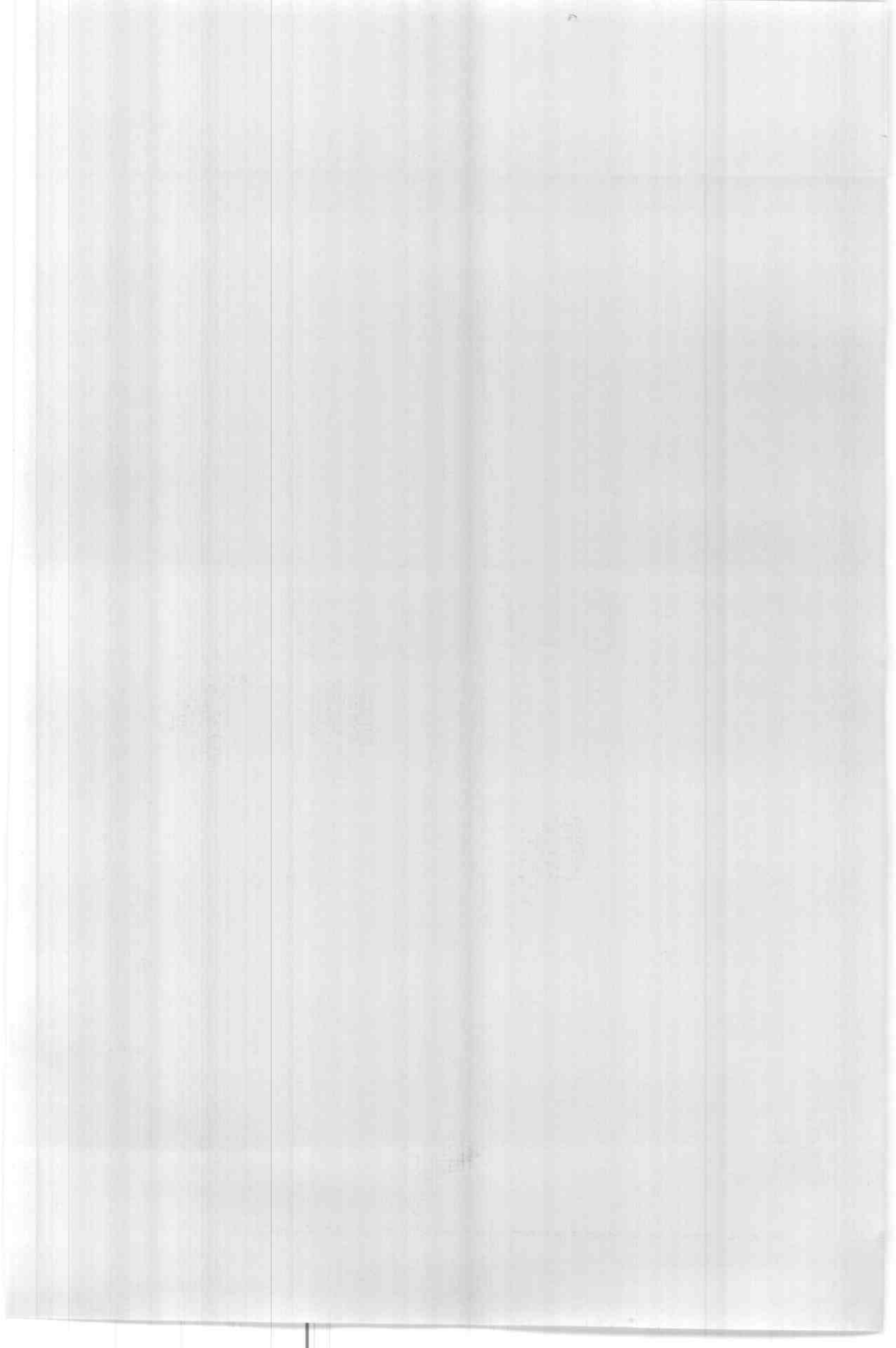
SUMMARY



SUMMARY

Two field experiments were carried out at the Agricultural Research and Experimental Center of the Faculty of Agriculture, Moshtohor, Kalubia Governorate, Benha University, Egypt, in the two successive seasons 2005 and 2006 to study the performance of four hybrids and two open-pollinated varieties under seven nitrogen fertilizer rates (mineral or mineral mixed with farmyard manure (FYM)) to estimate growth, grain yield, yield components and nitrogen use efficiency.

