RESPONSE OF SOME WHITE AND YELLOW MAIZE VARIETIES TO NITROGEN FERTILIZATION

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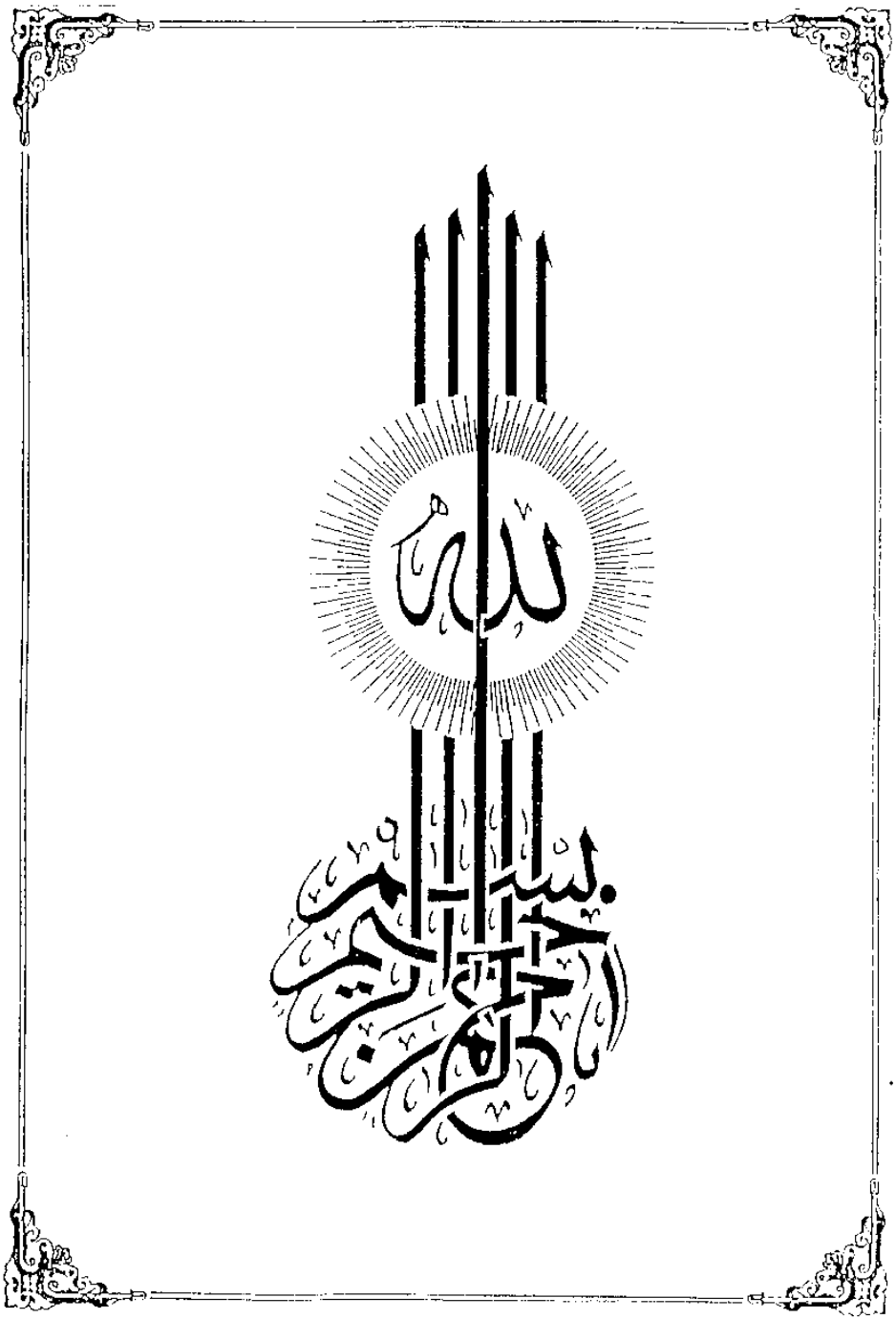
بسم الله الرحمن الرحيم

إقرأ باسم ربك الذي خلق ﴿١﴾ خلق الإنسان من علق ﴿٢﴾
اقرأ وربك الأكرم ﴿٣﴾ الذي علم بالقلم ﴿٤﴾ علم
الإنسان ما لم يعلم ﴿٥﴾ كلا إن الإنسان ليطغى ﴿٦﴾
أن رآه استغنى ﴿٧﴾ إن إلى ربك الرجعى ﴿٨﴾

سورة العلق.

