

## SEED PRODUCTION OF BIOLOGICAL CATEGORIES AT TOP OF SOYBEAN CULTIVARS AND THEIR BEHAVIOR TO SOIL AND CLIMATIC CONDITIONS AT ARDS SECUIENI

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### Abstract

Seed production is a very important activity for agricultural production, the quality of biological material depends largely cultivated production level obtained.

A good organization of seed production must not only satisfy the production of seeds with higher seminal qualities, but to ensure a seed productivity, what can't be achieved without knowing the nature of plants and their requirements to the conditions of existence.

Plant with high fat and protein content soybean is grown on large areas worldwide, the total amount of biomass being used, especially seeds with high protein substances ( 27.0 - 50.0%) and fats (17.2 - 26 , 9%). Mature seeds can be used in human nutrition (in various recipes), to obtain compound and for fat extraction.

As a leguminous plant, which enters into symbiotic relationship with nitrogen fixing bacteria, soy is a valuable pre-plant crop rotation.

Given the multiple uses of biomass soybean, it is considered „gold plant” of people, „extraordinary plant” or „plant of the future”.

During 2008 - 2010, in the Seed Production Laboratory of Agricultural Research and Development Station Secuieni, Neamt, had been grown three soybean varieties, Granat, Onix and Eugen, created by ARDS Turda. These varieties have performed very well in ARDS Secuieni soil and climate conditions realizing production up to 3000 kg / ha.

Due to the results obtained in 2011, ARDS Secuieni became the maintainer of variety of soybean varieties Onix and Eugen, establishing maintenance field and future expansion plans for seed production area for superior biological categories.

**Key words:** seed production, soybean, varieties

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With population growth and of the living standards, a problem that increasingly push more on the shoulders of scientists is solving the problem of the food. This problem it has its solution directly by increasing agricultural production and its qualitative characteristics.

To achieve higher production which satisfies current market requirements is necessary to be sow seeds of highest quality.

Seed production is a very important link for obtaining a healthy crop and to harvest.

The three characteristics of the varieties by which the activity of seed production is carried out are: distinctibility, homogeneity and the stability.

Soy is a plant that promises a lot and it has a great potential to solve both problems of human and animal nutrition and other industries. This led to many research results in obtaining new

valuable varieties and the most current discovery is transgenic soybean resistant to glyphosate.

### MATERIAL AND METHOD

Seed production in soybeans superior biological categories within Secuieni SCDA is particularly important in research so that this paper seeks to provide adaptability and productivity of soybean varieties in pedoclimatic conditions of the Central Moldavian Plateau during 2008, 2009 and 2010.

Soybean varieties grown in these years were Granat, Eugen and Onix. All these varieties are improved in ARDS Turda.

The soil that crops have been placed on is type mold typical bill.

Climatic conditions in the two years are presented in figure 1 and 2.

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## RESULTS AND DISCUSSIONS

In the production process of soybean seed is obtaining more biological categories, namely: seed breeder, seed pre-basic I and II, basic seed and certified seed.

In Secuieni ARDS research sector is obtained the higher biological categories which are very important to obtain high quality seed.

*Breeder seed* (BS) is the seed produced under the responsibility of the creator of cultivar based on a conservative selection. This category is the initial starting material to produce seed and is the basis for obtaining the pre-basic category. This category occurs at registration moment of the variety, when the breeder must make available to the cultivators the required quantities.

*Pre-basic seed* (PB) is descended from the seed breeder seed or is the seed derived from a conservative selection applied by maintainer. This category is intended for obtaining Basic category and it will be subjected to certification to comply with the requirements of varietal purity and cultural value provided by law.

Pre-basic seed can be pre-basic I (PB I) which is the equivalent of one or several descendants of the breeder seed, former name used being the basis of superelitei (BSE).

The second category is pre-basic II (PB II), which is the equivalent of pre-basic descent I, the former name being Superelită (SE). Into the pre-basic category II are included also the inbreed lines which are used in simple hybrids parental forms for double hybrids.

*The culture technology into the field of maintenance*

To accomplish this field were retained last year elite plants, plants that have very strict uniform varietal characters. To organize such a field, it shall be ensured optimum application of all technological measures in order to achieve seeds with superior quality indicators.

The land which was sown it was plowed at 20-25 cm with the plow in aggregate with the star-shaped harrow. In the spring, immediately that was able to enter into the field, it was done a disc with fixed toothed harrow aggregate shredding the lumps and land leveling then fertilized with complex fertilizer N20P20K0 in dosage of 200 kg / ha. The day before sowing, to incorporate the fertilizer and to finalize the seedbed, a disc work has been done.

