SUMMARY

V. SUMMARY

Morphological and biochemical identification of some wheat varieties.

Two field experiments were carried out at Moshtohor Agricultural Research Station, Egypt during 2001/2002 and 2002/2003 growing seasons. Each experiment included ten wheat varieties which were Sakha 8, Sakha 61, Sakha 69, Gemmiza 9, Sids 7, Giza 170, Beni swafe 1, Beni swafe 3, Sohag 2 and Sohag 3.

Experimental units were arranged in a complete randomized block design (RCBD) in four replications. The area of each plot was 10.5 m^2 (3.5 m long and 3 m wide).

The objective of this research is to determining the actual morphological and biochemical differences among various wheat varieties under test at different stages of growth. The necessity for such information to assist in characterizing and identifying these varieties for its quality control and certification tests.

Moreover, data of seed quality and protein fractionation as well as the DNA finger print using randomly amplified polymorphic DNA (RAPD) in seeds of the studied wheat cultivars were investigated. Results can be summarized and presented as follow:

1. Morphological characteristics:

-The cleoptile anthocyanin coloration of all wheat cultivars was absent.

- Plant growth habit in wheat varieties are intermediate except for Sakha 61, Sakha 69, Beni swafe 1, Beni swafe 3 and Sohag 2 varieties which are semi erect.

- Anthocyanin coloration of auricles for Sakha 69 is strong which can used as a unique character for this variety in this stage while Sakha 61 and Giza 170 are weak while it is absent in the other studied varieties.

- The frequency of plants with recurved flag leaves of Sakha 8, Gemmiza 9, Beni swafe 3 and Sohag 2 are low while the other varieties are medium.

- The varieties Sids 7 and Sohag 2 are early while Gemmiza 9 was late which can used as a unique character for this variety in this stage, whereas the other varieties are medium.

- The glaucosity of sheath flag leaf of wheat varieties divided in three categories could be detected as follows:

1- The first category includes Sakha 61, Sakha 69 and Sids 7 with strong glaucosity.

2- The second category includes Sakha 8, Giza 170, Beni swafe 1, Beni swafe 3, Sohag 2 and Sohag 3 which are medium.

3- The third category includes Gemmiza 9 variety which glaucosity is weak which can used as a unique character for this variety in this stage.

- Ear glaucosity, wheat variety could be classified into three classes as follows:

1- The first class includes Sakha 8, Gemmiza 9, Beni swafe 1 and Sohag 3 of weak ear glaucosity.

2- The second class includes Sakha 61, Sakha 69, Giza 170 and Beni swafe 3 varieties which of medium ear glaucosity.

3- The third class includes Sids 7 and Sohag 2 where their ear glaucosity are strong.

- Culm glaucosity of neck, wheat varieties could be classified into three groups as follows:

1- Strong culm glaucosity is in Sids 7 and Sohag 2.

2- The second group include Sakha 61, Sakha 69, Giza 170, Beni swafe 1, Beni swafe 3 and Sohag 3 where their culm glacosity is medium.

3- Sakha 8 and Gemmiza 9 varieties have weak culm glaucosity as a third group.

- Plant height of Sakha 61 is short which can used as a unique character for this variety in this stage, while Sakha 8, Sakha 69, Giza 170, Sids 7, Gemmiza 9, Beni swafe 1, Beni swafe 3, Sohag 2 are medium and Sohag 3 is of the tallest plants which can used as a unique character for this variety in this stage.

- Strow pih in cross section, varieties of Sakha 61, Sakha 69, Giza 170, Beni swafe 1 and Beni swafe 3 are thin while Sids 7, Gemmiza 9, Sohag 2 and Sohag 3 are medium and Sakha 8 is the thickest which can used as a unique character for this variety in this stage.

- Regarding ear shape, Sakha 8 and Sakha 61 varieties are of parallel shape, whereas all the other varieties are tapering.

- Ear density of Sakha 8, Sakha 61, Sakha 69 and Sids 7 have medium ear density, while Giza 170, Gemmiza 9, Beni swafe 1, Beni swafe 3, Sohag 2 and Sohag 3 are of density behavior.

