EFFECT OF PRUNING AND SOME GROWTH REGULATORS ON GROWTH AND FRUITING OF SOME MANGO CULTIVARS

By

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THESIS

Submitted in Partial Fulfillment of the Requirements for the Degree of

DOCTOR OF PHILOSOPHY

In

Agricultural Sciences
(Pomology)

Department of Pomology
Faculty of Agriculture
Cairo University
EGYPT

2010

APPROVAL SHEET

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SUPERVISION SHEET

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Title of Thesis: Effect of Pruning and Some Growth Regulators on Growth and Fruiting of Some Mango Cultivars
Supervisors: Dr. Magda Mahmoud Khattab
Dr. Gamal Mohamed Mahmoud Hasseb
Department: Pomology **Approval: / / 2010**

ABSTRACT

This investigation was carried out through three successive seasons (2005, 2006 and 2006, 2007) on 8-year old trees of Ewais and Sedik mango trees, This investigation included two experiments; the first one was to evaluate the response of trees to different degrees of pruning severity and time of pruning, also different concentrations of GA_3 at El-Wadi El-Faregh Cairo/Alexandria Desert Road. The obtained results could be summarized as follows: the best results of emerged shoots, shoot length, number of leaves and number of flushes in Ewais cv. were achieved by removing the whole terminal shoots after set without GA_3 treatments. The best results of flowering attributes were obtained by removing the whole terminal shoots after set or after harvest + GA_3 treatments, also the best setting attributes were accomplished by all treatments after set; furthermore, Sedik cv. has the best vegetative attributes, flowering attributes and fruit yield by removing the whole terminal shoots after set + GA_3 at 100 ppm. The second experiment was done to evaluate the response of trees to different degrees of pruning severity and Ethrel concentrations after harvest. The obtained results were as follows: the best results of vegetative attributes were obtanied by removing the whole terminal shoots + Ethrel at 1000 ppm. The best results of flowering attributes were noted by removing the whole terminal shoots + Ethrel at 1000 ppm, the best results of setting and yield were achived by the severe pruning +Ethrel at1000ppm in Ewais cv. but for Sedik cv. the best results of vegetative attributes were reported by removing the whole terminal shoots + Ethrel concentrations, the best results for flowering attributes were obtanied by the severe pruning + Ethrel at 500 ppm, also the best results for setting attributes and yield were reported with the severe pruning +Ethrel at 500 ppm, also there was a noticeable effect on fruit quality.

Key Words: Mango- Pruning- GA_3- Ethrel- Vegetative growth- Flowering- Fruiting**.**

DEDICATION

I dedicate this work to whom my heart felt thanks; to my Father ***Abd El-Kader****, my mother and my brothers* ***Ahmed*** *&* ***Heba*** *and finally for my lovely family* ***Shahenda*** *&* ***Kareen*** *&* ***Kenzy*** *for their patience and for all the support they lovely offered along the period of my post graduation.*

ACKNOWLEDGEMENT

*First of all, praise is to **Allah**, Lord of the worlds.*

*The author feels deeply grateful to **Dr. Magda Khattab,** Professor of Pomology at the Faculty of Agriculture, Cairo University For her ideal supervision, suggesting the problems, willing advise, continuous encouragement, sincere help, criticism, patience and precious advise, fruitful discussion fatherly attitude and valuable help during the preparation of the manuscript of this investigation.*

*My deepest appreciation and gratitude to **Dr. Gamal Mohamed Hasseb,** Professor of Pomology at the same Faculty, for his ideal supervision, valuable guidance, continuous encouragement, fruitful discussion and helpful advice during the course of this investigation.*

My thanks are directed to all staff members of Pomology Department, Faculty of Agriculture, Cairo University.

Grateful deep appreciation is given to my father, my mother, my brother and my sister . Also I feel deeply grateful to my dear Family wife and my daughters.

