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EFFECT OF NITROGEN FERTILIZATION AND
MICRO-ELEMENTS ON YIELD , YIELD COMPONENTS
AND QUALITY OF EGYPTIAN COTTON

By

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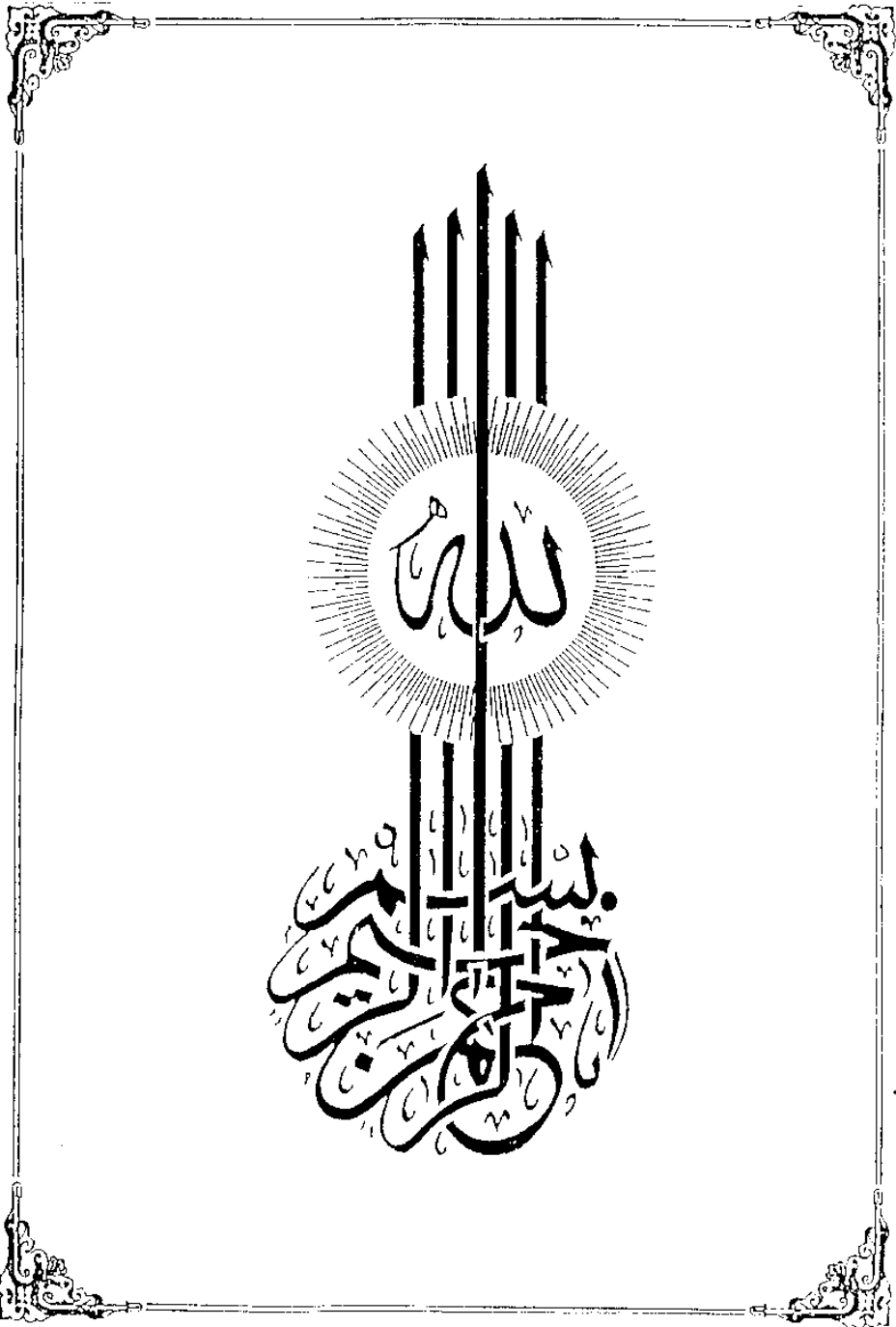
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INTRODUCTION

Cotton is one of the most important fiber crop in Egypt , as well as in the world , and one of the base of the economy of Egypt . But as the cotton area in Egypt decreased gradually during the last two decades , their had to be some ways to increase cotton yield per unit area . That can be achieved by means of breeding new varieties with high yielding capacity or through improved cultural treatments .

