THE INFLUENCE OF TECHNOLOGICAL MEASURES OVER THE ECONOMIC INDICATORS AT TRADITIONAL AND GENETICALLY MODIFIED SOYBEAN CROP

INFLUENŢA UNOR MĂSURI TEHNOLOGICE ASUPRA INDICATORILOR ECONOMICI LA CULTURA SOIEI CLASICE ŞI MODIFICATE GENETIC

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Abstract: *Various researches and results confirm the importance of growing soybeans as an extraordinary source of protein and fat, with utility in both food and animal feed (Dencescu S., 1982, Giosan N.1986). There have been taken to study some classical varieties and genetically modified soybean, monitoring the effectiveness of some herbicides and agro-technical measures for weed control.*
This paper promotes the recovery of crop technology through economic efficiency calculations, which is an important component when we consider the profitability. Results are presented as an average of 2003-2005 years, when genetically modified soybean was a great attraction for farmers (Pătrăşcoiu Mihaela, 2004, 2005).
Resumption of GM soybean cultivation in Romania is necessary both in agronomic purposes and for the ensurance of domestic production of vegetable protein requirements for the livestock sector (Smith S. 2002).

Keywords*: traditional soybean, genetically modified soybean, herbicide influence, economic efficiency*

INTRODUCTION

Romania is one of the few countries in Europe that have favorable conditions for soybean production. According to FAOSTAT (2006), cultivating 199,200 hectares of soybean, Romania was the third having this species growing in Europe, after Russia and Ukraina. At the same time, in 2006 Romania was also one of the nine countries in the world which cultivate transgenic soybeans.

Transgenic soybean crops were approved in our country since 2000, in 2006 alone being allocated 137 thousand hectares. In other words, 69% of the area belonged to soybean crops. The total production was 345,000 tons, of which 250,000 tons were transgenic soybeans.

As a result of seeding prohibition of genetically modified soybean, the majority of the Romanian farmers have dropped the soybean cultivation in general, considering that the subsidy system is not sufficiently remunerative up for a lack of competitiveness of conventional crop varieties. Certainly, the decrease of cultivated areas and yields obtained was accompanied by increased imports of grain and soybean srots (having as a source genetically modified soybean) of the main countries growing GM crops: Argentina, Brazil, USA, etc.

Losses resulting from no seeding varieties GM soy in Romania are estimated and difficult to assess, the largest being about lack of soil nitrogen resulting from the activity of bacteria living in symbiosis with soybean, additional costs for performing mechanical work in the culture conventional soybeans and higher costs for the acquisition of herbicides needed for weed control (Lăzureanu A. 1993, 1998).

MATERIALS AND METHODS

Experiment placement was performed in the Didactic Station Timisoara, in a field where the soil was type mold drafts, with an acid pH 27-30.

Biological material submitted for testing was represented by varieties Avilla (from Serbia, Novisad) and Agat (from Turda, România) for experimental field with conventional soybean, and varieties: AG 0801 RR, S 2254 RR and SP 9191 RR (produced and delivered by Monsanto) in experience with genetically modified soybean. Plants were sown at 40 cm

distance between rows, ensuring a density of 35,000 to 40,000 plants per hectare.

The pre emergent herbicides used in the experiment were: Treflan 48CE, Dual Gold 960CE, Guardian and Frontier 900 EC and those post emergent were the: Dynamic 75WG, Agil 100EC, Pivot 100LC, Sencor 70WP at soybean crop which follow classical technology. (Donaldson D.1999). The genetically modified varieties were sprayed with Roundup herbicide, a total herbicide, taking into account that these varieties are resistant to glyphosate, the active ingredient contained in the herbicide Roundup (Owen MDK, 2005).

Before and after located the culture, to the experimental field have performed all the work relevant to this specific cultures: fall plowing to 20 cm base, spring seedbed preparation harrow disc harrow with teeth in aggregate, soil fertilization with double and complex fertilizers.

