SOME STUDIES ON FLOWERING AND SETTING ON CITRUS TREES

by

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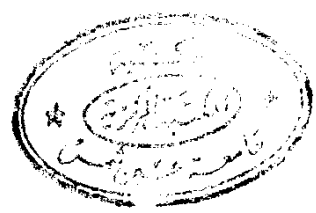

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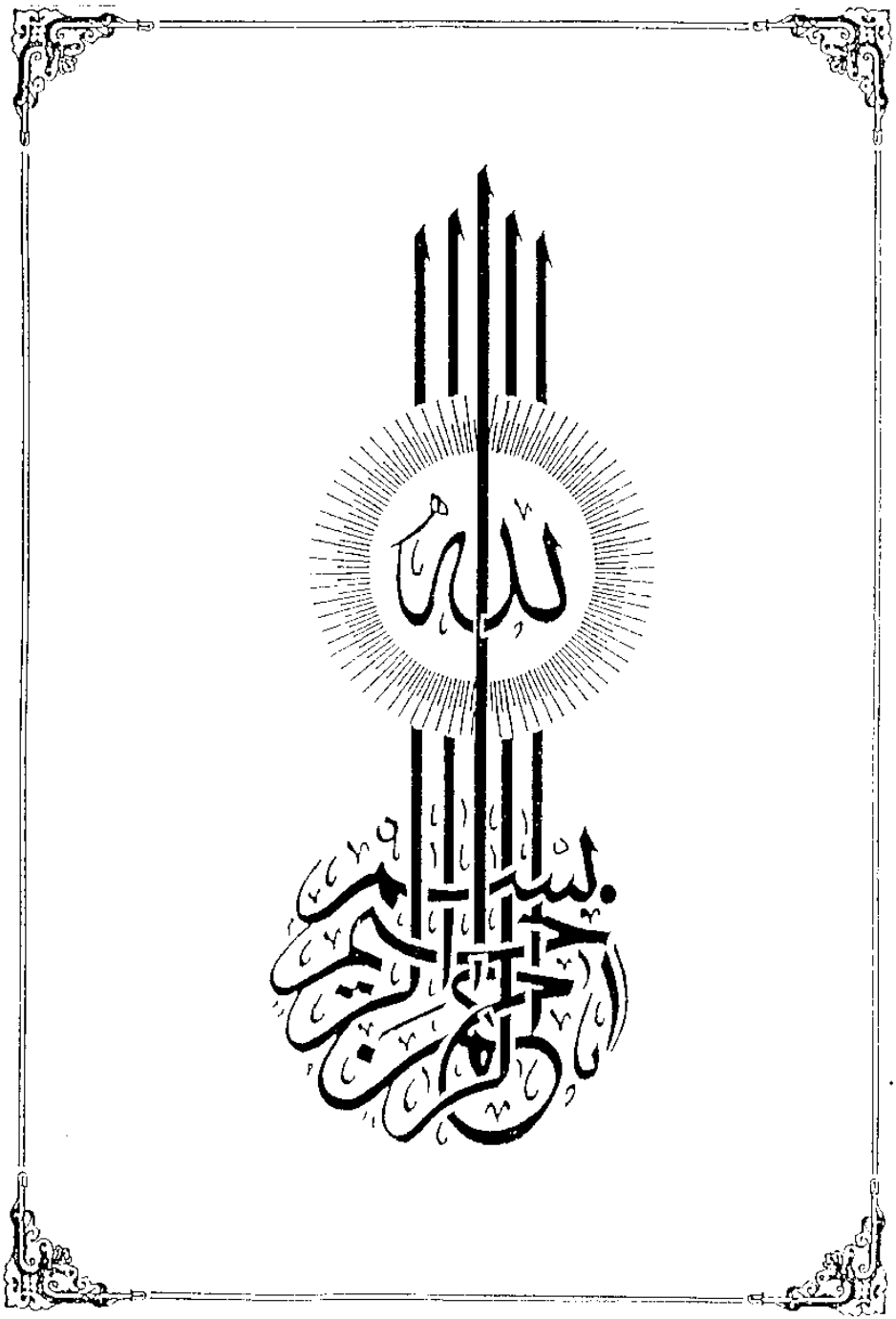

P R E S E N T A T I O N

TO THE GREAT MASTER OF ALL

HUMANITY OUR PROPHET

MOHAMED

A C K N O W L E D G M E N T

I would like to express deep sense of gratitude to Dr. Y. A. Wally and Dr. A. B. Abou Aziz, under whose supervision this work was carried out. Their kind help, constructive criticism and constant guidance throughout the course of investigation are very much appreciated.

