RESEARCH ON SOYBEAN GROWING TECHNOLOGY IN GIERA PEDOCLIMATE CONDITIONS

Maria Manuela CRISTA, S. C. CURCHI, Simona NIȚA, A. OKROS

Banat's University of Agricultural Sciences and Veterinary Medicine "King Michael I of Romania" from Timisoara, Romania
Corresponding author: simona_nita@usab-tm.ro

Abstract. *Cultivated soybeans belong to the species Glycine max. (L), order Leguminosales. Soybeans are one of the most important agricultural plants for human consumption, animal feed and industry. Soybeans are among the most important crops for the Western Plain of the country, motivated by the favorable soil and climatic conditions of this area.(NIȚĂ SIMONA 2004, NIȚĂ SIMONA2016) Soybeans, being a legume, contribute substantially to increasing the fertility of the soil. Representing a great importance as a precursor plant having the particularity of a substantial improvement soil properties. Like all legumes, it has the ability to increase the nitrogen content of the soil, especially when the seeds are treated with bacterial preparations. Leaving the soil free of weeds and with increased fertility, soybeans are a very good precursor for autumn cereals, when early varieties are grown, leaving large amounts of nitrogen in the soil (80 - 120 kg / ha).(NIȚĂ, LUCIAN DUMITRU.2007) The paper aims to present soybean hybrids tested for introduction into culture and optimization of technological links in order to obtain high quality economic harvests. In this regard, four different hybrids were studied. The research took place in 2020 in Giera. In order to highlight the profitability of soybean cultivation, we considered it necessary to calculate the main indicators of economic efficiency.(MUNTEAN L.S. şi colab., 2008)*

Keywords*: cultivated, Glycine max, agricultural, soil, economic*

INTRODUCTION

Cultivated soybeans belong to the species Glycine max. (L), order Leguminosales. Soybeans are one of the most important agricultural plants for human consumption, animal feed and industry.(AXINTE M., ROMAN GH., BORCEAN L., MUNTEANU L., 2006, SIMONA NITA, A. BORCEAN 2007)

Soybeans contain elements with a higher nutritional and energy value, such as: 36-40% protein; 13-26% fat; 13-24% non-nitrogenous extractive substances; 1.6-2.5% lecithin; type B vitamins (B1-thiamine, B6-pyridoxine); as well as enzymes (lipoxidase, urease, lipase, amylase).(BĂTRÎNA, Ș., CORCIONIVOSCHI, N., JURCOANE, S., LINTON, M., KELLY, C., PINKERTON, L., ... & IMBREA, F. (2021), DAVID GH., BORCEAN I., SIMONA ȘUVEȚI, 1999)

Soybean oil is semi-drying and is used in the consumption of the population, in the preparation of margarine, obtaining colors for painting, making plastics, and the grinds and cakes resulting from its extraction are used to feed animals.(BĂTRÎNA, V. Ș. S., CRISTA, F., & RADULOV, I. (2016), MUNTEAN L. S., ROMAN V. G., BORCEAN I., AXINTE M., 2001,)

Soy is used in the form of grains, pods and various derivatives in human food, industry and human nutrition.(BÎLTEANU, GH.1998, DAVID, GH., PÎRȘAN, P., IMBREA, FL 2006)

Soybeans, being a legume, contribute substantially to increasing the fertility of the soil. Representing a great importance as a precursor plant having the particularity of substantially improving the properties of the soil.(LILIANA PANAITESCU, MARIUS LUNGU, SIMONA NIȚĂ, 2009) Like all legumes, it has the ability to increase the nitrogen content of the soil, especially when the seeds are treated with bacterial preparations. Leaving the soil free of weeds and with increased fertility, soybeans are a very good precursor for autumn cereals, when early

varieties are grown, leaving large amounts of nitrogen in the soil (80-120 kg / ha).(BORCEAN I., BORCEAN A., IMBREA FL.,NIȚĂ SIMONA, IMBREA ILINCA, MIRCOV V., BOTOȘ L.-2005)

Soybeans are among the most important crops for the Western Plain of the country, motivated by the favorable soil and climatic conditions of this area.(BORCEAN I., BORCEAN A., DAVID GH. ,2002, DAVID, GH., 2003)

MATERIAL AND METHODS

The research that is the object of the paper has as objective the testing of some soybean hybrids in order to introduce them in the culture and to optimize some technological links in order to obtain economic and high quality harvests.(LILIANA PANAITESCU, SIMONA-MARIANA PRICOP, DANIELA VIȘAN, SIMONA NIȚĂ, R. PANAITESCU, 2015, MUNTEAN L. S., 1995,)

In this sense, for the introduction of new varieties, in the territory of Giera, comparative cultures were organized.

