

SUMMARY

This study included two main topics :

First topic: Effect of the responses of growth, yield and yield components of some maize varieties in relation to yield under different soil water stress conditions.

Second topic : Testing seed quality for original seed and produced grains.

First topic:-

Two field experiments were conducted at the research and experimental station of Faculty of Agriculture at Moshtohor, Kalubia Governorate, Egypt during 1997-1998 and 1998-1999 seasons. The target of these experiments is to find out the effect of the responses of growth, yield and yield components of some maize varieties in relation to yield under different soil water stress conditions:

The experimental design was split plot with four replications. Irrigation treatments were randomly assigned in the main plots, whereas maize varieties were allocated at random in the sub plots. The area of each experimental plot was 16.8m² which consisted of 8 ridges of 70 cm apart and 3 meters length. Treatments were applied as follows:

A: Irrigation treatments: Irrigation at 40% Available Soil Moisture Depletion (ASMD); Irrigation at 60% ASMD and Irrigation at 80%ASMD.

B: Maize varieties: Single cross 10 (S.C.10); Three way cross 310 (T.W.C.310);Giza 2(an open-pollinated cv.); Single Cross 152 (S.C.152), Yellow cv.;Three way cross 352 (T.W.C. 352), Yellow cv.

The effect of the applied treatment on the studied parameter can be sammarized as follows:

- 1- There was significant decreased number of days to 50% tasseling and silking by increasing availble soil moisture depletion from 40 to 60 and up to 80%. Earlier tasseling and silking were observed when maize plants were irrigated at 80% Availble Soil Moisture Depltion.
- 2-Giza 2 was of the earliest variety and S.C.152 was the latest one in reaching 50% tasseling and silking in the two growing seasons.However, differences between the other varieties (T.W.C.310, T.W.C. 352 and S.C.10) were almost ignorable in both of the studied traits.
- 3- Interaction effect of soil water stress and grwon maize varieties on tasseling and silking was significant in the two seasons . Giza 2cv wasthe earliest in tasseling and silking as compared with other varieties under the modrate (60%) and/or the higher (80%) soil water stress.
- 4- Increasing Availble Soil Moisture Depltion caused significant decreased in the height of maize plants. Shortest plants were produced at the severe soil water stress (80% ASMD), whereas tallest plants were produced at the lowest avilble soil moisture depletion of 40%.
- 5- Maize plant height was extermely related to each of the grown varieties with various significant differences in the two grown seasons. The variety S.C.10 was the tallest plants which was 298.0 and 281.7 cm and Giza 2 was the shortest plants of 267.8 and 235.3 cm in the two

growing season, respectively compared with other three varieties (T.W.C.352, T.W.C.310 and S.C.152).

6-Water stress of 60% ASMD produced the the tallest plants for the variety T.W.C 310 whereas, SC10 prouduce tallest plants at 40% ASMD.

7- Ear height of maize plants significantly affected by the imposed water status. Higher soil water stress of 80% ASMD produced the shortest ear height as compared with the other water stress of 60 and 40% ASMD.

8-The variety S.C.10 was of the tallest ear height in the two growing seasons as comared with the other variety. Meanwhile, Giza 2 and S.C.152 cv were of the shortest ear height in the first and second season,respectively.

9-The variety SC10 was of the highest ear height at ethier 40% or 60% ASMD.Meanwhile SC152 cv was of the shortest ear height at 80 % ASMD.

10-Increasing soil water status from 40 to 60 and up to 80% ASMD caused significant reduction in stem diamter of maize plants. There was similarity for such effect for the two grown season with slight differences.

11- The variety S.C.152 was of the thinnest stems as compared with the other four varieties (S.C.10, T.W.C.310, Giza2 and T.W.C. 352). Stemdiamter of S.C 152 cv was 1.93 and 1.86 cm for the first and secondseason, respectively.Meanwhile the other four varieties had a slight ignorable insignificant differences in its stem diamter.

12-Maize variety Giza2 was the thickest stems at lighter soil water status (40%ASMD) .Whereas , the thinnest stem was noticed for SC152 cv under the highest water stress (80% ASMD).

