RESULTS REGARDING THE INFLUENCE OF PERIOD AND PLANTING DENSITY OBTAINED IN POTATOES ON BOZOVICI DEPRESSION IN THE EXPERIMENTAL CYCLE 2019 – 2021

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Abstract. *The research was carried out in the Bozovici Depression, also called "Almăju Country", located in the western part of Romania. The average annual temperature is 9.30C. During the potato growing season, spring is characterized by an average temperature of 9.70C, summer 18.30C, and autumn 9.40C. The average amount of precipitation, per season, is 163.8 mm in spring, 225.7 mm in summer, and 152.5 mm in autumn. The multiannual average of precipitation varies between 670 – 750 mm. The soil type in the experimental field is a semicarbonate eutric alluvium with a loamy-sandy texture, pH 7.6, a humus content of 2.72% and a degree of base saturation of 97.7%. The experience was bifactorial, in which factor A was the planting period (a1: 10 – 15.III, a2: 20-25.III. a3: 1 – 10.IV.) and factor B – planting density with graduations b1 :55,000; b2.: 60.00; b3: 65.000; b4: 70,000. The variety studied was Gared, from the late maturity group. The synthesis of the harvest results from the three experimental years, depending on the variant studied, had an amplitude between 27,031 kg/ha in the variant in which the planting was done between 1 - 10.IV. with the density of 55,000 nests/ha and between 36,511 kg/ha and 36,474 kg/ha in the version in which the planting was done between 20 and 25.III., with the density of 65,000 and 70,000 nests/ha. On average, on the variants studied, the highest harvests were recorded in the variants when the planting was done between 20 - 25.III. The average planting density over the three planting periods led to the following harvests: 29,240 kg/ha in the variant with 55,000 nests/ha, 31,498 kg/ha in the variant with 60,000 nests/ha, 34,229 kg/ha in the variant with 65,000 nests/ha and 33. 263 kg/ha in the version with 70,000 nests/ha. The starch content in the studied area was between 17.3 and 18.0%. The highest starch production of over 6000 kg/ha was achieved when planting was carried out between 20 and 25.III. with 65,000 nests/ha.*

***Key words**: potato – the period and density of planting the crop*

INTRODUCTION

The potato is one of the important food plants that provides between 44 kg and 140 kg per inhabitant through direct annual consumption. In Romania, the annual consumption is around 100 kg. The potato is cultivated on all continents, Europe owns about 50% of the world surface. High yields are achieved by cultivating varieties with high production potential and modern cultivation technologies.

The paper presents the results obtained in the research related to two important links in cultivation technology, the planting period and the optimization of crop density. Research on the planting period has shown the advantages of early planting, which ensures the formation of shorter stolons, the production of early tuberization, with the formation of large and uniform tubers (BÎLTEANU, GH. 2001; AXINTE, M – 2003; SIN, GH., -2000; BÎRNAURE V -1971). Research in our country has shown that early planting ensures higher yields compared to later planting, regardless of the conditions that occur between the date of planting and that of sunrise (temperature drops and even snowfalls). Usually, in the Banat Plain, planting is done in mid-March, and in the intramontane depressions at the beginning of April. MARIA NĂFORNIȚĂ, 1974, FAZECAȘ I, BORCEAN I, 1980 showed that for unsprouted

potatoes, planting should be done when the land has been leveled and allows the soil to be processed at the planting depth. As a guideline, existing research shows that, in relation to the favorability of the area, planting should be done between March 10-20 in the lowland area and between April 1-15 in the favorable area, up to an altitude of 400-600 m and only after 15-25 April in areas with altitudes above 600 m.

MAN, S and DRAICA, C, 1978 mention that plantings carried out with a delay of 5 – 15 days compared to the early favorable period, cause distinct and very significant decreases in production in all varieties.

In the Netherlands, the optimal density is when 230 – 280 thousand main stems per hectare are provided. The optimal density is 25 epigean stems/m2 (DE van der Zaag, cited by BÎLTEANU GH, 2001).

MATERIALS AND METHODS

The experiments carried out between 2019 and 2021 at Pătaș were of a bifactorial type in which factor A represented the planting period and factor B the number of nests/ha. The number of repetitions was 3. The cultivated variety was Gared. Fertilization was done uniformly with N140P120K100. Nitrogen fertilizers were applied before planting and phosphorus and potassium fertilizers were applied at the same time as the basic tillage. The land preparation soil works were the current ones in culture technology, carried out during the optimal working periods. Works were carried out in the vegetation to combat weeds, diseases and pests, using substances approved by the Codex of plant protection products approved for use in Romania. The calculation of the harvest data was done according to the field placement method. At harvest, samples were taken for quality analysis.

