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# EVALUATION OF SOME EGYPTIAN COTTON VARIETIES BY THE YIELD AND SEVEN METHODS OF EARLINESS OF CROP MATURITY MEASUREMENTS

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***Abstract***

The performance of four varieties of Egyptian cotton, two of them belong to the extra long staple category i.e. Giza 87 and Giza 88, and two belong to the long staple category i.e. Giza 86 and Giza 89 were evaluated for early maturity using seven methods of earliness measurements and seed cotton yield during the 2000 and 2001 seasons. Date of flowering was recorded daily, and the average number of flowers for 10 plants per week was calculated to construct curves for weekly flowering.

Plants of each variety was picked at weekly intervals to calculate the percentage of crop harvested (PCH%). Moreover, this study included five measurements of earliness; i.e. position of first fruiting node (PFN), day to first flower (DFF), earliness percentage (Er %), mean maturity date (MMD in days) and production rate index (PRI). Simple correlation coefficients among five of the measurements and with seed cotton yield were calculated.

Rate of weekly flowering followed a normal distribution curve.

Effect of varieties on number of flowers showed significant differences in some weeks after planting. Also the effect of growing season was significant in some weeks. The effect of varieties x growing season was significant in two weeks after planting (18 and 21). The highest number of flowers was produced at the 15, 16 and 17 weeks after planting. The maximum average rate of flowering was found at the sixteen week after planting (15/7 : 21/7) in all varieties. Varieties differences were significant in the 1$^{st}$ and 2$^{nd}$ picks. The rate of PCH followed a normal distribution, while the effect of growing season was significant in the (1, 6, 7, 8 and 9) picks. The effect of interaction between cotton varieties and growing season was significant in 4$^{th}$ pick only. Giza 88 and Giza 89 were the earliest followed by Giza 86 while Giza 87 was the latest. The effect of varieties was significant for all the studied traits. While the effect of growing season was significant for studied traits except day to first flower (DFF), also the effect of interaction between varieties x growing season was significant for (MMD) and (PRI) traits. Giza 89 gave the highest seed cotton yield (12.48 K/F) while Giza 87 was to lowest (10 K/F).

Four of the measurements of earliness, (PFN, Er %, MMD and PRI) were significantly correlated therefore, any of them could be used with confidence to estimate earliness.

## INTRODUCTION

Early maturity in cotton has many advantages, it helps to fit the crop into a multicropping pattern. The losses of yield, its components and fiber properties quality from diseases and insects injury, may be reduced by the use of early maturing varieties. Earliness in cotton is not a character that can be easily measured since the cotton plant flowers and sets bolls over a long period of time. Earliness is influenced by several factors i.e., genotype, growing season, the time of flowering, rapid development of flowers and the length of time required for the bolls to mature.

Thus, the study of the methods of measuring earliness in cotton are very important in cotton breeding program in order to evaluate and select early mature varieties. Awaad (1994); Laila *et al.* (1994) and Badr *et al.* (2001) studied the flowering behavior in Egyptian cotton genotypes using flowering curves. However, Richmond and Radwan (1962); Mohamed (1991); Awaad (1989); Shafchak *et al.* (1993); Awaad (1994); Nassar *et al.* (1998); El-Ameer (1999); El-Lawend (1999) and Badr *et al.* (2001) studied the earliness by measuring the days to first flower, position of the first fruiting node and earliness percentage. Bilbro and Quisenberry (1973); Mohamed (1991); Awaad (1994); and Nassar *et al.* (1998), estimated the percentage of crop harvested (PCH), mean maturity date (MMD) and production rate index (PRI) as indication to crop maturity.

The objectives of this study were to evaluate four Egyptian cotton varieties by using seed cotton yield and seven methods measurement of earliness of crop maturity and simple correlation coefficients between studied characters.

