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Economic efficiency of some tehnological measures for carrot (*Daucus carota L.*) culture

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Abstract. The experience was conducted in 2010, in Garbau, Cluj County. This study aims to analyze the economic efficiency in case of carrot culture experiments performed in different technologies used for culture: two cultivars, two periods of sowing and two methods of fertilizing. In study were used carrot varieties Nantes and Flakker. Indicators of economic efficiency (unit cost of production, unit gross profit, profit rate, labor productivity, production costs on equivalent product) were calculated for each variant separately. It was found that best results were obtained in variant Flakker, sown in March and chemical fertilizer, where profit rate was 38.5% even if production costs were the largest, and the lowest profit was recorded by variety Nantes, 20.5%, fertilized with organic fertilizer and sown in May, due to low production quantity.

Keywords: carrot, economic efficiency, production cost

INTRODUCTION

The ability to identify the correct directions, on changes in culture technology requires knowledge and technological elements improving in conditions of market economy. Economic efficiency reflects the ratio of direct or indirect economic effects related to the exploitation of agricultural land in a given period of time and financial effort (Chiş, Merce, 1999).

For performing out manufacturing processes, the farms have production resources that are potential natural, material, financial and human, on a certain time period. Resources involved in the production process become inputs factors. Culture technology can contribute to superior capitalization of resources, increasing productivity, reducing costs and increasing profitability of production. Promotion of the production in the vegetable sector covers a number of objectives from selecting the varieties, the hybrids, with the design of estimates by crop and ends with assessing economic and financial results (Merce *et al.*, 2010).

The choice of varieties is a decisive factor of the system of culture, resulting in increased economic efficiency, and also on technical measures have a strong influence on output and economic efficiency indicators.

MATERIALS AND METHODS

The experience was conducetd in 2010, in Garbau, Cluj County. Carrot cultivars used in this experience were Nantes and Flakker. Nantes cultivar was approved in Romania in year 1952, is an early variety with vegetation period of 100-120 days. Flakker is a Dutch variety obtained in 1937 and continued to improve, is a late variety, very productive and resistant to winter storage.

Both carrot varieties were sown in March 27th and May 29th. Chemical fertilization was made with NPK (16:16:16) and the organic fertilization was made with cattle liquid manure.

The paper proposes a model of economic efficiency analysis of production systems with different technologies regarding the varieties, sowing time and fertilization method. In Table 1 can be seen the model by which economic efficiency indicators were calculated.

Correct determination of production costs requires evaluation of each item of expenditure, which is outlined in the culture technological sheet of carrot in partial mechanization conditions and an average production of 20 t / ha.

Tab. 1

Technological sheet after which economic indicators were calculated

No.	Items of expenditure	lei/ha	%
	Material expenses		
1.	Materials from its own sources	147	-
2.	Purchased materials	904	5.34
3.	Supply costs (10%)	90.4	0.53
4.	Mechanical work expenses	4132	24.39
5.	Value of water for irrigation	0	0.00
6.	Amortization of fixed assets	0	0.00
7.	Tax on agricultural income	0	0.00
8.	Other material expenses (1%)	51	0.30
	I Total material costs	5178	30.57
No.	Labour expenses	lei	%
1	Manual work expenses	8622	50.90
2	Contributions to social insurance (20.8%)	1793	10.59
3	Contributions to Health Insurance (5.2%)	448	2.65
4	Contributions to the unemployment fund (0.5%)	43	0.25
5	Contributions to the risk and accidents fund (0.205%)	18	0.10
6	Unique National Fun (0.85%)	73	0.43
	I Total labour expenses	10506	62.03
	I. Total direct expenses (I + II)	15684	92.59
	II. Indirect costs (8%)	1255	7.41
	III. Total production expense (CT)	16939	100.00
	The value of secondary production (VPS)	0	0.00
	Main production expenses	16939	100.00

Source: Pocol, 2009, processing own results

RESULTS AND DISCUSSION

Unit cost is the expression value of all the factors used to produce and sale of consumption goods and in this research the carrots are a good agricultural. The calculation of production costs was made on material consumption and on those with labor expenses, in terms of value, consumptions which takes the form of production and selling expenses incurred by farmers (Tab. 2).

