



STUDY AND ACCLIMATIZATION OF LOCAL AND INTRODUCED STRAWBERRY VARIETIES IN THE CONDITION OF UZBEKISTAN

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Article history:	Abstract:
<p>Received: 20th October 2021 Accepted: 17th November 2021 Published: 20th December 2021</p>	<p>The article reveals information on the growth, development, yield parameters and fruit quality indicators of local and introduced strawberry varieties grown in Uzbekistan. The varieties with high valuable economic and biological traits were selected among the studied varieties, and included in the State Register and recommended for planting in all regions of the country.</p>
<p>Keywords: Varieties, Fruit, Introduction, Vegetation, Phenology, Yield, Chemical content</p>	

INTRODUCTION

In accordance with the requirements of the food program, along with the development of agricultural products in Uzbekistan, including horticulture and viticulture, it is planned to increase the number and production of berry crops.

A special attention is paid currently in our republic to the issues of stable supply of the population of the country with food products, full satisfaction of consumer demand for food at the expense of fruits, berries and grapes grown in the country [1].

Among the various fruit and berry crops grown in Uzbekistan, strawberries have a special place, as well as rank a first in terms of growing area and productivity. It is possible to grow valuable and high-yielding strawberry varieties and harvest up to 10-20 tons per hectare under proper production conditions in artificially irrigated and nutrient-rich gray soils of the country, using required agricultural techniques. They are a very tasty dietary food and are also very good products for processing. Strawberries are loved for their fragrant taste, high content of vitamins and mineral salts necessary for the body, as well as their healing properties. Strawberries are also characterized by rapid ripening and early harvest [1,3,4,6].

Freshly harvested strawberries are very tasty and fragrant, contain 4-11% sugar, 0.28-1.6% acids, 37-130 mg% vitamin C, easily digestible iron, phosphorus, potassium, calcium salts, folic acid (vitamin B), 1.3% protein, up to 1.0% pectin, P-active substances, amino acids and mineral salts [1,2,5,6].

Since the 1960s of the last century, at the Research Institute of Horticulture, Viticulture and Winemaking named after academician Mahmud Mirzaev, the research has been conducted on the creation of new varieties of strawberries, the introduction of promising varieties and their application in the production which have been brought from abroad and studied.

MATERIALS AND METHODS

Strawberry varieties belonging to different ecological groups were selected as the object of research. Field experiments, biochemical and physiological laboratory analyzes, as well as production tests are carried out in the following methods adopted in fruit growing; the study of phenological observations and yield indicators is carried out according to the method of "Program and methods on varietal study of fruit and nut fruit crops" Oryol 1999, chemical analysis is carried out in accordance with the recommendations of the manual "Methods of biochemical research of plants" published under the general editorship of A.I. Ermakov. Statistical processing of experimental data is carried out according to the method recommended by B.A. Dospekhov.

RESULTS AND DISCUSSION

When the phenological phases of the studied varieties of strawberry in 2018-2020 were observed, the beginning of vegetation for an average of 3 years was detected in varieties Dildor and Festivalnaya Romashka from 21 January, Sanreval from 28 January, Guante Farmbadze from 29 January and Ruslan from 30 January, and in other varieties from 2 to 17 February.

The onset of flowering in varieties was observed on average from March 20 in Dildor, Remontantnaya Ada varieties, to April 7 in Hennon variety. The onset of flowering in 15 varieties was observed on March 20-30, while the onset of flowering in 23 varieties occurred on April 1-4. In the remaining varieties, the flowering began on April 6–7.

Fruit ripening in strawberry varieties for an average of 3 years was observed in Remontantnaya Ada and Orlets varieties on April 29-30, while in other varieties, it lasted from 1 to 13 May.

Among the studied varieties, the berries of 11 varieties began to ripen on May 1-3. These varieties are Uzbekistanguzali, Redgountlet, Bauntiful, Dildor, Ruslan, Elista, Bylinnaya, Red, Sanreval, Medvey, Penelopa-1, Festivalnaya Romashka. These varieties were included in the group of early ripening varieties. The other 13 varieties are Uzbekistanskaya, Cobra, Pamyat Shredera, Victoria, Vishnevaya, Uzb x Cobra, Minusinka, Disinskaya, Krasavitsa Zagorya, Zamposhnya. These varieties were included in the group of medium-ripening varieties. The remaining 17 varieties: Preya, Bomba, Zenga Prikoza, Stelimaster, Melzinskaya, Samos, Douglas, Voskhod, Dana, Guante Farmbadze, Venta, Velikan, Hennon, Relichenko, Nagrada, Chyorny Prints, Pozdnyaya Lyubov were included in the group of late ripening varieties (table-1).

