

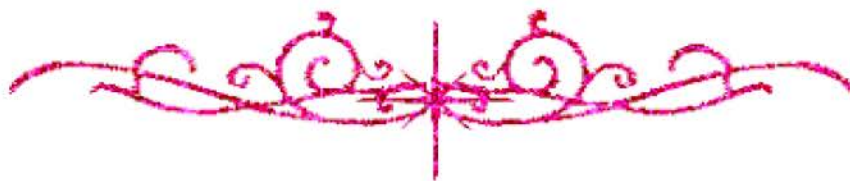
# بسم الله الرحمن الرحيم





# شبكة المعلومات الجامعية

## التوثيق الالكتروني والميكروفيلم





# جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

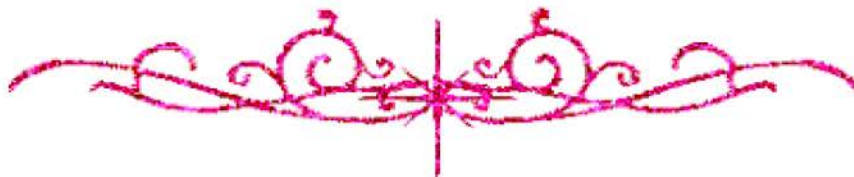
## قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها  
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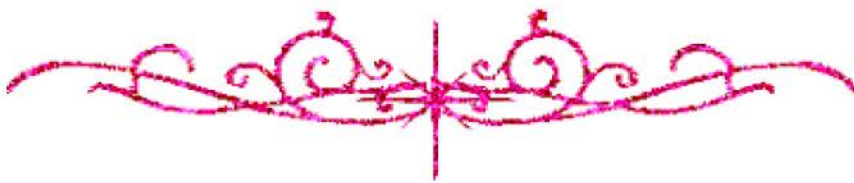
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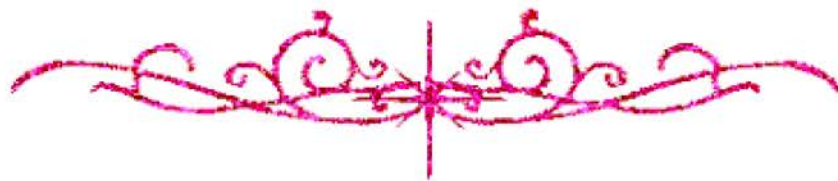
# بعض الوثائق الأصلية تالفة







بالرسالة صفحات  
لم ترد بالأصل



**IMPACT OF SPRAYING WASHINGTON NAVEL  
ORANGE TREES WITH COBALT, SELENIUM  
AND SILICON SALTS ON VEGETATIVE  
GROWTH, PRODUCTIVITY AND  
FRUIT QUALITY**

By

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B.Sc. Agric. Sc. (Pomology), Fac. of Agric., Cairo Univ., 2001  
M.Sc. Agric. Sc. (Horticulture), Fac. of Agric., Ain Shams Univ., 2009

**A Thesis Submitted in Partial Fulfillment  
Of  
the Requirements for the Degree**

**DOCTOR OF PHILOSOPHY  
in  
Agricultural Sciences  
(Pomology)**

**Department of Horticulture  
Faculty of Agriculture  
Ain Shams University**

**2020**

## **Approval Sheet**

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## ABSTRACT

**Basem Mohamed Mohamed: Impact of Spraying Washington Navel Orange Trees with Cobalt, Selenium and Silicon Salts on Vegetative Growth, Productivity and Fruit Quality. Unpublished Ph.D. Thesis, Department of Horticulture, Faculty of Agriculture, Ain Shams University, 2020.**

A study was carried out during two successive seasons, 2012 and 2013 on 7 years old Washington Navel Orange trees (*Citrus sinensis*) budded on sour orange rootstock (*Citrus aurantium*, L.) and planted at 5 x 5 meters under basin irrigation system. The trees are grown in a private orchard located at El-Kalubia Governorate Egypt. The study involved three experiments as follows:

The first experiment: Impact of spraying cobalt sulphate on vegetative growth, fruit set%, fruit drop%, productivity, fruit quality, leaf mineral concentrations and enzymes activity of Navel orange trees.

This experiment included five levels of cobalt (0, 5, 10, 20 and 40 ppm) as cobalt sulphate ( $\text{CoSO}_4$ ). Selected trees were sprayed twice in each season (the first week of each Mar. and Sept.). The experiment was arranged in a randomized complete block design with four replicates. Results indicated that 20 ppm Co gave the highest values of yield/tree, fruit weight, total soluble solids, leaf N, P, K, Ca, Mg, Zn, Mn and Co content as compared to the control treatment which gained the lowest values.

The second experiment: Impact of spraying sodium selenite on vegetative growth, fruit set%, fruit drop%, productivity, fruit quality, leaf mineral concentrations and enzymes activity of Navel orange trees.