صدق الله العظيم



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إهـــــداء

إلى روح والدى ... ودعوتى أن يرحمه الله و يسكنه فسيح جناته

إلى والدتى الحبيبة ... إعترافاً منى بفضلها وتقديراً لها وبركة دعائها

إلى أساتذتى الأفاضل ... أضاءوا القلب و العقل منى بنور العلم والمعرفة

إلى زوجتى وأولادى وأهلى وأصدقائى .

وكلى أمل أن يتقبل الله تعالى عملى هذا بقبول حسن و الله ولى التوفيق ،

CONTENTS

INTRODUCTION

Maize (*Zea mays* L.) is considered as one of the most important cereal crops. Many attempts in Egypt have been devoted to increase and improve the productivity and quality of corn crop.

It is known that all maize varieties cultivated in Egypt are white varieties because the Egyptian farmer uses the produced flour in bread making or in mixing it with wheat flour.

As for the yellow varieties, Egypt has imported in the year of 1986 about 1.8000 million ton, its price amounted to 171.0 million$ in order to be used as main component for livestock feeding. Since most of the imported maize is yellow type, therefore it may be useful to study the response of yellow types to Egyptian conditions.

Maize plant is highly sensetive to nitrogen fertilization especially during the early stages of growth, thus studying the effect of dividing the nitrogen fertilizer amount during the early stages of growth is very important. Moreover adding a small dose of nitrogen fertilizer at sowing may lead to growth stimulation in the early stages

of plant development and this may affect considerably the yield obtained.

Hence this research aims to study the usefullness of adding different amounts of nitrogen fertilizer at sowing as an activator dose for growth and its effect on the yield of white and yellow maize types.

REVIEW OF LITERATURE

Nitrogen is one of the major essential elements to plants especially for cereal crops such as maize. It exerts a marked effect on growth, photosynthetic pigments content, yield and yield components of most of field crops. Maize plant is known to be a nitrogen sensitive one (Milles, 1934).

I. EFFECT OF NITROGEN APPLICATION ON VEGETATIVE GROWTH :

Plant height of maize was increased by increasing nitrogen fertilizer rates as reported by El-Sharkawy et al. (1976) , Saad (1977) , Hussein and Hanna (1978) , Mikhail (1978), Anber(1979) , Mahgoub (1979) , El-Hattab et al.(1980), Adris (1981) , Shafshak et al .(1981) , Eraky et al. (1983), Faisal (1983) , Moursi et al . (1983) , Abd El-Lateef (1984), Gomaa (1985) , Salwau (1985) , Gheith et al . (1986) and Matta (1986). However, Abd El-Gawad et al. (1974) found that applying 25.50 and 75 kg N/fad. did not exert any significant effect on plant height. Similar results were obtained by Nour El-Din et al . (1974) , who used 20, 40 and 60 kg N/fad. On the other hand, Khalil (1978) reported that the differences

in plant height due to time of nitrogen application were not significant in 1976 and significant in 1977, where it was increased from 171 cm for the single application at planting to 190 cm for the split application at first and third irrigation. However Balko and Russel (1980) showed that the effect of applying 180 kg N/ha, as double dress (90 kg N/ha preplanting + 90 kg N/ha after 5 weeks from planting) generally was of no practical importance for plant height. Faisal (1983) found that there were no appreciable significant differences in the height of maize plants by using different times of N application. While , Gomaa (1985) indicated that the greatest plant height was obtained by adding N fertilizer before planting.

The number of active leaves per plant at tasseling time was increased by increasing the nitrogen fertilizer rates (Tiwary et al .(1970) , Salem (1973), Khalil (1978) , Mahgoub (1979) , Khalifa et al (1983) and Abd El-Lateef (1984) . Saad (1977) reported that increasing N levels caused an increase in the number of leaves at early stages of plant development , but the effect at 65 days after sowing was not statistically significant. Similar results were reported by Salwau (1985) at 75 days after planting

time. While, Raghip (1979) and Eraky et al .(1983) indicated that the number of active leaves per plant at 60 , 75 and 90 days after sowing was increased significantly by increasing N fertilizer levels up to 90 kg N/fad. Ibrahim et al . (1979) added more support to those results after 51 days from sowing. Concerning the time of nitrogen application, Khalil (1978) found that the differences in number of leaves per plant due to time of N application were not significant in 1976 and highly significant in 1977 . Two equal N doses at first and second irrigation gave maize plants bearing more leaves than other treatments. However, Faisal (1983) found that the time of N application did not affect the number of active leaves per plant.

