# PHYSIOLOGICAL AND BIOTECHNOLOGICAL STUDIES ON CELERY PLANT (*Apium graveolens* L. var.dulce mill.)

**By**

**SAMIR SABRY ABDEI FATTAH ISSA SALLAM**
**B.Sc. Agric. Sci. (Biotechnology), Fac. Agric., Cairo Univ., Egypt, 2001**
**M.Sc. Agric. Sci. (Plant physiology), Fac. Agric., Cairo Univ., Egypt, 2012**

## THESIS

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## APPROVAL SHEET

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**Date: 22 / 12 /2019**

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**Title of Thesis:** Physiological and biotechnological studies on celery plant (*Apium graveolens* L. var.dulce mill.)
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**Branch:** Plant Physiology
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## ABSTRACT

This work was carried out during two successive seasons of 2014/15 and 2015/16 at Biotechnology, Phytochemistry Department and Farm of Applied Research Center of Medicinal Plants affiliated to the National Organization for Drug Control And Research(NODCR).

The present work aimed to study the effect of inoculation *Apium graveolens L*. seeds with biofertilizers [arbuscular mycorrhizal (AM) and/or microbein and/or plants sprayed with Thidiazuron (TDZ) fertilized with half or full dose of NPK on soil microbial activity,plant characteristiecs , chemical composition.as well as seed phytochemical analysis. The most important results could be summarized as follow:

The results in both seasons showed, inoculation of celery seeds with mycorrhiza and microbein under full or half NPK fertilizers increased soil microbial activity (number of AM fungi spores and its colonization % as well as hydrogenase and nitrogenase activies). Also, plant growth characteristics, chemical constituents, photosynthtic pigments, mineral nutrients and non- structural charbohydrates) as well as number of umbel and seedyield / pant were signifcantly increased with the inoculation of celery seeds with mycorrhiza and microbien under full NPK dose. Howerer, the reduction% in seed yield/plant induced from 1/2 NPK inocoulated with mycorrhiza and microbien reached 14.3% comparing with uninocoulated full NPK dose.Morever, the reduction in volatile oil yield reached 11.5% , from SDS-PAGE protein profile, no protein banding was found between 1/2 and full NPK dose. Meanwhile, three protein bands (53, 55 and 57 KDa). were found after inoculation with mycorrhiza. whereas, Two protein bands (20 and 37KDa) were found after inculation with microbein comparing with uninoculated treatments.

**Key words.** Celery, *Apium graveolens* L., chemical fertilizer, mycorrhizae, microbein, TDZ. Volatil oil.

# *DEDICATION*

*I dedicate this work to whom my heartfelt thanks; to my father, mother, wife Saadeya, my sons Moatasem and Shehab, my doughter Youmna and my uncle prof. Abdel Halim Sallam this work dedicated my friends.Dalia Abdel Halim and Nora Ahmed for the support they lovely offered throughout the period of my post graduation.*

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# LIST OF ABBREVIATIONS

| | |
|---|---|
| a.i. | Active ingredient |
| AM | Arbscular Mycorrhiza |
| Chl. a | Chlorophyll a |
| Chl. b | Chlorophyll b |
| DAP | Day after planting |
| dd | distilled deionized water |
| DPPH | 2,2'-diphenyl,1-picryl hydrazyl |
| FM or FYM | Farmyard manure |
| FRAP | Ferric reducing ability of plasma |
| $GA_3$ | Gibberellic acid |
| GAE | Gallic acid equivalents |
| GLC | Gas liqued chromatogrphy |
| IAA | Indole-3- acetic acid |
| IBA | Indole-3- butyric acid |
| KDa | Kilo dalton |
| Kin. | Kintein |
| M. W. | Molecular weight |
| My | Mycorrhiza |
| Mi | Microbein |
| NODCAR | National Organization for Drug Control And Research |
| PGPR | Plants growth promoting rhizobacteria |
| ppb | Part per billion |
| ppm | Part per milllion |
| PSB | Phosphate solublizing bacteria |
| PTZ | Pentylenentetrazol |
| RBC | Red blood cells |
| TDZ | Thiodiazuran |
| TPF | Triphenyl formazon |
| TTC | Triphenyltetrazolium chloride |
| VAM | Vesicular arbscular mycorrhizae |

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