

**MAPPING HETEROTIC LOCI FOR YIELD AND AGRONOMIC TRAITS USING CHROMOSOME
SEGMENT INTROGRESSION LINES IN COTTON****X. Guo****Y. Guo****X. Sun****Shandong Agricultural University****Taian, China****X. Song****D. D. Fang****USDA-ARS-SRRC****New Orleans, LA****T.Z Zhang****Nanjing Agricultural University****Nanjing 210095, China.****Abstract**

Gossypium hirsutum L. produces high fiber yield while *G. barbadense* L. possesses excellent fiber quality. The integration of high fiber yield of *G. hirsutum* and super fiber quality of *G. barbadense* has always been cotton breeders' dream. But until now, the genetic mechanisms underlining *G. hirsutum* × *G. barbadense* interspecific hybrid heterosis remain unclear. In the present study, a set of chromosome segment introgression lines (CSILs) using *Gossypium hirsutum* L. TM-1 as the recipient parent and *G. barbadense* Hai7124 as the donor parent were used to explore the genetic basis of heterosis for interspecific hybrids. Two sets of F₁ populations individually derived from CSILs crossing with both parents were configured to investigate heterotic loci (HL) and substitution effect loci (SL) in a 3-year experiment (2010-2012). A total of 58 HLs and 39 SLs were identified in 3 years. One stable HL for lint percentage, *hLP-A4-3*, could be detected in all 3 years. Three HLs for boll size (*hBS-A8-1*), lint percentage (*hLP-D6-10*) and seed index (*hSI-D7-11*) could be detected in 2 years. Four SLs, *sBS-D7-1*, *sLP-A8-1*, *sLP-D7-1*, and *sLP-D12-1*, could be detected in 2 years. HL and SL tended to be distributed in some HL-rich chromosome segments with close positions. Compared with QTL detected in a former study, HL showed little overlap with QTL, indicating that trait phenotype and heterosis might be controlled by different sets of loci. All three types of genetic effects (partial-, full-, over-dominant) were identified, while the over-dominant effects made the main contribution to heterosis in yield-related traits. These results may help lay the foundation for clarifying the heredity mechanism of heterosis in cotton.