EFFECT OF CATTLE MANURE, ACTIVE DRY YEAST AND HUMIC SUBSTANCES ON THE GROWTH, YIELD AND CHEMICAL CONSTITUENTS OF *Oenothera biennis* PLANT

By

SARAH NAGY ABD EL-KHALEK

B.Sc. Agric. Sci. (Ornamental Horticulture), Fac. Agric., Cairo Univ., 2005
M.Sc. Agric. Sci. (Ornamental Horticulture), Fac. Agric., Cairo Univ., 2012

THESIS

Submitted in Partial Fulfillment of the Requirements for the Degree of

DOCTOR OF PHILOSOPHY

In

Agricultural Sciences
(Ornamental Horticulture)

Department of Ornamental Horticulture
Faculty of Agriculture
Cairo University
Egypt

2017

APPROVAL SHEET

EFFECT OF CATTLE MANURE, ACTIVE DRY YEAST AND HUMIC SUBSTANCES ON THE GROWTH, YIELD AND CHEMICAL CONSTITUENTS OF *Oenothera biennis* PLANT

Ph.D. Thesis
In
Agric. Sci. (Ornamental Horticulture)

By

SARAH NAGY ABD EL-KHALEK

B.Sc. Agric. Sci. (Ornamental Horticulture), Fac. Agric., Cairo Univ., 2005
M.Sc. Agric. Sci. (Ornamental Horticulture), Fac. Agric., Cairo Univ., 2012

APPROVAL COMMITTEE

Dr. MOHAMED SALAH HUSSEIN TAWFIK……...
Researcher Professor of Medicinal and Aromatic Plants, National Research Center

Dr. ABD EL-GHAFOOR AWAD EL-SAYED…….
Prof. of Ornamental Horticulture, Fac. Agric., Cairo University

Dr. HAZEM ABD EL-GALEL MANSOUR……
Prof. of Ornamental Horticulture, Fac. Agric., Cairo University

Dr. SAFIA HAMDY MAHMOUD ……
Prof. of Ornamental Horticulture, Fac. Agric., Cairo University

Date: 28 /2 /2017

SUPERVISION SHEET

EFFECT OF CATTLE MANURE, ACTIVE DRY YEAST AND HUMIC SUBSTANCES ON THE GROWTH, YIELD AND CHEMICAL CONSTITUENTS OF *Oenothera biennis* PLANT

Ph.D. Thesis
In
Agric. Sci. (Ornamental Horticulture)

By

SARAH NAGY ABD EL-KHALEK

B.Sc. Agric. Sci. (Ornamental Horticulture), Fac. Agric., Cairo Univ., 2005
M.Sc. Agric. Sci. (Ornamental Horticulture), Fac. Agric., Cairo Univ., 2012

SUPERVISION COMMITTEE

Dr. SAFIA HAMDY MAHMOUD
Professor of Ornamental Horticulture, Fac. Agric., Cairo University

Dr. HAZEM ABD EL-GALEL MANSOUR
Professor of Ornamental Horticulture, Fac. Agric., Cairo University

Dr. EATMAD OSMAN EL-GHAWWAS
Head Research of Medicinal and Aromatic Plants, Agriculture Research Center, Giza

DEDICATION

This thesis is dedicated to the spirit of my father, who taught me that the best kind of knowledge to have is that which is learned for its own sake.

It is also dedicated to my mother, who taught me that even the largest task can be accomplished if it is done one step at a time.

ACKNOWLEDGEMENT

Thanks to Allah, the most Merciful and the most Beneficial.

Dr. SAFIA HAMDY MAHMOD; *Professor of Ornamental Horticulture, Agriculture Collage, Cairo University and* ***Dr. HAZEM ABD EL-GALEL MANSOUR;*** *Professor of Ornamental Horticulture, Agriculture Collage, Cairo University. Their sage advice, insightful criticisms, and patient encouragement aided the writing of this thesis in innumerable ways. I would also like to thank* ***Dr. EATMAD OSMAN EL-GAWWAS;*** *Professor of Medicinal and Aromatic Plants, Agriculture Research Center, Giza whose steadfast support of this project was greatly needed and deeply appreciated.*

Special thanks to my friends and everyone who encouraged and helped me to make this work possible.

Name of Candidate: Sarah Nagy Abd El-Khalek **Degree:** Ph.D

Title of Thesis: Effect of Cattle Manure, Active Dry Yeast and Humic substances on The Growth, Yield and Chemical Constituents of *Oenothera biennis* Plant.

Supervisors: Dr. Safia Hamdy Mahmoud
Dr. Hazem Abd El-Galel Mansour
Dr. Eatmad Osman El-Gawwas

Department: Ornamental Horticulture

Branch: - **Approval: 28 /2 /2017**

ABSTRACT

This study was conducted at the farm of the Medicinal and Aromatic Plants Research Department in El-Kanater El-Khaireya, Kalyubeia Governorate, Horticulture Research Institute and Ornamental Horticulture Department, Agriculture Faculty, Cairo University, during the two successive seasons of 2012/2013 and 2013/2014. A field experiment was carried out to study the effect of cattle manure at the rates of 15 or 30 m^3/fed., active dry yeast at 4 or 8 g/l water, humic substances at 1 l/fed., or combinations of these treatments, on the growth, seed yield, oil productivity, fatty acid content, germination of seeds and chemical constituents of evening primrose (*Oenothera biennis*), compared to those obtained with the recommended dose of inorganic NPK fertilization [150 kg $fed.^{-1}$ ammonium nitrate (33%), 60 kg $fed.^{-1}$ calcium superphosphate (15.5%) and 60 kg $fed.^{-1}$ potassium sulphate (48%)]. The obtained results showed that the pair cobination of cattle manure at the rate of 30 m^3/fed. and humic substances 1L/fed. increased values of plant growth and seed yield parameters as well as chemical constituents (viz. chlorophyll a, b and carotenoid contents in fresh leaves and N, P, K , protein, total carbohydrate and total phenol contents in seeds). Also, the highest values of plant growth, yield parameters (viz. plant height, number of branches/plant, fresh and dry weights/plant, number of capsules/plant, seed yield/plant, seed yield/fed., oil percentage, oil yield per plant and oil yield per fed.) and chemical constituents (viz. chlorophyll a, b and carotenoid contents in fresh leaves and N, P, K , protein, carbohydrate, γ-Linolenic acid and total phenol content in seeds). were obtained with using the triple combination of cattle manure at 15 m^3/fed., yeast at 8 g/L water and humic substances at 1 L/fed.

Key words: Evening primrose *(Oenothera biennis),* cattle manure, active dry yeast, humic substances.

CONTENTS

LIST OF TABLES

LIST OF FIGURES