## MATERIALS AND METHODS

Two field experiments were conducted in 2000 and 2001 seasons at Sakha Agricultural Research Station to study the earliness of maturity in four Egyptian cotton varieties, i.e. Giza 87 and Giza 88 (extra long staple) and two belong to the long staple category, i.e. Giza 86 and Giza 89. The date of sowing was April, 1 in the two seasons. A randomized complete block design with four replications was used in each experiment. Each plot consisted of five rows, four meters long and 60 cm wide. Seeds were planted in hills 25 cm apart and thinned to two healthy plants. All usual cultural practices were applied throughout the growing season.

Nitrogen fertilization was applied at the rate of 70 Kg N/fed. The phosphorus fertilizer was applied to the soil before seeding in the form of superphosphate (15.5%

$P_2O_5$) at the rate of 23 Kg $P_2O_5$/fed. Data collected on mechanical and chemical analysis of the soil are presented in table (A).

Data of flowering was recorded daily on ten guarded plants which were taken randomly from the outer rows of each plot. Flowering date was recorded on labels which were hanged to the flowers. The number of flowers of ten plants on each of the four replicates were counted at weekly intervals during the ten weeks of the flowering period. The other plants were used to measure the following characters:

1- Flowering behavior: The curves of flowering were constructed using the number of flowers counted weekly during ten weeks.

2- Position of the first fruiting branch emerges expressed as number of nodes to the first sympodium branch.

3- Days to first flower (DFF): number of days from planting to the opening of the first flower.

4- Earliness percentage (Er %): was calculated according to the following equation:

$$\text{Earliness \%} = \frac{\text{Weight of seed cotton yield of the first pick}}{\text{Weight of the two picks}} \times 100$$

Table A. Mechanical and chemical analysis at 30 cm depth of the soil.

| Characters | season 2000 | season 2001 |
|---|---|---|
| Soil structure | Clay | Clay |
| pH (1:25) | 8.90 | 8.94 |
| Organic matter | 1.80 | 1.70 |
| Total S.S. | 0.65 | 0.60 |
| Bicarbonate | 1.90 | 1.95 |
| Chloride | 8.47 | 8.54 |
| Sulfuric | 6.66 | 6.18 |
| Ca | 2.00 | 1.80 |
| Mg | 1.80 | 1.60 |
| Na | 4.45 | 4.55 |
| Available N | 12.20 | 10.80 |
| Available P | 9.30 | 9.60 |
| Available K | 610.0 | 620.0 |

Pickings were carried out by hand on weekly basis on the three middle rows of each plot. Ten pickings were made in each of the two seasons at the dates specified in Table (1). For each variety the following characters were determined.

Table 1. Dates of weekly picking in 2000 and 2001 seasons.

| Pick number | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| $P_1$ | $P_2$ | $P_3$ | $P_4$ | $P_5$ | $P_6$ | $P_7$ | $P_8$ | $P_9$ | $P_{10}$ |
| 25/8 | 1/9 | 8/9 | 15/9 | 22/9 | 29/9 | 6/10 | 13/10 | 20/10 | 27/10 |

5- Percentage of crop harvested (PCH%): cumulative weight of seed cotton at a specified date or sequential harvest period, expressed as percentages of the total crop (Richmond and Ray, 1966).

6- Mean maturity date (MMD in days): weighted mean of the harvest date of several periodic harvests calculated by the following formula:

$$MMD\ (in\ days) = W_1H_1+W_2H_2+---+W_nH_n\ /\ W_1+W_2+---+W_n)$$

Where:

W = weight of seed cotton in grams

H = number of days from planting to the harvest.

1, 2....., n = consecutive period harvest number (10 harvests) (Christidis and Harrison, 1955).

7- Production rate index (PRI g.): dividing the total seed-cotton yield by (MMD) value, results in a relative production rate (amount per unit time). The general formula for this value would be :

$$PRI = (W_1+W_2+---+W_n)_2/(W_1H_1+W_2H_2+---+W_nH_n)$$

Where:

W = weight of seed-cotton in grams

H = number of days from planting to the harvest.

1,2,---, n = consecutive period harvest number (10 harvests), (Bilbro and Quisenberry, 1973).

