

**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**

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Approval Committee

Dr. EMAN MOKHTAR ABOU EL GHAIT.....
Professor of Floriculture and Medicinal Plants, Fac. Agric.,
Mostohor, Bena University

Dr. MONA AHAMED DARWISH...
Professor of Ornamental Horticulture, Fac. Agric., Cairo
University

Dr. AZZA MOHAMED SAIED ARAFA
Professor of Ornamental Horticulture, Fac. Agric., Cairo
University

Date: / / 2014

**SUPERVISION
SHEET**

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**SUPERVISION
COMMITTEE**

Dr. AZZA MOHAMED SAIED ARAFA
Professor of Ornamental Horticulture, Fac. Agric., Cairo
University

Dr. SAFIA HAMDY EL HANAFY
Professor of Ornamental Horticulture, Fac. Agric., Cairo
University

Dr. MAMDOUH AHMED EL-SHAMY
Senior Researcher of Botanical Garden, Horticulture
Research Institute, A.R.C.

Name of Candidate: Nashwa Abd EL kader Abd EL kader **Degree:** M.Sc.
Title of Thesis: PROPAGATION OF SOME ORNAMENTAL PLANTS BY TISSUE CULTURE
Supervisors: Dr. Azza Mohamed Saied Arafa
Dr. Safia Hamdy Elhnafty
Dr. Mamdouh Ahmed El-Shamy
Department: Ornamental Horticulture
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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 streghth 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 plus 1.0 mg/l IBA without activated charcoal., the highest root length was achieved on MS medium containing 3.0 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 ABBREVIATIONS

AC	Activated charcoal
B5	Gamborg <i>et al</i> 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

CONTENTS

	Page
INTRODUCTION.....	1
REVIEW OF LITERATURE.	4
<i>Gardenia jasminoides</i> Ellis	4
<i>Cordyline fruticosa</i> Atom.	14
<i>Spathiphyllum mauna</i> Loa	20
MATERIALS AND METHODS.....	33
RESULTS AND DISCUSSION.....	44
1. Micropropagation of <i>Gardenia jasminoides</i>	44
a-Surface sterilization of <i>Gardenia jasminoides</i>	44
shoot tips.....	
b-Establishment stage of <i>Gardenia jasminoides</i>	46
shoot tips.....	
c-Multiplication stage of <i>Gardenia jasminoides</i>	48
shoot tips.....	
d-Rooting stage of <i>Gardenia jasminoides</i>	51
shoots.....	
e- Acclimatization stage of <i>Gardenia</i>	55

<i>jasminoides</i> shootlets.....	
2. Micropropagation of <i>Cordline fruticosa</i>	59
a- Surface sterilization of <i>Cordlin fruticosa</i>	
shoot tips.....	59
b- Establishment stage of <i>Cordline fruticosa</i>	61
shoot tips.....	
c- Multiplication stage of cordyline <i>fruticosa</i>	
shoot tips.....	67
d- Rooting stage of cordyline <i>fruticosa</i> shoots	72
e-Acclimatization stage of <i>Cordline fruticosa</i>	
shootlets.....	75
3. Micropropagation of <i>Spathiphyllum mauna</i>.....	79
a-Surface sterilization of <i>Spathiphyllum</i>	
<i>mauna</i> shoot tips.....	79
b-Establishment stage of <i>spathiphyllum</i>	
<i>mauna</i> shoot tips	83
c- Multiplication stage of <i>spathiphyllum</i>	
<i>mauna</i> shoot tips	86
d- Rooting stage of <i>spathiphyllum mauna</i>	91
shoots.....	
e- Acclimatization stage of <i>Spathiphyllum</i>	
<i>mauna</i> shootlets.....	96
SUMMARY.....	100
	104

REFERENCES.....

ARABIC SUMMARY.....