The varieties studied are: RUBIN; ANNIKA; P21T45 and PR92B63.

The research carried out in the agricultural year 2020 regarding the specification of the particularities of some technology links, important for soybeans, specific for the Giera area, aims at the following:

- establishing the variety structure in the Giera area;
- research on cultivation technology.

Research has been done on single-factor experiments.

Soybean cultivation technology

The previous crop in the area where we decided to sow soybeans was sunflower cultivation.

In November, we started the autumn works, which consisted of a plow made at a depth of 25-30 cm which was made with a reversible plow with 6 heads, Lemnkem, which was towed by a JD8370 tractor.

The plowing was left over the winter, and in February I acted with a claw to aerate the land and start the early preparation of the germination bed.

Fertilization was done in two stages and potassium chloride with an active substance 00-60 was used, with an application of 100kg / ha and an NPK 8-24-24 complex with an amount of 150kg / ha.

Active substance used per hectare:

N-12kg active substance / ha

P-36kg active substance / ha

K-36kg active substance / ha

Chloride- 60kg active substance / ha

The preparation of the germination bed was performed by a Jumbo Rapido milling cutter 8 m wide, at a depth of 10-12 cm, which consists of fangs for shredding the ground, a leveling bar for leveling the ground and a roller for breaking the remaining boulders.

The complexes were distributed with a MEAU type aAxis 30.2 at a width of 24 meters applied evenly and subsequently incorporated with the milling cutter.

I started sowing in mid-April with a 12-row Gaspardo weeder-type seed drill with a row spacing of 45 cm and which was towed by a JD6170 m tractor equipped with a Starfire 3 antenna for precision sowing (autotrack).

We chose a density of 550,000 thousand germinating grains / hectare, sown at a distance of 45 cm between rows and a distance between plants of 3.4 cm.

After sowing, I applied a pre-emergent Adengo herbicide, applied with a Hardi herbicide machine, with a Tank of 4500 l and a working width of 24 m.

SENKOR herbicide is a pre-emergent herbicide for controlling annual dicotyledonous weeds in soybean crops.

Due to the moisture in the soil we had a uniform sunrise and a very good density.

Fertilization was performed with a 12-row weeder, with a fertilizing bunker at the root and 200 kg of N 34.4% nitrate was applied.

Post-emergence herbicide was performed with Corum and Buster.

At the beginning of September we started the harvest, the soybeans were harvested at a humidity below 12% so that they did not need to be put in the dryer.

RESULTS AND DISCUSSIONS

Analyzing the level of harvests this year, it is found that the harvest is lower, due to the deficit of precipitation during April.

The harvest results mentioned in table 1. highlight the good favorability of the area for this valuable crop, which although it was obviously influenced by significant climatic deviations, yielded crops of over 2600 kg / ha, under the conditions of correct choice of cultivated variety and sowing in optimal period.

The PR92B63 variety had the highest yield, with 15% higher than the control RUBIN variety, the difference in yield being 350 kg / ha, this being statistically assured, as very significant.

The P21T45 variety has an intermediate position in the scale of harvests, surpassing the harvest of the control variety RUBIN by 9%, returning a harvest difference of 200 kg / ha, ensured as very significant.

For the ANNIKA variety, the harvest was 2400 kg / ha, with a harvest difference of 100 kg / ha compared to the control variety RUBIN, being statistically assured as significantly significant.

Table 1

Soybean harvest results 2020

Alternative	Harvest kg/ha	%	The difference kg/ha	The meaning
RUBIN	2300	100	Mt.	
ANNIKA	2400	95	100	xx
P21T45	2500	109	200	xxx
PR92B63	2650	115	350	xxx

DL 5%= 46 kg/ha DL 1%= 69 kg/ha DL 0,1%= 111 kg/ha

Figure 1. shows the mass of 100 grains (MMB). For the experimental year 2020, the mass of one thousand grains has the following particularities depending on the variety sown, the highest value of MMB is 186 g, this being recorded for variety P21T45, and the lowest value of MMB of 145 g, was registered for the ANNIKA variety. The RUBIN (173 g) and PR92B63 (163) varieties have an intermediate position

