

## POSSIBILITIES FOR THE IMPROVEMENT OF THE SOYBEAN PRODUCTION IN SERBIA\*

DANICA BOŠNJAK., VESNA RODIĆ, JELENA KARAPANDŽIN<sup>1</sup>

*SUMMARY: Current trends in human nutrition and growing needs of livestock production, especially pig and poultry production, drive a demand for the soybean both on a global scale and in Serbia too. It is, therefore, necessary to examine the possibilities of improving this crop production at the national level. This paper analyses the yield of soybeans in Serbia in the period 1949-2012, as the main indicator of the production results. The main aim of the paper is to examine the level and stability of the soybean yields in the observed period, in order to show some possibilities for further improvement of the production of this crop. The conducted analysis has showed that an average soybean yield achieved in Serbia in the period 1949-2012 was 1,730 kg/ha; an average annual growth rate was 1.82 %, while the yield varied from 366 kg/ha (yield achieved in 1950) to 3,177 kg/ha (achieved in 2010). On the short term basis, the situation was somewhat better, i.e., in the last decade (2003-2012) the average yield was 2,448 kg/ha. This can be assessed as relatively satisfactory, when the national average yield is compared with the world, European and neighbouring countries averages, respectively. However, the demonstrated variability in the achieved yields and the fact that there are countries with higher average yields indicate that there is room for the further growth of this production. To exploit these possibilities, it is crucial that decision makers (managers) know well the specific conditions (both natural and socio-economic) in which the production takes place. Only if they constantly monitor the production process (on site), the limiting factors of yield growth can be recognized on time and the optimal management decisions for specific production conditions can be made. Thus, it can be concluded that high yields of the soybean require an optimal combination of agro-ecological conditions and adequate management decisions (for the specific conditions of production).*

**Key words:** soybean, yield, management decisions.

---

Original scientific paper / *Originalni naučni rad*

<sup>1</sup>Danica Bošnjak PhD, professor, Vesna Rodić PhD, professor, Jelena Karapandžin M.Sc, teaching assistant, University of Novi Sad, Faculty of Agriculture, Department of Agricultural Economics and Rural Sociology Trg Dositeja Obradovića 8, 21 000 Novi Sad, Serbia.

Corresponding author: Vesna Rodić, e-mail: rodicv@polj.uns.ac.rs, phone.: +381 21 4853-313.

\*This research is part of the projects No TR 31022 and TR 31033 financed by Serbian Ministry of Education, Science and Technological Development from 2011 to 2014

## INTRODUCTION

Current trends in human nutrition and growing needs of livestock production, especially pig and poultry production, as well as the expansion of the bio-fuel industry, drive a demand for oilseeds on a global scale and in Serbia (Keyzer et al., 2002; Gelder et al., 2008; Knežević and Popović, 2012). In this respect, the soybean is particularly important, given that it is the most important grain oilseed in terms of production and trade (Masuda and Goldsmith, 2009a; U.S. Soybean Export Council, 2011; Čurović, 2012). The continuously growing demand for soybeans creates the need to examine the possibilities of improving the production of this crop in Serbia.

According to Reljin et al. (1997), there are two ways to increase soybean production - an extensive one (by the extension of cultivated area) and an intensive one (by increasing the yield per unit area). The fact that the amount of agricultural land in our country (Tomić, 1993; Bošnjak and Rodić, 2002, 2010, 2011), as well as worldwide (Rodić et al., 2008), decreases slowly but steadily stresses the necessity for more efficient use of available land resources.

