

# Peculiarities of the Accelerated Methodology of Elite Seed Production of Early and Medium-Determined Varieties of Potato and their Productivity in Reproduction

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**Abstract:** The article describes the features of the accelerated method of obtaining an elite potato of early and middle-early varieties and their changes in the process of reproduction

**Key Words:** early and mid-early varieties, elite, reproduction, accelerated technique, infection with viruses, yield, nursery, crops.

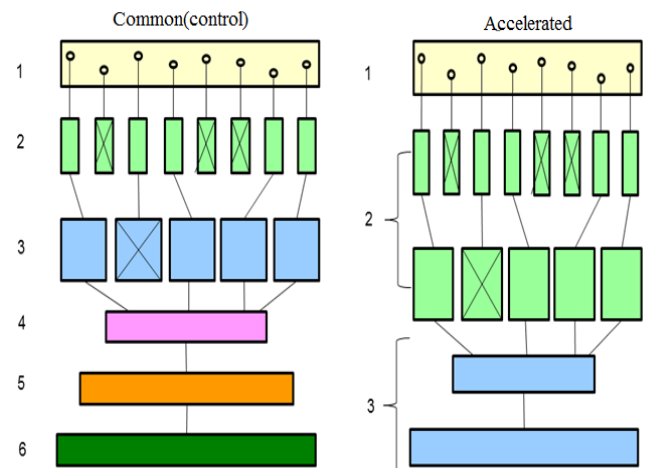
## I. INTRODUCTION

The process of growing elite potatoes according to the standard technique usually lasts 5-6 years. When spring planting is in local conditions for such a long period of time, seed potatoes inevitably become strongly infected and sharply reduce the yield properties. Summer planting last year's tubers for a number of circumstances also does not give positive results.

We have developed and introduced into production accelerated growing scheme of the growing elite of early and middle-early varieties of potatoes due to the transition to a double-crop culture. With the accelerated scheme, the period of time required for growing elite tubers is reduced by 2 times (Fig. 1).

## II. MATERIALS AND METHODS

The method of growing the elite according to this scheme is as follows. In the first year of autumn in the summer plantings with freshly harvested tubers (nursery selection), we select the original healthy plants (visually and by serodiagnosis), nest tubers from these plants (clones) in the second year we plant in the nursery of the first test of clones during the spring planting, and their offspring - in the nursery of the second test of clones during the summer planting with freshly harvested tubers. In the third year of seed production, we grow a super elite in the spring and the elite in the summer planting. Freshly harvested tubers before the summer planting period are treated in a solution of growth stimulants and fungicides per 100 liters of water: 1.0 kg of theorem, 1.0 kg of Rodanstone potassium, 0.5 g of gibberellin, 2.0 g of succinic acid and 5- 10 l Roslin. The exposure time is 1.0-1.5 minutes.



- 1.(First) selection of original healthy plants
- 2.(Second) clone testing of 1<sup>st</sup> year
- 3.(Third) clone testing of 2<sup>nd</sup> year
4. (Fourth)Super super elite
5. (Fifth) Super elite
- 6.(Six) Elite

- 1.(First) Selection of original healthy plants
2. (Second) First clone testing(Spring)
2. (Second) Second clone testing(Sumer)
- 3.(Third) Super elite (Spring)
- 3.(Third) Elite (Summer)

**Fig. 1 Accelerated growing scheme of elite early and mid-early potato varieties with double- crop**

In the initial year of work, only visually healthy plants were selected that meet the following requirements:

- morphological characteristics typical of s of the class;
- outwardly completely healthy, the leaf lobes evenly colored without mottling, smooth or with waviness typical of the variety;
- the number of stems in the plant (bush), characteristic of this variety ;
- normally developed plant s, all the stems in the bush on the thickness and height are the same.

This visual assessment allows you to select from the mass of apparently healthy plants with the most productive offspring.

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During the mass flowering period, the plants intended for the absence of a virus infection in their juice by serological or ELISA (ELISA) and indicator methods. For these purposes, diagnostic viruses were used annually. S, X, M and Y.

For the selected plants, the tops were destroyed at an early date. 7-10 days after the destruction of the bot, you carried out the digging of tubers and evaluated the plants by productivity. In the final selection, nests of tubers were taken that meet the following requirements: tubers in number, size and shape are typical for this variety and have no signs of disease and overgrowth. Then the tubers of each selected shrub were placed in separate plastic bags (with 10-15 holes) or nets.

Clone material, packaged in nets or in plastic bags with holes, was stored in ordinary potato storages on a rack. Temperature conditions in potato storage 2-4 °C.

In the second year, with 2-fold testing of clones, nurseries were located in isolated areas. Between the varieties left two empty grooves. In the spring, 20-30 days before planting, the tubers in the clones were examined. If there was at least one diseased tuber in the packet (grid), then the entire clone was rejected. At the same time, during the inspection, the clones were grouped according to the number of tubers (5-6, 8-10 and 12-14, etc.) for rational placement in the field.

Before planting, germination of tubers was carried out for 20–25 days at a temperature of 12–15 °C in bright rooms.

