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## From Top to Bottom, How Meristem Position Affects the Regeneration Capacity of Sweet Potato after Cryopreservation

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### Abstract

Sweet potato (*Ipomoea batatas*) provides, together with other tubers such as cassava and potato, more than 1000 million people a daily meal with a production of more than 112 million tons of sweet potato each year. Continuously new challenges such as diseases, pests and drought due to climate change arise, upon which farmers need to be able to react. Introducing improved varieties is a part of the solution, but to be able to do this, farmers and breeders need access to safely stored germplasm.

Cryopreservation could play an important role, since it allows the storage of genetic resources for an indefinite amount of time. The development of a cryopreservation protocol of sweet potato meristem already started in 1992 by Towill and Jarret and more protocols with ranging success rates have been developed over time. However most of these reports used apical meristems without considering the axillar alternative. These two types of meristems differ greatly in their composition, both hormonal and physiological, often resulting in different outcomes after cryopreservation as has also been shown in other plants.

This project aimed to optimise different parameters of a droplet vitrification protocol with a special focus on the meristem type. Three different cultivars CIN, IBA and CMR were cryopreserved with either apical or axillar meristems, which resulted in a plantlet regeneration rate of respectively 27.7 % and 56.6 %. The meristem type has thus a significant impact on the regeneration rate. This effect was found to be slightly cultivar dependent, since the CIN cultivar showed no significant improvement.

This improved protocol was subsequently tested on seven other cultivars. Since different cultivars of the same species vary greatly in their reaction towards cryopreservation. Cryopreservation of this material resulted in an overall regeneration rate of 49.7 %, with cultivar regeneration rates varying between 9.5 and 83.9 %. These results shows that the protocol is applicable to large parts of existing collections and that other protocols could also benefit from using axillar meristems.

**Keywords:** Conservation, cryopreservation, *In vitro*, sweet potato