The soil type of the experimental site was clay with pH of 8.06 and 8.02, electric conductivity of about 1.85 and 1.95dSm^{-1}, organic matter content of 1.91 and 1.98% and total of N 0.14 and 0.12% in the first and second seasons, respectively. The experiment included six maize genotypes and seven (mineral or mineral + organic) N rates. The experimental design was a split plot with four replications. The six maize genotypes were randomly allocated in the main plots and the seven treatments for nitrogen fertilizer rates were randomly distributed in the sub plots. The area of each sub plot was 10.5 m^2 (3.5 m wide x3.0m long), which contained five ridges of 3.0 m long and 70 cm wide maize grains were placed in hills, 25 cm apart.

Treatments were as follows:

-Six maize genotypes, i.e.

1- Single cross 3084 **(S.C.3084),** a yellow kernels, produced by Pioneer Company.

2- Single cross 30K8 **(S.C.30K8)**, a white kernels, produced by Pioneer Company.

3- Double cross Dahab **(D.C. Dahab)**, a yellow kernels, produced by Pioneer Company.

4- Three way cross 323 **(T.W.C.323),** produced by ARC, Giza.

5- Synthetic variety Giza 2 **(Giza2),** produced by ARC, Giza.

6- Open-pollinated variety **(Nab El-Gamal),** the local variety of Moshtohor.

- Nitrogen fertilization rates:

Seven N fertilizer rates were used in this study.

1- Control (**Zero**).

2- 60 kg N fed^{-1}.

3- 90 kg N fed^{-1}.

4- 120 kg N fed^{-1}.

5- 40 kg N +20 tons FYM fed^{-1}.

6- 60 kg N +30 tons FYM fed^{-1}.

7- 80 kg N +40 tons FYM fed^{-1}.

- Characters studied:-

- Growth characters:

1- Tasseling date.

2- Silking date.

3- Plant height (cm).

4- Stem diameter (cm).

5- Number of green leaves $plant^{-1}$.

6- Leaf area of topmost ear (cm^2).

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- Growth characters:

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2- Silking date.

3- Plant height (cm).

4- Stem diameter (cm).

5- Number of green leaves $plant^{-1}$.

6- Leaf area of topmost ear (cm^2).

7- Leaf area index.

8- Number of ears plant^{-1}.

- Yield and yield components:

1- Ear length (cm).

2- Ear diameter (cm).

3- Number of rows ear^{-1}.

4- Number of grains row^{-1}.

5- Ear weight (g).

6- Grains weight of ear (g).

7- 100-grain weight (g).

8- Shelling percentage.

9- Grain yield plant^{-1} (g).

10- Grain yield (kg fed^{-1}).

11- Stover yield in kg fed^{-1}.

12- Biological yield in kg fed^{-1}.

13- Harvest index.

-Chemical analyses:

1- Nitrogen content in grains.

2- Protein percentage in grains.

3- Protein yield (kg fed^{-1}).

4- N uptake in grains kg fed^{-1}.

5- Nitrogen use efficiency (NUE).

6- Apparent nitrogen recovery%.

Results could be summarized as follows:

1- Growth characters.

1.1- Varietal differences.

- Time of tasseling and silking were earlier in Nab El-Gamal than other maize genotypes in both seasons except Giza2 cultivar in the first season only. Single crosses reached tasseling and silking later compared with the other genotypes.

- Nab El-Gamal cultivar gave the tallest plants when compared with the other maize genotypes in both seasons except Giza2 cultivar in the first season only. D.C. Dahab produced the shortest plants.

- T.W.C.323 surpassed significantly the other maize genotypes under study in stem diameter in both seasons except S.C.30k8 in the second season.

- S.C.3084 and S.C.30k8 gave the maximum values of number of green leaves plant^{-1} in the first and second seasons respectively. Whereas no significant differences were found among S.C. 3084, S.C. 30k8, D.C. Dahab and T.W.C. 323 in number of green leaves plant^{-1} in both seasons.

- S.C.30k8 and T.W.C.323 gave the highest values of leaf area of topmost ear and leaf area index in the first and second seasons, respectively.

- T.W.C.323 gave the maximum value of number of ears plant^{-1} in both seasons.

1.2- Effect of N fertilizer rates.

- Nitrogen fertilizer rates induced early tasseling and silking of maize plants. The earliest tasseling and silking dates were achieved by applying 80 kg N+40(t/FYM) or 120 kg N fed^{-1} in both seasons.

- Plant height, stem diameter, number of green leaves $plant^{-1}$, leaf area of topmost ear, leaf area index and number of ears $plant^{-1}$ were significantly increased by increasing N rates up to 80 kg N+40(t/FYM) fed^{-1} in both seasons. Whereas no significant difference was obtained between 80 kg N+40(t/FYM) fed^{-1} and 120 kg N fed^{-1} in stem diameter, leaf area of topmost ear and number of ears $plant^{-1}$ in the second season only.

