JOURNAL OF ADVANCED SCIENTIFIC RESEARCH

ISSN: 0976-9595

Journal of Advanced Scientific Research (ISSN: 0976-9595)
Vol.5. Issue 5 page 58

Editorial Team

C/O Advanced Scientific Research,
8/21 Thamotharan Street,
Arisipalayam, Salem

Journal of Advanced Scientific Research (ISSN: 0976-9595)
Vol.5. Issue 5 page 59

FORMATION OF FIBER YIELD AND LENGTH IN COTTON HYBRIDS

Mukhammadieva Shakxzodabonu
National University of Uzbekistan

Abstract: The article analyzes the inheritance and variability of fiber output and fiber length traits in hybrid cotton families obtained by the method of complex hybridization. It has been scientifically proven that hybridization with the presence of forms with a complex genetic basis is effective in obtaining positive transgressive forms along the length of the fiber in hybrids with intermediate, dominant and completely dominant inheritance.

Keywords: cotton, variety, hybridization, interspecific complex hybridization, fiber yield, inheritance and variability of signs.

Introduction. In our republic, extensive work is being carried out by the state to create new varieties of cotton that are resistant to diseases and pests, highly profitable, competitive, and whose fiber quality meets the requirements of the world market. (In our Republic, extensive work is being carried out by the state to create highly profitable, competitive, new varieties of cotton whose quality meets the world market standards and are resistant to diseases and pests) On the basis of the programmatic measures *(were)* implemented in this direction (*and)* certain results were achieved, including the creation of varieties with high fiber quality based on wild and cultivated types of cotton.

In particular, the following tasks are defined in the development strategy of New Uzbekistan for 2022-2026[1]

- To increase the income of farmers by 2 times through intensive development of agriculture on a scientific basis
- To bring the annual growth of agriculture to at least 5%

It is very effective to use wild cotton varieties including *G.thurberi* Tod. and *G. Raimondi* Ulbr. to enrich the genotype of cultivated varieties of cotton and create the cotton varieties which is matchable to today's requirements. Furthermore, based on them to enrich the genotype of cultivated *G. hirsutum* L. varieties and to create new varieties with high fiber quality resistant to various environmental factors and to conduct scientific research aimed at their implementation [2]. are of particular importance

One of the main valuable economic characteristics of the cotton plant is fiber length, which is the main source of raw materials for the textile industry. Therefore, continuous research in extracting forms with high fiber length and quality index has always been the need of the times. Many scientists have conducted research on the improvement of these signs. For example, G.R.Vyahalkar, N.L.Bhale, L.A.Deshpande stated that the fiber length character is inherited under the influence of additive and non-additive effect of genes in F_1 hybrids obtained from cross-breeding samples of Indo-Chinese cotton type [4], while Uzbek scientists created varieties with high fiber yield. It has been found that without expanding the cotton

areas, it provides an increase in the volume of fiber production, and fiber output is polygenically inherited among a number of quantitative traits of cotton, that is, the development of this trait is controlled by many genes [6].

Research source and methods:13 families and lines with a complex genetic basis obtained with the participation of *G. thurberi* Tod., *G. raimondii* Ulbr., *G. arboreum* L., *G. hirsutum* L. and G. barbadense L. species of cotton as the object of research , G. hirsutum L., Guliston, S-4727 and Namangan-77 cotton varieties and their hybrid combinations were used.