8- Seed cotton yield kentar/F=

$$\frac{\text{Seed cotton yield of three rows (Kg )x 4200}}{7.2 \times 157.5}$$

The analysis of variance was carried out for each season, then the combined analysis of variance was performed for the two years according to Snedecor and Cochran (1967). Significant differences between means were carried out using (L.S.D.). Simple correlation coefficients were calculated between the studied characters.

## RESULTS AND DISCUSISON

The results reported in this study include the evaluation of four Egyptian cotton genotypes i.e. Giza 87 and Giza 88 (Extra long staple) and two long staple catogry i.e. Giza 86 and Giza 89 using seed cotton yield and seven methods measuring earliness. These results are summarized in the following points:

### Flowering behavior:

The data of weekly flowering intervals are presented in Table (2). The flowering season extended for ten weeks at the two growing seasons 2000 and 2001, respectively, it is realized that in both seasons and to combined, the variety Giza 89 produced total number of flowers per plant more than any other variety. With respect to weekly flowering, it followed a normal curve that was nearly similar in both Giza 87 and Giza 88 in both growing seasons (Figs 2 and 3 and the combined (Fig. 5). Regarding G 86 and G 89, they were little extreme about the normal distribution both growing seasons (Figs. 1 and 4) while they were almost normal in the combined (Fig 5). Data in Table (2) show that the maximum average rate of flowering was at the sixth week of planting (15/7 : 21/7), then it begin to slow at the (17) week (22/7 : 28/7), and then decreased gradually till it reached its minimum at the third week of August. Results obtained are in general agreement with those previously reported by Áwaad, 1994; Laila et al., 1994 and Badr *et al.*, 2001). It was clear in this respect that variety Giza 88 and Giza 89 was the earliest varieties in flouring they produced 81.72 % and 78.15% respectively of their total number of flowers after seventeen week, while Giza 86 ranked third producing about 76.40% of its total flowers. However, Giza 87 was the latest producing only 74.85%.

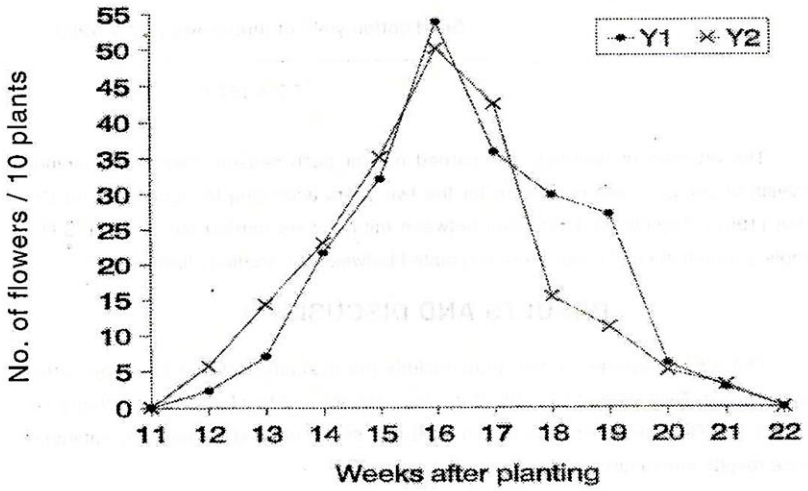


Fig. 1. The flowering curve of Giza 86 variety in the two seasons, 2000 ($Y_1$) and 2001 ($Y_2$).

