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Research Article

THE PHENOLOGICAL PHASES AND RIPENING PERIOD OF STRAWBERRY FRUITS PLANTED IN THE OPEN FIELD AREAS

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ABSTRACT

In this article, the results of the study have been discussed on the cultivation of Uzbekistanskaya (st), Uzbekistan guzali (st), Redgauntlet (st), Zenga-Zengana, Medvey, Velikan, Dana varieties of strawberry that had been planted in experimental plots of strawberries in open field conditions at the scientific research institute of horticulture, viticulture and winemaking named after Academician M. Mirzaev in Tashkent region. The duration of phenological phases and periods of ripening of berries in the varieties Vnuchka, Victoria and Zamposhniya were also monitored.

As a result, the ripening of strawberry varieties lasted from April 6 ("Victoria") to April 13 ("Uzbekistanskaya", "Redgauntlet"). The difference between varieties was 8 days. Fruit ripening was observed from May 3 ("Victoria") to June 24 ("Uzbekistanskaya" (st), "Zenga-Zengana"). It was observed that the duration of ripening was from 26 to 41 days in the section of varieties indicated in the experiment.

KEYWORDS

Strawberry, varieties, Redgauntlet (st), Zenga-Zengana, Medwey, Velikan, Dana, Vnuchka, Victoria, Zamposhniya, experimental field, phenological observations, recording of buds, flowering, ripening period of fruits, tasting score.

INTRODUCTION

The growing number of the world's population and its requirements for food requires the search for additional resources to increase the production of agricultural products, the efficient use of agricultural

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land, and the production and implementation of new innovative technologies in the sector. To meet this demand the global production of strawberries makes 9.5 million tons. The main share of the production, that is, 47.9% of the cultivated crop is in Asia and 24.5% is in the American continents. China is the leader in the cultivation of strawberries (Fragariaspp) in the world, with a harvest of 3.35 million tons, the USA grows 1.26 million tons, Turkey 728 thousand tons and Egypt 638 thousand tons of strawberries (FAOstat, 2022. http://www.fao.org/faostat/en/#data/QC).

The main reason for the low volume of strawberry cultivation in our republic is the lack of varieties and hybrids with high yield, disease resistance, short intensive development process, high marketability of fruits and processing characteristics in the assortment of varieties. Also, enrichment with strawberry varieties, improvement of their growing technology is an urgent issue in the agricultural sector of the republic (Kh.Abdullaeva 2015).

Studying the time of the beginning of the phenological phases depending on weather conditions allows to evaluate the adaptability of strawberry varieties and to recommend them for cultivation in the designated area, and the group of early-ripening varieties includes 35 varieties, medium-ripening varieties include 58 varieties, and late-ripening varieties include 25 varieties (M. I. Antipenko 2020). To increase the shelf life of fresh fruits, different ripening periods depend on the varieties (M.I.Antipenko 2020).

F. ananassa Duch. is named in Russian "garden strawberry", its Uzbek local name is "strawberry" and in some scientific sources it is called "land mulberry". In the book "Identifier of plants of Uzbekistan" (1987) by A. Hamidov, M. Nabiev, T. Odilov, this species is named as strawberry.

METHODS

Field experiments are being conducted at the central experimental farm of Scientific Research Institute of Horticulture, Viticulture and Winemaking named after academician Makhmud Mirzaev, located in Tashkent District, Tashkent Region.

The geographical coordinates of the experiment site are 450251 north latitude and 690161 east longitude, 490 m above sea level and 5 km from Tashkent city.

The soil condition of the experimental area is a typical gray soil with a deep underground water table, carbonate content from 19 to 23%, weakly alkaline (pN - 7.1), low structure, and prone to compaction and compaction. Irrigation is artificial and is carried out through ditches.

During observation of the phenological phases, the formation of buds, the beginning of flowering, full flowering, the end of flowering, the beginning of ripening of the fruits, full ripening, the end of ripening of the fruits, the change of the color of the leaves, the shedding of the leaves and the end of vegetation were recorded.

The day when the leaf tips started to emerge from the buds in most plants was recorded as the blooming date of buds. Observations were carried out day after day.

Flowering dates:

A) beginning – blooming of the first flower (-10%);

B) full flowering - 60% blooming;

C) the ending – 5% of the flowers are full, and the rest of the flowers are the shedding of flower petals in one way or another. The assessment of flowering power was determined on a 5-point scale, taking into account the age and development of the bush.

