

# Selection of varieties and heterotic hybrids of tomatoes suitable for re-cultivation

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## Abstract

The article presents the results of the assessment of 35 varieties and heterotic hybrids of tomato in repeated cultivation by early maturity, harvest, growth rate, resistance to diseases, pests and extreme growing conditions. It was revealed that under the conditions of irrigated meadow-sierozem soils of the Samarkand region, widespread cultivation of selected early and medium-early varieties (Dar Zavolzhyia, Finish, Solaris, Mustaqillik-28, Bohodir, Perst, Novichok) and hybrids (Lozhayin F<sub>1</sub>, Sulton F<sub>1</sub>, Amulet F<sub>1</sub>, Madera F<sub>1</sub>) in repeated cultivation contributes to obtaining a marketable crop from each hectare of 25-28 tons or more, suitable for fresh consumption, processing and sent for export, before the autumn frosts.

**Keywords.** varieties; hybrids; repeated cultivation; vegetation period; growth rate; harvest by harvest; marketable yield

## INTRODUCTION

The sharp expansion of grain crops in irrigated lands in the republic makes it possible to increase the acreage of vegetable crops, in particular, tomato in repeated cultivation in order to improve the provision of the population with a fresh harvest, the canning industry with raw materials, and this, in turn, the export capacity of the industry.

In the studies of a number of authors (Aramov, 2001; Ostonakulov & Oblokulov, 2008; Khakimov, 2013; Boteva & Yankova, 2017; Ganeva & Pevicharova, 2017; Ostonakulov et al., 2018; Pevicharova, et al., 2018; Grozeva et al., 2020), the solution to this problem largely depends on the selection and creation of tomato varieties and hybrids, which are distinguished by early maturity, simultaneous ripening, high yields, as well as the development and implementation of theoretical foundations and practical methods of their cultivation technology.

Currently, in the State Register of Agricultural Crops of the republic, only 114 are allowed for sow-

ing in open ground, including 33 varieties, 81 heterotic hybrid of tomato introduced from the Netherlands, France, Turkey, USA, Japan, Italy, India, Spain, South Korea, Russia and Surinam. Of these, the selection and widespread introduction in re-culture of suitable varieties and hybrids of tomato, ensuring the receipt of at least 28-30 tons of marketable yield per hectare before the first frost, resistant to diseases, pests and extreme growing conditions, is relevant, has important scientific and applied significance.

The aim of the research is to study the collection of early and mid-early varieties and heterotic hybrids of tomato in repeated cultivation and, on the basis of a comprehensive assessment, identify promising ones that differ in resistance to diseases, pests and extreme conditions, contributing to obtaining a ripe harvest of at least 28-30 tons before autumn frosts per hectare, suitable for consumption and processing. In the experiment, we studied 35 varieties and heterotic hybrids of tomato, our own and introduced abroad.

## MATERIALS AND METHODS

Field experiments were carried out in the conditions of irrigated meadow-sierozem soils of the Samarkand Scientific Experimental Station of the Scientific Research Institute of Vegetable and Melon Crops and Potatoes (VMPSRI). Planting of seedlings with 5-6 true leaves in varieties and hybrids of tomato was carried out on June 25-28 according to the scheme 70x20 cm. The plot area is 28 m<sup>2</sup>, the experiment was repeated 4 times.

At the experimental site, all counts, observations, analyzes and calculations were carried out according to the generally accepted method (Belik, 1992; Dospekhov, 1985; Litvinov, 2011; Ostonaqulov, 2018).

## RESULTS AND DISCUSSION

Studies have established that the field germination of seeds of varieties and hybrids of tomato in the second culture was from 42.9 to 61.0% on the 5<sup>th</sup> day after sowing, and 87.2-90.2% on the 10<sup>th</sup> day after sowing. The highest germination rate (88.6-90.2%) was observed in the variety Dar Zavolzhyia, Novichok, Finish, Surkhon-142 and the hybrid Sulton F<sub>1</sub>, Lozhayin F<sub>1</sub>, and low germination (69.6-73.6%) in the variety Rio-grande, Shafaq. The highest yield of standard seedlings from 1000 seeds was obtained in hybrids - Sultan F<sub>1</sub>, Lozhayin F<sub>1</sub>, in varieties - Surkhon-142, Namuna-70. At the same time, the height of the seedlings was 17.8-18.6 cm, the number of leaves was 7.4-7.7 pieces, the weight was 31.3-35.5 g. And the smallest seedling yield was observed in the varieties Toshkent tongi, Novichok, Volgogradets. When growing tomato samples in a second culture, early fruit ripening (69-70 days after planting seedlings) was noted in hybrids Sultan F<sub>1</sub>, Lozhayin F<sub>1</sub>, in varieties Volgogradets, Toshkent tongi, Dar Zavolzhyia, Uzbekistan-178, which before the first harvest was 77- 80 days.