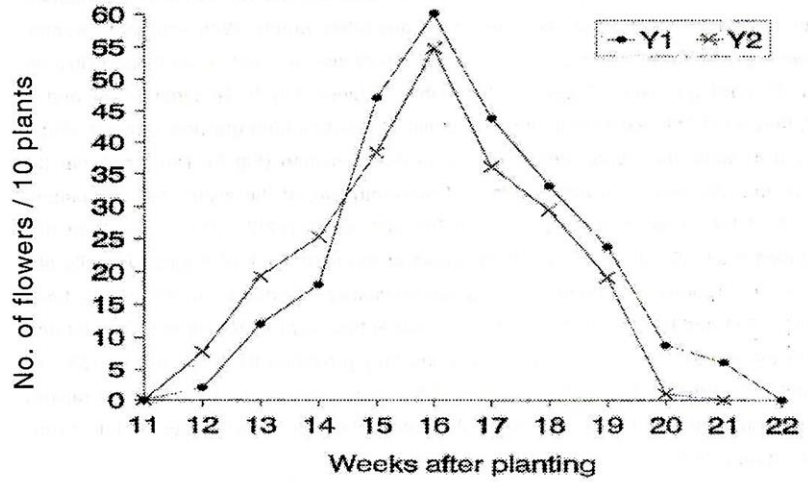


Fig. 2. The flowering curve of Giza 87 variety in the two seasons, 2000 ($Y_1$) and 2001 ($Y_2$).

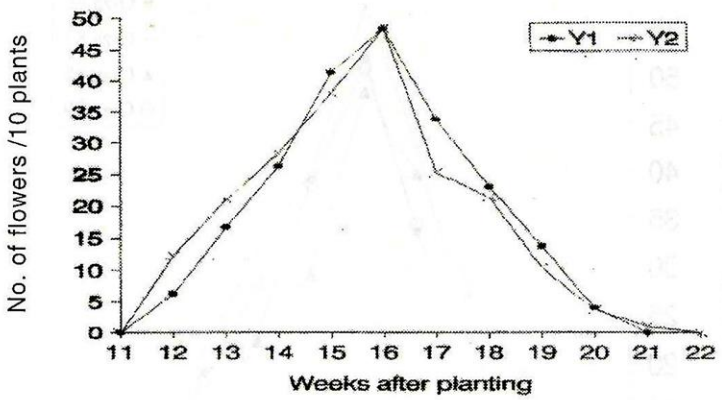


Fig. 3. The flowering curve of Giza 88 variety in the two seasons, 2000 ($Y_1$) and 2001 ($Y_2$).

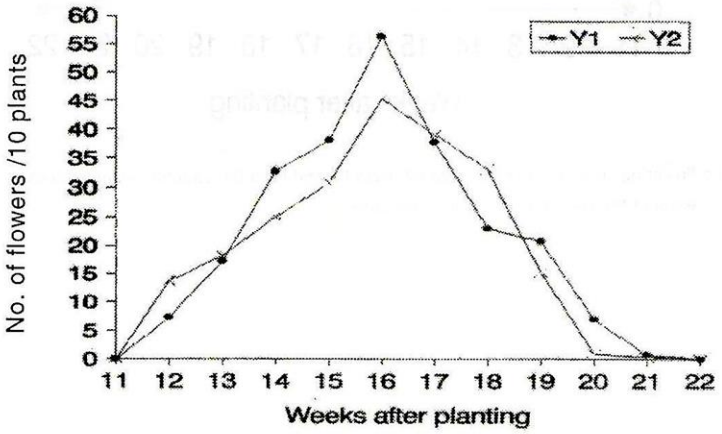


Fig. 4. The flowering curve of Giza 89 variety in the two seasons, 2000 ($Y_1$) and 2001 ($Y_2$).

