

***In vitro* Storage Techniques of *Fritillaria imperialis Lubra Maxima*, a Wild Rare and Critically Endangered Ornamental Species**

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ABSTRACT

*Wild population of *Fritillaria imperialis Lubra Maxima* is at the risk of extinction, mainly because of many harvesting and pest and pathogens infestation. Therefore, this plant needs urgent protection. Here and for the first time, this study aimed to evaluate the efficiency of *in vitro* storage techniques (cold preservation and cryopreservation by encapsulation–dehydration and cryopreservation by encapsulation–vitrification) as the methods of medium– and long–term conservation of this valuable ornamental species. The bulb scale was used as explant. Explants were encapsulated in alginate beads. This study was carried out in three sections, namely, cold preservation with steps of encapsulation, preculture with dehydration with 0.75 M sucrose and air desiccation followed by storage at 4°C; cryopreservation with steps of encapsulation, preculture with dehydration with 0.75 M sucrose and air desiccation followed by direct immersion in liquid nitrogen (LN); and cryopreservation with steps of encapsulation, loading solution, vitrification with plant vitrification solution 3 (PVS3) solution followed by direct immersion in LN. After 6 months cold storage, maximum survival (67.0%) was observed for encapsulated explants dehydrated by air desiccation. After thawing, maximum survival of 74.3 and 81.6% was obtained for cryopreserved explants pretreated by encapsulation–dehydration and encapsulation–vitrification (for 20 min), respectively. The optimized *in vitro* conservation techniques can be utilized for germplasm preservation, breeding programs, and exchange of *F. imperialis* genetic resources.*

Keywords: Cryoprotectants, Germplasm conservation, *In vitro* conservation, Liquid nitrogen, Slow–growth storage