Experimental field with conventional varieties is mono factorial, placed after the randomized block method in four repetitions, with a total of 48 variants (12 variants / repetition): V1 – no herbicides, no hoeing, V2 – Frontier 720EC 2l/ha + Sencor 70 WP 0,3 kg/ha, V3 – 2 hoeing mechanical+2 manual hoeing, V4 – Treflan 48CE 2l/ha + Pivot 100LC 0,75l/ha, V5 – Treflan 48CE 2l/ha + Dynam 75WG 0.08kg/ha, V6 - Treflan 48CE 2l/ha + Agil 100EC 1l/ha, V7 – Guardian 2,5l/ha + Pivot 100LC 0,75l/ha, V8 – Guardian 2,5l/ha + Dynam 75WG 0,08kg/ha, V9 – Guardian 2,5l/ha + Agil 100EC 1l/ha, V10 – Dual Gold 960EC 1l/ha + Pivot 100LC 0,75l/ha, V11 – Dual Gold 960EC 1l/ha + Dynam 75WG 0,08kg/ha, V12 – Dual Gold 960 EC 1l/ha + Agil 100EC 1l/ha.

Experimental field with genetically modified varieties is multi factorial, 3x4 two-factor type, placed after the subdivided parcels method with four repetitions, with a total of 36 experimental variants.Experimental factors are as follows: factor A (variety) and factor B (post emerging herbicide) with graduations: b1 – no herbicides, b2 - 4l/ha Roundup, b3 - 2 + 2 l / ha Roundup.

Experimental data processing and interpretation was done separately for each experience by analysis of variance for multi factorial and mono factorial experiments with two factors. (Săulescu, 1967, Ciulcă S., 2002)

Economic exploitation of the maintenance costs of the two cultures had focused on the following calculations of economic efficiency indicators: the main production (kg/ha), the main production value (Euro/ha),

production expenses (euro/ha), production cost (Ron/kg), total profit (Ron/ha) and the profit rate (%).

For calculating these indicators there were used production costs for 2005 year. We utilized an average recovery price for production of 0.75 Ron/kg.

RESULTS AND DISCUSSION

Obtained results in Agat variety shows that primary production ranged between 1907 kg/ha (Frontier 720EC 2l/ha+Sencor 0,300 kg/ha) and 2625 kg/ha (Dual Gold 1 l/ha+Dynam 0,080 kg/ha).

The main production value was directly influenced by the price of herbicides and administered dose per unit area and oscillates between 1567 Ron/kg (Treflan 48CE 2l/ha+Agil 1l/ha) and 1659 Ron/kg (Dual Gold 1 l/ha+Dynam 0,080 kg/ha).

Ton of grain is recovered by 0.75 Ron / kg, knowing the cost of production values between 0,83 Ron/kg Frontier 720EC 2l/ha+Sencor 0,300 kg/ha) and 0,62 Ron/kg (Dual Gold 1 l/ha+Dynam 0,080 kg/ha).

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Total profit was calculated as the difference between the value of global production and total expenses, ranging from -171 Ron/ha in variant (Frontier 720EC 2l/ha+Sencor 0,300 kg/ha) and 315 Ron/ha (Dual Gold 1 l/ha+Dynam 0,080 kg/ha).