Table-1
Phenological phases of strawberry varieties in 2018-2020

№	Varieties	Beginning of vegetation	Beginning of flowering	Beginning of fruit ripening
1	Uzbekistanskaya(st)	04/II	28/III	06/V
2	Uzbekistan guzali	03/II	27/III	03/V
3	Redgountlet	08/II	30/III	03/V
4	Bauntiful	06/II	16/IV	01/V
5	Cobra	10/II	26/IV	07/V
6	Alpine	01/II	18/III	30/IV
7	Zholtoyechudo	29/I	20/III	30/IV
8	Dildor	27/I	20/III	02/V
9	Ada	30/I	20/III	29/IV
10	PamyatShredera	01/II	26/III	07/V
11	Preya	05/II	01/IV	09/V
12	Bomba	17/II	03/IV	15/V
13	ZengaPrikoza	06/II	30/III	09/V
14	Stelimaster	05/II	30/IV	09/V
15	Victoria	06/II	20/IV	04/V
16	Melzinskaya	03/II	10/IV	08/V
17	Vishnevaya	02/II	27/III	06/V
18	Ruslan	30/I	26/III	03/V
19	Elista	01/II	24/III	01/V
20	Uzb x Cobra	10/II	31/III	06/V
21	Bylinnaya	02/II	28/III	03.05
22	Samos	07/II	03/IV	09/V
23	Minusinka	05/II	01/IV	04/V
24	Douglas	06/II	03/IV	08/V
25	Voskhod	04/II	03/IV	08/V
26	Disinskaya	04/II	03/IV	05/V
27	Red	02/II	06/IV	03/V
28	KrasavitsaZagorya	06/II	04/IV	06/V
29	Dana	03/II	07/IV	10/V
30	Sanreval	28/I	07/IV	01/V
31	GuanteFarmbadze	29/I	06/IV	09/V
32	Medvey	03/II	29/III	03/V
33	Penelopa-1	04/II	01/IV	02/V
34	Venta	02/II	01/IV	12/V
35	Velikan	08/II	07/IV	08/V
36	Penelopa	02/II	30/IV	05/V
37	Jemil	05/II	30/IV	06/V
38	Uzbekistanskaya ZengaPrikoza	x 06/II	03/IV	06/V
39	Hennon	10/II	07/IV	11/V

40	Zamposhnya	02/II	05/IV	07/V
41	Relichenko	03/II	01/IV	08/V
42	DesertnayaKubani	04/II	03/IV	08/V
43	Nagrada	06/II	01/IV	11/V
44	FestivalnayaRomashka	27/I	03/IV	01/V
45	ChyorniyPrins	10/II	04/IV	10/V
46	PozdnyayaLyubov	04/II	01/IV	09/V
47	Orlets	05/II	28/III	30/IV

The average yield of strawberry varieties in 3 years ranged from 106.7 grams per bush (Sanreval) to 194.4 grams (Pamyat Shredera) or from 61.84 centners to 110.8 centners per hectare. The highest yield from 8 varieties was between 91.56 centners (Bauntiful) to 110.8 centners (Pamyat Shredera). Yields in 10 varieties were from 70.8 centners (Stelimaster) and 78.48 centners (Ruslan). In the remaining 4 varieties the yield ranged from 60.8 centners (Sanreval) to 66.4 centners in the Uzbekistanskaya x Cobra variety (Table 2).

Table-2
The yield of strawberry varieties (in 2018-2020)