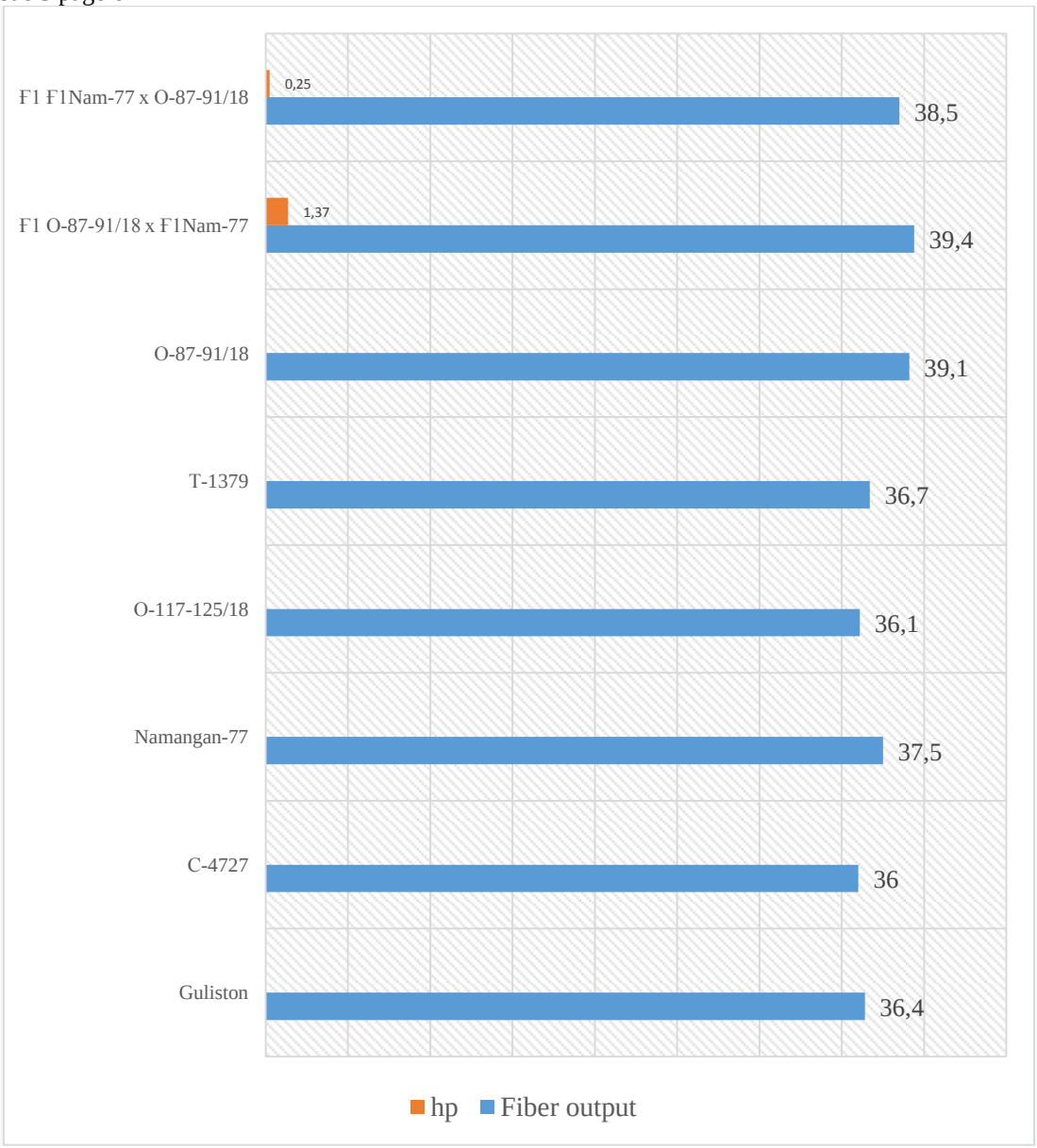
The results obtained on the basis of experiments were processed in large and small samples of statistical indicators in the methods given in B.A. Dospekhov [5] [4]. Dominance level G.M. Beil and R.E. It was calculated according to the formula of S.Wright given in the work of Atkins[3].

Research results and analysis . One of the main economic characteristics of cotton is fiber yield and its quality. In recent years, one of the main requirements in production is the high fiber yield of cotton varieties. Because the clusters and farmers are focusing on growing more fiber and increasing the expected income from it. Today, the fiber yield of cultivated varieties is on average 36-37%, and in practice it is on average 34-35%. As this does not provide sufficient returns, there is now a growing demand to develop new varieties of cotton with a fiber yield of 40% and above. Based on this, in our research, the fiber output sign of F_1 hybrids was compared with the parental forms. One of the main directions of research is aimed at increasing the fiber yield, and the high fiber yield O-87-91/18 family obtained on the basis of intergenome hybridization, and the Namangan-77 variety were also involved in crossbreeding.

