieve the quantitative and qualitative optimum between human beings and nature, to apply environmental protection so that economic and social life can continue. Romania must find the best pace for economic and social development so that:

- under the present conditions, economic growth can meet the society members' needs, which leads to sustainable development supported by the environmental factors and respecting the dynamic ecological balance;

- it can achieve internalised environmental costs, since economic agents tend to use the environment as a free assset whereas the environmental-damage costs are paid by the populations. Therefore, both economic agents and individuals must be compelled to pay for the ecological damage produced, by a suitable legislative framework, norms and standards drawing the highest limits

approved for different types of activities;

- environmental pollution and degradation prevention, as well as quality recovery should be not only GNP consuming, but also value creative (NNP).

All the above demonstrate the paramount importance played by the natural environment within the strategies defined for Romania's transition to a market economy, irrespective of the governing political party. Romanians should become aware that, without a healthy environment, any attempt of development or economic growth of the country will meet no success.

All the above is contradicted by the mining project of Roşia Montană which respects almost none of the listed principles.

Romania is a poor country in economic transition whose project aimed at exploiting gold resources by mutilating mountains, affecting the environment and human community, etc. for 18% of the business is the most obvious loss for the country, together with an even higher percentage of profitability. The benefits brought to Romania by this project will not make us richer, and the future generations will definitely be poorer by resource depletion, relief, environmental and cultural destruction and, last but not least, the destruction of local community cohesion.Finally, the aim of such a project is overall wealth which, in this case, is out of question. The small benefits of this project for Romania disappear, if compared with the losses, as the costs-benefits relation is extremely unfavourable for our country.

The potentially significant benefits that may derive from an alternative project, such as a project based on agriculture and tourist development (agrotourism and ecotourism), should be actually considered. The government has established national objectives for balanced long-term development. The Ministry of Development and Prognosis has established the Apuseni Mountains as a potentially significant tourist area, and has developed a viable strategy of progressive reclamation of the mining centres and promotion of rural development and ecotourism.

Previous experiments of mining-based monoindustrial development proved disastrous for the economy (see Roşia Montană, Valea Jiului, etc.). After 14 years of transition, the economy is still struggling to reclaim the mining areas by introducing diversified sustainable economic activities. To accept such a mining project as the one proposed by the Canadian company is nothing but to return to the policy based on monoindustrial mining, leading to more acute job-related and social problems. Gold can easily remain in the earth waiting for Romania to run truly profitable business, when technical development will allow nonpolluting exploitation and when the much lower corruption level will eliminate the suspicions related to the approval of one project or another. It is necessary for the

government, by the National Agency of Mineral Resources, to establish straight policy and criteria as guidance for the approval of mining grantings and projects in general, and precious metals extraction in particular.

Table1 – Impact of Roşia Montană project, costs and losses

Direct impact	**Indirect impact**	**Costs**	**Casualty**
Deforestation, land degradation and soil erosion			
Reduced forest area as a result of massive deforestation in order to obtain the space required by the mining activity	Land degradation, increasing soil erosion, land sliding, floods	Lower soil fertility in the valley areas, resulting from soil instability	> Valley communities neighbouring the mining area, including Abrud
		Damage in the inhabited areas (farms and houses) which are exposed to flooding and land slides	> Romanian state budget for emergency situations, in the case of natural disasters
	Loss of forestry resources and forest products, normally available for local communities	Loss of building forestry materials, resulting in increasing living costs for the local community	> Local communities, compelled to purchase fuel and building forestry material from other sources for higher prices
Limited fertile lands within the areas necessary for the mining activities and building the waste-management facilities	1. Losses in wildlife habitat in the area 2. Loss in the regional flora	Reduced biodiversity	> Endangered species > Biological network > Environmental quality
	Agricultural and animal production losses	1. Profit loss from farm activities 2. Higher living costs	> Local communities, compelled to purchase animals and agricultural products from other sources for higher prices
Water deficit, acid drainage, water pollution			
Reduced water resources due to water consumption in high amounts for mining exploitation	Loss of water available for other use (human or animal consumption, irrigation)	1. Costs of delivery and distribution of alternative drinkable water sources 2. Increasing living costs	* Local communities that will be compelled to purchase drinkable water from alternative sources for higher prices * Local budget that will have to finance the alternative systems of drinkable water supply and distribution
	Lower river flow and depth in the area	1. Less visual landscape downstream	* Aquatic life forms * Tourists

