EFFECT OF THE STIMULATIVE DOSE OF SOME FORMS OF NITROGEN FERTILIZERS ON GROWTH AND YIELD OF MAIZE PLANTS

By

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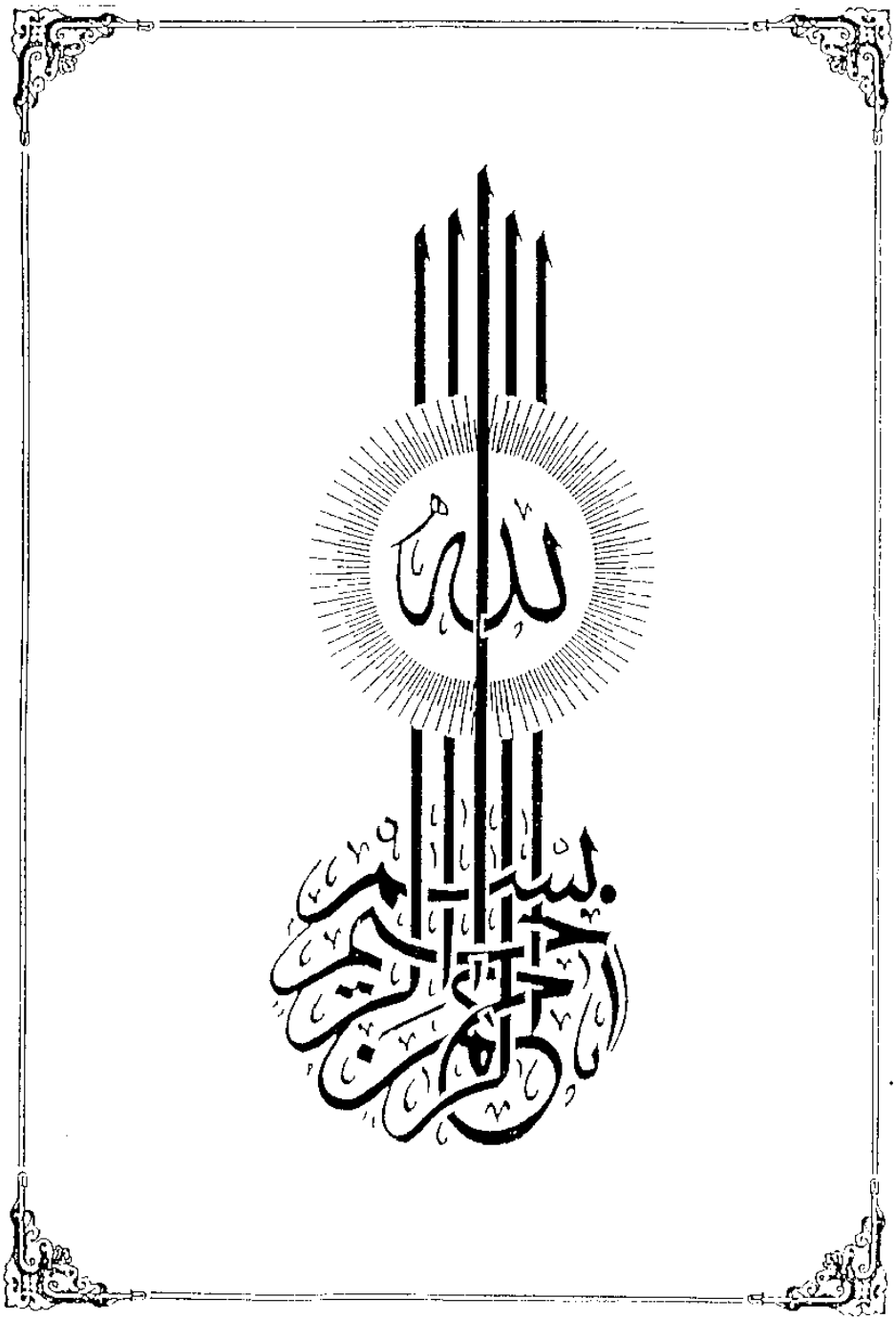

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ABSTRACT

The effect of three N-fixing bacteria inoculation treatments (*Azospirillum lipoferum*, the mixture of *Azospirillum lipoferum* + *Azotobacter* sp. and control (without inoculation) and nitrogen stimulative dose in two levels (zero and 15 kg N/fed.) in two N fertilizer forms urea or ammonium nitrate applied at 9 days after sowing of maize Giza cultivar 2 were studied in two successive seasons of 1989 and 1990. The rest of the whole amount (105 kg N/fed.) of N-fertilizer was added in two equal doses before 1st and 3rd irrigations.