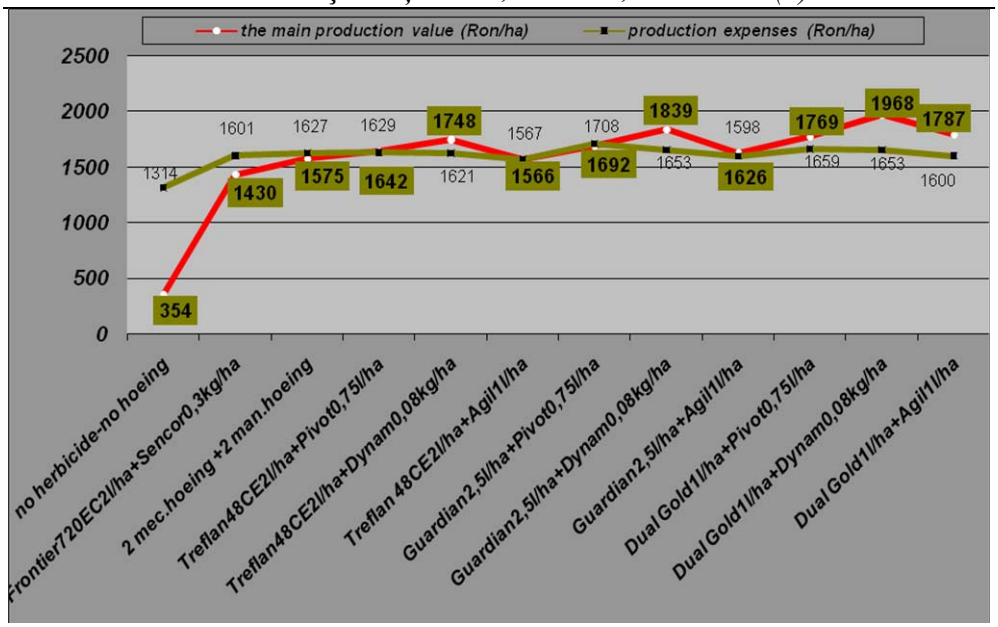


Fig.1 Graphic representation of the main economic efficiency indicators at Agat cultivar (average study of years 2003 – 2005)

The profit rate was calculated as a percentage ranged between -10.68% and 19.05%, which is in direct correlation with other indicators of economic efficiency. The value of economic efficiency indicators derived from Avilla variety (excepting the indicator "production costs") are superior to those achieved at Agate variety.

The variant with the lowest values of economic efficiency indicators are (Frontier 720EC 2l/ha+Sencor 0,300 kg/ha), are the following: the main production 2138 kg/ha, the main production value 1603 Ron/ha, production costs 0,75 lei/kg, total profit -3 Ron/ha, and the profit rate -0,18%.

The higher production costs were realized in variant Guardian 2,5l/ha+Pivot 0,75l/ha şi sunt de 1717 Ron/ha.

Optimal alternative has proved to be Dual Gold 1 l/ha+Dynam 0,080 kg/ha, the following values of the indices of economic efficiency: the main production 2950 kg/ha, the main production value 2212 Ron/ha, production costs 0,56 Ron/kg, total profit 552 Ron/ha, profit rate 33,25%.

The lower production costs, of 1603 Ron/ha were done in variant Dual Gold 1l/ha+Agil 1l/ha.

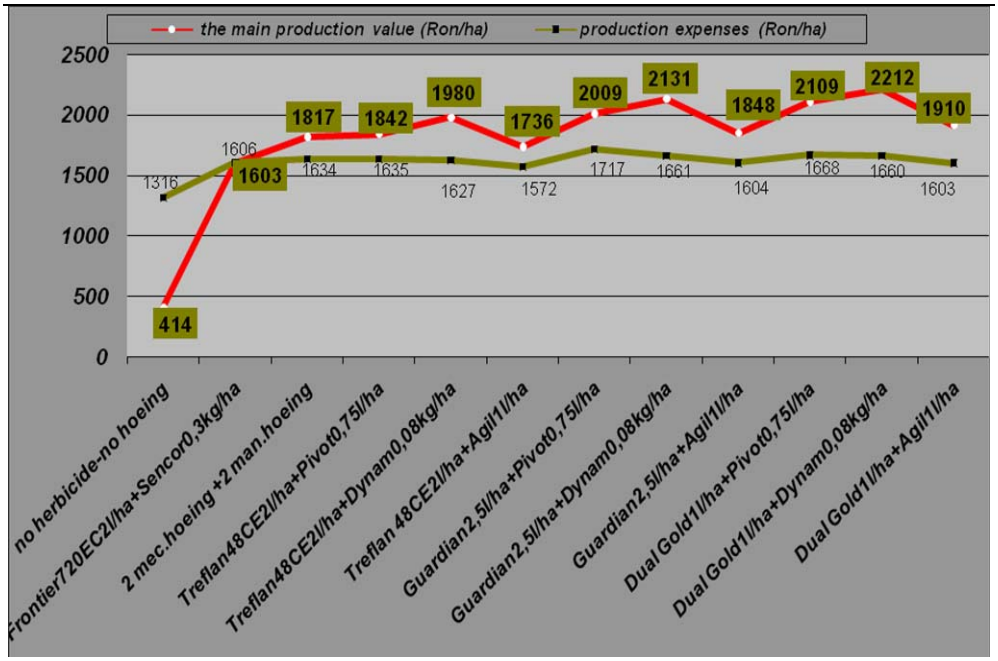


Fig.2 Graphic representation of the main economic efficiency indicators at Avilla cultivar (average study of years 2003 – 2005)