		2. Ecological loss 3. Loss of microhydrological resources	> Life quality + Romania > Hydrologic energy > Quality of natural environment
Groundwater contamination by cyanide and heavy metals resulted from waste storage in open lakes	Loss of clean water available for human and animal consumption	Higher costs for water cleaning and delivery	> Romanian state budget (water treatment and drinkable water supply systems)
	High health risks due to increasing exposure to various toxic substances	1. Consumers will avoid food coming from the mining area; 2. Increasing health costs	+ Local economy > Exposed population + State budget allocated to the health system
	Ecosystem damage (wildlife destruction)	Natural resourcess losses, including animals, medicinal plants and water sources	> Local population and ecosystem > Romanian state

Air and sonorous pollution

Increasing air pollution due to dust (silica) release causing serious damage to human health	1. Increasing disease risk (respiratory and infectious diseasesrisk will increase by 20-40%) 2. Lower life expectancy 3. Farm animals will also be affected	1. Higher medical care costs 2. Higher veterinary care costs	> Exposed population * State budget destined to health system * Owners still living in the area
Sonorous pollution due to explosions, demolition and busy traffic	1. Increasing disease rate (stress) 2. Farm animal stress	1. Increasing medical care costs 2. Lower production	+ Exposed population * Romanian health system > Owners still living in the area
	Wild animals will leave the area	1. Unstable ecosystem 2. Irreparable damage	> Owners still living in the area
Geotechnical changes			
Geotechnical changes resulting from the building of the decantation lake and wate-management facilities	Land sliding and movement	Increasing ecological costs	> Romanian Agency of Environmental Protection
	Risk of defective waste-management systems and accidental spread of	Eventually high ecological costs (tens of times higher than Baia Mare)	* The town of Abrud may bre completely destroyed, and the valley villages may be left

	toxic substances, including cyanide		without drinkable water > Downstream villages: Arieş basin and the Danube
A defect system and low mechanical resistance of the sediment cover in the location of the decantation lake may result in accidents. Systematic powerful explosions in the mountains crossed by old interior galleries.	Risk of accidents due to soil destabilisation	Risk of Romania being sued by the Hungarian state (see Baia Mare) Accidents with serious human consequences	* Romanian state compelled to pay important ecological damage inside and to neighbouring countries > The image of the country will also be seriouslt affected + Hungary (Tisza Basin) > The miners who are directly exposed to the explosion-affected area * Valley communities
Damage to national and international heritage: Historic, archeological and cultural losses			
Destruction of the unique Roman galleries and other valuable archeological sites	Irretrievable loss of some important 2000-year-old monuments	1. Loss of historic and archeological inheritance 2. Loss of eventual important profit from promotion of tourism 3. Loss of valuable cultural information 4. Negative effects concerning the country's perception abroad	> Local communities that may benefit from the promotion of tourism > The Romanian state that is losing an invaluable heritage > The entire international community, humankind + Romania. Disastrous effects regarding its international image
Destruction of some old historic buildings considered invaluable architectural heritage	Loss of houses, churches and monuments that are law-protected heritage	1. Loss of cultural identity 2. Loss of historic heritage 3. Loss of tourist profit	> Local communities > Romania + Future generations
Disappearance of some natural monuments	Loss of natural heritage	Loss of tourist heritage	* Local communities > Romania
Long-term impact (after closing up of the mine)			
Limited duration of the mining project (15 years)	1. Total destruction of local economic resources and impossibility to develop alternative economic activities	1. Long-term social costs 2. High crime rate	> Miners, local community and the whole area will be affected on the long term + Romanian state budget will have to