*I feel deeply thankful to **Prof.Dr. Samy El-Kosary, Dr. Ayman shaban**, Ahmed Abd-Elhady, Abdo Mohamed, Hamed Hosny and Medhat Hamed.*

CONTENTS

INTRODUCTION

Mango, *Mangifera indica* L., belongs to the family Anacardiaceae.

Mango trees were introduced to Egypt around year 1825 and ever since, it has gradually expanded through out the country and became one of the main fruits witch ranks the third after Citrus and Grape. The total acreage of mango in Egypt reached 216,987 feddans producing about 466,436 tons with an average of 4,190 tons/fed. (FAO, 2008), this area is concentrated in Ismailia, Sharqia and Giza Governorates.

Egypt is considered one of the major mango producing countries in Africa. It produces a huge tonnage of mango fruits. However, a small percentage of the production is primly exported to regional markets (Litz, 1997). Since, the exported quantity reaches 2462 tons from the fresh fruits and 11,583 ton of the mango juice (FAO, 2007).

Among the popular cultivars in the domestic market for fresh consumption are Ewais and Sedik numerous others. These two cultivars of mango, intensely biennial in which flowering is season bound and is always preceded by a prolonged growth cessation.

Within the context of Egyptian cultivars and horticulture practices, there is a wide range of yields, but even the highest yielding feddans at 6-8 tons per feddans are way bellow the commercial levels achieved in Florida, Mexico, Israel and elsewhere for comparably aged

trees, productivity of mango trees is considered low due to many reasons such as high percentage of fruit drop, low fruit set and irregular bearing.

Sedik (early cultivar) and Ewaise (mid-season cultivar) are main local cultivars exhibit irregular bearing under desert conditions, regulation of flowering and fruiting of mango cultivars in general and for Ewaise and Sedik cvs. in particular are considered of vital importance. Observations indicated that Ewaise and Sedik cultivars performed well under drip irrigation in newly planted areas in the desert, but they have a tendency to alternately bear fruit producing at different rate in consecutive seasons.

Selective pruning of early and mid season cultivar (Ewais and Sedik) can be performed after harvest and still ensure that bearing shoots mature for the next crop. This cut removes the growth flushes that occurred during the previous season and will be replaced in the postharvest growth period by one to three new vegetative flushes.

GA_3 which is most likely produced in the leaves and transported to the meristem, up-regulates one or both of the genes LEAFY (LFY), a floral meristem identity gene.

Using growth regulators might be of importance in increasing productive, regulate flowering and fruit size of some mango cultivars. (Abou-Rawash *et al.* 1983). GA_3 and Ethrel may; directly or indirectly, functions as growth regulators in certain increase the flowering and fruiting.

This investigation aimed at studying the effect of after set and after harvest pruning, GA_3 and Ethrel treatments in “on” year on the vegetative, flowering and fruiting attributes of Ewais and Sedik cultivars in “off” year, in a trial to regulate the yield in both cultivars.

REVIEW OF LITERATURE

1. Effect of pruning and growth regulators on vegetative growth

a. Emerged shoots

Kulkarni (1983) stated that pruning of Alphonso mango trees in February resulted in an immediate production of vegetative growth.

Reddy (1983) concluded that pruning of fruited shoots after harvest induced new vegetative growth abundantly early in the season. These new shoots, however, failed to bloom normally in the succeeding “off” year. Moreover, removing persistent peduncles on fruited shoots after fruit picking showed very little effect on induction of vegetative growth. Also, GA_3 was not effective in inducing vegetative growth in fruited shoots after harvest.

Das (1989) stated that GA_3 applied alone or with urea produced a vegetative flush leading to increased shoot length.

Moreover Singh and Rajput (1990) found that GA_3 at 0 and 30 ppm were applied on 30 Jan. and 1 Mar. 1984 and 1985 ("off" and "on" years, respectively) to the alternate bearing cultivar Langra, the number of lateral shoots was not affected by the treatments.

Nunez-Elisea *et al*. (1996) found that removing apical buds of mango by pruning stimulated initiation of shoots from auxiliary buds. Moreover, Pruning induced emerging shoots growth on pruned branches Lal *et al* (2000).

