RESULTS AND DISCUSSION

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The present study was designed to find out definite distinguished characters of maize genotypes under tests, in order to furnish such information to the maize breeders and the field inspectors. The breeder requires these data in the evaluation course of their programs. In addition, it serves as a true witness in any clain with respect to the course of breeder's right. Field inspectors require such precise information to have recognizable characters of the variety of crops under inspection so that standard of purity will be achieved properly. This could be carried out directly in the field or by taking samples for laboratory analyses. Certain morphological characters and biochemical aspects were studied to furnish the necessary data in this respect.

I- Morphological characteristics

A- Quantitative characteristics

1-Tassel characteristics

The comparison among number of primer late branches of the studied maize genotypes are presented in Table (1). It revealed that the inbred line S.34 (20.48) had the greatest significant number of primer late branches. While the inbred line G.4 (6.68) had the lowest number of primer late branches. The other maize inbred lines had in between values and which not

differ significantly between the inbred lines G.22 (12.62) and G18 (12.38).

Whereas, single crosses S.C.13 (17.95) had the greatest significant number of primer late branches. While, the lowest value was noticed for S.C11 (14.90). The other single crosses had in between values which did not differ significantly between the single crosses S.C.10 (17.35), S.C.12 (17.15) as well as between S.C.14 (16.08) and S.C.15 (15.98).

The Three-way crosses recorded the greatest number of primer late branches, where T.W.C.310 showed of the highest value (21.25) and the other variation did not differ significantly between the other tested Three-way crosses. These results are agreement with those obtained by **Revilla and Tracy (1995)** and **Galareta and Alvarez (2001).**

Results in Table (1) showed that the studied maize genotypes differ significantly in length of main axis above the lowest side branches (cm). The inbred line G. 27 had the greatest value (37.08cm), whereas the inbred lines G.14 had the lowest value (22.25 cm). The other maize inbred lines had in between values.

Nevertheless, single cross S.C.12 (45.60 cm) had the greatest significant length of main axis above lowest side branches, and the lowest value was for the S.C13 (35.00cm). The other single crosses were of intermediate values.

Regarding the Three-way crosses, the greatest length of main axis above lowest side branches was recorded by T.W.C.314 (42.51). Meanwhile, the lowest vale was recorded for T.W.C. 326 (32.69 cm). The other maize Three-way crosses

had in between values which did not differ significantly as for T.W.C. 310 (39.68 cm) and T.W.C. 325 (39.46 cm). Also, significant differences were noticed between T.W.C. 311 (38.40 cm), T.W.C. 326 (32.69cm) and T.W.C. 327 (37.75 cm) as in descending Table (1)

The comparison among the length of main axis above upper side branches (cm) of the studied maize genotypes are presented in Table (1). The inbred lines G.27 (31.52 cm) had the greatest significant length of main axis above upper side branches. Whereas, the inbred lines G.14 (17.02) had the lowest one. The other maize inbred lines were of intermediate values and did not significantly differ from the inbred lines G.4 (23.08cm), S.7 (23.45 cm), G.2 (20.83cm), and G22 (21.25cm).

Concerning the single crosses, S.C.13 (29.78 cm) and S.C.15 (29.32 cm) had the greatest significant length of main axis above upper side branches. But the lowest values were recorded by S.C10 (27.37 cm) and S.C.12 (29.59 cm). The other single crosses passed in between values for this studied trait.

The three-way cross recorded the greatest number for the length of main axis above upper side branches which was by T.W.C.311 (30.20 cm), and the lowest value was obtained by T.W.C. 325 (25.50 cm). The other maize Three-way crosses had in between values which did not differ significantly between T.W.C. 325 (25.50cm) and T.W.C. 327 (25.67cm). In conclusion there are some differences between genotypes in the length of main axis above upper side branches, but this character was not usually clear for some of the studied genotypes.

Genotypes differed significantly in length of side branches as it clear in Table (1). The inbred lines G.27 (27.02cm) and S.34 (27.35cm) had the greatest values. Whereas, inbred lines G.14 had the lowest one (14.00 cm). The other maize inbred lines were of intermediate values.

Nevertheless, single cross S.C.13 (30.43 cm) showed the greatest significant length of side branches, whereas the lowest value was noticed by S.C12 (22.28cm). The other single crosses exerted in between values which was not significant between the single crosses S.C.11 (28.09 cm) and S.C. 15 (27.87 cm).

Regarding Three-way cross, the greatest length of side branches was recorded by T.W.C.314 (32.67 cm) and T.W.C. 326 (32.65 cm). While, the lowest vales were obtained by T.W.C. 310 (30.14 cm) and T.W.C. 325 (29.36 cm). The Three-way crosses 311 (31.77cm) and T.W.C. 327 (31.18cm) were of in between values. These confirm what was found by **Galareta and Alvarez (2001).**

Table (1) Tassel characteristics (stage 65- 71 day) combined over the two studied seasons 2001 and 2002.

Genotype		Number of primer late branches	Length of main axis above lowest side branches	Length of main axis above upper side branches	Length of side branches
Inbred line			.....(cm).....		
Gemmeiza 2		16.68 C	25.93 F	20.83 G	19.00 G
Gemmeiza 4		6.68 J	24.83 G	23.08 E	16.50 I
Gemmeiza 14		13.55 E	22.25 H	17.02 I	14.00 J
Gemmeiza 18		12.38 G	27.50 E	20.25 H	23.32 C
Gemmeiza 21		7.28 I	30.28 CD	21.75 F	20.55 F
Gemmeiza 22		12.62 G	25.08 G	21.25 G	18.00 H
Gemmeiza 27		10.85 H	37.08 A	31.52 A	27.02 A
Gemmeiza 30		18.67 B	30.12 D	27.38 B	24.95 B
Sids 7		15.13 D	27.50 E	23.45 E	21.60 E
Sids 34		20.48 A	32.67 B	26.17 C	27.35 A
Sids63		13.03 F	30.65 C	24.48 D	22.22 D
Parent	Single cross				
S.7 x S.63	S.C.10	17.35 B	41.49 C	27.37 D	29.87 B
S.7 x G.4	S.C. 11	14.90 D	39.69 D	28.71 B	28.09 D
S.7 x G.21	S.C. 12	17.15 B	45.60 A	27.59 D	22.28 E
G.4 x G.30	S.C. 13	17.95 A	35.00 F	29.78 A	30.43 A
S.7 x G.30	S.C. 14	16.08 C	42.19 B	28.08 C	28.70 C
S.63 x G.30	S.C. 15	15.98 C	36.49 E	29.32 A	27.87 D
	Three-way cross				
S.34x S.7x S63	T.W.C. 310	21.25 A	39.68 B	26.50 D	30.14 C
S.34x G.2x S.63	T.W.C. 311	17.63 B	38.40 C	30.20 A	31.77 B
S.7x G.18x S.63	T.W.C. 314	16.69 B	42.51 A	29.35 B	32.67 A
S.7x G.14x S.63	T.W.C. 325	16.48 B	39.46 B	25.50 E	29.36 C
S.7x G.22x S.63	T.W.C. 326	16.48 B	32.69 E	27.83 C	32.65 A
S.7x G.27x S.63	T.W.C. 327	16.85 B	37.75 D	25.67 E	31.18 B

2- Plant characteristics

Data in Table (2) show that the inbred line G.30 had the longest plant length (cm) with an average of 212.2 cm, while the inbred line G.2 had the shortest plants with an average of 114.5 cm. Both inbred lines G.4 (181.5cm) and G.21(181.2cm) expressed in between plants height .

Significantly difference in plants were noticed among all of the single crosses. The tallest plants were obtained by S.C. 15 (317.1 cm) and the shortest plant was S.C12 (256.2 cm). The other single crosses had in between tall values.

The Three-way crosses T.W.C. 325 (259.1 cm) recorded the tallest plants but T.W.C.326 (259.1 cm) proved to be of the shortest plants.

From the above mentioned results, it could be concluded that plant length character could be useful parameters for identifying some maize genotypes. These results are in accordance with that was obtained by **Scapim *et al.* (1995), Soliman *et al.* (1995), El-Batal *et al.*,(1996), Galarreta and Alvarez (2001), Katta and Abd El-Aty (2001) and Nawar *et al.*(2002).**

Results in Table (2) showed significant differences between the studied genotypes in the ratio: height of insertion of upper ear to plant length. It is clear from the same table that the highest value was obtained by the inbred lines G.14 (0.49), G.22 (0.50) and G.27(0.51). In contrast, the lowest ratio height in insertion of upper ear to plant length (0.38) was obtained for the inbred line G.2. These results indicated that ratio height of

insertion of upper ear to plant height could be a useful tool for identifying the studied inbred lines. According to this character, inbred lines could ranked as follows: G27, G.22, G.14, G.18, S.34, G.30, G.4, S.63, G.21, S.7 and G.2.

Among all of the studied single crosses, the highest value was recorded by S.C. 12 (0.66) and the lowest value was by S.C11 (0.55), and the other single crosses had in between values of such studied trait. These results indicated that the ratio: height of insertion of upper ear to plant height could be pervading as a tool for identifying between the studied single crosses. It could be safe to rank the studied, single crosses according this character as follows: S.C.12, S.C. 14, S.C.10, S.C.15, S.C11, and S.C13.

Concerning the Three-way cross, the highest value, for the ratio: height of insertion of upper ear to plant length, was recorded for T.W.C. 326 and T.W.C. 314 (0.52 for either one), but T.W.C.325 recorded to the lowest one (0.43). Again these results indicated that the ratio: height of insertion of upper ear to plant height could be a good parameter for identifying between the studied T.W.C. which could be arrange according this character as follows: T.W.C.326, T.W.C.314, T.W.C.327, T.W.C.310, T.W.C.311 and T.W.C.325. The variation between the studied maize genotypes in ratio height of insertion of upper ear to plant height could be very much related to genetic makeup of the genotypes during growing. Similar results was reported by **El-Batal *et al.* (1996).**

Table (2) plant characteristic ((stage 71 day) combined over the two seasons 2001 and 2002.

Genotype		Plant Length cm	Ratio height of insertion of upper ear to plant length
Inbred line			
Gemmeiza 2		114.5 J	0.38 E
Gemmeiza 4		181.5 E	0.42 C
Gemmeiza 14		144.8 G	0.49 A
Gemmeiza 18		147.8 F	0.44 B
Gemmeiza 21		181.2 E	0.40 CD
Gemmeiza 22		136.5 H	0.50 A
Gemmeiza 27		196.5 C	0 .51 A
Gemmeiza 30		212.2 A	0.42 C
Sids 7		188.8 D	0.39 DE
Sids 34		205.8 B	0 .44 B
Sids63		134.2 I	0.41 CD
Parent	Single cross		
S.7 x S.63	S.C.10	307.2 B	0.57 C
S.7 x G.4	S.C. 11	286.1 D	0.55 E
S.7 x G.21	S.C. 12	256.2 F	0.66 A
G.4 x G.30	S.C. 13	288.6 C	0.54 F
S.7 x G.30	S.C. 14	280.5 E	0.63 B
S.63 x G.30	S.C. 15	317.1 A	0.56 D
	Three-way cross		
S.34x S.7x S63	T.W.C. 310	276.8 D	0.48 B
S.34x G.2x S.63	T.W.C. 311	288.0 B	0.45 C
S.7x G.18x S.63	T.W.C. 314	280.4 C	0.52 A
S.7x G.14x S.63	T.W.C. 325	290.1 A	0.43 C
S.7x G.22x S.63	T.W.C. 326	259.1 E	0.52 A
S.7x G.27x S.63	T.W.C. 327	277.4 D	0.48 B

3- Leaf characteristics

Variations in width of leaf blade of upper ear (cm) among maize genotypes were evaluated and the data are presented in Table (3). The combined data indicate that the inbred lines G.21 (6.92 cm) and G.4 (6.88 cm) had the highest values of blade's width , while the lowest values were recorded for the inbred lines G.2 (5.20 cm), G.14 (5.17 cm) and S.34 (5.35 cm). The other maize inbred lines had in between values of blade width that did not differ significantly between the inbred lines G.22, G.27 and G30.