Biometric measurements during the flowering period of tomato varieties and hybrids in repeated cultivation showed that the tallest (75.1-81.0 cm), leafy (71.2-77.6 pieces) and branched plants were in the varieties Doni, Dar Zavolzhyia, Finish, Namuna-70, Solaris and hybrids Sulton F<sub>1</sub>, Lozhayin F<sub>1</sub>.

The highest productivity indicators (leaf weight per bush 132-179, and fruits 510-640 g) were observed in the varieties Dar Zavolzhyia, Finish, Novichok, Surkhon-142 and hybrids Sulton F<sub>1</sub>, Lozhayin F<sub>1</sub>. Large-fruited (weight 100-116 g) were varieties Finish, Uzbekistan-178, Istiqlol, Namuna-70, Vostok-36, Shafaq, Dar Zavolzhyia, Lozhayin F<sub>1</sub> hybrid.

The yield of marketable fruits by varieties and hybrids was from 17.7 to 35.2 tons per hectare (Table 1).

The highest marketable yield (25.1-32.1 t/ha) was obtained in the varieties Novichok (25.1 t/ha), Perst (25.5 t/ha), Dar Zavolzhyia (26.4 t/ha), Finish (26.8 t/ha), Solaris (2.4 t/ha), Bohodir (25.6 t/ha), Mustakillik-28 (25.8 t/ha) and Amulet F<sub>1</sub> hybrids (25.3 t/ha), Madera F<sub>1</sub> (27.3 t/ha), Lozhayin F<sub>1</sub> (32.1 t/ha), Sulton F<sub>1</sub> (30.9 t/ha). At the same time, the increase in yield compared to the standard variety Volgogradskiy-5/95 was 7.5-10.8 t/ha or 142.6-162.5% for varieties, and 7.7-14.5 t/ha for hybrids or 142.6-182.4%.

The proportion of harvests by 1 and 2 picking of the selected varieties and hybrids were the largest and amounted to 73.4-85.4% of the total. The smallest share of the harvest 1-2 harvests (58.0-69.2% or 14.0-18.0 t/ha) of the total was observed in varieties - Rio Grande, Revenge, Sevara, Ofarin, Favorit, Fakhriy and in hybrids VT 1019 F<sub>1</sub>, Buran F<sub>1</sub>.

The biochemical composition of the studied varieties and hybrids differed significantly (Table -2). The dry matter content in fruits by varieties and hybrids ranged from 5.5 (Istiklol) to 6.6% (Favorite), sugar content from 2.2 (Surkhon-142) to 4.0% (Lozhayin F<sub>1</sub>). And the content of ascorbic acid (vitamin "C") varied within 15.7 (Buran F<sub>1</sub>) - 22.4 mg /% (TMK-22).

The highest dry matter content in fruits was in Favorit (6.6%), Sevara, Ofarin, Darkon (6.3%), hybrid - Amulet F<sub>1</sub> (6.5%), Madera F<sub>1</sub>, Sulton F<sub>1</sub> (6.4 %).

The highest sugar content was observed in Finish, Mustakillik-28 (3.7%), hybrids - Lozhayin F<sub>1</sub> (4.0%), Madera F<sub>1</sub> (3.8%), Amulet F<sub>1</sub> (3.6%), and vitamin "C" - TMK-22 (22.4 mg /%), Surkhon-142 (21.1 mg /%), Lozhayin F<sub>1</sub> (21.5 mg /%), Sulton F<sub>1</sub> (20.7 mg /%), Amulet F<sub>1</sub> (20.8 mg /%).

The dry matter content of the fruits of selected varieties and hybrids was 5,8-6,4%, sugar – 2,7-4,0%, ascorbic acid (vitamin "C") – 16,2-21,5 mg /%.

