INFLORESCENCES CULTURE OF DATE PALMS

By

AMANY ABDOU KINAWY

B.Sc. Agric. Sci. (Pomology Horticulture), Fac. Agric., Cairo Univ., 2010

THESIS

Submitted in partial Fulfillment of the requirements for the Degree of

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APPROVAL SHEET

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SUPERVISION SHEET

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ABSTRACT

This study was conducted to produce plants from inflorescences of date palm Sewi cv. through tissue culture technique. The present work study the effects of different auxins (2,4-D, NAA, NOA, IAA, IBA and picloram) at (10, 20 and 40mg/l) and types of sugar (sucrose, glucose and fructose) at 0.1 - 0.15 and 0.2M on direct somatic embryos and callus formation after eight months. Also the effect of different cytokinin combination, sugar alcohol, different media formula (NN- MS- B5- WPM) and complex addenda (Malt extract, Yeast extract and Casein hydrolysate) at concentrations 100, 200 and 400 mg/l and type of auxins IAA, IBA and NAA at concentrations 0.0 - 0.5 - 0.1 and 0.2mg/l on growth and development of produced embryos and callus were discussed on the study. The results showed that the addition of 40mg/l picloram induced the highest percentage (39.93%) of direct somatic embryo formation while the addition of 10mg/l picloram induced the highest percentage (59.96%) of callus formation. Sucrose is the preferred carbohydrate for direct and indirect somatic embryo formation percentages. Complex addenda promote callus growth and embryo formation. Either IBA or IAA induced the highest significant number of roots/shoot.

Key words: Phoenix dactylifera L.**,** Inflorescence, Micropropagation, auxins, complex addenda.

DEDICATION

This thesis is dedicated to my mother,
For her endless love, support and encouragement.
To the soul of my father to whom I feel so much grateful.

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LIST OF ABBREVIATIONS

2,4-D	Dichloro-phenoxyacetic acid
NAA	Naphthalene acetic acid
IAA	Indol acetic acid
NOA	2-Naphthoxy acetic acid
IBA	Indol butyric acid
Picloram	4-amino-3,5,6-trichloropicolinic acid
2iP	N6-(2-Iso-Pentenyl Adenine)
BA	Benzyl Adenine
GA_3	Gibberellic Acid
AC	Activated charcoal
MS	**Murashige and Skoog** medium **(1962)**
B5	**Gamborg** *et al.*,**(1968)**
NN	**Nitsch and Nitsch** medium **(1969)**
WPM	Woody Plant Medium **(Lloyd & McCown, 1980)**
SH	Schenk and Hildebrandant (1972)
ER	Eriksson medium
COA	Complex organic additives
ME	Malt extract
YE	Yeast extract
CH	Casein hydrolysate

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INTRODUCTION

Date palm (*Phoenix dactylifera* L.) of the family Arecaceae is a key plantation crop of many countries in arid regions in West Asia and North Africa (Al Khalifah *et al*., 2012).

Date palm is a perennial long-lived, dioecious, monocot which is a highly heterozygous plant with female floral initials characterized by high morphogenic potentialities for somatic embryogenesis and organogenesis (Masmoudi *et al.,* 2007). Utilizing inflorescence explants is considered as a quick and safe method to micropropagate date palms. Inflorescences (males or females) from adult plants can be used for the induction of embryogenic callus. This technique is useful especially in the case of singular trees that do not produce offshoots anymore (Zaid *et al.*, 2007).

The inflorescence explants proved promising alternative explants for micropropagation of elite cultivars and rare male and female individuals of date palm (Feki and Drira 2007).

Different tissue responses were observed for floral plant material cultured in vitro. Tissues reactions were influenced by many factors but mostly by medium composition (Abhamane 2013). Tissue and organ differentiation, somatic embryo and callus were induced, in many plant species, by the addition of exogenous auxins such as 2,4-D, IBA and NAA to the culture medium. Both the type and level of auxins influence in vitro responses although the genotype and the

developmental stage of the explants are also important factors governing success. Most tissue culture studies of palms have focused on the effects of different auxin types as IBA, 2,4-D, NAA, NOA, IAA and their concentrations on various explants cultures (Eke *et al*., 2005). 2,4-D, IBA, NAA, NOA, IAA are commonly used for regulation of tissues response and organ differentiation through *in vitro* culture. Recent advances in auxin biology have clarified the mode of action, singalling, and gene expression of this plant hormone (Dharmasiri *et al.*, 2004) and (Vanneste *et al*., 2009). Auxins induces the expression of several genes including Aux/IAA, GH_3 (IAA- amino acid conjugating enzyme), and glutathione S-transferase (Féher *et al*., 2003) and (Staswick, 2005). GH_3 protein homologs were strongly induced in response to picloram, NAA, 2,4-D (Wright *et al*., 1987). The auxin mimetic could use the signaling pathway of auxin response (Sané *et al*., 2012). Several workrs have been published describing some culture media for organogenesis or somatic embryogenesis (SE) of date palm (Ibrahim *et al*., 2012, Hassan and Taha 2012). Hassan *et al*., (2013) evaluated the effect of phytohormones, especially cytokinins, and activated charcoal on regeneration and shoot formation from explants of seven commercial date palm cultivars.

During the germination stage of somatic embryos produced through inflorescence culture, the use of modified MS salts at half strength supplemented with BA (0.05mg/l) and NAA (0.1mg/l) produced well-formed plantlets of date palm. Abhamane (2013).

The combination of one auxin and two cytokinins was found to be more effective on tissue growth and bud formation (Abahmane, 2005). The establishment of an effectual root system in vitro is vital for subsequent success throughout acclimatization to autotrophic condition. Usually in vitro grown micro shoots are rooted in an auxin - enriched medium to give rise to plantlets. Bekheet (2013).

This investigation is aimed to study some factors affecting the production of date palms plantlets from immature female inflorescences of sewy cultivar date palms through micropropagation protocol via tissue culture technique. These factors include the effects of sugars (Sucrose – Glucose - Fructose) and auxins (2,4-D – NAA – IAA – NOA – IBA – and picloram) on inflorescence response during the starting stage. Also the effect of different cytokinin combination, sugar alcohol, media composition, complex addend (Malt extract, Yeast extract and Casein hydrolysate) and different auxins during multiplication, elongation and rooting stages have been assessed.