	2. Very high rate of miners' unemployment		compensate for the social and economic loss
Continuous soil and water contamination after the mine closing up	Required continued treatment with acid water for 30 years after the mine closing up	Water treatment costs are estimated between 30 and 60 million USD per year	* Romanian state budget (Ministry of Finances)
Destruction of villages and local communities			
Destruction of entire Roşia Montană, the oldest Romanian village	1. Loss of identity, cultural and traditional values 2. Loss of 2000 years of history	Costs are impossible to evaluate and estimate	+ Romania's historic past and its heritage > The European heritage
Destruction of the social network, together with the entire local community	1. Loss of social cohesion 2. Destruction of community network and mutual support 3. Destruction of family ties	1. High living costs 2. High crime rate 3. Loss of human lives, especially the elderly	> Removed population, especially the elderly * Humankind. Lifestyle erosion > Humankind. Loss of continuity
Destruction of churches and cemeteries	1. Loss of cultural values 2. Loss of social cohesion	High stress, disease rate and human costs difficult to assess	> Inhabitants of Roşia Montană, Corna and their families < Orthodox churches losing their credibility and heritage
Economic issues, workforce and income sources			
Destruction of traditional subsistence system based on farm activities	1. Pressures for searching other income sources 2. Needs for additional employment	1. Lower living standards 2. Increasing social costs 3. Higher crime rate	> Removed population > Local economy + Romanian state and budget destined to social assistance
RMGC provides few jobs for local population (300)	High living costs for future unemployed people	1. Low living standards for most local population 2. High social costs 3. High crime rate	* Most local people will have no possibility to get employed * Romanian state
Lack of initiative from Romanian and foreign investors, due to the mine existing in the area	1. Ceasing the existing economic activities that are not compatible with the mine existing in the	1. Loss of jobs 2. Loss of income sources 3. Loss of potential alternatives and any	+ Local economy will be destroyed, in a similar manner with all the monoindustrial mining centres

	area (agricultural trade, tourism) 2. Impossibility of any future alternative activity (tourism, agriculture, light industry and other services)	sustainable development of the region 4. Long-term poverty of the entire area, higher unemployment and social costs	* State budget will have to to compensate for high social and economic costs > Romania's international reputation will be seriously affected

Source: Bran F., Manea Gh., David O., Mătăsariu L., *Preliminarii la o strategie de dezvoltare economică a zoneiMunților Apuseni – o abordare ecologică / Prelimiaries to an economic development strategy of the Apuseni Mountain area*, Economistul, Supliment nr. 361/20.10.2003, pp.3-4

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CONTRIBUTIONS TO DIMENSIONING OF THE SELF-SHIFTING CENTRAL-PIVOT WATERING INSTALLATIONS

EMILIA MANOLE

UASVM Bucharest

ABSTRACT

It is well-known that the shift-applying irrigation water – self-shifting – installations are the future solution for sustainable irrigated agriculture. Considering the increasing technical and economic efficiency and environmental protection, these installations fall into the following classification: drum and hose; liniar or frontal ramp; central pivot. Analysing the evolution of irrigations in Romania from a strategic viewpoint, the system rehabilitation and modernisation should start from their re-equipment with self-shifting installations. Thus, the use of the viable systems will increase, generating economic profit for the field beneficiaries. Therefore, their effort will be added to the governmental effort necessary to promote the investments related to the rehabilitation and modernization of the important irrigation systems.

KEY WORDS: reclamation-modernization, viability, efficiency, sustainable agriculture, fiability

Analyzing the evolution of irrigations in Romania from a strategic viewpoint, the system rehabilitation and modernisation should start from their re-equipment with self-shifting installations. The current performance of the self-shifting installations confirm the possibility to apply high-efficiency irrigations by the following: watering can occur where, when, and how much it is necessary (i.e., the momentary watering standard), as well as how long ti is necessary, thus meeting the fundamental law of crop irrigation; chemicals spreading can be applied (fertilizers, herbicides, pesticides) or used waters, mixed with the irrigation water; it can pass from traditional agriculture to minimum tillage technology owing to chemification occurring simultaneously with irrigation water and even without any water.

