

TENDENCY OF VEGETABLES DEVELOPMENT IN REPUBLIC OF SRPSKA

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Abstract

Vegetables production is one of the most intensive branches of plant production. It generates high yields and therefore economics effects per unit of land. According to importance of vegetable production (in economics sense) for producers and for agriculture in all, the basic direction in a future development of this branch, are optimal using of disposal capacity, increasing production and changing the structure of production.

The subject of this research paper is a volatility analysis of production characteristics of the most important vegetable varieties, cultivated in the Republic of Srpska. That means analyzing of changes and tendency of sowing areas, yields, and total production of: potato, tomato, pea, cabbage & kale, onion, pepper, beans, carrot, cucumber and garlic.

Analyzed period is 2001-10. Methods of descriptive statistics are applied in analyzing vegetables characteristics. That means basic statistical indicators, as: average value, extreme value (minimum & maximum), coefficient of variation, and change rate.

Research shows, that absolute area (in hectares) under the vegetables is decreasing, while, relatively, it is the same, about 11% of total sowing land in Republic of Srpska. Yields are showing tendency of increasing, and total production of all analyzed important sorts of vegetables are increasing, too.

Results of quantitative analysis makes base for the qualitative analysis of production and development of vegetables in Republic of Srpska. Both of them, are useful for creating of agrarian policy for development of production, consumption, processing, and export of different sorts of vegetables.

Key words: *vegetables, production, quantitative analysis, Republic of Srpska*

Introduction

Vegetables production is one of the most intensive branches of plant production, what proves high yields and high economic results. Taking in account importance of that branch of agriculture, in economic sense, for agricultural producers, and for agriculture in whole, basic directions for the future development are optimal usage of production capacity, increasing volume of production, and changes of production structure.

Subject of this research is analysis of changes of production characteristics of important varieties of vegetables in Republic of Srpska, and that is: tendency of sowing areas, yields, and total production. Analysis include: potato, tomato, pea, cabbage & kale, onion, pepper, beans, carrot, cucumber and garlic. Included period of research is the first decade of XXI Century, years 2001-10. Research in this paper has objective to improve importance of vegetables production, as for conventional development of agriculture, as for organic and sustainable and multy functional rural development.

Novkovic et. al. (2008) analysed vegetables production in Srebia and Vojvodina region, in the period: 1981-2007. Results are that vegetables production area in Serbia is 300.000 hectares in average. From that area, about 80.000 hectares is in Vojvodina region. Vegetables production in Vojvodina region is about 5% in the production structure of plough land, what is fare from Serbia, where is that share 8, 5%. Area under vegetables is very stable. Tendency of low increasing is present in Serbia, and low decreasing is present in Vojvodina.

Mutavdzic et.al. (2010), using regression models observe influence of yield and total production of some important sorts of vegetables in actual year, on sowing area in the next year. In general, in vegetables production, yield and total production don't have influence on sowing area in next year, as it is case of crops and industrial plants. The most, relatively important influence of yield, on sowing area in next year show melon & water melon, than paper, tomato and pea.

Mutavdzic et.al. (2011) analyzed natural results in vegetables production in Serbia in period 2001-10 year. Results of analysis are compared with adequate for the period from previous decade, 1992-2000. For last ten years, vegetables production in Serbia increase in all observed sorts of vegetables. Growth was from 2% in the case of onion, though 26% of paper, to 56% in the case of pea.

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 Srpska in the ten-year period, 2001-10.

Data are processed by standard statistic measures: average of value (\bar{X}), minimal (min), and maximal value of characteristics in observed period (max), coefficient of variation (Cv), and change rate (r).

For research was used official published data of Republic Institution of Statistics of Republic of Srpska.

Results of Research with Discussion

Analysis of Vegetables Area

In Table 1 was given the basic data about areas of important sort of vegetables in Republic of Srpska, in the period 2001-10 year. Potato is (with about 17 thousand hectares) the most represent vegetables sort in Republic of Srpska. Fore times more than second sort of vegetables, bean. In observed period, areas under the potato had fall in average year rate of minus 3 %, and they move in interval from 14.5 to 19 thousand hectares.

