



RESULTS OF FIBER YIELD INDICATORS IN INTERSPECIFIC HYBRIDIZATION OF COTTON

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ABSTRACT

This study evaluated fiber yield variability in F_3 cotton families developed through interspecific direct and double hybridization to identify promising breeding material. Ten direct and seven double hybrid combinations were assessed using variation analysis, with Sulton and Surxon-9 as standard varieties. Mean fiber yield ranged from 34.6% to 38.6% in direct hybrids and from 36.6% to 39.6% in double hybrids, compared with 37.6% for Sulton and 36.5% for Surxon-9. The highest mean fiber yield among direct hybrids was recorded in Namangan-77 $\times$ Surxon-100 (38.6%). Among double hybrids, (S-2610 $\times$ Termiz-31) $\times$ (S-2610 $\times$ Surxon-9) and (Namangan-77 $\times$ Surxon-9) $\times$ (Namangan-77 $\times$ Surxon-101) achieved the highest mean value (39.6%), with approximately 24% of plants exceeding 40% fiber yield. Coefficients of variation ranged from 2.1% to 2.5% in both hybrid groups. Double hybrids contained a greater proportion of plants with high fiber yield, indicating their potential for developing improved cotton breeding material. Plants with fiber yield exceeding 36% and desirable agronomic traits were selected for further evaluation.

Keywords: Cotton breeding; interspecific hybridization; direct hybrids; double hybrids; F_3 generation; fiber yield; trait variability; selection.



Introduction

The global revenue generated from cotton raw material production is projected to reach USD 46.5 billion by 2027, with an annual growth rate of 2.74% between 2020 and 2027. Currently, 90% of the cotton fiber produced worldwide is obtained from varieties of the species *Gossypium hirsutum* L.

Plant breeders strive to increase the variability of traits in the development of hybrid forms by using different parental forms and various hybridization methods, as well as by improving these approaches. The availability of recombinants with diverse genotypes is of great importance for the efficiency of the selection process. The greater the number of heterozygous loci present in hybrids used as initial material, the greater the possibility of isolating forms with genotypes possessing a broader combination of desirable traits from subsequent generations of hybrids.

Studies conducted by numerous scientists have demonstrated that interspecific hybridization makes it possible to incorporate and genetically enrich cultivated varieties with economically valuable traits and characteristics found in wild cotton species. It also enables the selection and practical application of breeding materials that combine high productivity, desirable fiber yield and quality, and tolerance to various adverse environmental conditions. Furthermore, such approaches increase the potential for developing new varieties with a favorable combination of valuable agronomic traits [2, p. 114; 5, p. 336].

The inheritance of fiber yield is closely associated with the morphological and biochemical characteristics of cotton and is primarily determined by its structural components, particularly seed weight and fiber index values [1, pp. 6–7].

According to the data reported by B. O'rozov, G. Shodmonova, F. Toreev, and R. Egamberdiev (2025), based on the results of studies conducted under conditions of natural infection with wilt pathogens, the highest fiber yield was recorded among the lines obtained through hybridization in lines T-1094, T-501, and T-500, with plants exhibiting fiber yields ranging from 38.6% to 42.3% being identified [4, pp. 39–41].

It was observed that the fine-fiber cotton lines T-204, ML-104, and T-396-b-2 differed considerably from other lines in terms of their combining ability and donor



properties for fiber yield. According to the researchers' conclusions, these lines can be recommended for use in the breeding process [3, pp. 30–31].

In our study, we investigated F3 hybrids obtained through interspecific direct and double hybridization with respect to fiber yield.

Fiber yield is one of the major indicators of cotton varieties and is of considerable importance. In our study, a variation analysis was conducted for the fiber yield trait in F3 interspecific direct and double hybrids. For this trait, the values were divided into 10 classes. In the F3 direct hybrids, the average fiber yield ranged from 34.6% in F3(S-2610 × Surxon-100) to 38.6% in F3(Namangan-77 × Surxon-100), with the plants distributed across the 31.1–41.0% classes of the variation series according to this trait.

It was observed that, among the F3 interspecific direct hybrids, a relatively large number of families with lower fiber yields occurred compared with the double hybrids. In our experiments, the fiber yield of the medium-fiber cotton variety Sulton, used as the standard, was 37.6%, while the corresponding value for the fine-fiber cotton variety Surxon-9 was 36.5% (Table).

