

DEVELOPMENT OF SELECTED PRODUCTION-ECONOMIC INDICATORS OF RAPE GROWING IN SLOVAK REPUBLIC

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Abstract

Under the Slovak climatic conditions the oil crops represent the second most important group of crops grown on the arable land. Out of the total area of oil crops the rape comprises the largest territory. The reason is its universal utilization, not only in the food industry but also in the production of biofuels. Rape ranks among the most significant export agricultural commodities. The objective of the paper is the comparison of the production-economic dependences in rape growing in the Slovak Republic. This paper is based on the available materials of the Research Institute of Agricultural and Food Economics in Bratislava in the period of 2009 - 2015. We analyze the rape production from the aspects of cost incurred, yields, prices and subsidies. Consequently, we evaluate the economic relationships such as revenues, cost effectiveness, rate of subsidies in the refundment of costs and break-even points.

Keywords: *biofuels, break-even points, effectiveness, food industry, rape.*

JEL Classification: Q12, Q13

1 Introduction

The oil crops rang among the arable crops grown for the production of oilseeds and they also serve as the raw material for the production of the vegetable oils. Apart from the human nutrition, the products of oilseeds are also used in the

pharmaceutical and cosmetic industry as well as the raw materials for the production of lubricants and biodiesel. The processing of oil crops creates the byproducts - seed cake, pressed pieces and macerated groats which present biologically valuable proteinous raw material for the production of fodder mixtures. The importance of these products is rising along with the reduction or elimination of some concentrate animal fodder. The placement of the individual species of oil crops in the world is different. While the European countries focus predominantly on the production of oil-seed rape, and particularly also on sunflower, in the world the most widespread crops are soya, cotton and peanut. The USA and China have the largest areas of soya, sunflower is grown mostly in the states of the former Soviet Union, Argentina, Romania and Turkey. Poppy seed is grown mostly in Turkey, Hungary and the states of the former Yugoslavia. The characteristic phenomenon for the growing of oil crops in the world is the expansion of production areas, and consequently the production of oil products.

In our agriculture the oil crops play a significant role thanks to their versatile usage. In the sowing structure they rang among the strategical crops and they fit in the second place after the cereal crops. In 2016 in the sowing structure the oil crops were grown at the total area 253, 171 ha, which represented 18.8 % of the arable land and 13.2 % of the total agricultural land in Slovakia. In our economy these crops are the raw material basis for quite a number of food processing and secondary industry. Recently the oil crops belong to the lucrative commodities of the agrarian market. The reason is the increased media support related to the healthy human nutrition, the increased production of biofuels and also the high demand of rape and sunflower on the foreign markets.

Under the Slovak climatic conditions the most significant oil crop is rape (*Brassica napus var. arvensis*). In Slovakia it is grown in all agricultural cropping areas. From the agronomic aspect rape is the crop which requires appropriate soil and climatic conditions. It is the crop of long vegetation period which reacts positively to the nutrition and fertilization. Due to the versatile usage rape ranks among the lucrative commodities of the agrarian market. The rape grown in Slovakia is mostly used for the production of methyl ester of rape oil (MERO) and also for export. Rape is utilized less for the food purposes, the production of pellets for heating or the production of cosmetics and fodder for farm animals. In 2012 rapeseeds were the second most exported agri-food commodity from Slovakia of the export value 381, 987, 000 €. In 2016 rapeseeds fell to the 15th position with the value of 71, 063, 000 €.

2 Data and Methods

The objective of our paper is to evaluate the selected marketing and economic indicators in the process of rape growing in the Slovak Republic. The paper is based on the available materials of the Research Institute of Agricultural and Food Economics (RIAFE) in Bratislava in the period 2009-2015. In the first part we state the balance indicators of rape production and consumption. In the following part we analyse the rape production and marketing from the viewpoints of cost incurred, yields, producers' prices, revenues and subsidies. Based on these data we evaluate the economic relationships as incomes, economic results, cost effectiveness and break-even points.

In order to achieve the assigned objective we received the factual material from the public available resources of the Ministry of Agriculture and Rural Development of SR, the Research Institute of Agricultural and Food Economics and the Statistical Office of SR in Bratislava. The cost effectiveness expresses the index value which means the profit rate (loss rate) out of each euro invested into the production.

Cost effectiveness is expressed by the relation:

$$EN = \frac{\text{Revenues}}{\text{Costs}}$$

Cost effectiveness with subsidies is expressed by the relation:

$$EN = \frac{\text{Yields}}{\text{Costs}}$$

Break-even point of yield from 1 hectare (without subsidies) is expressed by the relation:

$$\dot{U} = \frac{VN}{P}$$

Break-even point of yield from 1 hectare (with subsidies) is expressed by the relation:

$$\dot{U} = \frac{VN}{(P + D)}$$

This point expresses the minimal rape yield per 1 hectare where costs incurred of production are equal to revenues.

