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# Estimative analysis of breakeven point of marigold crops for seeds in conventional and organic farming system - forecast 2017/2018

BEREVOIANU ROZI LILIANA<sup>1</sup>

**Abstract:** Marigold (*Tagetes*) is of importance both as a decorative plant and plant used in the cosmetic and pharmaceutical industry, with recognized medicinal properties. This paper presents a scientific approach to the methods required for the analysis of the economic efficiency of marigold seed culture in conventional and organic farming system - forecast 2017/2018. Thus, theoretical and methodological measurement of technical - economic processes and phenomena needed for the determination of the costs of production, market price and the level of profitability per unit of product was achieved using a system of specific indicators. These indicators may be classified into specific indicators, result indicators and profitability indicators (profit, return rates, breakeven point, etc.). The results of scientific research can have positive influence over the decisions necessary for the future production cycle for cultivating marigold for seeds in conventional and organic farming system.

**Keywords:** economic efficiency, profitability threshold, marigold seed culture

**JEL Classification:** O12, Q14, Q57

## INTRODUCTION

Marigold, with the scientific name of *Tagetes* sp., Family Compositae, is an annual plant, herbaceous, which was quickly acclimatised to conditions in Romania. It features a wide range of uses: decorative plant, to allelopathic plant (planted next to cabbage acts as flies repellent, and next to tomatoes as pest repellent). Cultivation of this crop is economically advantageous because of the possibility to cultivate small areas or heavy soils without special requirements to the soil fertility. Marigold culture can ensure a high yield, which can lead to a rapid income for the growers of this plant by capitalizing on the production obtained both on the domestic and external markets.

## MATERIAL AND METHODS

To achieve estimates of breakeven point analysis for field crop of marigold for seeds, the input data started from cultivation technology for conventional and organic farming system.

### A. Precursor-cultures

	Conventional system	Ecological system
Very good	- legumes for beans, vetch, hay	
Good	- autumn cereals, pruning crops	
Contraindicated	- must not return to the same land until after a minimum period of 4-5 years	

### B. Application of fertilizers

	Conventional system	Ecological system
Basic fertilization	Organic fertilizers: 30 - 40 t / ha	
	- Reacts very well with the application of nitrogen fertilizers: 40-60 kg/ha and phosphorus: 30-50 kg/ha; - Potassium fertilizers in doses of 20 -30 kg/ha K <sub>2</sub> O;	- organic fertilizers can be used as starter fertilizers at the rates recommended by the technical research
Application	- is carried out with the tractor 55-75 cp in aggregate with the fertilizer machine - autumn, below the base ploughing: phosphorus, potassium, organic fertilizers - spring, in the preparation of the germinating bed: nitrogen, organic fertilizers	

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### C. Soil works

	Conventional system	Ecological system
Works executed in the autumn		
Discarding previous crop	<ul style="list-style-type: none"><li>- has the purpose of clearing the land from the vegetal debris of the previous crop</li><li>- is carried out with the tractor 55-75 hp, in the aggregate with the disc harrow and the adjustable angle harrow</li></ul>	
Maintenance leveling	<ul style="list-style-type: none"><li>- has the role of leveling the soil after the previous work</li><li>- is carried out with a tractor of 55 - 75 hp in aggregate with the grader</li></ul>	
Deep soil mobilization (ploughing)	<ul style="list-style-type: none"><li>- is to be used for the incorporation of fertilizers into the soil, as well as for loosening and shredding the soil</li><li>- is performed with the 55 - 75 hp tractor in the aggregate with the plough and adjustable angle harrow</li></ul>	
Works executed in the spring		
Harrowing	<ul style="list-style-type: none"><li>- is done to destroy the upper crust formed and to level the soil in the spring;</li><li>- is carried out with the tractor 55-75 cp in aggregate with adjustable tiller</li></ul>	
Preparing the germinative bed	<ul style="list-style-type: none"><li>- has the role of mowing, loosening and leveling the soil for planting</li><li>- is carried aut with the 55 - 75 hp tractor in aggregate with the combine</li></ul>	
Furrow marking	<ul style="list-style-type: none"><li>- is carried out with the 55 - 75 hp tractor in aggregate with the furrowing tool</li></ul>	
Modeling the soil in furrows	<ul style="list-style-type: none"><li>- is carried out with the tractor 55-75 cp in aggregate with the modeling machine for forrow soil</li></ul>	

