

## THE CONTRIBUTION OF AGRICULTURAL RESEARCH AND DEVELOPMENT STATION SECUIENI, NEAMŢ COUNTY, ROMANIA, TO THE SUPPLY OF SOYBEAN SEED

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**ABSTRACT.** In the 2008-2012 period, in the Seed production laboratory from Agricultural Research and Development Station (A.R.D.S.) Secuieni, Neamţ county, Romania, were cultivated three varieties of soybean, Granat, Eugen and Onix, created at A.R.D.S. Turda, Cluj county. These varieties were well adapted to the climatic conditions of A.R.D.S. Secuieni, obtaining yields of up to 3000 kg/ha. During 2008-2012, the following amounts of seeds were produced: PB1(pre-basic seed 1): 11000 kg in 2008, 8700 kg in 2009, 6500 kg in 2010, 5600 kg in 2011 and 3800 kg in 2012; PB2 (pre-basic seed 2): 45900 kg in 2008, 39000 kg in 2009, 67000 kg in 2010, 32000 kg in 2011 and 27000 kg in 2012. The amount of seed from the biological category PB2 ensure, annual, the required for sowing 300-700 ha of basic biological category, which is delivered to farmers for the sowing of about 5000-12000 ha. Both in the field of seed production as well as in the ecological testing field (comparative cultures of contest) Onix variety presented the greatest adaptability to the pedoclimatic conditions

from the Central Moldavian Plateau, achieving the highest yields.

**Key words:** Soybean; Seed production; Cultivar.

**REZUMAT.** Contribuția Stațiunii de Cercetare-Dezvoltare Secuieni, județul Neamț, la asigurarea necesarului de sămânță la soia. În perioada 2008-2012, în cadrul Laboratorului de producere de sămânță de la Stațiunea de Cercetare-Dezvoltare Agricolă Secuieni, județul Neamț, s-au cultivat trei soiuri de soia, Granat, Eugen și Onix, create la S.C.D.A. Turda, județul Cluj. Aceste soiuri s-au adaptat foarte bine la condițiile pedoclimatice de la S.C.D.A. Secuieni, obținând producții de până la 3000 kg/ha. În anii 2008-2012 s-au produs următoarele cantități de sămânță: PB1 (sămânță prebază 1): 11000 kg în anul 2008, 8700 kg în 2009, 6500 kg în 2010, 5600 kg în 2011 și 3800 în 2012; PB2 (sămânță prebază 2): 45900 kg în anul 2008, 39000 kg în 2009, 67000 kg în 2010, 32000 în 2011 și 27000 în 2012. Cantitatea de sămânță din categoria

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biologică PB2 asigură, anual, necesarul pentru însămânțarea a 300-700 ha din categoria biologică bază, aceasta fiind livrată fermierilor pentru însămânțarea a circa 5000-12000 ha. Atât în câmpul de producere de sămânță, cât și în câmpul de testare ecologică (culturi comparative de concurs), soiul Onix a prezentat cea mai mare adaptabilitate la condițiile pedoclimatice din Podișul Central Moldovenesc, realizând cea mai mare producție.

**Cuvinte cheie:** soia; producere de sămânță; cultivar.

## INTRODUCTION

Many statistics show that, on one side, the global population is growing, considering that by 2050 it will reach 9 billion people, and on the other side, productive of the arable land is decreasing, reaching only 0.10 ha/person (Lal *et al.*, 2000). To obtain high yields, which meets the current requirements of the market, it needs to make land sown with seeds of the highest quality.

Seed production is a very important link in achieving a healthy crop and rich harvests. The three characteristics of the varieties, after which the activity of seed production are distinction, uniformity and stability (Ceapoiu, 1976; Haș, 2006).

Soy is a plant with great potential for solving both problems related to human and animal nutrition as well as from other industries. This situation led to conducting research in order to obtain varieties with large production capacity and high content of protein and fats. At soybean, the

seed production from the upper biological categories within A.R.D.S. Secuieni, Neamț county, was performed for the Granat, Eugen and Onix varieties. All these varieties have been created within the A.R.D.S. Turda, Cluj county.

