



INDICATORS OF EARLINESS, LINT YIELD, FIBER INDEX, AND FIBER QUALITY TRAITS IN LINES INVOLVING THE BOLLGARD GENOTYPE

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Abstract

In the study, among 22 lines derived from the (C-6524 × BT) combination involving a BT gene genotype, those with earliness up to 115.0 days, lint yield above 39.0%, and fiber index higher than 9.0 g were selected. Based on analyses of fiber quality, resistance to bollworm, and resistance to wilt disease, these lines



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were identified for the development of new lines and varieties combining valuable agronomic traits.

Keywords: Cotton, hybrid, simple hybrid, lines, varieties, BT gene genotype, variability, earliness, fiber index, lint yield.

Introduction

In recent years, it has been noted that the amount of water used for irrigating agricultural crops worldwide has been decreasing. In addition, rapid fluctuations in temperature and high temperatures during the growing season negatively affect the normal development of plants. One of the main approaches to addressing this problem is the development of new early-maturing cotton germplasm and varieties. It is emphasized that, in cotton, the use of hybridization between geographically and genetically distant forms is effective for improving earliness during the periods from emergence to 50% flowering and from 50% flowering to 50% maturity.

It is well known that cotton is primarily grown for its fiber; therefore, improving fiber quality and lint yield through breeding efforts aimed at increasing fiber productivity is of great importance for the textile industry. Lint yield is calculated as a theoretical trait and is understood as the ratio of fiber weight to the weight of raw cotton, expressed as a percentage. In different cotton forms, lint yield can vary from 12–15% up to 43–44%. Lint yield depends on the quantity and weight of the fibers in the seed. Using a cotton collection, it is important to improve valuable agronomic traits of cotton based on samples brought from different countries. High results have been achieved by studying hybrids obtained through hybridization of geographically distant forms, intervarietal crosses, and interspecific crosses, focusing on earliness and lint yield [1, 2]. Moreover, based on results obtained from interline cotton hybrids, it has been shown that the inheritance of valuable agronomic traits in hybrid generations [3, 4] is intermediate for lint yield and fiber index, while the inheritance of the 1000-seed cotton weight trait depends on pure polymeric genes. During the experiments, it



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was observed that the parental forms differed from the lines obtained with their participation in terms of these traits.

The study analyzed the variability of lines from the (C-6524 × BT) combination involving a BT gene genotype in terms of vegetation period, lint yield, and fiber index, compared with the C-6524 variety as a standard. In terms of the vegetation period, lines of the (C-6524 × BT) combination ranged from an average of 109.6 days in line L-208 to 120.6 days. Lint yield ranged from 35.2% in line L-210 to 42.3% in line L-209, and fiber index ranged from 7.3 g in line L-211 to 10.4 g in line L-208. In the standard C-6524 variety, the vegetation period was 118.2 days, lint yield was 36.7%, and fiber index reached 7.8 g (see table).

Regarding the vegetation period, 50% boll opening occurred later in lines L-204 (119.2 days), L-211 (121.3 days), L-216 (120.6 days), and L-222 (122.8 days) compared to other lines. Lint yield was somewhat lower in lines L-207 (35.9%), L-210 (35.2%), L-216 (34.2%), and L-221 (35.0%). Fiber index values were 7.7 g in L-205, 7.6 g in L-210, 7.3 g in L-211, 7.5 g in L-216, and 7.9 g in L-221. Although these values were lower than in other lines, certain plants within these lines exhibited high performance in the traits mentioned above. The coefficient of variation ranged from 7.8–8.9% for earliness, 4.8–5.6% for lint yield, and 4.2–5.4% for fiber index.

In the lines of the (C-6524 × BT) combination involving the BT gene genotype, early-maturing plants were frequently observed in lines L-205 (113.5 days), L-207 (111.7 days), L-208 (109.6 days), L-214 (112.8 days), L-217 (112.0 days), and L-219 (110.9 days), showing a positive trend compared to the other studied lines. In these lines, compared to the standard variety, 50% boll opening occurred 4.7 to 8.6 days earlier.

