研究论文

对除草剂敏感致死水稻bel基因的RAPD和SCAR分子标记

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摘要　　以8077s与抗感的籼稻品种丰35亲本及杂交后自交所得的F2群体为材料，采用群分法（Bulked Segregant Analysis, BSA），从210个10mer随机引物，找到两个水稻苯达松敏感池和抗感池之间表现多态性的特异引物——S20和S316，分别产生的标记片段为S20-440和S316-590。它们与bel基因的连锁距离分别为12.132 cM和7.97 cM。对RAPD扩增标记的片段进行克隆、测序，根据测序结果合成两对特异性的SCAR引物，包含原有的RAPD序列。SC01引物在敏感单株中扩增出一条423 bp带；SC02引物在敏感单株中扩增出一条606 bp带，它们的SCAR标记与bel基因的连锁距离为10.66 cM和7.04 cM。应用SCAR标记对水稻恢复系进行了辅助选育。

关键词　　水稻　苯达松敏感致死基因　RAPD标记　群分法

分类号　q781

Identification of RAPD and SCAR Markers Linked to Herbicide Susceptible Lethality Gene (bel) in Rice

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Abstract The rice (Oryza sativa) cultivar 8077s is a photo-thermo-sensitive gene male sterile (PTGMS) line carrying the bentazon susceptible lethality gene. The gel bel made the self-seeding of 8077s killed by bantazon, while is safe for its F1 hybrids and all other normal varieties. 8077s prevents effectively seed production from self-contamination by the sterility instability. It is purpose that the bel gene be identified and marked by RAPD and SCAR methods in order to apply in the molecular marker assisted selection for the breeding (MAS). The study was carried out using bulked segregant analysis (BSA) in an F2 population from a cross between rice cultivars 8077s harboring bentazon susceptibility trait and Feng 35 harboring bentazon resistance trait. The analysis indicated that segregated proportion was 1∶3 between susceptible and resistant individual in F2 population. This ratio was accord with Mendel's Law of Segregation. The character of bentazon susceptibility controlled by a single recessive gene (bel). A total of 210 arbitrary 10-mer oligonucleotide primes were screened on the genomic DNA of 8077s and Feng 35 by RAPD technique. Among primes produced polymorphic RAPD bands between 8077s and Feng 35. Nine plants of the bentazon susceptible lethality and resistance lethality plants were selected for DNA extraction to establish susceptible and resistance gene pools respectively. Above primers were repeatedly screened from the BSA. Two primers (S20 and S316) were obtained from the primers. The result shows that polymorphic RAPD fragments were S20-440 (440 bp) and S316-590 (590 bp). The genetic distance between the bel gene and two RAPD markers was 7.97 and 12.132 cM respectively. The fragments of RAPD markers were recovered, cloned and sequenced. According to the sequence, two pair of specific SCAR primers were designed and synthesized. The specific bands with size of 423 bp and 606 bp respectively on the single herbicide susceptible plant of F2 were amplified with primers SC01 and SC02. The genetic distance closely to bel gene was 10.66 and 7.04 cM. And SCAR markers were applied in assisted selection for a bentazon susceptible lethality gene (bel) in rice. The studies laid foundations for the breeding with MAS and researching further bel gene.

Key words　Rice　Herbicide Susceptible Lethality Gene (bel)　RAPD markers　Bulked Segregant Analysis

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