研究论文

数量性状的核质互作遗传效应分析：二倍体植株遗传模型

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摘要 提出了能分析二倍体植株数量性状核质互作效应的遗传模型，该模型把控制数量性状总的遗传效应分为核效应、质效应和核质互作效应，以及它们分别与环境作用的效应。其中，核质互作效应可进一步分解为加性核质互作与显性核质互作。基于平衡与非平衡两种双列杂交试验设计，蒙特卡罗模拟结果表明：采用混合线性模型方法进行统计分析，可以有效地估计各项遗传效应值及其方差分量。此外，运用该模型对棉花的4个数量性状（单株铃数、衣分、2.5% 跨长和麦克隆值）进行了遗传分析。

关键词 植株性状；遗传模型；核质互作；基因型Î 环境互作；预测

分类号

Analysis of Genetic Effects of Nuclear-Cytoplasmic Interac-tion on Quantitative Traits: Genetic Model for Diploid Plants

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Abstract

<P>A genetic model was proposed for simultaneously analyzing genetic effects of nuclear, cytoplasm, and nuclear-cytoplasmic interaction (NCI) as well as their genotype by environment (GE) interaction for quantitative traits of diploid plants. In the model, the NCI effects were further partitioned into additive and dominance nuclear-cytoplasmic interaction components. Mixed linear model approaches were used for statistical analysis. On the basis of diallel cross designs, Monte Carlo simulations showed that the genetic model was robust for estimating variance components under several situations without specific effects. Random genetic effects were predicted by an adjusted unbiased prediction (AUP) method. Data on four quantitative traits (boll number, lint percentage, fiber length, and micronaire) in Upland cotton (Gossypium hirsutum L.) were analyzed as a worked example to show the effectiveness of the model.</P>

Key words Plants traits genetic model nuclear-cytoplasmic interaction effects GE interaction genetic prediction

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