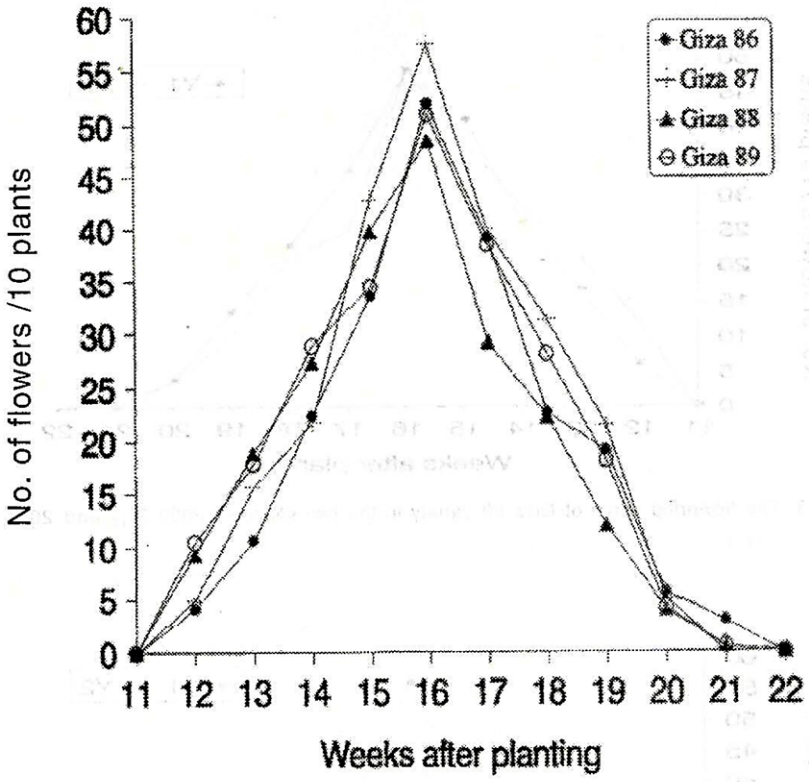


Fig. 5. The flowering curve of Giza 86, Giza 87, Giza 88 and Giza 89 varieties as combined means of the two seasons, 2000 and 2001.

Table 2. Mean number of flowers in the four Egyptian cotton genotypes at weekly intervals for the two growing seasons 2000, 2001 and its combined (Means of replicates 10 plant each).

| Weeks after planting | Flowering period 2000.2001 | 2000 | | | | 2001 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Giza 86 | Giza 87 | Giza 88 | Giza 89 | Giza 86 | Giza 87 | Giza 88 | Giza 89 |
| 12 | 17/6-23/6 | 2.33[z] | 2.00 | 6.33 | 7.33 | 5.67 | 7.67 | 12.33 | 13.67 |
| 13 | 24/6-30/6 | 7.0 | 12.00 | 16.67 | 17.33 | 14.33 | 19.33 | 21.00 | 18.33 |
| 14 | 1/7-7/7 | 21.67ab | 18.33bc | 26.33a | 32.67a | 23.00 | 25.33 | 28.33 | 25.00 |
| 15 | 8/7-14/7 | 32.0 | 47.00 | 41.33 | 38.00 | 35.00 | 38.30 | 38 | 30.67 |
| 16 | 15/7-21/7 | 53.67 | 60.00 | 48.33 | 56.33 | 50.00 | 54.67 | 48.33 | 45.33 |
| 17 | 22/7-28/7 | 35.67 | 43.67 | 33.00 | 37.67 | 42.33a | 36.00a | 25.33b | 39.00a |
| 18 | 29/7-4/8 | 29.67 | 33.00 | 23.00 | 23.00 | 15.33c | 29.33ab | 21.33bc | 33.00a |
| 19 | 5/8-11/8 | 27.0a | 23.67a | 13.67b | 20.67ab | 11.00 | 19.00 | 10.33 | 15.33 |
| 20 | 12/8-18/8 | 6.0 | 8.67 | 4.00 | 7.00 | 5.00 | 0.67 | 3.67 | 1.00 |
| 21 | 19/8-25/8 | 2.67b | 6.00a | 0.00c | 0.67c | 3.00a | 0.00b | 1.00b | 0.33b |
| Total | | 217.68 | 254.34 | 212.66 | 240.67 | 204.66 | 230.30 | 209.66 | 221.66 |

| Effest of varieties x years interaction | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 18 | 29/7-4/8 | 29-67a | 33.00a | 23.00b | 23.00b | 15.33c | 29.33a | 21.33bc | 33.00a |
| 21 | 19/8-25/8 | 2-67b | 6.00a | 0.00c | 0.67c | 3.00b | 0.00c | 1.00c | 0.33c |

