

研究论文

水稻孕穗期耐热性QTLs分析

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摘要 水稻籼粳亚种间杂种优势利用是提高水稻产量的重要途径。然而, 异常高温或低温导致籼粳亚种间杂种育性下降是影响其优势利用的主要因素之一。本研究以USSR5 (粳稻)/广解9号 (籼稻)//USSR5回交群体为供试材料, 构建了相应的分子连锁图谱, 分别以高温处理下直接小穗育性及小穗育性热敏感指数为指标, 对水稻孕穗期高温耐热性及其相对耐热性进行数量性状位点 (QTLs) 分析。结果表明, 在第2、4和5染色体上检测到孕穗期耐热性相关的QTL各一个, 对表型变异的解释率为6.4%~15.8%; 在第4、8染色体上分别检测到与孕穗期相对耐热性相关的QTL, qhts-4和qhts-8, LOD值分别为3.81和2.86, 对表型变异的解释率分别为16.8%和9.9%。对其进一步的上位性分析表明, 有8条染色体的4对位点存在基因间互作, 小穗育性耐热性除受主效QTL控制外, 还受基因间互作及修饰基因的影响。

关键词 [水稻](#) [高温胁迫](#) [孕穗期耐热性](#) [数量性状位点](#)

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Identification of QTLs for Heat Tolerance at the Booting Stage in Rice (*Oryza sativa* L.)

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Abstract The utilization of heterosis between indica and japonica rice is an important approach to improve the productivity of rice. However, the reduced productivity due to the influence of abnormal temperature on spikelet sterility has been limiting the application of the indica-japonica cross of rice. The objective of this study was to identify the quantitative traits loci (QTLs) related to the spikelet fertility of the indica-japonica cross of rice under high growth temperature. The backcross population of USSR5/ Guangjie 9//USSR5 and related molecular map were constructed. The spikelet fertility under high temperature and heat susceptibility index (HSI) of spikelet fertility were used to evaluate the tolerance of rice to heat stress at booting stage, respectively. These QTLs related to heat tolerance at the booting stage were detected on chromosome 2, 4 and 5, respectively, which explained 6.4% - 15.8% of the observed phenotypic variance. Two QTLs related to relative heat tolerance at the booting stage were detected, with LOD scoring 3.81 and 2.86 on chromosome 4 and 8, and explained 16.8% and 9.9% of the phenotypic variance, respectively. Further analysis of epistatic effected QTLs for relative heat tolerance showed that four pairs of loci exhibited interaction on 8 chromosomes, which indicated that the heat tolerance of spikelet fertility was not only controlled by main effect QTL but also influenced by gene interaction.

Key words [Rice](#); [Heat stress](#); [Heat tolerance at the booting stage](#); [QTLs](#)

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