Cotton fertilization is one of the very important tools contributing to an increase in cotton yield .

Since Egyptian soil is deficient in nitrogen and some micro-elements , the application of nitrogenous fertilizers and some micro-elements are among the important factors affecting yield and quality of cotton .

The main objective of this study is to investigate the possibility of increasing the cotton yield and quality through three different nitrogen fertilizer levels as well as the possibility of increasing cotton yield and quality by spraying cotton plants with some micro-elements i.e. boron and zinc , at 60 and 90 days after sowing date .

REVIEW OF LITERATURE

Nitrogen fertilizer was and still one of the important limiting factors for vegetative plant growth and crop production , since nitrogen has a marked effect on building tissues . Excessive amount of nitrogen fertilizer result in excessive vegetative growth and late fruiting which ultimatly provide favourable conditions for insect infestation and reduced the final cotton yield . On the other hand , the low amount of nitrogen fertilizer led to decrease the vegetative growth and consequently reduced the final yield . Thus , many investigators have been actively engaged in studying the optimum amount of nitrogen fertilizer required for the maximum cotton production of high quality . The effects of nitrogen fertilizer on cotton yield and quality are liable to change in various directions and magnitudes as long as there are changes in the genetic material used for study and many influences of environment and the interactions between them . For the sake of simplicity the effect of nitrogen fertilizer on each character will be reviewed separately .

I- Effect of nitrogen fertilizer on growth characters :

1] Number of fruiting branches per plant

Abd El-Raheem (1960) found that number of fruiting branches per plant significantly increased by increasing nitrogen levels up to 46.5 kg./feddan . Similar results were obtained by Abed (1966) , Chaudhry

(1969), El-Banna (1969) , Hassanein (1970) , Nour El-Din et al (1970), Sawan (1978) , Abo-Zahra (1979) , Ali (1983) , Risha (1983) , Shafshak et al (1983 a) and El-Zaree (1985) . On other hand Hussein et al (1979 a) and Wahdan (1981) found that number of fruiting branches per plant was not affected by nitrogen levels .

2] Plant height :

Chrisitidis and Harrison (1955) , Abd El-Raheem (1960) , El-Hattab and Ali (1962) , Mackenzie and Van Shaik (1963) , Shalaby and Khalil (1963) , Clark (1964) , Perkins and Douglas (1965) , Verma et al (1965), Chaudhry (1969) , Eid (1969) , El-Banna (1969) , Hassanein (1970), Nour El-Din et al (1970) , Basinski et al (1971) , Girgis (1972), Rink (1974) , Abdallah (1976) , Hassan (1976) , Moursi et al (1976 a) , Makran (1977) , Hefni et al (1978) , Sawan (1978) , Abo-Zahra (1979) , Hussein et al (1979 a) , Varshney (1979) , El-Habbak (1980) , Hosny (1981) , Wahdan , (1981) , El-Shaer et al (1983) , Risha (1983) , Shafshak (1983 a) , Ziadah (1983) and El-Zaree (1985) , who found that nitrogen fertilizer application increased cotton plant height .

3] Dry weight per plant :

Chrisitidis and Harrison (1955) , Awadalla (1961) , Clark (1964), Chaudhry (1969) , Eid (1969) , Basinski et al (1971) , Sriscock et al

et al (1973) , Hassan (1976) , Abo-Zahra (1979) , Kherallah (1979) , El-Habbak (1980) , Hosny (1981) , Shafshak et al (1983 a) and Ziadah (1983) , showed that dry matter per plant significantly increased by increasing nitrogen levels . On other hand El-Shawarby et al (1962) reported that nitrogen fertilizer application had no significant effect on dry matter per cotton plant . They attributed this result to the excess of organic matter , total and soluble nitrogen in the experimental farm .

