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# INDICATORS OF EARLINESS, FIBER YIELD, FIBER INDEX, AND QUALITY TRAITS IN THE VARIETIES INVOLVING BOLLGARD GENE SAMPLES

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### Abstract

In the studies, from the 22 lines of the (C-6524 × VT) combination involving the BT gene sample, lines with earliness up to 115.0 days, fiber yield above 39.0%, and fiber index over 9.0 g, were selected based on analyses of fiber quality, bollworm resistance, and wilt disease tolerance, with the aim of developing new lines and varieties combining these valuable agronomic traits.

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

### Introduction

In recent years, it has been observed worldwide that the amount of water used for irrigating agricultural crops is decreasing. Moreover, rapid temperature fluctuations and high temperatures during the growing season negatively affect normal plant development. One of the key strategies to address this problem is the development of new early-maturing cotton germplasm and varieties. In cotton, it has been shown that 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 defined as the proportion of fiber weight to the total weight of raw cotton and is expressed as a percentage. In various cotton forms, fiber yield can range from 12–15% to 43–44%. The lint yield is influenced by the amount and weight of fibers contained in the seed. Improving valuable agronomic traits of wheat using samples introduced from different countries is essential. Improving valuable agronomic traits of cotton using a collection of samples from different countries is essential. Studies on hybrids derived from intra-varietal, inter-varietal, and inter-specific crosses have yielded high results, particularly in terms of earliness and fiber yield [1, 2]. Furthermore, based on the obtained results, the inheritance of valuable agronomic traits in inter-varietal cotton hybrids appears to be intermediate for fiber yield and fiber index in the hybrid progeny [3, 4], while the inheritance of the 1000-seed cotton weight trait is determined by pure polymeric genes. During the course of experiments, it was observed that the parental forms differed from the progeny lines in terms of these traits.

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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. For the (C-6524 × BT) combination, the average vegetation period of the lines ranged from 109.6 days in line L-208 to 120.6 days, fiber yield varied from 35.2% in line L-210 to 42.3% in line L-209, and the fiber index ranged from 7.3 g in line L-208 to 10.4 g in line L-211. As a standard, the C-6524 variety exhibited a vegetation period of 118.2 days, a fiber yield of 36.7%, and a fiber index of 7.8 g (Table).

Regarding the vegetation period, lines L-204 (119.2 days), L-211 (121.3 days), L-216 (120.6 days), and L-222 (122.8 days) exhibited 50% boll opening later than the other lines. In terms of fiber yield, lines L-207 (35.9%), L-210 (35.2%), L-216 (34.2%), and L-221 (35.0%) showed somewhat lower values, and for fiber index, lines L-205 (7.7 g), L-210 (7.6 g), L-211 (7.3 g), L-216 (7.5 g), and L-221 (7.9 g) were lower than the other lines. Nevertheless, some plants within these lines demonstrated higher values for these traits. The coefficient of variation ranged from 7.8 to 8.9% for earliness, from 4.8 to 5.6% for fiber yield, and from 4.2 to 5.4% for fiber index.

In the (C-6524 × BT) combination involving the BT gene sample, 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), exhibiting a positive trend compared to the other lines studied. In these lines, the 50% boll opening occurred 4.7 to 8.6 days earlier compared to the standard variety.

For fiber yield, the studied lines L-206 (40.6%), L-208 (42.2%), L-209 (42.3%), L-214 (41.0%), and L-219 (40.5%) showed average values above 40.0%, exhibiting an advantage of 3.8–5.6% compared to the standard variety. For fiber index, the average values ranged from 9.3 to 10.4 g, with 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 showing values within the 9.3–10.1 g range. These lines showed fiber index

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values 1.3 to 2.6 g higher than the standard variety, indicating a potential increase in fiber productivity.

In the study, among the 22 lines of the (C-6524 × BT) combination involving the BT gene sample, lines exhibiting earliness up to 115.0 days, fiber yield above 39.0%, and fiber index over 9.0 g were selected based on analyses of fiber quality, bollworm resistance, and wilt tolerance, with the aim of developing new lines and varieties combining these key valuable agronomic traits.

**Table Development of earliness, fiber yield, and fiber index traits in lines of the F<sub>2</sub> (♀ C-6524 × ♂ BT) combination.**

Lines	(♀ C-6524 x ♂ BT)								
	Vegetation period (days)			Fiber 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
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
<b>ECHF<sub>05</sub></b>	<b>2,5</b>			<b>0,7</b>			<b>0,4</b>		



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