Škorić (2009), Rodić et al. (2008) and Popović (2007) emphasize that the absolutely necessary growth of production per unit area and the more intensive use of resources (especially land) should not be achieved at the expense of natural resources and the environment, i.e., the intensification of production must respect environmental limitations. These requirements, on the one hand, and the fact that the obtained yield is a significant economic factor of production efficiency (Bošnjak and Rodić, 2006; 2010b, Munćan et al., 2010) on the other hand, emphasize the importance of the need for continuous monitoring and analysis of the production process and assessment of the possibilities for its improvement. In this respect, the analysis of obtained yields is always relevant and important, especially if one bears in mind that the yield per unit area is a result of natural conditions, but also of the efforts made by producers (Marko et al., 1986; Nenadić et al., 2007). Therefore, the authors of this paper tried to review trends and assess the yield stability over a longer period of time and, based on that, to indicate possibilities for the improvement of the soybean production in the Republic of Serbia.

## RESEARCH METHOD AND DATA SOURCES

The research method has been chosen in accordance with the defined research objectives. The analytical-comparative method has been applied, using the main descriptive statistics indicators (mean, extreme values, interval and coefficient of variation, average annual growth rate). The time series analysis of the obtained average yield of soybean covers the period 1949-2012. The analysis has also been done for certain ten-year sub-periods, with a special emphasis on the last decade of the study period. The spatial analysis covers primarily the region of the Republic of Serbia, but certain characteristics of the soybean production in the Autonomous Province of Vojvodina, the world, Europe and the EU have also been analysed. To accomplish the research objectives, the main sources of data databases of the NBS - National Bureau of Statistics ([www.stat.gov.rs](http://www.stat.gov.rs)) and FAO ([www.fao.org](http://www.fao.org)) were used. The research results obtained are presented in tables and figures.

## RESULTS AND DISCUSSION

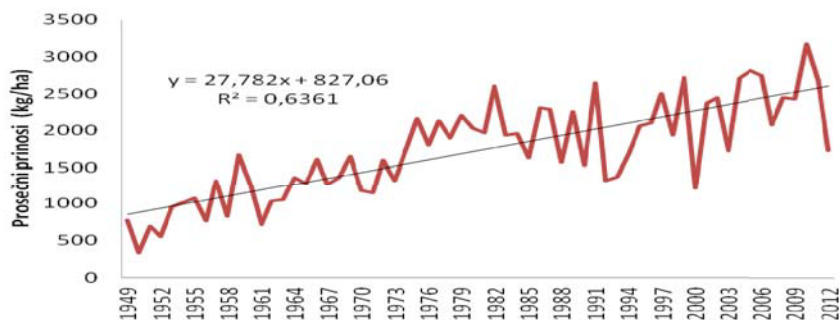
**Average yield of soybean.** The results achieved in agricultural production can be presented in a different way. Appropriate indicators should be chosen depending on the level and purpose of measurement. When the results of certain production (in this case soybean) are to be presented, commonly used indicators of production results are the total yield and the yield per unit of land capacity. Given the fact that the obtained yield in crop production always depends on a complex of different factors, the average yield per hectare is often considered the most appropriate quantitative indicator of success in production and as such is used most often.

The conducted analysis shows that during the observed period (1949-2012) the average soybean yield, as well as the yields of other main field crops, demonstrates an upward trend (Table 1). The pace of the increase is not particularly emphasized because the phenomenon which Marko et al. (2011) called 'yield fatigue' occurred in certain periods. An average soybean yield in the period 1949-2012 was 1,730 kg/ha. It showed a growing tendency (annual growth rate 1.82%) and fluctuated within the range of 366 kg/ha (the average yield in 1950) to 3,177 kg/ha (in 2010). In comparison with other main field crops, the soybean yields have had the most intensive development in the observed period (Table 1).