Roundup Ready soybeans production costs have recorded similar values to those recorded in the two traditional soybean varieties. Values of other indicators of economic efficiency, however, are higher than those found in traditional varieties.

The variant with the lowest value is AG 0801 RR - Roundup 4l/ha and most efficient alternative proved to be the variety planted with and SP 9191 RR with Roundup herbicide applied in divided doses of 2+2 l/ha.

Depending in two variants, the economic efficiency indicators within the following limits: 2851 – 3859 kg/ha the main production, 2138 – 2894 Ron/ha the main production value, 1722 – 1782 Ron/ha production expenses, 0.60 – 0,46 Ron/kg production costs, 416 – 1112 Ron/ha total profit and 24,15 – 62,40%, profit rate.

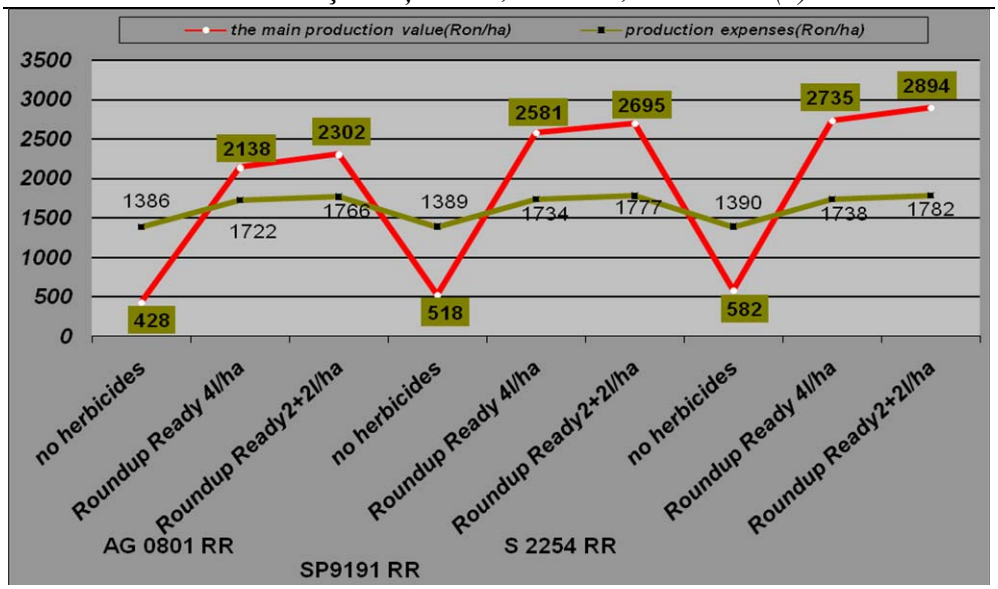


Fig.3 Graphic representation of the main economic efficiency indicators at Roundup Ready soybean (average study of years 2003-2005)

CONCLUSIONS

The data presented arising superiority of genetically modified soybean varieties compared to soybean varieties cultivated by traditional technology, both in terms of yields, especially the maximum amount of profit obtained from a hectare.

All these calculations and interpretations reinforced the belief of many scientists and farmers of the need for reintroducing the genetically modified soybean cultivation in Romania, from basic crops with wheat and corn, and especially in the western part of Romania where the requirements for temperature and precipitation are optimal for the harmonious development of plants and obtain high yields.

ACKNOWLEDGEMENTS

This work was published during the project “POSTDOCTORAL SCHOOL OF AGRICULTURE AND VETERINARY MEDICINE", POSDRU/ 89/1.5/S/62371, co-financed by the European Social Fund through the

Sectorial Operational Programme for the Human Resources Development 2007-2013.

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