ECONOMIC EFFECTS OF SUNFLOWER PRODUCTION IN VOJVODINA

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Abstract

This paper deals with the analyses of the conditions and results of sunflower production in the Autonomous Province of Vojvodina (Serbia and Montenegro), from the economic point of view. In order to estimate the economic situation in sunflower production natural and economic indicators are used. The results obtained in such analyses have shown harvested sunflower cropland has continually been reduced; average sunflower yields are low; sunflower production is characterised by high investment per hectare (resulting from high input prices and not from increased use of particular factors of production); the effectiveness of this production has shown a falling trend; and some significant reserves for improving the cost-effectiveness of this crop are intensification of production (higher yields); and the movement of inputs prices should be continually monitored for the purpose of estimating potential results with respect to the major goal of production, the economically optimal yield.

Introduction

Serbia and Montenegro is among those rare countries in which sunflower is grown on more than 100,000 ha. There are only 20 such countries in the world, and 94% of the world's total sunflower cropland is in these countries (Bosnjak and Jovanovic, 2003).

Sunflower is mostly grown in the province of Vojvodina, its sunflower fields making up 90% of total sunflower cropland in Serbia and Montenegro. In the long run, sunflower occupies 10% of arable land in Vojvodina, or 42% of land with industrial plants.

There are two economics involved in organizing sunflower production: family farms, with somewhat more land (57%), and agricultural companies (43%).

Producers aim to obtain as favorable a ratio between the output (income) and input (expenditures) as possible. That is what makes the analysis of the economics of sunflower production so necessary.

Materials and Methods

For the analysis objective defined, among the analyses of economic position of sunflower production in particular years the following ones were used as data sources: Zivkovic and Muncan (1987) and Bosnjak et al. (1997, 1998, 2001).

Only large companies were the subject of this analysis, since there is no valid source of the data for small production units (family farms). By applying the analytical-comparative method the input and output levels, the trends were quantified. In order to obtain a more realistic assessment, the input to output ratios were analyzed in terms of quantity of final product necessary for the input costs to be covered, and their ratio to the final result.

Based on the results of the analyses mentioned above, sunflower production in the years 1985, 1995, 1997 and 2001 was analysed.

The results of this analysis are given in the Tables 1 through 5. The mathematical-statistical instruments were used that are commonly applied in this type of analysis.

Results and Discussion

Sunflower Cropland, Yields and Sunflower Production in Vojvodina. In recent years (1998-2002), sunflower production in the Province of Vojvodina was produced on 145,337 ha on average. Harvested sunflower fields have shown a negative trend (the rate of change being 2.17%) manifested especially with agricultural companies (with a 5.63% rate), while on private farms the amount of area was stagnant (Table 1).

Table 1. Sunflower fields, yields, and production in Vojvodina.

	Harvested cropland			Yields			Production		
	$\overline{X}$ (ha)	RC	CV	$\overline{X}$ (kg/ha)	RC	CV	$\overline{X}$ (t)	RC	CV
TOTAL									
1985-1989	118.921	14,25	27,36	2.316	-4,11	8,96	271.702	9,55	23,24
1990-1994	153.565	2,65	11,35	2.064	-4,37	8,14	316.057	-1,83	10,74
1995-1999	158.788	-0,85	11,32	1.722	-4,44	10,26	274.311	-5,29	19.04
1998-2002	145.337	-2,17	9,85	1.734	4,19	12,91	251.139	1,90	13,16
AGRICULTURAL COMPANIES									
1985-1989	71.285	11,92	20,10	2.388	-3,05	7,12	168.760	8,43	17,22
1990-1994	82.088	-4,95	9,71	2.125	-4,47	9,03	175,009	-9,21	15,93
1995-1999	72.675	-1,72	8,76	1.646	-4,19	11,61	119.792	-5,91	17,19
1998-2002	62.410	-5,63	13,62	1.671	3,17	11,72	103.529	-2,59	12,64
FAMILY FARMS									
1985-1989	47.636	19,15	40,21	2.213	-5,61	12,70	102.945	12,47	35,66
1990-1994	71.477	12,74	25,74	1.989	-3,31	7,53	141.048	9,00	23,46
1995-1999	86.113	-0,09	13,79	1.789	-4,67	10,63	154.519	-4,85	21,52
1998-2002	82.927	0,63	9,60	1.782	4,66	14,39	147.610	5,46	17,77

$\overline{X}$ = Average value; RC= rate of change; CV= Coefficient of variation.