The sowing was done in layers using the method "seeds of each plant on a row." Row length was 2 m, the distance between rows 50 cm wide and distance between seeds in row was 5-6 cm,

seeds were sown at a depth of 3-5 cm. After every 10 rows sowed it was sowed one each row of PB1 to have a permanent period of comparison between descendants typicity studied and the basic type of variety.

Throughout the growing season, from beginning of the growth until harvest observations were made at each descent to detect any deviations from the basic type of variety. When plants were found with different characters from those of the basic variety were removed from the field by plucking.

Before harvest were chosen from the field of maintenance elite plants to be sowed in the following spring.

When the seeds have reached maturity, it have been conducted a series of tests of humidity and it was harvested when seeds achieved 14-16% humidity. The seed so obtained forms the "breeder seed" (BS).

Yields obtained in the field of maintenance are presented in table 1.

*The technology of of pre-basic seed production (PB1 and PB2).*

*The choice of land.* The best conditions for the growth and development of seed production at soy can be found on the middle-textured soils rich in humus with a good capacity of absorption and water retention and air, soils within SCDA Secuieni.

*Isolation.* Soybean is a autogamous plant presenting risks very small of cross-fertilized, respectively free crossing so that the isolation in space of the varieties as well as of biological categories of the same variety is done only to avoid mechanical mixtures, on the occasion of planting or harvesting works.

In the Order nr.1263/2005 of MAPDR regarding the insurance of some isolation spaces it was mentioned that at soybean plots the delimitation must ensure compliance the identity of the variety at harvest.

In our case we left 1 m wide strips between varieties and between biological categories.

*The rotation and preceding plants.* The best preceding for the beans vegetables are straw cereals who leave the field early and give the possibility of early plowing performing, after a period of rest and activation soil microbiological processes into the soil. Very good preceding are and rapeseed which liberates earliest the field and weeding plants properly maintained which leaves the field clean of weeds(table 2).

*The soil works.* This link it is of a very high technological importance in the development of the future plants, aiming to create favorable conditions of aeration, water retention and mobilization of

mineral substances from the soil and the normal development of plant roots. The plowing was done in autumn of the previous year at 25 cm with the plow in aggregate with the star-shaped harrow to crush and leveling better the soil. In the spring when weather conditions have allowed the entry into the field a work was carried out with the disks harrow. The work with the disks harrow was repeated the day before sowing this time in aggregate with adjustable tusks harrow to prepare the seedbed.

*The fertilization.* The soil which was sown soybean is a good soil regarding the mobile potassium content so that there have not been administered potassium fertilizers. The situation is different in the case of the nitrogen and of phosphorus. So that plants receive enough food during the vegetation have been administered complex type N20P20K0 fertilizers in dose of 200 kg / ha. After the first work with the disk, the fertilizer was spread with M.A. to 3.6 and it has been incorporated into the soil by the second passing with the disks harrow. The roots of the leguminous plant have the capacity to form nodosity with bacteria of the genus *Rhizobium*. This symbiosis can synthesize the atmospheric nitrogen by converting it into nitrogen biological highly accessible to the leguminous plants. It is estimated that grain vegetables provide 50-80% of their necessary nitrogen into the soil remained available for the preceding plant a value of 40-50 kg/ha. In this sense the seeds were treated the year 2010 with Nitragin-soybean in the same day when it was sowed. Nitragin Soybean-bottles contains strains selected from bacteria of *Rhizobium* on the agar suspension. The content of 4 bottles was dissolved in one liter of water and mixed with 100 kg soybeans, amount necessary for the sowing of a hectare.

For sowing was used seed from the varieties Granat, Onix and Eugen varieties of which breeder is ARDS Turda.

*Mode of sow.* Soybean is a weeding plant so that it was sowed at 50 cm between rows with the tractor U 650 and the drill SPC 8.

*Epoch of sowing.* When in the soil at the depth of sowing is 8 to 12 ° C it can be sow, this corresponds for our area of culture, second epoch, second urgency namely during April 23 to May 5.

*Sowing density* under the conditions from SCDA Secuieni, without irrigation conditions was 40-50 germinable seeds / m<sup>2</sup>.

*Sowing depth* was 3-6 cm, depending very much on the uniformity of the seedbed and soil humidity at the moment of sowing.

#### *Maintenance works*

Maintenance works are represented by the weed control, disease and pests by treating the seeds, foliar disease control during the vegetation, soil and pests control of crops as well as the execution of certain special works of biological purification.

*Weed control* was achieved using mechanical and herbicide weeding works (table 3).

