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SELECTION OF PROMISING AND EARLY MATURING SPECIMENS OF POTATO CLONES AND LINES BY PLANTING IN TESTING PLOT AT EARLY PERIOD

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ABSTRACT

This article reveals the data on the selection of promising and early maturing specimens of 15 clones and lines of potatoes brought from Centre of International Potato growing (CIP) by planting them in testing plot at early period. By yield indications, control Sante variety yielded 20,4 t per ha, while in L-8 and L-10 samples these indications were 6,4 and 8,8% higher relative to Sante, in the remaining specimens the yield indications were reported to be 6-25 % less relative to control variant. In the result of the studies, 2 lines of potato L-8 of L-10 were presented to State Variety Testing commission.

KEYWORDS: clone, selection, variety, hybrid, specimen, collection, small tubers, industrial tuber, potato seedling, meristem.

1. INTRODUCTION

Potatoes rank after wheat, rice and corn crops by planting area in the world farming, and rank the second by the importance. Potatoes are a source of protein, starch, various vitamins, elements and mineral salts that are important for human.

The biochemical composition of potato tuber consists of 75% water and 25% dry matter. 70-80% of the dry matter is starch, in the tuber its content is 13-20%, protein is 2-3%, fiber -1%, fat -0,2-0,3%, sugar -1%, ash is 0,8-1,0%. In addition, potato tuber also contains vitamins (C, B_1-B_6, PP, K and carotenoids). Mineral elements (calcium, iron, iodine, sulfur, phosphorus, potassium, etc.) in the content of tubers play an important role in the strength and energy of bones and muscles of the young growing human body. Potato protein is rich in essential amino acids (lysine, leucine, valine, tyrosine, isoleucine, methionine, tryptophan, etc.) and is superior to other crop proteins in its biological significance.

The concept of potato seed-breeding includes a set of all measures that ensure the preservation of the initial qualities of the variety as long as possible, the organization of varietal renewal and variation on a planned basis, the rational selection of varieties. Therefore, for obtaining healthy planting material from potato varieties, it is advisable to create artificial microclimate conditions or to organize cultivation in protected land structures equipped to improve the natural microclimate conditions.

In foreign and domestic literature, it has been emphasized by scientists that in order to improve potato growing, great attention should be paid to the cultivation of high quality seeds.[1,3,8,10] It is also necessary to establish potato seed production, which includes several standard requirements to be at the required level, i.e, healthy level, variety and physiological condition, etc.[2,5,9] It has been scientifically and practically substantiated that high yield of potato depends on the variety 75-80% and on the treatment 20-25%.[4,6,7]

While 75-80% depends on the variety to achieve high yields of potatoes, 20-25% depends on the processing from a scientific and practical point of view.[4,6,7]

Promising early-maturing specimens of potato clones and lines brought from Center of International Potato (CIP) were selected by planting in a testing plot at an early period.

2. MATERIALS AND METHODS

The research was conducted in the experimental fields of the Research Institute of Vegetables, Melon crops and

Potato growing in 2018-2020. The institute is located in the Tashkent district of the Tashkent region, in north of Tashkent city. The climate is similar to that of most vegetable growing farms in the plains of Uzbekistan.

The peculiarity of the weather is that here the photoperiod and heat are sufficient, and the continental variable and dry air. The duration of sunlight is 2700-3000 hours per year, in summer sunlight duration is 360-400 hours per month and 90-130 hours in winter. The daily temperature variability is high (10-15 °C in winter and 15-20 °C in summer) and reaches 30 °C throughout the year.

The soil is pre-irrigated typical gray soils, groundwater is located at a depth of 6-7 meters, amount of humus in soil is 0,793-0,957%, gross phosphorus is 0,131-0,157 mg/kg, potassium 1,843-2,195 mg/kg and nitrogen is 0,131-092 %, active N-NO_3 is between 8,1-17,9 mg/kg, P_2O_5 - 12,4-28,4 mg/kg, K_2O - 187,5-227,4 mg/kg. The soil of experimental field is not saline.