Sunflower yields in Vojvodina show significant oscillations (Bosnjak and Jovanovic, 2003). The average yield reached extreme values in 1952 (615 kg/ha) and 1977 (2,633 kg/ha). At present, 1,734 kg/ha should be considered to be the average sunflower yield, with the average annual rate of growth being 4.19% (Table 1). The positive trend has

been accompanied by low yields. In view of higher average yields of the earlier years (1985-1994) it is clearly necessary to intensify sunflower production in this region.

In Vojvodina, annual sunflower production averages 250,000 t, with a modest upward trend (1.9%). The physical scope of production is decreasing in agricultural companies, but on family farms there is a positive trend.

Economic Indicators of Sunflower Production. In assessing the economic position of sunflower production, the production conditions and results obtained are considered. Production costs per cropland unit are taken as indicators of production conditions. Since total costs are composed of an aggregate of various factors, their structure is significant as well.

Numerous indicators may be considered as indicators of production results. For the purpose of assessing the economic position the results are quantified through indicators of effectiveness (yield, production value, financial result) and efficiency (cost-effectiveness, profitability, work productivity).

Production Costs and Their Structure. The comparison of the data from earlier studies indicated significant differences in annual average total costs of sunflower production. In the year 2001, sunflower production costs in Vojvodina averaged around 550 €/ha. For a comparison, corn production in the same year averaged 644 €/ha. In 1985, absolute costs of sunflower production per hectare were 16% higher than those of wheat production and about 12% lower than the costs of corn production.

There had been significant movement in the share of specific cost groups (subcosts) in total costs of production (Table 2). The biggest item in total costs was the cost of machinery use. Over the period observed a trend of their increase was present. Increasing costs of machinery use and their high share in total costs were not caused by increased use of machinery, but by increasingly expensive machine working hours (resulting from growing prices of fuel, lubricants and spare parts, as a result of old machinery).

The costs of material ranked second, showing an upwards trend (Table 2) due to a sharp growth in prices of seeds, pesticides and fertilizers. The share of labour costs (direct labour) has been decreasing, due to the working hour getting cheaper and not due to an increase in work productivity. The costs of machinery depreciation have been falling since machinery has mostly been fully depreciated and the companies have no means to purchase new machines.

As reported in earlier analyses (Bosnjak et al., 1992) over the 1979-1988 period, the costs of material and of mechanization had been falling, while those of labour (wages) and machine depreciation had risen.

The growing shares of cost of mechanization and of material in total costs and the decreased share of labour and depreciation costs have resulted in substantial increase of direct costs. It should be pointed out that the ratio between the shares of direct and indirect costs in total costs has changed. At present, that ratio is 4:1. The change in favour of direct costs might be considered a positive one. However, the growth of direct costs in this case has not resulted from an increase in quantity of inputs aimed at production intensification. Since the sunflower yield per cropland unit has decreased (Table 3) the indicators of an increasingly worse position in sunflower production are clear.

Table 2. Sunflower production total costs structure (in %) in agricultural companies of Vojvodina (Total costs = 100%).

Cost items	1985[1]	1995[2]	1997[3]	2001[4]
1. MATERIAL	15.31	9.55	25.65	33.50
- seed	1.38	3.86	4.10	7.16
- mineral fertilizers	5.19	-	10.48	9.97
- manure	0.30	-	0.85	-
- agrichemicals (herbicides, pesticides)	8.44	5.69	10.22	16.37
2. MACHINERY	19.07	34.58	25.26	39.78
- tractors	9.56	23.79	21.45	31.04
- combines	4.32	10.79	3.81	8.74
- other services	5.19	-	-	-
3. OTHER (MISC.) SERVICES	4.25	3.57	5.12	1.70
4. OTHER MATERIAL COSTS	11.75	2.98	17.13	2.10
5. LABOUR	5.90	2.11	3.12	1.58
6. DEPRECIATION	2.38	1.84	2.95	1.24
I DIRECT COSTS (1-6)	58.66	54.63	79.23	79.90
II INDIRECT COSTS	41.34	45.37	20.77	20.10

1) Zivkovic and Muncan (1987), 2) Bosnjak et al. (1997), 3) Bosnjak et al. (1998), 4) Bosnjak and Jovanovic (2001)

A more concrete assessment of the economic position of sunflower production is obtained when total costs and subcosts are viewed in relation to selling prices. For that purpose the quantities of final product are used equivalent to prices of material purchased per cropland unit in sunflower production (Table 3).

