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COMPARATIVE ANALYSIS OF VEGETABLES PRODUCTION IN SERBIA AND REPUBLIC OF SRPSKA

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Abstract

The subject of this research is comparative analysis of changes of production characteristics, the most important sorts of vegetables in Serbia and Republic of Srpska.

Changes and tendency of sowing areas, yields, and total production are analyzed, and compared during 2001-2010. Subject of analyzing were the most important sorts of vegetables, namely: potato, tomato, pea, cabbage & kale, onion, pepper, beans, carrot, cucumber and garlic. The each sort and vegetables in whole are analyzed.

Research of comparative analysis shows that Republic of Srpska, comprising with Serbia has: Higher share in participation of total sowing area (about 11%, compare with 8%); Higher average yields of tomato, peas, pepper, beans, cucumber and garlic. Yields are higher between 4% (cucumber) and 25% (pepper); Higher increasing rates of all analyzed sorts of vegetables; Total year production on the level of between 7.7 % (carrot) and 20 % (potato, beans, cucumber), of total year production in Serbia.

Key words: *vegetables, comparative analysis, Serbia, Republic of Srpska*

Introduction

Vegetables production is very important branch of plant production for the agriculture of Republic of Serbia, and Republic of Srpska. Characteristics of vegetables production are: Relatively short time of production, what give possibilities for two or more sowing in the same year, and much better usage of land; Intensive production - large investment in the irrigation and production technology, and in the same time, getting a high yields;

The subject of research in this paper is the comparative analysis of movement in production characteristics of the most important kind of vegetables in Republic of Serbia and Republic of Srpska. The sowing areas, yields, and total year production of: potato, tomato, pea, cabbage & kale, onion, pepper, beans, carrot, cucumber and garlic, are analyzed. Included period of research is 2001-10 year.

The goal of research was to compare yields, areas and quantity of production and tendency of changing specific kind of vegetables in Serbia and Srpska. On the base of results of comparative analysis it is possible to get conclusion about importance, positive and negative tendencies of specific kind of vegetables and this causes. It is one of the bases of making agrarian policy and strategy in the vegetables production development in both case – Serbia and Republic of Srpska. Mutavdzic et.al. (2011) analyzed production results in vegetables production in Republic of Serbia in the period of 2001-10. Novkovic et. al. (2011) was analyzed changing of sowing areas, yields, and total production of important kind of vegetables in Vojvodina region in the period 2000-09. Novkovic et. al. (2012) gets the similar results about vegetables production tendency in the case of Republic of Srpska.

Method of Research and Data Source

In this paper, the quantitative methods of research are implemented. The quantitative analysis included areas, yields and total year productions of ten important sorts of vegetables in Republic of Serbia and Republic of Srpska in the ten-year period, 2001-10. Data are processed by standard statistic measures: average of value ($\overline{X}$) of characteristics in observed period and change rate (r). For research was used official published data of Reublic Institution of Statistics of Republic of Serbia and Republic of Srpska. After separate analysis fo the each kind of vegetable, the comparative analysis between Srebia and Srepska was done. The index method has been used for the comparation. For comparishment of movement for vegetables characteristics whic had an oposite direction, indx coeficient is not accounting. In that cases the qualitative analisis has been implemented.

Results of Research with Disscusion

The comparative analysis of production characteristics in vegetables production between Republic of Serbia and Republic of Srpska has been implemented for the each kind of vegetables. In Table 1 are presented results of comparative analysis in potato production. Sowing area under the potato was in average five times bigger in Serbia than in Republic of Srpska. Decreasing rate of sowing area was for 40 % higher in Srpska, than in Serbia.

The yield of potato was the same in the both Republics, but in Republic of Srpska it has five times more increasing rate than in Serbia. Results of movements of sowing areas and yields were that total production of potato in Serbia had high tendency of decreasing, while in Srpska it showed tendency of slow increasing. In the same proportion of sowing area was and total production of potato.

Table 1. Potato indicators in Serbia & Republic of Srpska (2001-10)

Indicator	Average $\overline{X}$		Index Serbia =100%	Change rate r (%)		Index Serbia =100%
	Serbia	Republic of Srpska		Serbia	Republic of Srpska	
Area (ha)	84,880	16,639	19.6	-2.19	-3.07	140
Yield (t/ha)	10.5	10.5	100.0	0.72	3.81	529
Production (t)	885,933	173,113	19.5	-1.48	0.64	-

In Table 2 are showed results of comparative analysis in tomato production. Sowing area under tomato was almost ten times more in Serbia than in Srpska. In the both case sowing areas had negative tendencies in observed period 2001-10. Negative tendency is four times much higher in Republic of Srpska. Average yield of tomato was higher for the 13 index point in Republic of Srpska, than in Serbia. Also, opposite of sowing area average yield has more than four times higher increase rate than tomato yield in Serbia. Total year production of tomato in Serbia was les than 35 thousand ton. In Republic of Srpska it was 3 thousand ton. Result of positive tendencies of sowing area and yield was much more positive tendency on total production of tomato in Republic of Srpska.

