

Perspective Varieties and F₁ Hybrids of Sweet Pepper

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Abstract: In a result of a comprehensive evaluation of 20 varieties and F₁ hybrids of sweet pepper, the perspective samples were selected to be used in breeding purposes. F₁ hybrids Abay and Claudio, with 97–99 days of “sprouting-biological maturation” duration of fruits, can be used as a source of an early ripening. For the creation of large-fruited varieties in breeding, F₁ hybrids should be used: Prokraft, Dallas, Magno, Claudio, Gemini and Zumrad varieties. While for the selection of pachypleurous and very pachypleurous varieties and hybrids, the varieties Dar Tashkenta, Sabo, Nargiza, Lastochka, Podarok Moldovy, Shodlik, Zumrad and others, as well as F₁ hybrids Prokraft, Cadia, should be used.

Keywords: sweet pepper, variety, F₁ hybrid, interphase periods, plant height, fruit mass, fruit shape

1. Introduction

Pepper belongs to the genus *Capsicum* Tourn., which combines 30 species, 5 of which are cultivated: annual (*C. annum* L.), shrub (*C. frutescens*), called by the Indians “chilly”, downthrown (*C. pubescens*), Chinese (*C. chinense*) and *C. bacattum* [4]. Of all cultivated peppers, the most widespread in most countries of the world was only the most polymorphic species, *Capsicum annum* L. This species is the only one that has practical value in the vegetable growing of our country.

Among a wide range of varieties of pepper the *Capsicum annum* L. represents 13 varieties. Cultivated varieties relate mainly to three of them: var. *grossum* (L.) Sendt. – round, var. *longum* (DC) Sendt. – long and var. *acuminatum* Fingerh. – long and bitter [5].

In Uzbekistan, pepper is considered one of the leading vegetable crops. Besides being a main crop, it is grown in crop rotation after cereals and early vegetables (onions, cabbage, greens), under film cover, in film greenhouses without heating, etc.

49 varieties and hybrids of sweet pepper are included in the State register of agricultural crops recommended for sowing in the Republic of Uzbekistan. Out of these, 7 varieties and one hybrid of F₁ are of domestic selection and 41 hybrids of F₁ are of foreign selection [6]. However, many of them, especially of foreign breeding, do not meet the requirements of the local market and are not adapted to local climatic conditions.

In this regard, we conducted preliminary experiments on the varieties and hybrids included in the State Register, as well as new hybrids of F₁ offered by foreign companies in order to identify the most promising varieties in the conditions of the central zones of the republic. In this article, we have presented the morphobiological characteristics of the tested varieties.

2. Methods of Research

The preliminary experiment included 20 varieties and hybrids. Among them 7 varieties and one hybrid of F₁ were of domestic selection, 2 varieties and 10 hybrids of F₁ were of foreign selection. The experiments were conducted in the experimental plot of the Research Institute of Plant Production, in two repetitions. The area of the experimental plot was 12.0 m². The plot was double row. The number of plants in the plot was 68 pcs. Planting scheme was 70 × 25 cm. The investigations were carried out according to the “Methodological guideline for the study and maintenance of the world collection of *Solanaceae* vegetable crops (tomatoes, peppers, eggplant) [3], “Methodological guideline for the selection of varieties and hybrids of pepper and eggplant for open and protected ground” [2], GOST 4671-78 (III-stage) [2].

3. Results and Discussion

The studies have shown that the varieties and hybrids vary significantly by length of the interphase periods, as well as the growth period. From the data given in table 1 it is obvious that the foreign hybrids are distinguished by the shortest “sprouting-flowering” period (70-79 days).

The hybrids of F₁ Abay, Claudio, Gemini are particularly differentiated with a duration of 70-73 days. Of the domestic varieties, the best ones were Tong and Nargiza (81-84 days). The same indication was noted in the phase of “sprouting-setting” as indicated in Table 1. All hybrids of F₁ differ with a short period of “sprouting-technical maturation”. The duration of this period was 90-99 days. In comparison with the standard, F₁ hybrids such as Cadia, Abay, Claudio, Gemini, Atol were better, which had the shortest (for 4-7 days) period “sprouting-technical maturation”. All the tested hybrids include to the group of precocious (to 100 days).

Table 1: The duration of interphase periods of varieties and hybrids of sweet pepper, in 2018-2019.

Varieties and hybrids	From sprouting to, days			
	flowering	setting	Fruit maturation	
			technical	biological
Dar Tashkenta, st.	87	98	118	147
Zarya Vostoka	85	96	115	141
Zumrad	103	114	135	169
Sabo	90	101	129	153
Nargiza	81	93	117	144
Tong	84	95	121	145
Lastochka	80	91	115	139
Podarok Moldovy	83	94	117	143
Shodlik	91	102	125	150
F ₁ Jaykhun, st.	77	86	97	105
F ₁ Prokraft	79	88	95	107
F ₁ Claire	75	84	97	103
F ₁ Cadia	76	85	91	100
F ₁ Abay	70	81	90	97
F ₁ Magno	78	87	98	107

F ₁ Dallas	79	88	99	105
F ₁ Claudio	71	80	90	99
F ₁ Gemini	73	82	90	105
F ₁ Lotta	78	88	97	107
F ₁ Atol	75	84	93	101

This period was longer (115-135 days) in the varieties in comparison with hybrids F₁. The shortest period of “sprouting-technical maturation” was observed in the varieties Lastochka, Zarya Vostoka, Nargiza – 115 -117 days compared to the standard variety Dar Tashkenta which had 118 days. This period was also longer in the varieties Zumrad, Sabo, Shodlik (125-135 days) and they are considered late-ripening. The studied varieties required from 139 to 169 days, hybrids F₁ - from 97 to 107 days for the period “sprouting - biological maturation”. Better varieties with this indication were of Zarya Vostoka, Nargiza, Tong, Lastochka, Podarok Moldovy and hybrids F₁: Claire, Cadia, Abay, Claudio and Atol.

