RESPONSE OF MAIZE GROWTH AND YIELD TO IRRIGATION, AMMONIA GAS FERTILIZATION AND SOME MICRONUTRIENTS

By

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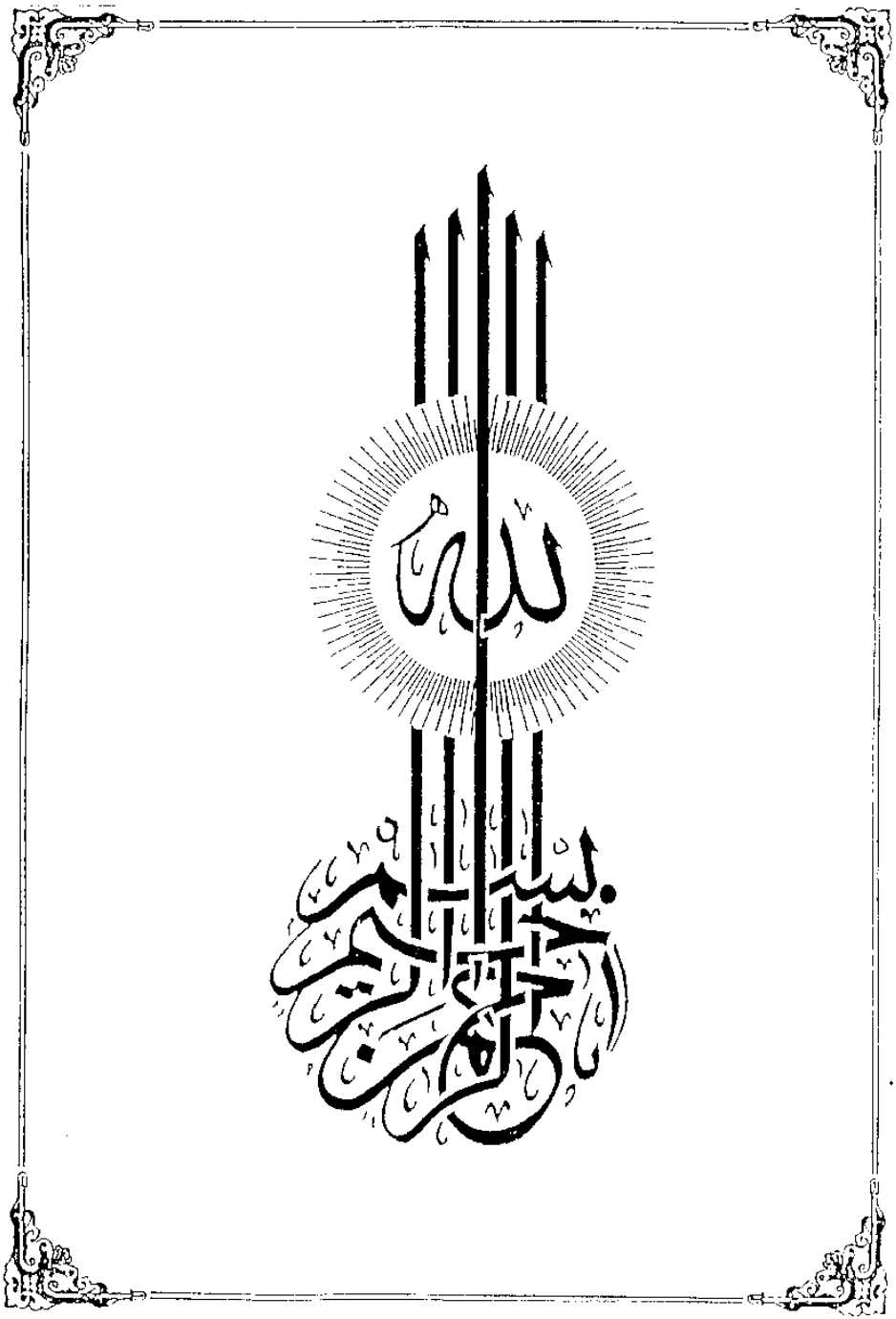

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ABSTRACT

The influence of irrigation at two intervals (10 or 15 days), N. fertilization at three levels (80, 100 or 120 kg/fed.), and micronutrient treatments of untreated control, (Zn, once), (Mn, once), (Zn + Mn, once), (Zn, twice), (Mn, twice) and (Zn + Mn, twice) on growth, yield, yield components and chemical characteristics for maize three way cross 310 . The study was carried out at sids Agricultural Research Station, Beni Suef Governorate, Middle Egypt, during 1991 and 1992 seasons.

