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高品质陆地棉铃-叶系统干物质质量的发育遗传研究

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Developmental Genetic Analysis of Dry Matter Weight of Boll-leaf System in Upland Cotton Cultivars with High Fiber Quality

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摘要 应用加性-显性发育遗传模型及条件与非条件的统计分析方法，对6个高品质陆地棉品种（系）及其30个F_1组合的伏桃与对位果枝叶的干物质质量进行了研究。非条件方差分析表明，果枝叶质量在棉铃体积增大期主要受加性效应控制，内部充实期主要受显性效应控制；铃壳质量在不同发育时期均以加性效应为主；铃重在前中期主要受显性效应控制，后期以加性效应为主。条件遗传分析表明，影响果枝叶质量的净遗传效应在铃龄38 d至45 d达到高峰；控制铃壳质量的基因表达分别在铃龄17 d至24 d和铃龄38 d至45 d出现两个高峰；影响铃重性状的基因分别在铃龄17 d至24 d和铃龄31 d至38 d出现两个表达活跃的高峰，此后基因的表达量急剧下降。遗传相关分析表明不同发育时期的铃壳质量均与最终铃重成极显著的加性正相关。

关键词： 陆地棉 高品质 铃-叶 发育遗传 干物重 遗传方差 条件遗传方差

Abstract： Six upland cotton(*Gossypium hirsutum* L.) varieties (lines) with high fiber quality were used to create a genetic population according to a complete diallel cross design. The developmental genetic behavior of the dry matter weight of mid-summer bolls and their subtending leaves (boll-leaf system) was investigated by using additive-dominant developmental genetic models and corresponding statistical methods. The results showed that the dry weight of the leaf subtending the boll was mainly controlled by additive effects in the former half period of boll development, and by dominant effects in the latter half period. Boll shell weight was affected by additive and dominant effects in the whole developmental process, but additive effect genes mainly acted. Boll weight was mainly governed by dominant effects in the early-middle period, and by additive effects in the late period. The results of conditional genetic variance components indicated that net genetic effects for the dry weight of the leaf subtending the boll reached a peak at 38-45 days post anthesis. Meanwhile, the expression of additive genes closed. Gene expression for the boll shell weight was most active at 17-24 days and 38-45 days after flowering. The net dominant effects played major roles. The two summits of gene expression amounts for the boll weight appeared at 17-24 days and 31-38 days after flowering, and the dominant genes were expressed in larger amounts than the additive genes. From then on, the expression of genes decreased dramatically. The maximum of net genetic effects for the boll weight appeared earlier than those of the dry weight of the leaf subtending the boll and the boll shell weight, which was consistent with the observation of more dry matter accumulation in the boll shells of high quality upland cotton varieties than low-medium quality ones. Dominance correlation coefficients between the boll shell weight at diverse developmental stages and the boll weight finally attained were positive and significant at the 0.01 probability level.

Keywords： Upland cotton(*Gossypium hirsutum* L.) high-fiber quality boll leaf developmental genetics dry matter weight genetic variances conditional genetic variances

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