



SOURCE MATERIAL FOR THE BREEDING OF STANDARD VARIETIES AND HYBRIDS OF TOMATO

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ABSTRACT

The article outlines the advantages of standard varieties of tomato compared to the ordinary ones. In the result of studying 20 varieties of standard tomato, essential sources of farm-valuable traits proposed for the use in breeding work were identified. Super-determinant, determinant, semi-determinant, small-fruited, medium- and large-fruited forms, various shapes and colors of tomato fruit were distinguished.

KEYWORDS: *tomato, standard varieties, plant height, fruit mass, growth period, fertility.*

INTRODUCTION

The standard variety of tomato (*Lycopersicon esculentum var. validum* (Bailey) Brezh.) includes the varieties with upright and ascending stems which may lie down only with the fruit mass. The plant can vary in shape and form from dwarf to medium-sized, both indeterminate and determinant. Leaves are with a short petiole and corrugated strong or moderate surface. The whole plant is compact, especially in the initial phases of development, including the root system, and compared with other varieties, it branches less and forms weaker epicormic branches below the first inflorescence.

Standard varieties have a number of useful traits that give them an advantage over ordinary plants. Thus, a compact, upright habitus allows for inter-row processing throughout the growing season and more efficient harvesting of fruits using partial or complete mechanization. Therefore, the fruits of these forms have less contact with the soil, which reduces their susceptibility to disease infection. Seedling of standard varieties can be grown greater density, it does not stretch and better ecizes in the field, which significantly reduces its cost [1, 2, 5, 7, 9, 11, 12].

The sign of standards is associated with a set of useful physiological and morphological characters. Standard varieties are usually more heat-resistant and drought-resistant [3, 9]. This is especially important in the hot and dry climate of southern Uzbekistan.

It is assumed that the leaves of the standard forms have increased photosynthetic activity and are potentially capable of producing higher productivity than conventional non-standard varieties [8].

With good features of plant in the seedling period (early sowing), the standard varieties develop well and form a yield of 100 t/ha and higher.

According to Mukhortova G.V., Kudryasheva N.I. (2009) in the conditions of the Astrakhan region, the highest yields were achieved for varieties Astrakhan 5/25 and Yuryevsky. Their productivity during drip irrigation reaches to 136-140 t/ha, which is higher than in a number of varieties with an ordinary plant type.

Considering the abovementioned, breeding works are being conducted on the creation of standard varieties and hybrids of tomato different in maturity, size and color of the fruit, plant height, etc. in the leading breeding centers of Russia, Ukraine, Transnistria [1, 3, 9, 10].

There are more than 200 standard varieties and hybrids in the world tomato collection. In Russia the selectionists of AUSRISBVC (All-Union Scientific Research Institute of Selection and Breeding Vegetable Crops), AUSRIIVMG (All-Union Scientific Research Institute of Irrigated Vegetable and Melon Growing), AUSRIVG (All-Union Scientific Research Institute of Vegetable Growing), "Aelita" firm, "Agrosemptoms" and others [8] deal with the breeding and selection of standard varieties and hybrids of tomato for open field ground.

In Uzbekistan, the demand for standard varieties among the population is growing from year to year, but the range of varieties allows much to obtain the best one. In the republic the cultivated standard, mid-ripening, large-fruited and resistant to gall eelworms is the variety Surkhan 142 from the breeding of the Central Asian laboratory of AUSRISBVC. In addition, Russian varieties Volgogradsky 5/95, Astrakhansky 5/25 are in great demand.

The standard, determinant varieties Dustlik and Sevara (with pink fruits) which were introduced in Uzbekistan in recent years, are grown in personal plots for an early harvest.

The disadvantage of the above varieties (except Surkhan 142) is that their fruits are not of high transportability and resistance to gall eelworms (genus *Meloidogyne*), the yield loss constitutes from 30 to 100%.

In this regard, in 2018-2019 a collection of standard tomato varieties in the amount of 20 samples was studied in research station of the Research Institute of Vegetable-melon and potato production in Surkhandarya.

MATERIALS AND METHODS

The investigations were carried out in accordance with "Methodological instruction on the breeding of tomato varieties and hybrids for open and protected area" (AUSRISBVC, 1986), "Methodological instruction on the study and maintenance of the world collection of *Solanaceae* (tomato, pepper, eggplant)" (Leningrad, 1977), GOST 4671-78 (AUSRISBVC, 1997) and others.

Seed sowing was carried out under the film cover on February 9, seedlings were planted in open field on April 13. The area of the experimental plot made 4.5 M².

The plot was double-row. The number of plants in the plot constituted 20, planting scheme was 90×25 cm.

