EFFECT OF SOME BIO-STIMULANTS AND MICRO-ELEMENTS ON GROWTH, YIELD, ESSENTIAL OIL PRODUCTION AND CHEMICAL COMPOSITION OF SWEET MARJORAM (*Majorana hortensis*) PLANT

By

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B.Sc. Agric. Sci. (Ornamental Horticulture), Fac. Agric., Cairo Univ., 2012

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SUPERVISION SHEET

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Title of Thesis: Effect of Some Bio-stimulants and Micro-elements on Growth, Yield, Essential Oil Production and Chemical Composition of Sweet Marjoram (*Majorana hortensis*) Plant
Supervisors: Dr. Mohamed Sayed Hanafy
Dr. Hossam Ahmed Ashour
Department: Ornamental Horticulture **Approval:** 11 / 12 / 2018

ABSTRACT

This experiment was conducted at the experimental nursery of the Ornamental Horticulture Department, Faculty of Agriculture, Cairo University, Giza, during the two successive seasons of 2014/2015 and 2015/2016 seasons. The aim of present research was to investigate the effect of some bio-stimulants and micronutrients mixture and their interactions on vegetative growth, yield, essential oil production and chemical compositions of *Majorana hortensis* plants. The plants were treated with actosol as bio-stimulant applied monthly as soil drench at the concentrations of 0.25 and 0.50 ml/l, in addition to control and the same plants were foliar sprayed with micronutrients mixture (Fe+ Mn + Zn) applied monthly at the concentrations of 30 and 60 ppm in addition to control that sprayed with tap water. The results showed that;

Actosol treatments significantly increased plant height, fresh and dry weights of herb in the first and third cuts, root length, number of roots/plant, oil percentage and oil yield (at the third cut), content of chlorophyll a and carotenoids, total carbohydrates % (at the second season of third cut) as well as Fe, Mn and Zn content in dry herb as compared to the control. N and K% in dry herb were increased significantly with Actosol at high concentration, while P% was increased significantly with Actosol at low concentration as compared to the control. On the other hand, fresh and dry weights of herb in the second cut, fresh and dry weights of roots, oil yield (at the first season of second cut) chlorophyll b content (in first seasons) and total carbohydrates % (at the second cut) were reduced significantly with application of Actosol treatments as compared to the control.

Foliar application of micronutrients mixture at the two concentrations significantly increased plant height at the first cut, fresh and dry weights of herb at the three cuts, root length, roots number/plant, oil yield (at the second cut), chlorophyll a, carotenoids, N, K, Fe, Mn and Zn contents in dry herb as compared to the control. Application of the low concentration (30 ppm) significantly increased fresh and dry weights of roots and total carbohydrates % (at the third cut), while high concentration (60 ppm) caused significant increase in oil percentage and oil yield (in first season of the third cut).

the combined treatment of Actosol at 0.25 ml /l and micronutrients mixture at 60 ppm resulted in the highest values for plant height in the first and third cuts, fresh and dry weights of herb in the tree cuts, number of roots/plant, oil percentage and oil yield (in the first season of third cut).whereas, Actosol at 0.25 ml /l plus micronutrients at 30 ppm resulted in the highest values for root length, dry weight of roots and oil yield (in the second season of second cut).

GLC analysis of essential oil revealed that thirteen compounds (representing 85.33 to 93.71%) were identified and among the major constituents, Terpine-4-ol, β-Phyllandrene and α-Pinene recorded the highest values with the combined treatment of Actosol at 0.25 ml /l plus micronutrients at 60 ppm.

Based on the obtained results, it is possible recommended that treating *Majorana hortensis* plants monthly with Actosol at 0.25 ml + micronutrients mixture (Fe+ Mn +Zn) at 60 ppm for high growth production and oil yield.

Key words: *Majorana hortensis,* Biostimulants, Actosol, Humic acid, micronutrients (Fe, Mn and Zn).

DEDICATION

I dedicate this work to the spirit of ***Prof. Dr. Abou Dahab Mohamed Abou Dahab*** *God rest his soul*

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*Thanks to "**ALLAH**" the merciful and clement God for everything especially completing this work.*

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