*Combat of diseases and pests.* Soybean is a plant of culture which in general do not present significant attacks of diseases and pests which does not require treatments

*Biological purification.* This work is extremely importance in the production of Soybean seeds, because of it depends on the biological value of the seeds, from both points of view of varietal purity as well as health of their condition. It have been carried out two biological purifications during the period of vegetation, one during flowering and one during the period of physiological maturity .

The work consists in removing the foreign plants and of those not typical of the cultivated variety that have different morphological characters of the basic variety as well as all powerful attacked plants by diseases or pests. The aim is to achieve the uniformity and the typically variety. It must provide morphological characteristics, physiological, productivity and quality characteristic of the variety.

Biological purification conducted during the period of flowering is intended to eliminate all not typical of the variety. The criteria of estimating typical plants of the variety it will take into account the type of growth, height and position of strain, bush form, color, shape and size of leaflets leaf, type and shape of inflorescence, color and size of the flowers, presence or absence of hairs on the leaves and stems and resistance to the attack of diseases and pests.

Shall be removed all the plants typical of the variety by those criteria, as well as those which bloom earlier or later, or those powerful attacked by diseases and pests.

The maturity period is eliminated and those plants that do not meet the above mentioned characteristics of the variety and uneven ripening plants, earlier or later, the podded leguminous with other shape, size, color or pubescent than the basic variety, as well as those powerfully attacked by diseases or pests.

Harvesting have been conducted using John Deere combine C1170 when climatic conditions have allowed the entry into the field and the seed humidity it was 14-16%.

*Seed productions* obtained during the period of 2008 - 2010 showed some differences caused by climatic conditions and quality of work performed. In the year 2008 was obtained yields of 2500-3000 kg / ha. The year 2009 being a dry year were obtained lower productions of 1300-2400 kg / ha. In 2010 were obtained yields of 2800-3000 kg / ha, being a year rich in precipitation, which led to a very good development of plants (Table 4).

*The conditioning.* It is a very important operation that consists in passing through the seed selection and calibration installations which aim the elimination of inorganic impurities, as well as the seed that have smaller dimensions or higher than normal. At conditioning of other biological

category or other variety is done an extremely rigorously cleaning to prevent any mixing of different seeds. Conditioning of soybeans was done with MCS 5. Efficiency as a result of conditioning it was on average 84% (Table 4).

*Packaging.* As a result of conditioning the seeds were placed in bags of 40 kg each and then each one were sewed with the official label.

*Storage and preservation of the seed.* After packing, the bags have been batching in store. This was previously disinfected, pest control and ventilated. During storageshall be checked the status of batches, In case of a attack by mices shall be carried out series of disinfestation.