With these installations creating irrigation water bogging, it is easily understood that their economic efficiency is low. This phenomenon – that also has negative effects on the environmental factors – is determined by numerous factors: lack of studies on water inflitration; unsafe hydraulica parameters required for installation provision (charge, pressure); unsuitable speed; low coefficient of sprayed water uniformity, etc.

Consequently, it is necessary to find new basic elements in order to draw out placement studies,

to provide the efficient design and exploitation of the self-shifting installations that are fundamentally different from the static installation design. Among these, the most important are: the hydraulic conditions of installation provision (charge, pressure), according to its working location; the relation between the shifting speed of the installation, the rain distribution law and the speed of water infiltration into the soil; the shifting speed variation of the installation during a watering cycle; the water distribution law along the installation, according to its type, the net watering standards and the daily consumption rate through evapotranspiration.

In this context, this paper is aimed at presenting the main dimensioning and checking methods that are specific to the central-pivot installation.

The charge distribution along the installation proves that its ending is the main issue in watering. Also, the loss og hydraulic energy – in the same installation provided with the same charge (Q_o) – is higher by at least 60% as installation (IAPC), compared with (IAL). The instantaneously watered surface to the downstream ending of the installation (IAPC) is unique and the distributed (sprayed) charge is high, which makes the simultaneous pluviometry much lower than the speed of water infiltration into the soil (v_i).

The intensity (Ih) of rain spread along the spraying radius of the sprinklers (in the case of the sprinkler-equipped installations) will have a group of transversal profiles along the radius (Rp) – profiles that can be determined as a result of the measurements made by yhr tatic installation.

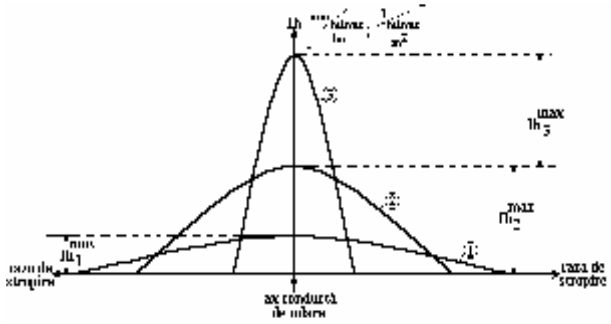

Figure 1 – Piezometric profiles in prependicular section on the watering conduct axis

1. **near the pivot ($r \rightarrow 0$);**
2. **at an intermediary distance ($0 < r < Rp$);**
3. **downstream the installation ($r \rightarrow Rp$).**

Since these installations have a variable shifting speed, the issue is to determine the speed spreading the watering norm that is closer to the required value and meets the demand according to which it should avoid water bogging. Conventionally, the speed that meets the two conditions simultaneously was termed the optimum shifting speed (v_o).

The determination of the optimum speed (v_o) is based on the knowledge pf three elements:

unitary (specific) sprayed or sprinkled charge (q_o); the spreading function of the sprayed (sprinkled) water intensity along the spraying radius of the sprinkler of the devices that make up the installation; the speed of water infiltration into the soil during the sprinkling of a unitary surface (1 m^2).