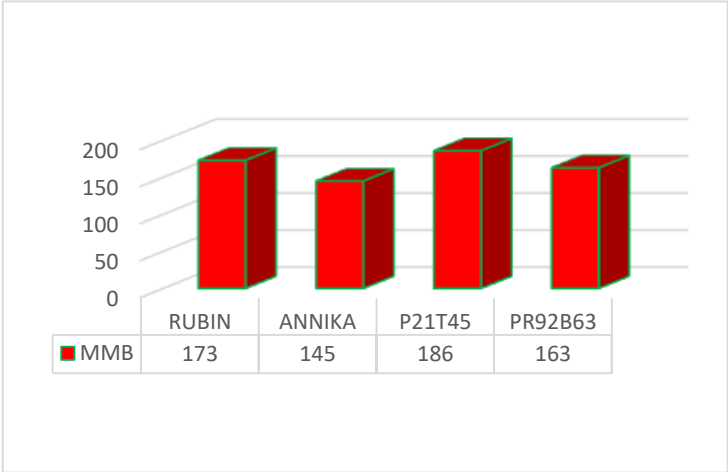

Fig. 1. The mass of 1000 grains recorded for soybeans in 2020 at Giera

.

Hectolitre mass (hectolitre capacity) is one of the basic indicators in assessing quality. This indicator has been used since ancient times, constituting the mass of the unit of volume. It was determined using the NIR analyzer, Granomat Pfeuffer, according to ISO 9001, to determine the hectoliter mass, humidity, temperature.

Under the pedoclimatic conditions of the experimental year 2020, the values of the hectoliter mass vary between 69.7 kg / hl for the RUBIN soil and 73.8 kg / hl for the ANNIKA variety. In the PR92B63 variety the hectolitre mass was 72.5 kg / hl and 69.9 kg / hl in the P21T45 variety.

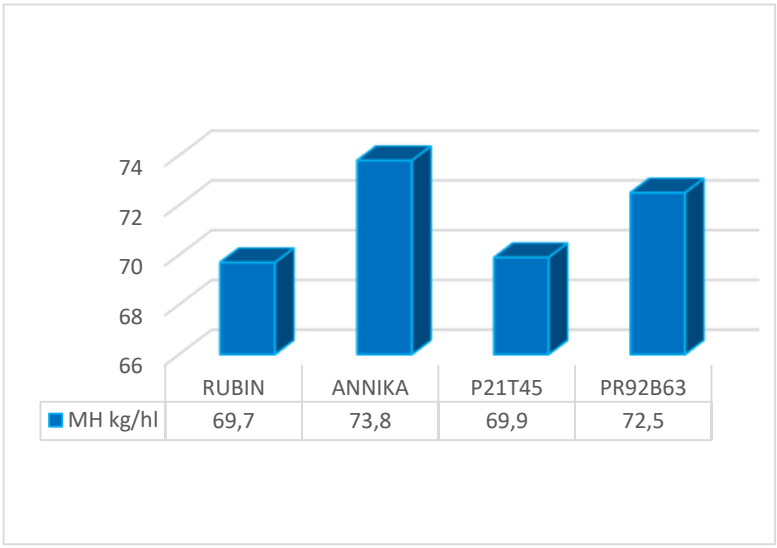

Fig. 2. Hectolitre mass kg / hl recorded for soybeans in 2020 at Giera.

Figure 3. shows the variation of the protein content, which in the researched range, was between 36% for the ANNIKA variety and 42% for the P21T45 variety. In the PR92B63 variety the protein content was 40% and in the RUBIN variety 39%.

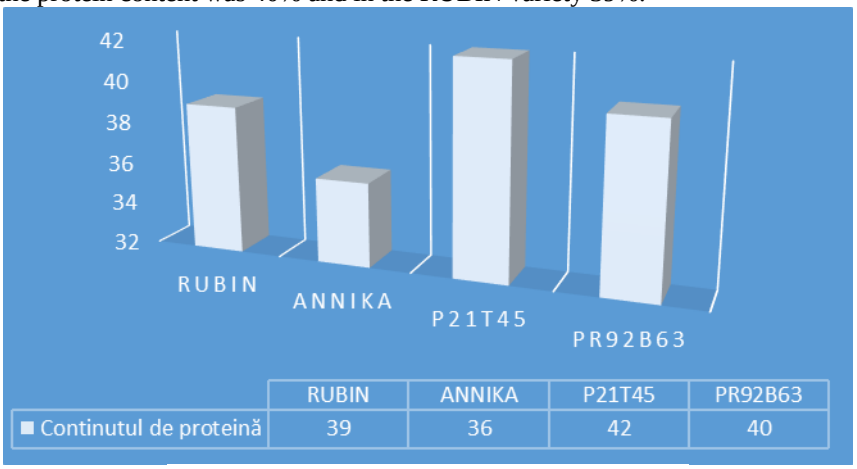

Fig. 3. The protein content obtained from soy in 2020.

