

Genetics and Breeding Potential of Intraspecific Polymorphism in Tetraploid Species of *Gossypium* L.

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Abstract: In this article, the character of the inheritance of the fiber length and yield characteristic, the mass of raw cotton of one box, 1000 seeds in reciprocal interspecific hybrids of the first generation, obtained by crossing intraspecific varieties and forms of *G.barbadense* L. with *G.darwinii* Watt. New data have been obtained that determine the degree of dominance of the studied hozjajstvenno valuable signs at interspecific hybrids of the first generation.

Keywords: cotton, species, variety, variety, hybrid, hybridization, polymorphism, inheritance, dominance factor.

1. Introduction

The success of applied research, and hence the acquisition of promising lines, varieties, is possible without the creation of a source material with valuable germ-plasma, with a unique potential of wild and cultivated species, encompassing the rich polymorphism of features and properties of the genus *Gossypium* L.

Currently, the use of the entire biomorphological diversity, in particular the rich and valuable intraspecific potential, such notable representatives as *G.hirsutum* L. and *G.barbadense* L. species as a starting material for improving cultivated varieties and creating but the ones that meet the requirements of the time are very limited.

Indicators of heritability of the trait are the main criteria for the effectiveness of selection and are of great importance for breeding. The coefficient of self-consistency reflects that share of phenotypic variability, which is caused by the genotypic heterogeneity of the population [2].

The aim and objective of the research is to study the biological and morphological features, the nature of the inheritance of economically valuable traits of interspecific hybrids, F₁ obtained through cross-breeding of wild-growing, ruderal, cultured-tropical and cultivated representatives of *G.barbadense* L. and *G.darwinii* Watt.

2. Material and Methods of Research

Intraspecific varieties, forms of the species *G.barbadense* L. and species *G.darwinii* Watt., As well as their interspecific hybrids F₁ served as the object of research.

Hybrids of the first generation studied the inheritance of such morphobiological features as fertility (the mass of raw cotton of one box, 1000 seeds), the quality of the fiber (length, yield). The obtained actual data were subjected to statistical processing on a personal computer (MS-Excel program) according to the method of BA Dospekhov [1]. To determine the coefficient of dominance of economically

valuable traits in hybrids of the first generation, the Wright formula was used, cited in G.M.Beil and R.E.Atkins [5].

3. Research Results and Discussion

Fiber length - an important indicator of the technological quality of fiber is its length, yield and index. The study of the features of inheritance and variability of the noted properties of fiber is of great importance in the selection of cotton.

When the length of the fiber is inherited, as noted by many authors [3, 4], dominance of long-fiber or heterosis is observed in intraspecific hybrids, intermediate inheritance when crossing non-contrast forms by this feature.

The original parental forms of the intraspecific variety *G.barbadense* did not differ in their high fiber length. In ruderal -growing forms, the length of the fiber varied in the range in 16,8-23,3 mm, in the cultured-tropical subsp.vitifolium f.brasiliense 28,7 mm, the cultivated Karshi-8 variety is characterized relatively high fiber length, 37,0 mm. Length of fiber of Peruvian, wild species *G.darwinii* Watt. was -30,5 mm.

We traced the character of the inheritance of the fiber length feature of interspecific hybrids of the first generation, obtained by crossing intraspecific varieties and forms of *G.barbadense* L. with *G.darwinii* Watt.

In hybrid combinations obtained by crossing wild, ruderal, cultured-tropical and subtropical forms with *G.darwinii* Watt. intermediate, dominant and super-dominant inheritance of the trait with the effect of positive heterosis was revealed. When crossing wild and cultivated forms of *G.barbadense* L. with *G.darwinii* Watt. there is an intermediate and dominant inheritance of fiber length with the effect of positive heterosis with a bias towards the best parent. The coefficient of dominance is $h_p = 0,73$; $h_p = 6,1$. The greatest effect of positive heterosis, i.e. super dominant inheritance of the trait is observed in the crossing groups of the ruderal form x *G.darwinii* Watt. ; cultural-tropical form x *G.darwinii* Watt. The dominance factor is $h_p = 5,2$; $6,1$;

2,7. In a hybrid combination of the ruderal form x ssp obtained by crossing *f.ishan nigeria* x *G.darwinii* Watt with *G.darwinii* Watt. lack of dominance effect.