Nevertheless, single crosses recorded significant differences among this studied trait. The highest value was obtained by S.C. 11 (10.17 cm) and the lowest value was detected by S.C13 (8.99 cm).The other single crosses had in between blade width and did not differ significantly from the single crosses S.C.10 and S.C.15.

The Three-way crosses showed that the highest value of leaf width was recorded for T.W.C. 327 (12.06 cm), whereas, T.W.C.325 (10.31 cm) and T.W.C.311 (10.36 cm) recorded the lowest values with no significant difference. These results confirm what was recorded by **Oraby and Sarhan (2002)** and **Sadek *et al.*, (2003)**.

Table (3) Leaf characteristic (stage 75 day) combined over the two seasons 2001 and 2002.

Genotype		Width of blade (leaf of upper ear)
Inbred line		cm
Gemmeiza 2		5.20 C
Gemmeiza 4		6.88 A
Gemmeiza 14		5.17 C
Gemmeiza 18		5.78 BC
Gemmeiza 21		6.92 A
Gemmeiza 22		6.27 AB
Gemmeiza 27		6.60 AB
Gemmeiza 30		6.50 AB
Sids 7		5.92 BC
Sids 34		5.35 C
Sids63		6.65 AB
Parent	Single cross	
S.7 x S.63	S.C. 10	10.15 AB
S.7 x G.4	S.C. 11	10.17 A
S.7 x G.21	S.C. 12	10.07 B
G.4 x G.30	S.C. 13	8.99 D
S.7 x G.30	S.C. 14	9.13 C
S.63 x G.30	S.C. 15	10.12 AB
	Three-way cross	
S.34x S.7x S63	T.W.C. 310	11.61 B
S.34x G.2x S.63	T.W.C. 311	10.36 D
S.7x G.18x S.63	T.W.C. 314	10.83 C
S.7x G.14x S.63	T.W.C. 325	10.31 D
S.7x G.22x S.63	T.W.C. 326	10.72 C
S.7x G.27x S.63	T.W.C. 327	12.06 A

4- Ear characteristics

The length of peduncle (cm) among maize genotypes was evaluated and the data are presented in Table (4). The combined

data indicated that the inbred line S.34 recorded the highest value of length of peduncle (10.77 cm). While the lowest values were recorded for the inbred lines G.2 (4.13 cm) and G.14 (4.29 cm). The other maize inbred lines had in between values of such trait.

Single crosses recorded significant difference among them for peduncle length. The highest value of peduncle length was obtained by S.C. 15 (14.28 cm) and the lowest one was noticed by S.C10 (8.2 cm). The other single crosses were in between for peduncle length

The Three-way cross showed that the highest value of peduncle length was T.W.C. 314 (20.45 cm), but T.W.C.325 (9.69) was of lowest one (Fig 4).

Data in Table (4) showed that the inbred line S.34 had the longest length of ear without husk (cm) which was 20.02 cm, while the inbred lines G.2 and S.63 had the shortest values with an average length of ear without husk of 10.48 and 10.20 cm. The other maize inbred lines had in between variation among this trait.

Data showed a significant difference among the single crosses in their length of ear without husk. The longest value was obtained by S.C. 10 (23.70 cm) and the shortest one was noticed by S.C14 (18.21 cm). The other studied single crosses had in between values of such trait and did not differ significantly among the other single crosses of S.C.13 (20.40 cm) and S.C.15 (20.30 cm).

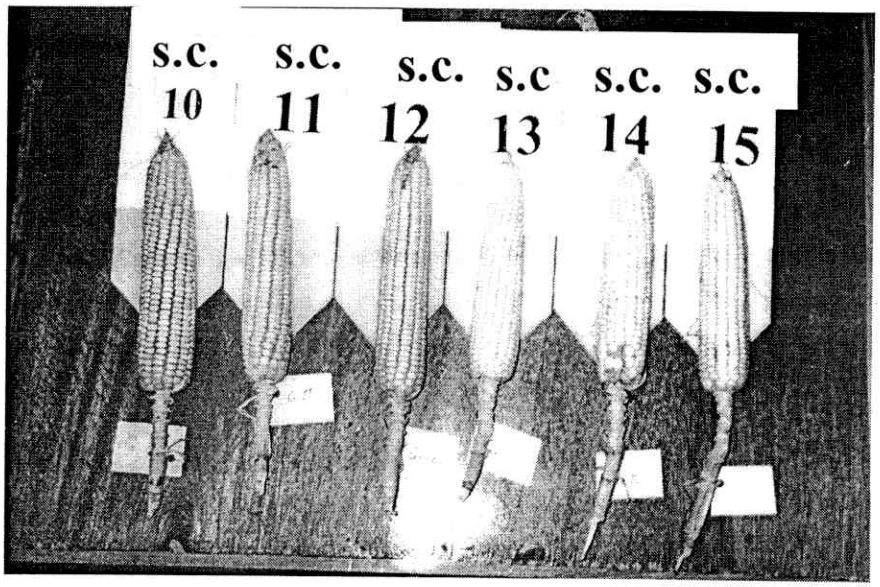
Regarding the Three-way crosses, the longest ear length without husk was recorded by T.W.C. 310 (23.95 cm), but

T.W.C.314 (21.02 cm) was of the shortest value. Other maize Three-way crosses had in between values which were not differ significantly between T.W.C. 311(22.35 cm), T.W.C. 325 (22.25 cm) and T.W.C. 326 (22.23 cm) as shown in (Fig 4). These results are agreement with those obtained by **Basha (1994)**, **Soliman *et al.*, (1995), Oritz and Sevilla (1997), El- Batal *et al.*, (1996)** and **Banchero *et al.*, (2000).**

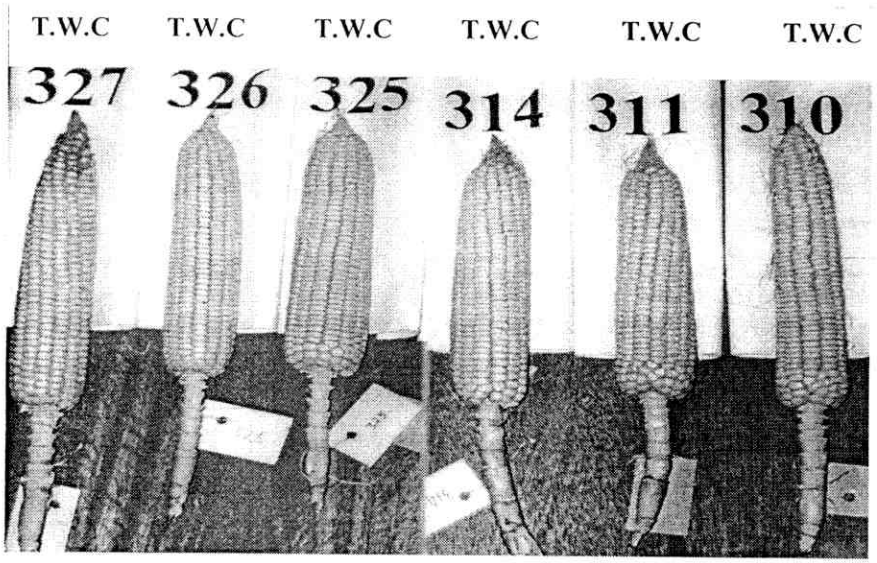
The studied genotypes differ significantly in ear diameter and the results are shown in Table (4). The inbred lines G.14 and S.34 had the widest ear diameter which was 4.12cm and 4.10cm, respectively. Inbred line S.7 had the lowest value (1.85 cm). The other maize inbred lines had in between values.

Concerning single crosses, S.C.10 (4.81cm), S.C.12 (4.76 cm), S.C.14 (4.71 cm) and S.C.15 (4.79 cm) had the highest diameter of ears. However, the lowest value was obtained by S.C11 (4.16cm). Meanwhile S.C.13 expressed in between value (4.30 cm).

Data revealed that differences reached the level of significance in the Three-way crosses. The highest ear diameter was recorded by T.W.C.314 (5.46 cm) and the lowest values was by T.W.C. 310 (4.37 cm). The other maize Three-way crosses showed intermediate values of ear diameter which did not differ significantly as for T.W.C. 311(5.16 cm), T.W.C. 325(5.12 cm) and T.W.C. 327 (5.06 cm). These results are in accordance that was obtained by **Basha (1994), soliman *et al.* (1995), Banchero *et al.* (2000), Katta and Abd El-Aty (2002) and Nawar *et al.* (2002)**.



Single crosses



Three-way crosses

Fig. (4) Showed " Ear: length of peduncle and length of ear without husk)

Table(4) Ear characteristics (stage 85- 92 day) combined over the two seasons 2001 and 2002.

