

论文

转蔗糖: 蔗糖-1-果糖基转移酶基因提高烟草的耐旱性

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摘要:

蔗糖: 蔗糖-1-果糖基转移酶 (sucrose: sucrose 1-fructosyltransferase, 1-SST) 以蔗糖为底物催化生成蔗果三糖等低聚合度的果聚糖. 将从莴苣中克隆的1-SST基因重组到pCAMBIA1300-als中, 构建了在CaMV 35S启动子调控下的植物表达载体, 利用农杆菌介导的叶盘转化法将1-SST基因导入烟草中, PCR和Southern杂交检测表明获得了转基因植株, RT-PCR结果表明该基因在烟草中正常表达. 对T₀代转基因烟草进行的耐旱性分析结果表明, 干旱胁迫6d的转基因植株丙二醛含量和电解质渗漏率显著低于未转基因对照, 叶片相对含水量下降速度也明显比对照慢. 对转基因植株叶片糖分分析表明, 转基因烟草植株积累果聚糖, 并在干旱胁迫后含量明显增加, 而未转基因对照植株不积累果聚糖. 在14%PEG溶液中未转基因烟草种子的萌发率仅为转基因烟草种子的一半; 在附加200mmol/L甘露醇的培养基中未转基因烟草种子根的生长明显受到抑制, 而转基因烟草根的生长发育正常. 以上研究结果表明, 转1-SST基因烟草植株耐旱性的提高可能与该基因的表达有关.

关键词: 果聚糖 蔗糖: 蔗糖果糖基转移酶 转基因烟草 耐旱性

Enhancement of drought resistance in transgenic tobacco expressing sucrose: Sucrose 1-fructosyltransferase gene from *Lactuca sativa*

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Abstract:

Sucrose: sucrose 1-fructosyltransferase catalyses the synthesis of 1-kestose by transferring a fructosyl moiety from one sucrose to another. A full-length cDNA encoding sucrose: sucrose 1-fructosyltransferase from *Lactuca sativa* was inserted into pCAMBIA1300-als under the control of the CaMV 35S promoter. This plasmid was used for *Agrobacterium* mediated tobacco leaf disc transformation. Transgenic plants were analyzed by PCR and Southern blotting. 1-SST gene expression was confirmed by RT-PCR. After 6 days without watering, electrolyte leakage and malondialdehyde (MDA) of T₀ transgenic tobacco are obviously lower than those of the wild type. Significant decreases of relative water content (RWC) are detected in wild type tobacco, when compared with transgenic tobacco. According to carbohydrate analysis, the fructan of transgenic tobacco is detected and not in the wild type. Fructan content of transgenic tobacco is significantly increased after drought stress. Seed germination rate of wild type tobacco is 50% of that of transgenic tobacco under 14% PEG treatment. Root development of transgenic tobacco is not affected while that of wild type tobacco is inhibited when they were cultured in 200 mmol/L mannitol. These results indicate that fructan might be related to tobacco's drought tolerance.

Keywords: fructan sucrose: 1-SST transgenic tobacco drought tolerance

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