- Ear length Beni swafe 1, Sohag 2 and Sohag 3 varieties are short, whereas Sakha 8, Sakha 61, Sakha 69, Giza 170 and Beni swafe 3 are medium but Sids 7 and Gemmiza 9 are of the longest ear length.

- All of the studied wheat varieties are of awns present.

- Awns at tip of ear for Sakha 8, Giza 170 and Sids 7 varieties are medium, but the other varieties are of long awns.

- Only Sakha 8 wheat variety have colored ear which can used as a unique character for this variety in this stage, whereas all of the other studied varieties having ear color.

- Hairness of convex surface for Sakha 8, Sakha 69, Sids 7 and Gemmiza 9 are of medium hairness while Sakha 61, Giza 170, Beni swafe 1, Beni swafe 3, Sohag 2 and Sohag 3 are of weak hairness.

- Shoulder width of lower glumes for the variety Sakha 8 are of broad width shoulder which can used as a unique character for this variety in this stage, while Sida 7, Gemmiza 9, Beni swafe 1, Beni swafe 3, Sohag 3 are of medium shoulder width, and Sakha 61, Sakha 69 and Giza 170 are of the narrowest shoulder width.

- In view of shoulder shape, wheat varieties Sakha 61, Sakha 69 and Bene swafe 3 have sloping shoulder, while Sids 7, Beni swafe 1 and Sohag 3 have slightly sloping shoulder, while Sakha 8 and Sohag 2 are of straight shoulder, while Giza 170 are of elevated shoulder which can used as a unique character for this variety in this stage, but Gemmiza 9 shoulder is strongly elevated with 2 nd point in its shape habit which can used as a unique character for this variety in this stage.

- Concerning beak length of lower glume, varieties Giza 170 and Gemmiza 9 have short beak, while the other varieties have medium beak length.
- The beak shape of lower glum for wheat varieties could be classified into three categories.

1- The first category is of strait beak shape of lower glume in Sakha 8, Sakha 61, Sakha 69, Giza 170 and Gemmiza 9.

2- The second category where its beak shape is slightly curved which includes Beni swafe 3 and Sohag 2.

3- The varieties Sids 7, Beni swafe 1 and Sohag 3 are of moderately curved beak shape of lower glume as a third category.

- Regarding extent of internal hairs of lower glume, Giza 170 and Gemmiza 9 have weak internal hair, while the other studied varieties have medium extent of internal hairs.
- Beak shape of lowest lemma for the variety Giza 170 have straight shape of lowest lemma which can used as a unique character for this variety in this stage, while Gemmiza 9, Beni swafe 1 and Sohag 2 have slightly curved ones, and Sakha 8, Sakha 61, Sakha 69, Sids 7, Beni swafe 3 and Sohag 3 have moderately curved beak shape of lowest lemma.
- The studied wheat varieties are similar in grain color and seasonal type. Therefore, these characters could not be used as a descriptor for wheat varieties under the studied condition.
- Regarding grain coloration with phenol, Beni swafe 1, Beni swafe 3, Sohag 2 and Sohag 3 are very light in such coloration, while it is medium for Sakha 8 which can used as a unique character for this variety in this stage, but it is dark for Giza 170

which can used as a unique character for this variety in this stage, and very dark for Sakha 61, Sakha 69, Sids 7 and Gemmiza 9.

2. Seed quality:

2.1. 1000- grain weight

Significant differences among the studied wheat varieties were obtained in 1000- grain weight. The variety Sids 7 had the heaviest weight with an average of 52.17g. While the variety Giza 170 had the lightest weight of (34.35g). The significant difference in grain weight among the studied wheat varieties reveal that this character is a good descriptor factor for identifying wheat varieties.

2.2. Germination test:

The standard germination test does not consistently predict the field performance of a seed lots. As a result, seed scientists have emphasized the development of another seed quality parameter as seed vigour. This is defined as seed properties, which determine the potential for rapid uniform seedling emergence and development of normal seedling under a wide range of field conditions. The maximum potential for seed vigour expression in most crops is achieved when the seed is at its maximum dry weight (a stage known as physiological maturity). This requirement places stringent burdens on the production and marketing for only the highest quality seed. High value seed are increasingly when exposed to varying pretreatments to improve their performance. Results idecated

significant differences among the variety of high germination percentage for Sakha 61, Sakha 69, Giza 170, Sids 7, Beni swafe 1 and Beni swafe 3. Whereas, Gemmiza 9 recorded lowest value.