## MATERIAL AND METHOD

This paper presents data regarding the adaptability and productivity of some soybean varieties in the pedoclimatic conditions of the Central Moldavian Plateau in the period 2008-2012. Data refers to the contribution of Agricultural Research and Development Station Secuieni (A.R.D.S.), Neamț county, Romania, by ensuring the farmers with seed with high biological value of the varieties recommended in the area. From the comparative culture, performed simultaneously with the production of seed, were used productivity elements which differentiate and characterizes the varieties concerned.

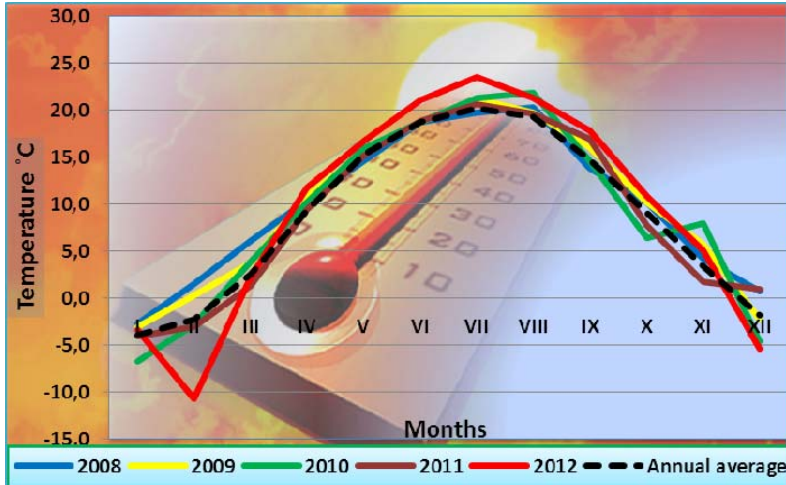
The subtype of soil "cambic chernozem" (Cz cb) from Secuieni is characterized as highly well supplied with mobile phosphorus ( $P_2O_5$  - 95 ppm) and mobile potassium ( $K_2O$  - 400 ppm) and average with total nitrogen supply (0.165%). The humus content varies between 2.55 and 3.1% on the 0-20 cm depth. With the values of pH (in aqueous suspension) of 6.29 fits in the category of slightly acid soils.

During 2008-2012, the climatic conditions have been less favorable for soybean having significant effects on the main characters and qualities, that determined the production. In terms of thermal, only the year 2012 presented significant positive deviations compared to the annual average (*Fig. 1*).

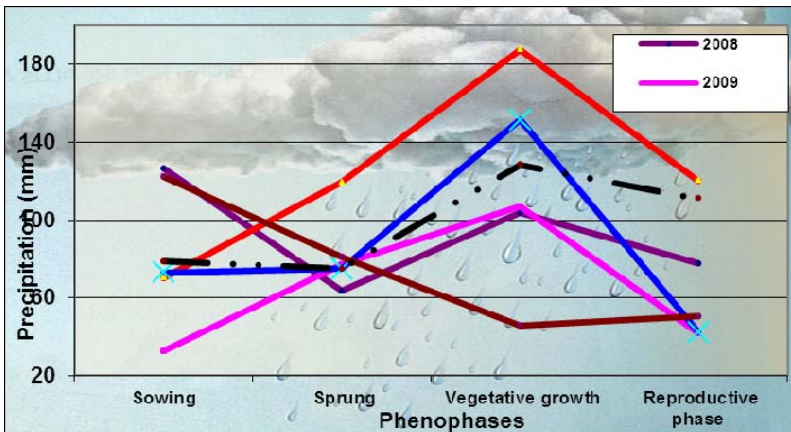
**THE CONTRIBUTION OF A.R.D.S. SECUIENI-NEAMŢ (ROMANIA) TO THE SUPPLY OF SOYBEAN SEED**

In 2008 and 2009, in the period of vegetative growth and until full maturity of the seeds were recorded below normal precipitation quantities, so that the crops were unable to realize its full productive potential. In terms of rainfall, the year 2010 was the most favorable to soybean crop because the precipitations have been

wealthier than the annual average, which led to a very good growth and development of plants. The following two years, 2011 and 2012 were dry years with negative influences on plant growth and development and therefore on production and seed yield obtained (Fig. 2).