Area under the tomato was 2 thousand hectares, in average. The area is very stable; the coefficient of variation was only 4%, what was a minimal, after onion and pepper. Sowing area under the tomato was in interval of 1.8 to 2.1 thousand hectares. Tomato area shows low decrease rate of -1.47 % per year, in observed period.

In Republic of Srpska, the pea was sowed in last ten years on one thousand hectare, in average. Pea was only vegetables sort (with cucumber) which shows a tendency of increasing, in observed period. The rate of increasing of sowing area under the pea was symbolic 0.62 %, per year. Pea was produced on area from 900 to 1,100 hectares, with highly expressed variability, what show high coefficient of variation, more than 10%.

Table 1 Indicators of analyzed vegetables area in Republic of Srpska (2001-10)

Vegetables	Average \bar{X} (ha)	Interval of variation		Coefficient of variation Cv (%)	Change rate r (%)
		Minimu m	Maximum		
Potato	16.639	14,539	19,247	8.15	-3.07
Tomato	2.047	1,872	2,138	4.00	-1.47
Pea	1.016	876	1,147	10.24	0.62
Cabbage & kale	2.587	2,297	2,818	6.08	-2.25
Onion	1.968	1,852	2,086	4.00	-0,15
Pepper	2.334	2,170	2,464	4.00	-0.52
Bean	4.389	4,006	4,668	4.92	-1.68
Carrot	852	710	988	8.64	-1.93
Cucumber	1.629	1,393	1,811	8.96	1.54
Garlic	980	862	1,045	5.57	-1.34

Cabbage & kale were produced on 2.6 thousand hectares, in average. Area was relatively stable (coefficient of variation 6 %), and it was moving in interval of 2.3 to 2.8 thousand hectares. In observed period, cabbage & kale have highly expressed rate of decreasing. Onion possesses about 1.9 thousand hectares, in average. It changes from year to year, in the interval of 1.8 to 2.1 thousand hectares in observed period.

Area under pepper was 2.3 thousand hectares. It was moving in interval of 2.1 to 2.5 thousand hectares. The area was stable (low coefficient of variation 4 %). Tendency of low decreasing of sowing area under the pepper was also present.

Bean was, after potato, the most sowed sort of vegetables in Republic of Srpska. It was cultivated on 4.4 thousand hectares, in average. Area under the bean was changing in the interval of 4 to 4.7 thousand hectares, depending of year, and possessed relatively low coefficient of variation, 4.92 %. Bean had high rate of decreasing of hectares.

Carrot was produced on less than one thousand hectare (852 ha), and it is the minimum of the all observed kind of vegetables. Area under the carrot shows high variability (Cv = 8.6), and tendency of decreasing in 1.93 % per year.

Cucumber possessed 1.6 thousand hectare, in average. Cucumber, also, shows unstable sowing area. The coefficient of variation was 9 %. The tendency of increasing was present, too. Increase rate was 1.54 %, per year.

Garlic was produced on 980 hectares, in average. It was changing in interval from 860, to 1,050 hectares per year, in observed period. Area under the garlic showed tendency of increasing. Decreasing rate was -1.35 %, per year.

Analyzed sorts of vegetables are possessed more than 92.4 % of total area under the vegetables in Republic of Srpska. The most present were: potato with 44.6%, bean with 11.8 %, cabbage & kale with 6.9 %, and pepper, with 6.3 %. In last ten years (2001-10) area under the vegetables in Republic of Srpska was decreased from 40,867 hectares in 2001, on 33,935 hectares in 2010. Decreasing was constant, from year to year. Total decreasing of vegetables area was 6,932 hectares, or 17 %.

It is interesting, that rate of vegetables in total sowed area in Republic of Srpska was not practically changed. It was insignificantly increasing from 10.7 % on 10.8 %. The reason for this is that total sowing area in Republic of Srpska is decrease for 69 thousand hectares, or more than 18 %, in period 2001-10.

Analysis of Vegetables Yield

Statistical data about yields of observed vegetable plants are presented at Table 2. Average Yield of potato in the period 2001-10 was 10.5 t/ha, and it was changing between 7.3 t/ha, and 12.3 t/ha. Yield of potato had medium variability, with coefficient of variation of 16.1 %. In the first decade of XXI century potato yield shows increasing, by average rate of 3.8 % per year.