In Table 3 are presented results of comparative analysis in pea production. Sowing area under the pea was much more in Republic of Serbia than in Republic of Srpska. In Srpska sowing area was les than 8 % sowing area of pea in Serbia. Low tendencies were present in the both case. The difference was that in Serbia was present low decreasing rate while in Srpska was present low increasing rate. Average yield of pea in observing twenty

years period was higher in Republic of Srpska for the 12 % and showed twice more tendency of increasing than the same in Serbia. The result of tendencies in sowing are and yield, total year production of pea showed two and half higher increase rate in Republic of Srpska.

Table 2. Tomato indicators in Serbia & Republic of Srpska (2001-10)

Indicator	Average $\overline{X}$		Index Serbia =100%	Change rate r (%)		Index Serbia =100%
	Serbia	Republic of Srpska		Serbia	Republic of Srpska	
Area (ha)	20,647	2,047	9.9	-0.36	-1.47	408
Yield (t/ha)	8.7	9.8	113.0	1.24	5.28	426
Production (t)	178,823	20,029	11.2	0.87	3.82	439

Table 3. Pea indicators in Serbia & Republic of Srpska (2001-10)

Indicator	Average $\overline{X}$		Index Serbia =100%	Change rate r (%)		Index Serbia =100%
	Serbia	Republic of Srpska		Serbia	Republic of Srpska	
Area (ha)	13,197	1,016	7.7	-0.08	0.62	-
Yield (t/ha)	2.6	2.9	112.0	2.46	5.03	204
Production (t)	34,628	3,024	8.7	2.37	6.10	257

Table 4 shows comparative relations and movements of indicators in production of cabbage & kale in Serbia and Srpska in the period of 2001/10. Average sowing area of cabbage & kale in Republic of Srpska was about 12 % of average sowing area of cabbage & kale in Republic of Serbia. In the both case the negative changing rate are presents. Decreasing rate of sowing area of cabbage & kale is three times more intensive in Srpska. Average yield of cabbage & kale was higher in Serbia for almost 15 %. While, in Serbia was present tendency of slow increasing of yield, in Srpska yield of cabbage & kale showed hard tendency of increasing. Total year production of cabbage & kale in average in Republic of Srpska was on the level of 10 % from the same in Serbia. Because negative rate of changing sowing area and yield in Serbia, rate change of total production of cabbage & kale cabbage & kale was also negative. In the Republic of Srpska increase rate of yield was much higher than decreasing rate of sowing area, so total production of cabbage & kale showed high increasing rate. The results of comparative analysis in production of onion are presented in the Table 5.

Table 4. Cabbage & kale indicators in Serbia & Republic of Srpska (2001-10)

Indicator	Average $\overline{X}$		Index Serbia =100%	Change rate r (%)		Index Serbia =100%
	Serbia	Republic of Srpska		Serbia	Republic of Srpska	
Area (ha)	21,439	2,587	12.1	-0.74	-2.25	304
Yield (t/ha)	14.1	12.3	87,0	-0.62	6.85	-
Production (t)	311,643	31,708	10.2	-0.17	4.50	-

Area under the onion in Srpska was 10 % of areas under the onion in Serbia, in average. In the both Republics were present slow decreasing rate. In Serbia it was much intensive. The same as in the case of cabbage & kale average yield of onion in Serbia was higher for 15 %. Both yields, in the Serbia, and in the Srpska showed tendency of increasing. The increasing rate in Srpska is almost twice higher than in Serbia.The total year production of onion, in average in Srpska was les than 9 % from that one in Serbia. While in Serbia was

present rate of slow increasing, in Republic of Srpska it is much more intensive. Change rate of total production of onion in Srpska is almost eight times higher than in Serbia.