Analysing the fiber yield indicators of parental forms, the best in the Family group was found in the O-87-91/18 family (39.2 %), and in the variety group, the Namangan-77 variety (37.5 %). Other parental forms involved in the hybridization were not significantly different from each other in terms of character index and were located in the range of 36.0-36.7% (Table 1).

Table 1

Inheritance of fiber yield trait in F_1 hybrid plants



Analyzing the heredity of fiber yield in F1 hybrid plants, it was found that in hybrid combinations of forms that sharply differ from each other in characteristics with the O-87-91/18 family, having a high fiber yield, have a relatively high indicator with other combinations. It can be concluded that the genotypic influence of the O-87-91/18 family is high, that is, it has a high combinatory ability. In terms of fiber yield, the combination F_1 O-87-91/18 x F_1Nam-77 showed the best index (39.4 %) and heterosis. Also, in the combination of F_1Nam-77 x O-87-91/18, a high index was determined and the fiber output was equal to 38.5%. In this case, it was found that the fiber yield was high in the hybrids under the influence of the genotype of the high-performance parental forms involved in the hybridization. The occurrence of heterosis was noted in the combinations F_1Guliston x T-1379, F_1 O-117-125/18x C-4727, F_1C-4727 x O-117-125/18 and F_1T-1379 x C-4727, respectively, at the level of dominance hp=2 ,0; hp=9.0; It also shows that hp=15.0 and hp=2.25. Fiber yield was relatively low in hybrid combinations of F_1 O-117-25/18 x Gulistan and F_1 O-117-125/18x C-4727, that is, on average 36.5%. In the remaining hybrid combinations, it

was found that the character under study was inherited in incomplete and complete dominance of the paternal and maternal forms with an intermediate or high index. Dominance of parental forms belonging to the negative index was not noted in any of the hybrids.

If we conclude from the analysis of the obtained results, the indicators of the fiber yield sign are low or high depending on the genotype of the parental forms involved in the crossbreeding, the deviation of the sign towards the paternal and maternal forms with a high index, and their inheritance in incomplete and complete dominance, and depending on the combinations, some F_1 hybrids showed heterosis.

Among the parent forms, a relatively high index of fiber output was recorded in the O-87-91/18 family (38.9 %) as in F_1, and a relatively high index in the Namangan-77 variety (37.3 %). Other cultivars, families, and lineages were at F_1 generation level. They have a low level of variability between V=4.1 and V=4.5%, and it was found that they are stable in character and there are no dramatically changed plants.

Among the studied hybrids, F_2O-117-25/18 x Gulistan, F_2Guliston x O-117-25/18 and F_2O-117-125/18 x S-4727 combinations have a decrease in the average index compared to F_1, with a lower index compared to the parental forms it was determined that plants would appear. A leftward deviation was also reflected in this variation line, and their fiber yield was 35.7-35.8%. In these hybrid combinations, the variability of the trait was not high, and the existing transformed plants also had negative values.

It was found that the fiber yield was high in accordance with the genotype in F_2 hybrid combinations involving the O-87-91/18 family and the Namangan-77 variety with a high index of fiber yield (Table 2). Especially in the variation series of F_2O-87-91/18 x Nam-77 and F_2Nam-77 x O-87-91/18 combinations, a right deviation was observed, and the appearance of row plants in classes with high fiber output (39-45%) exceeded the average indicator. also provided 39.3-39.5%, unlike other hybrids.