**Figure 1 - Monthly temperatures recorded at A.R.D.S. Secuieni, Neamţ county, during 2008 - 2012**



**Figure 2 - Monthly precipitation recorded at A.R.D.S. Secuieni, during 2008 - 2012**

## RESULTS AND DISCUSSION

At A.R.D.S. Secuieni, Neamț county, in the production process of soybean seed, are obtained, annually, the following biological categories:

breeder seed, pre-basic 1 and pre-basic 2 seed, basic seed and certified seed (Fig. 3). In 2008 - 2012 period, was produced seed from superior biological categories at Eugen, Granat and Onix varieties, which we characterize briefly below.

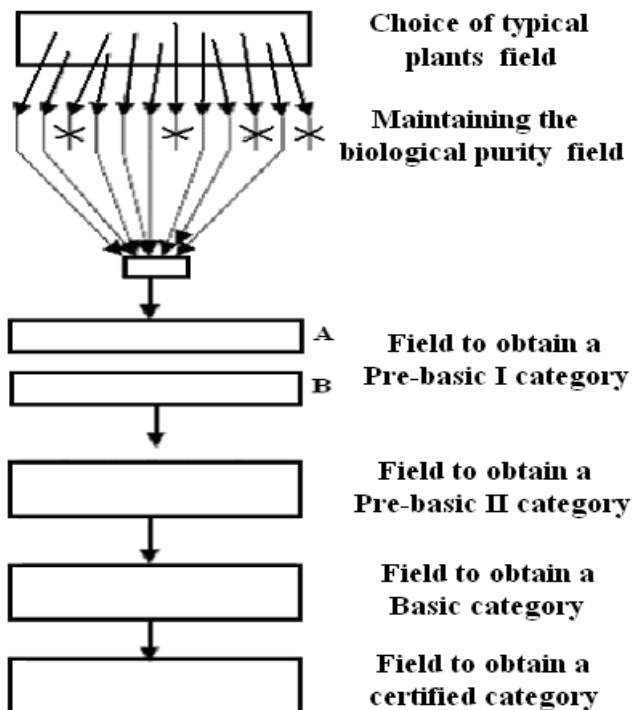


Figure 3 - Establishment of seed production to grain legumes (Păcurar, 2007)

### Soybean varieties multiplied at A.R.D.S. Secuieni

*Eugen*, variety registered in 2002, is precocious (00), with an average vegetation period of 130 days. The stem has, on average, 94 cm, and is covered with gray piliferous. The hypocotyl presents light anthocyanin colouration.

Trifoliolate leaves present ovoid folioles with a light green color. In the florescence of raceme type are found flowers of violet color. At maturity, the pods have brown and are covered with gray piliferous. The seed is spherical, flattened, the skin is yellow, hilum color is gray and the 1000 grain weight is 172 g.

THE CONTRIBUTION OF A.R.D.S. SECUIENI-NEAMŢ (ROMANIA) TO THE SUPPLY OF SOYBEAN SEED

The cultivar is characterized by good resistance to dropping, shaking and at the major diseases of soybean. First pod insertion height is 18 cm. In the State Institute for Variety Testing and Registration (SIVTR) network, the variety has made an average production of 2.89 t / ha, with 34.5 to 40.0% protein and 22.3% fat in dry matter. It is recommended to be cultivated in Transylvania and in the hilly area of Moldavia (Păcurar, 2007).