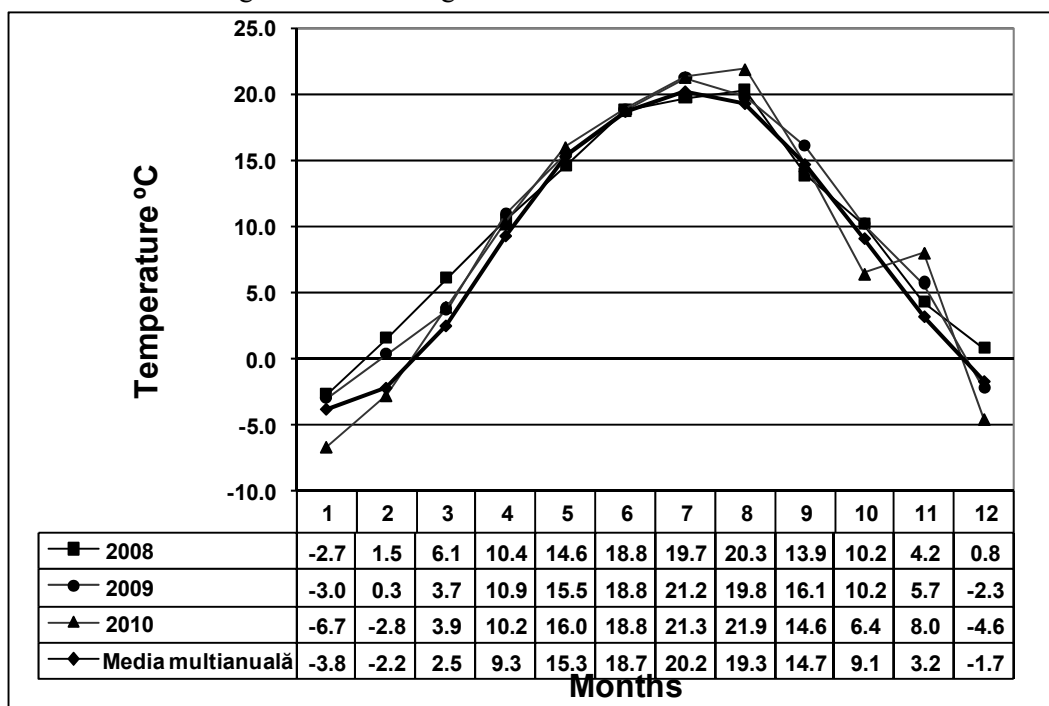


Figure 1 Air temperature graph 2008 - 2010 Secuieni – Neamț

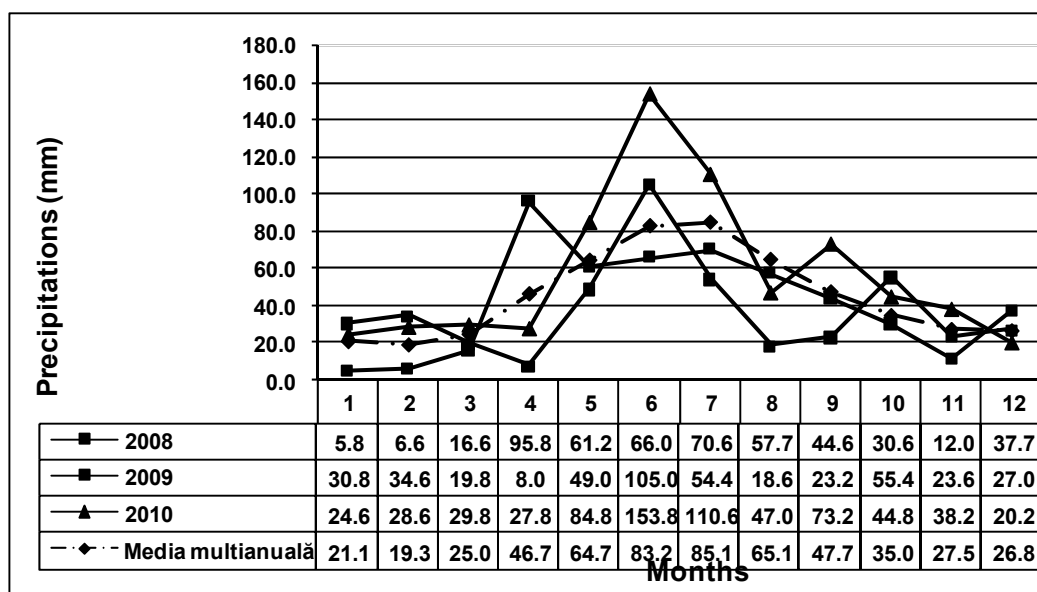


Figure 2 Graph rainfall 2008 - 2010 Secuieni – Neamț

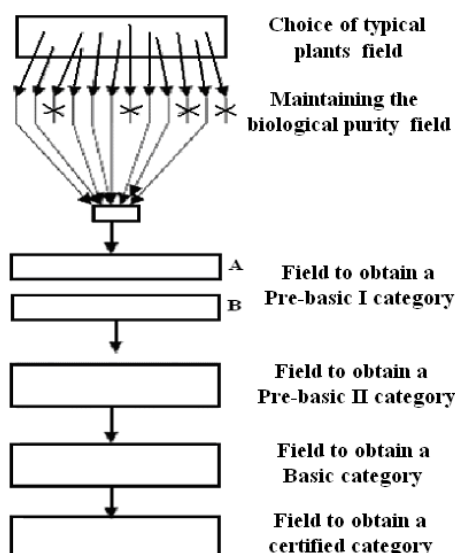


Figure 3 Seed production scheme to legumes

Table 1

**Yields obtained in field maintenance**

Nr. ctr.	Year	Variety	Surface (ha)	Preceding plant	Harvested production (kg)	Conditioning production (kg)	Yield (%)
1	2008	Eugen	0,20	cânepă	280	250	89
		Granat	0,10	cânepă	150	120	80
2	2009	Eugen	0,20	orzoaică pv.	170	140	82
		Granat	0,20	orzoaică pv.	180	150	83
3	2010	Eugen	0,10	mărar	250	200	80

Table 2

**Soybean culture rotation in 2008-2010**

Nr. ctr.	Year	Variety	Surface (ha)	Preceding plant		Plot
				Previous year	2 years before	
1	2008	Eugen PB2	10,16	grâu, porumb	porumb, cânepă	411
		Granat PB2	1,00	porumb	porumb	424
2	2009	Granat PB1	1,45	grâu	soia	411
		Eugen PB1	2,14	grâu	porumb	424
		Granat PB2	6,00	grâu	soia	411
		Eugen PB2	6,70	orz, ovăz	floarea s.	420 441
3	2010	Eugen PB1	2,00	grâu	rașiță	420
		Eugen PB2	20,68	grâu	rașiță	420 424
		Onix PB2	0,40	grâu	rașiță	420

