



风、蜜蜂因素对转Cry1Ac基因棉花花粉介导的基因漂移的影响

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The Influences of Wind and Bee on Pollen-mediated Gene Flow from Transgenic Cry1Ac Cotton

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摘要 在温室內人工创造风力和释放传粉昆虫蜜蜂的条件下, 应用PCR和蛋白试纸条结合的方法检测外源Cry1Ac基因通过花粉漂移至非转基因的频率和距离。结果表明: 风力处理和蜜蜂处理的基因漂移频率均显著高于空白对照。漂移至非转基因亲本棉石远321的频率显著高于陆地棉所35和海岛棉吉扎1号。漂移至石远321的频率随距离远近差异显著, 而漂移至中棉所35和吉扎1号的频率在不同距离上差异不显著。风力共检测到阳性样本72个, 在检测范围内, 漂移至石远321的最远距离为25.6 m, 漂移至中棉所35和吉扎1号的最远距离均为19.2 m。蜜蜂处理中共检测到阳性样本75个, 在检测范围内, 漂移到常规棉的最远漂移距离均达到设置最远处36 m, 并在此处达到峰值。本研究可为转基因棉花基因漂移生态风险性评估提供参考。

关键词: 转Bt基因棉花 基因漂移 花粉介导 安全性评估

Abstract: The frequency and distance of pollen-mediated gene flow from transgenic cotton to non-transgenic cotton were investigated in greenhouses using artificial wind, or bee pollinators, separately. The seedlings of F₁ generation were screened using PCR assays, then the positive samples were identified for Bt insecticidal protein by dipstick assay. The results showed that the frequency of gene flow in the greenhouse with wind or bee pollinators was higher than that of the control (without wind or bee pollinators). The pollen-mediated gene flow (PGF) to the non-transgenic counterpart (Shiyuan 321) was obviously higher than those to the island cotton (GIZA 1) and another upland cotton (CCRI 35) in both wind and bee pollination treatments. Furthermore, in both treatments, there was a remarkable difference in the PGF to Shiyuan 321 related to distances from the donor plots; whereas this trend was not obvious in the other two conventional cultivars. There were a total of 72 positive samples in the wind treatment. The maximal distance of gene flow to Shiyuan 321 was 25.6 m, while the maximal distance to both CCRI 35 and GIZA 1 was 19.2 m. In the bee treatments, there were a total of 75 positive samples. The maximal distances of gene flow to all three conventional cultivars was 36 m, and gene flow peaked at this distance. Our research builds a foundation for the modeling of gene flow, and provides value reference for the ecological risk assessment of transgenic cotton.

Keywords: transgenic Bt cotton transgene escape pollen-mediated safety assessment

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