Eugen variety seed production was conducted throughout the period

of the five years under study so that its evolution could be observed. Annually, we obtained an amount between 140 and 250 kg of breeder seed, required for setting up the pre-basic fields. The highest production of pre-basic seed 1 was obtained in 2010, of 2650 kg/ha and the lowest production of 1960 kg/ha was obtained in 2011. The highest production of 2852 kg/ha, from the biological category PB2, was obtained in 2010, and the lowest production of 1830 kg/ha, at the same biological category was obtained in 2012 (Fig. 4).

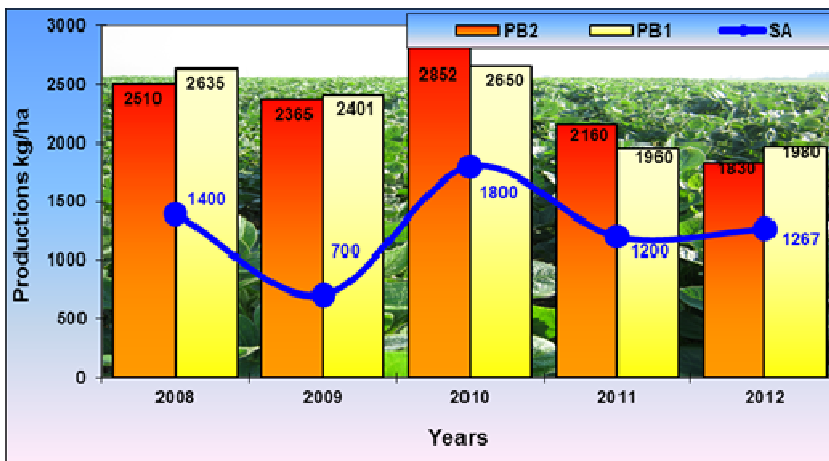


Figure 4 - Yields obtained at Eugén variety, during 2008 - 2012

**Granat** is a variety registered in 1998. It is precocious (00), with an average vegetation period of 127 days. The form of the bush is compact and semi determined type of growth. The stem has an average height of 102 cm, with the insertion of the first pod at 21 cm. Pubescence leaves, stems and pods have the gray color. The raceme has white flowers. The grain

is round with yellow skin and brown hilum and the 1000 grain weight of 161 g. The variety is highly resistant to dropping, shaking and *Peronospora manshurica* and resistant to bacteriosis. The average protein content is 39.3% and 19.5% fats. In the testing network of SIVTR, the variety realized yields ranging between 2,6 and 3,1 t/ha. It is

recommended to be cultivated in the fourth and the fifth cultured area and in the central area of the country, north of Moldavia also in the Western Plain of Romania (Păcurar, 2007).

For the period 2008 - 2012, Granat variety was multiplied only in 2008 and 2009, afterwards being replaced with the Onix variety.

In 2008 it was achieved a production of 2700 kg/ha PB2 seed and 2584 kg/ha PB1 seed, and in 2009, at the biological category pre-basic 1 was achieved a production of 2468 kg/ha and 2300 kg/ha at the biological category pre-basic 2 (Fig. 5).