Table 3. Final product quantities (kg) equivalent to prices of material purchased per cropland unit in sunflower production in Vojvodina.

Cost items	1985		1995		1997		2001	
	kg	index	kg	index	kg	index	kg	index
TOTAL MATERIAL	263,02	100	187,19	71	549,64	209	940,60	358
- seed	23,77	100	75,66	318	85,20	358	201,02	846
- mineral fertilizer	89,05	100	-	-	224,66	252	280,00	314
- manure	5,10	100	-	-	18,12	355	-	-
- pesticides	145,10	100	111,53	77	218,96	151	459,57	318
Yield per hectare	2.737	100	2.230	81	2.523	92	2.450	90

As shown in Table 3, in the year 2001 as compared to 1985 it took 3.5 times more of the final product amounts to cover the material costs. Of all the material costs quantified, the cost of seed has been the highest: it took an 8.5 times higher amount of final product to cover these costs in 2001 than in 1985. Also the cost of mineral fertilizers (index 314) required a much higher amount of the final product (Table 3), as well as the cost of agrochemicals (pesticides and herbicides, index 318).

In view of the fact that the 2001 yield was 10% lower than the one in 1985, it should be concluded that the output prices (sunflower selling prices) lag behind those of material, i.e., input prices, which reflects unfavorably on the economic position of sunflower production.

Effectiveness and Efficiency of Sunflower Production. The economic position of sunflower production depends not only on total costs of production, but on price of its realization and on yield per capacity unit.

Over the period observed the companies' yields were decreasing (Table 4). Their yields could be regarded as satisfying if compared to world's leading producers (Bosnjak and Jovanovic, 2003). However, if production costs are taken into account as well, the conclusion is inevitable that production efficiency has been falling. Such a conclusion is based on the fact that the break-even point has risen and the yields have fallen over the period observed. Increasingly higher break-even points are even more obvious if expressed in terms of final product amount equivalent in price to total cost. With respect to the previously mentioned costs of production in 2001 (about 559 €/ha) and the final product's (kernel) selling price (195.8 €/ha) the break-even point is at 2,808 kg/ha, which is higher than the average yield.

Table 4. Indicators of sunflower production efficiency.

INDICATORS	1985	1995	1997	2001
1. Average yield (kg/ha)	2.737,00	2.230,00	2.530,00	2.450,00
2. Total costs* (kg/ha)	1.719,49	1.960,00	2.143,51	2.807,90
3. Financial results (1-2)	+1.017,51	+270,00	+379,49	-357,90
- Coefficient of cost-effectiveness (1:2)	1,59	1,14	1,81	0,87

Amount of final product equivalent to total costs (the limit of cost-effectiveness)

Table 5. Production-economic competitiveness in comparison to basic field crops.

CROPS	PRODUCTION COST-EFFECTIVENESS*			
	1985	1995	1997	2001
Sunflower	159	114	117	87
Soya bean	93	120	118	108
Sugar beet	122	83	115	106
Corn	87	112	118	106
Wheat	117	83	119	110

*Production value per 100 dinars of costs.

It should be noted that in 2001 the break-even point as expressed by the equivalent amount of product was 1,088.4 kg/ha higher than in 1985. These levels and the changes in the break-even point indicate that the price of product realization lags behind the price of input, which all makes sunflower production unprofitable.

The falling cost-effectiveness of sunflower production affects this crop's competitiveness. In the recent years, the unfavourable ratio between input and output prices in sunflower production was more sharply manifested as compared to other crop yields. Without sufficient competitiveness (Table 5) sunflower "steps back" in favour of

other industrial plants (the trend of cropland reduction being 5.63% [Table 1]). In extremely dry years, however, sunflower production is likely to reduce the production risk for the company in general, and to contribute to its better economic results.

Conclusions

The analysis has shown that harvested sunflower cropland has continually been reduced (in the first place the fields owned by agricultural companies). Average sunflower yields are low (1,734 kg/ha) and accompanied by a modest positive trend. Sunflower production is characterised by high investment per cropland unit (550 €/ha), resulting from high input prices and not from increased use of particular factors of production. The effectiveness of sunflower production has shown a falling trend. Some significant reserves for improving the efficiency of this crop are in production intensification (higher yields); the movement of input price should be continually monitored for the purpose of estimating potential results with respect to the major goal of sunflower production: the economically optimal yield.

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