

## PRODUCTIVITY AND PROFITABILITY IN PRODUCTION OF CABBAGE

M. Pesevski<sup>1</sup>, N. Ralevic<sup>2</sup>, D. Zivkovic<sup>2</sup>, Z. Rajic<sup>2</sup>, S. Jelic<sup>2</sup>

**Abstract.** The authors perform an analysis of economic indicators in the production of cabbage in the Republic of Macedonia, based on statistics (2005-2009) and data from directly interviewed thirty family holdings. In doing so, they found that cabbage in this country is produced on average area of 3,947 hectares. Total production, with an average yield of 22,342 kg/ha, is 88,182 tones in average, which is 11.4% of the total production of horticultural products. Production of cabbage is mainly concentrated in three statistical regions, as follows: 37.43% in the Southeast region, 12.54% in Pelagonia region and 11.15% in Polog region of the total area in the country. Because of that, surveys are carried out in these three regions. Labor productivity varies between 30.0 kg/h in the Southeast and 34.9 kg/h in Polog region and inside the region 26.7 to 39.2 kg/h. Although average yields at the surveyed producers are largest in Polog region (on average 39,980 kg/ha), the efficiency of invested assets is lowest. The profit is 211.6 EUR/ha in average. This is why they sell the entire production on the wholesale market where the purchase price is lowest. In contrast, highest profit (on average 1,389.4 EUR/ha) accomplish the producers from Pelagonia region because they produce with lowest unit costs and sell the products with highest price, compared to other producers.

**Key words:** cabbage, yield, productivity, profitability, price

### Introduction

Land for agricultural production capacities of the Republic of Macedonia amount to an average of 1,122,139 ha (2005-2009) or 43.64% of the total territory of the country. This capacity is used irrationally because for intensive agricultural

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<sup>1</sup> Mile Pesevski, Ph.D., full professor, University Ss. Cyril and Methodius in Skopje, Faculty of Agricultural Sciences and Food, blvd. Edvard Kardelj bb, 1000 Skopje, Republic of Macedonia.

<sup>2</sup> Nebojsa Ralevic, Ph.D., full professor, Dragic Zivkovic, Ph.D., full professor, Zoran Rajic, Ph.D., associate professor, Sreten Jelic, Ph.D., docent, University in Belgrade, Agricultural Faculty, Nemanjina 6, 11080 Zemun-Belgrade, Republic of Serbia.

production only 528,767 ha or 47.12% of the total agricultural area is engaged [1]. In the researched period, vegetable production was organized at an average area of 58,491 ha or 11.06% of the arable land. Within that area, more than 30 vegetables are grown, including cabbage. Most of them have grown at over five thousand hectares (potatoes, beans, tomatoes, peppers and watermelons), and the onions, garlic, peas, cucumber and other vegetable crops on a relatively smaller area [2]. Cabbage is grown on 3,974 hectares (see Table 1) or 6.75% of the total area under vegetables. But no matter the number and area of cultivated crops, in this country are produced relatively high-quality vegetables, due to relatively good comparative climatic advantages in relation to many European countries [4].

State Statistical Office of Republic of Macedonia in the past years continuously run statistics only for 11 garden crops. But anyway, according to available statistics, Republic of Macedonia annually (2005-2009) produced 774 530 tons of fresh vegetables on average and 11.38% or 88,182 tons are cabbage [2]. Most of the production (90%) of fresh vegetables are consumed in the country and the rest is exported as fresh or processed [7]. Out of the total exports of vegetables, fresh produce dominate (nearly 86%) over the processed [5; 6]. Here, the main export partner is Serbia, and in second place (with 32% share in total exports of fresh vegetables) are the EU Member States. Of these, however, for Macedonia the most important countries are Slovenia (with 32%), Italy (with 29.65%) and Greece with 23% share in total exports to the EU [7]. With a value of total exports of over 1 million EUR (in 2006), Serbia is the first country in the ranking of a group of 'very attractive markets' for exports of fresh vegetables [7].

The results of the research show that 28,165 tons or 31.94% of the total production of cabbage is consumed in the country [1]. As for the export of cabbage, in the researched period, it was an average of 33,544 tons or 38.04% of the total production. Macedonia exports fresh cabbage to an average of 14 countries, and the average price is 0.139 EUR / kg [3]. The most important export partner is Serbia with over 31% share in total exports of fresh cabbage.

The aim of this paper is to analyze the production and economic results of the production of cabbage in the family business in the Republic of Macedonia.