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C O N T E N T S

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INTRODUCTION

The U.A.R. government encourages the production of citrus ..its in the last few years and that is due to the future wide ..portation. The urgency of exporting was due to urgent need of ..reign curency essintial for industry.

The increase of production is based upon two factors. The ..st, an increase in the urea cultivated(horizontal enlargment), ..ereas the second factor is the increase in the production per ..dan . Such factor is affected by pest and disease control, ..rtilizers. irrigation applications and also to solve some ..oblems which may face citrus fruits' growers.

One of the most common problems is flower shedding and fruit ..ropping which affect, to a certain extent , citrus production.

There are further reasons which may contribute separately ..r collectively in the case of flower shedding and fruit dropping. ..he temperature fluctuations from one season or day to another, ..ay justify that condition, besides, it may be a result of the ..hange in temperature between day and night. On the other hand, ..he changes of atmospheric humidity and soil moisture may affect ..uch phenomenon . Generally, agricultural practices are respon-..sible for flower shedding and fruit dropping

Growth active substances may control flower shedding and ..fruit dropping .2,4-D and 2,4,5-T auxin were successfly used so ..as to limit fruit dropping . Orange and-especially navel orange

being one of the most affected species as for flower shedding and fruit dropping . It has been disclosed that sprays for minor elements, viz. boron and molybdenum, have done beneficial rôle in improving plant growth and cropping (1), (4) , (7), (8), (11),(13),(23) and (32).

It is well known that new reclamed area in U.A.R. are mainly in sandy soils which are characterized by lacking of nutrients. Accordingly , both boron and molybdenum sprays were tried to investigate their effects on flower shedding and fruit dropping, moreover, their effect on fruit quality was also studied.

It was also reported that glutamic acid sprays have some effect on both flower shedding and fruit dropping (30) and (44). Hence , such study was also involved in the experiment . ~~Nothing~~

Nothing concerning the metabolism of the organic acid s during fruit dropping has been explored . It seems quite inevitable to study such point to clarify the physiology of fruit dropping.

REVIEW OF LITERATURE

1 . BORON:

Effect of boron on fruit setting and yield:

Sato (1963) working on citrus found that boron deficient trees were less vigorous than normal trees, and gave smaller yield of smaller fruits. A heavy drop of young fruits occurred. Similar results concerning apples and pears were obtained by Compton (1957) , Bankatova and Bramilage & Thompson (1962). Boron spray treatments increased fruit-set of some varieties of apples and failed to affect others. However, Condel (1961) reported that boron foliar spray of grapes during flowering time increased the percentage of flower-set.

Titarenko and Kuzecova (1959) working on chrysanthemum, found that boron sprays increased the number of flowers. Similar results concerning broad beans were obtained by Velasco and Carrido (1962). The Annual Report(1959) of the government chemists of Tanganika also reported that boron improved coffee flowering.

Sato (1963) mentioned that citrus trees suffering from boron deficiency yielded small fruits and less yield. Mester (1963) treating grapes during flowering with boron increased the yield. Bowen (1957) and Emmert (1961) also found that boron increased tomato yield.

Seasonal changes in boron content:

Lebanauskas Jones and Embleton (1960) mentioned that

boron content of Washington navel orange leaves remained constant during the winter monthes, then slightly decreased during bloom, and at initiation of new flush which took place at the end of the growing season.

Effect of boron on carbohydrate and protein metabolism:

Najdenov (1957) and Derkunskaja (1961) reported that vine treated trees showed an increase in sugar content. Similar results were obtained by Azimov (1959) on strawberry, who found that boron spray led to a great accumulation of high molecular carbohydrates. Rodrigvez (1962) reported that coffee boron deficient trees yielded less values of reducing sugars, whereas total nitrogen increased. Singh and Singh (1960) working on sugar-cane found that sugar translocation to terminal buds was affected towards decrease in boron deficient plants. Scholz (1962) found that boron deficient lima minor plants produced an extreme accumulation of starch, he added that this mainly seemed to be due to an influence of boron on carbohydrate metabolism, rather than to any effect on translocation , he alsc mentioned that protein content was remarkably reduced. Skolnik and Solwva (1961) studying the growing points of sun-flower deficient plants, found a disturbance in the nucclic acid metabolism. Similar results were obtained by Skolnik and Mevskaia (1962) working on beans and sunflowers. Boron deficient plants contained less RNA and DNA than the control. Kiplenko (1963) indicated that boron activated tobacco synthesis, translocation and transformation of

soluble carbohydrate and increased the yield. On the other hand, Curtis(1961), found that tobacco cell wall was affected by boron deficiency which caused light changes for relative pectic substances and cellulose. At the same time, Slack and Whitington (1964) reported that boron is concerned with radical cell-wall bonding.