Genotype		Length of peduncle	Length without husk	Diameter
Inbred line		.....(cm).....		
Gemmeiza 2		4.13 ^{F}	10.20 ^{D}	3.55 ^{B}
Gemmeiza 4		9.82 ^{B}	12..93 ^{BCD}	3.58 ^{B}
Gemmeiza 14		4.29 ^{F}	11.72 ^{CD}	4.12 ^{A}
Gemmeiza 18		8.01 ^{C}	15.03 ^{B}	3.26 ^{C}
Gemmeiza 21		6.68 ^{D}	15.90 ^{B}	3.53 ^{B}
Gemmeiza 22		5.15 ^{E}	13.87 ^{BC}	2.95 ^{D}
Gemmeiza 27		9.95 ^{B}	14.68 ^{BC}	2.40 ^{E}
Gemmeiza 30		7.95 ^{C}	11.78 ^{CD}	2.07 ^{F}
Sids 7		4.45 ^{EF}	14.57 ^{BC}	1.85 ^{G}
Sids 34		10.77 ^{A}	20.02 ^{A}	4.10 ^{A}
Sids63		6.68 ^{D}	10.48 ^{D}	3.50 ^{B}
Parent	Single cross			
S.7 x S.63	S.C.10	8.2 ^{F}	23.70 ^{A}	4.81 ^{A}
S.7 x G.4	S.C. 11	8.79 ^{E}	21.77 ^{C}	4.16 ^{C}
S.7 x G.21	S.C. 12	10.26 ^{D}	22.54 ^{B}	4.76 ^{A}
G.4 x G.30	S.C. 13	10.47 ^{C}	20.40 ^{D}	4.30 ^{B}
S.7 x G.30	S.C. 14	11.36 ^{B}	18.21 ^{E}	4.71 ^{A}
S.63 x G.30	S.C. 15	14.28 ^{A}	20.30 ^{D}	4.79 ^{A}
	Three-way cross			
S.34x S.7x S63	T.W.C. 310	10.35 ^{D}	23.95 ^{A}	4.37 ^{D}
S.34x G.2x S.63	T.W.C. 311	10.55 ^{CD}	22.35 ^{C}	5.16 ^{B}
S.7x G.18x S.63	T.W.C. 314	20.45 ^{A}	21.02 ^{D}	5.46 ^{A}
S.7x G.14x S.63	T.W.C. 325	9.69 ^{E}	22.25 ^{C}	5.12 ^{B}
S.7x G.22x S.63	T.W.C. 326	10.73 ^{C}	22.23 ^{C}	4.76 ^{C}
S.7x G.27x S.63	T.W.C. 327	13.99 ^{B}	23.08 ^{B}	5.06 ^{B}

B- Qualitative characteristic

1- Leaf characteristics

Results in Table (5) showed the characteristic of the studied inbred lines of corn at the first leaf stage. Three categories were noted for the anthocyanin coloreation. The first category have a weak anthocyanin which was for G.2, G.14, G.18, G.22, G.30 and S.3. second category was G.27 and S.63 which have medium anthocyanin whereas, the last category was G.4, G.21 and S. 7 which have strong anthocyanin. These confirm what was obtained by **EL-Hawary *et al.* (2003)** who reported that the inbred lines G.4, G.21 and S. 7 have strong anthocyanin coloration on the sheath of the first leaf at seedling stage.

Also, results proved that the single crosses under study can be divide into three categories in anthocyanin coloreation. first category was S.C.10 and S.C.15 which have a weak anthocyanin. The second category was S.C.13 and S.C.14 which have medium anthocyanin. And the last category was by S.C11 and S.C.12 which have strong anthocyanin coloreation.

Whereas, all the Three-way cross have strong anthocyanin with no differences in between for such studied character.

Regarding the shape of tip of the first leaf, it is clear that all genotypes recorded pointed shape tips as for inbred lines, single crosses and Three-way crosses as it is clear from Table (5).

Table (5) First leaf characteristic (stag 12-14 day).

Genotype		Anthocyanin coloration of sheath	Shape of tip
Inbred line			
Gemmeiza 2		3	1
Gemmeiza 4		7	1
Gemmeiza.14		3	1
Gemmeiza 18		3	1
Gemmeiza 21		7	1
Gemmeiza 22		3	1
Gemmeiza 27		5	1
Gemmeiza 30		3	1
Sids 7		7	1
Sids 34		5	1
Sids 63		3	1
Parent	Single cross		
S.7xS.63	S.C.10	3	1
S.7xG.4	S.C.11	7	1
S.7x G.21	S.C.12	7	1
G.4xG.30	S.C.13	5	1
S.7xG.30	S.C.14	5	1
S.63xG.30	S.C.15	3	1
	Three-way cross		
S34xS7xS63	T.W.C.310	7	1
S34xG2xS63	T.W.C.311	7	1
S7xG18xS63	T.W.C.314	7	1
S7xG14xS63	T.W.C.325	7	1
S7xG22xS63	T.W.C.326	7	1
S7xG27xS63	T.W.C.327	7	1
Degree of characteristic		Absent or v.w 1 Weak 3 Medium 5 Strong 7 Very strong 9	ointed 1 Pointed round 2 Round 3 Round spatulate 4 Spatulate 5

Results in Table (6) showed the characteristic of the studied inbred lines in relation to the angle between blade and stem (above upper ear). Three categories can be noted and recognized. First category has a very small angle between blade and stem as for G.2. Second category was G.14, G.22, G.27, G.30, S.7 and S.63 which has a small angle between blade and stem. The last category was by G.4, G.15 G.21 and S. 34 which has medium angle between blade and stem (above upper ear). Whereas, the single crosses and the Three-way crosses can be divided into two different categories. The first category has a small angle between blade and stem as for S.C 11, S.C12, S.C13, S.C15 , T.W.C 311, T.W.C 237. The second category as for S.C10, S.C14, T.W.C310, T.W.C 314, T.W.C 325 and T.W.C 326 which has medium angle between blade and stem (above upper ear). These results are in the same line with those obtained **by EL-Hawary *et al.* (2003).** They reported that the leaves of G.2 appear to be leathery and thick in the same time, while leaves of S. 63 has curly appearance.

The attitude of blade divided inbred lines and single cross into two categories. The first category was for G.2, G.14, G.22, G.30, S.7, S.C 11, S.C12, S.C13 and S.C15 which has a slightly recurved attitude of blade. The second category was G.4, G.18, G.21, G.27, S.34, S.63 S.C 10 and S.C14. They has recurved attitude of blade. Meanwhile, all of the Three-way crosses have recurved attitude of blade Table (6)

Table (6) Leaf characteristic (stag 61 day)

Genotype		Angle between blade and stem (above upper ear)	Attitude of blade
Inbred line			
Gemmeiza 2		1	3
Gemmeiza 4		5	5
Gemmeiza.14		3	3
Gemmeiza 18		5	5
Gemmeiza 21		5	5
Gemmeiza 22		3	3
Gemmeiza 27		3	5
Gemmeiza 30		3	3
Sids 7		3	3
Sids 34		5	5
Sids 63		3	5
Parent	Single cross		
S.7xS.63	SC.10	5	5
S.7xG.4	SC.11	3	3
S.7xG.21	SC.12	3	3
G.4xG.30	SC.13	3	3
S.7xG.30	SC.14	5	5
S.63xG.30	SC.15	3	3
	Three-way cross		
S34xS7xS63	T.W.C.310	5	5
S34xG2xS63	T.W.C.311	3	5
S7xG18xS63	T.W.C.314	5	5
S7xG14xS63	T.W.C.325	5	5
S7xG22xS63	T.W.C.326	5	5
S7xG27xS63	T.W.C.327	3	5
Degree of characteristic		Very small 1 Small 3 Medium 5 Large 7 Very large 9	Straight 1 S. recurved 3 Recurved 5 Strongly recuv. 7 Very S. recuv 9

2- Stem characteristics

Regarding degree of stem zig-zag, results in Table (7) showed that all of the studied inbred lines and single crosses were characterized with the absent degree of zig-zag stem except for G.30 which have strong degree of zig-zag. These confirm what was obtained by **EL-Hawary *et al.* (2003).** Whereas, all of the Three-way crosses were of slight degree of zig-zag stem.

Regarding anthocyanin coloration of brace roots, there are four recognized color categories as it is clear in Table (7) the first category was inbred lines G.2, G.14, G. 18, G. 27, G30, S.34 and S.63 with absent or a very weak anthocyanin coloration of brace roots. The second category was S.C.11, S.C.12, S.C.13 and T.W.C. 325 which were of weak anthocyanin coloration of brace roots. Whereas, the third category was G.4, G.21, S.C.10, T.W.C. 311 and T.W.C. 314 which were of medium anthocyanin coloration of brace roots. And the fourth category was G.22, S.7, S.C. 14, S.C.15, T.W.C. 310, T.W.C. 326 and T.W.C. 327 in which anthocyanin coloration of brace roots was strong. These confirm what was obtained by **EL-Hawary *et al.* (2003).**

Table (7) Stem characteristic (stag 65-75 day)

Genotype		Degree of zig-zag	Anthocyanin coloration of brace roots
Inbred line			
Gemmeiza 2		1	1
Gemmeiza 4		1	5
Gemmeiza.14		1	1
Gemmeiza 18		1	1
Gemmeiza 21		1	5
Gemmeiza 22		1	7
Gemmeiza 27		1	1
Gemmeiza 30		3	1
Sids 7		1	7
Sids 34		1	1
Sids 63		1	1
Parent	**Single cross**		
S.7xS.63	SC.10	1	5
S.7xG.4	SC.11	1	3
S.7xG.21	SC.12	1	3
G.4xG.30	SC.13	1	3
S.7xG.30	SC.14	1	7
S.63xG.30	SC.15	1	7
	Three-way cross		
S34xS7xS63	T.W.C.310	2	7
S34xG2xS63	T.W.C.311	2	5
S7xG18xS63	T.W.C.314	2	5
S7xG14xS63	T.W.C.325	2	3
S7xG22xS63	T.W.C.326	2	7
S7xG27xS63	T.W.C.327	2	7
Degree of characteristic		Absent 1 Slight 2 Strong 3	absent or v.weak 1 Weak 3 Medium 5 Strong 7 Very strong 9

3-Tassel color characteristics

Another point of difference among genotypes, is tassel characteristic stage (65 day), Anthocyanin coloration at the base

of glum characteristic divide the genotype into five groups. The first group was G.22, G.27, 30, S.C.13 and S.C.14 with absent or very week anthocyanin coloration at base of glum, whereas, the second group was G. 2, G.14, S.34, S.C. 15 and T.W.C.10 with week anthocyanin coloration at base of glum. The third groups was T.W.C. 311, T.W.C. 314, T.W.C. 326 and T.W.C. 327 which were medium of anthocyanin coloration at base of glum. The fourth group was G.4, G.18, S.7, S63, S.C.10, S.C.11, S.C.12 and T.W.C. 325 which were of strong anthocyanin coloration at base of glum. The last group included inbred line of G.21 which was of strong anthocyanin coloration at base of glum (Table 8). These confirm what was obtained by **EL-Hawary *et al.* (2003).**

Anthocyanin coloration of glumes (excluding the base) is presented in Table (8). Results showed that both inbred lines G.27 and G.30 have absent or very weak anthocyanin coloration of glumes. Whereas another maize genotypes classified into three classes. The first class was G.14, G.22, S.34, S.C.11, S.C.15 and T.W.C. 310 with weak anthocyanin coloration of glumes, whereas, the second class was G.2, G18, S.C.10, S.C.12, S.C.13, S.C.14, T.W.C. 311, T.W.C.314, T.W.C.326 and T.W.C. 327 which have medium anthocyanin coloration of glumes (excluding the base). The third class was G4, G.21, S.7, S.63 and T.W.C.325 in which anthocyanin coloration of glumes (excluding the base) was strong. These confirm what was obtained by **EL-Hawary *et al.* (2003).**

The relevant results in Table (8) reveal that anthocyanin coloration of anthess was strong affected by genotypes. It appeared all inbred lines were characterized with absent or very

weak anthocyanin coloration of anthess. Whereas, single cross and Three-way crosses were weak except for T.W.C. 310 which was strong in anthocyanin coloration of anthess.

