ANALYSIS OF ECONOMIC MODELS OF POTATO PRODUCTION IN MONTENEGRO

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Abstract

The northern region of Montenegro represents a very important resource for agricultural production. However, the depopulation of the analysed area, pronounced in-kind character of production without significant participation of market producers, lack of market research, stronger vertical and horizontal connection between primary production and processing sectors have significant impacts causing the low level of competitiveness of agricultural production. Potato production in the analysed area has recorded positive trends in last ten years. This paper presents economic models of agriculture households on the analysed area from the potatoes production point of view.

Key words: *competitiveness, economic models, market, production*

INTRODUCTION

Potato production in Montenegro has great importance. Potato arrived to Montenegro and was introduced into production three hundred years after its transfer from South America – end of 18 century, during the rule of Petar I Petrovic Njegos. At that time it was very little known or almost unknown to other Balkan and Dunav countries. Nowadays, large number of citizens of the Northern area of Montenegro gains income from potato production. In such context, the following locations are particularly significant: Rovačko Trebaljevo (Kolašin municipality) and Lubnice (Berane municipality). Thanks to the natural conditions, potato production in the before mentioned areas is significantly competitive in comparison to other productions, such as: wheat and winter barley production. Increase of area under potato at households represents an important line of market production, where increased volumes contribute to the higher financial results of the household as a whole. Objective of this paper is to indicate significance of the organization-economic conditions for potato production in the area of Kolasin and Berane municipality. The research subject was production-economic models, which show changes in

economic results of production depending on the conditions for the conduct of production.

On the basis of obtained results and analyses, the conclusions can be derived regarding the production-economic conditions and results of potato production and also the results and their impact to the increase of yield at the observed area can be assessed.

Tica, N., Zoranovic ,T., (1991-93) performed economic assessment of potato production results in comparison to other crops on one private household. Measuring of results shows that in comparison to other crops, potato production realizes the most favourable measuring ratios regarding the production value and financial results per area unit, as well as financial results per labour hour.

Munćan, P., Živković, D., and cooperatives (1994) tried to measure the level of achieved work productivity in potato production at two large households in Srem area and compare it with other significant crops. Labour productivity in potato production and production of other relevant crops can be increased only with the increase of yield and reduction of live and materialized labour. With the desire to reduce participation of human labour in production, the efforts of experts are focused on better application of contemporary production means, technologic

procedures and in general, fast development of techniques and technologies.

Živković, D., Minćan, P., Broćić, Z., Sredojević, Z., Tomić, R. (2002) determined that from the economic point of view and as measured by the indicators of production cost-effectiveness and profitability, potato production is resembled by high competitiveness in comparison to other agriculture crop cultures.

Despotović Aleksandra (2005), analysing the influence that the increased household agricultural area and higher potato share in the planting structure have to the achieved household results, indicates that their increase contributes to the increase of profit of the household as a whole and per hectare of arable area. As a result of increased agricultural areas and potato share in the planting structure, the level of labour force utilization increases.

MATERIALS AND METHODS

Considering that the research topics are of organization-economic nature, the general method that was applied in the paper is the method of models. Data used for the paper were gathered in the field, respectively were obtained on the basis of interviews with individual producers from the analysed area. Moreover, the data based on the authors' assessment are also shown. Tables and graphs are also used for the purpose of displaying analyses of the paper.

RESULTS AND DISCUSSIONS
1.
The paper analyses two production-economic models, which are the following: a) production-economic model of conventional production without irrigation system and b) production-economic model of conventional production with irrigation system.