Potato tubers and plants at an early period are taken as an object of this research. Research experiments were carried out in field and laboratory conditions by using methodological instructions "Methodics for conducting experiments on vegetables, melon crops and potato growing", "Guidelines for the study and maintenance of the world collection of vegetable nightshade crops", "Methodics of field experiments", "Methods of agrochemical analysis of soils in Central Asia".

3. RESULTS AND DISCUSSION

In addition to natural selection of varieties, artificial selection is also important in breeding work. Plant evaluation can significantly increase the effectiveness of artificial selection by using specific methods of distinguishing them. When choosing a variety, the goal must first be formed. It describes the requirements for the variety.

It is directed to study and analyze the biological, morphological, and farm traits of the existing varieties and select samples that are close to the cast target. Initial materials are collected by artificial selection through the crossbreeding of several varieties with traits that meet the requirements of the module, albeit partially.

Promising specimens that were selected from potato clones and lines brought from Centre of International Potato (CIP), were compared and tested at an early period in testing plot. Phenological observations were carried out on potato samples planted in the selection-testing plot at an early period (Table 1).

P; L;TS specimens brought from CIP were planted in experimental plot on March 25 in the scheme 70×25 cm at an early period and were tested comparatively with control variety Sante. Phenological observations were carried out on 15 family specimens planted in early time.

Table 1: Results of phonological observations on potato specimens planted in the selection- testing plot at an early period (in 2018-2020).

Variety samples	Sprouting of seedlings, day		From full sprouting to .., day			
			budding		flowering	
	10%	75%	10%	75%	10%	75%
Sante (st)	17	27	25	35	24	39
P-2	20	31	28	37	27	43
P-5	19	30	27	38	28	41
P-6	21	32	29	38	27	43
P-12	20	29	28	38	27	42
L-6	18	29	26	37	26	41
L-8	15	24	23	32	22	36
L-10	16	26	24	33	23	34
L-11	19	29	28	39	29	43
L-15	21	31	29	36	28	42
TS-1	19	29	27	38	27	43
TS-3	19	30	28	37	27	41
TS-5	20	29	27	38	27	45
TS-7	19	29	28	38	26	41
TS-9	18	28	27	36	25	40
TS-16	20	30	28	38	28	41

According to research results, sprouting of potato seedlings in control Sante variety was observed to be 10% in 17 days, 75% in 27 days, budding 10% in 25 days, 75% in 35 days, flowering 10% in 23 days, 75% in 39 days, while in some potato specimens, including L-8; L-10 lines, 10-75% of sprouting of seedlings, budding, flowering were observed 1-2 days earlier than in control variety. 10-75% sprouting of seedlings, budding, flowering of some specimens, including L-6; TS-9 were observed 1-2 days later than in control variety. Sprouting

of seedlings, budding, flowering of the remaining specimens P-2; P-5; P-6; P-12; L-11; L-15; TS-1; TS-3; TS-5; TS-7; TS-16 were observed 2-4 days later than in control.

Yielding results of potato specimens planted in early planting testing plot were studied and analyzed (Table-2).

Yield of Sante variety planted in control variant made 20,4 t per ha, while in L-8 and L-10 specimens, this indication was 6,4 and 8,8% higher relative to control, the lowest yield among all variants was observed in TS-3 (12,1 t/ha or 59,3%) specimen. In L-6; TS-9 specimens, yielding indications were close to the control variant.

The yield least significant difference (LSD_{05}) indication of promising lines that were selected in selection-testing plot from the specimens brought from CIP was noted to be 2,3 t/ha and experiment accuracy was Sx 4,2%.

The indicators of cost-effectiveness of potato samples planted in the selection-testing plot in an early period were determined (Table 3).

While studying the cost-effectiveness indications of promising specimens selected in selection-testing plot, it was determined that total costs made 12600 thousand soums when 3 tons of potato were planted in 1 ha area (price of 1 kg potato for sowing is 4200 soums). Fuel used per ha was 534,4 litre and price of 1 kg fuel was 6000 soums, totally was 3206 thousand soums. For fertilization of potatoes in 1 hectare, $N_{200}P_{150}K_{100}$ kgs of pure mineral fertilizers were used which accounted for 2736 thousand soums.