In the F3 interspecific double hybrids, fiber yield values ranging from 36.6% to 39.6% were observed. In the hybrid combinations F3(S-2610 × Termiz-31) × (S-2610 × Surxon-9) and F3(Namangan-77 × Surxon-9) × (Namangan-77 × Surxon-101), the proportion of plants with fiber yield values exceeding 40% was recorded at 24%.



Table Variability of the Fiber Yield Trait in Families of F3 Interspecific Direct and Double Hybrids

№	F3 direct and double hybrids	K=1										N	M±m	δ	V%
		32,1 - 33,0	33, 1- 34, 0	34,1- 35,0	35,1- 36,0	36,1- 37,0	37,1- 38,0	38,1- 39,0	39,1- 40,0	40, 1- 41, 0	41,1 - 42,0				
1	F ₃ (S-6524xSurxon-100)	1	12	28	14	2						57	34,7±0,11	0,8	2,4
2	F ₃ (S-6524xSurxon-101)			2	10	30	8	3				53	36,6±0,12	0,8	2,4
3	F ₃ (S-6524xSurxon-9)		2	15	27	16	1					61	35,6±0,11	0,8	2,4
4	F ₃ (S-2610xSurxon-100)	1	12	31	13	2						59	34,6±0,10	0,7	2,3
5	F ₃ (S-2610xSurxon-9)			3	10	29	11	1				54	36,5±0,11	0,8	2,3
6	F ₃ (S-2610xTermiz-31)		2	14	28	10	2					56	35,5±0,11	0,8	2,5
7	F ₃ (Namangan-77xSurxon-100)					1	10	32	12	2		57	38,6 ±0,10	0,7	2,1
8	F ₃ (Namangan-77xSurxon-101)				2	13	28	11	1			55	37,5±0,11	0,8	2,2
9	F ₃ (Namangan-77xSurxon-9)			3	11	30	15	1				60	36,6 ±0,11	0,8	2,4
10	F ₃ (Namangan-77xTermiz-31)				1	12	29	14	2			58	37,7±0,11	0,8	2,2
11	F ₃ [F ₁ (S-6524xSurxon-101)x F ₁ (S-6524xSurxon-100)]			2	13	27	12	3				57	36,6±0,12	0,9	2,5
12	F ₃ [F ₁ (S-6524xSurxon-9)x F ₁ (S-6524xSurxon-100)]					1	14	25	17	2		59	38,7±0,11	0,8	2,3
13	F ₃ [F ₁ (S-2610xSurxon-9)x F ₁ (S-2610xSurxon-100)]				2	14	30	9	1			56	37,5±0,10	0,7	2,2
14	F ₃ [F ₁ (S-2610xTermiz-31)x F ₁ (S-2610xSurxon-9)]						3	9	29	11	2	54	39,6±0,12	0,9	2,2
15	F ₃ [F ₁ (Namangan-77xSurxon-100)x F ₁ (Namangan-77xSurxon-101)]					2	13	31	14	1		61	38,6±0,10	0,8	2,1
16	F ₃ [F ₁ (Namangan-77xSurxon-9)x F ₁ (Namangan-77xSurxon-101)]						2	11	31	12	2	58	39,6±0,11	0,8	2,1
17	F ₃ [F ₁ (Namangan-77xTermiz-31)x F ₁ (Namangan-77xSurxon-101)]					3	11	28	13	2		57	38,6±0,12	0,9	2,4
	Sulton (St)				2	14	23	13	3			55	37,6±0,12	0,9	2,5
	Surxon-9 (St)			1	13	27	10	2				53	36,5±0,11	0,8	2,3

The coefficient of variation for the fiber yield trait in F3 interspecific direct hybrids was found to be 2.1–2.5%, while in double hybrids it was also 2.1–2.5%.

It was observed that plants with high fiber yield occurred more frequently in interspecific double hybrids than in direct hybrid combinations.

Thus, for further research in the following year, plants were selected from among the interspecific direct and double cotton hybrids that were resistant to wilt disease, had large bolls, high productivity, early maturity, were positioned on the right side of the variation series for fiber yield, and had fiber yield values exceeding 36%. Plants located on the left side of the variation series were discarded.



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