Table 1. The main characteristics of average annual yields of the major field crops in Serbia (1949-2012)

Crop	The mean value (kg/ha)	Coefficient of variation (%)	Variation interval (kg/ha)		Average annual growth rate (%)	R <sup>2</sup>
			Min	Max		
Wheat	2,973	34.82	759	4,593	1.10	0.60
Corn	3,687	36.33	646	5,954	1.41	0.48
Sugar beet	34,872	29.54	7,005	50,729	1.02	0.42
Sunflower	1,778	25.32	583	2,558	0.90	0.44
Soybean	1,730	37.20	336	3,177	1.82	0.61

Source: ([www.stat.gov.rs](http://www.stat.gov.rs) and authors' own calculation)



Graph 1. The average annual yield of the soybean in Serbia (1949-2012)

The extreme values of the yields (minimums and maximums) are farthest from each other in the production of soybeans and corn (1:9), followed by sugar beet (1:7) and wheat (1:6). The difference is much lower (1:4) in the production of sunflower. As can be seen from Table 1 and in Graph 1 (which shows the average annual yield of soybean in Serbia for the entire observed period of 64 years), the soybean yields showed the greatest variation of all major field crops (this is confirmed by the coefficient of variation  $CV = 37.2\%$ ).

The presented variability of the soybean yield and its trend of growth indicate that the desired and possible yields have still not been reached. This conclusion is confirmed by the distribution of the obtained soybean yields in certain periods (Table 2). Namely, in the production of soybeans in the observed period, during more than a half of that time, the achieved yields were within the range of 1.01 to 1.50 t/ha (in 16 years), and 1.51 to 2.00 t/ha (in additional 17 years).

Table 2. The distribution of the average soybean yields in Serbia by the amount and periods of achievement (1949-2012)

Yield t/ha	1949-1952	1953-1962	1963-1972	1973-1982	1983-1992	1993-2002	2003-2012	Frequency	Structure %
								64	100
<0.50	x							1	1.56
0.51-1.00	xxx	xxxx						7	10.94
1.01-1.50		xxxx x	xxxx xxx	x	x	xx		16	25.00
1.51-2.00		x	xxx	xxxx	xxxx x	xx	xx	17	26.56
2.01-2.50				xxxx	xxx	xxxx	xxx	14	21.88
2.51-3.00				x	x	xx	xxxx	8	12.50
> 3.01							x	1	1.56

Source: ([www.stat.gov.rs](http://www.stat.gov.rs) and authors' own calculation).

The average yield of 1.5 t/ha was exceeded in 2003 and such a low level of the average yield has not repeated ever again. In the last decade of the observed period (2003-2012), the soybean yield even exceeded 3 t/ha, which had not been recorded in the past. The fact that in the same decade the average yield was only two times between 1.51 and 2.0 t/ha is an additional argument for the claim that the average yield of the soybean in Serbia is moving to higher levels. This is particularly seen in Vojvodina, which should not be surprising since 94% of the total production of the soybean in Serbia is produced in this region. These yield changes could be evaluated as positive. They occur as a result of continuous improvements in the soybean production. This is especially visible on family farms, which have become increasingly important factors in the total soybean production in recent years (Bošnjak and Rodić, 2011).

According to the FAO data, Serbia was the 4<sup>th</sup> biggest European and the 16<sup>th</sup> biggest world soybean producer in the last decade. In other words, this means that

more than 10% of the soybean produced in Europe was produced in Serbia, while Serbian contribution to the global soybean production was 0.16% (Table 3)

Table 3. Regional characteristics of harvested area, yield and production of soybean (2003-2012)

Region	Harvested area			Yield			Production		
	Harvested area (ha)	Growth rate (%)	Coeff. of variation (%)	Yield (kg/ha)	Growth rate (%)	Coeff. of variation (%)	Production (t)	Growth rate (%)	Coeff. of variation (%)
World	96,155,663	2.22	6.92	2,375	0.90	4.57	228,714,011	3.25	10.14
Europe	2,132,237	10.41	31.99	1,666	0.80	9.36	3,578,425	11.41	35.68
EU	373,471	-1.98	17.50	2,607	0.70	10.94	968,978	-0.99	18.72
Serbia	146,957	3.25	11.01	2,448	0.20	18.56	360,789	3.46	23.77
Vojvodina	136,566	3.05	10.55	2,466	0.20	18.74	337,792	3.25	23.90

Source:FAO ([www.fao.org](http://www.fao.org)) and NBS ([www.stat.gov.rs](http://www.stat.gov.rs)) databases and authors' own calculations.