Table 2 Cont.

| Weeks after planting | Flowering period 2000, 2001 | Effect of growing season | | Effect of varieties | | | |
|---|---|---|---|---|---|---|---|
| | | 2000 | 2001 | Giza 86 | Giza 87 | Giza 88 | Giza 89 |
| 12 | 17/6-23/6 | 4.50b[z] | 9.84a | 4.00b | 4.83b | 9.33a | 10.50a |
| 13 | 24/6-30/6 | 13.24b | 18.24a | 10.67 | 15.67 | 18.83 | 17.83 |
| 14 | 1/7-7/7 | 24.75 | 25.42 | 22.33c | 21.83c | 27.33a | 28.83a |
| 15 | 8/7-14/7 | 39.58 | 35.49 | 33.50 | 42.67 | 39.67 | 34.33 |
| 16 | 15/7-21/7 | 54.58a | 49.58b | 51.83 | 57.33 | 48.33 | 50.83 |
| 17 | 22/7-28/7 | 37.50 | 35.67 | 39.00a | 39.83a | 29.17b | 38.33a |
| 18 | 29/7-4/8 | 27.17 | 24.75 | 22.50 | 31.17 | 22.17 | 28.00 |
| 19 | 5/8-11/8 | 21.25a | 13.92b | 19.00ab | 21.33a | 12.00c | 18.00b |
| 20 | 12/8-18/8 | 6.42a | 2.59b | 5.50 | 4.67 | 3.83 | 4.00 |
| 21 | 19/8-25/8 | 2.34a | 1.08b | 2.83a | 3.00a | 0.50b | 0.50b |
| Total | | 231.33 | 216.58 | 211.16 | 242.33 | 211.16 | 231.16 |

Means followed by the same letter within a character are not significantly different 10 plant each).

Data in Table (2) show that the effect of varieties on number of flowers were significantly difference in the some weeks of planting i.e. (12, 14, 17, 19 and 21) also the effect of growing seasons were significant different in the some weeks of planting i.e. (12, 13, 16, 19, 20 and 21), while the effect of varieties x growing season interaction were differences significantly in two weeks of planting (18 and weeks 21). The highest number of flowers was at the (15, 16 and 17) weeks after planting i.e. (8/7 : 21/7) also the maximum average rate of flowering was at the sixty week of planting (15/7 : 22/7) in the all studied varieties combined two seasons.

## Position of the first fruiting node (PFN):

It could be seen from Table (3) that, means of the position of the first fruiting node varied significantly between varieties under study, growing season and (varieties x growing season) interaction. The combined means showed that the first fruiting node was low ($5^{th}$) for Giza 89 and comparatively high in Giza 87 to ($7^{th}$). As can be seen from Tables (2 and 3), that the genotype which were earlier in producing flowers were also lower in the position of the first fruiting node.

## Days to first flower (DFF):

Analysis of variance of number of days from planting to the day of the first an thesis indicated that there were significant differences between varieties in the two seasons and their combined analysis (Table 3). The earlier varieties in producing the first flower were Giza 89 and Giza 88 followed in order by Giza 86 and the latest variety was Giza 87. Mohamed (1991), Shafshak *et al.* (1993) and Awaad (1994), mentioned that the effect of genotype was significantly on day to first flower.

## Earliness percentage (Er %):

Results in Table (3) show means of earliness percentage in 2000 and 2001 season and combined means. These varieties showed that earliness percentage in 2000 ranged from 67.43% to 60%, also in 2001 ranged from 68.67% to 60.87% while in the combined it ranged from 68.05% to 61% for Giza 89 and Giza 87 respectively. The effect of growing season was significant on this character in this respect, Awaad (1994); El-Ameer (1999); El-Lawendy (1999); Abd El-Salam (2000) and Badr *et al.* (2001). They noted that the effect of genotype was significantly on earliness percentage.

