EFFECT OF FERTILIZATION ON THE PROTEIN AND OIL CONTENTS OF COTTONSEEDS

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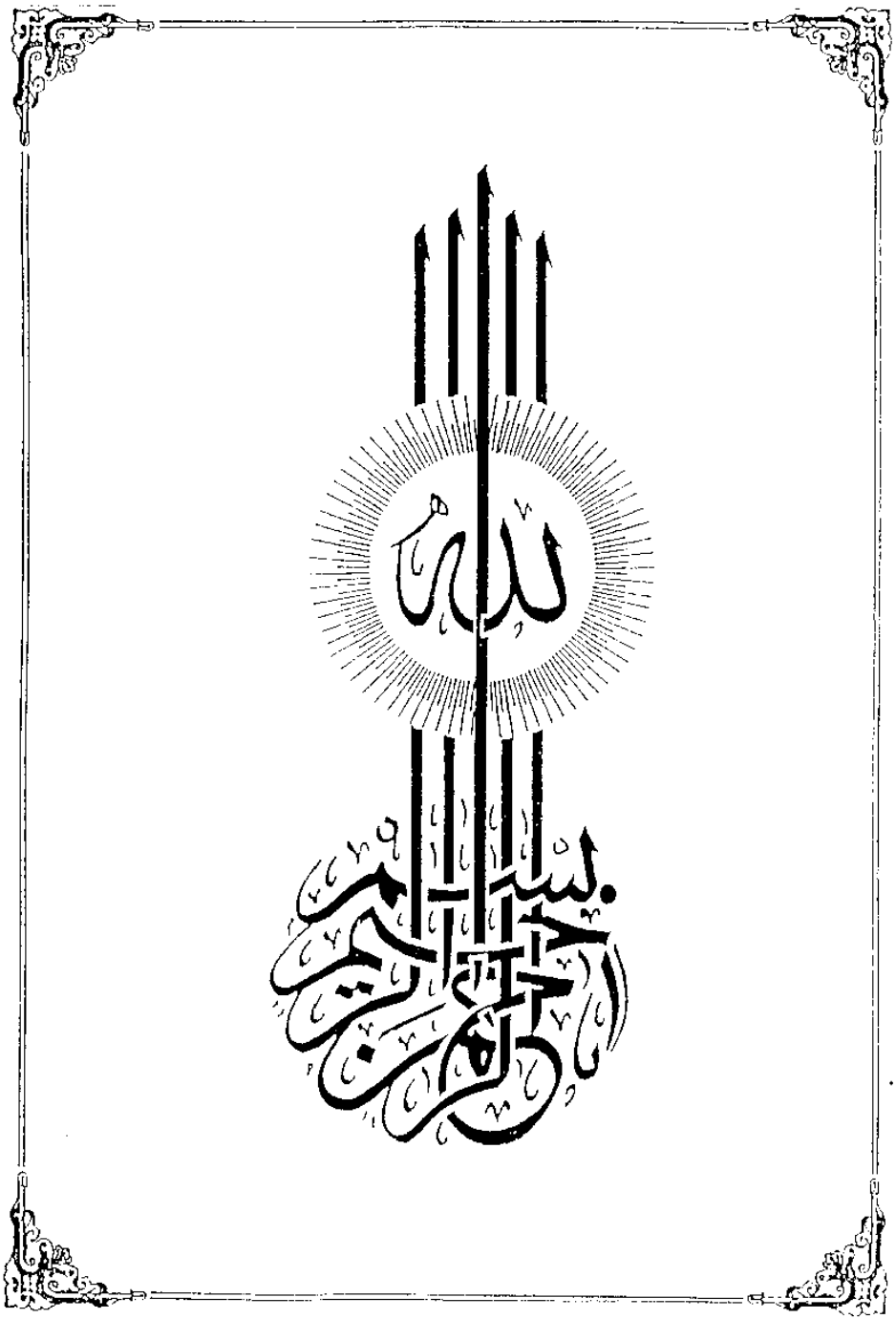

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INTRODUCTION

Cottonseed is considered the main source of oil industry. In this aspect the average cotton seed oil produced locally amounts from 90,000 to 91,000 tons annually and since the average apparent local consumption from oils and their products amount to more than 125,000 tons till year 1965, it appears that there is a lack in local oil production while is expected to be increased due to greater consumption and the gradual increase of population.

From the nutritive point of view cottonseed has an excellent value. It contains roughly 20 percent oil, 40 percent protein and 20 percent carbohydrates and minerals. One ton of seeds yields 170-190 kg.oil, about 400-420 kg. cake and the remaining husks amount to 380-400 kg. The cake with about 40 percent protein is considered a good concentrated meal for feeding milk and meat animals.

From the above-mentioned informations, it reveals how important are the cottonseed products and the prompt necessity for their increase. In Egypt, the area that could be planted by cotton is limited and no

increase in cottonseed products could be gained by horizontal expansion; in other words, the vertical expansion is the unique way to achieve our aim.

The objective of the present work is to obtain a high quality of cottonseed by means of fertilization, i.e., nitrogen and phosphorus fertilization. To fulfil this aim, two experiments have been carried out in Sakha and Sods as representative spots for lower and middle Egypt respectively.

PART I

REVIEW OF LITERATURE

COTTON YIELD

1. Cotton yield as affected by nitrogen fertilisers:

In North Carolina, Musgrave and Dana (1927) indicated that cotton yield increased with applications of 20 and 30 lbs. per acre, then slightly decreased at the addition of 40 lbs. per acre and was significantly less at 50 pounds of nitrogen per acre.