The average yields of the soybean in Serbia can be assessed as relatively satisfactory. This claim is based on earlier studies of Bošnjak and Rodić (2010b), and the fact that the average yields of the soybean in Serbia, especially in Vojvodina (2003-2012), were higher than the world and European averages (Table 3). The fact that Serbia had the highest average soybean yields among neighbouring countries supports the previous statement<sup>2</sup>.

However, as could be seen from the data given in Table 3, the average yields of the soybean in Serbia and in Vojvodina lag behind the average yields of this crop in the EU. The determined difference in the yields of the soybean in Serbia and the EU cannot be considered as significant since according to the FAO data, the Republic of Serbia holds the 15<sup>th</sup> place among the world producers with the highest level of yield per hectare. On the other hand, there is still room for further improvement, especially given the fact that Serbia has very favourable agro-ecological conditions for the soybean production.

**Characteristics of soybean yield by sub-periods.** According to Masuda and Goldsmith (2009b), the increase of the world average yield of the soybean from 1961 to 2007 was not very considerable. The average annual growth rate during that period was rather low, i.e. 1.5%. These authors emphasize the different pace of change in this yield in certain sub-periods. For example, from 1990 to 1995, the average growth rate of yields on a global level was 1.4%, while in later years the rate decreased; from 1995 to 2000 it was 1.3; from 2000 to 2005 there were no changes and the rate was 0.0; while from 2005 to 2007 the growth rate was negative -0.9%.

<sup>2</sup>The average yields of soybeans in the 2003-2012 period in the neighbouring countries were: Croatia 2,362 kg/ha, Hungary 2,149 kg/ha; Romania 1,948 kg/ha, Bosnia and Herzegovina 1,865 kg/ha, Macedonia 1,833 kg/ha, Albania 1,681 kg/ha, Bulgaria 1,389 kg/ha

The analysis conducted in this paper shows that the increase in the average yield of the soybean achieved in Serbia from 1949 to 2012 was also characterized by different dynamics, if the yield is analysed by shorter time intervals, in this case the decades of study period <sup>3</sup> (Table 4).

Table 4. The main characteristics of the average yield of the soybean in Serbia by subperiods

Indicators	Period					
	1953-1962	1963-1972	1973-1982	1983-1992	1993-2002	2003-2012
Variation interval (kg/ha)	720-1,676	1,053-1,647	1,321-2,607	1,322-2,647	1,205-2,717	1,720-3,177
Year of minimum yield	1961	1963	1973	1992	2000	2003
Year of maximum yield	1959	1969	1982	1991	1999	2010
Average yield (kg/ha)	1067	1352	1986	1944	2040	2448
Coefficient of variation (%)	25.78	14.9	16.19	20.85	23.13	18.56
Growth rate (%)	0.60	1.31	4.39	-1.0	3.25	0.20

Source: ([www.stat.gov.rs](http://www.stat.gov.rs) and authors' own calculation)

The first decade of the study period (1953-1962) was marked by the greatest variation ( $Cv=25.78\%$ ) and a slight increase in the soybean yield. According to Marko (1987), that increase, as well as the increase in the yield of other field crops at the time, could be explained both by different measures undertaken in order to increase the yield (intensification) and by the very low starting point. In the following two decades, the variation of yields was significantly reduced and the growth in average yields accelerated (especially in the third decade, when the annual growth rate was 4.39%). This progress can be attributed to the fact that after 1975 the expansion of the soybean areas was conducted mainly in Vojvodina (Reljin et al., 1997) where agro-ecological conditions for this crop are very favourable, but also to the fact that a number of the soybean varieties were introduced from the United States (Nenadić et al., 2007).