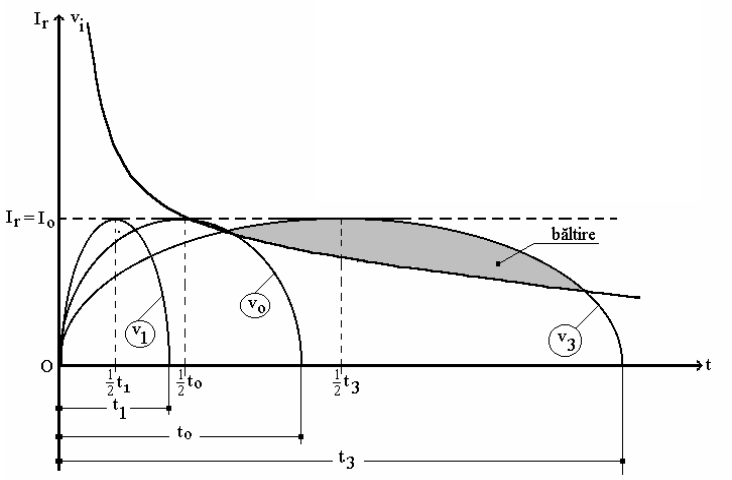

Figure 2 – Water spread during watering of a unitary surface [$I_r(t)$] for the three values of the liniar installation shifting speed ($v_1 > v_0 > v_3$) related to the infiltration speed evolution (v_i)

The analysis of the above diagram shows that bogging occurs only when the water spreading curve [$I_r(t)$] - corresponding to shifting speed – exceeds the infiltration speed curve [$v_i(t)$]. The best installation shifting speed (v_o) is:

$$v_o = \left(C \cdot \frac{q_o}{\alpha} \cdot \frac{1}{R^{1-\beta}} \right)^{\frac{1}{\beta}} \qquad (1.1)$$

The analysis of this relation shows that an installation that will function in a certain location should be specifically dimensioned so that the unitary charge (q_o), sprinkling aza radius (R) and the parameter (C) of water spreading along the radius should meet this demand, corresponding to an optimum shifting speed (v_o) between the limits foreseen by the provider. The shifting speed of the installation varies within a wide range, providing a full rotation from t_r^{max} = 240 hrs/rot to t_r^{min} = 15 hrs/rot. Also, the bogging phenomenon in such an installation is more likely to occur towards its end, where the unitary charge is the highest:

$$q_o^{max} = 2 \cdot k \cdot Rp, (l/s.m) \qquad (1.2)$$

CONCLUSIONS

Following the analysis on the self-shifting central-pivot installations, the following conclusions can be drawn:

1. this type of installation has the highest fiability of all the other types, as it has a fixed pivoting point, which forces the wheels to run the same routes during the entire exploitation time (minimum 15 years);
2. from the hydraulic viewpoint, this installation is characterized by: linear variation of the charge along the installation, lowest in the pivoting section and highest in its downstream; the loss of hydraulic energy within the installation is 60% higher than in the case of linear shift; the equipment with devices providing water application on the cultivated surface is made by simultaneously meting the two specific laws of this installation: the linear variation of the spreading charges and the variation of the available pressures in any section that is considered a pivot in the sense of water flow along the watering pipe;
3. the combined effect of the two hydraulic laws considerably increases water bogging towards the downstream. From this viewpoint, the installation has a limited length for different soils, which is expressed by the infiltration speed equation;
4. the use of this installation of sandy and loamy soils does not limit their length as bogging us avoided in the hypothesis of adding rotative sprinklers, pressure up to 35 mcA in the nozzle.

It is noteworthy that the use of the installation on clayey soils is limited by the occurence of blogging over the length of the installation (120 m), which justifies the fact that the soils of low water-bogging speed (clays, loamy clays, clayey loams) are avoided by central-pivot installations (IAPC).

Table1 – Determining the highest length of the IAPC installations for the three soil types in the hypothesis of installing rotative sprinklers

Nr	Parameter	Soil type					
		LOAM		CLAY		SAND	
1	α	0.41		0.89		2.22	
2	β	0.34		0.25		0.19	
3	$m_o(m^3/ha)$	450		550		350	
4	η_u	0.80		0.825		0.85	
5	C	45		45		45	
6	$et(m^3/ha.day)$	50		50		50	
7	t_f(hrs/day)	20		20		20	
8	k	10^{-4} x 2.727		10^{-4} x 2.644		10^{-4} x 2.566	
9	$\alpha_p = \frac{Ha}{d_o}\left(\frac{mcA}{mm}\right)$	5		4		3	
10	t_r^{min} (hrs/rot)	15		15		15	
11	$1{,}6 \times \alpha_p^{0,4} \times d_o \times \left[\left(\frac{\pi}{30t_r^{min}}\right)^{\beta} \frac{\alpha}{2ck}\right]^{\frac{1}{1-\beta}}$	17		67		217	
d_o (mm)		Ha (mcA)	R_{max}(m)	Ha (mcA)	R_{max}(m)	Ha (mcA)	R_{max}(m)
5		25	85	20	335	15	> 1000 m
6		30	102	24	402	18	
7		35	119	28	469	21	
8		40	136	32	536	24	
9		45	153	36	603	27	
10		50	170	40	670	30	
11		55	187	44	737	33	
12		60	204	48	804	36	

