Genetic Analysis of a Novel Dwarf Mutant, AISHENG98, from Upland Cotton

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Cotton (*Gossypium hirsutum* L.) is the most important textile fiber and the second most important oil seed source in the world. To control excessive growth of cotton plant height, which may result in shading and lodging, farmers and researchers have used plant growth regulators that increased the production costs. So the breeding for dwarf plant is the best way to solve this problem. In the past, some dwarf mutants of cotton with recessive gene controlled were reported. We found a novel spontaneous mutant named AISHENG 98, with an incomplete dominant gene from an upland cotton in 1998. The plant height of AISHENG 98 was about 12.9 cm, ranged from 5 cm to 20 cm, and it was one fifth of that of wild type LHF10W99. The primary investigation indicated that the dwarf phenotype is produced by shortening the length of internodes. To study the genetic characteristics of the height of the dwarf mutant AISHENG 98, LHF10W99 (wild type) and AISHENG 98 (mutant) were crossed as female and male parents, respectively, and the populations of F_1, F_2, and BC_1 (the backcross derived from F_1 crossed with F10W99) were produced. In 2007, the parents, F_1, F_2 and BC_1 were planted, and the plant heights were investigated at maturity. The F_1 plants were semi-dwarf with an average height of 33.4 cm, ranged from 21 cm to 44 cm. F_2 populations segregated into normal, semi-dwarf, and dwarf plants, with the ratios of 86∶146∶82. Through assessing by Chi^2 tests, F_2 segregation fit the ratio 1∶2∶1. The backcrosses with wild parent showed two types, 103 normal and 86 semi-dwarf plants. In this population, the average plant height of wild type was about 69.8 cm, ranged from 46 cm to 85 cm, and the average height of semi-dwarf was about 33.1 cm, ranged from 21 cm to 45 cm. The segregation ratio gave a good fit to the expected ratio of 1 normal ∶ 1 semi-dwarf. These results further confirmed that one pair of incomplete dominance gene controls the dwarf mutant trait. It provides valuable material in cotton breeding and physiology studies.