Table 5. Onion indicators in Serbia & Republic of Srpska (2001-10)

Indicator	Average $\overline{X}$		Index Serbia =100%	Change rate r (%)		Index Serbia =100%
	Serbia	Republic of Srpska		Serbia	Republic of Srpska	
Area (ha)	19,583	1,968	10.1	-1.67	-0.15	9
Yield (t/ha)	6.7	5.8	87.0	2.27	4.41	194
Production (t)	130,560	11,447	8.8	0.56	4.44	793

In the Table 6 are presented the results of comparative analysis in pepper production in the Republic of Serbia and Republic of Srpska. Average sowing area of pepper in Republic of Srpska was more than 12 % of sowing land of onion in Serbia. In the both case there were present almost the same rates of slow decreasing of areas under the onion. Average yield of pepper in Republic of Srpska was higher for 25 %, than in Republic of Serbia. This is the most higher different in yield fro the all vegetables kind for Srpska. It is positive that in both cases the increasing rate of yield is showed. In Srpska increasing rate is thee and half times higher than in Serbia. The total year production of pepper in Srpska in average was on the level of 15 % from production of pepper in Serbia. Even decreasing the sowing areas of pepper in both cases it were present tendency of increasing the total production. The change rate was four times higher in Srpska than one in Serbia.

Table 6. Pepper indicators in Serbia & Republic of Srpska (2001-10)

Indicator	Average $\overline{X}$		Index Serbia =100%	Change rate r (%)		Index Serbia =100%
	Serbia	Republic of Srpska		Serbia	Republic of Srpska	
Area (ha)	19,234	2,334	12.1	-0.55	-0.52	95
Yield (t/ha)	7.9	9.9	125.0	2.32	7.90	341
Production (t)	151,946	23,222	15.3	1.76	7.41	421

In Table 7 is given data about production of bean in Serbia and Srpska. The sowing area under the bean in Republic of Srpska was almost one fifth from that one in Republic of Serbia. With potato and cucumber, bean showed the highest percent of sowing area (When compare sowing area of some vegetable in Srpska and Serbia). Tendencies of changing the sowing areas under the bean were in the both case negative. In Serbia, the negative tendency was higher for 36 index point than in Srpska. Average yield of bean of 1.4 tons per hectare in Republic of Srpska was higher for 17 % or for two hundred kilo then that one in Serbia. While in Serbia was present insignificant tendency of increasing the yield of bean, in Republic of Srpska was present intensive tendency of growth for average rate of increase of 5 % per year. Total production of bean in Republic of Srpska was more than 20 % that bean production in Serbia, in average. In a both case were presents positive tendencies of changing. Little more higher rate of increase was in Serbia.

Results of comparative analysis are presented in Table 8. Sowing area of carrot in Republic of Srpska was 11 % from sowing area of carrot in Serbia. While in Serbia area under the carrot showed tendency of slow increase, in Srpska area under the carrot showed tendency of medium decrease. Average yield of carrot was more than 40 % higher in Serbia than in Republic of Srpska, and that is the biggest difference in yield of some vegetable. The yields in a both cases showed almost the same positive rate of increase. Total production of carrot in Srpska was les than 8 % of the same in Serbia. Positive change rates were present in a both cases, but in Serbia it was higher.

Table 7. Bean indicators in Serbia & Republic of Srpska (2001-10)

Indicator	Average $\overline{X}$		Index Serbia =100%	Change rate r (%)		Index Serbia =100%
	Serbia	Republic of Srpska		Serbia	Republic of Srpska	
Area (ha)	22,970	4,389	19.1	-2.29	-1.68	73
Yield (t/ha)	1.2	1.4	117.0	-0.40	5.03	-
Production (t)	28,600	5,857	20.5	3.79	2.95	78

Table 8. Carrot indicators in Serbia & Republic of Srpska (2001-10)

Indicator	Average $\overline{X}$		Index Serbia =100%	Change rate r (%)		Index Serbia =100%
	Serbia	Republic of Srpska		Serbia	Republic of Srpska	
Area (ha)	7,716	852	11.0	0.79	-1.93	-
Yield (t/ha)	8.5	6.0	70.0	4.48	4.61	103
Production (t)	66,030	5,096	7.7	5.30	2.52	47

In the Table 9 are showed results of comparative analysis in cucumber productions. The average area under the cucumber in Republic of Srpska was almost 19 % from the average sowing area of cucumber in Serbia. In a both case the positive change rates were present, but that one in Republic of Srpska is much higher. The yield of cucumber in Republic of Srpska was insignificant higher (4 %) than that in Serbia. In a both case the positive change rate of yield were present. In Srpska, change rate was 8.3 % per year, what was 4.6 times higher than in Serbia. Total year production of cucumber is Srpska was les than 20 % than production of cucumber in Serbia. The same as in the case of yield, in total production of cucumber the positive tendencies were present. The increasing rate of production in Srpska was five times higher.