The dynamics of the yield growth, unfortunately, was not continued. In the fourth decade (1983-1992) the soybean yield even decreased slightly (annual growth rate was -1.0%). The decreasing tendency was coupled with a high coefficient of variation, indicating that the decade was not favourable for the soybean production is in question. It is undisputed that natural factors are very important in the yield formation. However, in this sub-period the main causes of the soybean yield reduction were not natural conditions, but the reduced use or even the omission of basic inputs. Earlier researches also indicate that the level of applied agricultural technology was one of the limiting factors of the soybean yields during that period (Reljin et al., 1997; Hrustić et al., 2002; Bosnjak and Rodic, 2006). The following

<sup>3</sup>The first four years of the study period (1949-2012) are not included in this analysis. In this period the achieved average soybean yield is very low (588 kg/ha) as a result of both adverse climatic conditions and the low level of applied agricultural technology.

decade (1993-2002) was characterised by 'revitalisation' of the soybean production (expressed through both the average achieved yield (2,040 kg/ha) and the annual growth rate (3.25%). Yet, the extreme values of the yield in that period and the determined coefficient of variation indicate that the desired stability in soybean production was not achieved. During the last decade of the observed period (2003-2012) the positive trend continued. The identified growth rate (0.20%) indicates certain yield 'fatigue', while the decreased coefficient of variation indicates certain stabilization in the soybean production. An annual average soybean yield reached 2,448 kg/ha, which is 20% more than the average obtained in the previous decade, or 2.5 times more than in the first decade of the observed period (1953-1962). Once during this period, the average soybean yield per hectare was even over 3 tons (3.18 t/ha in 2010), which is rather a proof that such a yield is possible and an indication of what should be striven for.

The analysis of the average soybean yields in this 64-year-long period has shown that two characteristic sub-periods could be identified. The first one was until 1975. It was characterized by the gradual introduction of soybeans into planting structure, a lack of knowledge about the technology of production, and consequently relatively low and unstable yields. After that, in the last 35 years, the soybean production increased significantly, due to the technological progress. Owing to that, the average soybean yield unimaginable in the past was achieved. Analysing the soybean yields at individual production units, Nenadić and Zeković (2009) point to a significant increase in yield and emphasize that many producers in Serbia could obtain a yield as high as 4.0 to 5.91 t/ha, which supports earlier findings of Nenadić et al., 2007 that farmers in Serbia should strive to yields as high as 5-6 t/ha. Hrustić et al., 2009 have also pointed to the significant growth of the soybean yield in the past, noting that as a good basis for further growth.

**Possibility for further growth of soybean yield.** The expressed variability (CV = 37%) and registered growth of the soybean yields over the long term (average annual growth rate 1.82%) are clear evidence that the constant striving of farmers to increase the efficiency of this production with the help of technical progress has brought some respectable results. However, having in mind favourable natural conditions for the soybean production and yields achieved in most developed countries, it can be concluded that there is still room for further improvement. Ever growing demand for the soybean and the fact that it could be multipurposely used are strong motivating factors for further improvement in this production. However, considering numerous factors that could influence yields, there are no quick and predefined solutions to increase production. When considering options for further growth, all the factors of influence should be identified, their effects examined and systematic activities should be taken in order to adapt production to specific circumstances. Therefore, it is clear that the role of good management decisions is substantial. That is why, as far back as in 1985, Borojević (quoted by Marko et al., 1986) emphasized the importance of knowledge and personal presence on site for the achievement of high yields.

