

The Utilization of HB-red Flower in Hybrid Cotton Breeding

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The HB-red flower trait came from the filial generation of the interspecific cross of upland cotton (*Gossypium hirsutum* L.) and *G. bickii*. It exhibits pink petals and filaments, with a large purplish red spot in the petal base, and it showed single dominant gene inheritance. Backcrossing since 2000 was used to produce HB near-isogenic lines. SCRC 16, 17, 22, and 28 and the insect-resistant strains 5A58, 118, and 20R37 were used as recurrent female parents and HB321 as donor of HB red flower trait. By 2006, 4, 2, and 10 homozygous HB near-isogenic sister lines from BC₄F₃ plant-row generation of SCRC 16, 22, and 5A58, and 5, 10, 5, and 3 lines from BC₃F₃ plant-row generation of SCRC 17, 28, 118, and 20R37 were developed, respectively. The evaluation tests were conducted at the experimental station of Shandong Cotton Research Center (SCRC) in 2007. Resistance to seedling diseases: The results indicated that the introgression of HB-red flower gene to upland cotton varieties has enhanced the resistance to seedling diseases of the majority receptors. The more sensitive the recurrent parents were to seedling diseases, the more obvious the increase in the resistance. Resistance to *Fusarium* wilt disease: There were no significant differences between the HB near-isogenic lines and their recurrent parents in the average index of *Fusarium* wilt disease, nor among the HB near-isogenic lines from the same recurrent parent. Resistance to *Verticillium* wilt disease: compared to the recurrent parents, the average index of *Verticillium* wilt disease of the HB near-isogenic lines from 5 of 7 genetic backgrounds displayed varying degrees in resistance, but not statistically significant. Between the HB near-isogenic sister-lines from the same genetic background, the resistance to *Verticillium* wilt displayed larger differences. Yield and its components: The yield of seed cotton and lint of HB near-isogenic sister-lines from 7 genetic backgrounds did not change significantly compared to their recurrent parents, nor did the yield components like lint percentage, boll weight, and boll number per plant. Fiber quality: Considering the fiber quality traits such as strength, uniformity, micronaire, and elongation rate, there were no significant differences between the HB near-isogenic lines of 7 genetic backgrounds and their recurrent parents, while the fiber length from 3 genetic backgrounds was significantly shorter than their recurrent parents. Using HB-red flower cotton as male parent, we have bred a series of new hybrids with significant F₁ competitive heterosis, which were included in the new cotton variety tests in the Yellow River region, Shandong, Jiangsu, and Henan Provinces. Among them, 3 hybrids had outstanding performance in the 2007 tests.