Results reveal the following findings:

1- Decreasing irrigation intervals from 15 to 10 days or increasing N. fertiliziation level from 80 to 120 kg/fed. caused significant increases in dry matter of each of leaves/plant, stem, ears/plant, tassel, whole plant; as well as, plant length, stem diameter (at 65 day age); also, upper ear height, green plant percentage (at 110 day age) and plant height at harvesting in both seasons. Moreover, it led to significant increases in ear length, ear diameter, number of grains/row, weight of 100 grains, shelling percentage, number of ears/plant, grain yield/fed. and straw yield/fed. in the two seasons. Furthermore, it led to significant increases at age of 65 days in each of total nitrogen, zinc or manganese uptake/ plant and significant increases in protein or carbohydrat yields of grains in the two seasons.

2- Spraying zinc in any case caused significant increases in dry matter of each of leaves/plant, stem, ears/plant, tassel, whole the plant; as well as, plant length and stem diameter (at 65 day age); also, it significantly increased upper ear height, green plant percentage (at 110 day age), plant height at harvesting, ear length, ear diameter, number of grains/ row, wt. of 100 grains, shelling percentage and grain yield/fed. in the two seasons. Moreover, spraying (zinc , twice) led to significant increases in number of ears/plant; and maximum significant increases in each of total nitrogen, zinc or manganese uptake/plant at age of 65 days,

as well as maximum protein and carbohydrate yields in grains in both seasons.

3- Spraying manganese alone led to significant increase in manganese uptake/plant at age of 65 days in both seasons; while it cause insignificant increases in the other previous characteristics for growth, grain yield, yield components and chemical properties which were mentioned above during the two seasons.

4- Straw yield increased significantly by spraying (Zn + Mn, twice), (Mn, twice), (Zn, twice), (Zn + Mn, once) and (Zn, once) in the two season. While, spraying (Mn, once) had no significant effect on this characteristic.

Key words :

Irrigation intervals, N. fertilization, Anhydrus ammonia (82% N.), Micronutrients, Zinc chelate 12%, Manganese chelate 14%, Maize, Growth, Grain yield, Straw yield, Yield components, Chemical properties, Plant length, Plant height, Stem diameter, Green Plants%, Dry matter of leaves, Dry matter of stem, Dry matter of ears, Dry matter of tassel, Dry matter of whole plant, Zinc uptake, Manganese uptake, Protein yield, Carbohydrate yield.

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INTRODUCTION

Maize is one of the main cereal crops grown in the world to day. It is still a major traditional food crop in many regions because of grain composition, multiple food uses, high yield ease of cultivation, transference and storage characteristics. Maize also is the prime source of grain for feeding all livestock and monogastric animals in several parts of the world because of grains are highest in energy content and palatability; moreover, the development of techniques for ensilage of the whole plant has made maize the major fodder crop for ruminants. Furthermore, the grain is a key industrial row material for very diverse purposes.

The maize production is affected greatly by the main environmental factors such as dates of planting, plant density, irrigation, fertilization, growth regulators, weed control, insect control and dates of harvest.

Plant growth is controled directly by plant water stress. Plant water stress depends on the relative rates of water absorbition and water loss rather than on soil water supply alone, Kramer (1963).

Nitrogen is essential for plant growth as it is constituent of all proteins and nucleic acids and hence of all protoplasm, Russell (1973).

In Egyptian soils plants suffer from deficiency of simultaneously of a number of micronutrients after the construction of High Dam. Maize is one of the more susceptible species for zinc and manganese deficiency. Thus, it can respond to the application of that elements.

Thereon, the objective of this study is to evaluate the effects of irrigation intervals, nitrogen fertilization levels and zinc and/or manganese spraying applications on growth, yield and its components and chemical characteristics for maize, to determine the optimum irrigation intervals, nitrogen, zinc and manganese applications.

REVIEW OF LITERATURE

I. Effect of irrigation applications on growth, yield and its components, and chemical characteristics of maize:

Denmead and Show (1960) reported that moisture stress prior to silking reduced grain yield by 15%, moisture stress at silking reduced grain yield by 50%, and moisture stress after silking reduced grain yield by 21%.

Kramer (1963) reported that water serves four general functions in plant.

1- It is the major constituent of physiologically active tissue.

2- It is a reagent in photo - synthesis and in hydrolytic processes such as starch digestion.

3- It is the solvent in which salts, sugars, and other solutes move from cell to cell and organ to organ.

4- It is essential for the maintenance of the turgidity necessary for cell enlargement and growth.

El-Sergy *et al.*, (1966) stated that crude protein percentage in grains increased about 0.47% as irrigation frequency interval was increased from 9 to 18 days.