Tomato had average yield of 9.8 t/ha. Tomato yield had very wide interval of variation, from 5.6 до 13.6 t/ha, what shows extremely high coefficient of variation, 24.6%. Even high variability, tendency of increasing of yield was present.

Table 2 Indicators of analyzed vegetables yield in Republic of Srpska (2001-10)

Vegetables	Average \bar{X} (t/ha)	Interval of variation		Coefficient of variation Cv (%)	Change rate r (%)
		Minimum	Maximum		
Potato	10.5	7.3	12.3	16.15	3.81
Tomato	9.8	5.6	13.6	24.57	5.28
Pea	2.9	1.8	4.3	22.87	5.03
Cabbage & kale	12.3	7.6	16.0	18.83	6.85
Onion	5.8	4.0	7.7	20.39	4.41
Pepper	9.9	5.8	12.2	21.07	7.90
Bean	1.4	0.9	1.7	21.28	5.03
Carrot	6.0	4.0	7.7	19.70	4.61
Cucumber	7.4	4.1	9.1	21.59	8.30
Garlic	3.3	2.5	3.9	13.68	2.59

Pea, with average yield of 2.9 tons per hectare had significant variability (Cv = 22.9 %). Yield of pea was changing in the interval between 1.8 and 4.3 tons per hectare. In the observed period, yield of pea shows growth by average year rate of 5 %.

Average yield of cabbage & kale was 12.3 tons per hectare, and also shows high variability of 18.8 %. Cabbage & kale have tendency of increasing of yield, by average increase rate of 6.85 % per year.

Onion had average yield of 5.8 tons per hectare. It had also a high variability. The coefficient of variation was 20.4 %. Yield of onion was moving in the interval of 4 and 7.7 tons per hectare.

Average yield of pepper was 9.9 t/ha. It had variation in interval of 5.8 and 12.2 tons per hectare. Yield of pepper shows tendency of increasing in observed period, by average rate of 7.9 % per year.

Average yield of bean in Republic of Srpska in observed ten-year period was 1.4 tons per hectare. It was moving in the interval of variation of 0.9 to 1.7 t/ha, and it shows the same rate of increasing as pea, 5 % per year.

Carrot had average yield of 6 tons per hectare. The yield was in the interval of 4 to 7.7 t/ha. Increase rate of yield of carrot was 4.6% per year in observed period.

Yield of cucumber was 7.4 tons per hectare in average. It shows the biggest rate of increase, comparing with all observed sorts of vegetables. The average rate of increase of yield of cucumber was 8.3 % per year.

Average yield of garlic was 3.3 t/ha. The variation of yield was in the interval of 2.5 to 3.9 tons per hectare. Garlic has tendency of increasing the yield, by average rate of 2.6 % per year. It is the minimal increase rate, comparing with all observed kind of vegetables.

The all vegetables plant, in observed decade (2001-10) had positive rate of grow. The highest grow rate had cucumber (8.3%), pepper (7.9) and the all cabbage & kale, while, garlic had the lowest grow.

Analysis of Total Vegetables production

Total vegetables production is result of sowing (harvesting) area and yield. Quantity of each vegetable kind depends of participation in sowing structure, and level of intensity of production. Table 3 presents changing of total production of important kind of vegetables in Republic of Srpska, in the period 2001-10.

Table 3 Indicators of vegetables production in Republic of Srpska (2001-10)

Vegetables	Average	Interval of variation		Coefficient of variation Cv (%)	Change rate r (%)
	\bar{X} (t)	Minimum	Maximum		
Potato	173,113	122,933	208,447	14.40	0.64
Tomato	20,029	12,012	26,620	24.32	3.82
Pea	3,024	1,536	4,836	30.36	6.10
Cabbage & kale	31,708	21,401	40,551	16.70	4.50
Onion	11,447	7,523	15,552	20.86	4.44
Pepper	23,222	13,071	28,806	21.27	7.41
Bean	5,857	4,026	7,755	20.93	2.95
Carrot	5,096	3,421	7,188	23.22	2.52
Cucumber	12,120	5,684	16,406	25.09	10.03
Garlic	3,239	2,443	3,919	15.78	1.25

Average year production of potato in Republic of Srpska in the last ten years was about 173 thousand ton. Year production was relatively stable, and shows the minimal coefficient of variation among the all observed kind of vegetables ($Cv = 14.4\%$), and tendency of insignificant increasing (0.64 %).