Table 3

**Chemical treatments applied in 2008-2010**

Nr. ctr.	Year	Variety	Seed treatment	Herbicide	Productions (kg/ha)
1	2008	Eugen PB2	Semnal 2,5 l/t	Treflan 2 l/t	2510
		Granat PB2	Semnal 2,5 l/t	Treflan 2 l/t	2700
2	2009	Granat PB1	Topsin 2 l/t Dithane 1,5 l/t	Guardian 2 l/ha Pulsar 1 l/ha	2468
		Eugen PB1	Topsin 2 l/t Dithane 1,5 l/t	Guardian 2 l/ha Pulsar 1 l/ha	2401
		Granat PB2	Topsin 2 l/t Dithane 1,5 l/t	Guardian 2 l/ha Pulsar 1 l/ha	2300
		Eugen PB2	Topsin 2 l/t Dithane 1,5 l/t	Guardian 2 l/ha Pulsar 1 l/ha	2365
3	2010	Eugen PB1	Nitragin soia	Guardian 2 l/ha Pulsar 1 l/ha	2650
		Eugen PB2	Nitragin soia	Guardian 2 l/ha Pulsar 1 l/ha	2852
		Onix PB2	Nitragin soia	Guardian 2 l/ha Pulsar 1 l/ha Leopard 0,7 l/ha	3000

Table 4

Soybean seed yields obtained in 2008-2010

Nr. ctr.	Year	Variety	Surface (ha)	Total production (kg)	Production per hectare (kg/ha)	Conditioned seed (kg)	Yield (%)
1	2008	Eugen PB2	10,16	25500	2510	22800	89
		Granat PB2	1,00	2700	2700	2160	80
2	2009	Granat PB1	1,45	3580	2468	2960	83
		Eugen PB1	2,14	5140	2401	4360	84
		Granat PB2	6,00	13800	2300	11040	80
		Eugen PB2	6,70	15850	2365	13000	82
3	2010	Eugen PB1	2,00	5300	2650	4680	88
		Eugen PB2	20,68	58980	2852	50800	86
		Onix PB2	0,40	1200	3000	1000	83

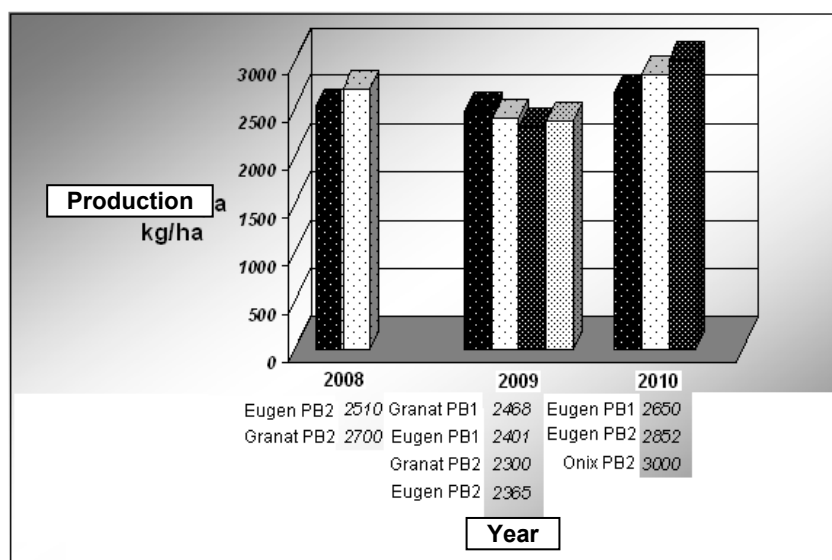


Figure 4 Graph yields obtained in 2008-2009

## CONCLUSIONS

Climatic conditions in the three years of study, 2008, 2009 and 2010 were different from year to year which is reflected in the yields obtained.

Level of production to soybean is conditioned by the observance of all technological links.

Varieties studied in ARDS Secuieni are well adapted to the climatic conditions of the Central Moldavian Plateau.

Yields obtained ranged from 2365-2852 kg / ha in variety Eugen, 2300-2700 kg / ha in variety Garnet and 3000 kg / ha in variety Onyx values.

Seed production is an extremely important activity, providing a link quality seed available to farmers, to ensure high yields with good quality features.

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