**Table 1.** Productivity of early and mid-early varieties and hybrids of tomato in repeated cultivation

№	Name and origin of the variety, hybrid	Yield by years, t/ha			Average yield, t/ha	Including marketable yield		Increase in marketable yield compared to control	The proportion of harvests by picking, %		
		2018	2019	2020		t/ha	%		1-picking	2-picking	3-picking
1	Volgogradsky 5/95 (ct.)	20,8	18,1	19,6	19,5	17,6	90,0	-	35,9	41,0	23,1
2	Vostok - 36 (UZ.)	18,9	19,6	23,3	20,6	16,5	80,1	1,1	43,7	34,0	18,3
3	Volgogradets (RU.)	25,2	20,9	25,9	24,0	21,7	90,6	4,1	41,7	37,5	20,8
4	Amulet F <sub>1</sub> (RU.)	30,0	26,2	27,8	28,0	25,3	90,5	7,7	39,3	39,3	21,4
5	Namuna -70 (UZ.)	23,8	20,1	23,6	22,5	18,9	83,8	1,3	44,4	40,0	15,6
6	Novichok (RU.)	29,0	26,6	26,3	27,3	25,1	92,1	7,5	36,6	44,0	19,4
7	Perst (RU.)	29,0	26,6	28,1	27,7	25,5	92,0	7,9	28,9	46,9	24,2
8	Doni (UZ.)	28,0	25,8	27,8	27,2	23,6	86,7	6,0	33,8	44,1	22,1
9	Darkhon (UZ.)	25,0	27,1	29,5	27,2	22,3	82,0	4,7	36,8	40,4	22,8
10	Dar Zavolzhya (RU.)	30,1	27,8	29,8	29,3	26,4	90,1	8,8	41,0	44,4	14,6
11	Fakhriy (UZ.)	28,6	23,0	26,4	26,0	22,2	85,2	4,6	34,6	34,6	30,8
12	Favarit (RU.)	27,5	25,2	30,7	27,8	24,3	87,4	6,7	28,8	36,0	35,2
13	Buran F <sub>1</sub> (RU.)	28,3	26,8	31,0	28,7	24,7	86,1	7,1	31,4	34,8	33,8
14	Madera F <sub>1</sub> (IT.)	29,1	30,6	34,2	31,3	27,3	87,2	9,7	35,1	38,3	26,6
15	VT1019 F <sub>1</sub> (TR.)	26,0	25,2	30,4	27,2	23,0	84,7	5,4	29,4	33,1	77,5
16	Domates tanimi F <sub>1</sub> (TR.)	27,0	22,0	23,3	24,1	20,6	85,4	3,0	35,7	39,2	25,1
17	Sevara (UZ.)	25,4	24,1	27,0	25,5	21,8	85,3	4,2	29,4	33,6	37
18	Surkhon-142 (UZ, RU.)	24,4	21,7	25,3	23,8	20,8	87,6	3,2	30,4	38,0	31,6
19	Surkhon guzali (UZ.)	28,9	24,0	26,0	26,3	23,7	90,2	6,1	36,6	33,0	30,4
20	Ofarin (UZ.)	28,0	25,8	28,0	27,3	23,7	86,8	6,1	28,6	36,7	34,7
21	Uzbekiston 178 (UZ.)	26,1	22,6	24,8	24,5	18,5	75,5	0,9	33,3	37,5	29,2
22	Shafaq (UZ.)	24,6	21,6	25,9	24,0	21,6	90,2	4,0	29,9	37,3	32,8
23	Reven (RU.)	28,0	23,8	28,6	26,8	24,0	89,7	6,4	24,0	37,5	38,5
24	Plamia Agro (RU.)	24,4	21,7	25,9	24,0	21,1	87,8	3,5	36,6	41,9	21,5
25	Magnat (RU.)	20,0	17,2	20,1	19,1	17,1	89,4	-0,5	34,5	38,3	27,2
26	Toshkent tongi (UZ.)	28,9	24,0	25,4	26,1	23,5	90,2	5,9	33,9	33,9	32,2
27	TMK 22 (UZ.)	18,2	14,2	19,4	17,7	14,1	79,4	-3,5	34,6	41,5	23,9
28	Finish (RU.)	30,9	26,3	29,6	28,9	26,8	92,9	9,2	39,3	38,0	22,7
29	Rio-grande (NL)	25,2	21,8	24,5	27,3	23,1	84,5	5,5	29,0	29,0	42
30	Solaris (MD.)	32,8	27,7	32,2	30,9	28,4	92,0	10,8	38,8	35,6	25,6
31	Lozhayin F1 (NL)	35,0	31,2	35,4	35,2	32,1	91,1	14,5	45,4	36,9	17,7
32	Istiqloil (UZ.)	28,6	24,3	26,7	26,5	23,1	87,0	5,5	37,7	41,5	20,8
33	Sulton F <sub>1</sub> (NL)	35,9	31,4	33,0	33,4	30,9	92,5	13,3	41,9	35,9	22,2
34	Bohodir (UZ.)	29,8	27,7	25,9	27,8	25,6	91,8	8,0	36,0	38,0	26,0
35	Mustaqillik -28 (UZ.)	32,0	26,0	27,8	28,6	25,8	90,3	8,2	38,5	42,0	19,5
		<b>Sx (%)=</b>	<b>4,2</b>	<b>4,0</b>							
		<b>LSD<sub>05</sub>=</b>	<b>2,9</b>	<b>2,7</b>							