RESULTS AND DISCUSSIONS

The summary of harvest results from the experimental cycle is presented in table 1. The harvest results show a range of potato production, depending on the factors experienced, between 27,031 kg/ha in the variant where the planting was done between April 1 and 10, with a density of 55,000 nests/ha and between 36,511 kg/ha and 36,474 kg/ha in the variants where planting was done between March 20 and 25 with 65,000 and 70,000 nests/ha, respectively. On average, on the 4 planting densities, the harvest was 32,610 kg/ha in the variant in which the planting was done between March 10-15. In the second planting period, respectively March 20 - 25, an average harvest of 34,342 kg/ha was obtained, thus higher by 1732 kg/ha compared to the first period, i.e. the production increased by 5%. The difference in production between the two planting periods is insignificant.

During the planting period from April 1 to 10, the average harvest of 29,220 kg/ha was obtained, thus lower by 3390 kg/ha compared to the production obtained during the period from March 10 to 15, a difference ensured as significantly negative. It follows that the planting in the area where the research was carried out must be done between March 1 and 25.

Table 1

Synthesis of harvest results obtained in the experimental cycle 2019 - 2021

The A factor Date of planting	**Factot B number of nests/ha**				**Factor A means**			
	55000	**60000**	**65000**	**70000**	Harvest Kg/ha	%	Difference Kg/ha	Significance
10 – 15. III	29530	31946	34652	34313	32610	100		
20 -25. III	31159	33224	36511	36474	34342	105	1732	
1 – 10.IV	27031	29325	31524	29002	29220	89	-3390	0

DL 5%=2864
DL1%=4740
DL0.1%=8872

Average Factor B

Specification	**55000**	**60000**	**65000**	**70000**
Harvest Kg/ha	29240	31498	34229	33263
%	100	107	117	113
Difference Kg/ha		2258	4989	4023
Significance		XXX	XXX	XXX

DL5%=765
DL%1=1049
DL 0.1%=1428

Analyzing the harvest results according to the number of nests/ha, it turns out that on average over the 3 planting periods, by increasing the density from 55,000 nests/ha to 60,000 nests/ha, the harvest increased by 7%, in the version with 65,000 nests /ha the harvest increase was 17%, and in the version with 70,000 nests/ha the increase tended to decrease, being 13%.

The yield differences of 2258 kg/ha in the variant with 60,000 nests/ha, 4989 kg/ha in the variant with 65,000 nests/ha and 4023 kg/ha in the variant with 70,000 nests/ha are statistically assured as highly significant. It results that in the late Gared variety, in the reference area, the optimal number of nests is 65,000 /ha.

Table 2

Variation of average starch content and average starch production in the experimental cycle 2019 - 2021

Specification	Date of planting			The number of nests			
	10-15 III.	20-25 III.	1-10. IV.	55,000	60,000	65,000	70,000
% starch	18	17.5	17.6	17.3	17.6	17.8	17.9
Starch production kg/ha	5869	6010	5142	5058	5543	6092	5954

The starch content presented in table 2, on average over the experimental cycle, was 18% in the planting variant between b10 - March 15, 17.5% in the variant March 20 - 25 and practically equal to 17.6% in planting variant 1 – April 10.

Depending on the number of nests/ha, the starch content varied between 17.3% (55,000 nests/ha) and 17.9% (70,000 nests/ha). Starch production was mainly influenced by tuber production. Thus, among the planting periods, the variant in which the planting was done between March 20 and 25 of 6010 kg/ha and among the planting densities of 6092 kg/ha in the variant with 65,000 nests/ha stood out.

CONCLUSIONS

The research carried out in the period 2019 – 2021 in the Bozovici Depression, Pătaș territory, leads to the following:

1. The research carried out on a semicarbonate eutric alluvial type soil, in an area where the amount of annual precipitation varies between 670-750 mm and with the average annual temperature of 9.40C, with the late Gared variety, economically motivated harvests were obtained.
2. The optimal planting period was March 20-25 in which, on average, the planting densities yielded an average harvest of 34,342 kg/ha, only 5% higher than the March 10-15 planting interval in which the harvest was was lower by 1732 kg/ha insignificant yield difference. The delay in planting until April 1-10 reduced the harvest compared to March 10-15 with n3390 kg/ha, a significantly negative difference.
3. The optimal planting density was 65,000 nests/ha, representing a 17% increase compared to the variant with 55,000 nests/ha, a very significant difference in yield. Increasing the planting density to 70,000 nests/ha is not justified, the harvest increase was 13%.
4. The starch content varied between 17.5% and 18.0% depending on the planting period and between 17.3 and 17.9% depending on the planting density, so in all variants below the 20% value with which the variety has been released into production.

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