Thus, studies have shown that the nature of the inheritance of fiber length in interspecies hybridization is different and varies depending on the genetic nature of the original forms and the combination of crosses.

The yield of fiber is one of the main economically valuable signs of cotton. We studied the inheritance of the fiber yield of interspecies hybrids obtained by crossing wild, ruderal and cultured-tropical forms of the species *G.barbadense* L. with *G.darwinii* Watt.

Among the ruderal-growing representatives, the highest fiber yield is observed in subsp.*ruderalis f.ishan nigeria* (30,4%), the smallest in subsp.*ruderalis f.pisco* – 20,5%. In ruderal forms, this feature varies within the limits of 18,0-24,0%. In the cultural-tropical form subsp.*vitifolium f.brasiliense*, the yield of fiber was 29,5%. *G. darwinii* Watt. The yield in the window is 26,0% .

An analysis of the obtained data showed that in interspecific F₁ hybrids obtained by crossing varieties and forms of *G.barbadense* L. with *G. darwinii* Watt., The yield of the fiber is mainly inherited in an intermediate manner and with the effect of negative heterosis, with a partial dominance of the forms with low yield of water. In hybrid combinations involving wild and ruderal forms, a dominant and superdominant inheritance of the trait is observed. In the group of hybrid combinations obtained by hybridizing cultured-tropical forms with *G. darwinii* Watt. the effect of negative heterosis is observed. For example, in a hybrid combination of *f.pisco* x *G.darwinii* Watt, the fiber yield is inherited with the effect of negative heterosis, dominantly, respectively, the dominance factor is $h_p = -0,89$. In the reciprocal hybrid combination *G.darwinii* Watt x *f.pisco* sign, also inherited with the effect of negative heterosis, the dominance factor is equal to $h_p = 0,78$.

Similar results of studies are observed, in groups of crosses between *G. darwinii* Watt. and cultivated varieties. Thus, the results of the studies showed that in interspecific F₁ hybrids obtained by crossing varieties and forms of *G.barbadense* L. with *G. darwinii* Watt., the outflow of the fiber is mainly inherited intermediate and with the effect of negative heterosis, with partial domination of forms with low fiber yield.

The weight of raw cotton in a single box - in the intraspecies varieties *G.barbadense* L., the largest mass of raw cotton in one box was found in sub-tropical forms (subsp.*eubarbadense* (Karshi-8-3,3 g), comparatively average in cultured tropical forms (subsp.*vitifolium f.brasiliense* – 2,2 g), and the lowest values were found in ruderal (1.6-1,8 g) forms. *G.darwinii* Watt. The mass of raw cotton one capsule is 1.9 g.

A study of the nature of the inheritance of a sign of the mass of raw cotton in a single box in interspecific hybrids of the first generation obtained by intersection of intraspecies varieties and forms of *G.barbadense* L. with *G. darwinii*

Watt. showed that the trait is inherited mainly dominantly and super-dominantly, in some cases intermittently or with the effect of negative goethosis. The interspecific reciprocal hybrid F₁ *G.darwinii* Watt x *f.ishan nigeria* marked the highest result, the trait is inherited super-dominantly with the effect of positive heterosis. The weight of cotton-cotton of one box in the hybrid was 3,7 g, while in parent forms this figure is 2,6-2,7 g, the dominance factor, respectively, $h_p = 15,0$. The lowest results were observed in the hybrid F₁ *G.darwinii* Watt x *f.parnat* The symptom is inherited with a negative effect of heterosis, with a bias towards the worst parent. Accordingly, the dominance factor is $h_p = - 1,2$.