### **Method and Data Source**

The data collecting is done by direct inquiry (during 2009) of independent producers of cabbage from the three major statistical regions in the Republic of Macedonia. The importance of the statistical areas is determined by the average (2005-2009) per cent share of the total surface area under cabbage in the country. According to this criterion, these three statistical regions were selected: Southeast with 37.43% share (see Table 1), Pelagonia with 12.54% and Polog with 11.15 %

share in the total average area (3,947 hectares) in the country. In the selected region, a municipality is selected that dominates in the total area of the selected region. Studies of the Southeast region were conducted in the municipality of Strumica, which accounts for 22%; Bitola in Pelagonia, which accounts for 29.41% and the municipality of Tetovo in the Polog region, which accounts for 26.9% of the total average area under cabbage in the region. In each of these municipalities, ten farmers were surveyed. Then, for each group, the average values were calculated from the results of the survey.

Table 1 Participation of regions in the total area and in the total production of cabbage in the Republic of Macedonia (average 2005-2009)

Region	Area		Production		Yield (kg/ha)
	ha	Participation (%)	Tons	Participation (%)	
1. Skopje	421	10.67	4,867	5.52	11,561
2. North-East	305	7.73	3,820	4.33	12,525
3. East	242	6.13	4,358	4.94	18,008
4. South-East	1,477	37.43	49,785	56.46	33,707
5. Vardar	300	7.60	5,677	6.44	18,923
6. Pelagonia	495	12.54	7,701	8.73	15,558
7. South-West	267	6.77	2,768	3.14	10,367
8. Polog	440	11.15	9,206	10.44	20,923
Total, RM	3,947	100.00	88,182	100.00	22,342

Source: Authors' estimations based on the data from Statistical Review: Field Crops, Orchards and Vineyards, 2005-2009.

Variable costs are calculated based on the production costs of inputs and current market prices in the selected municipalities. Fixed costs are not calculated due to the fact that there was no difference in the use of machinery in the surveyed economies.

Conversion of national currency (MKD) in the EUR is done with average exchange rate of the National Bank of Republic of Macedonia MKD 61.27 / EU in 2009.

## Research Results and Discussion

### 1. Costs of production

Direct production costs vary in a relatively wide range. The variability mostly depends on the amount of spent inputs. They, in turn, depend on the degree of intensity of the technological process, and the number of parcels and average distance of the parcels for production. Also, it depends on the distance from markets, as well as place of residence of the producers.

A greater impact on the labour costs may be influenced by the amount of the realized yield, because at higher yields it is spent more human labour for harvesting, packaging and sale of the production. The total costs for these three business processes range between 141.2 EUR/ha in Pelagonia to 652.8 EUR / ha in Polog, or 19.9% to 69.7% of the total labour costs (see Table 2). The costs of labour, in this case have no significant impact, because the daily wages from region to region do not differ, i.e. they are almost the same. They range between 9 and 11 EUR/day.

The costs of mechanization are in direct correlation with the total time they were engaged and their rational use. The highest time engaged and perhaps the highest level of irrational use of machinery has the Polog region. Despite this fact, cabbage producers in this region transport the products with their own means to the Skopje wholesale market. Here, the costs are more than 2 times higher than the same costs in Pelagonia. Farmers from the other two regions realize their production on the local markets.

Table 2 Structure of costs (per ha) and unit costs in production of cabbage by regions

Type of cost	Region			Average
	Southeast	Pelagonia	Polog	
Salaries	925.7	710.9	936.0	857.5
Fuel, oil, lubricants	223.4	205.7	470.6	299.9
Materials	945.3	488.0	978.8	804.1
Total variable costs	2094.4	1404.6	2385.4	1961.5
Unit costs (EUR/kg)	0.0616	0.0499	0.0597	0.0571

The level of the material costs for cabbage depends on the amount and type of spend fertilizers. The results of the research show that the highest amount of those kind of costs has the Southeast region (437.8 EUR/ha or 46.3% of total material costs).

Cabbage with the lowest total variable costs is produced in the Pelagonia region. Because of that, the costs of production in this region are the lowest (see Table 2).

On an average, in the first place (with 43.72%) there are the labour costs (see Figure 1), although in the Southeast and Polog regions the material costs dominated. This is because of the fact that in the Polog region they are about 1.7 times lower than the same costs in the Polog region, or compared with the Southeast region, they are lower by 33%.

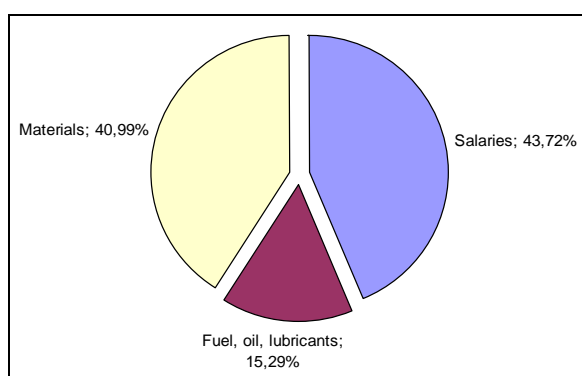


Figure 1 Structure of average costs of a cabbage production per 1 ha

## 2. Productivity and profit in the production of cabbage

The labour productivity is a reflection of the quality of the level of engagement of the participants in the production process and the results of production, as well as the level of involvement of the means of production. In other words, it's the relationship between the realized production and spent human labour. In this case, economies of the Polog region have the highest labour productivity (see Table 3), which means that they have a relatively higher level of intensity of production at relatively same amount of human labour.