1.3- Interaction effect.

- Effect of the interaction between maize genotypes and N fertilizer rates (mineral & organic) was significant on number of green leaves $plant^{-1}$ in both seasons and silking date and plant height in the first season as well as stem diameter and number of ears $plant^{-1}$ in the second season.

- The earliest silking date (60.68 days) was recorded by Nab El-Gamal cultivar under 120 kg N fed^{-1} or 80 kg N+ 40(t/FYM) fed^{-1} in the first season.

- The tallest maize plants (310.58 cm) were obtained by Nab El-Gamal cultivar under 80 kg N + 40(t/FYM) fed^{-1} in the first season.

- The highest value of stem diameter (2.87 cm) was obtained by SC30k8 under 80 kg N + 40(t/FYM) fed^{-1} in the second season.

- The highest number of green leaves $plant^{-1}$ (13.04 and 12.47 leaves) respectively was obtained from S.C.3084 and S.C.30k8 under 80 kg N+40(t/FYM) fed^{-1} in the first and second season, respectively.

- The highest value of No. of ears $plant^{-1}$ (1.2 ear) was obtained by T.W.C. 323 under 80 kg N + 40(t/FYM) fed^{-1} in the second season.

2- Yield and yield components.

2.1- Varietal differences.

- T.W.C.323 has the longest ears followed by S.C.3084, S.C.30k8 and Giza2 in a descending order in the first season. Also, in the second season, T.W.C.323 has the longest ears followed by S.C.30k8 and S.C.3084 in a descending order but without significance defferances.

- S.C.30k8 gave the maximum values of ear diameter and No. of grains row^{-1} in both seasons.

- S.C.3084 and D.C. Dahab gave the maximum values of No. of rows ear^{-1} in both seasons.

- S.C.30k8 has the maximum grain weight per ear followed by S.C.3084, T.W.C.323, Giza2, D.C. Dahab and Nab El-Gamal in a descending order in both seasons.

- S.C.30k8 gave the highest value of 100-grain weight in the first season.

- S.C.30k8 and T.W.C.323 recorded the highest shelling percentage followed by S.C.3084, Giza2, D.C. Dahab and Nab El-Gamal in a descending order in both seasons.

- S.C.30k8 surpassed significantly the other maize genotypes under study in ear weight, grain yield plant^{-1}, stover and biological yields feddan^{-1} and harvest index in the first and second seasons.

- S.C.30k8 and S.C.3084 were the best hybrids in grain yield feddan^{-1} with an excellent potentiality, followed by D.C. Dahab, T.W.C.323, Giza2 and Nab El-Gamal in a descending order in both seasons.

2.2- Effect of N fertilizer rates.

- Ear length, ear diameter, number of rows ear^{-1}, number of grains row^{-1} , ear weight, grain weight per ear, shelling percentage, 100-grain weight and grain yield plant^{-1} were significantly increased by increasing N rates up to 80 kg N+40(t/FYM) fed^{-1} in both seasons. Whereas no significant difference was found between 80 kg N+40(t/FYM) fed^{-1} and 120 kg N fed^{-1} in number of rows ear^{-1}, ear weight and grain weight per ear in the first season only.

- Grain yield feddan^{-1} increased by 70.66, 138.99, 191.14, 73.25, 151.62 and 206.20% when maize plants received 60 kg N, 90 kg N, 120 kg N, 40 kg N + 20(t/FYM), 60 kg N + 30(t/FYM) and 80 kg N + 40(t/FYM) fed^{-1}, respectively over the control

treatment in the first season, Also, in the second season, grain yield increased by 61.27, 118.26, 169.31, 65.88, 130.16 and 177.56%, respectively, due to the same N rates.

- Stover and biological yields feddan^{-1} and harvest index were significantly increased by increasing N rates up to 80 kg N+40(t/FYM) fed^{-1} in both seasons. Whereas no significant difference was found between 80 kg N+40(t/FYM) fed^{-1} and 120 kg N fed^{-1} in stover yield in the first season as well as stover and biological yields feddan^{-1} in the second season.

2.3- Interaction effect.

- Ear weight, grain weight per ear, shelling percentage, grain yield plant^{-1}, grain yield feddan^{-1}, stover yield feddan^{-1}, biological yield feddan^{-1} and harvest index in both seasons and ear diameter in the first season as well as ear length, number of rows ear^{-1} and number of grains row^{-1} in the second season were significantly affected by interaction between maize genotypes and N fertilizer rates (mineral & organic).

