SUMMARY

Two field experiments were conducted at Giza Agricultural Research Station. Agric. Res. Cen., during 1991 and 1992 seasons to study the performance of three hybrids and one open-pollinated variety under four N levels and to estimate N uptake, N use efficiency and N recovery.

The soil texture was clay loam with a pH value of 8.16 and electric conductivity of about 0.5 and available N from 293 to 392 ppm.

The studied varieties were, D.C. 215, T.W.C. 310, S.C. 10 and Giza-2 (composite variety), which were developed by Maize Research Section, Agric. Res. Center, Giza.

The N levels were, zero, 80, 105 and 130 kg N /fed. The normal cultural practices of growing maize as recommended for the region were carried out.

The experimental design was randomized complete blocks with four replications.

Data on growth and agronomic characters, flowering date, grain yield and its components and NPK content in leaf of the topmost ear as well as in grain were collected.

Results could be summarized as follows :

1 - The increase in N levels significantly increased plant height of maize at 35 and 50 days from planting as well as at harvest. Also ear height was significantly increased due to N application.

2 - Number of leaves/plant at 35 and 50 days from planting was significantly increased with the increase in N level. Also area of the topmost ear was significantly and consistently increased due to the increase in N level from 0 to 80, 105 and 130 kg/fed.

3 - Nitrogen application induced early tasseling and silking of maize plants. The earliest tasseling and silking dates were achieved by the highest N level namely, 130 kg N/fed.

4 - Nitrogen application significantly reduced barren plants % and increased number of ears/plant, which indicates the effect of a good supply of N on the prolificacy of maize plants.

5 - Ear characters studied namely, ear length, ear diameter, ear weight and number of rows/ear were significantly increased with the increase in N level.

6 - Grain index, shelling % and grain yield per feddan were significantly increased due to the increase in N level. Applying N at 80, 105 and 130 kg/fed increased grain yield over the check treatment by 18.4, 26.1 and 36.7 % in the first season, corresponding to 20.5, 32.1 and 48.9 % in the second season, respectively. The average grain yield produced under the 130 kg/fed N level was 3.05 and 3.82 t/fed in 1991 and 1992 season, respectively.

7.- The increase in N level significantly increased N and K % in leaves, whereas P % in leaves was not significantly affected by N application. Also, increasing N level significantly increased N, P, K and protein content in grain.

8 - The four tested varieties showed differences in plant height at different growth stages. S.C 10 was the tallest variety in both seasons. Also ear height was higher in S.C. 10 while Giza-2 had the lowest ear height.

9 - Number of leaves/plant was higher in S.C. 10 followed by T.W.C. 310, D.C. 215 and Giza-2 in a descending order. Also, area of the topmost ear was higher in hybrids compared with the open-pollinated variety Giza-2.

10 - S.C 10 was the earliest variety in tasseling and silking dates.

11 - S.C. 10 recorded the lowest barren plants % in both seasons, whereas Giza-2 recorded the highest percentage . Similarly, S.C. 10 recorded the highest value for number of ears/plant followed by T.W.C. 310, D.C. 215 and Giza-2 in a descending order.

12 - Varieties differed significantly in ear characters. S.C. 10 had the longest ears and Giza-2 the shortest ears, whereas T.W.C. 310 and D.C. 215 were in between. The four evaluated varieties did not differ in ear diameter and number of rows/ear, while ear weight was higher in S.C. 10 and T.W.C. 310 compared with Giza-2 and D.C. 215.

13 - S.C 10 was superior to the other varieties in grain index, whereas Giza-2 was the worst in this trait.

14 - Shelling % was higher with D.C. 215 and lower with Giza-2 and S.C. 10 and T.W.C. 310 were in-between.

15 - S.C. 10 was the best variety in grain yield/fed and outyielded T.W.C. 310, D.C. 215 and Giza-2 by 27.9, 38.3 and 47.5 % in 1991 season and by 4.4, 13.2, and 18.1 % in 1992 season, respectively.

16 - The four tested varieties did not show significant differences in N, P and K contents in leaves. Also, N, P and k% in grain did not differ significantly in the tested varieties, whereas P % in grain of T.W.C. 310 was significantly higher in the second season compared with the other three varieties.

17 - No significant differences were detected in protein % in grain of the four evaluated varieties.

18 - Nitrogen uptake in grain was markedly affected by N level. Applying N at 80, 105 and 130 kg/fed increased N uptake in grain over the check treatment by 41.2, 53.5

and 77.6 in 1991 season, respectively, corresponding to 38.0, 66.7 and 113.6 % in 1992 season.

19 - Nitrogen uptake in grain of S.C. 10 surpassed that of T.W.C. 310, D.C.215 and Giza-2 by 25.7, 37.6 and 47.7 % in the first season and by 2.6, 13.1 and 25.6 for the three other varieties, respectively. Nitrogen uptake in grain averaged over the four N levels in S.C. 10, T.W.C. 310, D.C. 215 and Giza-2 was 50.0, 39.8, 36.4 and 33.9 kg/fed in 1991 season, respectively corresponding to 67.9, 66.1, 60.0 and 54.0 kg/fed in 1992 season.

20 - Nitrogen use efficiency markedly increased due to the increase in N level. In 1991 season, applying N at 80, 105 and 130 kg/fed produced N use efficiency of 5.84, 6.31 and 7.17, whereas the same N levels resulted in N use efficiency of 7.80, 9.31 and 11.46 in 1992 season, respectively. The results indicate that a level of 130 kg N/fed is an optimum level under the conditions of the experiment.

21 - The four evaluated varieties could be arranged in the following descending order with regard to N use efficiency as, S.C. 10 (7.16), T.W.C. 310 (7.41), D.C. 215 (6.4) and Giza-2 (4.28) in 1991 season. In 1992 season, the arrangement was S.C. 10 (12.37), T.W.C. 310 (11.55), Giza-2 (8.95) and D.C. 215 (5.41), in a descending order.

22 - Nitrogen recovery was recorded as 14.42, 14.25 and 16.69 for the N levels of 80, 105 and 135 kg/fed in 1991 season. The same N levels produced N recovery of 19.03, 25.44 and 35.24 %, respectively in 1992 season.

23 - S.C. 10 was the best variety in N recovery followed by D.C. 215 in 1991 season and T.W.C. 310 in 1992 season. N recovery values were 17.01, 13.03, 17.21 and 13.21 for S.C. 10, T.W.C. 310, D.C. 215 and Giza-2 in 1991 season, respectively. In 1992

season, N recovery values were 33.38, 30.30, 20.99 and 21.52 for S.C. 10, T.W.C. 310, D.C. 215 and Giza-2, respectively.

24 - The interaction between N levels and varieties had significant effect on leaf area of the topmost ear leaf in 1991 season, other studied characters were not significantly affected by the interaction.

25 - The present results showed clearly the superiority of growing S.C. 10 as well as T.W.C. 310 and the application of 130 kg N/fed for maximizing maize grain yield.