4] Dry weight of stems per plant :

Abdallah (1976) , Abo Zahra (1979) , Kherallah (1979) and Shafshak et al (1983 a) found that dry weight of stems per plant increased by increasing nitrogen fertilizer levels .

5] Dry weight of leaves per plant :

Increasing nitrogen fertilizer applications led to an increase in dry weight of leaves per plant [Abo Zahra (1979) , Kherallah (1979) and Shafshak et al (1983 a)] .

6] Dry weight of bolls per plant :

Abd El-Raheem (1960) , El-Banna (1969) , Abdallah (1976) , Hassan (1976) , Abo Zahra (1979) and Shafshak et al (1983 a) reported that dry weight of bolls per plant significantly increased by increasing nitrogen

fertilizer application .

7] Dry weight of root per plant :

Clark (1964) , Eid (1969) , Abo Zahra (1979) and Kherallah (1979) found that increasing nitrogen fertilizer application caused significant increase in dry weight of root per plant .

II- Effect of nitrogen fertilizer on yield and yield components :

1] Effect of nitrogen fertilizer on seed cotton yield per unit area :

El-Gabaly (1958) , concluded that seed cotton yield (kantar/feddan) increased by increasing nitrogen level up to 48 kg./feddan .

El-Hattab and Ali (1962) , found that seed cotton yield increased by increasing nitrogen fertilizer level up to 46.5 kg./feddan .

Verma et al (1965) , indicated that seed cotton yield increased by 30.63 % due to increasing nitrogen level from 30 to 60 lb/acre .

Moursi et al (1976 b) reported that the highest seed cotton yield was obtained at 200 kg. calcium nitrate/feddan .

Chamy et al (1977) , concluded that the highest seed cotton yield was obtained at 80 kg. N/ha.

Hefni et al (1977) , found that seed cotton yield (kantar/feddan) was not affected by increasing nitrogen level from 30 to 60 kg./feddan .

Hefni et al (1978) , concluded that increasing nitrogen level up to 30 kg./feddan , resulted in increasing seed cotton yield by 17.8% .

El-Shaer et al (1979) , reported that seed cotton yield increased by increasing nitrogen level up to 60 kg./feddan .

Hussein et al (1979 b) , mentioned that application of nitrogen fertilizer up to 45 kg./feddan caused an increase in seed cotton yield, and application of 60 kg.N/feddan decreased it .

Mayilsami and Iruthayaraj (1979) , showed that higher average of seed cotton yields (1.25 t/ha) were obtained with 45 kg. N/ha comparing with 0 or 90 kg./ha (0.79 - 1.20 t/ha) .

Varshney (1979) , using many sources of nitrogen fertilizer , he found that application of 60 kg./ha caused significant increase in seed cotton yield as compared with the control treatment .

El-Kholany and Sawan (1980) , found that increasing nitrogen level up to 45 kg./feddan caused an increase in seed cotton yield .

Balasundaram et al . , (1981) , showed that the highest seed cotton yields were obtained with 69.5 - 77.2 kg. N/ha , but the optimum economic rate was 65 - 70 kg. N/ha .

Gomaa et al (1981 a) , found that increasing nitrogen levels from 0 to 80 kg./feddan increased seed cotton yield (kantar/feddan) .

Nehra et al (1981), indicated that seed cotton yield increased from 1.58 to 1.92 t./ha. by increasing nitrogen level up to 80 kg/ha .

Nandwal et al (1982), reported that increasing nitrogen rates from 0 to 80 kg./ha increased the average seed cotton yields from 1.64 to 1.92 t / ha .

Ali (1983), reported that seed cotton yield (kantar / feddan) significantly increased by increasing nitrogen fertilizer application up to 45 kg / feddan .

Risha (1983), stated that nitrogen fertilizer had no significant effect on seed cotton yield (kantar / feddan) .

