

Application of silicon in plant tissue culture

ABSTRACT

Silicon (Si) is one of the most plentiful mineral elements in soil. It is a macroelement involved in the responses of plants to a variety of abiotic stresses. The culture medium composition, particularly the mineral nutrients, greatly impacts the growth as well as the morphogenesis of in vitro plant cultures. Numerous morphological and physiological disorders including hyperhydricity, upwardly curled leaves, shoot tip necrosis, and fasciation are often related to inorganic nutrient imbalances of the tissue culture medium. Silicon has been reported to improve many growth parameters including embryogenesis and organogenesis, as well as leaf morphology, physiology, and anatomy. Silicon decreases the susceptibility of plants to salinity and low temperature, alleviates metal toxicity, lessens the incidence of hyperhydricity, and avoids oxidative phenolic browning in various plants. Overall, the evidence indicates a positive role for Si in improving various aspects of plant tissue culture, including micro-propagation, organogenesis, cryopreservation, somatic embryogenesis, and secondary metabolite production.

Keyword: Disorders; Epicuticular wax; Hyperhydricity; Organogenesis; Silicon