PROPAGATION OF SOME ORNAMENTAL PLANTS by TISSUE CULTURE

By

NASHWA ABD EL KADER ABD EL KADER
B.Sc. Agric. Sci. (Plant Pathology), Fac. Agric., Cairo Univ., 2002

THESIS

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APPROVAL SHEET

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Date: / / 2014

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ABSTRACT

This investigation was carried out during the period from 2009 to 2012 at Ornamental Horticultur Department Fac. Of Agric. Cairo Univ. Giza Egypt. The experimental trial was conducted in Plant Tissue Culture Laboratory at El-Zohria Garden, Horticulture Research Institute, Agriculture Research Center, Ministry of Agriculture.

The aim of this study was to reach a well defined protocol protocol for *in vitro* propagation of *Gardenia jasminoides* Ellis, *Cordline fruticosa* Atom and *Spathiphyllum mauna* Loa. For, *G. jasminoides,* the best survival rate (100%) was found by using 1.5 % NaOCl for 25 min with zero% contamination and mortality. NAA at 4.0 mg/l during establishment stage, resulted in the highest shoot length and the highest number of leaves. For multiplication stage, 5mg/l BA was produced the highest number of shoots. At rooting stage, 3.0 mg/l IBA plus activated charcoal resulted the highest shootlet length and number of leaves. While, MS medium with activated charcoal contained 5.0 mg/l IBA produced the greatest number and length of roots. All plantlets acclimatized at pots containing 1:2 (v/v) peatmoss and sand. As for.*Cordyline fruticosa*, the highest survival percentage (100%) and the lowest mortality and contamination percentages were found at 2.0 % NaOCl for 25 min. At establishment stage, the highest number of shoots, shoot length and number of leaves were at full salt-strength of MS medium free hormon. While, callus formation were best at 5.0 mg/l NAA at different salt-strength of MS medium. For multiplication stage, the highest number of shoots resulted at 1.0 mg/l BA and 2.0 mg/l Kin. The highest shoot length and number of leaves were measured at control. The greatest callus formation was obtained at 4.0 mg/l BA and 3.0 mg/l kin. In the rooting stage, the highest shoot length, number of leaves, number of roots and root length were obtained on 3.0 mg/l IBA plus activated charcoal. For acclimatization stage, the highest plantlets length and number of leaves was achieved at pots containing 1:1(v/v) sand and peatmoss. Concerning. Spathiphyllum *mauna*, NaOCl at 2.0 % for 30 min resulted the largest survival percentage (100%) and lowest mortality or contamination percentage (0.0 %). at establishment stage, the highest number of shoots, number of leaves and shoot length was obtained on MS medium at full salt stregth plus 3.0 mg/l NAA. In the multiplication stage, 4.0 mg/l BA and 3.0 mg/l Kin was gave the highest number of shoots. Control treatment resulted the highest shoot length and number of leaves. Rooting medium plus 3.0 mg/l IBA without activated charcoal was the most effective to shoot length, number of leaves,but the best number of roots was obtained on MS medium plus1.0 mg/l IBA without activated charcoal., the highest root length was achieved on MS medium containing3.0 mg/l IBA plus activated charcoal. A mixture of peatmoss and sand at 1:2 (v/v) gave the highest number of leaves and plantlets length at acclimatization stage.

Key words: Micropropagation**,** Tissue Culture**,** *in vitro*, callus, *Gardenia jasminoides, Cordyline fruticosa,* Spathiphyllum *mauna***.**

