ECONOMIC EFFICIENCY OF EARLY AND EXTRA EARLY POTATO CULTURE IN HILLY AREAS CONDITIONS OF TRANSYLVANIA

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Abstract. *Early potatoes comes to improve the diet that being a fresh food, rich in vitamins, minerals and carbohydrates, in a period when most of fruit and vegetables have not yet appeared, and the autumn potatoes has lost most of quality, due to the long winter storage. For producer, early and extra-early potatoes culture for consume has also great importance under economic aspect being a easy crop, relatively, and income generator. Early and extra-early potatoes for consumption are situated from this point of view among the first crops that earn revenue in peasant household.*

Keywords: potato, early, sprouting, protect, income

INTRODUCTION

Potatoes, considered a simple and cheap food, deprived areas crop, it enjoys of great popularity, being considered alongside of other cultures a revelation in the plant cultivation, becoming a staple food for the entire population of the globe.

In addition being a tasty and nutritious aliment, potato is the main source of income for many farmers specialized in potato crop, but not only, this is an excellent culture for different crop rotations, which fits perfectly in many types of farms cultivators for cereals, vegetables or fodder.

Production as soon of large quantities of early potatoes for consumption should be increasingly more supply to meet both the internal market and for export requirements.

MATERIAL AND METHOD

To help improve early and extra-early potato cultivation technology the research conducted, whose results are presented in this paper have approach some aspects of the overall protection efficiency of the potato crop covered with plastic sheets, to obtain early and extra-early yields in the specific area of Cluj.

The varieties studied were Ostara, Impala and Agata, early varieties through technology applied and harvest time. Regarding the suitability of varieties taken under study, we observed the degree of early, production from plant material prepared from different variants (pre-sprouted, sprouted, root) and growth of early they bring methods to protect the culture.

Studied factors for carrying out this experience are:

Factor (A) Potato variety with graduations:

a_1 – Ostara;

a_2 – Impala;

a_3 – Agata;

Factor (B): Preparation tubers before planting, with graduations:

b_1 – un-sprouted;

b_2 – pre-sprouted;

b_3 – sprouted;

b_4 – sprouted and rooted;

Factor (C): Protecting culture, with graduations:

c_1 – unprotected;

c_2 – with black polyethylene foil (mulching);

c_3 – in the tunnels;

c_4 - în the greenhouse;

In the experiences conducted was used different culture system: in tunnels, with black polyethylene foil applied on the soil after planting and culture in greenhouses.

The most important technological work to achieve extra-early and early crop is the preparation of seed material before planting. After sorting and grading tubers were undergoing to pre-sprouting, sprouting and germination - root process.

RESULTS AND DISCUSSION

Economic efficiency was monitored at all three cultivated varieties for variant culture in tuber sprouting. Calculation of economic efficiency (Table 1,2,3) was performed using extra-early and early potato yields obtained in 2007 in the four different system cultures (open, black foil, and greenhouse tunnel).

In table 1 is shown the economic efficiency indicators realized on the four experimental variants (open field, black foil, foil tunnels transparent and greenhouse), potatoes of the variety Ostara in 2007, the variant of culture sprouting tubers. Indicators were calculated for two periods of sampling, May 24 and June 28, respectively 27 May and 3 June in greenhouse variant.

For the first harvest period (ie May 24 May 27 - greenhouse), potato yield obtained ranged from 1500 kg/ha (open field) and 1600 kg/ha (tunnel), except where there has been a greenhouse variant production over 16,000 kg/ha. Low yields obtained in the first two variants, caused a production cost per kilogram significantly above the level average price of potato recorded of turning period. This is confirmed by the negative values obtained for profitability rates in the three different culture, ranging between -62% and -76%.

As regards culture variant in greenhouse, high production obtained caused a production cost by 1.96 lei/kg, this ensuring a rate of return of 78.34%, ie a hundred lei spent to make a profit of 78.34 lei.

