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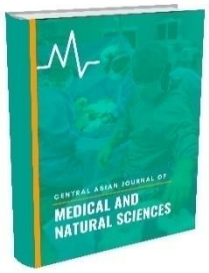

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Combination Ability of Melon Powdery Mildew Resistance Varieties and Donor Lines on Yields

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Abstract: As a result of evaluation of the combinational value of varieties and lines-donors of resistance to powdery mildew of melon, varieties and lines with high combinational ability for yield were identified. Varieties Galaba, Oltin tepa and line L-4 are recommended for breeding as donors of high productivity.

Key words: Melon, varieties, selection, hybrid, seeds, fruit weight, resistance.

Introduction. In Uzbekistan, there are 14 genera and 25-30 species belonging to the pumpkin family. Widespread crops of this family are watermelons, melons and pumpkins.

Gourd growing in Uzbekistan has a centuries-old history and melon is considered as the most valuable food product for the population. N.I. Vavilov (1926) stated that Central Asia is considered to be the center of origin of cultivated plants and the second center of origin of melon, where its main varieties are concentrated.

At the present time in Uzbekistan there are more than 160 local varieties of melons, differing from each other in maturity, yield, taste, shelf life of fruits and most of them have become world famous. In the state register of Uzbekistan there are 43 local varieties of melon, including 2 early maturing, 9 early-medium maturing, 18 medium maturing and 14 late maturing. In Uzbekistan, 150-155 thousand hectares of land are allocated for melon crops.

According to medical norms in Uzbekistan, each person is recommended to consume 270 g of melons daily. Melon fruits have excellent taste and many useful properties. Melon fruits contain 85-92% water, 8-15% dry matter, 0.8% protein, 1.8% fiber, 6.2% other carbohydrates, 0.9% fat, 20-30 mg/% ascorbic acid, iron, contains trace elements such as calcium, magnesium, potassium, organic and mineral salts. The amount of sugar in fruits of local melon varieties reaches 14-16%.

Taking into account the great demand for melon crops, especially for the melon.

Materials and methods. As an object of research were used 7 breeding varieties and lines of melon resistant to powdery mildew and 4 local disease-resistant varieties.

Evaluation of combinative ability was carried out according to the topcross scheme. Hybrids and parental forms were tested on mealybug infectious background in 3-fold repetition, plot size 25 sq.m.

The research was carried out according to the methods of "Methodical guidelines of VIR. Selection of melon crops" (1988), "Methods of conducting experiments in vegetable, melon and potato growing" (2002), "Methods of conducting experiments" (1985). Combination ability was determined according to the methods of V.K.Savchenko (1973), S.P.Yakovlev and V.N.Boldyrikhin (1979)).

Location of the research. The research was conducted at the Research Institute of Vegetable, Melon Crops and Potato, located in Tashkent district, Tashkent region, Republic of Uzbekistan. Its coordinates are 41º21' north latitude and 69º19' east longitude, elevation 478 m above sea level.

Research results. It is known that the combinatory ability of varieties is a genetically determined trait determined by different types of gene interaction. Its study is important for all crops, not only in solving the practical use of the effect of heterosis, but also because the total combinatory ability of varieties used in hybridization can serve to some extent as an indicator of the breeding value of hybrid combinations with this variety. Since the crossing was carried out according to the topcross scheme, we had the opportunity to determine the effects of GCA (General combinatorial ability) and SCA (Specific combinatorial ability) on the main economically valuable traits not only in 7 varieties and lines of resistance donors, which was the main objective of the study, but also in 4 local disease-resistant varieties used as testers. Below we present the results of experiments to assess the combinatory ability of yields.

The first step to determine the effects of GCA is to evaluate the results of yield tests of varieties, lines and their hybrids by analysis of variance and test the null hypothesis. The results of this analysis, indicate the significance of genetic differences between the variants of experiments.

The results of variance analysis of combinatorial ability of the initial forms by yield also confirm the high significance of the variant of GCA and SCA, which indicates that heterosis in F_1 hybrids is largely due to the interaction of additive genes.

Table 1 shows the yields of 7 donor varieties and lines and 4 local varieties in comparison with the estimation of their effects of variant GCA and SCA. The analysis of the results shows a close relationship between the yields of varieties and lines and their GCA. About this regularity in melon crops there are also indications in the works of K. Dyutin (1980), who believes that the yield of varieties can be judged on its overall combinatory ability.

Among the varieties and donor lines with the highest yield GCA, the varieties Oltin tepa, Galaba and line L-4 stood out. At the same time, there is no close correlation between the yield of these varieties and lines and their GCS value. L-4, which has the highest GCA values for yield and Oltin tepa, which had one of the highest GCA values, although they were inferior to Galaba. The other varieties and lines (Suyunchi, Shirali, Lazzatli and L-83) had negative GCA.