Good management practices and right agronomic decisions in the future should primarily aim at the reduction of the number of environmental stresses. Only then it could be expected that favourable natural conditions, created soybean varieties (with high yield potential) and modern technical-technological solutions will come to the fore, which will result in higher average yields. In recent years, there have been

more and more opinions that sufficient rainfall in August is not a guarantee of a high yield by itself, as used to be stated before. Much greater impact on yields is exerted by proper agronomic decisions, such as selection of varieties, the optimum time of sowing and harvesting, the analysis of soil fertility, proper crop rotation, weed and pest control, etc.<sup>4</sup> Making right management decisions is certainly easier if the decision maker is personally present on site. Knowing and constantly monitoring production could provide insight into factors limiting yields and thus allow efficient management decisions in specific production conditions. Therefore, it can be concluded that the high soybean yields require both an optimal combination of agro-ecological conditions and adequate (for the specific conditions of production) management decisions. Of course, in order to improve the soybean production, it is necessary to invest in irrigation systems, as well as to attract this sector's major international companies with market access, modern technology and management know-how<sup>5</sup>.

## CONCLUSION

The yield of soybeans in Serbia in the long term (1949-2012) varied from 366 kg/ha (in 1950) to 3,177 kg/ha (in 2010). The average annual yield was 1,730 kg/ha, with an increasing tendency (average annual growth rate 1.82%). The pace of increase in soybean yields is uneven during the observed period, i.e., there are significant differences in average annual growth rates observed in individual decades.

The analysis conducted has shown that the yield level of 1.5 t/ha was exceeded in 2003 and has not been reappeared afterwards. An average soybean yield in Serbia in the last ten years (2003-2012) was 2,448 kg/ha, which could be assessed as relatively satisfactory, if compared with the world, European and the average yield in neighbouring countries. However, the expressed variability of the soybean yield and significantly higher yields achieved by some developed countries indicate that the desired level of production has not been reached yet, i.e., that there is room for further improvement.

Knowledge and constant monitoring of production by decision makers on site provide insight into factors limiting yields and contribute to making effective management decisions in specific production conditions. Therefore, it can be concluded that high yields of the soybean require an optimal combination of agro-ecological conditions and adequate management decisions (for the specific conditions of production).

## REFERENCES

- BOŠNJAK, D., RODIĆ, V.: Ekonomska obeležja proizvodnje soje, Zbornik radova Naučnog instituta za ratarstvo i povrtarstvo, 42: 117-127, 2006.
- BOŠNJAK, D., RODIĆ, V.: Konkurentnost osnovnih ratarskih useva u Vojvodini. Ratarstvo i povrtarstvo, 47:607-612, 2010b.
- BOŠNJAK, D., RODIĆ, V.: Korišćenje oranica u funkciji razvoja ratarske proizvodnje u Vojvodini. Agroznanje, 12(3):337-346, 2011.

---

<sup>4</sup><http://extension.agron.iastate.edu/soybean/documents/HighYield.pdf>

<sup>5</sup>[http://195.178.40.73/poljoprivreda/sites/default/files/Analiza\\_konkurentnosti\\_Seudev.pdf](http://195.178.40.73/poljoprivreda/sites/default/files/Analiza_konkurentnosti_Seudev.pdf)