№	Varieties	Yield		Average mass of berry (g)	Mass of the largest berry (g)
		Per bush (g)	c/ha		
1	Uzbekistanskaya (st)	156,7	89,3	13,6	24
2	Relichenko	150,5	85,7	13,3	22
3	Chyorniy Prins	129,1	73,57	11,0	20
4	Bauntiful	160,8	91,56	11,6	21
5	Elista	167,2	95,30	11,0	18
6	Jemil	147,7	884,1	13,6	27
7	Nagrada	148,9	84,87	11,6	26
8	Dana	135,3	77,12	11,5	28
9	Redgountlet	191,3	109,0	14,3	29
10	Venta	108,5	61,84	10,0	18
11	Medvey	170,4	97,12	14,6	29
12	Velikan	128,9	73,47	15,0	32
13	Bomba	150,6	85,84	14,3	37
14	Ruslan	133,7	78,48	10,3	23
15	Samos	152,9	87,15	10,3	20
16	Uzb x Kobra	116,5	66,40	13,6	27
17	Krasavitsa Zagorya	133,4	76,03	12,6	22
18	Douglas	132,0	75,24	13,0	27
19	Voskhod	128,6	73,30	12,3	31
20	Desertnaya Kubani	151,7	86,47	12,0	24
21	Festivalnaya Romashka	120,8	83,3	10,3	18
22	Pamyat Shredera	181,8	110,80	23,0	79
23	Uzbekistanskaya x Zenga Prikoza	136,5	77,8	14,0	23
24	Zamposhnya	124,2	70,70	10,3	19
25	Vishnevaya	111,0	63,27	9,3	22
26	Red	128,1	73,01	10,0	18
27	Hennon	126,8	72,27	11,0	20
28	Bylinnaya	151,2	86,18	10,6	19
29	Pozdnyaya Lyubov	132,5	75,52	12,3	20
30	Uzbekistan guzali	175,3	99,92	13,3	21
31	Disinskaya	129,7	73,92	11,6	32
32	Cobra	166,4	94,84	20,0	44
33	Zenga prikoza	126,6	72,16	13,3	27
34	Ada	130,0	77,2	5,6	11,6
35	Melzinskaya	131,2	73,12	11,6	19
36	Orlets	106,8	76,3	10,6	17,6
37	Guante Farmbadze	173,0	98,61	10,3	21
38	Victoria	126,8	72,27	11,6	20

39	Sanreval	116,4	72,29	9,0	18
40	Minusinka	141,4	80,80	10,0	22
41	Dildor	120,3	57,71	13,6	24,6
42	Preya	130,8	74,55	10,6	18
43	Stelimaster	124,3	70,85	12,3	25
44	Penelopa-1	96,7	55,11	4,3	19
45	Zholtoye Chudo	48,1	29,06	1,5	2,8
46	Alpine	43,3	26,10	1,7	1,9
47	Penelopa	63,9	36,42	5,8	8

According to the obtained results, the following strawberry varieties: Redgountlet, Pamyat Shredera, Uzbekistanguzali, Cobra, Guante Farmbadze, Medvey, Elista and Bauntiful were included in the group of the most productive, high-yielding varieties.

When calculating the average mass of berries of strawberry varieties, the average berry mass in the varieties ranged from 9 grams (Sanreval) to 23 grams (Pamyat Shredera), 15 grams in the Velikan variety and 20 grams in the Cobra variety. The average mass of the berry in 24 varieties ranged from 11 grams to 14.6 grams, in 8 varieties this indicator was 10-10.3 grams, in the remaining 2 varieties - 9-9.3 grams.

The highest rate in the mass of berries was 44 grams in Cobra, 79 grams in Pamyat Shredera, 37 grams in Bomba, 32 grams in Velikan, 31 grams in Voskhod and 32 grams in Disinskaya. In the remaining varieties, the mass of the largest berry was around 18-29 grams.

In order to determine the biologically active substances in the content of berries in 28 varieties of strawberries, a thorough analysis was performed in the laboratory.

The dry matter content of the berries of 28 studied varieties ranged from 8% to 12%. The dry matter content was 12% in 4 varieties, 11% in 7 varieties, 10% in 3 varieties, 9-9.2% in 7 varieties, and 8% in the remaining 7 varieties.

The sugar content in the varieties ranged from 7.7% (Penelopa) to 12.4% (Preya), in 8 varieties from 11.3% to 12.4%, in 5 varieties from 10-10.9%, in 7 varieties from 9% to 9.8%, in the remaining 7 varieties from 8% to 8.7%. The least 7.7% amount of (Penelopa) of sugar was observed in one variety.

In varieties, the acid amount ranged from 0.57% to 1.60%. The lowest acid was 0.57% to 0.64% in 4 varieties, 0.76% to 0.96% in 7 varieties, and more than 1% in the remaining varieties (Table 3).

Table-3
Biologically active substances in the content of strawberries %

№	Varieties	Dry matter (%)	Sugar content (%)	Acid content (%)
1.	Uzbekistanskaya(st)	11	12,3	1,34
2.	Uzbekistan guzali	9,2	10	0,64
3.	Minusinka	9	9,4	0,64
4.	Ruslan	11	10,8	0,96
5.	Ada	8	8,2	0,26
6.	Elista	8	8,5	1,47
7.	Venta	9	9,5	0,9
8.	Orlets	9	8,7	1,15
9.	Redgountlet	10	10	1,6
10.	Penelopa	8	7,7	1,85
11.	Dildor	8	8	1,34
12.	Bylinnaya	8	9,2	1,47
13.	Jemil	9	8,1	1,15
14.	DesertnayaKubani	12	12,4	1,6
15.	Victoria	11	10,2	1,08
16.	Nagrada	11	11,4	0,76
17.	Bomba	10	9,7	1,15
18.	Vishnevaya	12	11,9	0,64
19.	Preya	12	12,4	1,15
20.	Samos	8	8,2	1,02
21.	Stelimaster	8	8,9	1,02

