Creation of Heterosis Hybrids of *Cucumis Melo L.* for the Protected Soil of Uzbekistan

Lyan Ekaterina.

Head of lab. Genetics, selection and seed production of vegetable crops in greenhouses
Research Institute of Vegetable Melon Crop and Potatoes.
Uzbekistan.

ABSTRACT

For the first time in the republic, varieties of hothouse melons were created, which are distinguished by high yield, high palatability, resistance to major diseases common in protected ground. The hybrid F_1 Zarkhal was submitted to the variety testing inspection, and the promising hybrids F_1 L-160 × L-179 and F_1 L-161 × L-179 are undergoing production tests in greenhouses of the republic.

Keywords: Melon, variety samples, hybrids, sowing, growth, development, yield, taste, disease resistance, protected ground.

Introduction

The precociousness of the variety is associated with its resistance to temperature drops, i.e. with plasticity in relation to the temperature factor. Varieties that are able to develop in a larger range of temperatures and at lower minimum temperatures, as a rule, are more precocious, are promising for the northern regions of melon growing and for growing in film greenhouses of the northern zone [10, 13, 17, 30].

The first reports of heterosis in melons referred to a sign of early ripeness. Precociousness is the main advantage of heterosis hybrids of melon, since it is a dominant trait and is controlled by three groups of genes. In this regard, the use of heterosis hybrids of melon is also of particular interest for selection for precociousness [3, 4, 18].

The thickness of the pulp is also an important indicator of the quality of melon fruit. Fruits with thick pulp are more attractive to the consumer. So far, there is little domestic work on the varietal study and selection of melon samples for such a feature as the thickness of the pulp. However, this feature is of significant importance for consumers of products, as it positively correlates with the output of the edible part of the melon fruit [5, 8, 23, 24].

The most common melon diseases in protected ground are fusarium, powdery mildew, ascochitosis, cladosporiosis, bacterial and viral diseases [7, 26, 29].

Fusarium wilt. The causative agent of the disease is the fungus Fusarium oxysporium f. Melonis Schlecht., which belongs to the facultative parasites. It persists for a long time in the soil. The disease manifests itself in all phases of development in the form of yellowing and wilting of leaves, rapid drying of whips, dwarfism of plants. The quality of the fruits of affected plants deteriorates sharply [9].

Most researchers isolate two genes for resistance to fusarium wilt (Fusarium oxysporium f. melonis) in melon: Fom1 and Fom2. The Fom1 gene controls resistance to races 0 and 1, and the Fom2 gene controls resistance to races 0 and 2 of Fusarium oxysporium f. melonis.

Powdery mildew. Powdery mildew affects all melon crops, but is especially harmful to melons. The causative agents of the disease are two fungi: Erysiphe cichoracearum Do. And Sphaeroteka fuliginea Poll. The second is of paramount importance. It should be noted that E. cichoracearum develops in a wider range of temperatures (from 10 to 27 0C), and S. fuliginea - only at 20-270C [28, 35].

In developed countries, along with varietal crops of melon, significant areas are occupied by hybrids. Moreover, there is a tendency to increase the area of hybrid crops. Most varieties of melon have male and hermaphroditic flowers (the sexual type of andromonotium), and only some precocious varieties of the European subspecies are male and female flowers (the sexual type of monocy). This makes it difficult to obtain heterosis hybrids of melon [15, 22].

In this case, several ways are possible to obtain heterosis hybrids of melon. In the first case, andromonocial varieties can be used as a mother form, but they require a lot of labor for pre-castration, isolation and pollination of flowers. This method is applicable only for the production of small batches of seeds for greenhouses [6, 16, 34].

It is possible to reduce labor costs by eliminating the castration operation by using samples with a monational type of flowering as a maternal form. In this case, often to obtain seeds of F1 hybrids, the mother lines are treated with growth regulators that shift the sex of the plant to the female side. At the same time, there is a period of plant development during which male flowers are completely absent on the plant [27].

The starting material for the selection of gynomonocytic melon lines is a wild species of melon from China with purely hermaphroditic flowers - Cucumis monoclinus. K.I. Pangalo by hybridizing a monocium sample of melon with Cucumis monoclinus obtained plants with a purely female type of flowering. However, one of the main problems in the selection of gynomonocytic melon lines based on C. monoclinus is the low taste of the fruits characteristic of this melon species and transmitted to offspring, therefore, long-term selection work is necessary to obtain the maternal forms of heterosis hybrids of melon with the female flowering type [21, 25].

The creation of heterosis hybrids is a promising direction in the selection of melon culture in closed ground.

The more the parents differ from each other in the ecological conditions of cultivation, precociousness, origin, morphological and other signs, the more heterosis manifests itself [12].

However, in our republic to date, melon hybrids suitable for protected ground have not been zoned. In this connection, the first hybrids of melon F_1 Zarkhal were created, as well as hybrid combinations F_1 L-160 × L-179 and F_1 L - 161 × L-179 allocated in terms of yield, taste, as well as resistance to diseases is very promising and relevant for greenhouses in Uzbekistan [11, 13].

Research Methodology

The main directions of obtaining hybrid seeds by natural repollination of the original parent forms are: use as one of the parent forms of plants with signs of male sterility, the use of forms with signal signs, the effect on maternal forms of physiologically active substances in order to strengthen the female sex, as well as the use of female (genocidal) forms [19, 31, 33].