Where: VN – costs incurred (€ . ha⁻¹)

P – exercise price (€ . t⁻¹)

Ū – yield (t . ha⁻¹)

D – subsidy (€ . t⁻¹).

3 Results and Discussion

We are approaching to the solving of the production-economic relationships of rape growing under the production conditions in Slovakia. The objective is to determine the development trend of rape growing in our zone with the continuing climatic changes at the territory of the Central Europe.

Table 1 **Selected information about commodity rape in SR in particular years (in ha, t.ha⁻¹, t)**

Indicator	Years							Index 15/09
	2009	2010	2011	2012	2013	2014	2015	
Harvest area	166,476	163,989	143,676	106,839	136,566	125,566	119,302	0.72
Yield	2.32	1.97	2.31	1.99	2.74	3.57	2.69	1.16
Production	386,224	323,058	331,892	212,610	374,191	448,271	320,922	0.83
Import	58, 593	95, 857	164,714	87, 170	33, 524	27, 509	41, 109	0.70
Export	185,284	177,657	265,869	91, 953	202,180	263,367	125,564	0.68
Balance	126,691	81, 800	101,155	4, 783	168,656	235,858	84, 455	0.67
Domestic consumption	260,000	240,652	240,000	207,849	205,304	213,000	236,171	0.91
MERO	180,000	170,652	210,000	177,849	200,304	208,000	209,655	1.16

Source: RIAFE Bratislava: Oil crops. Situational and perspective review, own calculations.

In the Table 1 the principal balance indicators of rape in 2009-2015 are given. In particular, they are the harvest areas, yields per hectare, production, indicators of international trade, domestic consumption and rape usage for MERA production. The rape harvest areas have been gradually falling, in 2015 rape was harvested from 119, 302 ha. It means the decrease by 47, 174 ha (28 %) in comparison with 2009. The yields per hectare are fluctuating as a result of the different climatic conditions in the particular years. The lowest average yield per hectare was recorded in 2010 (1.97 t.ha⁻¹), the highest yield (3.57 t.ha⁻¹) was achieved in 2014. In that year the high yield per hectare was the essential factor of the highest production (448, 271 t). Import and export of rape are the indicators with the highest extent of variation (137, 205 t or 173, 916 t). Both indicators are decreasing, the balance of the international trade with the rapeseed achieved the positive value in all evaluated years. In 2015 out of the total rape production (320, 922 tonnes) 236, 171 tonnes (73.6 %) was used in Slovakia. In our country rape is mostly used

for the production of methyl ester of rape oil (MERO). In 2015 out of the total rape production 209, 655 t (65 %) was used for the production of MERA.

The production-economic analysis of rape growing without subsidies is indicated in Table 2. There are the following indicators: yields per hectare, producers' prices, costs incurred per hectare and tonne, achieved revenues per hectare and cost effectiveness. The highest producers' price was monitored in 2012 (484.0 €·t⁻¹), and the lowest value in 2009 (241.2 €·t⁻¹). The costs incurred were increased by 30 %, by 12 % per tonne. The highest revenues per hectare were detected in 2014 (1, 195.9 €·t⁻¹) and the lowest ones in 2009 (559.6 €·t⁻¹). The revenues rose by 407.5 €·ha⁻¹ (73 %) in the course of the whole evaluated period. The indicator of cost effectiveness points out at the fact that rape growing without subsidies was profitable only in 2011 and 2014.

Table 2 Production-economic analysis of rape growing in SR in particular years (without subsidies)

Evaluated years	Yield in t·ha ⁻¹	Producers' price in €·t ⁻¹	Costs incurred in €·ha ⁻¹	Costs incurred in €·t ⁻¹	Revenues in €·ha ⁻¹	Cost effectiveness
2009	2.32	241.2	885.2	381.6	559.6	0.63
2010	1.97	319.2	797.9	405.0	628.8	0.79
2011	2.31	460.6	954.3	413.1	1, 064.0	1.11
2012	1.99	484.0	1, 083.0	544.2	963.2	0.89
2013	2.74	369.8	1, 098.1	400.8	1, 013.3	0.92
2014	3.57	335.0	1, 151.0	322.4	1, 195.9	1.04
2015	2.69	359.5	1, 154.2	429.1	967.1	0.84
Index 11/05	1.16	1.49	1.30	1.12	1.73	-

Source: SO SR, Costs incurred and economic results of agricultural firms in SR in 2009- 2015 RIAFE Bratislava, own calculations.