Table 2

Variability of F_2 hybrid plants in terms of fiber yield, %

№	Parenting patterns are hybrid combinations.	n	K=2								$\bar{x} \pm S_{\bar{x}}$	S	V%
			29,1-31	31,1-33	33,1-35	35,1-37	37,1-39	39,1-41	41,1-43	43,1-45			
1	Guliston	57		2	14	28	13				36,2±0,2	1,7	4,2
2	C-4727	55		3	13	27	10	2			36,0±0,2	1,8	4,3
3	Namangan-77	59			5	25	19	8	2		37,3±0,2	1,8	4,2
4	O-117-125/18	55		5	13	21	15	1			36,0±0,2	1,7	4,1
5	T-1379	58			8	18	23	6	3		37,2±0,2	1,8	4,3
6	O-87-91/18	60			2	13	24	15	4	2	38,9±0,3	1,9	4,5
7	F_2 O-117-25/18 x Guliston	105	2	11	27	37	18	10			35,7±0,3	2,4	7,5
8	F_2Guliston x O-117-25/18	126	3	14	31	39	19	9	1		35,8±0,3	2,9	9,8
9	F_2T-1379 x Guliston	123		9	32	43	32	13	4		36,5±0,3	2,5	7,9
10	F_2Guliston x T-1379	117		6	19	39	28	17	8		37,3±0,3	2,7	7,4
11	F_2O-87-91/18 x Guliston	100		7	18	34	24	10	5	2	38,0±0,3	3,3	9,5
12	F_2Guliston x O-87-91/18	107		3	12	30	21	17	11	3	38,3±0,4	3,4	9,6
13	F_2 O-117-125/18x C-4727	76	3	10	24	19	13	7			35,8±0,3	2,5	7,4
14	F_2C-4727 x O-117-125/18	86		14	16	27	14	11	4		36,0±0,3	3,0	9,6
15	F_2T-1379 x C-4727	94		7	11	36	20	13	6	1	36,4±0,3	3,0	9,3
16	F_2C-4727 x T-1379	98		8	19	32	21	11	5	2	36,6±0,3	3,1	9,7
17	F_2 O-87-91/18 x C-4727	93	1	5	16	35	22	10	4		36,7±0,3	3,7	10,9
18	F_2C-4727 x O-87-91/18	105		6	12	37	28	15	6	1	38,0±0,3	2,9	8,7
19	F_2O-117-125/18 x Nam-77	92	2	2	11	17	32	14	8	6	37,0±0,3	3,8	11,6
20	F_2Nam-77 x O-117-125/18	88	2	4	13	15	23	17	12	2	37,5±0,5	3,9	11,5
21	F_2T-1379 x Nam-77	87		2	9	22	28	15	11	1	37,4±0,3	3,2	10,1
22	F_2 Nam-77x T-1379	102		1	12	26	33	17	10	4	37,8±0,3	2,9	9,2
23	F_2O-87-91/18 x F_1Нам-77	84			11	20	22	14	11	6	39,3±0,4	3,1	9,0
24	F_2Нам-77 x O-87-91/18	82			10	13	25	15	12	7	39,5±0,4	3,2	9,1

Also F_2T-1379 x Nam-77, F_2Nam-77 x T-1379, F_2O-87-91/18 x Guliston and F_2Gulistan x O-87-91/18 and F_2C-4727 x O-87-91/18 hybrid were found that the fiber yield is relatively high in combinations, i.e. 37.4-38.5%. The Namangan-77 and the O-87-91/18 family with a high index for the crossbreeding had a high genotypic effect, and the emergence of forms with a high index among the F_2 hybrids was observed.

The high rate of variability of the studied character was determined in the combinations F_2O-117-125/18 x Nam-77 and F_2Nam-77 x O-117-125/18, their variability was V=11.5% and V=11.6%, respectively formed. In other hybrid combinations, the level of variation was higher than that of the parental forms, ranging between V=7.4 % and V=10.9 %. Hence, the effect of cross-breeding in achieving variable fiber yield was noticeable, and the impact of reciprocal cross-breeding was hardly observed. By continuing research on F_2 O-87-91/18 x Nam-77 and F_2Nam-77 x O-87-91/18 hybrid combinations with high fiber yield, it was found that unique forms with high fiber yield can be isolated.