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Fruit ripening dates:

A) beginning – the appearance of the first healthy fruits with ripe color;

B) full ripening –50% of total fruits;

C) the end of ripening – 90% of fruits ripen.

The general condition of the berry bushes: every year in the spring and autumn seasons, the thickness of the stem (body) of the plant, the annual growth rate, the rate of leaf change, etc. were evaluated on a 5-point scale.

Leaf color change was studied in autumn and expressed in scores: 0 - no leaf color change;

1- the color changed on individual leaves;

2- the color changed in 10% leaves;

3- the color changed in 30% leaves;

4- the color changed in 70% leaves;

5- the color changed in more than 70% leaves.

Natural shedding of leaves was determined from the date of 20-25% leaf shedding. Leaf shedding observation works were carried out once every five days.

The degree of leaf shedding was visually characterized in cultivars that did not fully complete their vegetation before frost. Results were expressed as percentages (20, 40, 60, or 80% of leaves shed). In such varieties, the end of vegetation was recorded as the date of sustained frost, which caused growth to stop.

RESULTS AND DISCUSSION

All phenological observations are inextricably linked with weather conditions. According to the phenological observations of strawberry fruits, the earliest, middle and latest periods of phenophase transition were determined. The date of onset of the most frequent phenophase in the years of observation was shown as the middle period.

Regarding the study of strawberry varieties, the growing season of strawberry varieties started a little later this year due to the fact that the duration of cold weather lasted longer than in previous years. In 10 studied varieties of strawberry, vegetation, i.e. the formation of leaves, was observed between February 7 and February 28.

The beginning of flowering in strawberry varieties lasted from March 23 (“Vnuchka”) to March 27 (“Zenga-Zengana”). The difference on duration between varieties was 5 days. The ending of flowering in strawberry varieties lasted from April 13 (“Redgountlet” (st)) to April 22 (“Uzbekistanskaya”, “Viktoriya”, “Zamposhniya”). The duration of flowering made 30 days.

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Fig.1. Flowering phase

Fig.2. Ripening phase of fruit.

The beginning of fruit ripening in strawberry varieties lasted from April 6 (“Viktoriya”) to April 13 (“Uzbekistanskaya”, “Redgountlet”). The difference on duration between the varieties was 8 days. The ending of fruit ripening lasted from May 3 (“Viktoriya”) to June 24 (“Uzbekistanskaya” (st), “Zenga-Zengana”). Ripening duration of vaieties was found to be among 26 days and 41 days (table-1).

Table-1

Phenoogical phases for strawberry varieties

№	Varieties	beginning of vegetation	flowering		ripening		
			beginning	ending	beginning	ending	duration
1	Uzbekistanskaya (st)	16/II	25/III	22/IV	09/IV	14/V	35
2	Uzbekistan guzali (st)	20/II	26/III	15/IV	10/IV	18/V	39
3	Redgountlet (st)	20/II	25/III	13/IV	13/IV	13/V	30
4	Zenga-Zengana	27/II	27/III	15/V	13/IV	24/VI	41

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5	Medvey	16/II	27/III	15/IV	13/IV	09/V	26
6	Velikan	18/II	26/III	20/IV	10/IV	20/V	40
7	Dana	23/II	26/III	20/IV	13/IV	17/V	34
8	Vnuchka	21/II	23/III	15/IV	12/IV	10/V	28
9	Viktoriya	28/II	25/III	22/IV	06/IV	03/V	34
10	Zamposhniya	23/II	25/III	22/IV	10/IV	17/V	37

According to the results of the study, it was an important factor for the growth and development phases of strawberry varieties in 2023. When calculating the yield of strawberry varieties, the lowest indicator among five bushes was noted in "Victoria" variety 310 g, the highest indicator in "Medvey" variety, 555 g. The lowest yield per bush was from 56.2 g. ("Victoria") to 115.6 g. ("Medvey"). Among the varieties, the lowest yield indicator was noted 31.6 c/ha in the "Victoria" variety, while the highest indicator was observed in the "Medvey" variety and it was 61.5 c/ha.

Among the studied strawberry varieties, the lowest average weight of fruits was 8 g in the "Victoria" variety, and the largest fruit weight was 18 g.

Fig.3. Fruits of strawberry varieties

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During the research, the yield of strawberry varieties, i.e. the yield of five bushes, the average yield of one bush, the yield per centner, the average fruit mass and the mass of the largest fruit, and the tasting score were determined.