RESULTS AND DISCUSSION

The characteristics of the variety samples according to the main periods of development are given in Table 1. Information on the duration of both the interphase periods and the vegetative period is very important for the selection of tomato varieties and hybrids different in early maturity.

The shortest "sprouting-flowering" period was observed in the group of super-determinant samples, with a duration of 61-62 days, which was 2-3 days shorter than the Dustlik standard (64 days). The duration of the flowering-ripening period in samples of this group made 39-44 days, which was also significantly shorter compared to the standard.

The determinant, precocious variety samples: Agro, Sevara, Perst, Otradniy, Revanch, Chelnok, Severyanka, Alpatieva 905a and Fonarik, the duration of the "flowering-ripening" period was 62-64 days. In determinant, mid-ripening samples, the duration of this period constituted 64-69 days.

A significant difference in the duration of the flowering-ripening period was noted among determinant samples: in relatively early-growing samples, the duration of this period was 38-41 days: in Agro, Sevara, Perst, Revanch, Otradniy, Chelnok, Severyanka it was 4-7 days shorter than in the standard. The relative early maturity of these samples is ensured by reducing this period. In mid-ripening samples, the duration of this period made 43-57 days.

In general, in super-determinant and relatively precocious, determinant samples, the duration of the flowering – ripening period, i.e. the growing season made 101-109 days. In determinant, mid-ripening samples, the duration of the growing season was 111-121 days.

In the semi-determinant samples Surkhan 142, Volgogradsky 5/95, the vegetation period was 113-118 days, which corresponds to their biological traits.

The characteristic of the source material is of great importance according to plant height, weight, shape, color of the fruit, habitus of plants, foliage and other traits. The use of these indicators facilitates the selection of parental forms close in morphobiological characteristics for hybridization.

Table 1.
Duration of interphase periods in standard varieties of tomato, in 2018-2019

№	Variety	Duration of interphase periods, days		Growth period, days
		sprouting-flowering	flowering-ripening	
1	Dustlik standard	64	45	109
Super-determinant				
2	Komnatniy red	62	39	101
3	Komnatniy yellow	61	42	103
4	Natasha	62	42	104
5	Timosha	62	44	106
Determinant				
6	Agro	62	39	101
7	Perst	62	39	101
8	Revanch	62	39	101
9	Chelnok	62	39	101
10	Sevara	64	38	102
11	Otradniy	63	40	103
12	Severyanka	63	41	104
13	Utenok	64	43	107
14	Alpatyeva 905 ^a	61	48	109
15	Fonarik	64	57	111
16	L-31	64	49	113
17	Sugdiyona	65	49	114
18	Marjona	69	46	115
19	Taramata	64	57	121
Semi-determinant				
20	Volgogradsky 5/95	65	48	113
21	Surkhan 142	64	54	118

Morphobiological features of the studied varieties are presented in Table-2.

As per plant height the studied varieties were divided into the following groups:

a) Super-determinant varieties form 2-3 inflorescences on the main and lateral shoots, and plant growth ceases for a long time (Gavrish and Galkina, 1990). This group includes varieties of samples Komnatniy red, Komnatniy yellow, Natasha, Timosha varieties with a plant height of 13-17 cm.

b) Determinants are characterized by limited growth of replaced seedlings after the formation of 4-6 inflorescences on them. These include Perst, Chelnok, Severyanka, Revanch, Otradnoy, Fonarik, Alpatyeva 905a, Agro, Utenok, Taramata, Sevara, Sugdiyona and Marjona with plant height from 35 to 88 cm.

c) Semi-determinants are characterized by a weak manifestation of determinism, i.e. prolonged absence of

stem growth restriction. This group includes varieties Surkhan 142, Volgogradsky 5/95, with a plant height of 115-118 cm.

Thus, we have at our disposal the varieties of tomato plants of different heights that will serve as a valuable source material for the selection of standard varieties and tomato hybrids.

According to mean mass of fruit the varieties are distinguished as follows:

a) Very small-fruited: Komnatniy red, Komnatniy yellow, Natasha, Timosha with a fruit mass of 6-10 g. These are the so-called "cherry" tomatoes suitable for pot culture;