In terms of lint yield, lines L-206 (40.6%), L-208 (42.2%), L-209 (42.3%), L-214 (41.0%), and L-219 (40.5%) showed an average value above 40.0%, demonstrating an advantage of 3.8–5.6% compared to the standard variety. Additionally, in terms of fiber index, the average values ranged from 9.3 to 10.1 g in lines L-201 (9.1 g), L-207 (9.6 g), L-208 (10.4 g), and L-212, L-213, L-214, L-215, L-217, and L-219. In these lines, the fiber index was 1.3 to 2.6 g higher



compared to the standard variety, indicating a potential increase in fiber productivity.

Formation of earliness, lint yield, and fiber index traits in F9 lines of the (♀C-6524 × ♂BT) combination.

Lines	(♀C-6524 x ♂BT)								
	Vegetation period (days)			Lint yield (%)			Fiber index (g)		
	M±m	δ	V%	M±m	δ	V%	M±m	δ	V%
L-201	116,2±3,7	5,8	8,3	38,5±1,5	2,1	4,9	9,1±0,4	0,7	4,4
L-202	114,5±3,5	5,6	8,4	39,6±1,4	2,2	4,8	8,2±0,5	0,8	4,5
L-203	118,3±3,8	5,6	8,3	39,7±1,4	2,2	4,9	8,6±0,4	0,8	4,5
L-204	119,2±4,0	6,2	8,3	36,4±1,8	2,6	5,4	8,0±0,7	1,0	4,8
L-205	113,5±3,4	5,4	8,1	39,2±1,4	2,3	5,0	7,7±0,9	0,9	4,6
L-206	115,2±3,6	5,5	8,2	40,6±1,3	2,0	5,1	8,9±0,5	0,7	4,4
L-207	111,7±3,3	5,3	8,0	35,9±1,5	2,6	5,5	9,6±0,4	0,6	4,3
L-208	109,6±3,2	5,2	7,9	42,2±1,3	2,2	4,9	10,4±0,3	0,5	4,2
L-209	113,8±3,4	5,4	8,3	42,3±1,4	2,0	4,8	9,8±0,4	0,6	4,3
L-210	118,9±3,9	6,3	8,9	35,2±1,9	2,8	5,3	7,6±0,8	1,2	5,4
L-211	121,3±4,1	6,1	8,7	36,8±2,0	2,7	5,6	7,3±0,9	1,1	5,2
L-212	114,1±3,4	5,3	8,2	38,7±1,7	2,3	5,1	9,3±0,4	0,7	4,4
L-213	115,0±3,5	5,6	8,7	39,4±1,5	2,1	5,0	9,6±0,3	0,6	4,3
L-214	112,8±3,2	5,2	8,1	41,0±1,4	2,0	5,1	9,7±0,3	0,8	4,3
L-215	116,3±3,6	5,8	8,4	38,2±1,5	2,1	5,5	9,4±0,4	0,5	4,2
L-216	120,6±3,9	5,8	8,6	34,2±2,1	2,9	5,6	7,5±0,8	0,9	4,9
L-217	112,0±3,3	5,3	8,2	39,7±1,4	2,7	5,0	9,9±0,5	0,6	4,3
L-218	114,2±3,5	5,4	8,0	38,8±1,6	2,6	5,1	8,7±0,9	0,7	4,7
L-219	110,9±3,2	5,2	7,8	40,5±1,3	2,3	4,8	10,1±0,3	0,5	4,2
L-220	115,7±3,6	5,9	8,4	39,3±1,4	2,2	4,9	8,3±0,8	0,8	4,5
L-221	122,8±4,1	5,8	8,5	35,0±1,9	2,8	5,4	7,9±0,9	1,0	4,8
L-222	116,8±3,8	5,5	8,3	37,3±1,7	2,4	5,1	8,6±0,5	0,7	4,3
St.C-6524	118,2±3,6	5,7	8,4	36,7±1,8	2,5	5,2	7,8±0,4	0,9	4,6
ECHF ₀₅	2,5			0,7			0,4		

Conclusion

In the study, among 22 lines of the (C-6524 × BT) combination involving a BT gene genotype, lines with earliness up to 115.0 days, lint yield above 39.0%, and



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fiber index higher than 9.0 g were selected. Based on analyses of fiber quality, resistance to bollworm, and resistance to wilt disease, these lines were identified for the development of new lines and varieties combining valuable agronomic traits.

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