22.	Hybrid	11	10,9	0,64
23.	Melzinskaya	10	9,8	0,57
24.	FestivalnayaRomashka	9	9,2	0,87
25.	Disinskaya	12	11,9	0,89
26.	Voskhod	11	11,3	0,76
27.	Douglas	11	11,3	0,76

CONCLUSION

It can be concluded that:

1. In strawberry varieties, for an average of 3 years, vegetation began very early on January 27th and lasted until February 17th. The onset of flowering in the varieties lasted from March 20 to April 7. It was noted that the ripening of the berries occurred from May 1 to May 15. According to the obtained results, 11 varieties were included in the group of early ripening, 13 varieties in the group of medium ripening and 17 varieties in late ripening group.
2. Yields in strawberry varieties for an average 3 years, ranged from 106.4 grams to 194.4 grams per bush. Among the studied varieties, Redgountlet, Pamyat Shredera, Uzbekistanguzali, Cobra, Guante Farmbadze, Medvey, Elista and Bauntiful varieties yielded high from 91.56 centners to 110.8 centners per hectare, while in other varieties the yield ranged from 60.81 to 99.92 centners.
3. When biologically active substances were determined in the berries of the studied varieties, the highest rate on dry matter content was 12% in Desertnaya Kubani, Bomba, Vishnevaya and Disinskaya varieties, the highest sugar content was 12.4% in Desertnaya Kubani, Preya varieties and it ranged from 11.3% to 12.3% in 6 varieties, from 10% to 10.9% in 5 varieties, and less than 10% in the remaining varieties. The lowest amount of acid among the studied varieties was noted in Minusinka and Vishnevaya varieties 0.64%, in 8 varieties it was less than 1% and in 15 varieties it was found to be more than 1%.
4. According to the results, the documents of strawberry variety Medvey in 2018, documents of the varieties Komola, Dildor, Preya and Jemil in 2019 were submitted to the State Variety Testing Center. From 2018, Bauntiful, Cobra and Redgounlet varieties of strawberries, and from 2020, the Medvey variety were included in the State Register and recommended for planting in all regions of the republic.

Bauntiful.

U.S. variety. Berries are mid-ripening. They begin to ripen in the first decade of May. The berry is light pink in color, juicy, with a slightly fragrant odor. It contains up to 10% of sugar, 0.89% of acid and 48.2% of vitamin C. The berry of this variety is large, weighing an average of 10 g, the largest up to 30 grams. The variety is self-pollinating. The harvesting period is 25-30 days. Yields are high, ranging from 180 to 220 centners per hectare.



Redgountlet.

English variety. Berries are early-ripening and begin to ripen in early May. The berry shape is conical, red in color, the taste is sour-sweet, with fragrant odor. The berry contains 6.8 to 10.4% of sugar, 1.0% of acid and 42.59 mg% of vitamin C. The variety is self-pollinating. The harvesting period is 25-30 days, the yield is 150 c / ha and higher. The berries can be eaten freshly, can be processed and transported. The average mass of the berry is 13 grams, the largest is 35 g.



Cobra.

German variety. The berries begin to ripen in the second decade of May. The berry is dark red, sour-sweet in taste. It contains 5.6% of sugar, 0.87% of acid and 62.49 mg% of vitamin C. The variety is self-pollinating. The harvesting period is 20-25 days. The average mass of the berry is 13 g, the largest berry is up to 45 g. Productivity is 120-130 c / ha. The berries are processed and transported easily.



Medvey.

U.S. variety. The berries begin to ripen in the first decade of May. The berry is red crimson in color, tastes sweet, with a slightly fragrant odor. The berry contains 8.2% of sugar, 1.16% of acid and 53.2 mg% of vitamin C. The variety is self-pollinating. The harvesting period is 20-25 days. Yields range from 150 quintals per hectare. The average mass of the berry is 12 g, the largest one is 30 g. The variety is resistant to heat and winter. It begins to bloom from March 28-30. The bush is large, grows widespread around, the leaves are dark green, the leaf margins are impermeable, the berries are red, shiny, the seeds are small, light brown, moderately noticeable. The taste is sweet-sour.



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