Total year production of tomato was about 20 thousand ton, in average. It shows tendency of low increasing, by the rate of 3.8 % per year. Year production of tomato was in interval of 12 and 26 thousand ton.

Extremely increasing of production of pea was present in observed period. Average rate of increasing of total production was more than 6 % per year. Average year production of pea was 3 thousand ton, and it was changing in the interval between 1.5 and 4.8 thousand ton, depends of year.

Average production of cabbage & kale in the observed period was 32 thousand ton per year. Production shows tendency of increasing, by change rate of 4.5 % per year.

Total year production of onion was in interval of 7.5 to 15.5 thousand ton. In average it was 11 thousand ton per year. Onion shows the similar tendency as cabbage & kale.

Year production of pepper in Republic of Srpska in the period 2001-10 was between 13 and 29 thousand ton. In average it was 23 thousand ton per year. Pepper also shows tendency of high grow, by change rate of 7.4 & per year. Bean was produced in quantity between 4 and 7.8 thousand ton per year. Average year production of bean was 5.8 thousand ton. Bean shows lower increase rate of nearly 3 % per year.

Carrot was produced in quantity of 5 thousand ton per year, in average. Variation of production was in interval of 3 and 7 thousand ton. Similar as bean, carrot shows lower rate of increasing of production (under the 3 %).

Production of cucumber in Republic of Srpska was changing in the interval of 5 to 16 thousand ton per year, during observed period. In average it was 12 thousand ton. Cucumber shows the highest increasing rate, more than 10 % per year.

Garlic year production was more than 3 thousand ton in average. It was changing between 2.5 and 4 thousand ton. Year production of garlic shows tendency of low grows, by rate of 1.25% per year.

Conclusion

The characteristic of vegetables production in Republic of Srpska, in the period 2001-10 in generally was:

- It is present process of decreasing of sowing area in the greater part of vegetables. Yearly rates of decrease were: potato - 3, cabbage & kale - 2.2, carrot – 1.9, bean -1.7, tomato – 1.4 and garlic – 1.3 percent. Positive moving shows only pea (0.6 %) and cucumber (1.5 %).
- Average yields of the all observed kinds of vegetables were increased. The yearly increasing rate was: cucumber 8.3, pepper 7.9, cabbage & kale 6.8, tomato 5.3, pea 5, bean 5, carrot 4.6, onion 4.4, potato 3.8 and garlic 2.6 percent.
- Increasing of yields were more intensive than decreasing the sowing area, what results by increasing of total year production to all observed kind of vegetables in Republic of Srpska. Year rate of increasing of total vegetables production were: cucumber 10, pepper 7.4, pea 6.1, cabbage & kale 4.5, onion 4.4, tomato 3.8, bean 2.9, carrot 2.5, garlic 1.2 and potato 0.6 percent.
- Tendency in vegetables production are: 1. Increasing of intensity of production; 2. Absolutely, but not relatively increasing of sowing area; 3. Increasing of total production of vegetables.

Literature

- Mutavdžić, Beba (2010): Analiza i predviđanje proizvodno – ekonomskih parametara u poljoprivredi Vojvodine, Doktorska disertacija, Univerzitet u Beogradu, Poljoprivredni fakultet Zemun, Beograd
- Mutavdžić Beba, Novković, N. Kunovac, G. (2010): Regresioni modeli u povrtarstvu, Zbornik radova naučnog skupa XXI naučno-stručne konferencije poljoprivrede i prehrambene industrije, Poljoprivredno - prehrambeni fakultet, Sarajevo, Neum str. 321-328
- 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, Šomođi, Š. (2010): Modeli predviđanja u povrtarstvu, Škola biznisa, naučno-stručni časopis, Visoka poslovna škola strukovnih studija, Novi Sad str.41-49