

植物遗传学

水稻种子萌发和苗期ABA敏感性的QTL定位分析

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摘要

植物激素ABA参与不同的生理过程, 尤其是在种子发育和非生物逆境的适应都需要ABA的调控。以水稻珍汕97和早稻IRAT109为亲本的重组自交系群体为材料, 分别调查种子发芽和苗期对ABA的敏感程度。种子发芽阶段以ABA处理下的相对发芽势 (Relative germination vigor, RGV) 和相对发芽率 (Relative germination rate, RGR) 为指标, 苗期以ABA喷施处理下的卷叶程度 (Leaf rolling scores by ABA spraying, LRS) 和含ABA水培条件下的卷叶程度 (Leaf rolling scores by ABA culturing, LRC) 为指标。性状相关分析表明发芽阶段的相对发芽势与苗期卷叶程度呈显著正相关。用复合区间作图法和混合线性模型对ABA敏感性QTL定位和上位性效应分析。两种软件检测到的主效QTL位点大致相同。共检测到5个单位点QTL和6对上位性QTL与发芽阶段的ABA敏感性有关; 8个单位点QTL和5对上位性QTL与水稻苗期对ABA的敏感性有关; 在苗期, 两种ABA处理条件下共检测到两个共同的QTL; 仅一个共同的QTL同时控制发芽阶段和苗期对ABA的敏感性。这些研究结果说明, 水稻对ABA的敏感性同时受单位点的多基因和上位性基因控制; 而且控制种子萌发阶段发芽势和苗期对ABA敏感性的遗传基础有很大的不同。

关键词

[水稻](#); [ABA敏感性](#); [QTL](#); [上位性](#)

分类号

Identification of Quantitative Trait Loci for ABA Sensitivity at Seed Germination and Seedling Stages in Rice

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Abstract

<P>Abscisic acid (ABA) is one of the important plant hormones, which plays a critical role in seed development and adaptation to abiotic stresses. The sensitivity of rice (*Oryza sativa* L.) to exogenous ABA at seed germination and seedling stages was investigated in the recombinant inbred line (RIL) population derived from a cross between irrigated rice Zhenshan 97 and upland rice IRAT109, using relative germination vigor (RGV), relative germination rate (RGR) and leaf rolling scores of spraying (LRS) or culturing (LRC) with ABA as sensitivity indexes. The phenotypic correlation analysis revealed that only RGV at germination stage was positively correlated to ABA sensitivity at seedling stage. QTL detection using composite interval mapping (CIM) and mixed linear model was conducted to dissect the genetic basis of ABA sensitivity, and the single-locus QTLs detected by both methods are in good agreement with each other. Five single QTLs and six pairs of epistatic QTLs were detected for ABA sensitivity at germination stage. Eight single QTLs and five pairs of epistatic QTLs were detected for ABA sensitivity at seedling stage. Two QTLs were common between LRS and LRC; and one common QTL was detected for RGV, LRS and LRC simultaneously. These results indicated that both

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single and epistatic loci were involved in the ABA sensitivity in rice, and the genetic basis of ABA sensitivity at seed germination and seedling stage was largely different.</P>

Key words

[Oryza sativa L.](#); [ABA sensitivity](#); [QTL](#); [epistasis](#)

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