This experiment included five levels of selenium (0, 20, 40, 80 and 160 ppm) as sodium selenite (20% Se) ( $\text{Na}_2\text{SeO}_3 \cdot 5\text{H}_2\text{O}$ ). Selected

trees were sprayed twice in each season ( the first week of each Mar. and Sept.). The experiment was arranged in a randomized complete block design with four replicates. Results indicated that 40 ppm selenium gave the highest values of yield/tree, fruit weight, total soluble solids, leaf N, K, Ca, Mg, Fe, Zn, Mn and Se content as compared to the control treatment which gained the lowest values.

The third experiment: Impact of spraying silicon on vegetative growth, fruit set%, fruit drop%, productivity, fruit quality, leaf mineral concentrations and enzymes activity of Navel orange trees.

This experiment included five levels of silicon (0, 25, 50, 100 and 200 ppm ) as silicon (Si) . Selected trees were sprayed twice in each season ( the first week of each Mar. and Sept.). The experiment was arranged in a randomized complete block design with four replicates. Results indicated that 50 ppm silicon gave the highest values of yield/tree, fruit weight, total soluble solids, leaf N, P, K, Ca, Mg, Fe, Zn, Mn and Si content as compared to the control treatment which gained the lowest values.

**Key words:** Navel orange, Cobalt, Selenium, Silicon, Fruit quality, Leaf mineral content, Fruit mineral content.

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Deep thanks and great gratitude to **Dr. Nabil Sabet** Researcher Associate Professor of Pomology, National Research Center for his supervision and great support.

I am deeply grateful to **Dr. Emad El Din Ali** Researcher Associate Professor of Pomology, National Research Center for his supervision, and preparing this manuscript.



## **DEDICATION**

I dedicate this work to whom my heartfelt thanks; to **Dr. Mamdouh Mohamed Nageib**, Prof. Emeritus of Pomology, National Research Center for kind help and encouragement.

## CONTENTS

|                                                                                                                                                                                                                   | <b>Page</b> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| <b>LIST OF TABLES.....</b>                                                                                                                                                                                        | <b>VI</b>   |
| <b>LIST OF FIGURES .....</b>                                                                                                                                                                                      | <b>IX</b>   |
| <b>1. INTRODUCTION.....</b>                                                                                                                                                                                       | <b>1</b>    |
| <b>2. REVIEW OF LITERATURE.....</b>                                                                                                                                                                               | <b>3</b>    |
| 2.1. The active role of cobalt in plant life.....                                                                                                                                                                 | 3           |
| 2.2. The active role of selenium in plant life .....                                                                                                                                                              | 5           |
| 2.3. The active role of silicon in plant life .....                                                                                                                                                               | 11          |
| <b>3. MATERIALS AND METHODS .....</b>                                                                                                                                                                             | <b>17</b>   |
| <b>4. RESULTS .....</b>                                                                                                                                                                                           | <b>23</b>   |
| 4.1. The first experiment: Impact of spraying cobalt sulphate on vegetative growth, fruit set%, fruit drop%, productivity, fruit quality, leaf mineral concentrations and enzymes activity of Navel orange trees. | 23          |
| 4.1.1. Vegetative growth: .....                                                                                                                                                                                   | 23          |
| 4.1.1.1. Number of shoots/ branch .....                                                                                                                                                                           | 23          |
| 4.1.1.2. Shoot length .....                                                                                                                                                                                       | 23          |
| 4.1.1.3. Number of leaves/ shoot .....                                                                                                                                                                            | 23          |
| 4.1.1.4. Leaf area .....                                                                                                                                                                                          | 24          |
| 4.1.2. Fruit set percentage.....                                                                                                                                                                                  | 30          |
| 4.1.3. Fruit drop percentage.....                                                                                                                                                                                 | 30          |
| 4.1.4. Yield/tree .....                                                                                                                                                                                           | 35          |
| 4.1.5. Fruit quality .....                                                                                                                                                                                        | 40          |
| 4.1.5.1. Fruit physical characteristics .....                                                                                                                                                                     | 40          |
| 4.1.5.1.1. Fruit volume .....                                                                                                                                                                                     | 40          |
| 4.1.5.1.2. Fruit height .....                                                                                                                                                                                     | 40          |
| 4.1.5.1.3. Fruit diameter .....                                                                                                                                                                                   | 40          |
| 4.1.5.1.4. Peel thickness .....                                                                                                                                                                                   | 40          |
| 4.1.5.1.5. Pulp weight .....                                                                                                                                                                                      | 41          |
| 4.1.5.1.6 Pulp percentage .....                                                                                                                                                                                   | 41          |
| 4.1.5. 2. Fruit chemical characteristics .....                                                                                                                                                                    | 45          |

