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A thesis submitted in partial fulfillment

of

the requirements for the degree of

MASTER OF SCIENCE

in

Agriculture

(soil science)

Department of Soil Science

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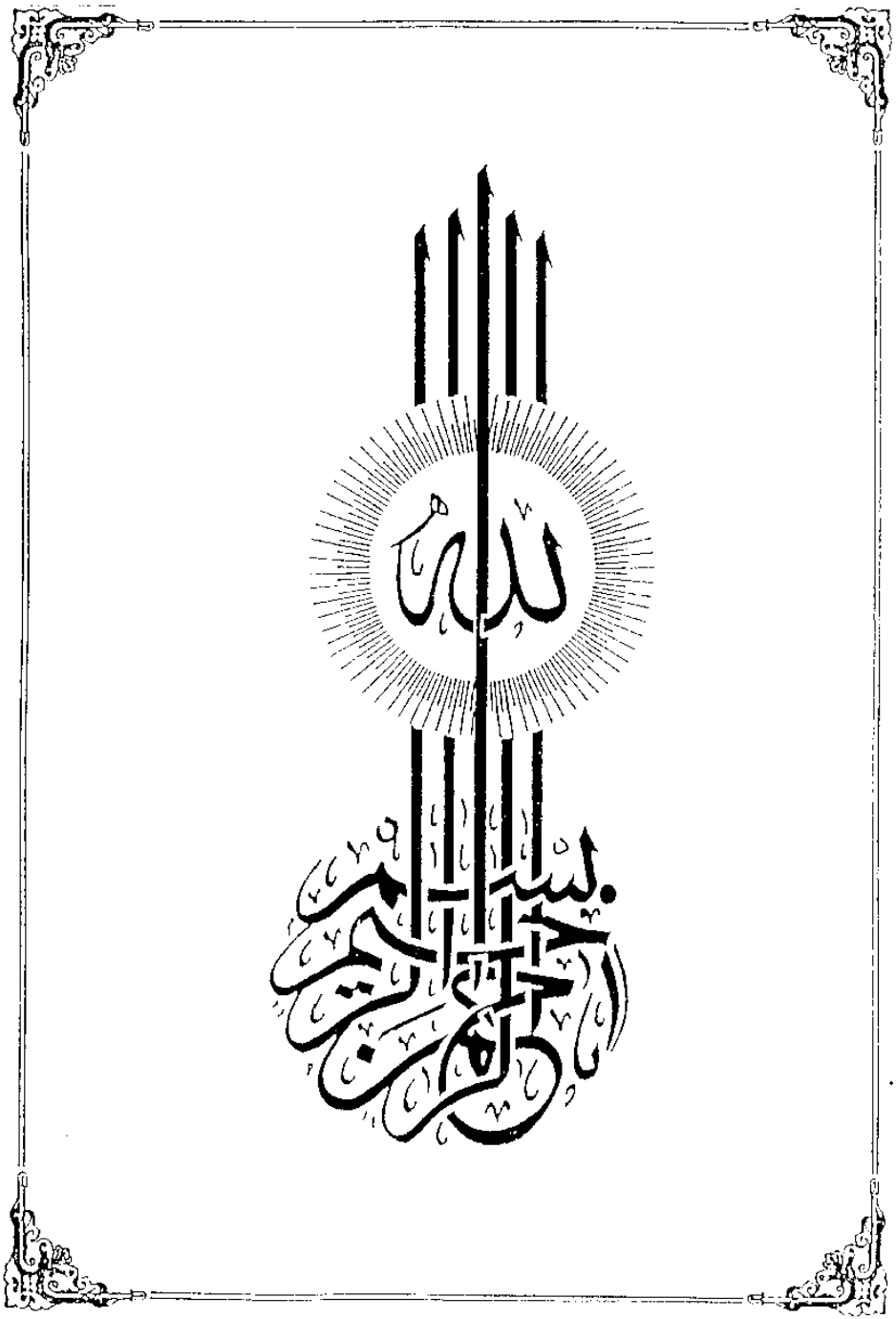

APPROVAL SHEET

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BY

ALAAEL-DIN ABDEL-HAMID ABOEL-SOUD

B. Sc.Agric.(Soil Sci.), Fac. Agric.,
Ain Shams University, 1981.

High Diploma(Soil Sci.), Fac. Agric.,
El-Azhar University, 1985.

This thesis for M. Sc. degree has been

approved by :

Prof. Dr. Saad M.El-Sherif .....
Prof. Soil Sci., Ain Shams Univ.

Prof. Dr. Mohamed S.A.Safwat .....
Prof. Microbiol., El- Menia Univ.

Prof. Dr. Abdel-Samad S. Ismail .....
Prof. Soil Sci., Ain Shams Univ.

Date of examination : 6 / 6 / 1992.

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BY

ALAA EL-DIN ABDEL-HAMID ABO EL-SOUD

B.Sc. Agric.(Soil Science),
Fac. Agric. Ain Shams Univ., 1981

High Diploma,(Soil Science)
Fac. Agric. El-Azhar Univ., 1985

Under the supervision of :

Prof. Dr. A.S. Ismail
Prof. of Agric. Soil Science.

Prof. Dr. M.E. El-Haddad
Prof. of Agric. Microbiology.

Prof. Dr. S.M. Abdel-Wahab
Head of Research of Agric. Microbiology,
Soils and Water Research Institute,
Agricultural Research Center.

ABSTRACT

The growth response of five leguminous hosts to rhizobia inoculation and their nitrogen fixation potential (measured by difference method or ^{15}N) were evaluated with respect to soil type and nitrogen fertilization. Inoculated clover, faba bean and cowpea were grown on clay loam, sandy and calcareous sandy loam soils. Soybean and peanut were grown on clay loam and sandy soil, respectively. The leguminous plants under investigation were fertilized with 0.6 or 1.6 g N pot^{-1}, except soybean plants which were received 0.6 or 2.8 g N pot^{-1}. The symbiotic performance of

each system was determined by the level of nodulation, growth, nitrogen content, yield and nitrogen availability (using N-balance and final N-gain calculations). Results showed that, soybean plants failed to form nodules in uninoculated treatment. All inculated plants, grown on soils fertilized with the lower dose of nitrogen, produced greater levels of nodulation than uninoculated or inoculated ones, received higher dose of nitrogen. The dry matter and N-contents were higher in the inoculated treatments received either lower or the higher dose of nitrogen compared to the uninoculated one. Although, alluvial soil was the most favourable medium for growth and N_2-fixation of faba bean, clover and cowpea compared with the other two soils, the greatest responses were obtained from sandy soil. Calculations of nitrogen balance gave positive effects due to application of rhizobia to any of the tested soils. Considerable variation in the amount of N_2-fixed was repoted amongst the tested leguminous hosts grown in pots. The order of effectiveness was faba bean > clover > soybean > cowpea, as they have fixed 4.998, 3.007, 2.446 and 2.359 g N pot^{-1}, respectively, at maturity stage of inoculated plants having received the activation dose of nitrogen and grown on alluvial soil. The ^{15}N method, has shown that uninoculated field grown clover plants in alluvial soil have fixed 33.6, 49.4, 68.7 and 37.5 Kg N fed^{-1} against 41.3, 65.8, 90.3 and 40.9Kg N fed^{-1} for inoculated ones being determined after 60, 110, 160 and 200 days of cultivation, respectively.

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