Clones with the same number of tubers were planted on separate tiers, dividing the last tracks 0.5 m wide. After the emergence of shoots, the clones were numbered, placing the pegs in 10 rows.

During the growing season, the plants were inspected three times and at the same time visual screening was performed. When at least one diseased plant was found in

the clone, the entire clone was culled, dug together with tubers and removed from the field.

Clones of the 1- spring test were removed manually. The harvest of each clone was stored separately and used, according to the generally accepted method, for planting in the nursery the second-year clones, and for accelerated - for the summer planting with freshly harvested tubers, that is, in the nursery of the second summer-test clones.

Tuber preparation, site selection (predecessor), plant evaluations in the nursery of clones of the summer test are similar to the spring test nursery.

In order to identify and cultivate clones infected with viruses, in each of them up to 20-60 plants were tested by a serological method.

When harvesting, those nests were rejected in which the tubers had a shape, size and color or symptoms of fungal and bacterial diseases, pest damage, deformation, etc. that were not typical for the variety. Nests with a low number of tubers were also removed. The tubers of all clones that stood the test during harvesting were combined into one batch and used them next year for planting the kennels of the super elite.

In the control variant of the studies (according to the generally accepted scheme) in the nursery for testing clones of the first year, the proportion of diseased plants was 29.5%; in the nursery, tests of clones of the second year – 12.5% and in the super elite – 0.7%, and with an accelerated pattern of growing the elite, these figures in the same nurseries, respectively, were: 10.9; 2.9 and 0%, which indicates the advantage of the accelerated scheme of growing the elite.

**Table. 1 Growth, infection of plants with viruses and the yield of the elite of potato varieties in reproduction, grown during selection of clones visually and by sero diagnosis depending on preplant hardening, germination with antiviral treatment (2014-2017)**

No	Indicators	When planting germinated tubers according to the scheme 70x19cm (control)					When planting hardened, germinated tubers with processing WUA (UBH-1) scheme 90x15cm				
		Elite	Reproduction				Elite	Reproduction			
			R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	R <sub>4</sub>		R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	R <sub>4</sub>
<b>In variety Kuvonch - 16 / 56m</b>											
1	Vegetation period, in days	74	74	73	72	72	76	75	74	74	73
2	Biometric indicators:										
	a) in plant height, cm	67.2	66.6	65.1	63.5	63.1	68.9	67.6	66.2	65.1	64.4
	b) the number of stalks, pcs.	4.5	4.4	4.4	4.2	4.0	4.8	4.6	4.6	4.4	4.4
	c) Number of leaves, pieces	219	214	211	206	201	242	240	235	232	230
3	Plant contamination by viruses, %										
	a) explicitly	-	1.7	2.5	3.8	8.9	-	-	1.2	2.0	3.7
	b) In latent form	3.4	8.6	13.4	18.1	23.8	1.1	3.5	6.7	9.3	12.4
4	Productivity, t / ha	25.2	24.6	24.0	23.1	22.0	28.6	27.5	26.3	25.7	24.9



<b>In variety Bahro-30</b>											
1	Vegetation period, in days	83	83	82	82	81	85	85	84	84	83
2	Biometric indicators:										
	a) in plant height, cm	82	81	81	80	79	84	83	83	82	80
	b) the number of stalks, pcs.	5.2	5.1	5.1	5.0	4.9	5.4	5.4	5.4	5.3	5.3
	c) Number of leaves, pieces	251	247	242	236	230	278	271	266	262	260
3	Plant contamination by viruses, %										
	a) explicitly	-	1.1	2.0	3.4	5.7	-	-	-	0.8	1.9
	b) In latent form	1.2	4.4	7,8	11.9	15.6	0.6	1.6	3.1	5.5	8.6
4	Productivity, t / ha	28,8	28.2	26.5	25.1	24.3	32.3	31,8	30.6	30.1	29.8
<b>In variety Bardoshli - 3</b>											
1	Vegetation period, in days	85	84	84	83	82	87	86	85	84	84
2	Biometric indicators:										
	a) in plant height, cm	79	77	74	73	71	82	80	79	78	75
	b) the number of stalks, pcs.	4.6	4.5	4.4	4.4	4.2	4.9	4.8	4.7	4.5	4.4
	c) Number of leaves, pieces	242	236	234	230	220	259	256	251	247	244
3	Plant contamination by viruses, %										
	a) explicitly	0.5	1.2	2.4	2.9	5.6	-	-	1.1	2.0	3.6
	b) In latent form	1.5	3.3	5.5	9.0	12.4	0.4	0.9	1.5	4.3	7.5
4	Productivity, t / ha	28.5	27.8	26.2	25.0	23.1	31.5	29.2	28.6	28.3	28.0

After winter storage, seed material was assessed by the susceptibility of tubers to filiformity, ring, wet, dry rot and hollowness. In each variant, 160 pieces were evaluated. clones and 400 tubers of the super elite. It has been established that with the usual method of growing the elite, its disease incidence was 3.2–5.6% higher than in the elite produced by an accelerated method. This is explained by the fact that tubers grown according to the generally accepted method are formed against the background of high temperature and low air humidity and are stored for almost 7-8 months, and under an accelerated pattern they are formed in favorable conditions and stored only for 4-4.5 months.