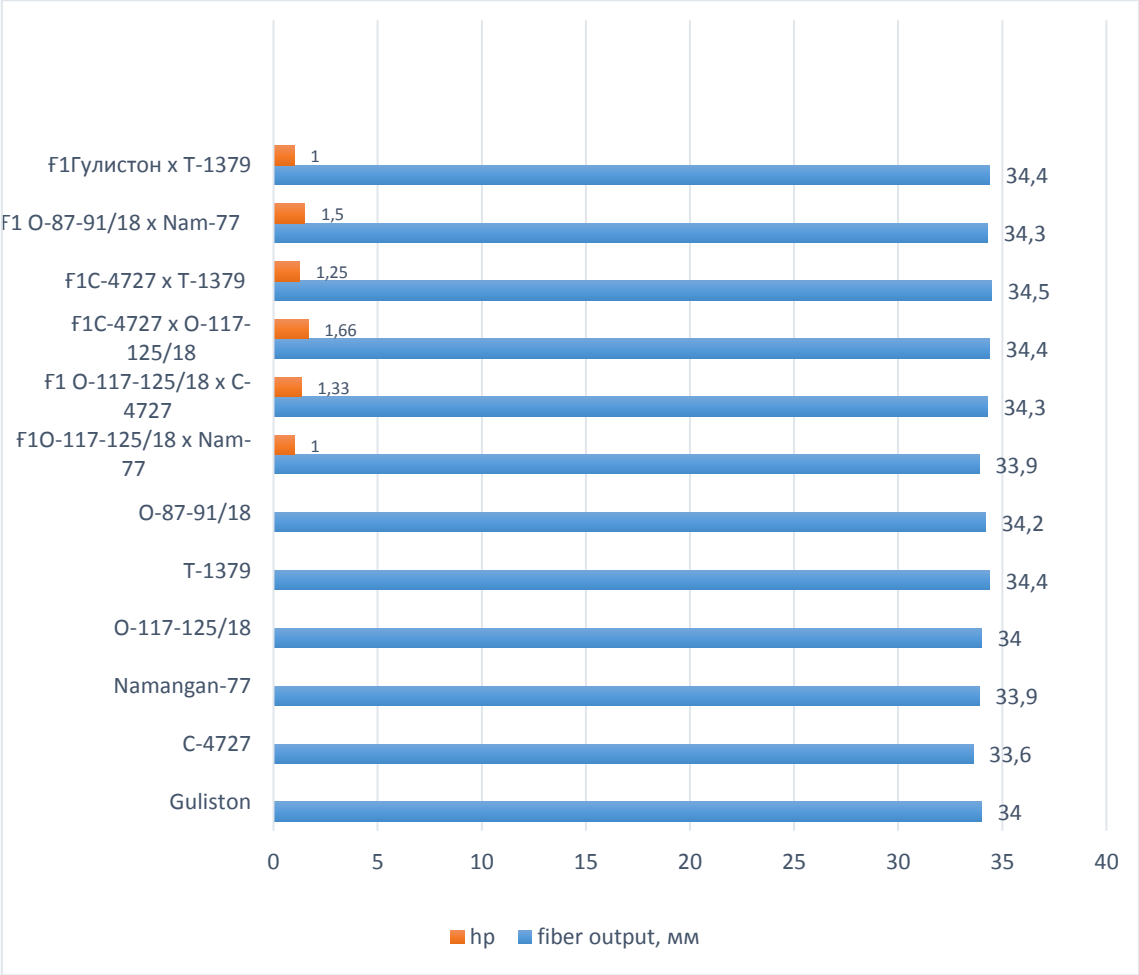
Among the fiber quality indicators, the fiber length indicator is important. When determining the type of fiber, special attention is paid to the length of the fiber, and this causes the cost of the fiber to increase. Scientific sources report that the fiber length character is controlled by polygenic genes, and therefore there are difficulties in studying and improving this character. If we pay attention to the parental forms involved in the hybridization, the relatively low fiber length indicators were in C-4727 and Namangan-77 varieties, which were 33.6 mm and 33.9 mm, respectively. In the rest of the varieties, families and ridges, the fiber length was in the range of 34-34.4 mm (Table 3).

In the majority of F_1 hybrid combinations, the fiber length marker was inherited in an incompletely and fully dominant state. Looking at Table 3, the relatively long-filament parental forms involved in the cross showed incomplete or complete dominance.

In 4 out of 18 studied hybrid combinations, incomplete dominance of the character was found, and in 5, complete dominance of the paternal or maternal form with a high index was determined. In the combination of F_1O-117-125/18 x Nam-77, the complete dominance of the Namangan-77 variety with a low index (hp=-1.0) was recorded, it was found that the fiber length was relatively low under the influence of the paternal form genotype, and the average index of the trait was 33.9 was mm. F_1 1 O-117-125/18 x C-4727, F_1C-4727 x O-117-125/18, F_1C-4727 x T-1379 and F_1 O-87-91/18 x Nam-77 hybrid combinations showed heterosis , the fiber length was higher than that of the parent forms. Fiber length was higher in hybrid combinations F_1Guliston x T-1379, F_1C-4727 x T-1379 and F_1C-4727 x O-117-125/18 and averaged 34.4-34.5 mm.