The highest efficiency of invested money have the producers from Pelagonia. For every unit of money they invested, they received nearly two units. In contrast, the worst financial results have the Polog farmers, although they realize the best production results. This situation is probably due to the relatively lower quality, but also because of the wholesale way of selling, where the production is sold at relatively lower prices. In this region, because of the mentioned reasons, the value of production is the lowest. Here, the average selling price of the production is 0.0649 EUR / kg, which in comparison to the average unit costs, is higher by just 13.7%.

Table 3 Productivity and profitability  
of the cabbage production per regions

Indicator	Region			Average
	Southeast	Pelagonia	Polog	
Labour expenditures (h/ha)	1,134.4	871.2	1,147.0	1,050.9
Crop achieved (kg/ha)	34,013	28,110	39,980	34,034
Production value (EUR/ha)	2,836.7	2,794.0	2,597.0	2,742.6
Productivity (kg/h)	30.0	32.3	34.9	32.4
Profit (%)	26.2	49.7	8.2	28.0

Profit is relatively low (approximately 28% of the value of the production), which compared to the earnings from carrot production [9], is lower by almost 49 index units.

### Conclusions

Based on the results of the family farms survey, which among other vegetable crops produce carrot, it can be concluded the following:

1. In all statistical regions there is a relatively wide variability in the amount of used human labour, and thus the level of the labour costs.
2. Because of major differences in the time of utilization of the machinery, the cost of fuels, oils and lubricants range between 205.7 and 470.6 EUR/ha.
3. Although there are no major differences in the price of fertilizers and other material inputs, material costs difference between the interval of almost 491 EUR/ha, due to differences in the quantity of spent fertilizers.
4. Although the difference between the minimum and maximum total variable costs is 1.7 times, it does not reflect the same intensity of the cost of production. Here, the difference is relatively lower, due to the soft difference of the yields.
5. The sale of cabbage on the markets exercises different prices, due to differences in quality and because of the different way of sale, but also because of the supply-demand relationship.
6. There is no big difference in the performance of used human labour, because the level of labour productivity has relatively the same value.

7. Unlike labour productivity, there is a big difference (6 times between the minimum and maximum) in the performance of invested funds.

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## ПРОДУКТИВНОСТ И ПРОФИТАБИЛНОСТ У ПРОИЗВОДЊИ КУПУСА

Др Миле Пешевски<sup>1</sup>, др Небојша Ралевић<sup>2</sup>, др Драгић Живковић<sup>2</sup>,  
др Зоран Рајић<sup>2</sup>, др Сретен Јелић<sup>2</sup>

<sup>1</sup>Факултет за земјоделски науки и храна, Скопје

<sup>2</sup>Пољопривредни факултет, Београд - Земун

### Резиме

Аутори су, на бази статистичких (2005-2009) и података директно анкетираних тридесет породичних газдинстава, извршили анализу економских показатеља у производњи купуса у Републици Македонији. Утврдили су да се у Републици Македонији купус производи на просечној површини од 3.947 хектара. Укупна производња, при просечном приносу од 22.342 kg/ha, износи 88.182 тона, што је 11,4% од укупне производње повртарских производа. Производња купуса углавном је концентрисана у три статистичких региона, и то: 37,43% у Југоисточном региону, 12,54% у Пелагонијском региону и у Полошком региону 11,15% од укупне површине у земљи. Продуктивност рада креће се између 30,0 kg/h у Југоисточном и 34,9 kg/h у Полошком региону, а унутар региона од 26,7 до 39,2 kg/h. Иако су просечни приноси код анкетираних произвођачи из Полошког региона највећи (у просеку 39.980 kg/ha), ефикасност уложених средстава је најнижа. Профит у просеку износи 211,6 EUR/ha јер произвођачи сву производњу пласирају на кванташким пијацама, где је откупна цена најнижа. Насупрот овоме, највећи профит (у просеку 1.389,4 EUR/ha) остварују произвођачи из Пелагонијског региона, зато што производе по најнижој цени коштања, а продају по највишој продајној цени у поређењу са осталим произвођачима.

**Кључне речи:** купус, принос, продуктивност, профитабилност, цена

### *Адреса аутора*

Др Миле Пешевски  
Универзитет "Св. Кирил и Методиј", Скопје  
Факултет за земјоделски науки и храна  
бул. Едвард Кардељ б.б., 1 000 Скопје  
Република Македонија  
Е-mail: [milepesevski@yahoo.com](mailto:milepesevski@yahoo.com)