EFFECT OF GROWING MEDIA AND SOME BIO-STIMULANTS ON GROWTH AND CHEMICAL COMPOSITION OF *Cordyline terminalis* AND *Spathiphyllum wallisii* PLANTS

By

AFNAN ADNAN SABER

B.Sc. Agri. (Horticulture and landscape), Kirkuk Univ., Iraq, 2013

THESIS

Submitted in Partial Fulfillment of
Requirements for the Degree of

MASTER OF SCIENCE

In

Agricultural Sciences
(Ornamental Horticulture)

Department of Ornamental Horticulture
Faculty of Agriculture
Cairo University
EGYPT

2018

APPROVAL SHEET

EFFECT OF GROWING MEDIA AND SOME BIO-STIMULANTS ON GROWTH AND CHEMICAL COMPOSITION OF *Cordyline terminalis* AND *Spathiphyllum wallisii* PLANTS

M.Sc. Thesis
In
Agric. Sci. (Ornamental Horticulture)

By

AFNAN ADNAN SABER
B.Sc. Agri. (Horticulture and landscape), Kirkuk Univ., Iraq, 2013

APPROVAL COMMITTEE

Dr. AZZA ABD El-EHAMEED MAZHAR.....
Researcher Professor of Ornamental Plants and Woody Trees, N R C, Giza

Dr. El-SAADY MOHAMED BADAWY.....
Professor of Ornamental Hort., Fac. Agric., Cairo University

Dr. MOHAMED ABD EL-KHALEK EL-KHATEEB.....
Professor of Ornamental Hort., Fac. Agric., Cairo University

Dr. EFFAT ISMAIL EL-MAADAWY .....
Professor of Ornamental Hort., Fac. Agric., Cairo University

Date: 28 / 6 /2018

SUPERVISION SHEET

EFFECT OF GROWING MEDIA AND SOME BIO-STIMULANTS ON GROWTH AND CHEMICAL COMPOSITION OF *Cordyline terminalis* AND *Spathiphyllum wallisii* PLANTS

M.Sc. Thesis

In

Agric. Sci. (Ornamental Horticulture)

By

AFNAN ADNAN SABER

B.Sc. Agri. (Horticulture and landscape), Kirkuk Univ., Iraq, 2013

SUPERVISION COMMITTEE

Dr. MOHAMED ABD-ELKHALEK EL-KHATEEB
Professor of Ornamental Horticulture, Fac. Agric., Cairo University

Dr. EFFAT ISMAIL EL-MAADAWY
Professor of Ornamental Horticulture, Fac. Agric., Cairo University

NAME OF CANDIDATE:.Afnan Adnan Saber **DEGREE**: M.Sc.

TITLE: Effect of Growing Media and some Bio-Stimulants on Growth and Chemical Composition of *Cordyline terminalis* and *Spathiphyllum wallisii Plants*

SUPERVISORS : Dr. Mohamed Abd-Elkhalek El-Khateeb
Dr. Effat Ismail El-Maadawy

DEPERTMENT : Ornamental Horticulture **APPROVAL:** 28 / 6 /2018

ABSTRACT

The present study was accomplished to achieve the effect of stimulated and growing media on indoor plant during two consecutive seasons (2016 and 2017) at the Experimental Nursery of Ornamental Horticulture Department, Faculty of Agriculture, Cairo University**.** Effect of some biostimulants on *Spathiphyllum wallisii* (Algae at 2 and 4 g/l, chitosan at 0.1 and 0.2 g/l, Atonik at 1 and 2 ml/l and Humic acid at 1 and 2 ml/l) on the vegetative growth and chemical constituents of *Spathiphyllum wallisii* plant. The obtained results revealed that all treatments of the bio-stimulants significantly increased the plant height, stem thickness, significantly enhanced the formation of leaves ,as compared with the control treatment. The application of algae at 2g /l, produced the tallest plants, followed by the high level of atonik and chitosan. Atonik at 2ml/l and low level of algae treatments formed the thickest stems. The highest value of number of leaves and the heaviest leaves were produced with the treatments of atonik at 2ml/l and algae at 4g/l. The largest measured of leaf area for Peace lily plant (*Spathiphyllum wallisii*) was measured atonik at 2ml/l, followed by low level of algae and high levels of chitosan and humic acid. Spraying plants with chitosan at 0.2g/l or atonik at 2ml/l or algae at 4g/l increased the formation of roots .The foliar application of both humic at 1ml/l and chitosan at 0.1g/l was the best treatment for increasing the root length. Atonik at 2ml/l ,algae at 4g/l and chitosan at 0.2g/l gave the heaviest fresh weights of roots Most of the bio-stimulants treatments significantly increased the chlorophyll-a, and chitosan (0.2g/l) gave the highest content of chlorophyll-b .Spraying plants with atonik (2ml/l) or algae(2g/l) or chitosan(0.2g/l) effectively increased the carotenoids content.