Table 3

Inheritance of fiber length trait in F_1 hybrid plants



The obtained results showed that in F_1 hybrids, paternal or maternal forms with a high index of fiber length are inherited in incomplete, complete dominance and intermediate state, and heterosis is manifested in most hybrid combinations. This indicates the release of recombinants with higher performance among these hybrid combinations in subsequent generations.

It was observed that the fiber length of the plants was scattered in the variation line in comparison to other farm signs, and in some combinations the sign deviated in a positive direction. Plants characteristic of hybrid combinations F_2Guliston x T-1379, F_2 O-117-125/18 x C-4727, F_2T-1379 x C-4727 and F_2 F_1Nam-77 x O-87-91/18 from 29.1 mm of the variation row It was found that the classes up to 38.0 mm were scattered and, accordingly, their degree of variability was high compared to other hybrid combinations. That is, their level of variability is between V=10.7 % and V=13.6 %, respectively, which indicates a medium level of variability.

It should be noted that the degree of variability of parentage forms involved in hybridization was in the range of V=3.9% and V=4.1%, respectively, that is, it was low compared to hybrids. This shows that it is possible to achieve large-scale variation in traits based on hybridization and to create unique recombinants due to the isolation of positive transgressive forms.

In F_2 hybrids, unlike the parent forms, it was found that plants appeared in the 36-37.1 mm and 37.1-38.0 mm classes of the variation row. That is, in most F_2 hybrid combinations, the appearance of plants in the left and right classes of the variation row indicates the manifestation of negative and positive transgression. In particular,

the combinations F_2T-1379 x Nam-77, F_2Nam-77 x T-1379 and F_2C-4727 x T-1379 showed a positive, i.e., rightward deviation, which ensured that their average was also relatively high. Average fiber length in these hybrid combinations was 35.0-35.2 mm higher than other hybrids and parental forms. A relatively low indicator was found in F_2O-117-25/18 x Guliston and F_2O-87-91/18 x C-4727 combinations and made 33.9 mm. The average fiber length index of other hybrids is in the range of 34.0-34.8, and it was found that there are many transgressive forms among them. It was found that in the studied hybrids, in contrast to other characters, there was more positive transgression in the fiber length character, and this caused an increase in their average index. It can be concluded that hybridization with complex genetic basis forms is effective in obtaining positive transgressive forms in terms of fiber length, and among them it is possible to isolate unique recombinants with high fiber length.

Conclusion: Based on the obtained results, it can be concluded that the fiber yield sign is inherited in the intermediate, dominant and fully dominant state in hybrids, the genotypic influence of the Namangan-77 and O-87-91/18 families in obtaining recombinants with high fiber yield is high, in obtaining positive transgressive forms in terms of fiber length. It has been scientifically proven that hybridization with forms with a complex genetic background is effective and allows for the isolation of rare recombinants with high fiber length from among them.

List of used literature

1. Decree of the President of the Republic of Uzbekistan dated February 7, 2017 No. PF-4947 "On the Strategy of Actions for the Further Development of the Republic of Uzbekistan". http: // www.lex.uz
2. Boboev S.G. Muratov G.A. Cross-species hybridization of cotton.//Monograph "Nishan Nashir" 2017 y 57-156 B.
3. Beil GE, Atkins RE. Inheritance of quantitative characters sorghum // Jow State J. of Sci. - 1965. - No. 3. - P. 35-37.
4. Vyahalkar GR, Bhale NL, Deshpande LA. Interitance of fiber traits in Gossypium arboreum L inn. // Indian J. Agr. Sci. - 1984. - Vol. 54. - No. 9. - P. 702-704.
5. Dospehov B.A. Methodology of field experience // Moscow: Agropromizdat, 1985. – 351 p.
6. Simongulyan N.G. Genetics of quantitative traits of cotton // Tashkent: Fan, 1991. – 123 p.