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Effect of Light Duration and Intensity on the Development of Embryogenic Callus of Date Palm *in-vitro*

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A B S T R A C T

The idea of this experiment was to study the impact of various light periods and levels on the in vitro growth and development of embryogenic callus created from date palm (Phoenix dactylifera L.) cv. Barhi. Seven treatments, each with five replicates, were employed in a completely randomized design (CRD). The treatments comprised three light intensities (0, 1000, 3000 Lux) and four light exposure periods (0, 8, 12, and 16 hours per day). The findings revealed that the continuous darkness treatment (A) had the highest mean values for fresh weight (1100.20 g), dry weight (220.04 g), and dry matter content (20%), far outperforming all other treatments. With a minimal browning incidence (10%) and no clear vitrification, it exhibited highest callus viability (100%). Growth traits were substantially reduced if the light period increased to 8 hours per day, with vitrification appearing up at 5% under 3000 Lux intensity. The adverse effects intensified at 12 hours daily, where fresh weight dropped to 354.8 g, browning increased to 35%, and vitrification reached 10%. The poorest outcomes were recorded for treatments F and G (16 hours daily), with fresh weight declining below 155 g, browning escalating to 50%, and vitrification reaching 20%. It is concluded that complete darkness is optimal for somatic embryo formation in date palm, and that light exposure, even briefly, suppresses growth and promotes physiological abnormalities due to oxidative stress.

Introduction

Date palm (*Phoenix dactylifera* L.) constitutes a fundamental fruit crop in arid and semi-arid zones, fulfilling crucial economic, environmental, and societal functions for local populations (Zaid and de Wet, 2002). Traditional propagation methods for date palm encounter multiple challenges, including slow growth rates, insufficient offshoot production from elite mother plants, and resultant plant variability (Mazri and Meziani, 2015). Consequently, adopting micropropagation techniques has become essential to satisfy the rising demand for superior date palm seedlings.

Achieving successful micropropagation in date palm relies heavily on the capability to generate high-quality