- The highest value of ear length (20.45 cm) was obtained by S.C.3084 or S.C.30k8 under 80 kg N+ 40(t/FYM) fed^{-1} in the second season.

- The highest value of ear diameter (5.31 cm) was obtained by D.C. Dahab or S.C.30k8 under 80 kg N+ 40(t/FYM) fed^{-1} in the first season.

- The highest value of No. of rows ear^{-1} (15.63 rows) was obtained by D.C. Dahab under 80 kg N+ 40(t/FYM) fed^{-1} in the second season.

- The highest value of No. of grains row^{-1} (49.35 grain) was obtained by S.C.30k8 under 80 kg N+ 40(t/FYM) fed^{-1} in the second season.

- The heaviest ear weight and grain weight per ear were obtained from S.C.30k8 under 80 kg N + 40(t/FYM) fed^{-1} in both seasons.

- The highest values of shelling percentage (84.20 and 83.73%) were obtained by T.W.C.323 and S.C.30k8 when received 80 kg N + 40(t/FYM) fed^{-1} in the first and second seasons, respectively.

- The heaviest grain yield plant^{-1} (224.64 and 225.66 g) and grain yield feddan^{-1} (4466.7 and 4191.5 kg) were obtained by S.C.30k8 when received 80 kg N+40(t/FYM) fed^{-1} in the first and second seasons, respectively.

- The highest values of stover yield feddan^{-1}, biological yield feddan^{-1} and harvest index were obtained from S.C.30k8 under 80 kg N + 40(t/FYM) fed^{-1} in both seasons.

3- Chemical contents and NUE.

3.1- Varietal differences.

- D.C. Dahab, Giza2 and Nab El-Gamal cultivars surpassed significantly T.W.C.323, S.C.3084 and S.C. 30k8 in N content in maize grain in both seasons.

- Nab El-Gamal and D.C. Dahab cultivars gave the highest mean values of protein percentage in the first and second seasons, respectively.

- S.C.3084 and D.C. Dahab gave the highest mean values of protein yield feddan^{-1} and N uptake in the first and second seasons, respectively.

- S.C.30k8 surpassed significantly the other maize genotypes in N Use Efficiency in both seasons.

- S.C.3084 and S.C.30k8 surpassed significantly the other maize genotypes in N recovery% in the first and second seasons, respectively.

3.2- Effect of N fertilizer rates.

- N content, protein percentage, protein yield feddan^{-1}, N uptake, N Use Efficiency and apparent nitrogen recovery of maize were significantly increased by increasing N rates up to 80 kg N+40(t/FYM) fed^{-1} in both seasons. Whereas no significant difference was obtained between 80 kg N+40(t/FYM) fed^{-1} and 120 kg N fed^{-1} in N content and protein percentage in grain in the first season as well as N content, protein yield feddan^{-1}, N uptake and N recovery% in the second season.

- In the first season, applying N rates of 60 kg N, 90 kg N, 120 kg N, 40 kg N+20(t/FYM), 60 kg N+30(t/FYM) and 80 kg N+40(t/FYM) fed^{-1} caused significant increase in protein yield feddan^{-1} by 82.71, 165.99, 259.52, 95.82, 193.72 and 283.97 kg, respectively when compared to the control. In the second

season, the respective increases were 82.92, 162.09, 257.43, 95.03, 187.84 and 262.69 kg.

3.3- Interaction effect.

- Effect of the interaction between maize genotypes and N fertilizer rates (mineral & organic) was significant on N content in grain, protein percentage, protein yield feddan^{-1}, N uptake, N Use Efficiency and N recovery% of maize in both seasons.

- The highest N content (1.91 and 1.99%) and protein percentage (11.91 and 12.41%) were obtained by Nab El-Gamal and D.C. Dahab when received 120 kg N fed^{-1} in the first and second seasons, respectively.

- The highest values of protein yield feddan^{-1} (480.13 and 456.60 kg) and N uptake (76.82 and 73.06 kg) were produced from S.C. 3084 and D.C. Dahab under 80 kg N + 40 (t/FYM) fed^{-1} and 120 kg N fed^{-1} in the first and second seasons, respectively.

- The highest value of N Use Efficiency was 27.17 and 25.36 kg grain kg^{-1} N which was obtained by S.C.3084 and S.C.30k8 under 60 kg N + 30 (t/FYM) fed^{-1} in the first and second seasons, respectively.

- The highest values of N recovery% were 54.00 and 44.67% and were obtained by S.C.3084 and S.C.30k8 under 60 kg N + 30(t/FYM) fed^{-1} and 80 kg N + 40 (t/FYM) fed^{-1} in the first and second seasons, respectively.