Table 2: Yield results of potato specimens planted in early planting testing plot (2018-2020).

Variety samples	Harvesting time, day			Yield per plant, g	Yield, t/ha	Relative to control,%
	60	70	80			
	Mean weight of a tuber per plant, g					
Santé (st)	95	118	145	358	20,4	100,0
P-2	56	105	140	301	17,1	83,8
P-5	60	105	130	295	16,8	82,4
P-6	50	103	135	288	16,4	80,4
P-12	55	106	135	296	16,8	82,4
L-6	85	115	138	338	19,2	94,1
L-8	96	131	155	382	21,7	106,4
L-10	98	135	158	391	22,2	108,8
L-11	55	111	144	310	17,6	86,3
L-15	30	87	122	239	13,6	66,7
TS-1	35	95	125	255	14,5	71,1
TS-3	28	80	105	213	12,1	59,3
TS-5	55	102	145	302	17,2	84,3
TS-7	48	92	130	270	15,3	75,0
TS-9	65	115	155	335	19,0	93,1
TS-16	45	84	127	256	14,5	71,1
LSD_{05} t/ha					**2,3**	
Sx,%					**4,2**	

Table 3: Cost-effectiveness indications of promising specimens planted in selection-testing plot in early time, ha/thous.soums (2018-2020).

Indications	Variety samples					
	Santé (st)	P-2	L-6	L-8	L-10	TS-9
Seeding material, fertilizer, fuel, care measures and other costs	21442	21442	21442	21442	21442	21442
Harvesting and transportation costs	2550	2138	2400	2713	2775	2375
Total expenses	23992	23580	23842	24155	24217	23817
Overhead costs, 25%	5998	5895	5961	6039	6054	5954
Unexpected expenses (20%)	4798,4	4716	4768	4831	4843	4763
All expenses	34788,4	34190	34571	35024	35115	34535
Yield, t/ha	20,4	17,1	19,2	21,7	22,2	19,0
Yield price, soums	42840	35910	40320	45570	46620	39900
Net profit	8051,6	1720	5749	10546	11505	5365
Cost price of 1 t of product	1705	1999	1801	1614	1582	1818

In the experiments, the costs for 8 irrigations of potatoes was 900 thousand soums, 1000 thousand soums for 2 cultivations and weeding, 125 thousand soums for harvesting and transportation of 1 ton of harvest, and 1000 thousand soums for 3 times control measures against diseases and pests, the total costs were 23560 thousand soums.

The costs of harvesting and transportation depended on the amount of produce harvested per hectare of land. The sum of the costs of materials and care technology, as well as the cost of harvesting and transportation, accounted for the total cost. On the technological map for potato care, the overhead costs are set at 25%. According to it, the amount of these costs is derived from the total cost figures, and in addition, 20% of unexpected expenses are taken into account. Total expenses included overheads (25%) and unexpected expenses (20%) and made all expenses. As the yield per hectare decreased, the cost price of 1 ton of produce increased. The level of production profitability of the research was dependent on the yield per hectare. In the control variant, the yield rate of the Sante variety was 123,1%, while in L-8 sample the profitability rate was 130,1% and in L-10 sample the rate increased to 132,8%.

4. CONCLUSIONS

According to research results, sprouting of potato seedlings in control Sante variety was observed to be 10% in 17 days, 75% in 27 days, budding 10% in 25 days, 75% in 35 days, flowering 10% in 23 days, 75% in 39 days, while in some potato specimens, including L-8; L-10 lines, 10-75% of sprouting of seedlings, budding, flowering were observed 1-2 days earlier than in control variety.

According to potato yield indicators, the yield of Sante variety planted in control variant made 20,4 t per ha, while in L-8 and L-10 specimens, this indication was 6,4 and 8,8% higher relative to control, in the remaining specimens yield rate was 6-25% less than in control variant.

Moreover, the profitability level of control variety Sante made 123,1%, while in L-8 specimen this indication was 130,1% and in L-10 specimen profitability level was observed to be 132,8%.

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