

研究论文

花粉特异性核糖核酸酶基因诱导籼稻雄性不育及其遗传研究

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摘要 以水稻愈伤组织和悬浮细胞系作为基因枪转化的外植体, 把水稻花粉特异性基因PSI启动子与barnase构成的嵌合基因导入籼稻, 获得籼稻五个品种Basmati-1、青油占、胜优2号, 明恢63, 新山占29的转基因植株。试验以两个质粒PSI-barnase和pILTAB227共转化的方法, 以潮霉素B作为筛选因子, 选择抗性愈伤及再生植株。获得的barnase转基因植株的育性比未转化的对照明显降低, 表现为部分不育和完全不育。除barnase阳性转化株平均株高比对照有所降低外, 营养器官发育正常, 雌性可育。完全不育的植株花粉粒畸形, 不能被I-KI溶液染色, 但它们与正常植株杂交能够获得杂交种子。转基因植株的Southern杂交分析表明, barnase基因普遍为多拷贝整合。对转基因植株自交及与非转化株测交后代以点杂交分析barnase转基因的遗传行为, 发现转基因的遗传符合1~3个插入位点的孟德尔遗传模式。

关键词 [核糖核酸酶](#) [工程雄性不育](#) [籼稻](#) [花粉特异性基因PSI](#)

分类号

Studies on Male Sterile Indica Rice Induced by a Pollen Specific Ribonuclease Gene and Its Inheritance

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Abstract A fusion of the rice pollen-specific PSI₁ gene promoter to ribonuclease (barnase) and plasmid pILTAB 227 were introduced to indica rice cultivars in a particle co-bombardment trans-formation system with embryogenic callus and cell suspension cultures. The transgenic plants of varieties Basmati-1, Qingyouzhan, Shengyou2, Minghui63 and Xinshanzhan 29 were obtained. Comparing with untransformed control, PSI-barnase-containing plants reduced significantly fertility from partially to completely male sterile, but were phenotypically normal and female fertile. Some barnase transgenic plants decreased in plant height. The pollen grains of complete male sterile plants were of abnormal morphology and failed to be stained by I-KI solution. Southern blot analysis of transgenic plants demonstrated multiple copies of the barnase gene integration were common. Microspores with barnase gene were inability for fertilization, based on Dot blot analysis of seed progenies of back crossings. Dot blot analysis of T1 plants showed that barnase-containing plants inherited the barnase gene at 1~3 loci in a Mendelian fashion. The rice PSI₁ promoter was found to be active in the stage before meiosis of pollen mother cell to microspore development.

Key words [Ribonuclease](#); [Engineered male sterile](#); [Indica rice](#); [Pollen specific gene PSI](#)

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