Table (8)Tassel color characteristic (stag 65 day)

Genotype		Anthocyanin coloration at base of glum	Anthocyanin coloration of glumes excluding base	Anthocyanin coloration of anthess
Inbred line				
Gemmeiza 2		3	5	1
Gemmeiza 4		7	7	1
Gemmeiza.14		3	3	1
Gemmeiza 18		7	5	1
Gemmeiza 21		9	7	1
Gemmeiza 22		1	3	1
Gemmeiza 27		1	1	1
Gemmeiza 30		1	1	1
Sids 7		7	7	1
Sids 34		3	3	1
Sids 63		7	7	1
Parent	Single cross			
S.7xS.63	SC.10	7	5	3
S.7xG.4	SC.11	7	3	3
S.7xG.21	SC.12	7	5	3
G.4xG.30	SC.13	1	5	3
S.7xG.30	SC.14	1	5	3
S.63xG.30	SC.15	3	3	3
	Three-way cross			
S34xS7xS63	T.W.C.310	3	3	5
S34xG2xS63	T.W.C.311	5	5	3
S7xG18xS63	T.W.C.314	5	5	3
S7xG14xS63	T.W.C.325	7	7	3
S7xG22xS63	T.W.C.326	5	5	3
S7xG27xS63	T.W.C.327	5	5	3
Degree of characteristic		Abs.or V.weak 1 Weak 3 Medium 5 Strong 7 Very strong 9	Abs.or V.weak 1 Weak 3 Medium 5 Strong 7 Very strong 9	Abs.or V.weak 1 Weak 3 Medium 5 Strong 7 Very strong 9

Another point of difference is the degree of density of spikelets as show in Table (9). All of the studied genotypes were of medium density of spikelets except the inbred lines G18, T.W.C. 325 and T.W.C. 326 which were of lax density of spikelets. Nevertheless, T.W.C. 311 and T.W.C. 327 were of dense density of spikelets. These confirm what was obtained by **EL-Hawary *et al.* (2003).**

Referring to the angle between main axis and lateral branches, data in Table (9) showed that it could be generally noted that all genotypes under this study have medium angle between main axis and lateral branches, except nine genotypes with small angle between main axis and lateral branches were G.14, G.18, G.21, G.22, G.27, S.7, S.63, S.C.10 and S.C.14. Whereas, T.W.C. 310 was characterized with large angle between main axis and lateral branches.

It is well noticed that attitude of lateral branches differs among the tested genotypes as it is clear in Table (9). All genotypes under study have recurved attitude of lateral branches except for G.14 and S.C.11 which have straight attitude of lateral branches. While G.2, G.4, G.30 and S.C. 10 have slightly recurved attitude of lateral branches. These confirm what was obtained by **EL-Hawary *et al.* (2003).**

Table (9)Tassel characteristic (stag 65 day)

Genotype		Density of spikelets	Angle between main axis and lateral branches	Attitude of lateral branches
Inbred line				
Gemmeiza 2		5	5	3
Gemmeiza 4		5	5	3
Gemmeiza.14		5	3	1
Gemmeiza 18		3	3	5
Gemmeiza 21		5	3	3
Gemmeiza 22		5	3	5
Gemmeiza 27		5	3	5
Gemmeiza 30		5	5	3
Sids 7		5	3	5
Sids 34		5	5	7
Sids 63		5	3	5
Parent	Single cross			
S.7xS.63	SC.10	5	3	3
S.7xG.4	SC.11	5	5	1
S.7xG.21	SC.12	5	5	5
G.4xG.30	SC.13	5	5	5
S.7xG.30	SC.14	5	3	5
S.63xG.30	SC.15	5	5	5
	Three-way cross			
S34xS7xS63	T.W.C.310	5	7	7
S34xG2xS63	T.W.C.311	7	5	5
S7xG18xS63	T.W.C.314	5	5	7
S7xG14xS63	T.W.C.325	3	5	5
S7xG22xS63	T.W.C.326	3	5	5
S7xG27xS63	T.W.C.327	7	5	5
Degree of characteristic		Lax 3 Medium 5 Dense 7	Very small 1 Small 3 Medium 5 Large 7 Very large 9	Straight 1 Slightly recurved 3 Recuved 5 Strongly recurved 7 very Strongly recurved 9

4- Flowering characteristic

Another point of differences among genotypes for time of anthesis 50%of plant and time of silk emergency for 50% of plants. Genotype can be divided into four groups. The first group was for G.2, G.4, G.18, G.21, S.34, S.63, S.C.10, S.C.11, S.C.12, T.W.C.310 , T.W.C.326 and T.W.C. 327 with early time of anthesis for 50%of plants and time of 50% silk emergency. The second group was for G.14, S.7, S.C.13, S.C.14, S.C. 15, T.W.C. 311, and T.W.C. 314 with medium time of anthesis 50%of plant and time of 50% silk emergency. The third group included G.22 which showed medium to late time of anthesis 50%of plant and time of 50% silk emergency. The fourth group was G.27, G.30 and T.W.C. 325 which were of late time of anthesis for 50%of plant and time of silk emergency 50% of plant as recorded in Table (10). These results are in the same line with those obtained by **Nawar *et al.*,(2002)** and **Sadek *et al.* (2003)**

Table (10) Flowering characteristic (stage 65 day)

Genotype		Time of anathesis 50% of plant	Time of silk emergency 50% of plant
Inbred line			
Gemmeiza 2		3	3
Gemmeiza 4		3	3
Gemmeiza.14		5	5
Gemmeiza 18		3	3
Gemmeiza 21		3	3
Gemmeiza 22		6	6
Gemmeiza 27		7	7
Gemmeiza 30		7	7
Sids 7		5	5
Sids 34		3	3
Sids 63		3	3
Parents	Single cross		
S.7 x S.63	S.C.10	3	3
S.7 x G.4	S.C. 11	3	3
S.7 x G.21	S.C. 12	3	3
G.4 x G.30	S.C. 13	5	5
S.7 x G.30	S.C. 14	5	5
S.63 x G.30	S.C. 15	5	5
	Three-way cross		
S.34x S.7x S63	T.W.C. 310	3	3
S.34x G.2x S.63	T.W.C. 311	5	5
S.7x G.18x S.63	T.W.C. 314	5	5
S.7x G.14x S.63	T.W.C. 325	7	7
S.7x G.22x S.63	T.W.C. 326	3	3
S.7x G.27x S.63	T.W.C. 327	3	3
Degree of characteristic		very early 1 v. early to early 2 early 3 early to medium 4 medium 5 medium to late 6 late 7 late to very late 8 very late 9	

5- Ear characteristics

Another point of difference for reorganization, is the values of range of the degree of anthocyanin coloration of silks. It could classify maize genotypes into two classes . The first class was G.27, G.30, S.7, S.C.10, S.C.14 and S.C.15 in addition to all of the Three-way crosses which were characterized with the absent anthocyanin coloration of silks. The second class included another genotypes in which anthocyanin coloration of silks was present as it is clear in Table (11).

Results in Table (11) revealed that intensity of anthocyanin coloration of silks of maize genotypes could classify maize genotypes into three classes. The first class was G.4, G.14, G.27, G30, S.7, S.34, S.C.10, S.C.14, S.C.15 and all Three-way crosses which were very weak in anthocyanin coloration of silks. Whereas, the second class included G.2, G.18, G.21, S.63, S.C.11, S.C.12 and S.C.13 where their silks color were weak in anthocyanin coloration of silks. The third class G.22 in which intensity of anthocyanin coloration of silks was medium. These confirm what was obtained by **EL-Hawary *et al.* (2003).**

Table (11) Ear characteristic (stag 65 day)

Genotype		Anthocyanin coloration of silks	Intensity of anthocy coloration of silks
Inbred line			
Gemmeiza 2		9	3
Gemmeiza 4		9	1
Gemmeiza.14		9	1
Gemmeiza 18		9	3
Gemmeiza 21		9	3
Gemmeiza 22		9	5
Gemmeiza 27		1	1
Gemmeiza 30		1	1
Sids 7		1	1
Sids 34		9	1
Sids 63		9	3
Parents	**Single cross**		
S.7xS.63	SC.10	1	1
S.7xG.4	SC.11	9	3
S.7xG.21	SC.12	9	3
G.4xG.30	SC.13	9	3
S.7xG.30	SC.14	1	1
S.63xG.30	SC.15	1	1
	Three-way cross		
S34xS7xS63	T.W.C.310	1	1
S34xG2xS63	T.W.C.311	1	1
S7xG18xS63	T.W.C.314	1	1
S7xG14xS63	T.W.C.325	1	1
S7xG22xS63	T.W.C.326	1	1
S7xG27xS63	T.W.C.327	1	1
Degree of characteristic		Absent 1 Present 9	very weak 1 Weak 3 Medium 5 Strong 7 Very strong 9

Results in Table (12) showed that anthocyanin coloration of sheath (in the middle of plant) varied among genotypes. Single crosses S.C.12, S.C.13, S.C.14 and T.W.C.311 were absent or weak in anthocyanin coloration of sheath. Whereas, such characteristic exhibited in the inbred line G.27 was strong

in anthocyanin coloration of sheath. Another genotypes were weak anthocyanin coloration of sheath (G.2, G.14, G.18, G.22, G.30, S.34, S.63, S.C.10, S.C.11, S.C.15, T.W.C. 314, T.W.C.325, T.W.C.326 and T.W.C. 327). Nevertheless, the inbred line G.4, G.27, S.7 and T.W.C.310 were medium in anthocyanin coloration of sheath (in the middle of plant).

Table (12)Leaf characteristic (stag 71 day)

Genotype		Anthocyanin coloration of sheath (in the middle of plant)
Inbred line		
Gemmeiza 2		3
Gemmeiza 4		5
Gemmeiza.14		3
Gemmeiza 18		3
Gemmeiza 21		7
Gemmeiza 22		3
Gemmeiza 27		5
Gemmeiza 30		3
Sids 7		5
Sids 34		3
Sids 63		3
Parents	**Single cross**	
S.7xS.63	SC.10	3
S.7xG.4	SC.11	3
S.7xG.21	SC.12	1
G.4xG.30	SC.13	1
S.7xG.30	SC.14	1
S.63xG.30	SC.15	3
	Three-way cross	
S34xS7xS63	T.W.C.310	5
S34xG2xS63	T.W.C.311	1
S7xG18xS63	T.W.C.314	3
S7xG14xS63	T.W.C.325	3
S7xG22xS63	T.W.C.326	3
S7xG27xS63	T.W.C.327	3
Degree of characteristic		Abse. or v.weak 1 Weak 3 Medium 5 Strong 7 Very strong 9

Data on ear shape were presented in Table (13). Results indicated that both of G.2 and T.W.C. 327 were of conical ear shape, while G.14, S.63, S.C. 13, S.C.15 and T.W.C. 325 were of con. cylindrical ear shape. The rest of the studied inbred lines, single crosses, as well as the Three-way crosses were of cylindrical ear shape.

Type of kernel (middle third of ear) was presented in Table (13). Results indicate that the studied single crosses and the inbred line G.4 noticeably have den link type of kernel. Whereas, the Three-way crosses appeared to have dent type of kernel (middle third of ear), except T.W.C. 327, inbred lines G22, G.30, S.7, S.34 and S.63 which have had flint link type of kernel . Meanwhile , G.2, G14, G.18, G.21 and G.27 have flint type of kernel (middle third of ear). These confirm data the previous obtained by **Ni *et al.* (1996).**

Color of top of kernel and color of dorsal side of kernel are recorded in Table (13). These were the same in the inbred lines, single crosses and the Three-way crosses. So, it means that these characters must not be used as a descriptor for maize genotypes under this study.