Table 9. Cucumber indicators in Serbia & Republic of Srpska (2001-10)

Indicator	Average $\overline{X}$		Index Serbia =100%	Change rate r (%)		Index Serbia =100%
	Serbia	Republic of Srpska		Serbia	Republic of Srpska	
Area (ha)	8,760	1,629	18.6	0.32	1.54	481
Yield (t/ha)	7.1	7.4	104.0	1.80	8.30	461
Production (t)	62,259	12,120	19.5	2.13	10.03	471

The results of comparative analysis of garlic production are presented in Table 10. Areas under the garlic in Srpska was about 11 % of sowing are of garlic in Serbia. In the case of Srpska and in the case of Serbia there were present the negative change rate of sowing areas movement. The negative tendencies was twice more intensive in Serbia. The average yield of garlic of 3.3 tons per hectare was for 18 % or five hundred kilo per hectare higher in Republic of Srpska than in Republic of Serbia. Yield had an opposite tendency in observed period. In Serbia yield had a very slow tendency of increasing, while in Srpska yield of garlic had tendency of grow. The average year production of garlic in Republic of Srpska was les than one thousand tons. It was on the level of 13 % of average year production of garlic in Republic of Serbia. Also, total production of garlic had opposite tendency of movement in Serbia and Srpska. In Serbia was significant tendency of decreasing the total production of garlic, by negative rate of changing of -2.6 % per year, in average. In Srpska production of garlic showed positive change rate of 1.25 % per year in average.

Table 10. Garlic indicators in Serbia & Republic of Srpska (2001-10)

Indicator	Average $\overline{X}$		Index Serbia =100%	Change rate r (%)		Index Serbia =100%
	Serbia	Republic of Srpska		Serbia	Republic of Srpska	
Area (ha)	8,795	980	11.1	-2.35	-1.34	57
Yield (t/ha)	2.8	3.3	118.0	-0.22	2.59	-
Production (t)	24,902	3,239	13.0	-2.57	1.25	149

Conclusion

The results of comparative analysis of production of ten the most important kind of vegetables in Republic of Serbia and Republic of Srpska in the period 2001-10 showed next:

- It is higher participation of vegetables in total sowing lend in Srpska (11%), than in Serbia (8 %); Sowing areas of some kind of vegetables in Srpska were in the interval between 7.7 % (pea) and almost 20 % (potato, bean), from areas of the same kind of vegetables in Serbia; In the Republic of Srpska higher decreasing rate of sowing area have: potato, tomato and cabbage & kale. Lower decreasing rate have: onion, pepper, bean and garlic. Higher increasing rate of sowing area has cucumber, while other kinds of vegetables (pea and carrot) have the opposite tendency;
- The average yields of tomato, pea, pepper, bean, cucumber and garlic are higher in Republic of Srpska. The difference in yield is interval of 4 % (pepper) to 25 % (pepper). Republic of Serbia have higher yields of cabbage & kale, onion, and carrot, while the yield of potato is the same in both countries. The highest difference in yield has carrot (40 %); In the Republic of Srpska are higher increasing rate of yields of the all observed kind of vegetables. In the case of Serbia, some kind of vegetables even have a negative changing rates (cabbage & kale, bean and garlic);
- The level of total year production of vegetables in Republic of Srpska is in interval between 7,7% (carrot) and 20% (potato, bean and cucumber) from the same in Serbia; The all observed kinds of vegetables have higher increasing rates of total production in Republic of Srpska. Some kinds of vegetables (potato, cabbage & kale and garlic) have even negative change rates of total production in Serbia.

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References

Mutavdžić, Beba, Novković N., Ivanišević, D. (2010): Tendencije razvoja povrtarstva u Srbiji, Agroznanje vol.12, br.1, str.23-31

Novković N., Ilin Ž, Janošević M., Mutavdžić Beba (2008): Značaj proizvodnje povrća za multifunkcionalni ruralni razvoj, zbornik radova međunarodnog naučnog skupa „Multifunkcionalna poljoprivreda i ruralni razvoj III“, IEP, Beograd, I knjiga 141- 148

Novković, N., Mutavdžić Beba, Vukelić Nataša (2011): Vegetable production tendencies in Vojvodina, Proceedings of 22nd International Symposium Food Safety Production, Poljoprivredni fakultet, Novi Sad, Trebinje 19-25.juna

Novković, N., Mutavdžić Beba, Drinić LJiljana, Ostojić, A., Roković Gordana (2012): Tendency of vegetables development in Republic of Srpska, Agrosym, 2012, Jahorina (u štampi)