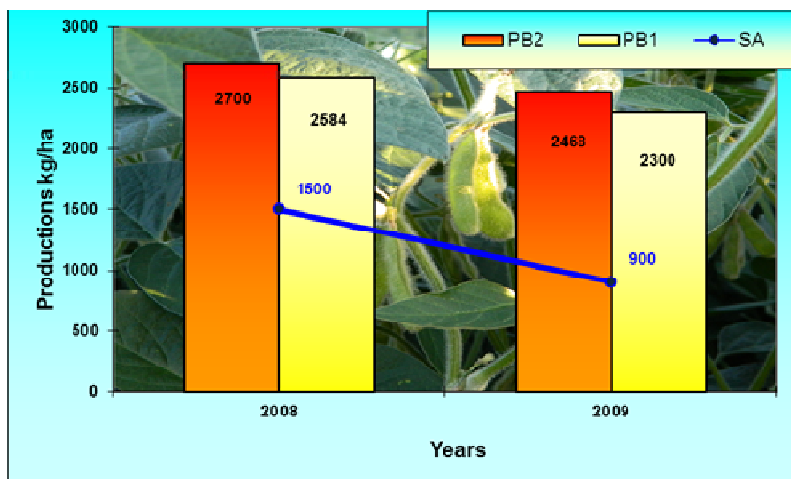


Figure 5 - Yields obtained at Granat variety, during 2008 - 2009

**Onix** is a variety registered in 2002. It is precocious (00), with the vegetation period of about 131 days. The stem is covered with a gray pubescent and can reach 100 cm, the growth being semi determined. The hypocotyl presents a slight anthocyanin colouration. The leaf is trifoliate, with light green oval folioles. The inflorescence is a raceme type, with violet color flowers. The brown mature pods are covered with gray piliferous. The seed have spherical shape, slightly flattened, the tegument is yellow, the hilum has

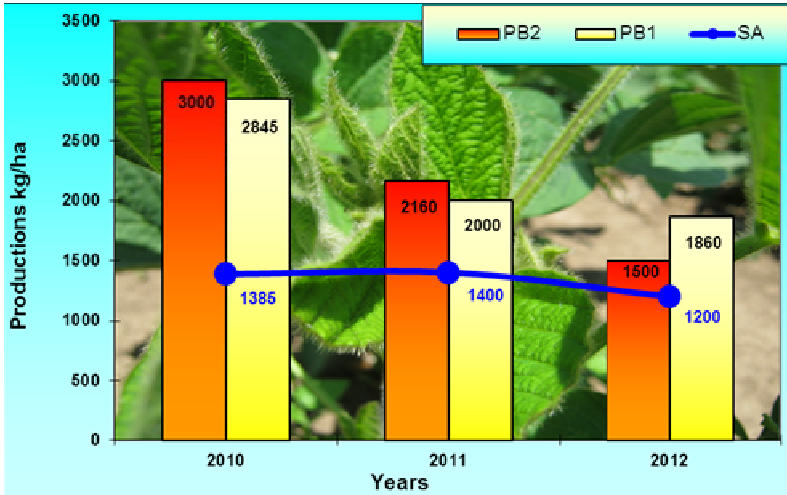
dark brown color and the 1000 grain weight is 163 g. The variety has good resistance to dropping, shaking and against major diseases of soybean. First pods insertion height is 18 cm. In the testing network of SIVTR, the variety realized 2.85 t/ha having from 35.18 to 42.53 protein and 20.13 to 22.43% fats in the dry matter. It is recommended to be cultivated in Transylvania and in the hilly area of Moldavia (Păcurar, 2007).

Since 2010, inside of A.R.D.S. Secuieni was introduced for the multiplication Onix variety. This

**THE CONTRIBUTION OF A.R.D.S. SECUIENI-NEAMȚ (ROMANIA) TO THE SUPPLY OF SOYBEAN SEED**

variety performed very well in 2010, obtaining the highest yields during 2010-2012, 3000 kg/ha PB2 seed and 2845 kg/ha PB1 seed.

The lowest values of the productions have been recorded in 2012, 1500 kg/ha PB2 seed and 1860 kg/ha PB1 seed (Fig. 6).