- BOŠNJAK, D., RODIĆ, V.: Major Characteristics of Plowed Fields Exploitation in Vojvodina, In e-Proceedings of the Internacional Simposium of Interdisciplinary Regional Research, Section – Use of Natrural Resources of the Region, Novi Sad, 2002.
- BOŠNJAK, D., RODIĆ, V.: Oranice u Srbiji – kapaciteti, razmeštaj i način korišćenja, Univerzitet u Novom Sadu, Poljoprivredni fakultet, Novi Sad, 2010a.
- BOŠNJAK, D., RODIĆ, V.: The place of soybean in the crop planting structure in Vojvodina. Proceedings of the 22<sup>nd</sup> International Simposium "Food safety production", Trebinje, Bosnia and Herzegovina, 2011. pp. 149-152.
- ČUROVIĆ, O.: Proizvodnja uljarica u svetu i Srbiji u 2011. godini. Uljarstvo, 43(1-2)57-65, 2012.
- HRUSTIĆ, M., SABADOŠ, V., ĐORŠEVIĆ V., IVAN J.: Proizvodnja soje na teritoriji opština Sombor, Apatin i Odžaci u periodu 1998-2007. Zbornik radova Instituta za ratarstvo i povrtarstvo, 46(2)277- 284, 2009.
- HRUSTIĆ, M.,VIDIĆ, M.,MILADINOVIĆ, J.: Stabilnost prinosa i sadržaj ulja i proteina u novim i gajenim genotipovima soje, Zbornik radova Instituta za ratarstvo i povrtarstvo, 36:115-124, 2002.
- KEYZER, M., MERBIS, M., PAVEL, F.: Can We Feed the Animals? Origins and Implications of Rising Meat Demand. Proceedings of the X<sup>th</sup> EAAE Congress 'Exploring Diversity in the European Agri -Food System', Zaragoza (Spain), 28-31 August 2002 (available at <http://purl.umn.edu/24955>).
- KNEŽEVIĆ, M., POPOVIĆ, R.: Dinamika svetskog tržišta uljarica. Ratarstvo i povrtarstvo, 49(3):320-325, 2012.
- MARKO, J., JOVANOVIĆ, M., NIKOLIĆ-ĐORIĆ, E., MARKOVIĆ, T.: Dinamika bioenergetskog potencijala Vojvodine. Ekonomika poljoprivrede, 58(1)105-120, 2011.
- MARKO, J., JOVANOVIĆ, M., OBRENOVIĆ, D.: Ekonomski uslovi privredjivanja u agroindustrijskom kompleksu. Poljoprivredni fakultet Novi Sad, 1986.
- MARKO, J.: Rezultati proizvodnje, Osnovni pravci razvoja agroindustrijskog kompleksa Vojvodine. Poljoprivredni fakultet, Novi Sad, str. 88-117, 1978.
- MASUDA, T., GOLSMITH, P.: World Soybean Demand: An Elasticity Analysis and Long-Term Projections. Selected Paper presented at the Agricultural & Applied Economics Association's 2009 AAEA & ACCI Joint Annual Meeting, Milwaukee, WI, July 26-28, 2009a.
- MASUDA, T., GOLSMITH, P.: World Soybean Production: Area Harvested, Yield, and Long-Term Projections. International Foodand Agribusiness Management Review, 12(4)143-161, 2009b.
- MUNČAN, P., BOŽIĆ, D., BOGDANOV, N.: Ekonomska efikasnost proizvodnje ratarskih kultura na porodičnim gazdinstvima u AP Vojvodini. Ekonomika poljoprivrede, 57(1)15-24, 2010.
- NENADIĆ, N., NEDIĆ, M., ŽIVANOVIĆ, LJ., KOLARIĆ, LJ., ZEKOVIĆ, J., ANĐELOVIĆ, S.: Prinos soje od 5000 i 6000 kg/ha – stvarnost ili zabluda. Zbornik naučnih radova, 2007, 13(1-2):73- 82.
- NENADIĆ, N., ZEKOVIĆ, J.: Sortna tehnologija u funkciji povećanja prinosa soje sa posebnim osvrtom na obradu zemljišta i setvu, Zbornik naučnih radova, 2009, 15(1-2)59-66.
- POPOVIĆ, R.: Profitabilnost poljoprivredne proizvodnje – teorijski pristup. Anali Ekonomskog fakulteta u Subotici., 17:113-117, 2007.
- RELJIN, S., JOVANOVIĆ, M., TICA, N.: Soja – ekonomika proizvodnje. Sojaprotein, Bečej, 1997.
- RODIĆ, V., BOŠNJAK, D., VUKELIĆ, N.: Održivost upravljanja poljoprivrednim zemljištem u AP Vojvodini. Agroekonomika, 37-38:15-22, 2008.
- ŠKORIĆ, D.: Genetički modifikovani organizmi (GMO) – budućnost čovečanstva ili zabluda. PTEP, 13(1)5-12, 2009.
- TOMIĆ, D.: Zemljišni potencijali i njihovo korišćenje u poljoprivredi Srbije. Zbornik radova sa naučnog skupa. Problemi sabijanja zemljišta, Novi Sad-Bečej, 1993, pp. 6-13.