Thus, as a result of the research, it was revealed that in F₁ interspecies hybrids (*G.barbadense* L. x *G.darwinii* Watt.), The mass of raw cotton in one corona is different. In hybrid combinations obtained by crossing wild-growing, ruderal and cultured tropical forms with *G.darwinii* Watt., A dominant and super dominant, in some cases intermediate inheritance of the trait or the effect of negative heterosis was revealed. In hybrid combinations obtained by crossing subtropical forms with *G.darwinii* Watt., An intermediate inheritance of the trait was revealed, which may be explained by an alternative expression of the mass of raw cotton in one capsule in parental forms.

The mass of 1000 seeds - since wild forms of *G.barbadense* L. L. have small seeds in comparison with the central ones, the mass of 1000 seeds in them varied in the range 86,1125,0- g. It was also found that ruderal forms, the mass of 1000 seeds was a higher mass (86,1-118,0 g). The largest mass of 1000 seeds in the cultivated Karshi-8 variety is 114,0 g. In *G.darwinii* Watt., The indices of this feature were 112,3 g.

The nature of the inheritance of the 1000-seed mass feature in interspecies hybrids of the first generation obtained by crossing intraspecies varieties and tetraploid cultured species *G.barbadense* L. with *G. darwinii* Watt was studied.

As a result of the research it was revealed that in F₁ species the mass of 1000 seeds is inherited differently, mainly dominantly, super dominantly or intermittently, larvae in individual cases intermediate with the effect of negative heterocrosis with a bias toward the worst parent.

The best results of the inheritance of the mass of 1000 seeds are observed in the group of hybrid combinations obtained in the cross between cultured tropical and subtropical forms with *G.darwinii* Watt. The weight of 1000 seeds in hybrid forms was 90,0-123,4 g.

Thus, the results of studies on the nature of the inheritance of the mass of 1000 seeds showed that this feature is mainly inherited mainly dominantly, superdominantly or intermittently, larvae in isolated cases with the effect of negative heterosis with a bias toward the worst parent.

4. Conclusions

Thus, the study and evaluation of morphobiological and economically valuable characteristics of intraspecies species *G.barbadense* L. and *G.darwinii* Watt. revealed that, in the

main, the representatives studied are characterized by low indicators of the mass of raw cotton in one box, the length and length of the fiber. Low indicators of components of fertility, indicate their wild nature. But many wild species of cotton are of interest for genetically-selection works, as they possess genes bearing extremely valuable features that are not found in cultural forms: high fiber quality, adaptive potential to abiotic and biotic factors of the environment.

Involving these forms in hybridization, in the future, will allow combining valuable properties and attributes that are far apart in the course of evolution and create a wide variety of valuable hybrid generations.

References

- [1] Armor of B.A. Methodology of field experience. // Moscow: Agropromizdat, 1985.- 351 p.
- [2] Abdurakhmonov I., Buriev Z., Rizaeva S., Ernazarova Z., Abdullaev A. and Abdukarimov A. Evaluation of fiber quality and other agronomic traits of *G.hirsutum* accessions from Uzbek cotton germplasm. // International Cotton Genome Initiative ICGI-2004 Workshop. Book of Abstracts. Hyderabad, Andhra Pradesh, India. October 10-13, 2004. p.7
- [3] Beil G.E., Atkins R.E. Inheritance of quantitative characters sorghum // Jow State Journal of Science. 1965. - № 3. - P.35-37.
- [4] Egamberdiev A.E. Wild cotton species are fiber quality and vitreous fiber donors. // Dokl. Academy of Sciences of Uzbekistan. Tashkent, 1979. - No. 8. - P. 66-68.
- [5] Simongulyan N.G., Mukhamedkhanov S., Shafrin A. Genetics, selection and seed production of cotton. - Tashkent: Mehnat, 1987. - C. 3-317.