

Topography determines the impact of reactive oxygen species on shoot apical meristems of recalcitrant embryos of tropical species during processing for cryopreservation

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Keywords: *Trichilia dregeana*, *Amaryllis belladonna*, reactive oxygen species, wounding, cryopreservation, germplasm conservation

Abstract

Ex situ storage of recalcitrant (desiccation-sensitive) seeds is possible only in the short term; long-term storage for germplasm conservation requires cryopreservation. The most suitable explant for cryopreservation is the embryo or embryonic axis, which needs to be excised and partially dried prior to cryogenic cooling. In many cases, particularly for seeds with fleshy cotyledons, these treatments lead to the failure of shoot development. The act of cutting the cotyledons induces a wounding response that leads to a burst of reactive oxygen species (ROS). If the site of excision is close to the shoot meristem, oxidative damage to the meristem will occur, leading to failure of the shoot to develop. In seeds of the family Amaryllidaceae (and possibly others) whole embryos can be removed from the seed, avoiding excision damage, and in many species successful cryopreservation can be achieved. Thus the differences in embryo morphology can have an influence on the response to manipulations for cryopreservation.