EFFECT OF THE APPLICATION OF SULPHUR FERTILIZER MIXTURES ON THE MOVEMENT OF SOME NUTRIENTS IN THE RHIZOSPHERE ZONE

By

SHERIF MAHMOUD IBRAHIM MAHMOUD

B.Sc. Agric., (Soils), Ain Shams Univ., 1991

A thesis submitted in partial fulfillment

of

the requirement for the degree of

MASTER OF SCINECE

in

Agriculture

(Soil Science)

Department of Soil Science

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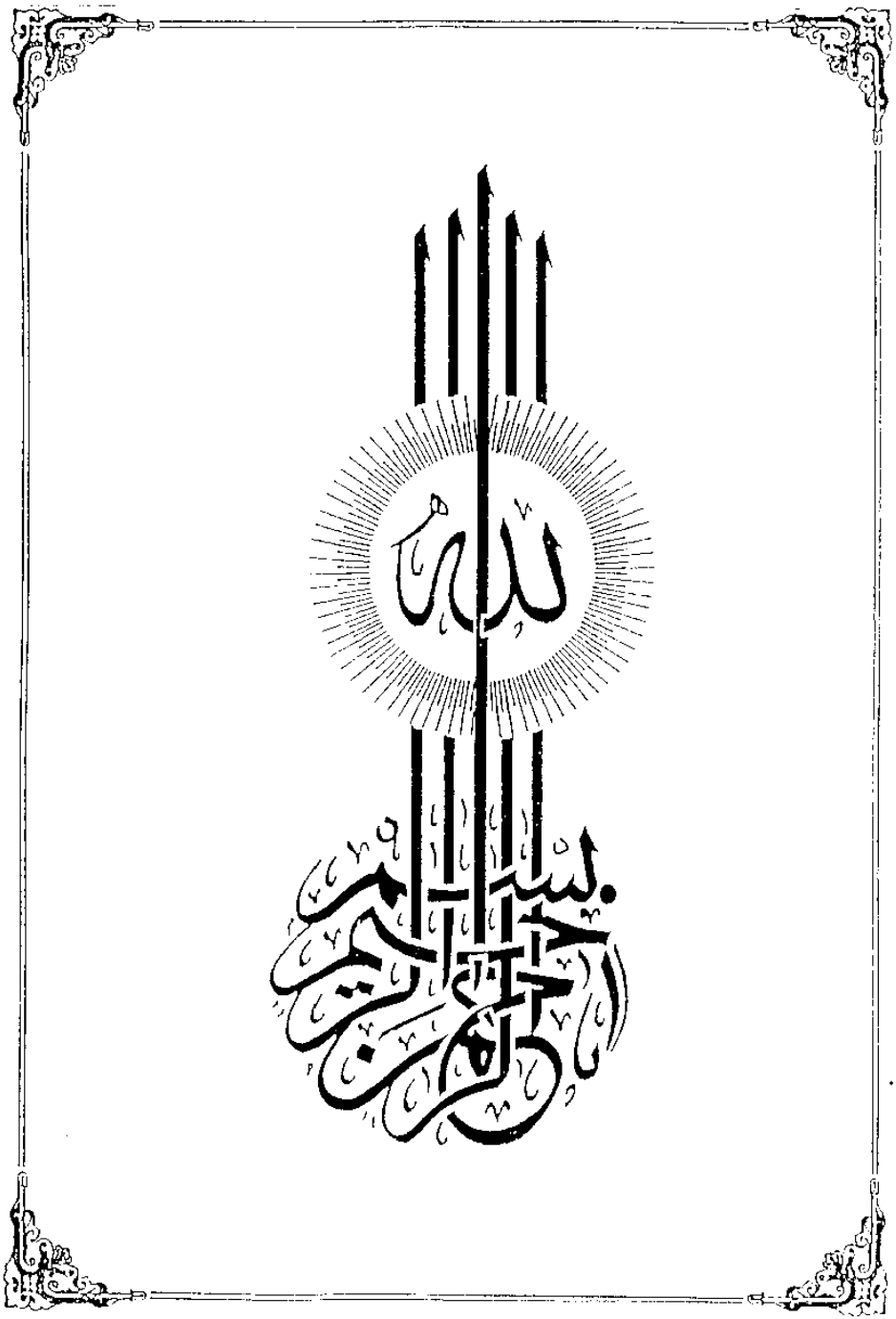

