

04-1-18

Characterization and Expression of C4 Photosynthesis Genes in Transgenic Rice Plants

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Objectives

To study the possible role of C4 photosynthesis genes of phosphoenolpyruvate carboxylase(PEPC) and NADP-malic enzyme(ME) in rice plants, we introduced the PEPC and NADP-malic enzyme to Korean rice cultivar and investigate expression and physiological characters of C3 transgenic rice plants.

Materials and Methods

Plant Material : Hwaseongbyeon

Methods : Assays of enzymes, Measurement of CO₂ exchange, PCR analysis

Results and Discussion

Experiments for regeneration from callus, results showed that increased 95.0% green spot, 83.3% shoot on MS medium included plant growth regulators of 1mg NAA, 5mg kinetin, 1mg TDZ, 2g casamino acid, osmotic regulators 3% sucrose, 2% sorbitol, 0.4% phytigel. The rate of regeneration increased until 90.8% in case of cultured 1/2MS medium translated to green spots. The rates of transformation was highest using Type II callus. Also, was 17.0% using LBA4404 strain, cultured calli and 1/3volume callus amounts about infection medium. Transgenic rice plants of 20 lines respectively in PEPC, NADP-ME lines passed second antibiotic selection were detected by PCR analysis. Average enzyme activity was higher by 8-fold(PC7line, 14-fold), 3.5-fold(ME20 line, 10-fold) respectively in PEPC, NADP-ME genes transformed rice plant lines than untransformed Korean cultivar (cv. Hwaseongbyeon).