FIBER QUALITY OF COTTON HYBRIDS OBTAINED ON THE BASE OF INTROGRESSIVE FORM

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Abstract

Some results of using introgressive form of cotton have fiber quality type II and III with geographically distant forms of high G.T.O. We studied the inheritance of fiber quality components in a hybrids F_1-F_3. Involvement in the selection introgressive form obtained with the wild diploid species *G.trilobum* Skovsted and ruderal subspecies *G.hirsutum* L. *ssp. yucatanense* and *G.hirsutum ssp. punctatum var. purpurascens* (Poir.) Mauer allowed us to bring new hybrids of medium staple cotton to the rich genetic basis.

Key words: introgressive form, cotton fiber quality, spinning consistency index,

Introduction

One of the important aims in cotton breeding is to create varieties with high fiber quality. Involvement in the hybridization of wild species produces progeny in a wide variety of forms, among which there are plants with unique characteristics. These synthetic introgression forms with a unique genetic basis are used as the gene pool of wild relatives during the breeding process for fiber quality.

The literature on the nature of inheritance fiber length contradictory. Most researchers have reported the dominance of long-fiber (Jerry L. et al., 1975). K.Gesos (1981) states that the inheritance of the fiber length in F_1 hybrids are intermediate. In the experiments of D. Ter-Avanesyan (1973) and other researchers while crossing cotton varieties with similar fiber length in the first generation is marked heterosis. Crossing of cotton varieties with differing in the length of fiber, hybrids have an intermediate position of heredity N.Simongulyan and E.Hodzha-Akhmetov (1982,1991) found that for length, strength and micronaire of the fiber characterized by incomplete dominance.

Materials and Methods

We study the inheritance of F_1-F_3 hybrids between introgression cotton forms with commercial cotton varieties. As a result of the hybridization of some cultivated varieties (*G.hirsutum* L.) with the wild diploid form *G.trilobum* Skovsted, followed by backcrossing of hybrids with recurrent parents, a number of introgressive forms of cotton were created (1979). These are characterized by early maturity, resistance to Verticillium wilt and high fiber quality.

Introgressive forms were also obtained with ruderal subspecies *G.hirsutum* L. *ssp. yucatanense* and *G.hirsutum ssp. punctatum var. purpurascens* (Poir.) Mauer (from Cuba). Obtained introgressive lines are of interest for selection because they are in genetic terms quite diverse and cytologically stable, which is important for

the presentation of genetic material, in this form, of the wild congeners into the genome of cultivated species.

The use of introgressive forms of cotton derived from the participation of the aforementioned wild diploid and polyploid species in the process of hybridization would help the enrichment of the genetic basis of cotton species *G.hirsutum* L., with new valuable features (Mauer F.M., 1954, Valichek P., 1980, Fryxell P.A. 1992 Avila A., Stewart McD., 2004, Iksanov M.I. et al., 2014).

Experiments were run in 2014-2016. Sowing of seeds was carried out on naturally infected *Verticillium dahliae* Kleb. background in the optimum time. Sowing circuit is 60 cm x 20 cm x 1 plant. Placing of options is randomized in four replicates. Standard varieties were medium fiber cotton of Namangan-77 and S-6524. In F_1 a massive selection of healthy plants in the whole population was carried out. The analysis of inheritance and variability of traits of hybrids F_1-F_3 and selection of forms among them was conducted. The nature of inheritance was determined by the degree of dominance of quantitative traits.

Fiber quality was determined on the HVI (High Volume Instrument) in the Center "Sifat". The statistical analysis of experimental data was conducted using the method B.A.Dospehov (1979). Coefficient of dominance (hp) determined by the formula S.Wright, pointed out by G.M.Beil and R.E.Atkins (1965).

During the breeding process F_3 hybrids with high fiber quality were obtained. The parental forms used in our trials were different in origin and, therefore, they differ in important morphological and economically valuable characteristics, in particular the quality of the fiber.

Most varieties of foreign selection in the conditions of cultivation in the Tashkent region showed a relatively coarse fiber, so fiber micronaire was 4.7 -5.3, strength of fiber was lower than local varieties for 2.3 - 6.4 gs / tex.

Table 1

Fiber quality components of F_1 hybrids and parental forms

Parents & hybrids	Fiber quality components					
	Mic	hp	Str	hp	Len	hp
St. Namangan-77	5.3	-	28.8	-	1.11	-
St. C-6524	5.1	-	33.8	-	1.14	-
L-T	4.5	-	35.6	-	1.21	-
L-U	4.3	-	35.1	-	1.18	-
L-578	4.5	-	33.3	-	1.19	-
L-6003	5.3	-	30.8	-	1.14	-
S -2515	5.0	-	33.3	-	1.16	-
S -6082	4.8	-	30.5	-	1.15	-
S-489	4.5	-	32.1	-	1.16	-
S-6593	4.3	-	29.2	-	1.17	-
S-6596	4.7	-	31.7	-	1.14	-
F_1 L-578 x L-6003	4.3	-1.5	34.6	2.0	1.30	4.6
F_1 -T x S -6003	4.2	-1.7	34.8	0.6	1.22	1.2
F_1 L-578 x S -2515	4.3	-1.3	38.2	9.0	1.27	5.0
F_1 L-T x S -2515	4.2	-1.6	37.1	2.2	1.24	2.0
F_1 L-578 x S -6082	4.3	-1.5	36.6	3.3	1.17	0.2
F_1 L-U x S -6082	4.3	-0.6	36.5	1.6	1.21	2.5
F_1 L-578 x S-489	4.4	1.0	37.2	7.5	1.23	3.0
F_1 L-T x S-489	4.5	-1.0	36.6	1.5	1.20	0.6
F_1 L-T x S-6593	4.4	0.5	36.5	1.3	1.21	1.0
F_1 L-U x S-6593	4.7	8.0	34.6	0.8	1.21	4.0