The research is based on comparative analysis of revenue and expenses for one hectare of crop.

Tab. 2

Culture of carrot costs depending on the experimental variants

Variety	Sowing date	Fertilizer	Sold production (t/ha)	Production costs (lei/ha)			
				materials	labor	total direct	overall
Nantes	early	chemical	20.0 Mt	4567	10404	14917	16169
Nantes	early	organic	19.0-	4352	10182	14534	15697
Flakker	early	chemical	26.0***	5271	12110	17881	18771
Flakker	early	organic	25**	5026	11810	16836	18182
Nantes	late	chemical	19.0-	4966	11089	16055	17339
Nantes	late	organic	17.000	4568	10404	14972	16170
Flakker	late	chemical	25**	5255	12011	17266	18647
Flakker	late	organic	25**	5187	12097	17284	18667
DL 5%			1,28				
DL 1%			2,28				
DL 0,1%			5,24				

Production results obtained in the culture of carrots in the experimental variants can be appreciated by calculating the economic efficiency indicators. The selling price is determined by product quality and sales period. Differences in costs vary depending on fertilizer use and by the greater mechanical work. The purchase price of chemical fertilizer is higher.

Highest costs were recorded in experimental variants of Flakker culture variety, both in crops sown in the early and late period, where the costs exceed 18 lei mii/ha, especially at the variant sown in March where it was obtained the highest quantity production. Investigated factors (Tab. 3) influenced the economic efficiency and productivity.

Tab. 3

Economic efficiency indicators of the culture of carrot based on experimental variants

Variants			Sold Production		Purchased price lei/kg	Costs		Profit		Profit rate
Variety	Sowing date	Fertilizer	Phisics t/ha	global thous and lei/ha		Total lei/ha	units lei/kg	lei/ha	lei/kg	%
Nantes	early	chemical	21.0	20.0	1.00	16169	0.81	3831	0.19	23.7
Nantes	early	organic	19.0	19.0	1.00	15697	0.83	3303	0.17	21.0
Flakker	early	chemical	26.0	26.0	1.00	18771	0.72	**7229**	0.28	**38.5**
Flakker	early	organic	25.0	25.0	1.00	18182	0.73	6818	0.27	37.5
Nantes	late	chemical	19.0	20.9	1.10	17339	0.91	3561	0.19	20.5
Nantes	late	organic	17.0	20.4	1.20	16170	0.95	4230	0.25	26.2
Flakker	late	chemical	25.0	22.5	0.90	18647	0.75	3853	0.15	20.7
Flakker	late	organic	25.0	23.8	0.95	18667	0.75	5133	0.20	27.5

Economic indicators of the two varieties have shown the effectiveness of the Flakker variety sown in March and chemical fertilized, on which maximum gross profit is achieved, the lowest unit cost 0.72 lei and the highest profit rate (38.5%).

Analysis highlighted the influence and changing economic efficiency, which serves to justify certain decisions, the application of more efficient technologies to identify opportunities for profit growth, on the context of achieving of quality and quantity production with high profit and low costs.

CONCLUSIONS

Varieties, sowing date and fertilizer method influenced the profit rate and labor productivity. Profit rate increased from 20.5% to 38.5%. Early sowing date is distinguished by high production, especially at the Flakker variety.

Unit costs have been recorded values between 0.72 lei / kg at Flakker variety sown in March and chemical fertilized and 0.95 lei / kg at Nantes variety sown in May and organic fertilized.

Selling price level influence achieving a high uniform profit, also influenced by the adjustment mechanism of market supply and demand, depending on the seasonality of production.

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