CALCULATION OF THE MAIN INDICATORS OF ECONOMIC EFFICIENCY

In order to highlight the profitability of soybean cultivation, we considered it necessary to calculate the main indicators of economic efficiency.

The analyzed indicators are the following:

- main production (kg / ha);
- the value of the main production (lei / ha);
- production costs (lei / ha);
- production cost (lei / kg);
- total profit (lei / ha);
- profit rate (%).

For the indicator "production costs" the estimate of expenses for the experimental year 2020 was prepared. The selling price in 2020 was 1.75 lei / kg.

The highest production was obtained for the PR92B63 variety, this being 2650 kg / ha, and the lowest production was obtained for the RUBIN variety, where only 2300 kg / ha were obtained.

The value of the main production is directly proportional to the capitalization price, falling between 4025 lei / ha and 4638 lei / ha, respectively.

The production costs were depending on the variety, being between 2520 lei / ha for the RUBIN variety, and 2700 lei / ha for the PR92B63 and P21T45 variety.

The total profit ranged between 1505 lei / ha in the case of the RUBIN variety and 1938 lei / ha in the PR92B63 variety. The highest profit rate was registered for the PR92B63 variety, which was 172%.

Table 2

Calculation of the main indicators of economic efficiency of soy for 2020.

Alternative (hybrid)	Main production kg / ha	Value of main production (lei / ha)	Production costs (lei / ha)	Production cost (lei / kg)	Total profit (lei / ha)	Profit rate (%)
RUBIN	2300	4025	2520	0,26	1505	160
ANNIKA	2400	4200	2640	0,27	1560	159
P21T45	2500	4375	2700	0,16	1675	162
PR92B63	2650	4638	2700	0,14	1938	172

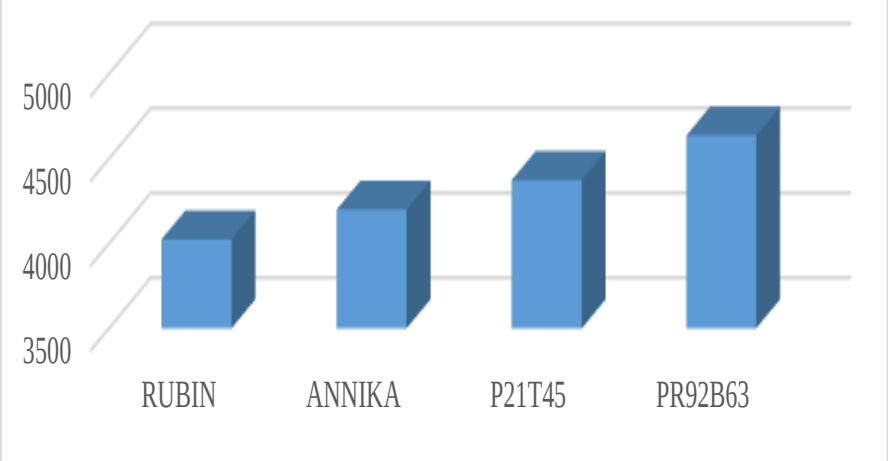

Fig. 4. The value of the main production (lei / ha)

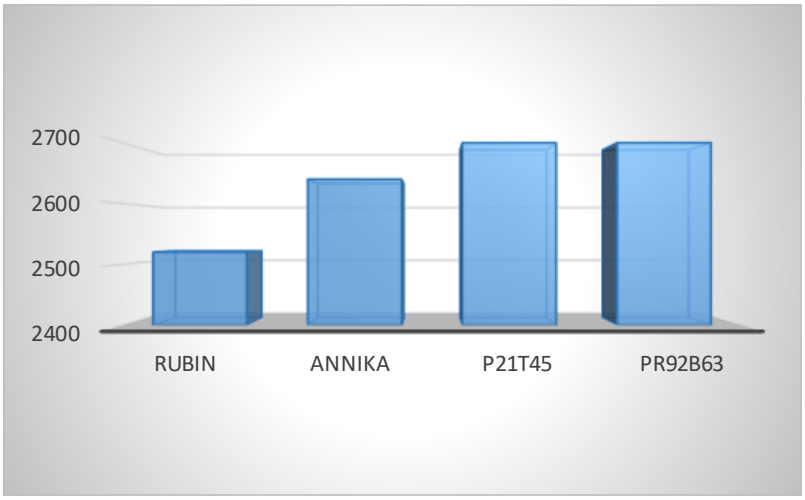

Fig. 5. Production costs (lei / ha)