**Table 2.** Biochemical composition of fruits of early and medium early varieties and hybrids of tomato in repeated culture (2018-2020)

№	Name and origin of the variety, hybrid	Average weight of one fruit, g	Content in fruits		
			dry matter, %	sugar, %	vitamin "C", mg /%
1	Volgogradsky 5/95 (ct.)	94	6,2	3,2	17,7
2	Vostok - 36 (UZ.)	112	5,6	2,8	19,1
3	Volgogradets (RU.)	88	6,0	3,0	18,0
4	Amulet F <sub>1</sub> (RU.)	72	6,5	3,6	20,8
5	Namuna -70 (UZ.)	106	5,7	2,6	18,7
6	Novichok (RU.)	65	5,9	2,7	16,8
7	Perst (RU.)	97	5,8	3,0	16,7
8	Doni (UZ.)	58	6,0	2,9	18,3
9	Darkhon (UZ.)	65	6,3	3,1	17,2
10	Dar Zavolzhya (RU.)	100	6,0	3,4	17,5
11	Fakhriy (UZ.)	64	6,1	3,5	18,2
12	Favarit (RU.)	67	6,6	3,1	16,2
13	Buran F <sub>1</sub> (RU.)	84	6,2	3,3	15,7
14	Madera F <sub>1</sub> (IT.)	106	6,4	3,8	19,1
15	VT1019 F <sub>1</sub> (TR.)	91	6,0	3,2	17,6
16	Domates tanimi F <sub>1</sub> (TR.)	80	5,7	2,8	19,2
17	Sevara (UZ.)	84	6,3	3,5	17,6
18	Surkhon-142 (UZ, RU.)	98	6,1	2,2	21,1
19	Surkhon guzali (UZ.)	92	5,8	3,2	18,3
20	Ofarin (UZ.)	60	6,3	3,0	17,5
21	Uzbekiston 178 (UZ.)	116	5,8	2,7	17,0
22	Shafaq (UZ.)	101	5,8	2,3	20,0
23	Reven (RU.)	71	6,1	2,9	17,8
24	Plamia Agro (RU.)	83	6,2	3,2	19,0
25	Magnat (RU.)	72	6,0	2,6	17,8
26	Toshkent tongi (UZ.)	96	5,8	2,4	20,0
27	TMK 22 (UZ.)	83	6,0	2,5	22,4
28	Finish (RU.)	100	6,1	3,7	20,0
29	Rio-grande (NL)	62	5,9	3,2	17,1
30	Solaris (MD.)	74	6,0	3,4	21,2
31	Lozhayin F1 (NL)	116	6,2	4,0	21,5
32	Istiqlol (UZ.)	111	5,5	3,5	17,4
33	Sulton F <sub>1</sub> (NL)	90	6,4	3,6	20,7
34	Bohodir (UZ.)	105	6,1	3,2	16,8
35	Mustaqillik -28 (UZ.)	98	6,0	3,7	18,2

## CONCLUSIONS

Thus, in the conditions of irrigated meadow-si-erozem soils of the Samarkand region, widespread cultivation of selected early and medium-early varieties (Dar Zavolzhya, Finish, Solaris, Mustaq-

illik-28, Bohodir, Perst, Novichok) and hybrids (Lozhayin F<sub>1</sub>, Sulton F<sub>1</sub>, Amulet F<sub>1</sub>, Madera F<sub>1</sub>) in repeated cultivation contributes to obtaining a marketable crop from each hectare of 25-28 tons or more, suitable for fresh consumption, processing and sent for export, before the autumn frosts.

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