LIST OF TABLES

N o.	Title	Pa ge
1.	Effect of different concentrations of sodium hypochlorite (NaOCl) and different times of disinfectants on surface sterilization of <i>Gardenia jasminoides</i> shoot tips after two weeks	47
2.	Effect of different concentrations of NAA on establishment stage of <i>Gardenia jasminoides</i> shoot tips after four weeks.....	48
3.	Effect of different BA concentrations and number of subcultures shoot number ,shoot length and leaf number of <i>Gardenia jasminoides</i> on shoot tips during three Subcultures.....	52
4.	Effect of different concentrations of IBA and activated charcoal (AC) on rooting stage of <i>Gardenia jasminoides</i> shoot after four weeks.....	56
5.	Effect of different growing media on acclimatization stage of <i>Gardenia jasminoides</i> on shootlet.....	57
6.	Effect of different concentrations of sodium hypochlorite (NaOCl) and different times of disinfectants on surface sterilization of <i>Cordline fruticosa</i> shoot tips after two weeks.....	62

No.	Title	Page
7.	Effect of MS salt-strength and different concentrations of NAA on shoot number and shoot length (cm) during establishment stage of <i>Cordline fruticosa</i> shoot tips after four weeks.....	66
8.	Effect of MS salt-strength and different concentrations of NAA on leaf number and callus formation during establishment stage of <i>Cordline. fruticosa</i> shoot tips after four weeks.....	66
9.	Effect of different concentrations of BA and Kin on shoot number and shoot length (cm)of <i>Cordline fruticosa</i> shoot tips after three subcultures	71
10	Effect of different concentrations of BA and Kin on leaf number and callus formation of <i>Cordline fruticosa</i> shoot tips after three subcultures.....	71
11	Effect of different concentrations of IBA and activated charcoal (AC) on rooting stage of <i>Cordyline fruticosa</i> shoot after four weeks.....	76
12	Effect of some growing media (peatmoss or peatmoss and sand(v/v) on acclimatization stage of <i>Cordline fruticosa</i> on shootlets.....	77
13	Effect of different concentrations of sodium hypochlorite (NaOCl) and different times of disinfectants on surface sterilization of <i>Spathiphyllum mauna</i> shoot tips after two weeks.....	82
14	Effect of MS salt-strength and different concentrations of NAA on shoot number , shoot length (cm) during establishment stage and leaf number of <i>Spathiphyllum mauna</i> shoot tips after four weeks.....	87
15	Effect of different concentrations of BA and Kin on multiplication stage of <i>Spathiphyllum mauna</i> shoot tips after three subcultures	92
16	Effect of different concentrations of IBA and activated	97

No.	Title	Page
17	charcoal(AC) on rooting stage of <i>Spathiphyllum mauna</i> shoot after four weeks..... Effect of some growing media (peatmoss or peatmoss and sand(v\v) on acclimatization stage of <i>Spathiphyllum mauna</i> on shootlet.....	98

LIST OF Plates

No.	Title	Page
1.	Plate1: Shoot formation of <i>Gardenia jasminoides</i> Ellis after 4 weeks on medium during establishment stage.....	58
2.	Plate2: Shoot multiplication of <i>Gardenia jasminoides</i> Ellis after 3 subcultures on medium during multiplication stage.....	58
3.	Plate3: Root formation after 4 weeks on rooting medium during rooting stage of <i>Gardenia jasminoides</i> Ellis	58
4.	Plate4: Adaptation stage of <i>Gardenia jasminoides</i> Ellis after 4 weeks at greenhouse...	58
5.	Plate5: callus formation of <i>Cordline fruticosa</i> Atom after 3 subcultures on medium during multiplication stage..... ...	78
6.	Plate6: Shoot formation of <i>Cordline fruticosa</i>	78

No.	Title	Page
	Atom after 3 subcultures on medium during multiplication stage.....	
7.	Plate7: root formation after 4 weeks on rooting medium during rooting stage of <i>Cordline fruticosa</i> Atom.....	78
8.	Plate8: Adaptation stage of <i>Cordline fruticosa</i> Atom after 4 weeks at greenhouse..	78
9.	Plate9: Shoot formation of <i>Spathiphyllum mauna</i> Loa after 4 weeks on medium during establishment stage.....	99
10.	Plate10: Shoot multiplication of <i>Spathiphyllum mauna</i> Loa after 3 subcultures on medium during multiplication stage.....	99
11.	Plate11 Effect of activated charcoal after 4 weeks on rooting medium during rooting stage of <i>Spathiphyllum mauna</i> Loa.....	99
12.	Plate12 Adaptation stage of <i>Spathiphyllum Mauna</i> after 4 weeks at greenhouse.	99

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 methods.

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.