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Salinity Response of Transgenic Potato Genotypes Expressing the Oxalate Oxidase Gene

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Abstract: In vitro and in vivo responses of transgenic and non-transgenic potato (Solanum tuberosum L.) genotypes to salinity were investigated. A gene responsible for the production of oxalate oxidase enzyme, whose expression has been associated with plant stress tolerance, was used. Transgenic potato plants expressing the oxalate oxidase enzyme were produced using Agrobacterium-mediated transformation. The transgenic nature of the plants was verified by their antibiotic (kanamycin) resistance and then in vitro enzyme assays. Four independent transgenic genotypes obtained from 2 cultivars, Maris Bard and Desiree, were tested at 5 levels of NaCl (0%, 0.25%, 0.50%, 0.75% and 1.00% w/v) in vitro. The same genotypes were also tested at 3 levels of NaCl (0%, 0.50% and 0.75% w/v) under glasshouse conditions (in vivo). The results revealed that the growth of all genotypes was significantly inhibited by increasing salt treatments under both in vitro and in vivo conditions. Transgenic genotypes showed a relatively higher salinity tolerance than the non-transgenic genotypes in vitro. On the other hand, in the glasshouse, the results were less consistent but some transgenic genotypes showed superior tuber yield characteristics to the non-transgenics under salt stress.

Key Words: Enzyme, Oxalate oxidase, salinity, Solanum tuberosum

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