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Studies on cryopreservation of mature zygotic embryos of coconut (Cocos nucifera L.)

Conservation of coconut genetic resources is of vital importance for present and future breeding programs. Cryopreservation is the only viable option for long-term conservation of coconut germplasm. The present study was undertaken with a view to develop an efficient protocol for cryopreservation of mature zygotic embryos of "Sri Lanka Tall" coconut.

Two experiments were conducted with different methods of preculture and different durations of desiccation. The water loss from embryos during preculture and desiccation was monitored and recovery of embryos (indicated by embryo germination) after each treatment was studied. In Experiment 1, the embryos were precultured in a sucrose solution (0.5 and 1. 0 M) for 96 and 120 h prior to desiccation by silica gel for 5, 10 and 15 h. The recovery rate of frozen embryos was influenced by the sucrose concentration, the duration of preculture and the duration of desiccation. Total inhibition of germination in frozen as well as many of the control embryos was observed when precultured in the higher concentration of sucrose (1.0 M). The highest recovery rate (40%) was observed in embryos precultured in the lower concentration of sucrose (0.5 M) for 120 h followed by 15 h exposure to silica gel. The corresponding water loss in this treatment was 62.9%.

In Experiment 2, the embryos were desiccated by exposure to silica gel for 8, 10 and 12 h. This was followed by a cryoprotective treatment with 600 g L-1 glucose and 15% glycerol for 10 and 15 h. A better recovery of embryos was observed in Experiment 2, when compared to Experiment 1. Thus the procedure followed in Experiment 2 was shown to be more effective for cryopreservation of mature embryos when compared to that of Experiment 1. The best treatment in Experiment 2 was 10 h desiccation followed by 15 h cryoprotective treatment, which gave rise to 60 % recovery in frozen embryos. The corresponding water loss in this treatment was 63.7%.

The study clearly indicated that combined effect of both desiccation and preculture are critical in determining the success rate and both conditions need to be optimal in order to obtain high rates of embryo recovery.