Obtained results showed that all of the studied inbred lines showed no difference in color of top of kernel and color of dorsal side of kernel, which were absent. Whereas, all of the single crosses and the Three-way crosses possessed color of top of kernel and color of the dorsal side of kernel.

Regarding degree of intensity of anthocyanin coloration of glumes of cob, data in Table (13) showed that single crosses S.C.11, S.C.12, S.C.13 and S.C.15 were weak in anthocyanin coloration of glumes and all of the other genotypes under study were very weak in anthocyanin coloration of glumes.

Results in Table (13) revealed that number of rows of kernels could classify maize genotypes into three classes. The first class was G.27, and S.7, which were of few number of rows/ ear. Whereas, the second class was G.4, G.14, G.18, G.21 G.30, S.C.11, S.C.12, S.C.15 S.C.10, S.C.14, S.C.15 T.W.C. 310 with medium number of rows/ ear. The third class was G.2, G.22, S.34, S.63, S.C. 10, S.C.13, S.C.314, T.W.C. 311, T.W.C. 314, T.W.C. 325, T.W.C. 326 and T.W.C. 327 where of many number of rows/ ear. These confirm with the previous results obtained by **EL-Hawary *et al.* (2003)**

Table (13). Identified specification of ear characters (stag 92-93 day) maize genotypes.

Genotype		Ear shape	Type of kernel (middle third of ear)	Color of top of kernel	Color of dorsal side of kernel	Anthocyan in coloration of glumes of cob	Intensity of anthocyanin coloration of glumes of cob	Number of rows per ear
Inbred line								
	Gemmeiza 2	1	1	1	1	1	1	7
	Gemmeiza 4	3	4	1	1	1	1	5
	Gemmeiza.14	2	1	1	1	1	1	5
	Gemmeiza 18	3	1	1	1	1	1	5
	Gemmeiza 21	3	1	1	1	1	1	5
	Gemmeiza 22	3	2	1	1	1	1	7
	Gemmeiza 27	3	1	1	1	1	1	3
	Gemmeiza 30	3	2	1	1	1	1	5
	Sids 7	3	2	1	1	1	1	3
	Sids 34	3	2	1	1	1	1	7
	Sids 63	2	2	1	1	1	1	7
Parents	Single cross							
S.7xS.63	SC.10	3	4	1	1	9	1	7
S.7xG.4	SC.11	3	4	1	1	9	3	5
S.7xG.21	SC.12	3	4	1	1	9	3	5
G.4xG.30	SC.13	2	4	1	1	9	3	7
S.7xG.30	SC.14	3	4	1	1	9	1	7
S.63xG.30	SC.15	2	4	1	1	9	3	5
	Three-way cross							
S34xS7xS63	T.W.C.310	3	5	1	1	9	1	5
S34xG2xS63	T.W.C.311	3	5	1	1	9	1	7
S7xG18xS63	T.W.C.314	3	5	1	1	9	1	7
S7xG14xS63	T.W.C.325	2	5	1	1	9	1	7
S7xG22xS63	T.W.C.326	3	5	1	1	9	1	7
S7xG27xS63	T.W.C.327	1	2	1	1	9	1	7

Degree of characteristic													
Conical	1	Flint	1	White	1	Absent	1	Very weak	1	Very few	1
Con.cylindrica	2	Flint link	2	Yellow	2	Present	9	Weak	3	Few	3
Cylindrical	3	Intermediat	3	white	3			Medium	5	Medium	5
		Den link	4	Yellow	4			Strong	7	Many	7
		Dent	5	Yelloworange	5			Very strong	9	Very many	9
		Sweet	6	Orange	6						
		Pop	7	Redorange	7						
				Red	8						
				Dark red	9						
				Blue blac	9						

II- Germination and Vigour tests

1- Germination test

The standard germination test dose not consistently predicts the field performance of a seed lot. As a result, seed scientists have emphasized the development of another seed quality parameter as seed vigour. This is defined as those seed properties, which determine the potential for rapid uniform emergence and development of normal seedlings under a wide range of field conditions **(AOSA, 1983)**. 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 **(TeKrony and Egli, 1997)**. This requirement places stringent burdens on the production and marketing for only the highest quality seed. High value seed are increasingly exposed to varying pretreatments to improve their performance.

Data in Table (14) showed significant differences among the inbred lines of high germination percentage for S. 63 and G. 14. While, G. 21 and G. 22 recorded lowest values. Meanwhile, single crosses showed significant deferences among S.C. 14, S.C. 15 and S.C. 12 as compared with S.C. 11, S.C. 13 and S.C. 10. These results are in the same line with those obtained by **Santipracha *et al* (1997), Wook *et al.* (2000)** and **Rosa *et al.* (2002)**.

All of the studied Three-way crosses have high germantion percentage over 99% except T.W.C. 327 that showed 97.5% germination.

2- Vigour test

A- Accelerated ageing test

The accelerated aging test is one of the most popular seed vigour tests due to its simplicity and ease of standardization **(TeKrony, 1995).**

According to the results presented in Table (14), the studied inbred lines showed significant differences in response to accelerated aging test. The highest response to accelerated aging was obtained by G.22, while , G. 4 had the lowest response to accelerated aging. While all of the studied single crosses recorded significant differences in between. The highest response to accelerated aging was noticed by S.C. 13 and the lowest response to accelerated aging was recorded by S.C11. Whereas Three-way crosses recorded the highest response to accelerated aging by T.W.C. 326 and T.W.C.314, but T.W.C. 325 and T.W.C.310 was of the lowest response to accelerated aging. These results are in the same line with those obtained by **Moreno-Martinez *et al.* (1998).**

B- Cold test

Concerning the cold test, S. 63 and S.34 recorded the highest vigor, whereas G. 14 and G.4 were of the lowest vigor . Moreover, data revealed significant differences between the studied inbred lines (Table 14). Significant differences were obtained among all of the studied single crosses. The highest vigor was recorded by S.C. 15, and the lowest vigor was noticed by S.C11 . Whereas, the Three-way crosses recorded high vigor for T.W.C. 326 and T.W.C.325, whereas T.W.C.310 recorded the lowest vigor. These confirm what was found by **Moreno-Martinez *et al.* (1998).**

Table (14) Germination percentage and vigour test for identification of maize genotypes combined over the two seasons 2001 and 2002

Genotype		Germination %	Accelerated %	Cold Test %
Inbred line				
Gemmeiza 2		90.00 DE	69.25 EF	66.50 E
Gemmeiza 4		92.25 B	66.25 G	65.00 F
Gemmeiza 14		93.00 B	68.75 F	64.75 F
Gemmeiza 18		91.00 CD	68.75 F	65.75 EF
Gemmeiza 21		90.00 DE	70.75 D	66.50 E
Gemmeiza 22		89.00 E	76.25 A	72.25 B
Gemmeiza 27		91.00 CD	73.25 C	69.75 C
Gemmeiza 30		90.25 D	74.00 C	69.50 CD
Sids 7		92.00 BC	71.00 D	68.25 D
Sids 34		91.00 CD	75.00 B	75.50 A
Sids63		95.00 A	69.75 E	75.00 A
Parents	Single cross			
S.7 x S.63	S.C.10	94.25 C	78.75 D	66.25 D
S.7 x G.4	S.C. 11	96.25 B	76.00 E	61.25 F
S.7 x G.21	S.C. 12	98.25 A	80.50 C	67.75 C
G.4 x G.30	S.C. 13	96.25 B	86.25 A	70.50 B
S.7 x G.30	S.C. 14	99.00 A	76.75 E	64.50 E
S.63 x G.30	S.C. 15	98.75 A	82.25 B	73.25 A
	Three-way cross			
S.34x S.7x S63	T.W.C. 310	99.00 A	91.00 C	69.00 D
S.34x G.2x S.63	T.W.C. 311	99.50 A	93.50 B	70.00 C
S.7x G.18x S.63	T.W.C. 314	99.00 A	94.75 A	71.50 B
S.7x G.14x S.63	T.W.C. 325	99.25 A	92.00 C	84.50 A
S.7x G.22x S.63	T.W.C. 326	99.50 A	95.50 A	85.25 A
S.7x G.27x S.63	T.W.C. 327	97.50 B	91.00 C	70.75 BC

III- Chemical characteristics

Seed chemical composition related to specific genes and gene products into the seed through the advances in molecular biology that challenge genetic purity testing. Seed performance

is increasingly improved by adding chemical and biological agents to the seed that must be accurately monitored. Increased oil levels or another components may affect seed drying properties and moisture levels for safe long-term storage as reported **Weber (1987).**

Chemical composition for identifying the studied maize genotype could be presented and studied as follows:

1- Total carbohydrate content

The averages of kernels carbohydrate percentage are shown in Table (15). Results revealed that the inbred lines could be well classified into six categories according to their carbohydrate content as follows:

Category 1. contained carbohydrate percentage in the range of 76 to77.1% which was recorded for G. 27 and G. 30 genotypes.

Category 2. was noticed for G. 22 with carbohydrate percentage of 75.84%.

Category 3. with carbohydrate percentage in the range of 73.0 to 74.32% for G. 21, S.7 and S. 7 genotypes.

Category 4. contained carbohydrate percentage in the range of 70.9 to 71.7% was noticed by G. 14, G. 18, G. 2 and S. 63 inbred lines.

Category 5. was categorized for G. 4 with carbohydrate percentage of 68.8%.

However, the studied single crosses were divided into two categories depending upon their carbohydrate content as follows:

Category 1. was noticed for S.C. 10 and S.C. 13 genotypes with an average of carbohydrate percentage of 74.4 to 75.00%.

Category 2. contained carbohydrate percentage in the range of 71.2 to 72.3% for S.C. 12, S.C. 15 and S.C. 14 genotypes.

The Three-way crosses could be classified into four categories depending upon their carbohydrate contents as follows:

Category 1. was noticed for T.W.C. 311 with an average carbohydrate percentage of 77.6%.

Category 2. was noticed for T.W.C. 327 with an average carbohydrate percentage of 76.61%.

Category 3. contained carbohydrate percentage in the range of 74.8- 75.3% by T.W.C.325, T.W.C.310 and T.W.C.314 genotypes.

Category 4. was noticed for T.W.C. 327 with an average carbohydrate percentage of 74.51%. These results confirm what was obtained by **Hamiliton *et al.* (1951).**

2- Oil content

Data in Table (15) showed the total oil percentage of the inbred lines under study. The present results indicated that the highest oil percentage was recorded by S. 63 (5.66%), G. 21(5.54%) and G. 18 (5.49%). The lowest oil content was found by G.22 of 3.29%. Whereas, the studied inbred lines were ranged from 5.02 % to 4.00% in its oil content. Regarding single crosses under study, the present results indicated that the highest

oil percentage was recorded by S.C. 10 (5.25%) and S.C 15 (5.21%). The lowest oil percentage was found in S.C. 13 which contained 4.00%, while the single crosses contain oil percentage ranges from 4.46 % to 4.41%.