We can thus say that the cultivation of extra-early potato Ostara variety, in the open field, black foil and tunnels, is not economically justified (cause of the loss), while the greenhouse may achieve a production which ensures high profit rate around 78%.

In the second harvest period for early consumption potato (28 June and 3 June - solar) have obtained yields much higher compared with first stage, which is between 15767 kg /ha-tunnel and 17577 kg/ha- greenhouse. This has resulted in obtaining production costs per kg ranged from 0.7 lei/kg – in the open field and 1.8 lei/kg - greenhouse.

The difference between production costs, was given by production volume on variants especially for the additional expenses of output produced were incurred for the

production of three different experimental variants (tunnel, black foil and greenhouse). Rates of return obtained in this stage are positive in all four versions, ranging from 185.71%- in open field and 33, 34%-tunnel.

Considering that highest rate of return was obtained for variant -the open field we can say that the other variants, even if higher yields are obtained, costs incurred to achieve them are not covered by the output gap obtained. Thus the economic cultivation of early potato variety Ostara is not justified in black film versions and solar or tunnel.

In that concerning the variety Impala in Table 2 were calculated the same indicators as for the variety Ostara, in four culture variant and two harvesting period, ie May 24 and June 28, and in the greenhouse version May 27 and June 3.

In the first harvest period (24 May 27 May - greenhouse) production were obtained from 934 kg/ha (open field) and 1930 kg/ha (tunnel) and in this case was an exception greenhouse version was obtained producing over 18760 kg/ha. In the first three variants, low yields obtained, have induced the production cost per kilogram very high, and significantly above average price recorded in the potato capitalization on that period. Rates of return for the three variants are negative, ranging from -72.82% in the black folia version and open field culture 70.87%. As regards cultural variant in greenhouse high production obtained was determine a cost of 1.68 lei/kg, providing a very high value of rate of return of 107.78%, which means that in a hundred lei spent make a profit of 107.78 lei.

Thus, we can say that the cultivation of extra-early potato variety Impala in the open field, black foil and tunnels, are not economically justified, production costs not covered by revenues from the sale of commercial production, (obtained the loss), while cultivation in solar are efficient economically, providing a high output rate of return obtained by 107.78%.

Production obtained in the second stage of harvest (28 June and 3 June –in greenhouse) were significantly superior to the first stage, the lowest production of 14212 kg/ha in variant-the open field while in greenhouse was obtained a production of 19590 kg/ha. Production costs per kilogram obtained in this case ranged from 0.79 lei/kg – in the open field and 1.61 lei/kg –in greenhouse. The difference between production costs by variant was not given the technology of cultivation, but production volume obtained by variant especially the additional costs were incurred for the production of three different experiments (tunnel, black foil and greenhouse). Rates of return obtained at this stage have values over 100% in the open field and greenhouse variant and about 60% for foil tunnel and black variants. In this case the highest value was obtained for return rate option - open field (153.31%), but it should be noted that the solar variant rate of return is116.98% (the highest value for variant cultivation, greenhouse). So we can say that the cultivation of early potato variety Impala is economically profitable in the open field version only compared with black foil, greenhouse and tunnel.

In Table 3 were calculated economic efficiency indicators of the variety Agata potatoes in 2007 realized on the 4 experimental variants (open field black foil, transparent foil tunnels and solar), the variant of culture with sprouting tubers. Indicators were calculated for two periods of harvesting, ie May 24 and June 28, and 27 May and 3 June in greenhouse variant.

For the first harvesting period (May 24 May 27 - Greenhouse), potato production ranged from 1592 kg/ha (in open field) and 1946 kg/ha (black foil), except where there has been a greenhouse alternative production 17670 kg/ha. Low yields obtained in the first two variants, caused a production cost per kilogram significantly above average price of potato

recorded capitalization period. This is confirmed by the negative values obtained for rates of return in the three different culture, ranging from - 50.34% to -71.41%. As regards cultural variant in greenhouse output caused obtained high production cost of 1.79 lei/kg, this ensuring a rate of return of 95.71%,a hundred lei spent to make a profit of 95.71 lei.