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APPROVAL SHEET

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ABSTRACT

***Sherif Mahmoud Ibrahim Mahmoud*, Effect of the application of sulphur fertilizer mixtures on the movement of some nutrinets in the rhizosphere zone. Unpublished Master of Science, University of Ain Shames, Faculty of Agriculture, Department of Soil Science, 1999.**

This work aimed to study the effect of elemental sulphur, sulphur -fertilizer mixture (SFM) as well as farmyard manure (FYM) on the mobility of P, Fe and Zn towards root zone, their uptake, growth and yield of different crops. For this purpose three experiments were conducted as follows: The first experiment has been carried out under greenhouse conditions at National Research Centre using rhizobox technique. Loamy sand soil was collected from Wady El-Mollak, Imailia, Egypt. SFM was mixed throughly with the bulk soil only at a rate of 2g/rhizobox. Barley (*Hordeum vulgare* L.Giza 123) root remained separated from the other rhizosphere compartments and bulk soil by nylon cloth. The second experiment has been carried out at Maryout Research Station of Desert Research Centre under calcareous soil conditions. Plastic net and plastic core were used for soil sampling from the different lateral and vertical spots. Amendments included: Sulphur at a rate of 120kg S/fed., and SFM as 120 kg S / fed. added as 300 kg SFM/fed., The dicotyledonous bean (*Vicia faba* L. Giza Blanka) root distribution and its length were evaluated. The third experiment was carried out under the same conditions at Maryout. Three soil samples were taken (surface soil as an application zone, root zone and non root zone at 10-20 cm depth away from the surface soil). Amendments included: Sulphur at a rate of 120 kg S/fed., SFM as 120 kg S/fed., added as 300 kg SFM/fed., and FYM at a rate of $10m^3$/fed. The monocotyledonous maize (*Zea mays* L. 310-hyprid) plants were cultvated.

The obtained results indicate the following points :

The first experiment :

1- SFM application reduced pH of the different soil compartments by about 0.2 units and also by about 0.45 units near the plant root surface compared to bulk soil of non SFM treated.

2- SFM + P addition increased P values in all rhizosphere compartments more than P addition alone. Extractable Fe gradually increased towards root surface when SFM + Fe were applied, and a depletion zone was created at the root plane when Fe alone was applied. Similar trend was observed for Zn but the lowest magnitude of depletion was shown when SFM was applied.

3- SFM addition with nutrient (P, Fe or Zn) significantly increased the uptake of the studied nutrients by barley plant compared to the nutrient addition alone.

The second experiment :

1- Effect of SFM on rhizosphere pH extended clearly to three layers (0-5, 5-10, and 10-15 cm)while S effect extended to surface and subsurface (0-5 and 5-10 cm) soil only.

2- Extractable nutrients (P, Fe and Zn) increased in all spots of the root zone under SFM treatment compared to S application .Root zone of control showed a clear depletion for the three nutrients compared to non root zone while the contrary occured when SFM was applied but S application had the same trend with less effect . Also SFM significantly increased dry matter, shoot uptake and grain yield compared to S and control.

The third experiment :

1- FYM treatment gave the highest values of extractable P,Fe and Zn in the surface soil compared to other treatments, while SFM treatment gave the highest values of those nutrients in root zone compared to other treatments.

2- FYM and SFM treatments gave the highest values for dry matter and nutrients shoot content compared to S treatment.

3- SFM significantly increased the grain yield of maize crop comapred to other treatments.

Results indicate that, SFM compound had a favourable effect under calcareous soils conditions.

Key Words: Rhizosphere zone - soil amendments - calcareous soil - nutrient uptake - grain yield - phosphorus - iron - zinc - *Hordeum vulgare* - *Vicia faba* - *Zea mays*

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