Concerning the Three-way crosses under study, the present results indicated that the highest oil percentage was recorded by T.W.C. 314 (5.26%) and T.W.C. 327 being (5.54)%, whereas the lowest oil percentage was found for T.W.C. 310 (4.62%). while the Three-way crosses were found to have oil percentage ranged from 5.29% to 4.79%. These results are in the same line with thoseobtained by **El-Sabbagh (1993)**

3- Crud Protein content

Results in Table (15) showed the total crud protein percentage in the inbred lines of maize under study. The present data indicated that the highest protein percentage was recorded by S. 63 (7.22%) and G. 14 (7.00%). But the lowest one was found in G.22 (6.2%) and G. 4 (6.25%). While other inbred lines was found to have protein percentage ranged from 6.82% to 6.40%.

Regarding the single crosses under study, the present data indicated that the highest protein content was recorded by S.C. 15 and S.C 11 of 7.84% and 7.82%, respectively. The lowest protein content was noticed in S.C. 10 of 7.2%. While the other single crosses was found to have protein contents ranged from 7.7 % to 7.51%.

Concerning Three-way crosses under study, data indicated that the highest protein content was recorded by

T.W.C. 327 (8.04%) and T.W.C. 325 (7.91%) whereas, the lowest protein content was found in T.W.C. 314 of 7.44% . The other Three-way crosses were found to have protein contents of 7.79% to 7.6%. These results are in the same line with those obtained by **El-Sabbagh (1993)**

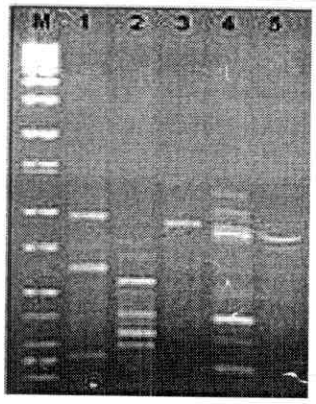
Table (15) Chemical characteristic combined over the two seasons 2001 and 2002.

Genotype		Carbohydrate %	Oil %	Crud Protein %
Inbred line				
Gemmeiza 2		71.47 ^{E}	4.00 ^{DE}	6.79 ^{BCD}
Gemmeiza 4		68.81 ^{F}	5.02 ^{ABC}	6.25 ^{FG}
Gemmeiza 14		70.91 ^{E}	4.25 ^{CDE}	7.00 ^{AB}
Gemmeiza 18		71.00 ^{E}	5.49 ^{A}	6.78 ^{BCD}
Gemmeiza 21		73.04 ^{D}	5.54 ^{A}	6.50 ^{DEF}
Gemmeiza 22		77.16 ^{A}	3.29 ^{E}	6.20 ^{G}
Gemmeiza 27		75.84 ^{B}	4.42 ^{BCD}	6.67 ^{CDE}
Gemmeiza 30		76.00 ^{AB}	5.24 ^{AB}	6.76 ^{BCD}
Sids 7		73.67 ^{CD}	4.77 ^{ABCD}	6.45 ^{EFG}
Sids 34		74.32 ^{C}	5.10 ^{ABC}	6.83 ^{BC}
Sids63		71.71 ^{E}	5.66 ^{A}	7.22 ^{A}
Parents	Single cross			
S.7 x S.63	S.C.10	74.47 ^{A}	5.25 ^{A}	7.20 ^{C}
S.7 x G.4	S.C. 11	71.23 ^{B}	4.46 ^{B}	7.82 ^{A}
S.7 x G.21	S.C. 12	71.81 ^{B}	4.51 ^{B}	7.70 ^{AB}
G.4 x G.30	S.C. 13	75.38 ^{A}	4.00 ^{C}	7.51 ^{B}
S.7 x G.30	S.C. 14	72.38 ^{B}	4.41 ^{B}	7.54 ^{B}
S.63 x G.30	S.C. 15	71.90 ^{B}	5.21 ^{A}	7.84 ^{A}
	Three-way cross			
S.34x S.7x S63	T.W.C. 310	75.10 ^{CD}	4.62 E	7.79 ^{BC}
S.34x G.2x S.63	T.W.C. 311	77.67 ^{A}	5.29 ^{BC}	7.60 ^{CD}
S.7x G.18x S.63	T.W.C. 314	75.32 ^{C}	5.62 ^{A}	7.44 ^{D}
S.7x G.14x S.63	T.W.C. 325	74.88 ^{CD}	4.79 ^{DE}	7.91 ^{AB}
S.7x G.22x S.63	T.W.C. 326	76.64 ^{B}	5.10 ^{CD}	7.71 ^{C}
S.7x G.27x S.63	T.W.C. 327	74.51 ^{D}	5.54 ^{AB}	8.04 ^{A}

IV- Identification of the Randomly Amplified Polymorphic DNA (RAPD- PCR) of some maize genotypes.

As it is clear from Table (16), for maize inbred line Gemmeiza 2, number of bands was 2 when using primers B14 or B18. Meanwhile, there other primers showed different numbers of bands, where B11, B12 and B17 clarified 3,5 and 11 bands, respectively.

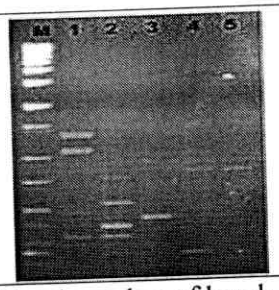
Table (16) The DNA patterns for the various primers of maize inbred line Gemmeiza 2.



	primers				
	B11	B12	B14	B17	B18
	.....(M.W bp).....				
	2000	1640	2696	2900	2134
	1450	1224	1600	2637	1817
	560	837		2000	
		750		1912	
		600		1480	
				1396	
				1197	
				1089	
				825	
				750	
				500	
Total number of bands	3	5	2	11	2

The results of primers banding are illustrated in Table (17). Either of primers 14 or 18 shoed single band. Also, primers B11 and B12 gave 4 bands each. While primer B17 identified 3 bands.

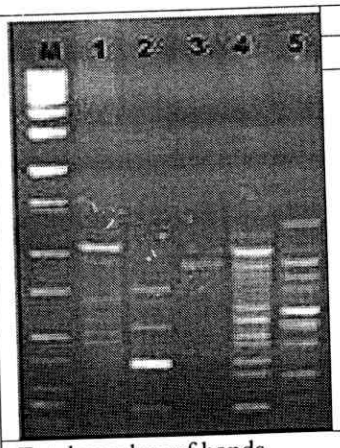
Table (17) The DNA patterns for the various primers of maize inbred line Gemmeiza 4.



	primers				
	B11	B12	B14	B17	B18
		.....(M.W bp).....			
	2745	1694	860	2850	1715
	2229	1270		1715	
	960	760		500	
	659	659			
Total number of bands	4	4	1	3	1

Results in Table (18) indicated that the highest number of bands for maize inbred line Gemmeiza 14 was obtained for primers B17 and B18 where the respective number of bands was 11 and 9. However, 2,4 and 6 number of bands was noticed for primer B14, B12 and B11, respectively.

Table (18) The DNA patterns for the various primers of maize inbred line Gemmeiza 14.



	primers				
	B11	B12	B14	B17	B18
		.....(M.W bp).....			
	2240	1600	2000	2100	2000
	1962	1290	1900	1892	1958
	1553	750		1730	1860
	1300	500		1681	1600
	1050			1472	1322
	950			1322	1254
				1000	974
				974	700
				800	500
				700	
				500	
Total number of bands	6	4	2	11	9

In Table (19), data cleared that for maize inbred line Gemmeiza 18, number of bands was 4 when using primers B11 or B17. Meanwhile, there other primers showed different numbers of bands, where B12, B14 and B18 clarified 2,3 and 5 bands, respectively.

Table (19) The DNA patterns for the various primers of maize inbred line Gemmeiza 18.

	primers				
	B11	**B12**	**B14**	**B17**	**B18**
			……(M.W bp)……		
	1638	1038	2840	3330	2980
	1038	870	2700	1992	2900
	800		1992	1898	1898
	720			500	1429
					1320
Total number of bands	4	2	3	4	5

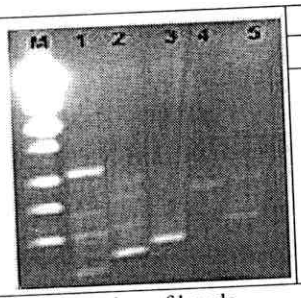
Results in Table (20) showed the different DNA patterns of maize inbred line Gemmeiza 21 when using different primers. Primers B11 and B14 showed 3 bands. The highest number of bands 7 was noticed from primer B17. Whereas, B12 gave just one band. Meanwhile, 5 bands was shown for primer B18.

Table (20) The DNA patterns for the various primers of maize inbred line Gemmeiza 21.

	primers				
	B11	**B12**	**B14**	**B17**	**B18**
			……(M.W bp)……		
	1750	920	2860	3730	2905
	1270		2450	3000	2400
	850		2000	2570	1840
				1840	1520
				850	1394
				740	
				602	
Total number of bands	3	1	3	7	5

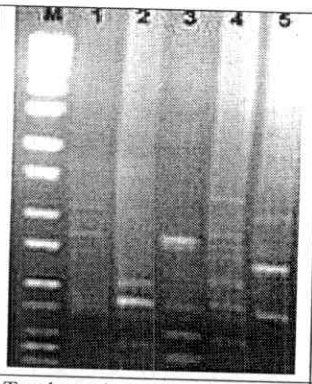
The different DNA patterns that obtained by the various primers of maize inbred line Gemmeiza 22 are presented in Table (21). Results showed that the minimum number of bands one was noticed for primers B14 and B17. Two bands was recorded for primer B18. While, 3 and 4 bands was obtained for primers B12 and B11, respectively.

Table (21) The DNA patterns for the various primers of maize inbred line Gemmeiza 22.

	primers				
	B11	B12	B14	B17	B18
	.....(M.W bp).....				
	2050	1680	924	1830	1850
	1490	1340			1380
	1000	850			
	670				
Total number of bands	4	3	1	1	2

Patterns of DNA for maize inbred line Gemmeiza 27 produced by various primers are presented in Table (22). Results showed that 3 bands were obtained for primers B11, B12 and B18. Meanwhile, higher number of bands were noticed for primers B14 and B17 where the number of bands was 4 and 5, respectively.

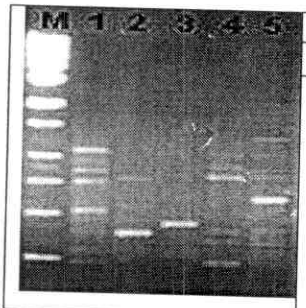
Table (22) The DNA patterns for the various primers of maize inbred line Gemmeiza 27.



	primers				
	B11	B12	B14	B17	B18
		.....(M.W bp).....			
	2350	1075	1840	2410	2025
	1840	870	870	2000	1420
	1580	690	720	1880	705
			500	1570	
				750	
Total number of bands	3	3	4	5	3

Primers and their bands for the DNA patterns of maize inbred line Gemmeiza 30 are recorded in Table (23). Results showed large variation in number of bands was obtained by the different primers. Primers B14 and B12 gave 1 and 3 bands respectively. Primers B18 and B17 showed 5 and 6 bands, respectively. Whereas, the highest number of bands 7 was noticed for primer B11.