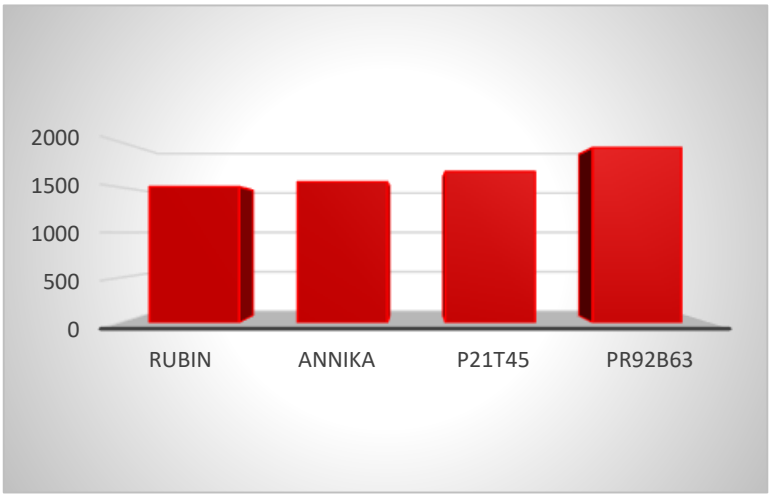

Fig. 6.The profit lei / ha obtained for soybeans in 2020

.

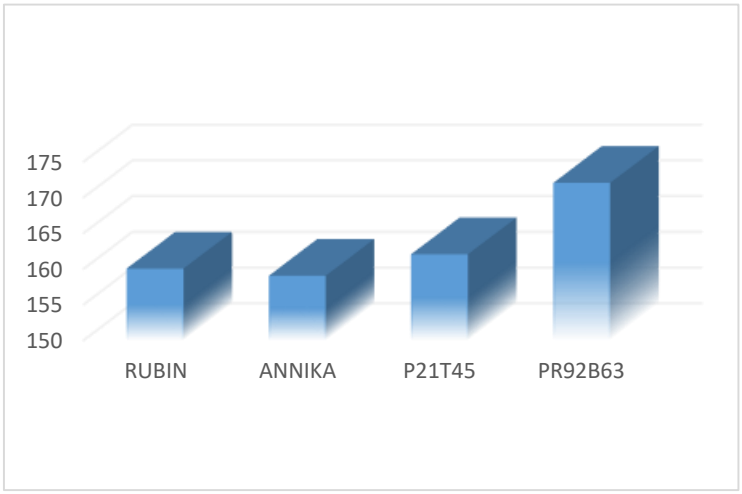

Fig. 7. Profit rate (%)

CONCLUSIONS

The results of the researches undertaken on the soybean crop in the experimental year 2020, in the conditions of Giera, Timiş County, allow us to draw some conclusions regarding the influence of the variety on the production.

In the experimental field from Giera, Timiş county, good soybean results were registered.

The climatic conditions recorded during sowing and harvesting had to a large extent a favorable influence on the level of harvest and the physical properties studied in soybeans.

The soil on which the experiments were placed provides nutritional support for good growth and development of soybeans.

Bacteria seeding before sowing is mandatory, the treatment ensuring an increase in yield, motivated in terms of economic efficiency.

The sowing era is an important technological link.

In years with favorable climatic conditions, in this area, through the good choice of varieties, seed bactericationd, timely sowing and compliance with all technological links, soybeans, crops amount to over 2600 kg / ha, being the main plant supplying protein for human nutrition and animal feed.

The most recommended variety for the Giera area is the PR92B63 variety, which produced 2650 kg / ha.

The value of the main production is directly proportional to the capitalization price, falling between 4025, lei / ha and 4638 lei / ha respectively.