The technique of intervarietal hybridization in melon has been studied by many researchers. It is established that the best time for crossing is the morning hours (from 7 to 10 h). It is proved that the best knotting of hybrid fruits occurs when pollination of freshly harvested male flowers is pollinated. According to the generally accepted method of crossing, used for breeding purposes, in melons on the eve of the opening of female flowers, their castration is carried out, and in the morning only pollination and isolation are carried out [14, 20, 32].

In the experiments of 2021-2022, the following hybrid combinations obtained in previous years were planted below in spring greenhouses in comparison with the Kichkinta standard, as well as with parent forms:

Zarkhal (L - 131×Kichkinta), F_1 L-160×L-179, F_1 L-161×L-179, L-160, L-161, L-179.
The accounting area of the plot is 30m2, planting scheme is 120 + 80x 50cm,

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the culture was conducted in a single stem.

Results of the study

For the first time in the framework of the applied project in the period 2020-2022 studies were conducted on the culture of melon in the greenhouses of the Research Institute of Vegetables and Melons and Potatoes.

Table 1 shows the economic and biological characteristics of the new varietal specimens of melon, as well as their resistance to the most common melon diseases in the protected ground.

Larger fruits were hybrids F_1 L-160×L-179 - 0.850 kg, F_1 L-161×L-179 - 0.815 kg, F_1 Zarkhal -0.895 kg, Kichkintoy standard - 0.612 kg, parent forms - 0.550-0, 705 kg, the thickness of the pulp in new hybrids corresponded to 3.5 - 4.0 cm, at the Kichkintoy standard - 2.8 cm, in L-160, L-160, L-161 and L-179-2.8-3.3 cm. white, with the exception of the Kichkintoy standard, the flesh is light green.

Table 1

Characteristics of melon varieties in greenhouses in the spring turnover of 2022

№	Varieties	Characteristics of fruits				average fetal weight, kg
		length-width, cm	pulp thickness, cm	pulp color	fruit pulp	
St	Kichkintoy	12x10	2,8	light green	soft	0,840
1	F_1Zarhal (L131×Kichkintoy)	20x14	4,0	white	soft	0,965
2	F_1 L-160×L-179	18x12	4,0	white	soft	1,250
3	F_1L-161×L-179	16x12	3,8	white	soft	1,115
4	L - 160	14x13	3,3	white	soft	0,970
5	L - 161	13x10	2,8	white	soft	0,950
6	L - 179	16x11	3,2	white	soft	1,105
X						1,030

In Table 2. The yield data of melon varieties are presented. The largest commercial yield, average fruit weight and marketability are observed in hybrids F_1 L-160×L-179 - respectively (8.15 kg / m2; 1.250 kg; 160%), F_1 L 161×L-179 - (8.10 kg / m2; 1.115 kg; 159%), the smallest for the Kichkintoy standard - (5.10 kg / m2; 0.840 kg; 100%).

An important indicator of the prospects of varietal specimens is their resistance to diseases (the most common on melon culture, these are powdery mildew and fusarium wilt) (Fig. 1).

Weekly surveys of melon plants made it possible to establish that promising variety samples were not affected by powdery mildew - F_1 Zarhal - 10%, F_1 L-160×L-179 and F_1 L-161×L-179 - were resistant by 100%, the Kichkintoy variety was unstable affected by 30% fusarium wilt affected all samples slightly - 10 - 20%.

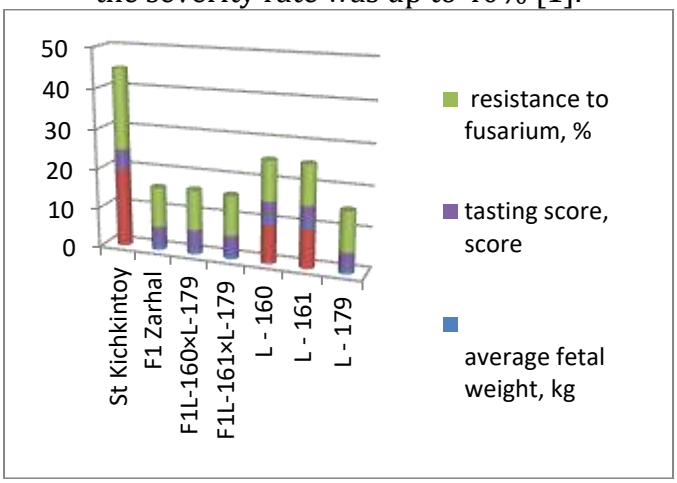
Table 2.

Yield data of greenhouse varieties of melon in spring turnover 2022

Varieties	yield, kg/m^2			early harvest compared to marketable, %	marketability to control, %	average fetal weight, kg
	marketable	early June 1	marketability,%			
Kichkintoy	5,10	2,45	91	48	100	0,840

F_1Zarhal (L131 × Kichkintoy)	7,80	4,65	96	60	153	0,965
F_1 L-160×L-179	8,15	5,25	93	65	160	1,250
F_1L-161×L-179	8,10	4,15	96	51	159	1,115
L - 160	7,23	4,20	97	58	141	0,970
L - 161	5,75	2,70	97	47	113	0,950
L - 179	6,42	3,65	90	56	125	1,105
X	***6,51***	***3,88***				***1,03***

The most unstable was the Kichkintoy standard - the severity rate was up to 40% [1].



Rice. 1. Resistance of melon varieties to powdery mildew and fusarium diseases

Conclusion

Based on the research carried out on the creation of new varieties and hybrids of melon for closed ground, the following conclusions can be drawn. Created new varieties of greenhouse melons for closed ground: F_1 Zarkhal, F_1 L-160×L-179, F_1 L-161×L-179 in terms of yield, taste, external commercial quality and disease resistance are considered very promising.

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