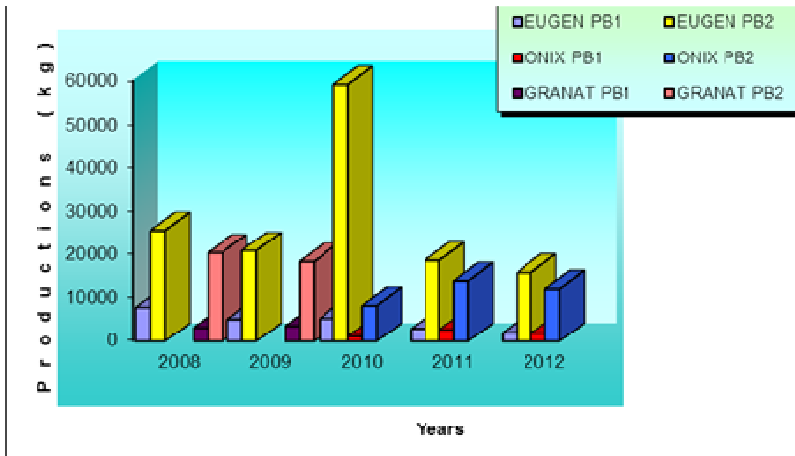
**Figure 6 - Yields obtained at Onix variety, during 2010 - 2012**

The differences in production are especially due to the climatic conditions very varied and also to the quality of the seedbed. Under a changing climate becoming more obvious is necessary the adoption of some machinery that ensures carrying out works of the highest quality and optimal conditions of growth and development for the future plants for obtaining maximum potential regarding the production.

Therefore in 2008 were obtained total productions of soybean of 11 t PB1 (7.8 t - Eugen, 3.2 t - Granat) and 45 t PB2 (25 t - Eugen, 20 t - Onix), in 2009 were obtained total productions of 8.7 t PB1 (5.1 t - Eugen, 3.6 t - Granat) and 39 t PB2 (21 t - Eugen, 18 t - Granat), and in

2010 were obtained the highest yields of 6.5 t PB1 (5.3 t - Eugen, 1.2 t - Onix) and 67 t PB2 (59 t - Eugen, 8 t - Onix). Years 2011 and 2012 were unfavorable to soybean crop obtaining the lowest productions from the experimental period namely 5.6 t PB1 (2.9 t – Eugen, 2.7, t - Onix) and 32 t PB2 (19 t - Eugen, 13 t – Onix) in 2011 and 3.8 t PB1 (2 t – Eugen, 1.8 t - Onix) and 26 t PB2 (15 t - Eugen, 11 t - Onix) in 2012 (Fig. 7).

For the influence area of A.R.D.S. Secuieni and not only it is ensured annually soybean seed for sowing 300-700 ha in order to obtain seed from the basic biological category, which will ensure, in its turn the sowing of 5000 -12000 ha in the units that cultivate soybean.



**Figure 7 – Total production of soybean seed obtained during 2008 - 2012 at A.R.D.S. Secuieni**

Following the experimentation in comparative cultures of Eugen, Onix and Granat varieties, conducted between 2010-2012, it was observed that the best agronomic characteristics

it had variety Onix and Granat the weakest variety. Onix variety with the highest yield of 2978 kg / ha also had the highest number of grains/plant (*Table 1*).

**Table 1 - Features of the varieties under study (average 2010 - 2012)**

Variety	Number pl. harvested /sqm	Size of plants (cm)	No. pods /pl.	No. grains /pl.	Grain weight/pl. (g)	Prod. (kg/ha)
Onix	42.5	94.6	94	201	32,3	2978
Eugen	41.9	91.5	92	196	32,9	2850
Granat	42.3	87.4	88	189	30,4	2590

## CONCLUSIONS

Agricultural Research and Development Station Secuieni, Neamț county, Romania, produces annually seed from the superior biological categories of soybean Eugen, Granat and Onix varieties.

Between 2008 - 2012, were produced the following quantities of seed: PB1: 11000 kg in 2008, 8700 kg

in 2009, 6500 kg in 2010, 5600 kg in 2011 and 3800 kg in 2012; PB2: 45900 kg in 2008, 39000 kg in 2009, 67000 kg in 2010, 32000 kg in 2011 and 27000 kg in 2012.

The quantity of biological seed from PB2 category ensures annually the necessary for sowing 300-700 ha of basic biological category, this being delivered to farmers for sowing around 5000-12000 ha.



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