Subsidies are one of the tools used by the EU and Slovak government in order to help farmers to survive under the negative conditions for the agricultural production and negative years. The Table 3 indicates the analysis of the subsidies effectivity in rape growing. If we compare the cost effectiveness in Table 2 and Table 3, we can see that the subsidies provided to our rape producers helped them to achieve the positive economic results in 2012, 2013 and 2015. In 2009 and 2010 rape growing was loss-making in Slovakia, the subsidies helped to our producers to decrease this loss to -102.6 €·ha⁻¹, or -26.7 €·ha⁻¹.

Table 3 Analysis of subsidies effectiveness of rape in SR in particular years

Evaluated years	Subsidies in €·t ⁻¹	Subsidies in €·ha ⁻¹	Revenues in €·ha ⁻¹	Economic results without subsidies in €·ha ⁻¹	Economic results with subsidies in €·ha ⁻¹	Cost effectiveness
2009	96.1	223.0	782.6	-325.6	-102.6	0.88
2010	72.3	142.4	771.2	-169.1	-26.7	0.97
2011	67.3	155.4	1, 219.4	109.7	265.1	1.28
2012	146.0	290.5	1, 253.7	-119.8	170.7	1.16
2013	90.8	248.9	1, 262.2	-84.8	164.1	1.15
2014	86.4	308.4	1, 504.3	44.9	353.3	1.31
2015	70.9	190.6	1, 157.7	-187.1	3.5	1.00

Source: Costs incurred and economic results of agricultural firms in SR in 2009-2015 RIAFE RIAFE Bratislava, own calculations.

Table 4 Break-even points of rape yield in SR in particular years

Indicator	Evaluated years							
	2009	2010	2011	2012	2013	2014	2015	
Yield in t·ha ⁻¹	2.32	1.97	2.31	1.99	2.74	3.57	2.69	
Break even point in t·ha ⁻¹	1	3.67	2.50	2.07	2.24	2.97	3.44	3.21
	2	2.62	2.04	1.81	1.72	2.38	2.73	2.68
Difference in t·ha ⁻¹	1	-1.35	-0.53	0.24	-0.25	-0.23	0.13	-0.52
	2	-0.30	-0.07	0.50	0.27	0.36	0.84	0.01

Note: 1 – without subsidies, 2 – with subsidies.

Source: Costs incurred and economic results of agricultural firms in SR in 2009-2015 RIAFE Bratislava, own calculations.

In the Table 4 we evaluate the break-even points of yields in rape growing. The break-even point expresses the economic situation where all costs are refunded and neither profit nor loss is recorded. The higher quantity of production is produced above the the break-even point the higher profit is achieved in the evaluated year. At the same time the profit is less influenced by the risk factors, in particular by the change of the exercise price in trading. The higher quantity of production is produced below the break-even point the higher loss was recorded in rape production in the evaluated year.

In the evaluated period the biggest difference in the calculated break-even point of rape yield without subsidies was recorded in 2009 ($-1,35 \text{ t}\cdot\text{ha}^{-1}$), which means if the rape yield was increased by $1.35 \text{ t}\cdot\text{ha}^{-1}$, thus the cultivation costs would equal revenues. If the subsidies were counted, the yield increase would achieve $0.30 \text{ t}\cdot\text{ha}^{-1}$. It is evident that the year 2009 was the least favourable out of the evaluated period from the economic viewpoint. The most profitable years for rape growing were 2011 and 2014 when the level of break-even point without subsidies was lower than the real yields per hectare. In 2009 and 2010 the value of calculated break-even points with subsidies was higher than the yield. That means the rape growing with subsidies was also loss-making. In 2012, 2013 and 2014 the rape production was profitable with subsidies, however, it was loss-making without subsidies.

The Table 4 indicates the necessity to intensify the production, in particular, by taking over the positive experience and results from the best producers who are able to achieve the yields $3.0 \text{ t}\cdot\text{ha}^{-1}$ and more. The rentability of rape growing was influenced by the other essential factors: costs incurred, exercise price and subsidies – apart from the achieved yields per hectare.

4 Conclusion

Growing of oil crops has gained the considerable dimensions. Rape is the most significant crop in our conditions. It ranks among the profitable commodities of the agrarian market. The rape grown in Slovakia is used predominantly for MERA production and for export. In 2015 out of the total production (320, 922 t) 125,564 t was exported, which is 39.1 %. In our paper we evaluate the rape growing from the production-economic aspect in 2009-2015. The results indicate that the economic advantage of rape growing is influenced mostly by the climatic conditions, production intensification, exercise prices and subsidies. The year 2011 was the most profitable one out of the evaluated years. The highest loss in rape growing was recorded in 2009. We can claim that the period 2011-2015 in rape growing was advantageous from the economic viewpoint. Our producers can achieve higher yields per hectare by the production intensification.

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