Shafshak et al (1983 b), indicated that seed cotton yield (kantar / feddan) increased by 8.5 , 18.7 and 21.7% in the first season, and by 2.0 , 13.0 and 20.5 % in the second season due to applying 15 , 30 and 45 kg. N / feddan , respectively .

Ziadah (1983), found that seed cotton yield increased due to increasing nitrogen level up to 80 kg. / feddan .

El-Zaree (1985), indicated that increasing nitrogen level up to 100 kg. / feddan resulted in increasing seed cotton yield (kantar/feddan).

2] Effect of nitrogen fertilizer on seed cotton yield per plant :

Hamdi et al (1964) , reported that seed cotton yield per plant increased by 14.4 % due to increasing nitrogen fertilizer application from 16 to 32 kg. / feddan .

Chaudhry (1969) , concluded that seed cotton yield per plant significantly increased (18.8 - 24.6 %) by increasing nitrogen level up to 52 kg. / feddan .

Hassan (1976) , found that seed cotton yield per plant increased by 75.4 % due to the application of nitrogen fertilizer up to 60 kg. / feddan .

Abdallah (1976) , mentioned that increasing nitrogen level from 30 to 60 kg./feddan resulted in increasing seed cotton yield per plant by 14.2 %

Hefni et al (1977) , reported that nitrogen levels up to 60 kg./feddan , showed no significant effect on seed cotton yield per plant .

Kherallah (1979) , found that nitrogen application up to 45 kg./ feddan resulted in increasing seed cotton yield per plant by 69.9 - 71.7 % .

Varshney (1979) , found that all nitrogen sources applied at the rate of 60 kg./ha increased seed cotton yield per plant .

Ghorab (1983), stated that nitrogen fertilizer application up to 45 kg./feddan resulted in increasing seed cotton yield per plant .

Wahdan (1981), showed that increased nitrogen rate up to 60 kg./feddan increased seed cotton yield per plant by 46.7 % .

Hefni et al (1982), found that nitrogen fertilizer up to 45 kg./feddan increased seed cotton yield per plant . Similar results were obtained by El-Shaer et al (1983) .

Risha (1985), reported that seed cotton yield per plant significantly increased due to increasing nitrogen level up to 75 kg./feddan .

Shafshak et al (1983 b), reported that increasing nitrogen level up to 45 kg./feddan increased seed cotton yield per plant .

El-Zaree (1985), indicated that seed cotton yield per plant significantly increased by increasing nitrogen level up to 75 kg./feddan.

3) Effect of nitrogen fertilizer on number of bolls per plant :

Heweidi (1965), showed that nitrogen fertilizer level up to 60 kg./feddan , resulted in increasing number of bolls per plant , over that increase nitrogen level resulted in decreasing number of bolls per plant.

Chaudhry (1969), concluded that nitrogen application up to 52.5 kg./feddan resulted in increasing number of bolls per plant by 18.16 - 23.97 % .

Nour El-Din et al (1970) , indicated that increasing nitrogen level up to 46.5 kg./feddan resulted in increasing number of open bolls per plant by 72.39 % .

Hassan (1976) , mentioned that number of bolls per plant increased by 100.12 % due to increasing nitrogen levels up to 60 kg./feddan .

Hefni et al (1977) , found that increasing nitrogen fertilizer application from 30 to 60 kg./feddan showed no significant effect on number of open bolls per plant .

Varshney et al (1979) , stated that the rate of 60 kg N/ feddan increased number of bolls per plant .

Ghorab (1980) , reported that increasing nitrogen fertilizer level up to 45 kg / feddan resulted in increasing number of open bolls per plant .

Gomez et al (1981a) showed that number of bolls per plant increased due to increasing nitrogen fertilizer application up to 80 kg / feddan .

Ali (1983) , indicated that the rate of 45 kg. nitrogen / feddan increased number of bolls per plant .

Risha (1983) , found that application of nitrogen fertilizer up to 75 kg. / feddan resulted in increasing number of bolls per plant .

Shafshak et al (1983b) , stated that number of bolls per plant increased with increasing nitrogen level from 15 to 45 kg / feddan .