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Two field experiments were conducted at the experimental Research Center, Faculty of Agricalture Moshtohor, Zagazig University ( Benha Branch ) , Kalubia Governorate during 2000 and 2001 seasons to study the response of some cultivars of maize to plant density and nitrogen fertilization.

Each experiment included 36 treatments which were the combination of three maize cultivars ( namely S.C.122, T.W.C 321 and Giza 2 ) , three densities of plant( i.e. 20 ,24 and 30 thousand plants / feddan ) and four levels of nitrogen ( 0,45,90and 135 kg N / feddan ) . These treatments were arranged in split- split plot design in four replications .Maize cultivars were randomly distributed in the main plot ,plant density were arranged at random in the sub plots whereas N level were assigned in the sub- sub plots . The area of each sub- sub plot was 14.87 $m^2$ ( 3.5x4.25 m) which contained 5 ridges of 4.25 m length and 70cm width. Maize grains were sown on the 2 $^{nd}$ of June and 31$^{th}$ of May in 2000 and 2001 seasons, respectively .Phosphorus fertilizer was applied at a rate of 24 kg $p_2$ $o_5$ / feddan in the form of calcium super-phosphate ( 15.5% $P_2$ $O_5$) during seed bed preparation . Maize plants were harvested on September , 26 and 22 in the first and second seasons, respectively.

## Characters studied :-

### Growth characters :-

1- plant height (cm ).

2-Ear height ( cm ) .

3-Leaf area of the topmost ear ($cm^2$ )

4- Stem diameter ( m m )

5- Number of green leaves / plant.

6- Tasseling and silking date.

### Yield and Yield components :-

1- Ear length and diameter.

2- Number of rows / ear .

3- Number of grains / row .

4- Ear weight and grain weight / ear .

5- Shelling percentage .

6- 100-grain weight.

7- Number of plants / feddan .

8- Number of ears / plant .

9- Grain yield ( ardab ) / feddan .

## Chemical analysis :-

1-Total carbohydrate percentage.

2- Crude protein percentage.

3- Oil percentage.

The important results of this study could be summarized as follow.

**A- Varietal differences :**

1- The difference between maize cultivars under study was significant in the mean values of plant and ear height in the two growing seasons. T.W.C.321 gave the tallest plant and highest ear position when compared with the other cultivars. Whereas no significant difference was obtained between S.C 122 and Giza 2 cultivars in plant and ear height .

2- T.W.C 321 cultivar significantly surpassed the other cultivars under study in ear leaf area of the topmost ear in the second season only .

3- T.W.C321 cultivar had the highest mean values of stem diameter with significant in one season only .whereas the lowest stem diameter was obtained from Giza 2 cultivar .

4- T.W.C. 321 cultivar significantly surpassed the other cultivars in number of green leaves / plant in both seasons. Whereas no significant difference was obtained between S.C.122 and Giza 2 cultivar in number of green leaves / plant.

5- Time of tasseling and silking were earlier in Giza 2 than S.C.122 and T.W.C.321 cultivars .

6- T.W.C.321 cultivar gave the longest ear, while the shortest one was obtained from Giza2 cultivar .on the contrary , Giza 2 cultivar gave the maximum mean values of stem diameter, but the minimum one was produced from S.C 122 cultivar.

7- The differences between the three maize cultivars under study were not significant in number of rows/ ear in both season .

8- T.W.C. 321 cultivar significantly surpassed the other maize cultivars in number of grains / row in one season only .whereas Giza2 cultivar gave the minimum number of grains / row .

9- T.W.C.321 cultivar gave the greatest ear weight and grain weight / ear followed by S.C.122 and Giza 2 cultivars in both season .

10- S.C.122 cultivar significantly exceeded the other maize cultivars in shelling percentage followed by T.W.C.321 and Giza 2 cultivars in both seasons.

11- The mean values of 100- grain weight was significantly affected by the three maize cultivaes under study in one season out of two. Giza 2 cultivar surpassed significantly than the other cultivars in 100-grain weight ., whereas S.C122 gave the lowest one.

12- The differences between the three maize cultivars was not significant on the number of plant / feddan in both season .

13- The higher number of ears / plant were produced from S.C.122 and Giza 2 cultivars, whereas ,T.W.C.321 cultivar gave the lowest number of ears / plant .

14- S.C.122 cultivar surpassed significantly T.WC321 and Giza 2 cultivars in grain yield / feddan ( 29.5 and 30.9 ardab / fed.) in the first and second seasons, respectively , whereas, Giza2 cultivar produced the lowest values ( 28.2 and 28.9

ardab / feddan , respectively ) On the other hand, no significant difference was obtained between S.C.122 and T.W.C. 321 cultivar in grain yield / feddan in the first season.

15- Maize cultivars under study had no significant effect on crude protein percentage , oil percentage and total carbohydrate content in grains in the two growing seasons.