Table 2: Characteristics of the plant and fruits of sweet pepper varieties and hybrids F₁, in 2018-2019

Variety and hybrid	Plant		Fruit			
	Height, cm	Number of side shoots, pcs	Mass, g	Pericarp thickness, mm	Form	color in technical maturation
Dar Tashkenta, st.	65	4	75	4-5	cone-shaped	light green
Zarya Vostoka	67	5	70	3-4	cone-shaped	lacteous
Zumrad	61	4	115	6-8	prismatic	dark green
Sabo	59	4	65	4-5	truncated pyramid	light green
Nargiza	67	5	80	4-5	cone-shaped	light green
Tong	66	4	57	2-3	pyramid	light green
Lastochka	71	6	77	4-5	cone-shaped	light green
Podarok Moldovy	73	6	85	4-5	cone-shaped	light green
Shodlik	65	4	70	4-5	cone-shaped	light green
F ₁ Jaykhun, st.	85	6	103	3-4	cone-shaped	light green
F ₁ Prokraft	91	7	170	5-8	truncated pyramid	dark green
F ₁ Claire	95	7	115	4-5	truncated pyramid	light green
F ₁ Cadia	103	9	93	5-6	prismatic	light green
F ₁ Abay	101	6	100	4-5	prismatic	dark green
F ₁ Magno	127	8	150	4-5	truncated pyramid	dark green
F ₁ Dallas	115	8	125	4-5	cone-shaped	dark green
F ₁ Claudio	107	7	175	4-5	cone-shaped	dark green
F ₁ Gemini	95	7	183	4-5	truncated pyramid	dark green
F ₁ Lotta	97	6	67	4-5	cone-shaped	light green
F ₁ Atol	103	6	90	4-5	cone-shaped	light green

Knowing the morphobiological characteristics of the samples makes it possible find out the most perspective varieties for direct use both in production and in breeding work. Biometric surveys carried out before harvesting technically ripe fruits showed that the tested varieties were found to be more stunted (from 59 to 73 cm) in comparison with hybrids F₁ (from 85 to 127 cm). The experimental varieties can be divided into two groups by plant height:

- Mid-growing (46-65 cm) – Dar Tashkenta, Zumrad, Sabo, Shodlik;
- Tall growing (66-86 cm) – Zarya Vostoka, Nargiza, Tong, Lastochka, Podarok Moldovy.

All tested F₁ hybrids (except for the standard - F₁ Jaykhun) are included in the group of very tall, with a plant height of more than 86 cm. Much taller hybrids F₁ were: Magno (127 cm) and Dallas (115 cm). More number of side shoots was also noted in hybrids F₁ from 6 to 9 pcs compared to 4 to 6 pcs in the varieties.

Determining the average fruit mass showed that varieties and hybrids vary in this indicator. The largest fruit mass was observed in the variety Zumrad (115 g), less mass - in the variety Tong (57 g). In other tested varieties, the weight of the fruit ranges from 65 to 85 g. In most hybrids of F₁, the fruits were large. Only the hybrids of Cadia, Lotta, Atol are inferior to the standard. The fruits of F₁ hybrids were very large such as Dallas (125), Magno (150), Prokraft (170 g), Claudio (175 cm), Gemini (183 g). The thickness of the pericarp (wall of the fetus) was average only in the varieties of ZaryaVostoka, Tong, and in Jaykhun hybrid (2-4 mm). In most hybrids and varieties, the thickness of the pericarp constituted 4-5 mm, i.e. they turned out to be pachypleurous. Very thick-walled were the hybrids of Prokraft, Cadia and Zumrad, with a pericarp thickness of 5-8 mm. The most important sign is the shape and color of the fetus. According to the shape of the fruit, the tested varieties and hybrids can be grouped as follows: cone-shaped - Dar Tashkenta, Zarya Vostoka, Nargiza, Lastochka, Podarok Moldovy, Shodlik, F₁

Jaykhun, F₁ Dallas, F₁ Claudio, F₁ Lotta, F₁ Atol; prismatic - Zumrad, F₁ Cadia, F₁ Abay; pyramidal - Tong; truncated pyramidal - Sabo, F₁ Prokraft, F₁ Claire, F₁ Magno, F₁ Gemini. The largest number of samples have the cone-shaped form of the fruit which are most demanded by the market. Prismatic fruit shaped varieties and hybrids F₁ are also considered promising ones.

4. Conclusions

Consequently, as a result of the research on 20 varieties and hybrids F₁ of sweet pepper, valuable sources of economically important and morphobiological traits have been identified. Hybrids F₁ Abay and Claudio can serve as sources of early-ripeness, with a duration of the period "sprouting-biological maturation" of fruits within 97-99 days. For the creation of large-fruited varieties in breeding work it is important to use F₁ hybrids: Prokraft, Dallas, Magno, Claudio, Gemini and a variety Zumrad. For the selection of pachypleurous and very pachypleurous varieties and hybrids, it is required to use Dar Tashkenta, Sabo, Nargiza, Lastochka, Podarok Moldavy, Shodlik, Zumrad and others, besides, hybrids F₁ Prokraft, Cadia.

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