

환경스트레스에 강한 포플러 개발에 성공

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곽상수 2010.9.

연구개요 ··국내 · 외 조건불리지역에 재배 가능한 환경스트레스에 강한 친환경 형질전환 포플러를 개발함.

개발내용 ··산화스트레스 유도성 식물유전자(SWPA2) 프로모터 조절하에 복합환경스트레스 내성 유전자(AtNDPK2)를 국립산림과학원이 보유하고 있는 꽃이 피지 않는 불개화(不開化) 포플러에 도입하여 개발한 형질전환 SN포플러임.

··형질전환 SN포플러는 LMO포장 증식과정에서 산화스트레스에 내성을 나타냈을 뿐만 아니라 식물생장호르몬인 옥신 합성유전자의 활성을 촉진하여 생장촉진효과를 나타냄.



대조식물(왼쪽 1개체), 형질전환SN포플러(오른쪽 3개체)

활용사례/효과 ··*Plant Biotechnology Journal*지 온라인판에 게재됨.

··국내 · 외 조건불리지역(사막화지역, 오염지역 등)에 대량식재 가능함.

··바이오매스증대를 통한 탄소배출권 확보 및 오염지역 토양정화에 기대됨.

Plant Biotechnology
Journal

aab
SEB

Plant Biotechnology Journal (2010), pp. 1-14

doi: 10.1111/j.1467-7652.2010.00551.x

Transgenic poplar expressing *Arabidopsis* NDPK2 enhances growth as well as oxidative stress tolerance

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Received 12 March 2010;
revised 22 June 2010;
accepted 24 June 2010.

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Summary

Nucleoside diphosphate kinase 2 (NDPK2) is known to regulate the expression of antioxidant genes in plants. Previously, we reported that overexpression of *Arabidopsis* NDPK2 (*AtNDPK2*) under the control of an oxidative stress-inducible *SWPA2* promoter in transgenic potato and sweetpotato plants enhanced tolerance to various abiotic stresses. In this study, transgenic poplar (*Populus alba* × *Populus glandulosa*) expressing the *AtNDPK2* gene under the control of a *SWPA2* promoter (referred to as SN) was generated to develop plants with enhanced tolerance to oxidative stress. The level of *AtNDPK2* expression and NDPK activity in SN plants following methyl viologen (MV) treatment was positively correlated with the plant's tolerance to MV-mediated oxidative stress. We also observed that antioxidant enzyme activities such as ascorbate peroxidase, catalase and peroxidase were increased in MV-treated leaf discs of SN plants. The growth of SN plants was substantially increased under field conditions including increased branch number and stem diameter. SN plants exhibited higher transcript levels of the auxin-response genes *IAA2* and *IAA5*. These results suggest that enhanced *AtNDPK2* expression affects oxidative stress tolerance leading to improved plant growth in transgenic poplar.

Keywords: antioxidant enzyme, auxin, nucleoside diphosphate kinase 2, stress-inducible promoter, transgenic poplar.