F_1 L-578 x S-6596	4.8	2.0	32.0	-0.6	1.11	-2.5
F_1 L-T x S-6596	4.5	-1.0	32.1	-0.7	1.17	-0.1
F_1 L-U x S-6596	4.6	0.5	32.7	-0.4	1.15	-0.5

Also, fiber length was significantly inferior for 0.04 - 0.07 inch (Table 1).The data in Table 1 shows that the fiber micronaire of all F_1 hybrids, except combinations F_1 L-578 x S-6596 is in the optimal range 4.2 - 4.7. Two hybrid observed positive heterosis for this trait - fiber micronaire have increased, which is not desirable. The remaining 11 combinations has negative dominance ratio. This indicates the improvement of fineness of fiber.

Table 2

Fiber quality components of F_2-F_3 hybrids

Hybrids & St.	F_2			F_3		
	Mic	Str	Len	Mic	Str	Len
St. Namangan-77	4.4	31.2	1.15	4.6	31.5	1.11
S-6524	4.3	33.9	1.17	4.3	34.7	1.15
L-578 x S -6003	4.6	38.4	1.23	4.5	35.1	1.21
L-T x S -6003	4.1	39.7	1.26	4.1	34.4	1.23
L-578 x S -2515	4.2	36.0	1.21	4.2	33.2	1.24
L-T x S -2515	4.1	39.8	1.21	4.4	34.9	1.20
L-578 x S -6082	4.5	40.2	1.28	4.5	38.0	1.27
L-U x S -6082	4.2	36.7	1.18	4.6	35.1	1.21
L-578 x S-489	4.0	33.7	1.26	4.1	34.3	1.27
L-T x S-489	4.1	33.0	1.18	4.6	31.6	1.18
L-T x S-6593	3.9	34.0	1.20	3.7	34.2	1.29
L-U x S-6593	4.0	33.5	1.17	4.3	33.6	1.22
L-578 x S-6596	4.4	34.2	1.22	4.7	32.6	1.20

L-T x S-6596	4.1	35.3	1.21	4.7	33.4	1.15
L-U x S-6596	3.9	35.4	1.24	4.3	33.0	1.17

The fiber strength of most F_1 hybrids combinations increased compared to the parental forms.Only three combinations, where his male parent serves as S-6596 is observed intermediate inheritance with incline towards the S-6596. In hybrid combinations F_1 L-578 x S -2515 and F_1 L-578 x S-489 there is a significant effect of heterosis of strength of fiber - 38.2 and 37.2 gs/tex, which describes as very high.

Regarding the fiber length as well as on strength of fiber at the same three combinations of paternal form where S-6596 is used, this feature has a relatively low rate of 1.11 - 1.17 inch. Negative dominance was observed in the combination of F_1 L-578 x S-6596 (-2.5), which once again confirms the dominance of short fiber in the variety S-6596. In the second and third generations show the process of stabilization and slight improvement in fiber quality components. The best combination with the complex of characteristics are L-578 x S -6082, L-578 x S-489, L-T x S-6593 (Table 2).

We evaluated the correlation relationships in cotton hybrids derived from participation of introgressive form on valuable features of fiber quality. Significant positive relationships are of particular interest, as it is known, these links make selection work easy.

Between the length and strenght of fiber moderate correlation is seen in many hybrids. Between this pair of signs a positive relationship remains stable and even slightly increases with generations. This dependence shows: the greater the length of the fiber, the higher its strength.

It should be noted that between the fiber length and micronaire the vast majority of the hybrids show negative or weak positive correlation. That is, the greater the length, the lower micronaire of fibers is. That is what the breeder needs.

SCI means Spinning Consistency Index. SCI is a calculation for predicting the overall quality and spin ability of the cotton fiber. The regression equation uses most

of the individual HVI measurements, and is based on the data taken from United States Department of Agriculture's (USDA) annual crop reports. Spinning consistency index (SCI) can be used to determine the technological value of cotton; this can play a pivotal role in an engineered fiber selection programme. (Abhijit Majumdar et al., 2004)

The vast majority of the studied hybrids between the SCI with the fiber length and micronaire showed positive correlation. The correlation coefficient of SCI with the fiber length was in the range of 0.44 to 0.82. Between the strenght and SCI - of 0.62 to 0.91. Being aware of the correlation dependence in hybrids, we can purposefully conduct selection work on a set of signs.

When creating recombinant samples based on introgressive forms of cotton plant, the seeds with a wide range of variability in fiber length in splitting generation of hybrids were derived. A gradual increase in fiber quality from F_1 to the rising generations in many hybrid combinations was revealed; best donors in fiber quality turned out forms L-T, L-Yu, and variety Omad.

Evaluation of correlative interrelations in cotton hybrids derived from the introgressive form based on fiber quality features showed that each studied hybrid combinations is characterized by specific structure of correlative relations. In our studies, the majority of hybrid combinations of the strongest link developed between the SCI and the fiber length, SCI and fiber strenght. Moderate positive correlation is observed between fiber strenght and fiber length. Negative connection was observed between micronaire and fiber length in the vast majority of hybrid combinations.

Lack of paternal forms with high gin turn out reflected in the fact that they have late maturity and low-resistant to Verticillium disease. By crossing introgressive forms with adapted to the local conditions varieties and purposeful selection, we obtained high-yield, medium-early maturity and resistant to the Verticillium Vilt cotton families.

The hybridization introgression forms with geographically distant origin high gin turn out varieties has shown prospect in the selection for the quality of the fiber.

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