

研究论文

含玉米pepc基因恢复系的MAS转育及其杂交稻的光合特性和杂种优势研究

李季航^{1, 2, 3}, 向珣朝^{1, 2, 4}, 何立斌^{1, 2}, 张楷正^{1, 2}, 李平^{1, 2, *}

1四川农业大学水稻研究所, 四川温江611130 2西南作物基因资源与遗传改良教育部重点实验室/四川农业大学, 四川雅安 3四川省农业技术推广总站, 四川成都610041 4西南科技大学, 四川绵阳621000

收稿日期 2006-1-9 修回日期 网络版发布日期 2006-11-14 接受日期 2006-5-25

摘要 用玉米pepc基因的特异性引物对转育pepc基因的后代材料进行分子标记辅助选育(MAS), 成功地培育出与轮回亲本蜀恢881遗传相似度达97.09%~99.03%的改良蜀恢881, 用此改良恢复系与3个不育系冈46A、776A、2480A形成组合。结果表明, (1) 自行设计的pepc基因特异性引物能对基因进行准确的筛选, 而且玉米pepc基因在新的遗传背景下能够稳定遗传和高水平表达; (2) 含有pepc基因F₁的PEPCase活力明显地高于对照, PEPCase活力与净光合速率(P_n)极显著正相关(0.6081**), 表现量子效率、羧化效率等光合指标也显著好于对照; (3) 含有pepc基因F₁农艺性状表现各不相同, 但千粒重和单株产量表现较为一致, 且单株产量较对照平均增加41.48%; (4) 776A、Line 1和Line 6的GCA较高, 值得今后进一步考察与利用。

关键词 [MAS](#) [杂交稻](#) [玉米pepc基因](#) [光合特性](#) [高光效育种](#)

分类号 [S511](#)

Photosynthetic Characteristics and Heterosis in Transgenic Hybrid Rice with Maize Phosphoenolpyruvate Carboxylase (pepc) Gene by MAS

LI Ji-Hang¹²³, XIANG Xun-Chao¹²⁴, HE Li-Bin¹², ZHANG Kai-Zheng¹², LI Ping^{12*}

1 Rice Research Institute, Sichuan Agricultural University, Wenjiang 611130, Sichuan; 2 Key Laboratory of Southwest Crop Genetic Resource and Improvement (Sichuan Agricultural University), Ministry of Education, Ya'an 625014, Sichuan; 3 General Station for extending Agriculture Technology in Sichuan, Chengdu 610041, Sichuan; 4 Southwest University of Science and Technology, Mianyang 621000, Sichuan, China

Abstract Posterity materials carrying maize *pepc* gene has been successfully applied into marker-assisted selection (MAS) by using specific primer of maize *pepc* gene, and the improved Shuhui881 with *pepc* gene has been obtained. The improved Shuhui 881 was similar to its backcross parents in genetic background with 97.09% - 99.03%. Then rice sterile lines Gang 46A, 776A, 2480A as the female parents were crossed with several improved Shuhui 881 above. Some progress on photosynthetic characteristics and agronomic traits in hybrid rices with *pepc* gene were achieved. Firstly, Maize *pepc* gene not only could be correctly screened by MAS using specific primer designed by BLAST, but also was stably inherited and had PEPCase activity highly expressed in different genetic backgrounds. Secondly, PEPCase activity increased significantly as compared with respective controls and there was a significant correlation (0.6081**) between PEPCase activity and P_n in hybrid rice with *pepc* gene. Thirdly, the photosynthetic indexes of transgenic hybrid rice such as apparent quantum yield (AQY), carboxylation efficiency (CE), were obviously superior to respective controls. Moreover, the performances in agronomic traits varied among hybrid rice with *pepc* gene except in 103-grain weight and grain yield per plant. Transgenic hybrid rice increased by an average of 41.48% in grain yield per plant as compared with controls. And finally, according to the effect analysis of general combining ability (GCA), the 776A, Line 1 and Line 6 had outstanding performances, which was worth of further study in the future.

Key words [Marker-assistant selection \(MAS\)](#) [Hybrid rice](#) [Maize *pepc* gene](#) [Photosynthetic Characteristic](#) [High photosynthetic efficiency breeding](#)

DOI:

扩展功能

本文信息

▶ [Supporting info](#)

▶ [PDF\(614KB\)](#)

▶ [\[HTML全文\]\(0KB\)](#)

▶ [参考文献](#)

服务与反馈

▶ [把本文推荐给朋友](#)

▶ [加入我的书架](#)

▶ [加入引用管理器](#)

▶ [复制索引](#)

▶ [Email Alert](#)

▶ [文章反馈](#)

▶ [浏览反馈信息](#)

相关信息

▶ [本刊中 包含“MAS”的 相关文章](#)

▶ 本文作者相关文章

· [李季航](#)

· [向珣朝](#)

· [何立斌](#)

· [张楷正](#)

