EFFECT OF SOME TREATMENTS ON GROWTH AND YIELD OF WASHINGTON NAVEL ORANGE UNDER SANDY SOIL

By

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APROVAL SHEET

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SUPERVISION SHEET

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Title of Thesis: Effect Of Some Treatments On Growth And Yield Of Washington Navel Orange Under Sandy Soil
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ABSTRACT

This study was carried out during two successive seasons 2010-2011 and 2011 – 2012 on Washington Navel orange cultivar (Citrus Sinensis) budded on sour orange (Citrus aurantium, L.Osbeck) rootstocks grown in sandy soil under drip irrigation system in a private orchard located at El-Shrouk farm (72 km of Cairo-Alex. desert road), El-Giza Governorate, Egypt.

The purpose of this study was to determine the optimum time of foliar application for Washington navel orange trees with pre- bloom foliar application with urea, putrescine, and full bloom foliar application with gibberellins (GA3), to improve nutritional status, growth characters, flower retention, fruit set and increase total yield. In addition to develop fruit quality and safety for competitiveness of citrus fruit products in local and international markets. The obtained results showed an improvement in the growth characters, yield, fruit quality, physical parameters and nutritional status with all foliar application treatments.

In this respect, it can be suggested that, foliar spray with urea (100% N unit) and 15 Micromolar putrescine at the pre-bloom period "4th week of December" and foliar spray with 30 ppm GA3, green algae extract "*Enteromorpha sp* at 0.5%" and red algae extract "*Asparagopsis sp* at 0.1%" at the full-bloom period "1st week of April" may be suitable for attaining a balanced plant nutrient resulting in increasing plant growth, fruit quality and yield through improving plant nutritive status.

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Contents

INTRODUCTION

Citrus (Citrus spp.) is one of the most important fruit crops in Egypt. It is the first popular fruit in Egypt and the most important fruit crops regarding both production and consumption because of the high nutritional value of their licenses and the length of displayed markets. (El- Kassas, 1984). Moreover, it occupies about 530415 feddans which represent 34.7% of total fruit cultivated area, the fruiting area of citrus occupies 440706 feddan produced 4402180 tons in Egypt during 2014 according to the yearly Bull. Agric. Economic and Statistics- Ministry of Agriculture and Land Reclamation of Egypt.

Washington naval orange considered as reported by many workers the first crop among the different citrus cultivars grown in Egypt. Leading for local market and especially export (El-Shobaky and Mohamed, 2000). So, the improvement of fruit yield and quality are very important objective to be achieved by different management practices in Egypt, especially in poor sandy soils. (Sayed *et al*, 2007)

Flowering induction and flower number are main factors for yield and fruit setting production in citrus crops. This event usually is achievable when source of growth stimulation sustains within the environment. Availability of essential minerals during morphological and physiological process can play an important role in growth and fruit setting in fruit trees.

Citrus yield can be closely related to production of total flowers in spring bloom even though most of the flowers do not set fruit (Chermahini *et al*, 2011). Applications of various nutrients applied to tree also affect fruit growth development and overall final quality.

Nitrogen could influence the number of flowers and fruit set (Albrigo, 1999). The pre-bloom urea spray increases the reserve N since it is readily accessible and metabolizable (Rabe, 1994).

Polyamines a beneficial sub-group of amines. Polyamines possess diverse biological functions and are formed during metabolic processes in living organisms. Polyamines in plants are involved in many steps of protein synthesis, embryogenesis, transcription of genes, cell division, organ development, fruit ripening, leaf senescence, tuber dormancy and stress minimization of plant organs. Polyamines, natural compounds involved in many plant growth and development processes, are ubiquitously present in plant cells (Valero et al., 2002). Putrescine concentration increases in plants in response to a number of stress factors including water stress, acid treatment, mineral deficiency, and osmotic shock or CO2 treatment. (Kosson and Prang, 2005).

The application of plant growth regulator (PGR) can provide significant economic advantages to citrus growers when used in appropriate situations as these have proven effective in stimulating a number of desired responses such as increase in fruit size and delay in fruit maturity (Basharat *et al*, 2008). Fruit development is thought to be triggered by hormones as it is evident from the report by (Talon et al., 1990) that the endogenous gibberellin status of the developing citrus ovaries is the limiting factor for the initiation of fruit development.

Plant hormones play an integral role in controlling the growth, development, metabolism and morphogenesis of higher plants (Taiz and Zeiger, 1991). Auxins, gibberellins, cytokinins, ethylene and abscisic acid are well known plant hormones. However, growth

hormones differ considerably in their mode of actions (Najma and Aisha, 2006).

Gibberellins are the most powerful of the growth promoters because they increase internode spacing, induce and promote flowering in many plants, and modify the flower sex expression in some plants (Davies, 1995).

Seaweed extract is a new generation of natural organic fertilizers containing highly effective nutritious and increase yield and resistant ability of many crops. Recently, macroalgae found to be viable alternative to chemical fertilization due to its high level of organic matter, micro and macro elements, vitamins, fatty acids and rich in growth regulators. (Crouch and Staden, 2005).

The main objective of this study was to investigate the possibility of pre-bloom foliar application of urea and Putrescine and full-bloom exogenous application of GA3, green algae extract and red algae extract for improve, morphological characteristics, flowering and fruitlets parameters, fruit quality, nutritional status and increase total yield of Washington navel orange. In addition to determine the optimum time of urea, Putrescine and GA3, green and red algae applied as a foliar spray to improve marketable yield of Washington navel orange for competitiveness of citrus fruit products in local and international markets.