

Photosynthetic Characteristics and Heterosis in Transgenic Hybrid Rice with Maize Phosphoenolpyruvate Carboxylase (pepc) Gene [PDF]

LI Ji-hang<sup>1, 2</sup>, XIANG Xun-chao<sup>1, 2, 3</sup>, ZHOU Hua-qiang<sup>1, 2</sup>, HE Li-bin<sup>1, 2</sup>, ZHANG Kai-zheng<sup>1, 2</sup>, LI Ping<sup>1, 2</sup>

(<sup>1</sup>Rice Research Institute, Sichuan Agricultural University, Wenjiang 611130, China; <sup>2</sup>Key Laboratory of Southwest Crop Genetic Resource and Improvement, Sichuan Agricultural University, Ministry of Education, Ya'an 625014, China; <sup>3</sup>Southwest University of Science and Technology, Mianyang 621000, China)

摘要: Three F1 hybrids derived from the sterile rice lines Gang 46A, 776A and 2480A and the improved restorer line Shuhui 881 containing maize phosphoenolpyruvate carboxylase (pepc) gene were used to analyze the effect of pepc gene on the heterosis and photosynthetic characteristics, while the F1 obtained by crossing Shuhui 881 with the above three sterile lines served as controls. The dynamics of photosynthetic characteristics in leaves of three F1 with pepc gene and their controls were determined at the initial-tillering, maximum-tillering, elongation, initial-heading, heading, maturity stages, and other different times after flag leaf fully expanded. The PEPCase activities of the three F1 with pepc gene increased significantly as compared with control plants during the whole developmental stages. Moreover, the net photosynthesis rate (Pn) also increased to certain extent. The data showed that PEPCase activity was significantly correlated to Pn with a correlation coefficient of 0.6081\*\*. The photosynthetic indexes of the three F1 with pepc gene were obviously superior to respective controls in apparent quantum efficiency, light compensation point and carboxylation efficiency, while the CO2 compensation point was lower than that of corresponding control. The Pn of the three F1 with pepc gene at light saturation point and CO2 saturation point was also higher than that of control plants. In addition, the three F1 with pepc gene had an average increase of 37.10% in grain yields per plant in comparison with control plants. The results indicated that the photosynthetic characteristics of hybrid rice containing pepc gene had been improved to some extent due to the introduction of pepc gene.

关键词: hybrid rice; phosphoenolpyruvate carboxylase gene; photosynthetic characteristic; high photosynthetic

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