In the spring of the third year of seed production they plant a super elite. Planting material is carefully sorted out. We calibrate healthy full-fledged tubers into 3 fractions by size (30-50; 50-80 g and more than 80 g, which we cut into halves) and sprout. Planting density in the range of 70-90 thousand tubers per hectare. Planting is done by potato planters.

In the landings of the super elite and the elite we carry out triple varietal and phytopathological cleansing; the first - after the emergence of shoots; the second during the flowering period; third - before cleaning.

Removed plants with signs of viral diseases, wilted, with suspicion of black leg or ring rot, varietal admixtures. To determine the degree of latent infection of plants with a virus infection during flowering, we check the method of serodiagnosis for 50 plants per hectare.

On the 20-25<sup>th</sup> day after the mass flowering of the plants, the tops of the potato are mown or treated with desiccants. After 7-10 days after the destruction of the tops, we dig up the tubers with potato diggers.

### III. RESULTS AND DISCUSSION

In order to identify the studied growth, development, yield and quality of tubers virus-free elite potatoes grown in one embodiment according to the standard, and the second - by the accelerated method. Tubers of improved plants were taken as the starting material using the apical meristema method.

The soils of the test site are meadow-sierozem, medium loamy, pH - 7.1-7.2, humus content 1.1%, P<sub>2</sub>O<sub>5</sub> - 17-22 mg and K<sub>2</sub>O - 210 mg per 100 g of soil. The agro technology in the experiment corresponded to the requirements and recommendations for growing seed material in the conditions of the Zarafshan valley. A fourfold repetition of the experiment, accounting for the area of the plot - 28 m<sup>2</sup>. Planting in the field - March 2-10 according to the 70x20 cm scheme. During the growing season, we observed the growth and development of plants and their incidence of viruses. When harvesting took into account the yield, quality and marketability of the crop.

The research results showed that the seedlings in both variants of potato seed-growing techniques appeared almost equally on the 23-26<sup>th</sup> day after planting. And the period of "shoots-yellowing of the tops" in elite potatoes, produced by an accelerated method, was extended by 5-6 days.

In the accelerated technique, the plants were taller (by 2.2-5.9 cm), had by 1.2-1.4 pieces. more stems, 9.5–12.5 thousand m<sup>2</sup> ha, more leaf area, 34.3–36.2 mg /% chlorophyll in leaves, 1.1–1.3 more tubers in the nest in comparison with control. The productivity of plants has also increased (from 103.0 to 164.7 g). Visually not identified plants with signs of defeat viral diseases. It



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was established that in the piedmont zone of the plant to a lesser extent were affected by viruses in the latent form.

The yield of the elite grown by the accelerated method provided a yield increase of 5.9-6.6 t/ha.

We studied the growth, infection of plants with viruses and the yield of elite potato varieties Kuvonch-16/56 m, Bahro-30 and Bardoshli -3 in the process of reproduction in two versions:

Option 1. When planting elite germinated tubers with a pattern 70x19cm (control);

Option 2. When planting elite hardened, germinated tubers with WUA treatment according to the scheme 90x15cm. WUA (UBH-1) consists of chitosan -500 g, lactic acid - 50 g, sorbic acid -10 g per 100 l of water.

The data in Table 1 indicate that in the process of reproduction the vegetation period of the plants of the elite was reduced by 3-5 days. However, when the elite was

planted with hardened, germinated tubers with WUA treatment (UBH-1) according to the 90x15 cm scheme, the vegetation period of the plants was reduced, the biometric parameters were insignificant. Elites, in the studied potato varieties with the use of stabbing, germination, WUA treatment and wide-row planting according to the 90x15 cm scheme, provide up to 3-4 reproduction to get a steady high yield of more than 25-30 tons.

Applying an accelerated scheme of seed production, potato farms in the Samarkand region annually grow 90-132 tons of the elite of early and middle-early potato varieties (Table 2).

**Table. 2 An accelerated growing scheme for the elite of early and middle-early potato varieties in the Samarkand region**

Year	Nursery	Area, ha	The need for seed material, t	Gross yield, ha
First	Selection of original healthy plants (from summer plantings with freshly harvested tubers)	Selection	2.0 thousand clones	
Second	The first test of clones in the spring planting	0.2	0.7	3.0
Second	Second test of clones during summer planting with freshly harvested tubers	0.8	3.0	8.0
Third	Superelite crops - at spring planting	2.2	8.0	4 0.6
Third	Elite crops - with summer planting with freshly harvested tubers	10.0	40, 6	100.0

## IV. CONCLUSIONS

Thus, in the conditions of the Zarafshan valley, the use of a double-crops crop makes it possible to grow the potato elite more rapidly for 3 years instead of 5-6. At the same time, its higher quality and high-yielding properties can be maintained for up to 3-4 reproductions. This makes it possible to organize seed production of early and mid-early potato varieties in local conditions and to refuse to import seed potatoes to Uzbekistan.

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