(O3-04)

Isolation of a Rice c/DRE Binding Factor cDNA and Development of CBF Transgenic Rice

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Productivity of agricultural crops is greatly affected by environmental stresses such as high salinity, low temperature, drought. This study was conducted to isolate a salt tolerant gene and to develop salt tolerant rice for reclaimed-saline areas through biotechnology. A rice CBF (c/DRE binding factor) cDNA was isolated from rice (cv Nipponbare) using RT-PCR. The full-length cDNA of the CBF gene consists of 838 nucleotides and 274 amino acid residues. The *OsCBF4* share from 33 to 49% identity of deduced amino acid sequence with different CBFs. Real-Time PCR analysis revealed that the expression of *OsCBF4* was markedly induced under salt and cold treatment more than under normal. The rice *OsCBF4* gene was expressed under salt and drought conditions similar to rice *OsDREB2A*. In order to develop salt tolerant rice using CBF4 gene, transgenic rice plants containing the rice *OsCBF4* gene were obtained via *Agrobacterium*-mediated transformation. Multiplied calli were cultured on shoot induction medium. After 4 weeks, phosphinothricin resistant shoots were obtained from the calli on the selection medium. Eighty regenerated plantlets were obtained and the stable incorporation of the rice *OsCBF4* gene into rice genome was confirmed by PCR and Southern analyses. The stable expression of introduced genes was also validated by northern analysis in T_0 plants. The transgenic rice plants can be used to examine the role of genes under abiotic stresses.
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(O3-05)

Mass Production of Siberian Ginseng (*Eleutherococcus senticosus*) Plantlets by the Temporary Immersion Culture System

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Siberian ginseng (*Eleutherococcus senticosus*) is a useful medicinal woody plant that is distributed throughout the cold regions of northeast Asia.
An efficient regeneration procedure was established using temporary immersion (TI) bioreactor via somatic embryogenesis of zygotic embryo extracted stratification treated seeds.
Zygotic embryo of *E. senticosus* cultured on Murashige and Skoog's (MS) medium with 2,4-D produced somatic embryos directly from the surface of matured embryo without

intervening callus formation. Friable embryogenic calli were formed mainly from radicle tips of somatic embryos. Selected embryogenic cells were stably maintained and propagated on MS agar or liquid medium with 1 mg/L 2,4-D. Maturation of embryo, embryogenic calli and cell clumps were transferred to MS liquid medium lacking 2,4-D and containing 5% sucrose. Regenerated plantlets though TI bioreactor were successfully acclimatized in the mist-tunnel and they grew to adult plants in soil.

TI bioreactor culture also reduced the hyperhydricity, which has severely affected the embryogesis in the liquid culture system. Application of TI bioreactor culture system reduced the production costs compared to the procedures based on the solid medium or the air lift bioreactor culture system.

In the present article we describe that an efficient system for the mass production of Siberian ginseng plantlet can be achieved by TI bioreactor culture.

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형질전환 들깨의 발현특성 변이

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형질전환 작물이 품종이 되기 위해서는 그 작물이 기존에 가지고 있는 유용형질을 그대로 유지하면서 특정의 목적형질이 안정적으로 발현되는 것이 중요하다. 본 연구에서는 농업생명공학연구원에서 개발한 형질전환들깨(종실용으로 사용되는 "엽실들깨" 품종에 바스타저항성 유전자 도입)에 대하여 후대에서 제초제저항성과 주요 특성이 안정적으로 발현되는 계통을 선발하고자 하였다.

시험에 사용된 형질전환 T_1 seed 67계통과 T_2 seed 19계통 중 제초제저항성 표현형이 3:1의 분리비를 나타내는 T_1 seed 38계통과 T_2 seed 9계통, 총 47계통을 선발하여 육묘 포트에 파종 후 3엽기에 격리포장에 이식하여 들깨 표준재배법에 준하여 재배한 후 특성 조사를 실시하여 T_3와 T_4 세대를 거쳐 총 57계통을 선발하였다.

제초제저항성은 T_4세대까지도 선발된 모든 계통에서 안정적으로 발현되었으나, 천립중은 기존의 "엽실들깨" 품종에 비하여 0.6~1.6g 정도 작았고, 줄기색이 "엽실들깨"는 자색인데 녹색으로 발현되는 계통이 있었다. 특히, 개화기에 있어서 기존의 "엽실들깨"와 개화기가 일치하는 계통도 있었지만 많은 계통들이 차이를 보였는데 개화기가 15일정도 빠른 계통도 있었다. 또한 형질전환 들깨는 후대에서 기름함량, 지방산조성 및 경도에서 계통마다 다양한 변이를 나타내 기존의 "엽실들깨"와 차이를 보였다. 따라서 형질전환 들깨는 새로운 유용변이체의 획득 가능성은 있지만 품종화를 위해서는 초기세대에서 선발된 개체 중에서 도입유전자가 지속적으로 발현이 되며 다른 형질들도 고정되어야하므로 이를 위해서 T_0세대에서의 약배양 또는 형질전환 재료로 사용된 기존 품종과의 여교배가 필요할 것으로 생각되었다.

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