2.3. Electrical conductivity test (EC):

Concerning the electric conductivity, Gemmiza 9 recorded the highest vigor, whereas Sohag 2 was of the lowest vigor. Moreover, data revealed significant differences between the studied varieties.

2.4. Accelerated ageing test (AA):

The studied varieties showed significant differences in response to their accelerated ageing test. The lowest response to accelerated ageing was obtained for Sakha 61, Sakha 69, Sids 7, Beni swafe 1 and Sohag 3. Whereas, Sohag 2 showed the highest response to accelerated ageing.

3. Chemical characteristics:

3.1. Chemical composition:

3.1.1Crude protein content

The total crud protein percentage in wheat varieties under study. The present data indicated that the highest protein percentage was recorded for Beni swafe 3 (12.95%). On the other side, the lowest content was found in Giza 170 variety (9.87%). Whereas, the other varieties were found to have protein percentage ranged from 12.95% to 9.87%. These results are in general agreement with those obtained by **Ghanem *etal* (1987).**

3.1.2. Total carbohydrate

The results revealed the studied wheat varieties could be classified into three categories depending upon their carbohydrate content as follows:

Category 1: contained total carbohydrate in the range of 79.88% to 77.58% which included Sakha 61, Sakha 8, Sids 7, Giza 170 and Sakha 69 varieties.

Category 2: was noticed for Beni swafe 1 and Gemmiza 9 varieties with an average carbohydrate percentage from 76.41% to 77.16%.

Category 3: included varieties of total carbohydrate in the range of 73.18 % to 74.48 % for Sohag 2, Sohag 3 and Beni swafe 3 wheat varieties.

3.2. Protein fractionation:-

Results showed that the number obtained of protein bands, the presence and absence of certain protein bands and the relative concentrations of the protein bands can be used successfully to characterize and identify some various wheat varieties under study. However, there was slight difference in some bands which could be identified in some varieties and not among others.

3.3. Molecular analysis:

Randomly amplified polymorphic DNA (R A P D) fingerprint

Five different primers were used in this study. Results could be summarized and presented as follows:

1- The primer OP- A 09. It showed a maximum of six bands which ranged from 3700bp to 875 bp. There were two observed common bands in all of the studied wheat cultivars which were at 1390bp and 875 bp.

2- The primer OP- A 10. It clarified a maximum of ten amplified products at the molecular sizes that ranged between 6245bp to 1075bp. A single common band was observed in all cultivars which was 2570bp. Some unique bands distinguished two cultivars, one for cultivar Sohag 3 at 3630bp and the other for Gemmiza 9 at 1075bp.

3- The primer OP- A 13. It identified a maximum of five bands which were ranged from 2210 bp to 910bp.

4- The primer OP- A 20. This primer produced a maximum of six amplification products of molecular sizes which ranged from 2720 bp to 1070bp. There were two common bands which were observed in all cultivars at 1595bp and 1070bp. Moreover, another specific band was noticed for Gemmiza 9 cultivar at 2385 bp.

5- The primer OP-B 17. It exhibited a maximum seven amplification products with molecular sizes that ranged from 4630 bp to 595 bp. Also a single common fragment was noticed

at 2080 bp in all cultivars. Moreover, Cultivar Sakha 8 has one specific band which was 4630 bp.

- The RAPD data developed by all primers of this study were used to estimate the genetic similarity among the ten cultivars. The genetic similarity matrix based on all possible pairs of cultivars ranged from 10% to 94%. The lowest genetic similarity value was between cultivar Sids 7 and Sakha 69 (similarity of 10%). While, the highest genetic similarity was noted between cultivar Sohag 2 and Gemmiza 9 (similarity of 94%).
- The dendrogram based on genetic similarities separated the ten cultivars into two main clusters, four of the cultivars, Gemmiza 9, Giza 170 Sakha 61 and Sakha 8 were grouped were grouped in the first cluster. While, all the other cultivars were grouped in the second cluster which was separated into two sub- clusters. Where, cultivars Sohag 2 and Sohag 3 were grouped together in the same sub- cluster.