|                                                                                                                                                                                                                             | <b>Page</b> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 4.1.5.2.1. Total soluble solids percentage .....                                                                                                                                                                            | 49          |
| 4.1.5.2.2. Total acidity percentage .....                                                                                                                                                                                   | 49          |
| 4.1.5.2.3. TSS/acid ratio.....                                                                                                                                                                                              | 49          |
| 4.1.5.2. Ascorbic acid.....                                                                                                                                                                                                 | 49          |
| 4.1.6. Leaf mineral concentrations: .....                                                                                                                                                                                   | 55          |
| 4.1.6.1. Leaf nitrogen percentage .....                                                                                                                                                                                     | 55          |
| 4.1.6.2. Leaf phosphorus percentage .....                                                                                                                                                                                   | 55          |
| 4.1.6.3. Leaf potassium percentage .....                                                                                                                                                                                    | 55          |
| 4.1.6.4. Leaf calcium percentage .....                                                                                                                                                                                      | 55          |
| 4.1.6.5. Leaf magnesium percentage .....                                                                                                                                                                                    | 56          |
| 4.1.6.6. Leaf iron concentration .....                                                                                                                                                                                      | 56          |
| 4.1.6.7. Leaf zinc concentration .....                                                                                                                                                                                      | 56          |
| 4.1.6.8. Leaf manganese concentration .....                                                                                                                                                                                 | 56          |
| 4.1.6.9. Leaf cobalt concentration .....                                                                                                                                                                                    | 56          |
| 4.1.7. Cobalt in fruit pulp .....                                                                                                                                                                                           | 68          |
| 4.1.8. Enzymes activity in fruit pedicels .....                                                                                                                                                                             | 70          |
| 4.1.8.1. Pectinase activity.....                                                                                                                                                                                            | 70          |
| 4.1.8.2. Cellulase activity.....                                                                                                                                                                                            | 70          |
| 4.2. The second experiment: Impact of spraying sodium selenite<br>on vegetative growth, fruit set%, fruit drop%, productivity, fruit<br>quality, leaf mineral concentrations and enzymes activity of Navel<br>orange trees. | 73          |
| 4.2.1. Vegetative growth.....                                                                                                                                                                                               | 73          |
| 4.2.1.1. Number of shoots/ branch .....                                                                                                                                                                                     | 73          |
| 4.2.1.2. Shoot length .....                                                                                                                                                                                                 | 73          |
| 4.2.1.3. Number of leaves/ shoot .....                                                                                                                                                                                      | 73          |
| 4.2.1.4. Leaf area .....                                                                                                                                                                                                    | 73          |
| 4.2.2. Fruit set percentage.....                                                                                                                                                                                            | 79          |
| 4.2.3. Fruit drop percentage.....                                                                                                                                                                                           | 79          |
| 4.2.4. Yield/tree .....                                                                                                                                                                                                     | 84          |
| 4.2.5. Fruit quality .....                                                                                                                                                                                                  | 89          |

|                                                                                                                                                                                                           | <b>Page</b> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 4.2.5.1. Fruit physical characteristics .....                                                                                                                                                             | 89          |
| 4.2.5.1.1. Fruit volume .....                                                                                                                                                                             | 89          |
| 4.2.5.1.2. Fruit height .....                                                                                                                                                                             | 89          |
| 4.2.5.1.3. Fruit diameter .....                                                                                                                                                                           | 89          |
| 4.2.5.1.4. Peel thickness .....                                                                                                                                                                           | 89          |
| 4.2.5.1.5. Pulp weight .....                                                                                                                                                                              | 89          |
| 4.2.5.1.6 Pulp percentage .....                                                                                                                                                                           | 89          |
| 4.2.5. 2. Fruit chemical characteristics .....                                                                                                                                                            | 97          |
| 4.2.5.2.1. Total soluble solids percentage .....                                                                                                                                                          | 97          |
| 4.2.5.2.2. Total acidity percentage .....                                                                                                                                                                 | 97          |
| 4.2.5.2.3. TSS/acid ratio.....                                                                                                                                                                            | 97          |
| 4.2.5.2.4. Ascorbic acid.....                                                                                                                                                                             | 97          |
| 4.2.6. Leaf mineral concentrations .....                                                                                                                                                                  | 103         |
| 4.2.6.1. Leaf nitrogen percentage .....                                                                                                                                                                   | 103         |
| 4.2.6.2. Leaf phosphorus percentage .....                                                                                                                                                                 | 103         |
| 4.2.6.3. Leaf potassium percentage .....                                                                                                                                                                  | 103         |
| 4.2.6.4. Leaf calcium percentage .....                                                                                                                                                                    | 103         |
| 4.2.6.5. Leaf magnesium percentage .....                                                                                                                                                                  | 103         |
| 4.2.6.6. Leaf iron concentration .....                                                                                                                                                                    | 104         |
| 4.2.6.7. Leaf zinc concentration .....                                                                                                                                                                    | 104         |
| 4.2.6.8. Leaf manganese concentration .....                                                                                                                                                               | 104         |
| 4.2.6.9. Leaf selenium concentration .....                                                                                                                                                                | 104         |
| 4.2.7. Selenium in fruit pulp .....                                                                                                                                                                       | 115         |
| 4.2.8. Enzymes activity in fruit pedicels. ....                                                                                                                                                           | 117         |
| 4.2.8.1. Pectinase activity .....                                                                                                                                                                         | 117         |
| 4.2.8.2. Cellulase activity .....                                                                                                                                                                         | 117         |
| 4.3. The third experiment: Impact of spraying silicon on vegetative growth, fruit set%, fruit drop%, productivity, fruit quality, leaf mineral concentrations and enzymes activity of Navel orange trees. | 121         |
| 4.3. 1. Vegetative growth: .....                                                                                                                                                                          | 121         |