Effect of growing media on *Cordyline terminalis* plant. Generally, growing the Cordyline plant in a mixture of sand+ polymer, sand + peatmoss+ vermiculite or sand+ peatmoss + perlite resulted in the tallest plants with the greatest number of leaves , the largest leaf area and stem diameter . The mixture of sand + peatmoss +compost as well as sand+ peatmoss +perlite significantly increased the number of shoots. Most of growing mixtures had a favorable effect on increasing the root length of cordyline as compared with the mixtures of sand+ peatmoss+ sawdust and sand + peatmoss+ dried leaves. The fresh and dry weights of leaves and stems were heavier in the mixtures of sand + peatmoss + perlite and sand + peatmoss + vermiculite. The mixtures of sand + peatmoss + peanut, sand + peatmoss + compost and sand + peatmoss + vermiculite were the most effective media in increasing the contents of both chlorophyll–a and chlorophyll–b .The highest value of the carbohydrates and indole content in the leaves of cordyline plants was recorded with the mixture of sand + peatmoss + vermiculite

key words: *Spathiphyllum wallisii*, algae, chitosan, atonik, humic acid, *Cordyline terminalis*, growing media

DEDICATION

*I will be honored to dedicate this work to my beloved family who had never failed in giving me the moral support and who taught me that even the largest tasks can be accomplished if it is done one step at a time with love. I love you Mom (**Gultan**), Dad (**Adnan**), my Husband (**Dr. Ali**), my beloved Brothers (**Ibrahem and Dr. Mohammed**), Sister (**Dr. Elaf**), my uncle (**Prof Dr.Yahya Jirjees**), and my friends, God bless you all.*

My deepest gratitude,

Afnan

ACKNOWLEDGEMENTS

First, thanks are due to ALLAH the Almighty for enabling me to achieve this work. I wish to express my deepest gratitude and sincere thanks to my supervisors Prof. Dr. Mohamed Abd-Elkhalek El-Khateeb and Prof Dr. Effat Ismail El-Maadawy for their Wised supervision, guidance, invaluable discussions and constructive comments that greatly improved the content, structure, and presentation of the work. Irecord my sincere gratitude to my husband (Dr.Ali Yahya Jirjees) and my family for their love, patience and support during the period of preparing this work. Special thanks and appreciation goes to the faculty member and staff in Ornamental Horticulture Department, Faculty of Agriculture, Cairo University and the administrative staff in Agriculture Cairo University for their help and continuous support.

Afnan Adnan Saber

CONTENTS

INTRODUCTION

Peace lily (*Spathiphyllum wallisii* L.) is a member of the family of Araceae and one of the most popular indoor houseplants (Sardoei, 2014). The plants have a dark-green leaves, lasting showy white flowers, and shade-tolerance (Chen *et al.,* 2005). The business of interior foliage plant production makes up a significant part of ornamental horticultural production (Chen *et al.*, 2003).*Cordyline terminalis* (Ti plant) *i*s a popular foliage plant belongs to family Asparagaceae. It is an evergreen foliage plant grown in houses or outdoors and it has high demand in the export markets as cut decorative foliage (Weerahewa and Somaratne, 2011). It is also popular as a potted plant, the *Cordyline terminalis* species is one of the most favorite of genus *Cordyline* (Kobayashi *et al.,* 2007). The colorful Ti-plant is perfect for creating a tropical landscape effect, with its smooth, flexible leaves ranging in color from variegated light greens and pinks to very dark reds. As foliage plants are produced primarily for interior decoration or plantscaping, a continued desire for multi-colour foliage plants in interior designs has resulted in a dramatic increase in ornamental foliage plant production (Ray et al., 2006)

Bio-stimulants are a category of relatively new products of diverse formulations that positively affect a plant's vital processes (Calvo *et al.,* 2014). Among naturally derived bio-stimulants, extracts from seaweed, humic substances, chitosan and algae extract. Algae as a new bio- fertilizer containing macronutrients as well as micronutrients, some growth regulators, polyamines, proteins and vitamins were