**B- Effect of plant density :-**

1-plant height was significantly decreased by increasing the distance between hills from 20cm to 30 cm in the second season only . The taller plant was obtained at a density of 30000 plants / feddan ( 20cm apart between hill ) in both seasons .

2- Increasing plant density up to 30000 plants/ feddan gave the highest ear position , whereas this result did not reach the significance in both seasons.

3-Increasing distance between hills significantly increased leaf area of the topmost ear and stem diameter in the second season only.

4- Population density had no effect on number of green leaves / plant , data of tasseling and silking in both seasons .A lower population density induced early tasseling and silking .

5- Ear length was significantly increased by increasing hill space up to 30 cm apart in both season .

6- Increasing plant population caused a significant decrease in ear diameter, number of rows /ear and number of grain /row. Plants grew at a distance of 30 cm between hill gave the

maximum mean values of ear diameter, number of rows / ear and number of grain / row .whereas no significant difference was obtained between plants grew at a distance of 25 cm and 30 cm between hill on these characters.

7- Increasing distance between hills from 20 cm to 30 cm caused a significant increase in ear weight and grain weight / ear in both seasons, whereas plants grew at a distance of 20 cm between hill gave the lowest weight of ear and grain weight / ear .

8- Population densities significantly affected shelling percentage in the second season only .A density of 24000plants / feddan gave the lowest value of shelling % whereas density of 20000 plants / feddan gave the highest value of shelling %.

9- Weight of 100-grain was significantly decreased by increasing plant density from 20000 to 30000 plants / feddan in the second season only the highest mean values of 100-grain weight was produced from widening distance between plants (at 25 cm between hills)

10- Number of plants / feddan was significantly increased by decreasing the distance between hills in both seasons . The highest number of plants / feddan was 27386.8 and 27872.3 plants produced from narrow distance between hills (20 cm apart) in the first and second seasons , respectively .

11- There were no significance differences between the mean values of ears number / plant as affected by plant density in both seasons .

12- Plant density had no significant effect on grain yield per feddan in both season . The maximum grain yield / feddan was 29.1 ardab in the first season when plants grown at a distance of 25 cm between hill , but plant grown at a distance of 30 cm between hill gave the highest grain yield / feddan ( 30.1 ardab ) in the second season .It could be concluded that the best distance between hills ( 25-30cm apart ) to produce the greatest grain / yield .

13- The mean values of protein content , oil content and total carbohydrate percentage were not affected by increasing the distance between hills in both season .

**C- Effect of N level :-**

1- The increase in N levels significantly increased plant and ear height of maize .the tallest plant and highest ear position were obtained from applied 135 kg N/ feddan .

2- Leaf area of the topmost ear and stem diameter were significantly increased by increasing N- level up to 135 kg N/ feddan in both seasons.

3- Nitrogen application resulted in significantly increasing the number of green leaves / plants in the second season .The highest number of green leaves / plant was 13.2 and 13.7 in the first and second seasons, respectively.

4- Nitrogen application induced early tasseling and silking of maize plants .The earliest tasseling and silking datas were achieved by adding 90kg N/ fed .

5- Increasing N level from zero to 135 kg N /feddan significantly caused increases in both ear length and diameter in both seasons.

6- Number of rows / ear and number of grains / row significantly increased by increasing N level up to 135 kg N/ feddan in the two growing seasons.

7- Ear weight and grain weight / ear significantly increased with increasing N level up to 135 kg N / fed.

8- Application of 135 kg N / feddan caused a significant increase in shelling percentage in both seasons. whereas no significant difference was obtained between adding 45 and 90kg N/ feddan on shelling percentage in the first season.

9- 100- grain weigh and number of ears / plant significantly increased by increasing N –level up to 135 kg N/ feddan in both seasons.

10- Nitrogen application had no significant effect on number of plants / feddan in the two seasons.

11- The application of 45, 90 and 135 kg N /feddan increased significantly the grain yield / feddan .over untreated plants by 49.2, 95.9 and 126.7 % , respectively in the fist season .The corresponding significant increase in grain yield in the second season were 28.2, 60.3 and 82.3 % respectively this result indicate that grain yield of maize plants response to N application more than 135 kg N / feddan .

12- There was a significant difference in protein content in maize due to application of nitrogen fertilizer in both seasons .The highest protein content produced from applied 45 and

90kg N/ feddan in the first and second seasons, respectively whereas ,the mean values of oil and carbohydrate content in maize grains were not significantly affected due to increasing N level in both seasons.

**D- Interaction effects: -**

1- The effect of the interaction between maize cultivars and plant density was not significantly for all studied characters under study .

2- Plant height, silking date and number of ears/ plant were significantly affected by the interaction between maize cultivars and N- level in one season only.

3- The effect of the interaction between plant density and N – level was not significant for all characters under study except the number of rows / ear and ear weight in one season only. The highest ear weight produced from plants grown at a distance of 25 cm or 30 cm between hill with applied 135 kg N /feddan .

4- The interaction between the three factors did not affect significantly all characters of growth, yield, yield components and chemical analysis in maize grains in both seasons.