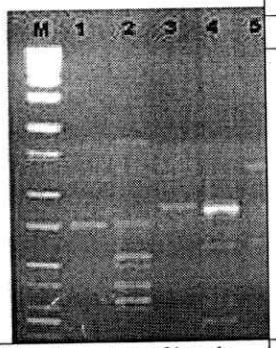
Table (23) The DNA patterns for the various primers of maize inbred line Gemmeiza 30.



	primers				
	B11	B12	B14	B17	B18
		.....(M.W bp).....			
	2105	1750	765	2360	2889
	1935	1195		1935	1650
	1740	750		1635	1265
	1095			750	985
	950			700	705
	780			500	
	660				
Total number of bands	7	3	1	6	5

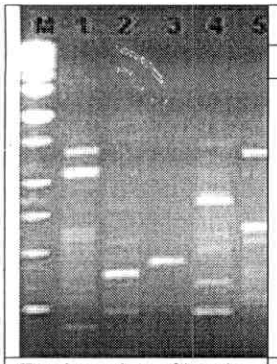
The results of primers bands of maize inbred line Sids 7 are presented in Table (24).The primers B14 and B18 gave 2 bands but B12 showed 7 bands, while B17 produced 3 bands and B11 presented minimum number single band previously mentioned results was recorded for maize inbred line Sids 7.

Table (24) The DNA patterns for the various primers of maize inbred line Sids 7.

	primers				
	B11	**B12**	**B14**	**B17**	**B18**
		.....(M.W bp).....			
	1670	3680	2770	1800	2430
		2660	1750	1460	1845
		1670		500	
		1460			
		1025			
		850			
		695			
Total number of bands	**1**	**7**	**2**	**3**	**2**

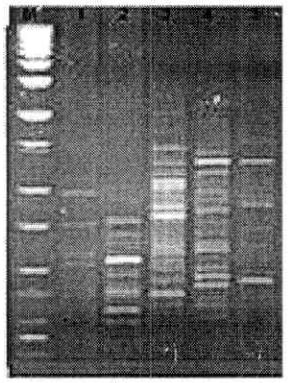
Regarding the different NDA patterns of maize inbred line Sids 34. Table (25), data showed that 7 bands were noticed for primers B11, B12 and B17. number of bands for primer B18 was of almost similar with one single band less than for the previously mention three primers. Whereas, the minimum number of bands was for B14 which showed one single band.

Table (25) The DNA patterns for the various primers of maize inbred line Sids 34.

	primers				
	B11	B12	B14	B17	B18
		.....(M.W bp).....			
	2775	3100	880	3000	2995
	2450	1755		2585	1420
	1200	1445		1970	1185
	1075	1185		1420	720
	950	935		1240	615
	500	690		685	550
	350	500		500	
Total number of bands	7	7	1	7	6

The different patterns of DNA for maize inbred line Sids 63 using various primers are presented in Table (26). Highest number of bands 10 was noticed for primer B17. Also, bands B12 and B14 gave higher similar number of bands (7 each). Whereas, lower number of bands were noticed for primers B18 and B11 which showed 3 and 4 bands respectively.

Table (26) The DNA patterns for the various primers of maize inbred line Sids 63.

	primers				
	B11	B12	B14	B17	B18
		.....(M.W bp).....			
	2000	1600	3000	3000	2960
	1600	1520	2675	2815	1920
	1210	1230	2535	2630	900
	1075	1030	2380	2470	
		850	2035	1835	
		690	1770	1420	
		520	1650	1075	
				930	
				690	
				520	
Total number of bands	4	7	7	10	3

Genetic Similarity

The RAPD data matrix Table (27) was utilized to estimate the genetic similarity among the studied eleven inbred lines. Genetic similarity ranged from .02-70% across all lines. The mean value of genetic similarity was 35%. Similarities among the ten inbred lines ranged from as low as .02% (between inbred lines Sids 34 and Sids 63) to as high as 70% (between inbred line Gemmeiza 4 and Gemmeiza 22).

Table (27) Similarity matrix among the eleven maize inbreds lines on RAPD analysis.

Inbred line	Gemmeiza 2	Gemmeiza 4	Gemmeiza 14	Gemmeiza 18	Gemmeiza 21	Gemmeiza 22	Gemmeiza 27	Gemmeiza 30	Sids 7	Sids 34
Gemmeiza 4	0.55									
Gemmeiza 14	0.37	0.52								
Gemmeiza 18	0.44	0.61	0.37							
Gemmeiza 21	0.50	0.63	0.49	0.54						
Gemmeiza 22	0.55	0.70	0.50	0.61	0.65					
Gemmeiza 27	0.46	0.61	0.41	0.50	0.58	0.65				
Gemmeiza 30	0.40	0.53	0.37	0.50	0.52	0.59	0.50			
Sids 7	0.48	0.61	0.41	0.54	0.60	0.65	0.56	0.50		
Sids 34	0.34	0.47	0.27	0.44	0.42	0.55	0.40	0.36	0.46	
Sids 63	0.08	0.19	0.05	0.10	0.16	0.21	0.14	0.06	0.20	0.02

Cluster Analysis

The dendrogram constructed from cluster analysis based on RAPD data is represented in Fig. (5). The data collectively distinguished two main clusters. First cluster include inbred Sids 63,second clusters include other inbreds were belonging to the same cluster, while inbreds Gemmeiza.2 and Gemmeiza.4 were closely-related.

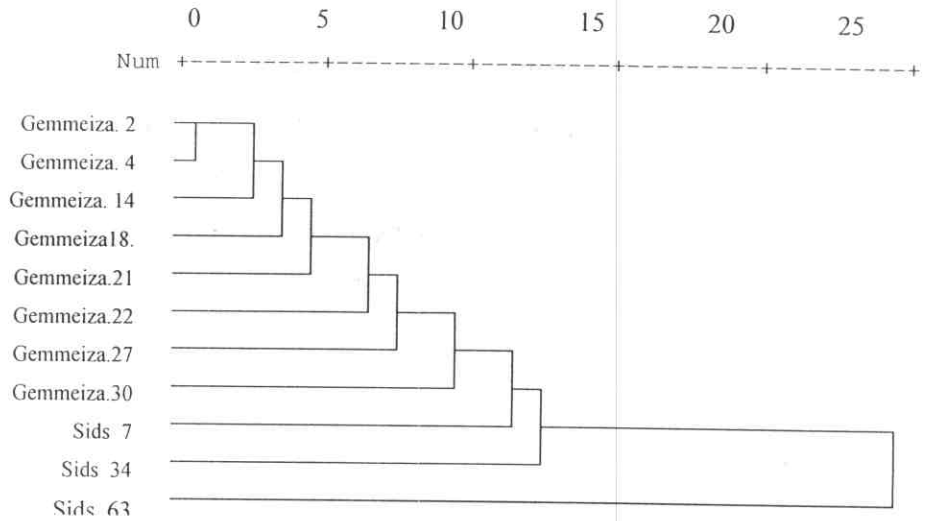


Fig (5)

Lanza *et al.* (1997), Zhang *et al.* (1998) and **Moeller and Schaal (1999)** indicated that RAPD technique can be used as a tool for determining the extent of genetic diversity among maize inbred lines, for allocating genotypes into different groups and are successful in confirming hypothesized relationships. **Lanza *et al.* (1997), Pejic *et al.* (1998)** and **Moeller and Schaal (1999)** clarified that the number and sizes of amplified DNA fragments differed with the different primers tested. **Heun and Helentjaris (1993)** found 20.7% of the fragments to be monomorphic in a RAPD analysis of maize hybrids, indicating high level of polymorphism for this species. **Wu (2000)** found 453 polymorphic bands among 17 elite inbred lines, used in the hybrid maize breeding program in China, using 73 primers with an average of 6.2 polymorphic bands per primer. **Sun *et al.* (2001)** estimated RAPD polymorphisms among 37 ontario corn hybrids using 24 random 10-mer primers, which gave 95% polymorphic fragments with a mean of 6.4 polymorphic fragments per primer.

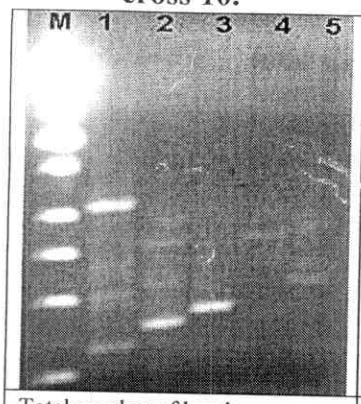
Agrama and Moussa (1996) reported that RAPD markers can be a valuable tool for maize breeding and for indirect selection for traits difficult to score like maize virus diseases. **Liu *et al.* (1998)** reported that RAPD clustering fitted best with the pedigree as the method was based on numerous molecular markers without functional, phenotypic and multiple effects, growth and development stage limitations, and environmental influences. The RAPD clustering is seen as a reliable approach for distinguishing heterotic groups of inbred lines. **Marson *et al.* (1993)** showed that products obtained from the amplification of the DNA of the second cycle lines were also amplified from one or both original lines, revealing that RAPDs were stably inherited. **Ajmone-Marsan *et al.* (1993)** confirmed that RAPDs behaved as dominant Mendalian factors.

Along the same line, **Lanza *et al.* (1997)** reported that RAPD can be used as a tool for determining the extent of genetic diversity among tropical maize inbred lines, for allocating genotypes into different groups, and to aid in the choice of the superior crosses to be made among maize inbred lines, therefore, reducing the number of crosses required under field evaluation.

Also, **Moeller and Schaal (1999)** reported that RAPDs revealed very high level of polymorphism among 15 of Native American maize accessions. Polymorphic percentage of banding patterns ranged from 46.7 to 86.2% with an overall mean of 70.7% for the primers analyzed. They concluded that RAPDs are potentially useful in organized seed collections and understanding interspecific genetic differentiation.

The results of primers banding are illustrated in Table (28). Either of primers 14 or 17 showed single band. Also, primers B12 and B18 gave 3 bands each. While primer B11 identified 4 bands.

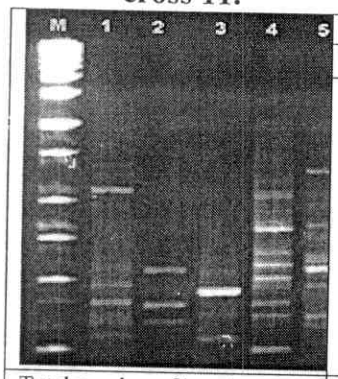
Table (28) The DNA patterns for the various primers of maize single cross 10.



	primers				
	B11	B12	B14	B17	B18
		.....(M.W bp).....			
	2240	1720	850	1740	1750
	1502	1120			1430
	1075	804			1250
	690				
Total number of bands	4	3	1	1	3

As it is clear from Table (29), for single cross11, number of bands was 2 when using primers B11 or B17. Meanwhile, there other primers showed different numbers of bands, where B18, B12 and B14 clarified 4,7 and 8 bands, respectively.

Table (29) The DNA patterns for the various primers of maize single cross 11.