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ENVIRONMENTALLY-INDUCED EFFECTS OF THE IRRIGATION SET-UPS

EMILIA MANOLE

UASVM Bucharest

ABSTRACT

The build-up of the irrigation system has brought along economic and social changes. The changes occurring even in the build-up stage of the project were ample. The inhabitants of the region took active part in accomplishing the investment programme, from unqualified work to basic jobs such as concreters, plumbers, electricians, eletro-mechanics, etc. This increased the level of professional knowledge of the people in the area. As system exploitation started, the peasants had to learn the watering technigue for various crops in various technological conditions. Thus, irrigation had a positive impact on the labour force, allowing the increase in new jobs. The application of Law No 18/1991 and the disappearance of the APCs has completely disorganised irrigations in the region. Land has been fragmented by property restoration, and many owners have worked their lands by primitive means, while others have organised smaller or greater family associations, all without economic resources, unable to incur quite high technological expenses together with price liberalisation. For an irrigation programme to succeed, it is necessary to be subsidy- supported, and the farmers should be psychologically and financially trained.

Key words: environmental protection, reclamation-modernization, sustainable agriculture, balance, fiability

1. Evolution of soil quality

Based on the soil observations, laboratory analytical data and specialist literature, the involution recorded on certain irrigation-planned lands is caused by several factors.

The main cause changing the groundwater regime and determining all the other negative side effects is related to the huge infiltrations in the inlet and dsitribution channels, as well as the irrigation over the field standards. Also, restrictions are imposed on the watering standard on the lands where water level was high.

Another equally important cause is the irrigation by waters exceeding the total mineral residues of 1500 mg/l. The water samples of the analysed systems show the total average residue amount of 1060 mg/l. Chlorines and natrium had high values, as follows: Cl 220mg/l and Na 88.mg/l. Considered according to the Priklondski

coefficient, these waters are satisfactory. According to the Florea diagram, they are classified into the 3rd accepted type of irrigation-water estimate (good irrigation waters).

The groundwater increase by annual accumulation of the system water loss at a higher rate than the natural land drainage, and the increase in their mineralisation degree resulting from irrigation water and intense evapotranspiration in the analysed areas, have led to the growing secondary degradation phenomena – salinity and/or alkalinity, intensified gleying or even marsh formation. The existence of clayey or loamy deposits, rich in capillary ascension, allows slow water circulation or intensifies salts accumulation. Pedological control stages have emphasized an alkaline tendency of the soil profile, compared with the initial situation, and even increased salinity.

Nowadays, laboratory tests for the lands under study show soluble salts watering and only weak alkalinity. The improvement is the result of the evolution of the depression region in strong hydromorphism regime: long-term and even permanent water bogging until 1990 when the water excess was removed. Considering the cumulative nature of the region under study (Dobrudja), future recommendations involve drainage and phospho-plaster improvements in order to prevent salts redepositing on the soil profile.

Another secondary degradation tendency is the intense gleyification of the valley and meadow soils. Due to the low slopes, the waters stand still, deepening the hydro and holomorphism processes.

A particular case of irrigation-determined soil degradation is the intensified erosion on the clopy areas. Irrigations were introduced on slopes of up to 10%. Erosion occurs on some lands that had slopes of 3-4%.

The share of CES workings consists in arable-made works, i.e. about 90%, and about 10% on pastures, whereas the rest has no important share. Therefore, the works were directed towards arable and pasture land protection which is the main productive resource for good agriculture. The CES workings were performed simulatenously with

the irrigation workings, and were 20 years old. All this time, the workings were not adequately maintained, which resulted in their frequent silting. The open irrigation channels fragment the slopes and, in some cases, create areas to deposit the slope-eroded matter.