Among the local varieties, Kokcha 588 and Ak Kaun 557 were the best in terms of GCA effects. These high-yielding released varieties stand out among local varieties with high ecological plasticity, which is probably associated with high GCA.

The lowest GCA was in varieties ecologically unadapted to local Tashkent conditions, especially in varieties of Zeravshan origin (Sarik Buri Kalla and Chogare 944).

Yield evaluation of F1 hybrids showed that the highest yielding hybrid combinations are: Galaba x Kokcha 588, Galaba x Chogare, Galaba x Ak kaun 557, L-4 x Chogare, L-4 x Ak kaun 557, L-4 x Kokcha 588, L-4 x Sarik buri kalla, i.e. those derived from parental forms with high GCA effects.

The role of genes in the inheritance of such an important quantitative trait as yield can be judged by the ratio of variants of general and specific combinatory ability. It is known that if the value of variants GCA (Q^2g) significantly exceeds the value of variants SCA (Q^2s), it is evidence of the value of

additive genes of a variety or line and indicates a large contribution of these genes to the genotype of hybrids.

In our experiments, GCA variants significantly outperformed SCA variants in most donor varieties and lines and the local variety Kokcha 588.

Table 1. Average yields of donor varieties and lines in t/ha (x) and their effect of GCA (g) and variants GCA (Q^2g) and SCA (Q^2s)

Lines, varieties	x	g	Q^2_g	Q^2_s
Shirali	28,1	-2,32	64,74	354,73
Suyunchi 2	23,7	-3,77	182,50	12,82
L-83	24,6	-4,55	269,01	14,63
L-4	33,2	5,93	461,84	317,82
Galaba	36,0	1,68	30,61	14,63
Oltin tepa	28,5	4,80	36,18	88,17
Lazzatli	28,0	-1,80	163,18	88,17
Ak kaun 557	31,6	3,78	163,18	234,74
Chogare	17,8	0,44	-1,25	23,78
Sarik buri kalla	20,5	-0,82	4,33	163,31
Kokcha 588	31,2	3,43	133,75	28,04
Standard error (Jj-Jj)		+-4,05		
Same (Jj-Jj)		+-3,61		
Same (Jj-Jj)		+-3,58		

Shirali and Oltin tepa varieties and local varieties Ak kaun 557, Chogare and Sarik buri kalla have higher values of the parameter (Q^2s), indicating a large role of non-additive gene effects in the genetic control of yield in their hybrids F1.

Specific combinatorial ability is known to show the deviation of specific combinations from expected combinations based on the average GCA. As mentioned above, SCA is controlled by the interaction of non-additive genes, which affects its low stability depending on the conditions of the year.

Therefore, the SCA constants in melon hybrids in our experiments for the same combination varied greatly by years from positive to negative values. Stable positive SCA constants were observed only in 2 hybrid combinations: Suyunchi 2 x Sarik buri kalla and L 83 x Chogare, while stable negative ones were observed in the combination Shirali x Kokcha 588.

The highest SCA constants in hybrids were obtained in separate years for the following combinations: Shirali x Ak kaun 557, Lazzatli x Chogare, L-4 x Sarik buri kalla, L-4 x Kokcha 588 and Oltin tepa x Ak kaun 557.

Thus, the study of combinatory ability of 7 varieties and lines of donors of resistance to powdery mildew allowed to identify among them varieties and lines with high combinatory value in productivity. These are varieties Galaba, Oltin tepa and L-4 possessing a high GCA.

Among the varieties and lines with negative SCA can be recommended for breeding use variety Shirali, characterized by high specific combinative ability in some hybrid combinations. Among local varieties, the highest yield SCA of Kokcha 588 and Ak kaun 557 varieties characterized by wide ecological adaptation have the highest yield SCA.

Analysis of variant SCA and GCA showed that in the studied lines and varieties productivity is controlled predominantly by additive genes and only in L-27 dominant-epistatic interaction of genes prevails.

Conclusion. As a result of evaluating the combinational value of varieties and lines-donors of resistance to powdery mildew, among them were identified by yield varieties Galaba, Oltin tepa and L-4. These varieties and lines can be recommended for breeding as donors of high productivity.

Among the local varieties of high combinational value in terms of yield, the varieties Kokcha 588 and Ak kaun 557 stand out, which in many SCA indicators exceeds even the best disease-resistant varieties and lines.

Combination ability of lines due to resistance to diseases and their general biological resistance is characterized by stability of manifestation over the years and the magnitude of its manifestation is mainly determined by genotype. In local varieties, the manifestation of combinability depends to a large extent on growing conditions, in particular on the conditions of the year and ecological adaptation.

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