Characteristics of the production-economic model of conventional production without irrigation system

Regarding the analysed household and taking into consideration the agro-economic conditions, the following potato varieties were determined as the most favourable: Kennebec, Jerla, Desiree and Agria. The analysis was performed on the area of 1 ha. Obtained products are planned for placement to the national and local markets. Number of permanent employees is 1, while the maximum number of workers employed in the season period during a year amounts to 10. Number of days when the season workers are engaged is 6 and price per day is 25.00€. Planned planting distance is from 0.75m x 0.30m. Planned purchase price is at the level of around 0.25 €/kg. Packaging (packaging sacks for 12 kg), price 0.10 €/pieces. Households with required facilities exist in the proposed locations. In cases which require construction of facilities, price per m^2 of constructed area varies from 150-250 €/m^2. Price of tractor with basic connected machines, suitable for operations on the analysed locations, should not exceed 17,000 €. For around 44000 potato plants, average investment per plant amounts to around 0.13 €. Investment per m^2 amounts to around 0.60 € per m^2. Expected yield per plant amounts to around 0.68 kg.

Table 1. Total planned annual yield on the area of 1 ha

	Type of product	Measuring unit	Amount	Sale Euro/kg	Value (Euro)
	1	2	3	4	5(3x4)
1.	Mercantile potato	kg	30,000	0.25	7,500.00
	Total				**7,500.00**

Source: Own calculation

Table 2. Annual production costs on the area of 1 ha

	Type of product	Measuring unit	Amount	Sale Euro/kg	Value (Euro)
	1	2	3	(4)	5(3x4)
1	Seed	kg/ha	3000	0.70	2100.00
2	Fuel	l	350	1.00	350.00
3	Mineral fertilizer	kg	1000	0.50	500.00
4	Protective agents	kg	50	6.00	300.00
5	Seasonal labor	No of workers	10	150.00	1500.00
6	Packaging	piece	2500	0.10	250.00
	Total				**5,000.00**

Source: Own calculation

Table 3. Business results - model „A"

Productivity of the project	net profit/no of workers =250.00 €
Coefficient of cost-efficiency	Total income/ total cost =1.50
	profit/total income=0,33

The performed analysis indicates that the achieved cost-efficiency coefficient is higher than 1, which means that potato production in the given conditions is cost-efficient. Obtained result is in accordance with the previous researches, (Živković, D., and coop. 2002), which indicated high level of cost-efficiency in potato production. As regards to the cost structure, the highest share is for seed costs (42%). In addition to the expected incomes from placement of products to the market, measures of the agrarian policy of Montenegro also envisage incentives of 130 € per ha of area under potatoes or contribution for the procurement of production means and investments with the share of 30% of the invoiced value of the equipment – machinery and irrigation system.

Taking into consideration the fact that agricultural areas of Montenegro are mainly uncultivated, therefore excellent conditions for starting the potato production exist. Main advantage of Montenegrin producers is that there is higher demand during the tourism seasons - winter and summer. Thanks to the possibility of so called invisible export, potato production, as the core or supplementary business activity, can be deemed as an important income source for local citizens. If we presume organizing potato production on for example 20 selected farms, on the area of 20 ha, the expected income at the annual level would be around 50,000 €. Moreover, we have to take into consideration the fact that this region covers the areas which are on the lower altitude therefore there are possibilities for diversified plant production.

Characteristics of the production-economic model of conventional production with irrigation system

Characteristics of the production-economic model B are similar to the model A, except that this production model includes irrigation system and due to that the planned potato sale price is higher. The used varieties are: Kennebec, Jerla, Desiree and Agria. Analysis was performed on the area of 1 ha. Obtained products are planned for placement to the national and local markets. Number of permanent employees is 1, while the maximum number of workers employed in the season period during a year amounts to 10. Number of days when the seasonal workers are engaged is 6 and price per day is 25.00€. Planned planting distance is from 0.75m x 0.30m. Planned purchase price is at the level of around 0.30 €/kg. Packaging (packaging sacks for 12 kg), price 0.10 €/piece. Irrigation system costs per ha do not exceed 500 €. For around 44000 potato plants, average investment per plant amounts to around 0.13 €. Investment per m^2 amounts to around 0.60 € per m^2. Expected yield per plant amounts to around 0.8 kg.

