Conservation Of Genetic Resources Of Oil Palm (*Elaeis Guineensis* Jacq.) Using Cryopreservation

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Introduction

Oil palm is one of the main plantation crops in Malaysia with 3.4 mil hectares and production of 10.65 mil tonnes crude palm oil in the year 2000 (MOF, 2001). Because of its importance it is vital that a broad genetic base in conserved for future improvement. At present, oil palm germplasms are mainly conserved in the field as the seeds are recalcitrant. Field conservation is however costly to maintain require much land and management inputs to control pests and disease. A practical alternative is *in-vitro* conservation, especially cryopreservation in liquid nitrogen (LN). Various methods are available, but this study evaluates the potential of the desiccation technique especially after sucrose pretreatment. This technique was reported to be effective for a number of species including cassava (Benson et al., 1992), sugarcane (Gonzalez-Arnao et al., 1996) and coffee (Mari et al., 1993)

Materials and Methods

Open pollinated Dura x Pisifera oil palm embryos were aseptically, and precultured in MS medium supplemented with 0, 0.2, 0.4, 0.6, 0.8 and 1.0M sucrose for 16hr. After preculture, the embryos were desiccated aseptically to target moistures of 40%, 30%, 20% and 10%. At each moisture, 10 embryos were cultured directly onto Murashige and Skoog (MS) medium (-LN) while further 10 embryos were plunged into LN for at least 16hrs. The embryos were then thawed and cultured onto MS medium to assess their viability (+LN).

A second study was also conducted to evaluate the optimum duration of sucrose preculture using the near optimum concentration of 0.5M. The duration evaluated were 0, 4, 8, 16 and 24hr and the method used was as described above.

A further study was also carried out to compare the effectiveness of naked and encapsulated embryos during sucrose preculture. The experiment is a 2x 3 factorial using 3 sucrose concentration to 10% moisture before being plunged into LN (+LN)

Results and Discussion

Preculture of naked excised embryos oil palm in sucrose for 16hrs considerably affects their survival in LN. the optimum concentration was 0.4M at which a high viability of 46% was obtained when they were desiccated to a target moisture of 20%. Higher or lower sucrose concentrations or target moisture resulted in lower survival in LN. Using the near optimum sucrose concentration of 0.5M, the optimum duration of precultured was 8hrs followed by desiccation to 10% moisture when a high viability of 76% was obtained after LN exposure. However, highest viability of 83% was obtained with 0 hr preculture, which is essentially direct desiccation of the embryos without any sucrose preculture. Encapsulation was less effective than the use of naked embryos during sucrose preculture for cryopreservation. At the optimum concentration of 0.4M sucrose, naked embryos desiccated to 10% moisture had 90% viability compared with only 68% viability for encapsulated embryos after LN exposure.

Conclusions

For cryopreservation of oil palm germplasm, direct desiccation of naked embryos to 10% moisture is recommended. This gave a high viability of 83%, which is comparable to the 90% viability obtained for naked embryos precultured in 0.4M sucrose, which is more tedious. However, the encapsulation technique was inferior to the use of naked embryos in all cases.

Benefits from the study

This study has shown that oil palm can be conserved using cyropreservation technique. Cryopreservation can be done using various pretreatments which are species specific, but for the case of oil palm the most basic method which is desiccation only gave high survival. This study also show that it is highly possible to establish a cryo gene bank for oil

palm collection for conservation purpose as a complimentary method to the field genebank.

Patent(s), if applicable :
Nil

Stage of Commercialization, if applicable :
Nil

Project Publications in Refereed Journals:
Nil

Project Publications in Conference Proceedings

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