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LIST OF ABBREVITATIONS

AC	Activated charcoal
B5	Gamborg *et al* medium
BA (BAP)	Benzyladenine or 6-benzylaminopurine
BM medium	(MS salts + 0.1 mg/l NAA)
cv (s)	Cultivar (s)
2,4-D	2,4-dichloro phenoxy acetic acid
GA_3	Gibberellic acid
IAA	Indole acetic acid
IBA	Indole butyric acid
2iP	2-isopentenyl aminopurine
Kin	Kinetin (6-furfurylaminopurine)
LS	Linsmaier & Skoog medium
µM	Micro mol
mM	Milli mol
MS	Murashige & Skoog medium
ng	Nano gram
NAA	Naphthalene acetic acid
N&N	Nitsch and Nitsch, medium
No.	Number
Bp	Base pair
PM	Pico Mole
ppm	Part per million
TDZ	Thidiazuron
WH	White medium
WP	Woody Plant medium

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Introduction

Tissue culture technique is used for propagation of numerous Ornamental plants for commercial purposes. Tissue culture has full potential of growing these plants on a large scale which will play a significant role in the introduction of new varieties. Micropropagation is a very economical means of multiplying a desirable plant species when time, space and personnel are often serious constraints. It is also possible to produce disease free, uniform propagules at needed quantity and at appropriate time of the year.

Gardenia jasminoides Ellis is an evergreen tropical plant, member of family *Rubiaceae* and belongs to the genus *Gardenia*. It is shrub cultivated in many temperate regions and favorite to gardeners throughout the world. The gardenia has very fragrant creamy-white flowers and glossy, dark-green leaves. White Gardenia blooms are borne from mid spring to early summer, a number of flowers opening over a fairly long season. It is used as a cut flower and a garden shrub.

It is a popular pot plant in the US and many European countries. There are over 200 species of Gardenias. In Florida, two species are of primary importance: *Gardenia jasminoides* which is native to China containing many cultivars, and *G. thunbergia* which is native to South Africa, grown primarily as a rootstock. This latter species is valuable due to its nematode resistance and the vigor it imparts to species grafted on its root **(Wilkins, 1986; He *et al.*, 2006; Duhoky and Rasheed, 2010 and Wu *et al*., 2012)**. In conventional propagation, terminal cutting of *G. jasminoides* results in a low proliferation rate, any way, cultivars of *G. jasminoides* can be propagated by cuttings or grafting. Cuttings can be taken any time during the year, but are most successful in June, July, and August months. However, the resulted plants are not too many. In this case, micropropagations a useful technique obtaining large number of plants in short time.

Among the approximately 20 species of *Cordyline*, which is in the family Agavaceae,. *Cordyline terminalis*, a native of Southeast Asia is the most popular species of the genus for indoor potted plants with multicoloured foliage. Many of the highly coloured named cultivars are propagated by terminal stem (tips) cuttings which are planted directly in pots. Micropropagation technique can be used to obtain large number of plants which much less expensive as compared to the conventional metheds.

Spathiphyllum mauna Loa literally translates into “leaf spathe.” It is commonly called Peace Lily, Snowflower, Spathe Flower, or White Anthurium. *Spathiphyllum mauna* belongs to the family Araceae, has about 41 species, and originates from Panama, Columbia,

Ecuador, Venezuela, the Malay Archipelago, Costa Rica, and the Philippines where it thrives in humid, tropical rainforest understories. From an ornamental viewpoint, the spathes and spadices are called flowers rather than the tiny true flowers on the spadix. Inflorescences are produced seasonally or intermittently and can also be induced with chemical sprays. *Spathiphyllum mauna* cultivars are popular interiorscape plants in part because of the wide selection of cultivars ranging in height from 12 inches to 4 feet. Also, they are easy to care for and they are attractive plants, with dark green foliage contrasting with lily-white flowers. They can be grown in a variety of pot sizes and hold up extremely well in interiorscapes. NASA even praised them in the Clean Air Study for their ability to remove formaldehyde, benzene, and carbon monoxide from interior air.

The present work aimed to study the process of propagating *Gardenia jasminoides* Ellis, *Cordyline fruticosa* Atom and *Spathiphyllum mauna* Loa through tissue culture technique in order to produce protocol for obtaining a large number of plants in short time.