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论文

水稻新质源(CMS-FA)雄性不育恢复基因的遗传研究

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摘要：

发掘水稻新型雄性不育细胞质源CMS-FA，育成系列优质米不育系和系列新质源恢复系，组配成强优势杂交稻组合的基础上研究新质源雄性不育恢复系的恢复基因遗传。采用新质源(CMS-FA)不育系金农1A与恢复系金恢3号杂交获得杂交F_1代种子，种植F_1代，收获自交F_2代种子。用F_1分别与不育系或保持系回交，获得(不育系//不育系/恢复系和不育系/恢复系//保持系)2个测交群体。同时种植P_1、P_2、F_1、F_2、B_1F_1和B_2F_1等群体，考察花粉染色率、套袋结实率和自然结实率，卡平方测验遗传分离适合度。结果表明，不育系与恢复系杂交F_1代正常可育，育性恢复(可育)基因为显性遗传。F_2代分离出可育：不育适合3：1，育性恢复(可育)基因为1对显性基因控制。B_1F_1和B_2F_1代2个测交群体的可育：不育都适合1：1分离规律，验证了F_2代育性恢复(可育)单基因的遗传模式。暂时确定新质源(CMS-FA)核质互作三系的基因型为不育系S(SS)、保持系F(SS)和恢复系S(FF)。

关键词： 杂交稻 新质源CMS-FA 雄性不育 育性恢复基因 遗传

Genetic Studies of Male Sterility Restorer Gene for CMS-FA Hybrid Rice

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Abstract:

After identifying the new male sterile cytoplasm (CMS-FA) from wild rice, a series of good quality CMS-FA male sterile lines and restorer lines as well as CMS-FA hybrid rice combinations with good quality and strong heterosis were developed, based on which the genetic studies of male sterility restorer gene for CMS-FA hybrid rice was conducted. The cross of CMS-FA male sterile line Jinnong 1A × CMS-FA male sterile restorer line Jinhui 3 was made to get F_1 seeds. F_1 generation plants were planted and let them self-cross to get F_2 seeds. In the meantime, backcrosses of male sterile line × F_1 and F_1 × maintainer line were carried out to get two test cross populations (male sterile line // male sterile line / restorer line and male sterile line / restorer line // maintainer line). Then the populations of P_1, P_2, F_1, F_2, B_1F_1, and B_2F_1 were planted at the same time to evaluate the three fertility indexes of stained pollen rate, bagged seed-setting percent and natural seed-setting percent, and to conduct chi-square test for the genetic segregation ratio of each population. The results showed that the F_1 of CMS-FA male sterile line × CMS-FA male sterile restorer line was normal in fertility, indicating the male restorer gene (male fertile gene) is dominant genetically. F_2 population had a segregation ratio of 3 fertile plants:1 sterile plant, proving that the fertility restoration of CMS-FA male sterility was controlled by a pair of dominant genes. The two populations of test cross B_1F_1 and B_2F_1 had a segregation ratio of 1 fertile plant:1 sterile plant, which proved the single gene genetic model of F_2 male restorer gene (male fertile gene). The genotypes of CMS-FA three lines were temporarily determined as S(SS)for male sterile line, F(SS) for maintainer line and S(FF) for restorer line.

Keywords: Hybrid rice New cytoplasmic resource CMS-FA Male sterility Restorer gene Inheritance

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