U. S. Soybean Export Council: How the Global Oilseed and GrainTrade Works? Project prepared by High Quest Partners and Soyatech, LLC., USA, 2011.

VAN GELDER, J. W., KAMMERAAT, K., KROES, H.: Soy consumption for feed and fuel in the European Union, A research paper prepared for Milieudefensie (Friends of the Earth Netherlands), 2008.

<http://extension.agron.iastate.edu/soybean/documents/HighYield.pdf>, accessed on October 10, 2013

[http://195.178.40.73/poljoprivreda/sites/default/files/Analiza\\_konkurentnosti\\_Seedev.pdf](http://195.178.40.73/poljoprivreda/sites/default/files/Analiza_konkurentnosti_Seedev.pdf), accessed on October 10, 2013

[www.stat.gov.rs](http://www.stat.gov.rs), accessed on September 25, 2013

[www.fao.org](http://www.fao.org), accessed on September 28, 2013

## MOGĆNOSTI UNAPREĐENJA PROIZVODNJE SOJE U SRBIJI

DANICA BOŠNJAK., VESNA RODIĆ, JELENA KARAPANDŽIN

### Izvod

Savremeni trendovi u ljudskoj ishrani i rastuće potrebe stočarske proizvodnje, posebno proizvodnje svinja i živine, utiču na rast tražnje za sojom, kako u globalnim razmerama, tako i u Srbiji. Zbog toga se nameće potreba sagledavanja mogućnosti unapređenja proizvodnje ovog useva na nacionalnom nivou. U radu se analiziraju prinosi soje postizani u period 1949-2012, kao osnovni pokazatelj proizvodnih rezultata. Osnovni cilj rada je da se oceni nivo i stabilnost ostvarenih prinosa soje u posmatranom periodu, kako bi se ukazalo na neke mogućnosti daljeg unapređenja u proizvodnji ovog useva. Izvršena analiza pokazuje da je prosečan prinos soje ostvarivan u Srbiji u periodu 1949-2012 bio 1,730 kg/ha; prosečna godišnja stopa rasta prinosa 1.82 %, uz variranje prinosa od 366 kg/ha (koliko je ostvareno 1950. godine) do 3,177 kg/ha (2010. godine). Posmatrano na kraći rok situacija je bila nešto bolja, odnosno u poslednjoj deceniji (2003-2012) prosečan prinos je bio 2,448 kg/ha. Ovaj nivo prinosa može se oceniti kao relativno zadovoljavajući, ukoliko se nacionalni prosečan prinos poredi sa svetskim, evropskim i prosekom zemalja iz okruženja. Međutim, prisutna varijabilnost u ostvarenim prinosima i činjenica da se u nekim zemljama, sa sličnim ili čak lošijim agroekološkim uslovima za proizvodnju soje, postižu i veći prosečni prinosi ukazuju na prostor za dalji rast. Da bi se te mogućnosti iskoristile od presudnog je značaja da donosioci odluka, odnosno menadžeri dobro poznaju specifične uslove (i prirodne i društveno-ekonomske) u kojima se proizvodnja odvija. Ograničavajući faktori rasta prinosa mogu se uočiti na vreme i optimalne upravljačke odluke doneti samo ukoliko se process proizvodnje dobro poznaje i neprekidno nadgleda i to na samoj parceli. Stoga se može konstatovati da je za rast i visoke prinose soje neophodna kombinacija optimalnih agroekoloških uslova i adekvatnih upravljačkih odluka, odnosno onih koje će u maksimalnoj meri uvažiti konkretne uslove proizvodnje.

**Ključne reči:** soja, prinos, menadžerske odluke.

Received / *Primljen*: 30.11.2013.

Accepted / *Prihvaćen*: 06.12.2013.