

Anatomical Study Of Adventitious Bud Regeneration From Shoot Tip Of Date Palm (*Phoenix dactylifera* L.) C.V Barhee In Vitro

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Abstract

Anatomy is highly important as a linking medium between several key branches of modern plant science. Detailed anatomical studies allow a more detailed understanding to achieve the ambitious goal of acquiring a holistic knowledge of plant development and aspects of cell and tissue differentiation. This study was carried out in the laboratories of Date Palm Research Centre at Basra University during the period from 2022-2023. The histological process of adventitious bud regeneration from the shoot tip explants of *Phoenix dactylifera* L. 'Barhee' was reported in this study. Shoot regeneration was obtained from Murashige and Skoog (MS) supplemented with 1 mg l⁻¹ naphthalene-acetic acid (NAA), 0.5 mg l⁻¹ 6-benzyladenine (BA), and 0.5 mg l⁻¹ kinetin (Kn) at a 16 hours photoperiod. The anatomical study of the responded explants revealed the presence of a mechanism for the differentiation of adventitious buds from shoot-tip. Further, a histological study showed that there were multiple vascular bundles around the adaxial side of explants, and the adventitious buds directly originated from the parenchymatous cells around the vascular bundles without the intervening callus phase. The parenchymatous cells started dividing and meristemoids formed thereafter. The meristematic cells continued division and subsequently gave rise to bud primordia. Well-developed shoot buds through direct organogenesis were achieved after 28 weeks of culture.

Keywords: Anatomical development; Direct organogenesis; Meristematic tissue cells; Parenchyma cells; Plant growth regulator

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Introduction

Date palm (*Phoenix dactylifera* L.) is one of the oldest cultivated fruit crops in the world and belongs to the family Arecaceae. It is a multipurpose tree that has food, medicinal, and ornamental importance. It is believed to have originated in Mesopotamia at least 6000 years ago. Then, cultivation has expanded and has become a main crop in the Arabian Peninsula, North Africa, and Middle Eastern countries (Chao and Krueger 2007). Date palm is propagated through seeds or offshoots, but both methods suffer from some inadequacies and limitations (Al-Khateeb, 2006; Asemota *et al.*, 2007). Therefore, it becomes necessary to propagate date palm using alternative biotechnology methods. Date palm micropropagation enables the rapid and large-scale propagation of uniform plant pathogen-free plants, during plant material exchange, and true-to-type (Al-Mayahi, 2014; Awad *et al.*, 2020). The success of plant tissue culture and development are affected by several factors, including the

composition of the culture medium used (Al-Asadi *et al.*, 2024). Plant growth regulators are synthetic compounds that act as natural plant hormones that are often .