Table 2.
Morphobiological features of standard varieties of tomato, in 2018-2019

№	Variety	Plant height, cm	Fruit				
			mass, g.	height, cm	diameter, cm	index	color
1	Dustlik standard	44	73	4,6	4,7	0,9	red
Super-determinant							
2	Komnatniy red	13	6,0	2,0	2,1	1,0	red
3	Timosha	15	9,0	2,0	2,1	1,0	yellow
4	Komnatniy yellow	14	8,0	2,1	2,2	1,0	orange
5	Natasha	17	10,0	2,4	2,6	1,0	red
Determinant							
6	Perst	44	48	5,3	3,8	1,4	red
7	Chelnok	36	40	4,2	3,2	1,3	red
8	Taramata	88	111	5,2	4,4	1,1	red
9	Marjona	42	75	3,8	3,3	1,2	red
10	Sevara	35	42	4,0	3,5	1,1	crimson
11	L-31	41	123	5,6	5,2	1,1	red
12	Sevryanka	37	45	3,9	4,0	1,0	red
13	Otradniy	38	50	4,2	4,2	1,0	red
14	Sugdiyona	61	100	5,2	5,5	0,9	red
15	Revanch	52	45	3,3	4,1	0,8	red
16	Utenok	59	68	4,0	5,1	0,8	orange
17	Alpatyeva 905 ^a	42	101	4,0	5,0	0,8	red
18	Agro	39	64	3,3	4,8	0,7	red
19	Fonarik	67	100	4,0	6,0	0,7	red
Semi-determinant							
20	Volgogradsky 5/95	118	115	4,5	5,5	0,8	red
21	Surkhan 142	115	110	4,2	5,3	0,8	red

b) small-fruited (from 30 to 60 g): Perst, Chelnok, Sevara, Sevryanka, Revanch, Otradniy with fruit mass from 42 to 50 g;

c) medium-fruited (from 60 to 100 g): Marjona, Sugdiyona, Fonarik, Alpatyeva 905^a, Agro, Utenok varieties with fruit mass of 64 -100 g;

d) large-fruited (over 100 g): Taramata, Surkhan 142, Volgogradsky 5/95.

It should be noted that the fruits of Perst, Chelnok, Taramata, Revanch, Marjona, Sugdiyona dense, transportable and they can be a source of this important feature.

The samples of Chelnok and Perst varieties have pear-shaped and elongated fruits. In other studied samples, the fruits are plain-rounded and rounded.

As a source of crimson colored fruit can serve Sevara variety, as yellow color source — Komnatniy yellow and Timosha. The coloration of the fruit of the remaining samples was red.

Depending on the type of plants, the fertility of varieties was different.

The lowest fertility was observed in super-determinant small-fruited forms. The fertility of the varieties of this group was 12.0-16.3 t/ha, which made 34-47% compared to the standard, Table 3.

In the determinant forms, only Taramata, Alpatyeva 905^a exceeded the standard for the total yield by 10-17%. The rest of the varieties by this indicator were at the level of standard variety or with a less level came after it.

Table 3.
Fertility of standard varieties of tomato, in 2018-2019

№	Variety	Total	Productivity, t/ha				
			in % relative to standard	earlier	in % relative to standard	For material	in % relative to standard
1	Dustlik standard	35,6	100	15,4	100	33,8	100
Super-determinants							
2	Komnatniy yellow	16,3	47	11,4	74	15,5	46+
3	Komnatniy red	15,1	42	10,5	68	14,3	42
4	Natasha	13,2	37	6,6	43	12,5	37
5	Timosha	12,0	34	8,2	53	11,4	34
Determinants							
6	Taramata	41,7	117	19,6	127	39,6	117
7	Alpatyeva 905 ^a	39,3	110	26,1	169	37,3	110
8	Utenok	37,5	105	21,2	137	35,6	105
9	Agro	37,5	105	19,0	123	35,6	105
10	Sugdiyona	37,3	105	16,3	106	35,3	105
11	Revanch	36,7	103	15,1	98	34,8	103
12	L-31	36,6	103	12,8	83	34,8	103
13	Fonarik	36,0	101	12,8	83	34,2	101
14	Marjona	35,1	99	21,0	136	33,3	99
15	Severyanka	34,1	96	12,8	83	32,4	96
16	Sevara	33,6	94	16,4	106	31,9	94
17	Perst	33,6	94	17,3	112	31,9	94
18	Otradniy	31,9	90	13,0	84	30,3	90
19	Chelnok	35,6	100	10,1	66	24,3	72
Semi-determinants							
20	Surkhan 142	52,0	146	32,6	211,7	49,4	146
21	Volgogradsky 5/95	45,1	127	21,7	140,9	42,8	127

A high total yield was observed in the widespread semi-determinant varieties Surkhan 142 and Volgogradsky 5/95. Their total productivity was 45.1-52.0 t / ha and exceeded the standard for this indicator by 27-46%.

According to our data, as the total productivity, determinant and semi-determinate samples turned out to be the best as per such an important indicator.

CONCLUSION

Consequently, in a result of the studies, the valuable source material was identified for the breeding of standard varieties and tomato hybrids in Uzbekistan.

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