Kumar *et al.* (2003) determine the effect of pruning shoots 10 cm back from the tips in mid-July, on the production of new shoots,

subsequent growth, and flowering, the highest number of shoots produced 2 laterals (261) followed by 3 laterals (230), but up to 6 laterals was produced by some shoots.

Yeshitela *et al*. (2003) found that postharvest pruning of terminal shoots that had been bearing fruit of the previous season were cut back to a suitable node produced the longest flush and the shortest was observed for trees when inflorescence removed together with apical whorl of leaves subtending the inflorescence (about 5 cm deep from the tip) during full bloom were applied in keitt cultivar. Similar data were obtained in Tommy Atkins cultivar but the length of new flushes when postharvest pruning treatment was applied was not significantly different to that when renewal pruning where 20-30% of terminal shoots with weak, misshaped and small fruit were cut back to a suitable node in October was executed.

Crane (2004) used pruning as a mean to control mango trees size and synchronize the vegetative cycle of the trees. He found that heading back or removing terminal flushes increased the number of emerged shoots. Moreover, he found that pinching decreased the number of emerged shoots.

In addition, removing terminal flushes recorded the highest significant increase in number of emerged shoots per pruned shoots followed by those resulted from heading back or pinching. Also all pruning treatments in January significantly increased the number of emerged shoots (Shaban, 2005). Similar results reported by Kumar and Reddy (2007)

b. Shoot length

Das (1989) stated that GA_3 applied alone or with urea produced a vegetative flush leading to increased shoot length. Moreover Singh and Rajput (1990) found that GA_3 at 0 and 30 ppm was applied on 30 Jan. and again on 1 Mar. 1984 and 1985 ("off" and "on" years, respectively) to the alternate bearing cultivar Langra, the length of terminal shoots was greatest in the treatment with GA_3.

Lal *et al.* (2000) found that pruning influenced growth of Dashehari mango trees and increased length of emerging shoots.

Moreover, the longest shoot of mango Keitt were observed with treatment of inflorescence removal together with apical whorl of leaves during full bloom. The same result like were found in Tommy Atkins cultivar, for this parameter but the length of new shoots of postharvest pruning was not significant different from that of renewal pruning where 20-30% of terminal shoots, the shortest shoots were observed from the control trees in Tommy Atkins cultivar (Yeshitela, 2003),

While Shinde *et al*. (2003) reported that heading back of branches at 50 cm level on alternate limb of the mango trees achieve the highest shoot length while heading back of branches at 50 cm level on entire tree with 0.75 g of PP333 achieved the lowest shoot length.

Shaban (2005) reported that length of emerged shoots increased with in increasing pruning severity, removing terminal flushes or heading back seemed to increase shoot length more than pinching, however, the highest shoot length was noticed with removing terminal flushes in November. Furthermore, heading back significantly

increased shoot length for all dates pruning, while it was significant only in November. Pinching in February decreased shoot length comparing to the control, so removing terminal flushes was the best pruning treatments for increasing shoot length.

c. Number of leaves

Oosthuyse and Jacobs (1996) demonstrated that tipping can be used to eliminate the problems associated with poor branching and increase number of leaves of Sensation and Kent mango trees.

Yeshitela (2003) demonstrated that the number of leaves developed per new flush was also affected by the interaction between cultivars and treatments. Tommy Atkins trees that received postharvest pruning had higher number of new leaves developed by 106.7% higher as compared to the control. In Keitt trees, higher number of leaves was recorded for post harvest pruning. However, the results were not significantly different from the results obtained for the control trees.

Moreover, Shaban (2005) reported that pruning by removing terminal flushes in December and November proved to be effective in increasing number of leaves per emerged shoot comparing to the control. In addition, heading back on the same dates resulted also in a significantly increase in number of leaves per emerged shoot. Pinching or heading back decreased number of leaves per shoot, however the differences were insignificant comparing to the control, all pruning treatments (pinching, heading back and removing all the terminal flushes) significantly increased number of leaves per shoot except pinching in October which significantly decreased this number,