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V. SUMMARY

The present investigation was conducted at Nubaria Agricultural Research Station in the seasons 2000/2001 and 2001/2002 to evaluate twelve bread wheat genotypes for their yielding ability under water stress (2 irrigations only plus rain water), and under normal irrigation conditions used in the new reclaimed lands i.e six irrigations during growth season + rain water. Twelve lines of wheat were, used ten were local landarces while two were improved cultivars produced by the Agricultural Research Center, Egypt.

The study was carried out to measure the effect of drought on yield and its components in addition to some morphological characters.

Moreover, the second objective of this study was to detect the genetic relationships between the twelve wheat accessions through DNA finger printing by using RAPD-PCR method.

The obtained results could be summarized as follows :

A- Morphological characters:

1. Number of days to 50% heading :

Number of days to 50% heading were found to decrease under drought conditions in the first season only by 2.25%. Highly significant variations were found between the studied genotypes in both seasons.

The interaction between irrigationtreatment x genotypes were not signifiin both growing seasons.

The two improved genotypes Sakha 69 and Giza 164 were the earliest in heading date in the first and second seasons under both treatments. While E 51-3 was the latest one under both treatments in the two seasons.

2. Number of days to maturity:

Drought stress significantly reduced the number of days from sowing to maturity by 1.71% in the first season and by 2.77% in the second season, also significant differences were found between wheat genotypes. The interaction between genotype x irrigation treatment was insignificant in the two seasons of study.

The improved genotypes, Sakha 69 and Giza 164 were the earliest ones in both seasons of study, in addition to E 22-4 and E 52-2 in the first season. While E 22-1 was the latest in maturity under both treatments in the two seasons.

3. Plant height :

Plant height decreased significantly under water deficit conditions in the first and second seasons by 3.9 and 2.1%, respectively, and significant variations were found between wheat genotypes.

The two improved genotypes Sakha 69 and Giza 164 produced the shortest plants in the first and second seasons under both treatments. On the other hand, E 22-1 and E 23-4 exhibited the tallest plants in the first season, while in the second season E 23-4 and E 5-1 exhibited the tallest plants under both treatment conditions.

4. Biological yield:

Drought treatment induced a significant reduction in biological yield by 31.03 and 23.49% in the first and second seasons, respectively. Significant differences were found between genotypes and also a significant interaction between genotypes x irrigation treatments was found.

The genotypes Sakha 69 and E 23-4 gave the highest biological yields under both treatments in the first and second seasons. In contrast E 51-3 produced the lowest biological yield under both treatments in the two seasons.

B. Yield and yield components:

1. Grain yield :

A significant reduction in grain yield was observed after water stress by 34% and 20.06% in the first and second seasons, respectively. Highly significant differences were found between wheat genotypes and also significant interaction between treatments x genotypes were found in the two seasons of study. The genotypes Giza 164 and E 51-3 exhibited the lowest reduction percentages (20.05% and 17.36%),respectively, while the remaining genotypes showed higher reduction percentages, in the first season. In the second season Giza 164 showed the lowest reduction percentage (8.5%), while E 52-2 exhibited the highest reduction percentage (43.39%).

2. Number of spikes/m^2 :

Water deficit significantly decreased number of spikes/m^2 by 23.7 and 6.88% for the first and second seasons, respectively. The number of spikes/m^2 was significantly affected by irrigation treatments with genotypes. Interaction between genotypes x treatments was significant for this character.

The two genotypes Sakha 69 and Giza 164 showed a higher average number of spikes/m^2 than the other tested landraces. The average of reduction percentages were 29.75 and 24.52%, respectively, in the first

season. In the second season, E 51-3 and E 52-2 produced the highest number of spikes/m^2, their reduction percentages were 21.16 and 16.17%, respectively. While Giza 164 produced the lowest number of spikes/m^2, with a reduction percentage of 10.31%.

3. Number of grains/spike :

Water deficit significantly decreased number of grains/spike by 6.7 and 4.07% in the first and second seasons, respectively. Concerning this character significant differences between the genotypes were found. The interaction between irrigation treatment x wheat genotypes was insignificant in both seasons.

The genotypes E 23-4 had the highest number of grains/spike in the first and second seasons, while Sakha 69 and E 87-3-2 gave the lowest number of grains/spike in the both growing seasons.