Applying small amount of nitrogen fertilizer as stimulative dose increased significantly plant height.

blades area, LAI, and the accumulated dry matter in stem + sheaths, ear as well as in whole plant at 63 days after sowing. At the later stages i.e., at 77 and 91 days from sowing the stimultant N-dose revealed significant increase in plant height, area of blades, LAI, dry weight of blades and whole plant, but it had no significant effect on NAR, CGR, RGR, LAR as well as RPP of vegetative parts, grains and biological yield at the period from 63 to 77 days from sowing, as well as on protosynthetic pigments content at all growth stages.

Fertilizing maize plants early with the stimulative N-dose had slight insignificant effect on grain yield per feddan, harvest index, crop index, seed index and ear characters. Number of plants bearing more than one ear significantly increased due to the addition of the stimulative N-dose. Urea seemed to be with small beneficial effect on yield and yield components compared with ammonium nitrate. Inoculation with N-fixing bacteria had no appreciable effect on most of yield and yield components except for number of plants bearing more than one ear where *Azospirillium lipoferum* bacteria recorded the highest values. The greatest values of both crop index and harvest index as well as the highest number of grains per ear were recorded by inoculation with *Azospirillium lipoferum* and fertilization with urea form.

Crude protein, oil percentage and total free amino acids were not significantly affected with the stimulator N-dose. Maize plant fertilized with urea surpassed that of ammonium nitrate for increasing such characters. Inoculating maize grains with N-fixing bacteria did not cause considerable change in the chemical constituent of grains.

KEY WORDS

Zea mays = maize = corn

Nitrogen source

Biofertilization

Stimultive nitrogen dose

Azotobacter

Azospirillum = *Azospirilla*

Growth

Photosynthetic Pigments

Yield attributes

Grain Protein

Amino acids

Oil content

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Among the major cereal crops being raised in Egypt is maize. Previous works on fertilizer requirements for this particular crop under local conditions has revealed that nitrogen is the most important element which responsible for increasing its production. This is due to the low content of the organic matter in the Egyptian soils and accordingly, the total and available nitrogen are also fairly low. The role of nitrogen element in stimulating growth enhancing photosynthetic activity as well as increasing the yield of higher plants especially cereal crops is incontestable. Maize is highly sensitive to nitrogen fertilization especially during the early stages of growth thus studying the effect of dividing the whole amount of nitrogen fertilizer during the early stages of plant growth is very important. Moreover applying a small dose of nitrogen at sowing may lead to growth stimulation in the early stages of plant development and this may affect considerably the yield obtained. There is much confusion in the literature on the relative effectiveness of nitrate and ammonium as sources of nitrogen for plants. Nitrate or ammonium ions constitute the two important forms of nitrogen NO_3 or NH_4 that taken up by plants in both fertilized and unfertilized soils. In many arable soils where nitrification normally takes place rapidly, nitrate is the prominent source. It could be stated that some nitrogen fertilizer is required to stimulate

inoculation response (Smith et al., 1975). The possible use of a symbiotic nitrogen fixing bacteria as grain inoculation has been investigated in several countries to increase crop production.

Accordingly, the objective of the present work is to investigate the effect of the stimulative dose of some forms (urea or ammonium nitrate) of nitrogen fertilizers applied at sowing the response of maize to inoculate maize grains with bacteria and to compare the efficiency of such sources of nitrogen fertilizers on growth and yield of maize plants. Due consideration was given to study the photosynthetic pigments in maize blades as well as the chemical constituents of the grains.