

# Chapter 11

## Desiccation and Cold Hardening of Date Palm Somatic Embryos Improve Germination

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### Abstract

Embryogenic suspension cultures of date palm are ideal for mass propagation of somatic embryos; however, the low percentage of germination of somatic embryos (SE) remains an impediment. This chapter focuses on two important physical factors to improve germination of date palm somatic embryos: the use of partial desiccation (3 h) of somatic embryos and the exposure to low temperature (4 °C for 24 h). High germination percentage (41%) is achieved by desiccation for 3 h. Moreover, adding 0.3 g/L activated charcoal (AC) to the liquid medium further improves somatic embryo number and weight as well as the percentage of germination. Moreover, partial desiccation and low temperature exposure tend to increase proline content. This improved protocol for somatic embryo germination is potentially applicable for commercial micropropagation of date palm.

**Key words** Cell suspension, Germination, Low temperature, Desiccation, Somatic embryos

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### 1 Introduction

Micropropagation of date palm has been achieved from several genotypes through organogenesis and somatic embryogenesis using various meristematic explants including zygotic embryos, shoot tips, and lateral buds [1]. However, the date palm remains a recalcitrant species to in vitro techniques because of the influence of genotypic factors that affect the explant response and the frequency of maturation and germination of embryos, thus hindering the establishment of simple, reliable, and reproducible protocols [2, 3]. In fact, date palm tissue cultures grow very slowly; thus, the initiation phase may require more than 24 months, especially when low concentrations of plant growth regulators are added to the culture medium to prevent somaclonal variation [4].

Somatic embryogenesis is the most efficient regeneration process for date palm micropropagation [5]. It is considered a rapid, efficient method for large-scale micropropagation of date palm and highly useful for breeding programs [6]. Several researchers