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Selecting salt tolerant pistachio rootstocks using tissue culture

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Abstract

The presence of excessive amounts of salts in soil or irrigation water hinders plant growth and productivity. The salts responsible are chlorides, sulfates, carbonates, and bicarbonates of sodium, calcium, and magnesium. The presence of large amounts of boron is also a problem in certain locations. Over 300 million acres of land in the world are affected by this malady. In the Central Valley of California, the fruit and nut bowl of the world, land suitable for cultivation and fresh irrigation water are becoming increasingly scarce; thus, there is a need to extend cultivation to areas that are high in salinity and/or have brackish water available for irrigation. Pistachio is an important crop in the Central Valley and the gradual increase in demand is extending its cultivation to soils or irrigation water with higher salt content. Therefore, there is a need for a pistachio rootstock that can withstand high salts and supports a productive scion cultivar.

Seeds of a popular pistachio rootstock, UCB-1 (*Pistacia atlantica* × *P. integerrima*; which came out of controlled crosses at the University of California, but has shown genetic variation within seedlings), were procured, stratified at 40°C for 6 weeks, surface sterilized, and germinated in vitro in the dark. About 5-mm sections of the hypocotyl and epicotyl were excised and placed on a defined medium and grown in an aseptic environment under 30 μM of fluorescent light and at 25+/-2°C. Individual sections developed into shoots and were multiplied as separate clones and were grown on media containing differential range of salts from 0 to 10,000 mg L⁻¹. Shoot growth was evaluated on a visual scale from 0 to 10. Clones that showed better growth under high salts were selected, multiplied, and acclimated for field trials. Four of the clones, namely UCB-D71, UCB-D90, UCB-D110, and UCB-D154, outperformed others in the field over 2 years in multilocational trials. These clones were selected and patented before public release. The field trials are still ongoing to evaluate fruit yield and quality with different scion cultivars grafted onto them.

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