

Effects of dicamba and casein hydrolysate on *in vitro* growth and shoot regeneration of date palm (*Phoenix dactylifera* L.) cv. Barhee

Ahmed Z.R. Al-Asadi¹, Ahmed M.W. Al-Mayahi^{2*}, Khairullah M. Awad³

¹Horticulture and Landscape Department, Agriculture College, Basrah University, Basrah, Iraq

^{2,3}Date Palm Research Centre, Basrah University, Basrah, Iraq

Abstract

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The investigation was carried out to evaluate the influence of the dicamba (3,6-Dichloro-2-methoxybenzoic acid) (DIC) and casein hydrolysate (CH) on the callus growth, shoot multiplication, and some biochemical constituents of date palm cv. Barhee cultured *in vitro*. Both DIC and CH were required for callus growth and shoots regeneration. The medium supplemented with 4.0 mg l⁻¹ DIC in combination with 1.0 g l⁻¹ CH gave the highest callus weight (287 mg), while the maximum response rate and the number of shoots per jar (86.67% and 15.07 shoots/jar) were found in MS media equipped with 4 mg l⁻¹ DIC and 0.5 mg l⁻¹ CH combination. The total amount of phenolic compounds was significantly reduced to 0.82 and 0.79 mg GAE g⁻¹ in shoots cultured in the medium equipped with 4.0 mg l⁻¹ DIC with 0.5 and 1.0 g l⁻¹ CH, which is reflected in the rate of browning. The results showed that the highest shoots content of endogenous IAA (3.71 and 3.50 µg g⁻¹), were obtained in response to 4 mg l⁻¹ DIC + 1.0 g l⁻¹ CH and 4.0 mg l⁻¹ DIC + 0.5 g l⁻¹ CH, respectively. The macronutrient K, P, Ca, and free amino acids content significantly increased in the *in vitro* shoots regenerated on the media supplemented with 4.0 mg l⁻¹ DIC + 1.0 g l⁻¹ CH. The genetic stability of this study was confirmed by the DNA-based fingerprinting method RAPD. The RAPD binding patterns indicated no variation among tissue culture-derived plants. The *in vitro* propagation protocol described herein can be introduced to the production of genetically stable date palm plants.

Keywords

amino acids, auxin, *in vitro*, macronutrient, RAPD, shoot regeneration

Introduction

Date palm (*Phoenix dactylifera* L.) is a flowering plant belonging to the monocotyledonous family Arecaceae and is an economically important tree species. Dates are a major food source and income source for local populations in the Middle East and North Africa (AL-KHALIFAH et al., 2013).

The traditional vegetative method of date palm propagation is by offshoots, what is inefficient because

each tree produces only a few offshoots, especially in some elite varieties, and fruit-bearing can take up to seven years (GANTAIT et al., 2018). The second way of propagation is by seeds, but it has many limitations including low rate of germination and progeny variations (CHAND and SINGH, 2004). With all these facts, *in vitro* propagation is the most promising method for the rapid propagation of date palms to overcome the decline in the number of desirable cultivars (AL-MAYAHI, 2019; ABDALLA et al., 2022). Plant

*Corresponding author:

e-mail: hng_1988@yahoo.com

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