Along the channel, there are reception and concentration areas. The concentrated flow towards the irrigation channels poses no problems related to their protection, since they had been equipped with hydrotechnical constructions of channel undercrossing to the valley stream or channel siphoning. However, there are serious problems in the reception areas where the measures taken (e.g., level waves) have been inefficient, as they had to be maintained after every significant rainfall, together with the other slope workings which did not function or were not built (e.g., parallel grass bands, band crops, protection crops, etc.). The biological workings on the slopes for open-channel protection was of no concern for those who exploted the system, since the agricultural units, associations and private farmers were concerned more with the agricultural lots and less with channel protection. It is necessary to adopt open-channel protection measures, in order to reduce the silt-removal expenses and provide normal water circulation. Compared with the solid flows on the slopes, the open-channel protection measures must be reconsidered, given the new ownership system which does not impose the growing of certain agricultural crops. However, what can be imposed is the land cultivation mode – workings on the level curbs – resulting from lot distribution. Even from the design stage, channels can be protected from direct discharge from the slopes, and the collected waters must be directed wither in the inner channel pools or towards the regularised or redirected water streams. The technological measures that must be applied for water retention on the slopes require some specifically anti-erosion agricultural workings consisting in balks ploughed at every one or two intervals between the rows, instead of the last mechanical ploughing. Each balk is compartmented from place to place by manual thresholds made at different distances, according to the slope

size. The balks must be 20-25 cm in depth, in order to provide water absorption and retention from waterings and rainfalls. These technologies must be achieved on a general anti-erosion background, together with sowing parallel with the level curves, resulting in an increased water infiltration in the soil (up to 90-95%) and reducing soil erosion by 3-8 times. Opening balks at two intervals is recommended for slopy lands (3-4%) or high-standard waterings (manual removal installations, 8-10 hours stable positioning). The CES measures are inefficient, as a result of their lack of maintenance. The CES workings are measures reducing soil pollution and degradation. When irrigation is introduced, degradation is higher unless some specific measures are taken: research that follows the evolution of slope flowing and soil watering under the conditions of some specific workings of private, irrigated agriculture.

According to the nature and intensity of the irrigation-determined limitations, the lands under sutdy have been included in the first five irrigation-suitability classes.

2. Evolution of underground water level

After beginning the functioning of the irrigation system, systematic observation of the underground water level was started by decade measurements in about 50 drillings by piezometers located all over the system. Observation data processing was based on annual division of the groundwater depth (average isophreates) which emphasized their evolution in time, under the mixed influence of rainfalls and groundwater irrigations. As results from the hydrographic division following the recorded data analysis, there was no area of excessive humidity. Concerning the seasonal and monthly evolution of the groundwater level, no significant conclusion can be drawn from the existing data. However, it can observed that the general level has decreased after 1989 between the groundwater depth and the sources filling the groundwater basin, thus influencing the level. There is, however, a certain correlation between the decreasing level in the rainy years or, on the contrary, the increasing water amount and the depth increase in the dry

or low-irrigation seasons. The statistical processing of the existing data and recording has resulted in unsatisfactory results in both hypotheses, due to insufficient data. Thus, most correlation coefficient values (r) are far under the limit of 0.6÷0.7. Even though in the few cases when r exceeds the limit, the existence of any real correlation is not admissible since the regression equation coefficient (a) is positive, which means an inverse correlation of higher depths or lower levels with abundant rainfalls.

To obtain information on the drinkable groundwater, two fountain water samples have been analysed. The chemical analysis bulletins showed that water was undrinkable as it exceeded the standard limits in several indicators: total mineralisation 1600-300 mg/l; total hardness 43-88 German degrees; natrium: 149-626 mg/l; magnesium: 145-332 mg/l; chlorine: 254-626 mg/l. It is also remarkable the high amount in nitrates 412mg/l.

