EFFECT OF SOME GROWTH REGULATORS ON GROWTH, YIELD AND FRUIT QUALITY OF LIME (CITRUS AURANTIFOLIA)

BY

AHMED SALAH ELDEEN HUSSIEN ABD-ALLAH

A thesis submitted in partial fulfillment

of

the requirement for the degree of

MASTER OF SCIENCE

in

Agriculture

(pomology)

Department of Horticulture

Faculty of Agriculture

Ain Shams University

1995

Approval Sheet

EFFECT OF SOME GROWTH REGULATORS ON GROWTH, YIELD AND FRUIT QUALITY OF LIME (*CITRUS AURANTIFOLIA*)

BY

AHMED SALAH ELDEEN HUSSIEN ABD-ALLAH

B. Sc. Agric. (HORTICULTURE), AL-AZHAR UNIVERSITY, 1984

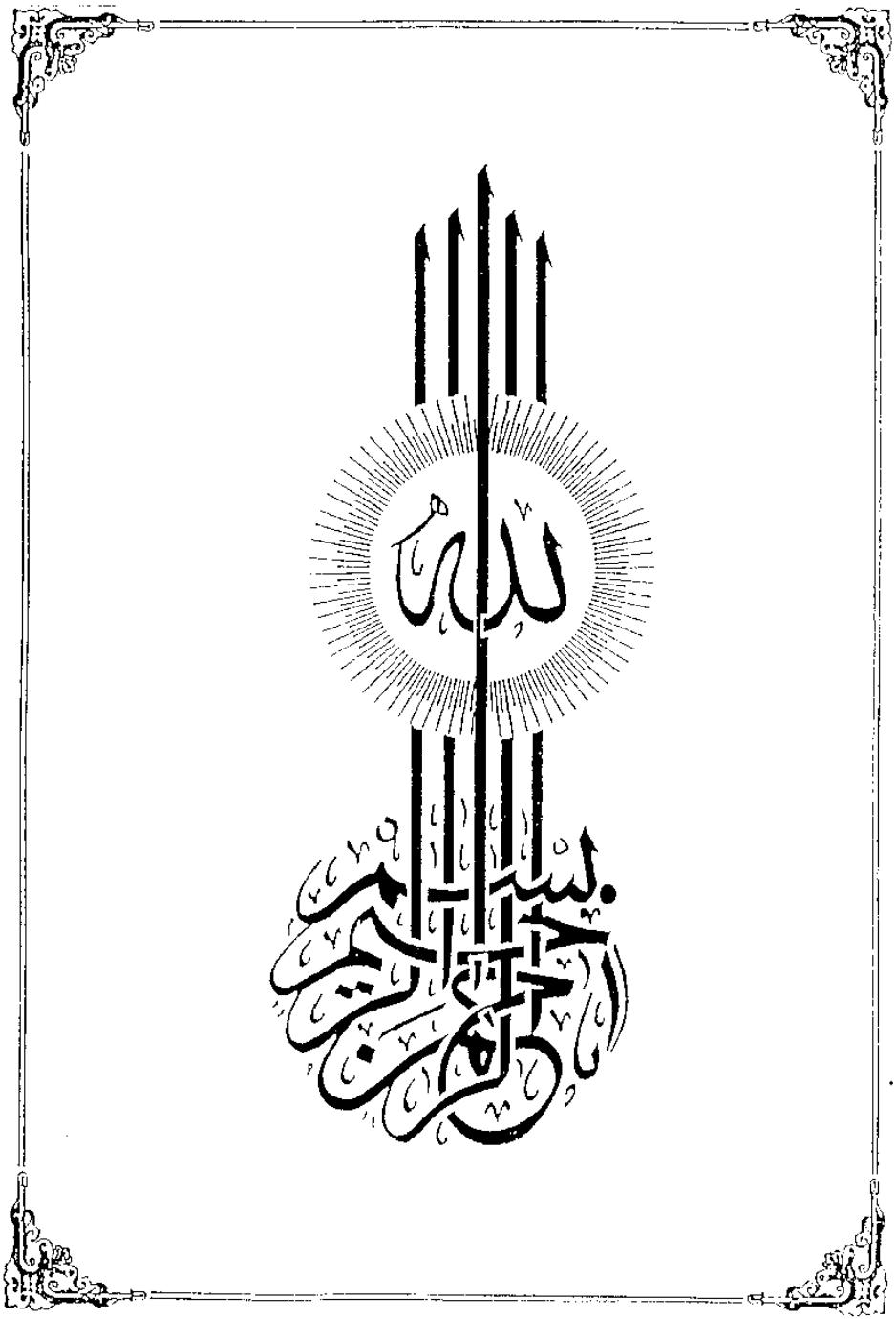
THIS THESIS FOR M.SC. DEGREE HAS BEEN APPROVED BY:

Prof. Dr. Moustafa, A. M. El-Hammady.....
Prof. of Pomology, Fac. of Agric., Tanta Univ.

Prof. Dr. Ibrahim, M. Desouky.....
Prof. of Pomology, Fac. of Agric., Ain Shams Univ.

Prof Dr. Ahmed Sayed Montasser.....
Prof of Pomology, Fac. of Agric., Ain Shams Univ.
(Supervisor)

Date of Examination : 22/ 1 / 1995.



EFFECT OF SOME GROWTH REGULATORS ON GROWTH, YIELD AND FRUIT QUALITY OF LIME (CITRUS AURANTIFOLIA)

BY

AHMED SALAH ELDEEN HUSSIEN ABD-ALLAH

Under the supervision of :

Prof. Dr. Abdel-Azeem M. El-Hammady
Prof. of Pomology, Horticulture Dept.,
Fac. of Agric., Ain Shams University

Prof. Dr. Ahmed, S. Montasser
Prof. of Pomology, Horticulture Dept.,
Fac. of Agric., Ain Shams University

Prof. Dr. Mamdooh. M. Nagib
Prof. of Pomology, Horticulture Dept.,
National Research Centre.