### D. The establishment of culture

	Conventional system	Ecological system
Establishment of crop by seeds		
Physical Purity of Seed	70%	75%
Germination	60%	65%
The optimal sowing time in the field	Spring (April)	
Seed norm	(4-5 kg/ha seed) 50-60 pl/mp	
The distance between rows	50 cm	
Depth of sowing	2-2.5 cm	
Establishment of seedling culture		
The optimal period for planting	May	April
Density	approx. 48,000 seedlings / ha(4.5-5.5 yards /square meter)	
The distance between rows	50-60 cm	

### E. Crop maintenance

	Conventional system	Ecological system
Watering	<ul style="list-style-type: none"> <li>- immediately after the planting of the seedlings and throughout the vegetation period of the crop</li> <li>- dripping is recommended, consistently ensuring the water needs of the plant</li> </ul>	

Completing possible gaps	- approx. 5-7 days after planting	
Weed control through agrotechnical works	<ul style="list-style-type: none"> <li>- mechanical hoeing, weeding: whenever needed</li> <li>- observance of preventive measures (rotation, cultivation hygiene)</li> </ul>	
Biological purification	- for the removal of atypical and poorly developed plants	
Additional fertilization	- to ensure the plant need for nutrients	
	- the products recommended by the technical research are used	- use recommended products for organic farming
Diseases and pests control	is carried out with a tractor of 40-45 hp in aggregate with the machine for applying phytosanitary treatments	
	chemical control can be done with approved fungicides and insecticides at the recommended dose	- it is recommended to observe the preventive measures (rotation, cultivation hygiene); using environmentally-friendly products applied during the periods and doses recommended by the technical research

#### F. Harvesting

	Conventional system	Organically grown
The optimal harvesting time	- at the full opening of the ligulated flowers when the inflorescences have a diameter of 2 to 2.5 cm (from June to September)	- at the opening of over 70% of the ligulate flowers
Harvesting for seed production	<ul style="list-style-type: none"> <li>- at full maturity</li> <li>- manually, with the sickle, after which the plant will be threshed and the impurities removed</li> </ul>	
Production of ligulate flowers	4,000-5,000 kg/ha	3,000-4,000 kg/ha
Seed production	250-350 kg/ha	200-300 kg/ha

## RESULTS AND DISCUSSION

### I. Structure and analysis of production costs - estimates for the production year 2017/2018

Table 1: Structure of crop production costs for seed crops - estimates for cultivation year 2017/2018

		Conventional (275kg / ha)	Ecological (230 kg / ha)
Total agro-technical expenditure	EUR / ha	15230	16128
	%	100	100
Mechanized work	EUR / ha	270	266
	%	1.8	1.6
Hand works	EUR / ha	7188	6136
	%	47.2	38.1
Raw materials and materials	EUR / ha	7773	9726
	%	51.0	60.3

Source: Own calculations

From the data presented in Table 1, it is noticed that the estimated crop yield in the open field for organic seed is about 16% lower than the estimated production for conventional crops. To achieve these productions, agrofitotechnical expenditures amounting to 15230 euro/ha were made in the conventional system, being exceeded by 5.9% in the ecological system. Expenditure on mechanized works has an insignificant share in both systems of cultivation, 1.8% in the conventional system, and 1.6% in the ecological system. The higher percentage is the raw material costs, namely 51% in the conventional system and 60.3% respectively in the ecological system. Expenditures for manual works in the ecological system amount to 6136 euro/ha, being 17.1% lower than the total value obtained in conventional system.

## II. Comparative analysis (organic and conventional) income and expense budgets for the cultivation of marigold for seeds in open field - the production estimates for the year 2017/2018

Analysis of budget income and expenditure framework is based on production technology, prices for production inputs authorities unfinished production of the plan.

Table 2: Income and expenditure budget for seed crops, conventional and organic system - estimates for the cultivation year 2017/2018

Indicators	U.M.	Conventional 275 kg/ha	Ecological 230 kg / ha
A. Value of production	Euro	22050	25405
B (+). Subsidies	Euro	130	130
C (=) Gross product	Euro	22180	25535
D (-) Total Expenses	Euro	16962	18146
I. Variable costs	Euro	9043	11200
II. Fixed costs	Euro	7919	6947
E (=) Taxable income	Euro	5089	7258
F (=) Net income + subsidies	Euro	4404	6227
G. Rate taxable income	%	30	40
H. Rate of net income + subsidies	%	26	34
Cost of production	Euro/kg	62	79
Predictable domestic price	Euro/kg	80	110

Source: Own calculations

- Marigold for seeds, open field - conventional system

At an estimated average production of 275 kg / ha of seed, a production value of 22050 euro / ha is achieved, and a subsidy of 130 euro / ha is obtained to produce a gross product of 22180 euro / ha.