In Egypt Gracie et al. (1935) reported that yield of cotton was greatly increased at high nitrogen levels.

Crowther et al. (1937) in Egypt studying the effect of nitrogen on the yield of seed cotton found that nitrogeneous fertilisers had slightly increased yield.

Data reported by Paden (1937) in South Carolina indicated that yield was increased with nitrogen applications up to 41 pounds per acre higher applications up to 82 pounds resulted in a decrease in yield.

Gracie and Balls (1939) in Egypt reported that nitrogen had a significant effect on the yield of cotton product. They found that the yield increments from adding nitrogen were very great in Beni-suef province at 4 Sacks (400 kgs.) of nitrate per feddan. They added that the addition of further nitrogen afterthere depressed yield.

In Arizona also, Abbott et al. (1955) in their studies on nutrient requirements of Arizona cotton, found that 50 pounds of nitrogen per acre were in adequate for maximum lint production. They found however little difference in yield of lint between the 200 pounds application treatment and that which recieved 100 pounds of nitrogen per acre. It has also to be mentioned that phosphorous balanced the higher nitrogen uptake in both treatments which recieved 100 pounds nitrogen and 260 pounds P_2O_5 per acre hence contributed to higher lint production than did notrogen alone. The same authers have also showed in another experiment that nitrogen response can be obtained but no increase from either phosphorous or potassium was obtained.

Christidis and Harrison (1955) reported that in New Mexico ammonium sulphate application at the rate of 150 pounds per acre failed to show any appreciable effect on yield.

Jones et al. (1956) in Texas found no definite response of cotton yield to rates of nitrogen used alone or in combination with other elements.

Allam et al. (1957) in Egypt indicated that the yield of seed cotton was increased significantly with

the application of nitrogen fertilizers which was found to be profitable up to 150 kgs. of nitrate per feddan.

Eid and Hemisa (1958) in Egypt found that the addition of further amounts of nitrogen up to 160 kgs. per feddan resulted in vigorous vegetative growth and the yield did not increase significantly.

Abou El-Ela and Baradey (1958) in Egypt came to the conclusion that yield of seed cotton showed a response to nitrate and added that such response was affected by soil fertility.

El-Gabaly (1958) in Egypt found that great increase in yield of seed cotton was noticed by increasing the doses of nitrogen up to the rate of 48 kgs. per feddan.

Jackson and Faulkner (1960) in Sudan showed that the yield of cotton was increased with the increase of nitrogen application from 0 to 80 pounds per feddan.

Wahhab and Ahmed (1960) found in Pakistan that applications of 75 lb. of nitrogen per acre resulted in seed cotton yield increases of 164-246 lbs./acre.

Zanati (1961) in Egypt found that nitrogen application increased cotton yield significantly when compared

with yield of unfertilized plots.

Hughes (1963) in Arkansas pointed out that lint yield was increased with 70 lbs.N/acre when compared with no fertilisation at all.

Longenecker et al. (1963) studying the effect of fertilisation on cotton yields of major Trans-Pecos soils in Texas found that maximum yield for Acala 1517 cotton was obtained with 120-180 pounds of applied nitrogen per acre in all tests and that higher rates generally decreased yields slightly.

Mackensie and Van Schaik (1963) recorded that yield response to nitrogen was shown by all varieties with rates of application up to 120 pounds per acre.

Perkins and Douglas (1965) found that cotton yield was increased with the increase of nitrogen rates up to 150 pounds per acre.

2. Cotton yield as affected by phosphorous fertilisers:

In the United States the use of phosphatic fertilizers is sometimes completely ineffective whereas in other cases application of 90 to 535 pounds of super-

phosphate per acre results in most significant increases in yield.

In north Carolina, Williams and Stacy (1937) indicated that the yield of cotton increased very slightly with the heavier rates of applications of fertilizers supplying only nitrogen and Potash.

In Mississipi coleman (1944) indicated that cotton gave only slight response to phosphorus which was applied with small amount of nitrogen. He came to the conclusion that plants reciving adequate amounts of nitrogen not only respond better to phosphorus but they also require large amount of it.

Moreover experiments by Ensminger (1950) showed that 400 pounds of superphosphate per acre gave higher increase in yield than 200 or 600 pounds. Best results have been obtained in the presence of additional quantities of the other two necessary nutrients.

In Arizona work of Brimhall and McGeorge (1951) showed that best results were obtained with 50 to 100 pounds of phosphoric acid per acre.

Other results indicating that phosphorus balanced the higher nitrogen uptake and thus contributed to their higher lint production than nitrogen alone were reported by Abbott et al. (1955).

In Greece application of phosphorus up to 700 pounds per acre proved to be entirely ineffective in some parts of the country but in others significant responses were never shown to be profitable, (Christidis and Harrison 1955).

Bederker et al. (1957) in India, indicated that application of P_2O_5 to cotton increased its yield. The optimum dose appeared to be 30 pounds of P_2O_5 per acre. He came to the conclusion that higher yields were obtained if phosphates were applied along with nitrogenous manure.

Abu El-Ela et al. (1957) reported that the effect of phosphatic fertilizers on the yield of cotton in the soil of Etay-El-Barud was not significant.

The same authors (1958) noticed that there was no response to phosphatic fertilizers to cotton yield in soil of Agriculture collage of Alex. University.