3. Effects upon agricultural production

The land reclamation workings are important for all the regions of the world, as a result of their major contribution to the provision of the popluation's food and environmental protection by the increasing and stabilising agricultural production in the dry areas by means of irrigations, additional water supply for the rural population, fishery and other use, agricultural land and site protection against flooding, excessive water protection on low areas, soil erosion prevention on the slopy areas and water flow protection against cilting, environmental recovery and improvement, etc. The analysis of the Romanian pedoclimatic and relief conditions results in the necessity to perform land reclamation workings, i.e. irrigations, drainage and soil erosion control on wide areas, in order to ensure soil protection and increased fertility, and set up higher agricultural yield under environmental protction conditions. The necessity of irrigations is determined by the soil moisture deficit. Under the conditions of correct application of the other agrotechnical workings, the effect of absent water leads to the drastic reduction in the

agricultural production on these areas and, in some cases, even to crop loss. The studies area is remarkable from the general viewpoint of lower agricultural production due to drought and reduced use of the irrigation systems. Thus, on the irrigated areas, the average production was: wheat 2.5 t/ha; maize 6.8 t/ha; sunflower 1.2 t/ha; vegetables and potatoes 30 t/ha; fodder 10 t/ha; as compared with the non-irrigated areas: wheat 1.9t/ha; maize 2.6 t/ha; sunflower 1.9t/ha; vegetable and potatoes 15 t/ha; fodder 5 t/ha.

Irrigations are not justified from the viewpoint of the real economic effects unless applied together with the other measures of increasing agricultural production that may emphasize the beneficial effects of watering. Crop rotation plays an important part under the conditions of intensive agriculture, on the irrigated lands subject to energetic changes under the influence of some production factors, as well as on some lands lacking certain chemical, physical and bilogical features. Crop rotation contributes, to a greater extent, to the recovery of the soil features and the lower unfavourable effect of some agrotechnical measures that may affect soil fertility. The specific requirements of each crop within the rotation, and particularly for the rotation time length and preemergent plants, are some of the basic criteria in lot and rotation management. The grown plants are grouped, according to rotation demands, into three categories: extremely demanding, medium and low. There are no rotation-independent crops, even if there some of them can be self-supportive for a long period of time and make better use of the rotation effect or the preemergent plant. There can also be identified crops of particular demand compared with the rotation time length, particularly in relation with the persistence of some agents reacting to the premergent plants, mostly determined by the time of land release, nutrients supply and water reserve. In the case of satly lands, the crop nature and structure, as well as crop rotation on private properties, is monoculture, which favours soil erosion on the slopy lands. Therefore, it is necessary to alternate these crops with fodder crops, and the agricultural workings should be applied along the level curve, together with the chemical and/or organic fertilisers.

The system under analysis has used fertilisers, herbicides, pesticides and seeds selected in state farms; there has been no use of materials from the private sector.

For the favourable nitrogen balance in the soil, favourable carbon-nitrate ratio must be provided, and for this it is necessary to use organic fertilizers, e.g. manure. These are extremely important to improve the soil physical properties, more exposed to degradation under irrigation conditions than under neglected crop conditions. Chemical fertilisers provide nutrients directly and more accessibly; their absorption by the plants is much eased by the irrigation conditions, owing to their circulation through the irrigation water, as well as to some related secondary processes, such as: increased microbial activity and quicker mineralisation of the organic matter, higher solubility of the minerals, etc. The most important fertilisers under irrigation conditions, are based on nitrogen, particularly because of its variability depending on soil moisture. The different experiments based on irrigated crops showed that the rate of 100kg/ha N is the average rate for the Romanian conditions. Irrational neutralisation and improper depositing of the fertilisers have a negative impact on the environment. This phenomenon can become even more serious on the irrigated lands, where the infiltrated waters loss in the roots of surface discharge can be a means of carrying the chemicals used as fertilisers to the underground or surface waters. A particular problem of irrigated agriculture is soi lfertilisation by waste water use, particularly of the waters resulting from animal husbandry.

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