Table 4. Total planned annual yield on the area of 1 ha

	Type of product	Measuring unit	Amount	Sale Euro/kg	Value (Euro)
	1	2	3	4	5(3x4)
1.	Mercantile potato	kg	35,200	0.30	10,560.0
	Total				**10,560.0**

Source: Own calculation

Table 5. Annual production costs on the area of 1 ha

	Type of product	Measuring unit	Amount	Sale Euro/kg	Value (Euro)
	1	2	3	(4)	5(3x4)
1	Seed	kg/ha	3000	0.70	2100.0
2	Fuel	L	350	1.00	350.00
3	Fertilizer	Kg	1000	0.50	500.00
4	Protective agents	Kg	50	6.00	300.00
5	Seasonal labour	no of workers	10	150.00	1500.0
6	Packaging	piece	2933	0.10	293.0
7	Irrigation system	Ha	-	-	500.0
	Total				**5,543.0**

Source: Own calculation

Overview of the Model B business results is given in the Table 6.

Table 6. Business results – model "B"

Productivity of the project	net profit/no of workers = 502.00 €
Coefficient of cost-efficiency	Total income/ total cost = 1.90
	profit/total income = 0.47

Performed analysis indicates that better economic results were achieved in the model B than in the model A (Fig.1).

Cost-efficiency coefficient amounts to 1.90 and the net profit per worker is at the level of 502.00 €.
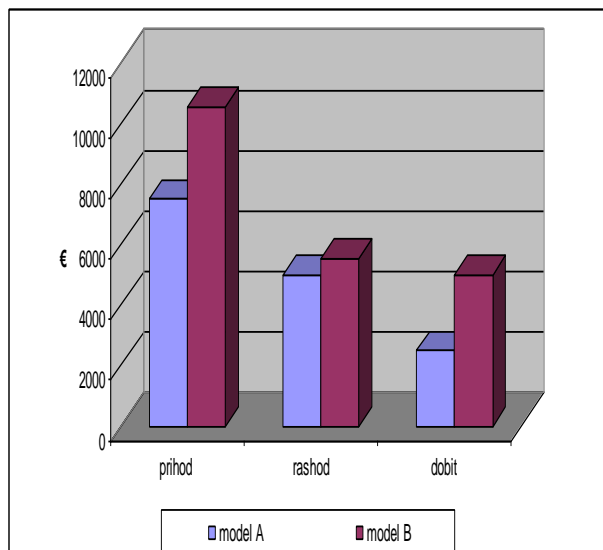

Fig. 1.Comparative analysis of financial results

Achieved economic results are complementary with the previous researches which indicate that with application of irrigation the potato yield can be increased even for 35-40%, (Broćić, Z., and coop., 2002). Moreover, (Egumenovski, P. and coop. 1990) determined that irrigation achieves important effects on the Desiree and Resy varieties. The largest effects of irrigation were achieved at the watering norm of 400 m^3 per ha.

CONCLUSIONS

In Montenegro, especially in its Northern part, there are significant uncultivated areas and there are outstanding agro-ecological conditions for potato production. Particular advantage is possibility for placement of agricultural products from the analysed area to the tourism capacities at the local and national level. Under the conditions of potato production on the area of 1 ha, higher revenues than expenditures can be expected for around 2,500.00 € without any significant investments (*model A*). Expected economic effects are higher if the production manner is changed and irrigation system is introduced (*model B*). Moreover, changes occur with the increase of arable areas planted with this culture, better storage conditions, application of more appropriate packaging, introduction of new sale channels, etc. Higher revenues than expenditures were obtained in the model B for around 5,017.00 €. If we compare levels of achieved revenues, it can be concluded that revenues of model B are higher for 50% in comparison to the model A. If the number of potato production farms increases and if such number is at the level of 20 farms a year in the area of Kolašin and Berane municipalities, it would have significant influence to the increase of revenues and improvement of life in the analysed area.

ACKNOWLEDGEMENTS

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