- 13-Dry matter accumulation was enhanced and increased as the available soil water decreased from 80 to 60 down to 40% ASMD. The respective reduction in dry matter accumulation for leaves, stems and ears were about 30, 26% and 25% for the first season, being 23.0%, 20.0% and 20.0% for the second season.
- 14- Maize variety SC10 produce the highest dry matter accumulation for leaves, stems and ears as compared with other varieties.
- 15-The highest dry matter accumulation for leaves, stems and ears was produced of S.C.10 cv at 40% ASMD whereas the lowest dry matter accumulation for the studied parameter was noticed for Giza 2 cv at 80% ASMD.
- 16- Ear weight was significantly effected by the applied soil water stress. As the ASMD increased from 40 to 60 and up to 80.0%, ear weight was continuously and significantly decreased. This result was true for the two seasons.
- 17- Heaviest ear weight was produced from the variety S.C. 10 as compared with other ones with significant differences in the two growing seasons. Ear weight of such variety was 253.6 and 217.8g in the first and second season, respectively.
- 18-The interaction effect of varieties under different soil water stress on ear weight was significant. Heaviest ear weight was obtained for S.C.10 variety under soil moisture depletion of 40%. Whereas, the lowest ear weight was obtained from S.C 152 variety at 80% ASMD.
- 19-Shorter ears were produced as the soil water stress increased. At ASMD of 40, 60 and 80% the respective ear length was 18.4, 17.4 and 16.6 cm in the first season; and 17.7, 17.3 and 16.1 in the second season.

- 20- Maize varieties S.C.10 and T.W.C. 310 were of the tallest ears with significant differences as compared with the other varieties and insignificant differences among themselves.
- 21- Maize varieties S.C.10 and T.W.C. 310 cvs produced the longest ears at 40% ASMD. Whereas, TWC 352 cv produced the shortest ears at 60% and 80% ASMD in the first and second seasons, respectively.
- 22- As ASMD increased from 40 to 60 and up to 80% ear diameter was significantly decreased.
- 23- Maize variety T.W.C.352 produced the thickest ears in the first season, whereas, either T.W.C. 352 and/or S.C. 10 produced the thickest ears in the second season.
- 24- At the 40% ASMD, T.W.C352 cv was of the thickest ears. Moreover, the thinnest ears were produced for S.C.152 cv at the sever ASMD (80%).
- 25- Number of rows/ear was insignificantly affected by the applied ASMD's (40,60 and 80%) in the two grown seasons.
- 26- Maize variety T.W.C. 352 was of the highest number of rows/ear followed by S.C. 152 cv for the first and second season with significant differences. Moreover, the variety S.C. 10 was of the lowest number of row/ear for the two growing seasons.
- 27- The interaction effect of grown maize varieties under different soil stress on number of rows/ear was insignificant.
- 28- As the ASMD increased from 40 to 60 and up to 80% number of grains/row decreased. However, the differences in number of grains/row was insignificant between the lower (40) and medium (60%) ASMD for the second season.
- 29- Maize varieties S.C.10 and T.W.C. 310 cvs were of the highest number of grains/ear in the first season with significant differences

among the other varieties. Whereas, in the second season only S.C.10 was of significantly higher in number of grains/row as compared with the remained varieties.

- 30- Maize varieties was significant. The variety S.C.10 at 40% ASMD was superior in number of grains/row as compared with the other varieties.
- 31- Grain weight/ear was significantly decreased as ASMD increased from 40 to 60 and up to 80%.
- 32- Heaviest grain weight/ear was produced from S.C.10 cv, followed by T.W.C. 310 cv with significant differences in the two seasons. The remained three varieties (T.W.C352, T.W.C.310 and Giza 2) were of no significant differences in their grain weight/ear.
- 33- There was significant interaction effect of applied ASMD on grain weight/ear for the grown maize varieties. The variety S.C.10 cv was of the heaviest grain weight/ear at 40% ASMD, whereas S.C.152 and T.W.C. 352 cvs were of the lightest grain weight/ear at 80% ASMD.
- 34- The applied ASMD's significantly decreased the 100-grain weight of maize. The lowest ASMD's (40%) produced the heaviest grains, whereas the medium ASMD (60%) caused 7% reduction in grain weight. Meanwhile, the greatest reduction was obtained when comparing between the lowest (40%) and the highest (80%) ASMD which was about 11.0 and 15.0% in the first and second growing seasons, respectively with significant differences.
- 35- Maize variety S.C. 10 was superior in producing the heaviest grain weight as compared with the other grown varieties for the two seasons with significant differences. On the other hand, S.C. 152 variety proved to be of the lightest 100 grain weight as compared with the other varieties (T.W.C.310, T.W.C.352 and Giza 2) for the two seasons.