ABSTRACT

The effects of Gibberllic acid (GA_3) paclobutrazol (PP_{333}) and malic hydrazide (MH) spray on growth, yield and fruit quality of adult lime trees were studied during the seasons of 1991/1992 and 1992/93. The obtained results showed that spraying lime trees with GA_3 at 200 ppm in early December and again in late December increased slightly shoot length, decreased leaf area while it does not affect dry weight. Results also reveald that GA_3 increased significantly the percentage of vegetative buds and connsequently

decreased flower buds percentage. The effect was more pronounced in the spraying season than in the next one. In addition to that, trees sprayed with GA_3 were delayed in their blooming date. Although GA_3 Sprays increased fruit set percentage, the obtained yield was low. Chemical constituents, i.e. total carbohydrates in stems, total nitrogen and total chlorophyll contents in leaves had no diffinit trend. Fruit quality was slightly affected by GA_3 treatments.

Results also indicated that PP_{333} application decreased shoot length, leaf area and vegetative bud percentage, whereas dry weight of shoots was not affected. Also, date of flowering was not affected, but flower bud percentage was increased with spraying PP_{333} at 2000 ppm in June. With regard to yield attributes, both fruit set and fruit drop percentage decreased while yield was increased with spraying PP_{333}. This was clear in the successive year to spraying one. Chemical constitunts, i.e. total carbohydrates in stems, total nitrogen and total chlorophyll contents in leaves, were not affected. Fruit quality was slightly affected.

Results also showed that MH application decreased in general, shoot length, leaf area, dry weight of shoots and the percentage of vegetative buds. Date of blooming was delayed by about 7 days than the control and flower buds percentage was slightly affected.

Therefore, it could be recommended that spraying lime trees with GA_3 at 200 ppm in early December and again in late December followed by spraying PP_{333} at 1000 ppm in June or spraying MH at 3000 ppm in June, may serve in controlling cropping of such experimental lime trees with maintainance of their vegetative growth.

Key Words

- Lime trees
- Growth regulators
- Growth promotors
- Growth inhibitors
- Growth retardants
- Flowering
- Fruit quality
- Yield

ACKNOLEDGEMENT

I'm deeply indebted to Dr. Abdel-Azeem M. El-Hammady and Dr. Ahmed Sayed Montasser, professors of pomology, Faculty of Agriculture, Ain Shams University, For their supervision, guidance, encouragement, valuable suggestions and review of this manuscript.

My sincere gratitude to Dr. Mamdooh Nagib, professor of pomology, National Research Centre and Dr. Malakah Abd El-Fattah Saleh, assistant prof. of pomology, National research centre for their supervision, guidance, and sincere help.

My deep thanks are to Dr. Nazmy Abd El-Hamid, lecturer of pomology, Hort. Dept., Fac. of Agric., Ain Shams Univ. of his sincere help during the whole work and preparing of this manuscript.

Thanks are also due to the staff members of National Research Center, and the staff members of Fac. of Agric., Ain Shams Univ., for the great help offered by them.

CONTENTS

LIST OF TABLES

NO. Page

INTRODUCTION

INTRODUCTION

It is well known that lime (*Citrus aurantifolia*, Swingle) trees, as well as trees of the other citrus species, grow in two or three distinct flushes in spring, summer and autumn. Lime and lemon trees are characterized by flowering and fruiting with the production of new shoots in each flush. In this respect, lime trees bear heavy crop in the spring flush (main crop), while they bear light crops with the summer and autumn flushes (second crop). Fruits of the main crop, which mature in the period from July till September, are sold cheaply in the markets. On the contrary, fruits of the second crop which mature and are picked during the period from March till May are sold more expensively.

Therefore, the main problem of lime production, in Egypt, lies in how to control cropping of trees and producing fruits of high quality and optimizing price in the markets along the year. Fasting young lime trees for a short period or fasting old lime trees for a long period are the common tools performed by lime growers, particularly at El-Fayoum Governorate, to solve this problem. These cultural practices could not be applied in the other locations of lime production where the soil texture is not suitable. In addition to that, applying these cultural practices make lime trees weak and of low productivity.

Therefore, it was imperative to find a better method which can serve in solving this problem in lime groves located either at El-Fayoum Governorate or at the other locations of lime production.

It has been reported that treatment of fruit trees with growth regulating substances affect on the behaviour of their vegetative and reproductive growth. This effect may appeared as promotion, retardation or inhibition of such growth phases depending upon kind, concentration, method and time of application of such growth regulating substances. Applying such growth regulating substances may have some residual effects on tree growth and productivity in the year next to the year of spraying. However, such residual effects of growth regulating substances has no great attention till now in spite of its importance for the evaluation of any growth regulating substance to be profitable for use.

In this regard, various plant growth regulators have been used for controlling excessive vegtative shoot growth, changing yield and increasing the ability of citrus trees to cold hardiness, Lima and Davies (1984).

The major objective of this study was to determine the effects of various growth regulators, including gibberellic acid (GA_3), paclobutrazol (PP333) and malic hydrazide (MH) on controlling excessive vegetative growth, regulating yield and improving fruit quality of "Baladi" lime trees. In this

study, GA3 (as growth promotor), PP333 (as growth retardant or (antigibberellin) and Malic hydrazide (as growth inhibitor), were sprayed at different concentrations and dates to evaluate their effects on controlling growth and cropping of adult "Baladi" lime trees. Moreover, their residual effects on growth and yield in the successive season were also investigated.

REVIEW OF LITERATURE