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Кріоконсервування суспензій на водній основі методом спливання задля зберігання крові

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Cryopreservation of Water-Based Suspensions by the Floating Process for Blood Storage

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The shelf life of blood stored at 4°C with the stabilizers commonly used today is a maximum of up to 49 days. Cryopreservation of red blood cell concentrate offers a promising possibility to provide blood reserves with almost no expiry date. Within the scope of known cryoprocesses, closed containers such as blood bags are applied for cryopreservation. Due to their material and geometry, these containers do not allow ideal heat transport. The resulting suboptimal freezing conditions have to be compensated by the use of large amounts of anti-freezing agents, some of which are toxic. The novel float-freezing process can be used to cryopreserve water-based suspensions such as blood. The process allows cryopreservation of blood without the use of blood bags during freezing. This approach ensures a continuous and reproducible process for cryopreserving blood with more homogeneous heat transfer.

In this study, a water-based suspension is floated on a bath of perfluorotributylamine (PFTBA) due to low density and spreads on it to form a flat plate. The cooling is provided by the PFTBA bath as well as by nitrogen vapour blown into the chamber from above. The frozen product is cooled down to temperatures of –25 to –40°C at a cooling rate of about 1 K/min. The control system of the Floatfreezer has been further developed to be safe and functional for 'human machine interaction'. The next steps are to lead up to higher cooling rates in order to subsequently store the frozen product for example at –196°C.

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Розробка методу вітрифікації рослин з використанням PVS3 для кріоконсервування генетичних ресурсів якона (*Smallanthus sonchifolius*)

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Development of a PVS3 Plant Vitrification Method for Cryopreservation of Yacon (*Smallanthus sonchifolius*) Genetic Resources

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Cryopreservation is a biotechnological method that plays a vital role in vegetatively propagated plant species conservation programs. This method is one of the most valuable methods for the long-term conservation of biological materials. It is used as an alternative method to safeguard plant genetic resources currently being preserved by conventional methods, such as field collections. The present study aims at developing an efficient cryopreservation method for the long-term storage of five yacon (*Smallanthus sonchifolius* (Poepp. and Endl.) Robinson) cultivars using PVS3. This vegetatively propagated crop is mainly cultivated for its edible tuberous roots rich in inulin-type fructooligosaccharides. To carry out the experiments, the plant material was transferred *in vitro* (surface-sterilized using 70% ethanol for 1 min and 2% NaClO for l5 min, rinsed three times in sterile distilled water, and transferred to MS medium). Apical shoot tip (2–3 mm long) comprising the meristematic dome plus 2 primordial leaves were then excised from *in vitro* plantlets. These were then placed in a PVS3 loading solution (20 min); thereafter, they were placed in the PVS3 for either 30, 45, 60, or 75 min treatment time duration, after which they were then placed in liquid nitrogen (LN). After lhr exposure to LN, they were then thawed and placed on either MS or MS+l mg/l BA as recovery media. Parameters such as survival, regrowth, and signs of morphological abnormalities were assessed in two-week intervals (up to 8 weeks). The results showed that PVS3 is an effective cryopreservation method for the long-term conservation of yacon with a 60 min treatment time duration in combination with MS without 1 mg/l BA as the optimal treatment, ensuring high survival and regrowth rates ranging from 94 – 80% and 75 – 62%, respectively, for the five tested cultivars of yacon. The developed method can ensure the safe long-term storage of yacon species currently being preserved by conventional conservation methods.

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