4. 1000-grain weight :

1000-grain weight decreased significantly by 19.77 and 20.2% due to drought stress in the first and second seasons, respectively. Also, significant differences were found between the studied genotypes in both seasons.

The genotypes E 52-2, E 51-3 and E 23-4 showed the lowest reduction percentages of the 1000-grain weight in both seasons. The percentages of reduction were 2.58, 3.75 and 9.71% in the first season, respectively. While were 10.07, 14.05 and 4.99% in the second season. On the other hand, E 5-1 and E 6-4 gave the highest reduction percentages; i.e 21.77 and 27.47%, respectively. In the first season, while in the second season the genotypes E 5-1 and E 90-2-1 gave the highest reduction percentages, i.e 33.96% and 32.49%, respectively.

5. Harvest Index (H.I) :

Drought treatment induced insignificant reduction of hravest index in both seasons of study. While there were significantly differences between the twelve genotypes under water stress.

The genotype Giza 164 showed the highest H.I values in both seasons, with averages of 0.35 and 0.27, respectively. On the other hand, E 23-4 showed the lowest H.I value in the first season, i.e 0.125, while E 52-2 exhibited the lowest H.I value in the second season i.e 0.133. The interaction between irrigation treatment x genotype was insignificant in both growing seasons.

C- Molecular genetic markers :

1- The DNA finger printing using RAPD-PCR amplified products were used in this study. Ten different primers were used. Only seven primers produced DNA amplification.

2- The primer Drs 4-2 produced the best amplification with all accessions, it produced 10 bands with the two improved genotypes with an average of 5.0. While it produced 55 bands with the ten landraces, with an average of 5.5. The whole number of bands of twelve accession was 65 bands with an average of 5.4.

3- The highest number of common polymorphic bands were 8 and 10 and were produced by the primer Drs 4-2 and wheat 1-10, respectively. While the lowest number of bands was one band, produced by primer A-13 in landraces.

4- The highest common number of polymorphic bands in the two cultivated genotypes was seven bands produced with the primer A-9, while the lowest number was two bands produced with the primers Drs 4-2, wheat 1-10 and Dr 33.

5- Among the landraces and cultivated genotypes, three common bands were found by using primer A-9. While one common band was found by using each of the primers P-N, Drs 4-2 and wheat 1-10.

6- The highest numbers of specific polymorphic bands were 9 and 12 found in genotypes E 90-2-1 and E 22-4, respectively, by using the seven primers, but the lowest number was one band observed in the landrace E 6-4.

7- In the two improved genotypes, primers A-9 and P-N produced two specific bands only. Also, in landraces the highest number of specific bands was 12 bands produced with the primer A-13 and the lowest one was 2 bands produced by the priner Dr 33.

8- The dendrogram of all genotypes showed that the two improved genotypes Sakha 69 and Giza 164 are located in the first cluster, which exhibited the highest degree of similarity among the 12 studied genotypes. While, the second cluster includes only the landrace E 90-2-1. The landraces, E 87-3-2, E 72-2-1 and E 52-2 are located in the third cluster, these landraces were collected from different locations of one region i.e Marsa-Matrouh district.

9- The group number four included E 51-3 and E 23-4 genotypes collected from Marsa-Matrouh and North Sinia, respectively, while the fifth cluster included the remaining four landraces; E 22-4, E 22-1 which were collected from Sheik Zwaied region-North Sinia, and E 6-4 and E 5-1 which were collected from Al-Arish region-North Sinia.

Conclusion

1- The two varieties E 52-2 and E 72-2 exhibited earliness in heading and maturity in both seasons of study under normal irrigation and water stress treatments.

2- The two landraces E 22-4 and E 23-4 showed the highest number of grains/spike in both seasons of study under normal irrigation and water stress, compared to other varieties.

3- The two landraces E 51-3 and E 23-4 showed the lowest reduction percent in most of yield and yield component traits, and exhibited a low S.I, indicating its tolerance to water stress.

4- The variety E 51-3 showed a high harvest index (H.I) under both irrigation and water stress.

5- From the dendrogram the variety E 23-4 collected from North Sinia (Sheikh Zwaied) and the variety E 51-3 collected from Matrouh (Marsa Matrouh-Saloum High Way) were classified on the same cluster.