We can thus say that the cultivation of extra-early potato variety Agata, in the open field, black foil and tunnels, is not economically justified (from the loss), while the greenhouse may make a production to ensure a high profit rate around 95.71%.

În a doua perioadă de recoltare (28 iunie respectiv 3 iunie – solar) producţiile obţinute au avut valori cuprinse între producţii cu mult superioare faţă de prima etapă, acestea fiind cuprinse între 13284 kg/ha – câmp deschis şi 18280 kg/ha – solar, astfel că, şi nivelul costurilor de producţie pe kilogram şi pe variante a fost cu mult mai mic decât în prima perioadă de recoltare, având valori între 0,84 lei/kg – câmp deschis şi 1,73 lei/kg – solar. Diferenţa dintre costurile de producţie, a fost dată de volumul producţiei obţinute pe variante dar mai ales de cheltuielile suplimentare ce au fost efectuate pentru realizarea celor trei variante experimentale (tunel, folie neagră şi solar). Ratele de rentabilitate au valori pozitive în toate cele 4 variante, fiind cuprinse între 136,77% – câmp deschis şi 37,62% – folie neagră. Având în vedere că cea mai mare rată a rentabilităţii s-a obţinut pentru varianta - câmp deschis, putem spune că în cazul celorlalte variante, chiar dacă producţiile obţinute sunt mai mari, cheltuielile efectuate pentru realizarea acestora nu sunt acoperite de diferenţa de producţie obţinută. Astfel din punct de vedere economic cultivarea timpurie a cartofului din soiul Agata în variantele folie neagră, tunel şi solar nu asigură un profit mai mare decât în varianta câmp deschis.

In the second harvest period (28 June and 3 June - greenhouse yields far superior to the first stage,) yields obtained ranged between 13284 kg/ha – in open fields and 18280 kg/ha- greenhouse, so, the production costs per kilogram and on the variants was much lower than the first harvest period, with values between 0.84 lei /kg – in the open field and 1.73 lei/kg -greenhouse. The difference between production costs, was given the variants of output produced especially for the additional expenses were incurred for the production of three different experiments (tunnel, black foil and greenhouse). Rates of return were positive in all four variants, ranging from 136.77% - open field and 37.62% - black foil. Considering that highest rate of return was obtained for variant - the open field we can say that the other variants, even if higher yields are obtained, costs incurred to achieve them are not covered by the output gap obtained. Thus the economic cultivation of early potato variety Agata on black foil variant, greenhouse and tunnel does not ensure a profit higher than the open version.

CONCLUSIONS

Growing extra-early varieties of potatoes from Ostara, Impala, Agata in the hilly area of Transylvania in variants open field, black folia and tunnel is not economically justified, expenditure not covered by revenues realized due to low yields. The alternative - greenhouse in all three varieties grown, high yields obtained provide a rate of return of 75%, 107.78% even if the variety Impala.

Table 1

The efficiency indicators of extra early and early potato production of Ostara variety in 2007

Nr. crt.	Issue	UM	Growing variants							
			Open field		Black polyethylene		Tunnel		Greenhouse	
			24 V	28 VI	24 V	28 VI	24 V	28 VI	27 V	3 VI
1.	Total production	Kg/ha	1210	16030	1516	16618	1606	15767	16102	17577
2.	Comercial production	Kg/ha	860	10890	1056	11658	1060	10604	10892	11777
3.	Total production costs	Lei/ha	11221	11221	21300	21300	23650	23650	31600	31600
4.	Unit cost of production	Lei/kg	9.27	0.70	14.05	1.28	14.73	1.50	1.96	1.80
5.	Sale price	Lei/kg	3.5	2	3.5	2	3.5	2	3.5	3.5
6.	Unitary profit	Lei/kg	-5.77	1.3	-10.55	0.72	-11.23	0.50	1.54	1.70
7.	Expenses equivalant product	Kg	3206.0	5610.5	6085.7	10650.0	6757.1	11825.0	9028.5	9028.5
8.	Production value of goods	Lei/ha	3010	21780	3696	23316	3710	21208	38122	41219.5
9.	Total profit	Lei/ha	-8211	10559	-17604	2016	-19940	-2442	6522	9619.5
10.	Profit rate	%	-62.26	185.71	-75.09	56.04	-76.23	33.34	78.34	94.68

