EFFECT OF ROOT EXUDATES ON MOBILITY AND AVAILABILITY OF SOME MICRONUTRIENTS IN CALCAREOUS SOILS

BY

SOAD MOHAMED EL-ASHRY

B. Sc. Agric. (Soil Sci.), Cairo University, 1982

M. Sc. Agric. (Soil Sci.), Ain Shams University, 1993

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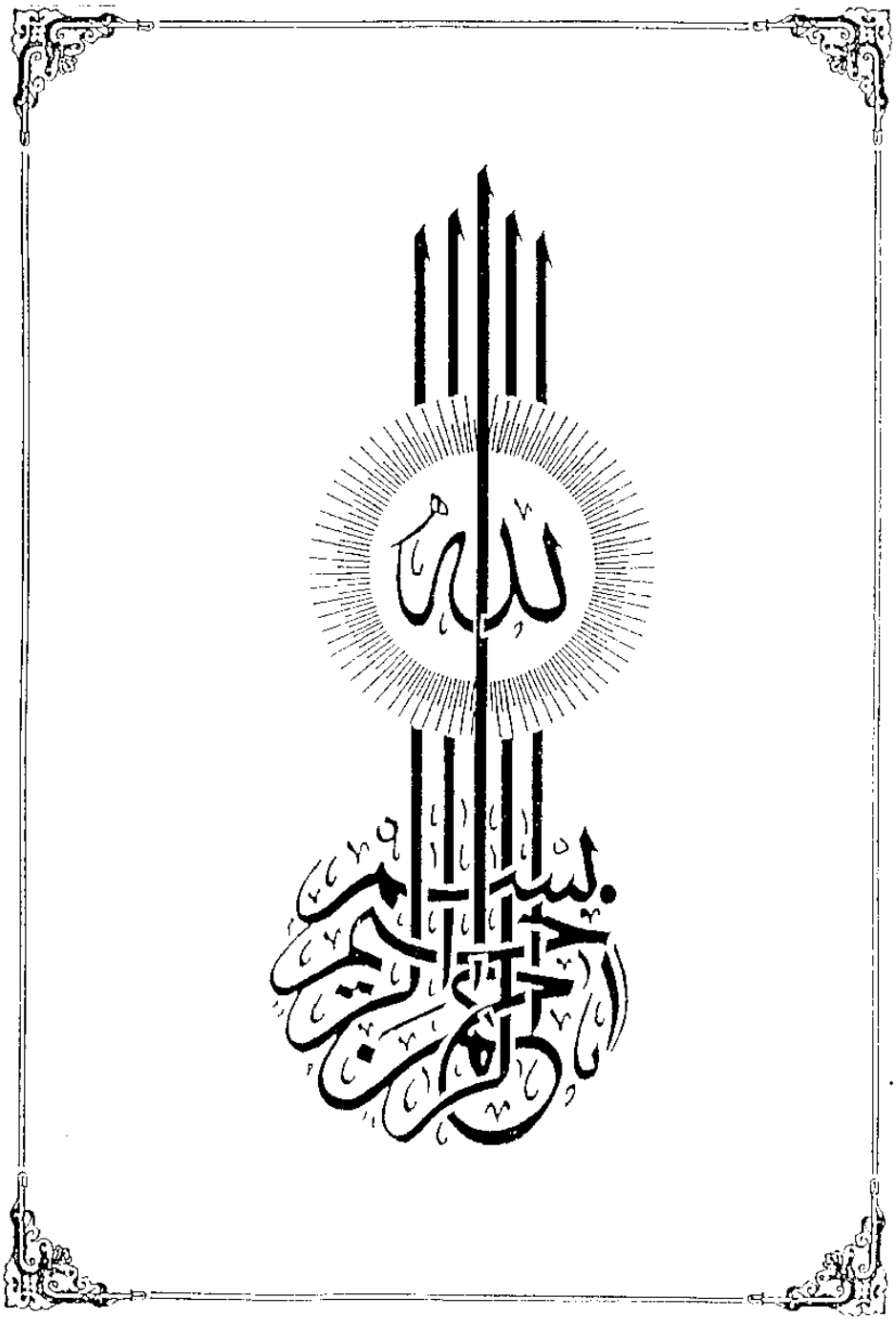