The production costs were depending on the variety, being between 2520 lei / ha for the RUBIN variety, and 2700 lei / ha for the PR92B63 and P21T45 variety.

The total profit ranged between 1505 lei / ha in the case of the RUBIN variety and 1938 lei / ha in the PR92B63 variety. The highest profit rate was registered for the PR92B63 variety, which was 172%.

BIBLIOGRAPHY

AXINTE M., ROMAN GH., BORCEAN L., MUNTEANU L., 2006 - Fitotehnia, Editura "Ion Ionescu de la Brad", Iași (Cap. III, IV, V, VI, VII, VIII).

BĂTRÎNA, Ș., CORCIONIVOSCHI, N., JURCOANE, S., LINTON, M., KELLY, C., PINKERTON, L., ... & IMBREA, F. (2021). Camelina sativa oil can inhibit Campylobacter jejuni but stimulate lactic acid bacteria growth.

BĂTRÎNA, V. Ș. S., CRISTA, F., & RADULOV, I. (2016). Research On Application Of Fertilising Resources On Some Cereal And Oil Seeds Crops. Research Journal of Agricultural Science, 48(4).

BÎLTEANU, GH. - Fitotehnie, Ed. Ceres Bucureşti, 1998.

BORCEAN I., BORCEAN A., IMBREA FL.,NIȚĂ SIMONA, IMBREA ILINCA, MIRCOV V., BOTOȘ L.- Research concerning the behaviour of some maize hybrids of different precocity groups in western Romania, Contemporery Agriculture, Vol 3-4, PAG. 62-69, 2005, NOVI SAD, SERBIA, SCINDKS

BORCEAN I., BORCEAN A., DAVID GH. ,2002 , Cultura şi protecţia cerealelor, Ed.Agroprint, Timisoara: 264;

DAVID GH., BORCEAN I., SIMONA ȘUVEȚI - The Behaviour of an assortment of corn hybrids cultivated for kernels within the western plain Romani, Production of field crops at the treshold of 21ST century Internaţional Scintific Conference 1999, Novi Sad, BDI

DAVID, GH. – Tehnologia plantelor de câmp, Ed. Eurobit, Timişoara, 2003.

DAVID, GH., PÎRȘAN, P., IMBREA, FL. - Tehnologia plantelor de câmp, Cereale, leguminoase pentru boabe şi plante tehnice, Ed. Eurobit, Timişoara, 2006.

MUNTEAN L. S., 1995, Mic Tratat de Fitotehnie, Vol. I - Cereale şi leguminoase pentru boabe, Editura Ceres, Bucureşti, p.111-159;

MUNTEAN L. S., ROMAN V. G., BORCEAN I., AXINTE M., 2001, Fitotehnie, Ediţia a-II-a, Ed. Ion Ionescu De La Brad, Iași;

MUNTEAN L.S. şi colab., 2008, Fitotehnie, Editura Academic Press ClujNapoca, 83-135;

NITA SIMONA, A. BORCEAN - Study regarding some varieties of zea mays everta Sturt which grow under the pedo-climatic conditions in Almaj Depression, Agricultura durabilă, Agricultura viitorului, Craiova, Ediția a Ii-a, 22-23 Noiembrie, 2007

NIȚĂ SIMONA – Fitotehnie, Ed. Eurobit, Timişoara, 2004.

NIȚĂ SIMONA – Tehnologia culturilor de câmp Ed. a II-a, Revizuită și actualizată Ed. Eurobit, Timişoara, 2016.

NIȚĂ SIMONA – Zonarea ecologică a culturilor, Agroprint Timișoara, 2016

NIȚĂ, LUCIAN DUMITRU. – Pedologie, Ed. Eurobit, Timișoara, 2007.

PANAITESCU LILIANA, MARIUS LUNGU, SIMONA NIȚĂ, Cercetari privind manifestarea potentialului productiv la unii hibrizi de porumb cultivaţi în condiţiile din judeţul Constanţa, Lucrări Ştiinţifice seria Agricultură-Horticultură, vol 2, 2009, ed. Universitară, ISSN 2065-1627

PANAITESCU LILIANA, SIMONA-MARIANA PRICOP, DANIELA VIȘAN, SIMONA NIȚĂ, R. PANAITESCU - The manifestation of the productive potential in corn (zea mays l.) Monoculture on a typical chernozem, with some fao 300-400 group hybrids, Research Journal of Agricultural ISSN:2066-1843 vol. 47 (3), pag.223-231, 2015,