Table 2

The efficiency indicators of extra early and early potato production of Impala variety in 2007

Nr. crt.	Issue	UM	Growing variants							
			Open field		Black polyethylene		Tunnel		Greenhouse	
			24 V	28 VI	24 V	28 VI	24 V	28 VI	27 V	3 VI
1.	Total production	Kg/ha	934	14212	1654	17750	1930	18930	18760	19590
2.	Comercial production	Kg/ha	674	9772	1078	12050	1282	12730	12710	12750
3.	Total production costs	Lei/ha	11221	11221	21300	21300	23650	23650	31600	31600
4.	Unit cost of production	Lei/kg	12.01	0.79	12.88	1.20	12.25	1.25	1.68	1.61
5.	Sale price	Lei/kg	3.5	2	3.5	2	3.5	2	3.5	3.5
6.	Unitary profit	Lei/kg	-8.51	1.210456	-9.38	0.80	-8.75	0.75	1.82	1.89
7.	Expenses equivalant product	Kg	3206.0	5610.5	6085.7	10650.0	6757.1	11825.0	9028.5	9028.5
8.	Production value of goods	Lei/ha	2359	19544	3773	24100	4487	25460	44485	44625
9.	Total profit	Lei/ha	-8862	8323	-17527	2800	-19163	1810	12885	13025
10.	Profit rate	%	-70.87	153.31	-72.82	66.67	-71.44	60.08	107.78	116.98

Regarding the early cultivation of these varieties can be seen that all the variations of culture (open field, tunnel, black folia, and greenhouse) of economically point of view are profitable, but the highest values of the rate of return in all three varieties and were obtained for variant – in the open field (being over 100%). Thus, we can say that the additional costs incurred for the production of three types (tunnel, black foil and greenhouse) are not economically justified, differences in production results in these versions do not cover the costs incurred to achieve them.

Also be emphasized that any economic activity should determine the effectiveness and superior quality, satisfying the rationality principle applied in the present tense and future, ensuring future efficiency assumptions.

Table 3

The efficiency indicators of extra early and early potato production of Agata variety in 2007

Nr. crt.	Issue	UM	Growing variants							
			Open field		Black polyethylene		Tunnel		Greenhouse	
			24 V	28 VI	24 V	28 VI	24 V	28 VI	27 V	3 VI
1.	Total production	Kg/ha	1592	13284	1946	14657	1932	16780	17670	18280
2.	Comercial production	Kg/ha	1052	8804	1318	9832	1200	11060	12510	12200
3.	Total production costs	Lei/ha	11221	11221	21300	21300	23650	23650	31600	31600
4.	Unitary cost of production	Lei/kg	7.05	0.84	10.95	1.45	12.24	1.41	1.79	1.73
5.	Sale price	Lei/kg	3.5	2	3.5	2	3.5	2	3.5	3.5
6.	Unit profit	Lei/kg	-3.55	1.1552996	-7.45	0.55	-8.74	0.59	1.71	1.77
7.	Expenses equivalant product	Kg	3206.00	5610.50	6085.71	10650.00	6757.14	11825.00	9028.57	9028.57
8.	Production value of goods	Lei/ha	3682	17608	4613	19664	4200	22120	43785	42700
9.	Total profit	Lei/ha	-7539	6387	-16687	-1636	-19450	-1530	12185	11100
10.	Profit rate	%	-50.34	136.77	-68.02	37.62	-71.41	41.90	95.71	102.47