Variable expenses are 53,3% of the total agrophytotechnical expenditure. Of these, the consumption value of raw materials and materials represent 75.4%. With a proportion of 46.6% of total expenditures, assets are represented in percentage by 90, 7% of consumption value for permanent labor. By the total production value deduction, taxable income results for 5089 EUR / ha, finally yielding a net income of 4404 euro / ha and a ratio of net income of 26%.

As suggestive synthetic indicator for the degree of economic efficiency that will be obtained from cultivation of marigold in open field - conventional system, the production cost of 62 euro / kg is calculated by dividing total expenditure to estimated average production.

Obtaining profitability of marigold for seed crop becomes profitable by establishing a predictable domestic market price of 80 Euro / kg, calculated by multiplying the cost of production by a factor of 1.30

- Marigold for seeds, open field - ecological system

For an estimated average production of 230 kg/ha of seeds corresponds to a production value of 25405 euro / ha and by adding a subsidy of 130 euro/ha a gross product of 25535 euro/ha is achieved.

Variable expenditures, accounting for 61.7% of total expenditures, account for 77.5% of the raw materials and materials consumption. Consisting of 38.2% of total expenditures, fixed expenditures are formed by 88.3% of the permanent labor force consumption value.

By deducting total costs from production value, a taxable income of 7258 euro/ha is achieved, resulting in a net income and a net income rate of 6227 euro/ha and 34%, respectively.

Being a synthetic indicator representative of the level of economic efficiency for marigold for seed cultivation in open field, in an ecological system, the production cost of 79 euro / kg results from the reporting of total expenditures on the expected production to be obtained.

The profitability of the crop is achievable by establishing the predictable domestic market price of 110 euro/kg, calculated by applying a coefficient of 1.40.

## CONCLUSIONS

The data presented in Table 3 highlights the fact that the output value obtained exceeds 30% of the costs incurred in the conventional system, and 39.9% in the ecological system. Variable expenditure accounts for 53.3% of total expenditures in the conventional system and 61.7% in the ecological system, the difference being fixed expenditures.

Raw materials and materials have a ratio of 75% and 77%, respectively of the total resources consumed and permanent labor costs up 90.7% and 88.3% of fixed costs. Representative synthetic indicator for the economic efficiency of expenditure items, the production cost is 62 euro / kg in the conventional system and 27% higher in ecological system, especially due to lower average yields by 16.4%.

Table 3: Synthesis of economic indicators for the cultivation of marigold for seeds in open field, organic and conventional system - the estimates for cultivation year 2017/2018

No. crt.	Synthesis economic indicators	U.M.	Conventional system	Ecological system
1	Average production at ha	kg/ha	275	230
2	Production value at ha	Euro/ha	22050	25404
3	Production costs per hectare	Euro/ha	16961	18146
4	Variable costs	Euro	9043	11199
5	Raw materials and materials	Euro	6822	8676
6	Expenditure on permanent labor	Euro	7188	6136
7	Fixed costs	Euro	7919	6946
8	Production cost	Euro/kg	62	79
9	Cost of capitalization	Euro/kg	80	110
10	Profit or loss per unit of production	Euro/ha	5088	7258
11	Profit or loss per unit of product	Euro/kg	18504	31558
12	Profitability rate	%	30	40
13	The threshold of return in units of value	Euro	13424	12423
14	Revenue threshold in physical units	to	167	112
15	The risk rate of exploitation	%	61	49
16	Security index (Is)		0.4	0.5

Source: Own calculation

The average price per unit of product is 80 euro / kg in the conventional system, and in the ecological system higher by 37.5%. Regarding labor productivity, it can be observed that 1 kg of product in the conventional system requires a consumption of 13.9 hours, of which 0.10 hours / kg for mechanical work and 13.8 hours / kg for manual work, while in the ecological system 1 kg of seeds obtained with 14.2 hours, of which 0.12 hours / kg of mechanical work and 14.08 hours / kg to manual work.

The rate of return has been 30% for the conventional system and 40% for ecological production of marigold for seed culture in open field, being economically viable. Breakeven point refers to the physical level or value of production for which the costs incurred are fully covered by revenues by capitalizing production, ie the level where the crop begins to be profitable. Thus, the cultivation of marigold for seeds in open field is considered cost-effective in conventional systems since the average production of 167 kg / ha corresponding value in the amount of 13424 euro, while for ecological system this threshold is lower with 33% in physical units, corresponding to 7.5%.

The operational risk rate is a synthetic indicator that estimates the risk in the event of not realizing the expected output. For the crop of marigold for seed in open field the indicator is 61% in the conventional system, and 49% in the ecological system.

The security index expresses the existing security margin through the respective culture, increasing in the same way as the value of the security index. This synthetic indicator for marigold for seeds crop in open field is 0.4 , respectively 0.5

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