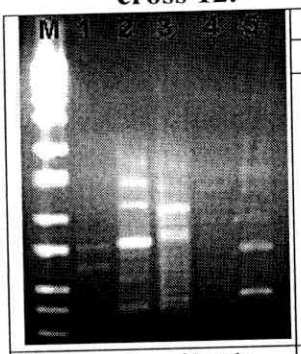


	primers				
	B11	B12	B14	B17	B18
		.....(M.W bp).....			
	1606	3050	3050	2850	3050
	1490	2360	2360	1970	2805
		1635	2255		1635
		1445	1630		940
		1295	1425		
		785	1250		
		500	845		
			780		
Total number of bands	2	7	8	2	4

Results in Table (30) indicated that the highest number of bands for maize single cross 12 was obtained for primers B12 and B14 where the respective number of bands was 7 and 6. However, 2,4 and 5

number of bands was noticed for primer B11, B17 and B18, respectively.

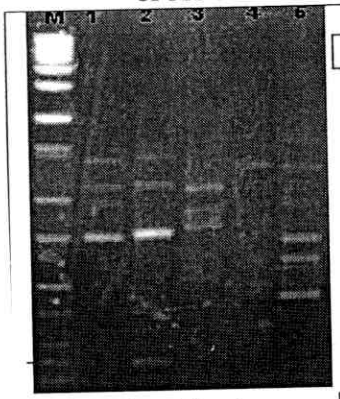
Table (30) The DNA patterns for the various primers of maize single cross 12.



primers				
B11	B12	B14	B17	B18
	.....	(M.W bp)	.....	
1600	3050	3050	3050	3755
1440	2432	2425	2000	2890
	1600	1890	1450	2000
	1450	1690	1070	1600
	1230	1485		960
	820	840		
	500			
Total number of bands	2	7	6	4	5

As it is clear from Table (31), for single cross13, number of bands was 5 when using primers B12 or B18. Meanwhile, other primers showed different numbers of bands, where B17, B14 and B11 clarified 1,3 and 4 bands, respectively.

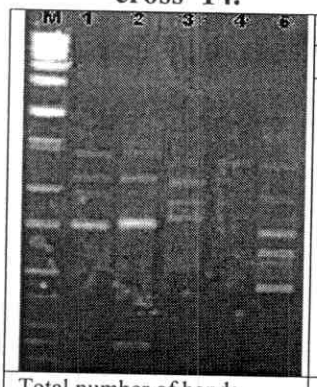
Table (31) The DNA patterns for the various primers of maize single cross 13.



primers				
B11	B12	B14	B17	B18
	.....	(M.W bp)	.....	
2670	3105	2335	2415	2445
2415	2784	1765		1980
1990	1760	1620		1600
1600	1610			1450
	500			940
Total number of bands	4	5	3	1	5

Results in Table (32) showed the different DNA patterns of maize single cross14 when using different primers. Primers B11 and B12 showed 4 bands. The highest number of bands 6 was noticed from primer B18. Whereas, B17 gave 2 bands. Meanwhile, 3 bands were shown for primer B14.

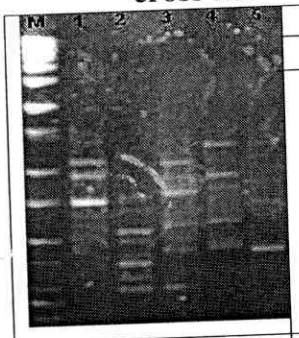
Table (32) The DNA patterns for the various primers of maize single cross 14.



	primers				
	B11	**B12**	**B14**	**B17**	**B18**
	.....	.....	(M.W bp)	.....	.....
	2780	3000	2430	2655	2900
	2430	2780	1714	2000	2655
	2000	2430	1630		2000
	1600	1600			1600
					1450
					830
Total number of bands	4	4	3	2	6

Primers and their bands for the DNA patterns of maize single cross 15 are recorded in Table (33). Results showed that large variation in number of bands was obtained by the different primers. Primers B18 and B11 gave 2 and 3 bands, respectively. Primers B14 and B17 showed 4 and 5 bands, respectively. Whereas, the highest number of bands 7 was noticed for primer B12.

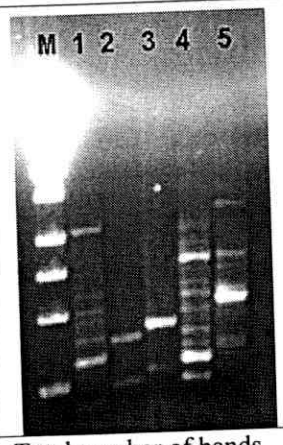
Table (33) The DNA patterns for the various primers of maize single cross 15.



	primers				
	B11	B12	B14	B17	B18
		.....(M.W bp).....			
	2230	1610	2040	2490	1520
	1890	1500	1650	1720	1000
	1600	1210	1220	1650	
		1000	915	1220	
		820		915	
		690			
		550			
Total number of bands	3	7	4	5	2

The results of primers banding are illustrated in Table (34). Either of primers B12 or B14 showed 2 bands. Also, primers B11 and B18 gave 5 bands each. While primer B17 identified 10 bands.

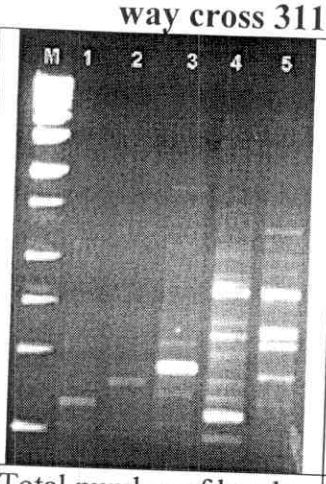
Table (34) The DNA patterns for the various primers of maize three way cross 310.



	primers				
	B11	B12	B14	B17	B18
		.....(M.W bp).....			
	2120	840	900	2030	2605
	1300	560	600	1800	1700
	1000			1700	1600
	840			1440	1350
	690			1350	780
				1000	
				840	
				780	
				690	
				560	
Total number of bands	5	2	2	10	5

As it is clear from Table (35), for three way cross 311, only one of band was obtained 1 when using either primer B11 or B12. Meanwhile, there other primers showed different numbers of bands, where B14, B18 and B17 clarified 3,7 and 9 bands, respectively.

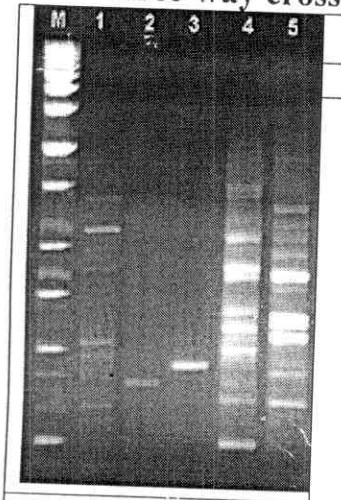
Table (35) The DNA patterns for the various primers of maize three way cross 311.



	primers				
	B11	B12	B14	B17	B18
	.....(M.W bp).....				
	700	855	3750	2045	2920
			1120	1800	2245
			930	1480	1820
				1300	1300
				1000	1210
				855	920
				795	795
				725	
				500	
Total number of bands	1	1	3	9	7

Results in Table (36) showed the different DNA patterns of maize three-way cross 314 when using different primers. Primers B11 and or B14 showed 1 band. The highest number of bands 11 was noticed from primer B17. Whereas, B11 gave 7 bands. Meanwhile, 9 bands was shown for primer B18.

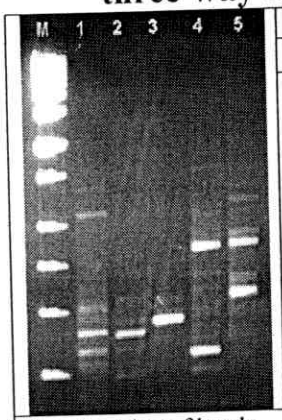
Table (36) The DNA patterns for the various primers of maize three-way cross 314.



	primers				
	B11	B12	B14	B17	B18
		.....(M.W bp).....			
	2770	940	980	3050	2500
	2320			2660	2400
	2000			2210	2210
	1810			1800	2000
	1075			1700	1750
	950			1450	1400
	830			1300	1250
				1000	970
				945	820
				820	
				500	
Total number of bands	7	1	1	11	9

Primers and their bands for the DNA patterns of maize three-way cross 325 are recorded in Table (37). Results showed large variation in number of bands obtained by the different primers. Primers B14 and B12 gave 2 and 4 bands, respectively. Primers B17 and B18 showed 5 and 6 bands, respectively. Whereas, the highest number of bands 7 was noticed for primer B11.

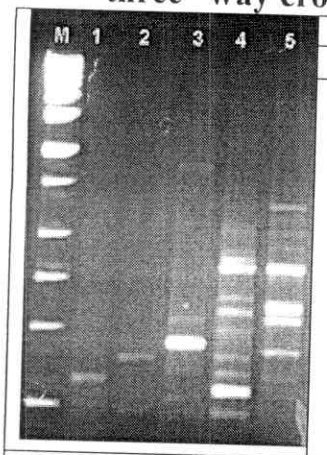
Table (37) The DNA patterns for the various primers of maize three-way cross 325.



primers				
B11	**B12**	**B14**	**B17**	**B18**
	.....(M.W bp).....			
2760	1115	1115	1620	2680
2485	830	920	1335	2420
1480	700		1190	1680
1070	500		700	1620
830			500	1335
700				1190
570				
Total number of bands	7	4	2	5	6

Primers and their bands for the DNA patterns of maize three-way cross 326 are recorded in Table (38). Results showed large variation in number of bands obtained by the different primers. Primers B12 and B11 gave 1 and 2 bands, respectively. Primers B14 and B18 showed 4 and 8 bands, respectively. Whereas, the highest number of bands 10 was noticed for primer B17.

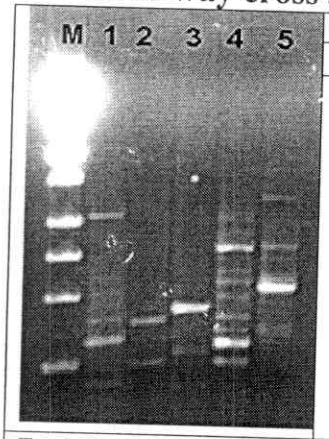
Table (38) The DNA patterns for the various primers of maize three way cross 326.



	primers				
	B11	B12	B14	B17	B18
			(M.W bp)		
	2119	905	3290	2100	2770
	680		1100	1800	2100
			960	1700	2000
			870	1325	1700
				1190	1300
				1000	1150
				915	895
				860	860
				680	
				500	
Total number of bands	2	1	4	10	8

The results of primers banding are illustrated in Table (39). Either of primers B12 or B14 showed 2 bands. Also, primers B11 and B18 gave 5 bands each. While primer B17 identified 10 bands.

Table (39) The DNA patterns for the various primers of maize three-way cross 327.



	primers				
	B11	B12	B14	B17	B18
			(M.W bp)		
	2085	800	915	2110	2320
	1300	560	590	1785	1695
	1000			1665	1420
	800			1450	1290
	690			1300	750
				1000	
				800	
				750	
				690	
				560	
Total number of bands	5	2	2	10	5