- 36-The variety S.C.10 produced highest 100-grain weight at any of the applied ASMD'S. Meanwhile, S.C.152 variety produced the lightest grain weight at the highest ASMD (80%) as compared with the other varieties in the two growing seasons.
- 37- Grain yield was reduced to 44.0% and 48.0% in the first and second seasons, respectively, as the soil moisture status reduced from 40 to 80% ASMD's. Moreover as the ASMD increased from 40 to 50 and from 60 to 80 %, the respective reduction in grain yield was 25.0% and 24.6% in the first season, being 29.0 and 27.0% in the second season with significant differences.
- 38- Maize variety S.C. 10 was the highest grain yield and S.C. 152 was of the lowest one in the two growing seasons. The differences among all of the grown varieties were significant in the second season. Whereas, in the second season there were no significant differences in grain yield between T.W.C.352, T.W.C. 310 and Giza 2 cvs as well as between T.W.C. 310, Giza 2 and S.C.152 cvs.
- 39- There was significant interaction between maize varieties and the applied Available Soil Moisture Depletion on grain yield. The highest grain yield was produced from S.C. 10 cv at 40% ASMD and the lowest grain yield obtained from S.C. 152 cv at 80.0% ASMD in the first and second grown seasons.
- 40- Crude protein yield increased as ASMD increased from 40 to 60 and up to 80 % in the two seasons.
- 41-Maize varieties S.C.10 and T.W.C. 352 were of the highest protein yield in the first and second season, respectively. Meanwhile the variety S.C.152 was of the lowest protein yield in the two seasons.
- 42- Total carbohydrate and oil production decreased continuously as the ASMD increased from 40.0 to 60.0 and up to 80.0%.

43- Maize variety S.C.10 was produced the highest total carbohydrate and oil production, Meanwhile S.C. 152 was of the lowest total carbohydrate and oil production in the two growing seasons.

Second topic:

Testing seed quality for the original seed and produced grains included the following: Germination test, seedling emergence, protein fraction and isozyme electrophoresis of esterase (Est) and Peroxidase (Px).

Results could be summarized as follows :-

- 1- Seed germination test for the selected maize varieties was within the acceptable range ($> 80\%$).
- 2- The germination percentage was not much affected by the increase in the moisture tension from -5 to -10 atm. This also indicates that the selected varieties are more promising for the target of the proposed field of study.
- 3- The increase in the level of moisture stress from -5 atm to -10 atm decreased plumule length stress index from 87.9% to 34.0%.
- 4- Highest plumule length stress index was 71.5% in Giza 2 and the lowest value was 51.7% for S.C.10.
- 5- Increasing water stress from -5 to -10 atm decreased radical length stress indices.
- 6- The radical length stress index ranged from 58.9% for T.W.C.352 cv to 31.5% for S.C.10 cv.
- 7- Increasing water stress index from -5 to -10 atm decreased dry matter stress index from 72.2% to 46.2%.
- 8- Dry matter of seedling stress index ranged from 73.9% for S.C.152 to 36.9% for T.W.C. 310 cv.

- 9- The number and location of bands on the molecular weight scale as well as the percentage of proteins varied according to the grown maize varieties and the induced ASMD's.
- 10- The obtained molecular weight of proteins was ranged from 554.500 to 25.636 Kd.
- 11- Electrophoretic bands of esterase for S.C.10 and T.W.C.310 cvs were 6 whereas for such enzyme S.C.152 and T.W.C. 355 cvs contained 4 bands while Giza 2 contained 5 bands. Moreover, such band number was varied according to the exposed to water stress.
- 12-Each maize variety contains four protein bands of peroxidase except T.W.C.310 cv which had five bands for such enzyme. Exposing maize varieties to soil water stress of 40, 60 and 80% ASMD lead to a change in number of protein bands and its R_f values.