2 . MOLYBDENUM:

Effect of molybdenum on flowering, fruit-seeting and yield:

Condel (1961) found that spraying vines with molybdenum increased the percentage of flower-set and the weight of 100 berries . Similar results were obtained by Fernandez (1959) on apple and tomato plants suffering from molybdenum deficiency. On the other hand, Kalinina (1963) reported that molybdenum at 0.15 g. per Kg. in the form of ammonium molybdate increased the pea yield. The findings of Martynenko, Lranova (1962) and Reisenaver (1963) were in line with those previously mentioned. It has been reported from the Washington State College (1960) mentioned that molybdenum sprayed strawberries showed an increase in growth and yield. Ammonium molybdate sprays in creased leaves total sugars and intensified their translocation. Singh and Singh (1960) found that molybdenum treatments on soil and /or as spray increased protein content of cane plants.

Watson (1960) working on the nutrition of centrosema pupescens and pureria pheseoloides found that molybdenum increased nitrogen contents and the dry weight production.

Ratner and Akimockina (1962) mentioned that infilteration of the leaves of Mo-deficient lettuce plants with sodium molybdate or vitamins of the B group increase the nitrate reductase activity of the leaves .The added Mo and the B group vitamins led to an increase in the ratio of protein N to nitrate-N- in the leaves Mo increase growth than did the vitamins .

Marcoliz (1963) working on tomato, found that molybdenum deficiency increased soluble nitrogen whereas Singh and Singh (1960) reported that sugar -cane protein content increased by molybdenum spraying.

Minina (1960) reported that molybdenum improved the growth and nitrate content of lettuce plants The treatments decreased glutamic and increased ascorbic acid content.

Boron and Molybdenum and fruit quality:

Morozova (1960) mentioned that boron nutrition of vines increased bunch size, whereas Sato (1964) reported that the rind of citrus Nats daidai in boron deficient fruits was thickened. Frolov(1967) working on vine found that boron increased bunch weight. Similar results were obtained by Condel(1961)on vines. Ishihara (1965) mentioned that boron application to Natsudaidai trees increased fruit weight. On the other hand, Condel (1961) reported that molybdenum increased the weight of 100 grapes in vine.

Thomas (1960) working on Jonathan apples found that boron sprays increased fruit acidity. On the other hand, Ishihara

(1965) working on Natsudaida trees indicated that boron application increased fruit and seed weight and decreased the total sugar content and sugar/acid ratio.

Minina (1960) mentioned that molybdenum increased ascorbic acid content in lettuce plants, whereas Fernandez (1960)reported that boron did not affect Vitamin C content of the tomato juice. However, Gorindan (1950) mentioned that boron increased the ascorbic acid of tomato fruits.

Sinclair and Brown (1960) reported that molybdenum sprays reduced tomato markitable yield.

3. GLUTAMIC ACID:

Rubinstein and Leopold (1962) studying the effect of amino acids on bean leaf abscission, found that alanine and glutamic acid produced marked promotions of abscission.

The results of Yager and Muir (1958) on tobacco showed similar results concerning leucine, alanine and glutamic acid, whereas methionine as a methyl donor may interact with indoleacetic acid to control abscission.

MATERIAL AND METHODS

This investigation was carried out on "Washington"navel orange trees, twelve years old, planted at Barshome orchard in Kalyoubeya Governorate. The soil is light clay received the normal agricultural practices (manuring, irrigation, pest control, etc.). The selected trees were uniform in vigour, growth and productivity .

First Season 1967:

The yield was harvested in November 1966, weighed and calculated as number of fruits per tree. Trees were divided into two classes and each class consists of four groups. Each group is represented by five trees. The first class was sprayed once at full -bloom, each group with its treatment as follows:-

Group A : Trees were sprayed by 1 p.p.m. boron as (boric acid)

Group B : Trees were sprayed by 5 p.p.m. molybdenum as (ammonium molybdate)

Group C : Trees were sprayed by 5 p.p.m. glutamic acid.

Group D : Trees served as control (untreated trees) and were sprayed by water and wetting agent.

The second class with its four groups were sprayed once at late May 1967 . All groups were sprayed similarily as far as the treatments were concered.

Every tree was sprayed with twenty liters of solution. Such