The leaf area (LA) per plant at silking stage and 15 days intervals during the growth stages was increased by increasing the rates of N fertilizer as reported by Krishnamurthy et al . (1974) , El-Hefnawy (1975) , Hassan (1977) , Lashin and Ali (1977) , Shafshak et al . (1981), Eraky et al. (1983), Abd El-Lateef (1984) , Abd El-Gawad (1986) and Matta (1986) . However, Nunez and Kamprath (1969) recorded that N rates up 112 to 280 kg N/ha did not exert any significant effect on LA/Plant after a week from tasseling.

Concerning the time of N application, Khalil (1978) indicated that applying N in a single dose before second irrigation in the first season or splitted into two equal doses before first and second irrigation in the second season gave the highest area. Nitrogen application before the third irrigation in 1976 as well as one-third at planting and the rest before the third irrigation in 1977 gave the lowest leaf area values . However, Faisal (1983) reported that the time of N application did not show any significant effect on the average leaf area per plant but the highest LA/plant could be produced by applying (120 kg N/fad.) using the triple dressing ($\frac{1}{3}$ at planting , $\frac{1}{3}$ at the first and $\frac{1}{3}$ at the second irrigation).

Leaf area index (LAI) per maize plant increased by increasing nitrogen application (El-Hefnawy (1975) , Mikhail (1978) , Raghip (1979) , Moursi et al . (1983) , Flesh and Dale (1984) , Kamel et al . (1986) and Matta (1986) . In addition, El-Hattab et al. (1980) indicated that LAI increased by increasing N fertilization rates at 60 days after planting, thereafter it decreased with advancing age. Berger (1962) , found that the best application of N fertilizer for maize by using the dressing

($\frac{1}{3}$ of N amount was applied at planting to accelerate early vegetative growth and $\frac{2}{3}$ was applied at kneestage). Similar results were recorded by Hanway (1965) and Kurtz and Smith (1966) .

The dry matter accumulation in maize plant was increased by increasing the rate of nitrogen fertilizer. This was achieved by Krishnamurthy et al . (1974) , Ahlawat et al . (1975) , Lashin and Ali (1977) , Mahgoub (1979) , El-Hattab et al . (1980) , Eraky et al . (1983) , Abd El-Lateef (1984) , Touchton and Rodriguez-Kabana (1985), Matta (1986) and Soliman (1986) . Similar results were obtained by Saad (1977) who found that the dry weight of the different organs of maize plant was increased by increasing N fertilizer and the increases were significant at the different stages of plant development except the dry weight of leaves and the dry weight of the whole plant at 65 and 85 days from sowing. Raghip (1979) reported that the effect of N fertilizer rates on total dry weight per plant was significant at 60 days from sowing and at all growth stages in 1976 and 1977 seasons, N fertilization had a significant effect on the blade dry weight at 75 and 90 days from sowing in 1976 season and at all growth stages except that after 90 days from sowing in 1977 season.

There was a little increase in blade dry weight by increasing N fertilization, the stem plus sheaths dry weight per plant increased gradually until 75 days from sowing and the effect of N fertilization on this character was significant at 45 and 60 days from sowing in 1976 season and 30 , 45 , 60 as well as 90 days in 1977 season, nitrogen fertilization had insignificant effect on tassel dry weight per plant except that after 90 days from sowing in both seasons. Increasing N fertilizer rates had favourable effect on dry matter accumulation of the growing ears . Adris (1981) and Matta (1986) found that the dry matter of tassel and ear per plant was increased by increasing nitrogen fertilizer rates. Concerning the time of N application, Faisal (1983) reported that the maximum dry weight of maize plant was produced by the double dressing of N application where each of the first and the second half of the proper amounts of N was applied at the first and the second irrigation.

Crop growth rate (CGR) of maize plant was increased significantly by increasing N fertilizer rates (Hamden 1977), Hassan (1977) , Ibrahim et al . (1979) and Eraky et al . (1983) . Faisal (1983) found that increasing nitrogen