Table-2

The yield of strawberry varieties (in 2023)

№	Varieties	Yield from five bushes (g)	average yield of one bush (g)	c/ha	the average fruit mass	mass of the largest fruit	tasting score
1.	Uzbekistanskaya (st)	365	68,8	39,4	11	16	4,7
2.	Uzbekistan guzali (st)	478	94	53,4	9	18	5
3.	Redgauntlet (st)	439	90,2	50	9	24	4,3
4.	Zenga-Zengana	515	102,3	60,2	11	35	3,9
5.	Medvey	555	115,6	61,5	9	25	5
6.	Velikan	485	104,6	56,4	9	25	4,3
7.	Dana	345	74	39,4	11	22	4,6
8.	Vnuchka	424	85,4	48,6	7	18	4,2
9.	Viktoriya	310	56,2	31,6	8	18	3,4
10.	Zamposhniya	375	70,2	39,9	10	20	3,2

According to the results of the study, an important factor was noted for the growth and development phases of strawberry varieties in 2023. When calculating the yield of strawberry varieties, the lowest indicator of five bushes was noted in the variety "Victoria" 310 g, the highest indicator in "Medvey" 555 g.

Table-3

The yield of strawberry varieties (in 2022-2023)

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The

№	Varieties	Yield from five bushes (g)	average yield of one bush (g)	c/ha	the average fruit mass	mass of the largest fruit	tasting score
1	Uzbekistanskaya (st)	365	68,8	39,4	11	16	4,7
2	Uzbekistan guzali (st)	478	94	53,4	9	18	5
3	Redgauntlet (st)	439	90,2	50	9	24	4,3
4	Kobra (st)	515	102,3	60,2	11	35	3,9
5	Dildor	895	184,8	100,2	9	24	5
6	Medvey	555	115,6	61,5	9	25	5
7	Velikan	485	104,6	56,4	9	25	4,3
8	Dana	345	74	39,4	11	22	4,6
9	Nagrada	424	85,4	48,6	7	18	4,2
10	Viktoriya	310	56,2	31,6	8	18	3,4
11	Zamposhniya	375	70,2	39,9	10	20	3,2

lowest indicator for the yield per bush was from 56.2 g ("Victoria") to 115.6 g ("Medvey"). Among the varieties, the lowest yield indicator was found in the "Victoria" variety, 31.6 c/ha, while the highest indicator was observed in the "Medvey" variety, 61.5 c/ha. In the rest of control varieties, it was from 39.4 c/ha to 53.4 c/ha

Among the studied strawberry varieties, the lowest average fruit mass was 8 g in the "Victoria" variety, the largest one was 18 g, the highest indicator was 11 g in the "Uzbekistanskaya" (st) variety, and the largest fruit was 16 g, , the average indicator was 11 g in the "Zenga-Zengana" variety, the largest fruit mass was 35 g, the average mass in "Dana" variety was 11 g, the largest fruit was 22 g.

When the tasting score was determined, the lowest indicator was 3.2 points for the "Zamposhniya" variety, while the highest indicator was 5 points for the "Medvey" and "Uzbekistan guzali" (st) variety.

CONCLUSION

In conclusion, it was noted that all phenological observations are inextricably linked with weather conditions.

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The beginning of flowering in early ripening strawberry varieties lasted from March 23 ("Vnuchka") to March 27 ("Zenga-Zengana"), and the end of the flowering phase was observed from April 13 in "Redgauntlet" (st) variety. The duration of flowering of all varieties was 30 days in the experimental fields planted with strawberries.

Fruit ripening of strawberry varieties began from April 6 ("Victoria", "Uzbekistanskaya", "Redgauntlet"). The difference between varieties was 8 days. The end of fruit ripening was observed from May 3 ("Victoria") to June 24 ("Uzbekistanskaya" (st), "Zenga-Zengana"). The duration of ripening in varieties was 26 to 41 days.

In experiments conducted on the productivity of strawberry varieties, the lowest indicator of five bushes on yield was noted in "Victoria" 310 g, the highest indicator in "Medvey", 555 g.

The lowest yield indicator per bush was from 56.2 g ("Victoria") to 115.6 g ("Medvey"). Among the varieties, the lowest yield indicator was found in the "Victoria" variety, 31.6 c/ha, while the highest indicator was observed in the "Medvey" variety, it was 61.5 c/ha.

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