APPROVAL SHEET

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This thesis for Ph.D. degree has been approved by :

Prof. Dr. A. F. El-Sherif. ---------- A. F. El-Sherif

(Prof. of Soil Sci., National Research Centre)

Prof. Dr. A. S. El-Leboudi. ----------

(Prof. of Soil Sci., Fac. of Agric., Ain Shams University)

Prof. Dr. M. A. Mostafa (supervisor) Mostafa, M.A.

(Prof. of Soil Sci., Fac. of Agric. , Ain Shams University)

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SOAD MOHAMED EL-ASHRY

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Under the supervision of :

Prof. Dr. M. A. Mostafa

(Prof. of Soil Sci., Fac. of Agric., Ain Shams University)

Prof. Dr. F. Awad

(Prof. of Soil Sci., Soils and Water Use Dept., National Research Centre)

Ass. Prof. Dr. A. S. El-Sebaay

(Ass. Prof. of soil Sci., Fac. of Agric., Ain Shams University)

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ABSTRACT

SOAD MOHAMED El-ASHRY Effect of root exudates on mobility and availability of some micronutrients in calcareous soils. Unpublished Ph.D., University of Ain Shams, Faculty of Agriculture, Department of Soil Science, 1997.

Four experiments were achieved to evaluate the root exudates released from some Egyptian plant genotypes differ in their iron and Zinc deficiency resistances. Mobilization and absorption of these micronutrients in relation to the various growth stand of efficient and inefficient plant genotypes grown on single or mixture culture using nutrient solutiontechnique. Finally, to study the influence of phytosiderophores (PS) released from Egyptian wheat cultivars on mobilization and uptake of iron and zinc from pre-amended calcareous soils, the flat box technique was used.

From the first experiment, data showed that values of root exudate components increased under Fe and Zn deficient and with plant age. In plants adequately supplied with both nutrients, the values of root exudate components (phytosiderophores from wheat and phenolics from either sunflower or soybean) remained low.

With respect to type of single and mixture culture (second experiment), plant growth of both species (wheat and soybean) was increased during the course of experiments and the mixture culture produced the highest values when compared with single culture. Iron

and zinc concentrations in both plant species were increased with harvest time.

Results of the third experiment indicated that in plants adequately supplied with Fe and Zn , PS released reminded low and did not exceed 20 nmol. PS $plant^{-1}$. h^{-1}. Phytosiderophores were released at much higher rates in Fe-deficient followed by Zn-deficient seedlings. Moreover, a highly significant negative correlation was obtained between the chlorophyll content in young leaves of wheat cultivars, as a parameter for Fe-nutritional status of leaves, and the PS released rate from the plant roots .

The flat box experiment indicated that DTPA extractable iron from amended calcareous soils with sewage sludge was much higher than that extracted from untreated soils and relatively affected by the distance from the central root compartment as to reach minimum values at a distance of more than 4 mm. The relative increases in extractable Fe and Zn were higher in Fe-deficient wheat (-Fe pretreatment) than with Fe-sufficient plants. Plant species and even cultivars of these graminaceous plants differed in their ability to release PS and mobilization showed that Sids 10 and Baniswaif 2 caltivars gave the highest rate while Giza 162 being inferior particularly under Fe-sufficient seedlings.

Iron and zinc concentrations were increased in roots when compared with shoots during the 4 days growth period.

Key words: *Calcareous soils, Chlorophyll, Iron-deficiency, Phenol, Phytosiderophores, Soybean, Sunflower, Wheat, Zinc-deficiency.*

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