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INHERITANCE MODEL FOR FIBERLESS UPLAND COTTON (*GOSSYPIUM HIRSUTUM* L.) LINE SL 1-7-1: VARIATION ON A THEME

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Abstract

Segregating populations were developed to evaluate the inheritance of the fiberless seed phenotype of upland cotton (*Gossypium hirsutum* L.) line SL 1-7-1. It has been established that fiberless lines do not produce lint or fuzz, whereas, fuzzless lines produce lint but no fuzz. The alleles which eliminate fuzz, i.e., N_1, n_2, and n_3 are often involved in the production of fiberless lines. One example is MD 17 fiberless ($N_1N_1n_2n_2$). We report the segregation patterns of SL 1-7-1 fiberless with crosses to the wildtype line DP 5690 ($n_1n_1N_2N_2N_3N_3$), Mexican fuzzless seed UA 3-3 ($n_1n_1n_2n_2n_3n_3$, MOVC accession 143), Ballard fuzzless seed line ($N_1N_1N_2N_2n_3n_3$, MOVC accession 243) and MD 17 fiberless. Data from the F_2 and $F_{2:3}$ populations derived from the SL 1-7-1 X DP 5690 cross fit a three loci model for expression of the fiberless seed phenotype. The F_1 population of the SL 1-7-1 X DP 5690 consisted entirely of fuzzless seed, indicating that SL 1-7-1 was homozygous for the dominant fuzzless seed allele N_1. The other two alleles involved in production of the fiberless phenotype of SL 1-7-1 were found to be recessive. Various tests were used to verify whether these recessive alleles in SL 1-7-1 were allelic to the fuzzless seed alleles n_2 and n_3. A collection of F_2 plants (SL 1-7-1 X DP 5690) with fuzzy seed (n_1n_1) were grown in the $F_{2:3}$ populations. If SL 1-7-1 possessed n_2 and n_3 some of the $F_{2:3}$ progeny would have fuzzless seed. The lack of plants expressing the fuzzless phenotype demonstrated the absence of alleles n_2 and n_3. The absence of n_2 and n_3 in the SL 1-7-1 genotype was confirmed in the F_2 population of the 143 X SL 1-7-1 cross as about 25% of the progeny possessed fuzzy seed (theoretically, 100% would be fuzzless seed if SL 1-7-1 possessed n_2 and n_3). The homozygous combination of the two recessive alleles in the SL 1-7-1 line do not produce progeny with a fuzzless seed coat, therefore, they cannot be classified as fuzzless seed alleles. Therefore, we have designated these alleles as en_1 and en_2, or recessive enhancers of N_1 to produce fiberless seeds. With this model of SL 1-7-1, a common theme is proposed for the production of fiberless cotton. Three of the four fiberless lines described in the literature possess at least one of the fuzzless seed alleles, SL 1-7-1 (N_1), MD 17 fiberless (N_1 and n_2) and XZ142w (n_2).