### Percentage of crop harvested (PCH%):

With respect to (PCH%) the varieties varied significantly in the ($1^{st}$) pick in the two season in the ($1^{st}$, $2^{nd}$) picks in the combined. The effect of growing season was significantly in $1^{st}$, $5^{th}$, $7^{th}$, $8^{th}$ and $9^{th}$ picks (Table 4). The other picks were insignificant. The combined means showed that the rate of PCH followed a normal distribution. A slow rate of seed cotton, ranged from 30.41 % to 13.23% for Giza 88 and Giza 86 respectively in the first week followed (15/8: 22/8) by a higher rate of PCH in the second week was 62.15% for Giza 88 while lowest rate was 34.48% for Giza 86.

### The mean maturity date (MMD in days):

It is clear from Table (3) that varieties, growing season and the interaction between varieties x season where significantly different with respect to the mean maturity date (MMD). The difference between the lowest and highest was only 18 days, in the combined means. The variety Giza 89 and Giza 86 had the lowest MMD (141 days) while Giza 87 variety was the highest (159 days). Also in 2000 and 2001 seasons, the varieties Giza 89 and Giza 86 had the lowest MMD while Giza 87 was the highest. Richmond and Ray (1966); Awaad (1994) pointed that MMD was considered to be the most discriminating and reliable method of estimating earliness regardless of yield.

### Production rate index (PRI-g.):

The means and combined means of production rate index (PRI) in 2000 and 2001 seasons are presented in Table (3) for the four varieties in the two seasons as well as from combined analysis, effect of season and the interaction between varieties x season, were significant. The variety Giza 89 was earlier than the other varieties, while Giza 87 was the lowest Earlierbilbro and Quisenbery (1973); Awaad (1994), reported that PRI method of measuring earliness indicated the cultivars that has superior combinations of yield and earliness. Data in Table (3) show that the seed cotton yield (S.C.Y.) was different significantly in the two seasons, the effect of growing season and the effect of varieties from the combined analysis the highest S.C.Y. recorded 12.48 K/F for Giza 89 while the lowest value S.C.Y. was 10 K/f for Giza 87, this results were agreement with that El-Ameer (1999); El-Lawendy (1999) and Abd El-Salam (2000), from the above results of earliness measurements, it could be concluded that the genotypes Giza 89 were earlier than the other varieties, flowering behavior, the first fruiting node, Giza 89 and Giza 88 for days to the first flower, Giza 89 and Giza 86 in (MMD) methods, Giza 89 in (PRI), Also Giza 89 produced the highest seed-cotton yield while Giza 87 was the latest in maturity than the other studied varieties in most of the studied measurements and gave the lowest seed-cotton yield.

Table 3. Mean number of position of the first fruiting node (PFN), days to first flower (DFF), earliness percentage (Er %) mean maturity date (MMD), production rate index (PRI) and seed cotton yield for four Egyptian cotton genotypes in 2000, 2001 seasons and its combined.

| Characters | Mean number in 2000 season | | | | Mean number in 2001 season | | | |
|---|---|---|---|---|---|---|---|---|
| | Giza 86 | Giza 87 | Giza 88 | Giza 89 | Giza 86 | Giza 87 | Giza 88 | Giza 89 |
| Position of the main stem node (PFN) | 6.33a | 7.00a | 6.33a | 5.33b | 5.66b | 6.67a | 5.33b | 5.00b |
| Days to first flower (DFF) | 78.33ab | 81.33a | 75.00b | 74.33b | 76.33ab | 80.67a | 74.00b | 74.00b |
| Earliness percentage (Er %) | 65.40c | 60.10d | 66.43b | 67.43a | 65.33c | 60.87d | 67.20b | 68.67a |
| Mean maturity date (MMD in days) | 144.10a | 173.36c | 156.72b | 145.90a | 138.12b | 164.9a | 141.64b | 136.07b |
| Production rate index (PRI-g.) | 0.26b | 0.26b | 0.29b | 0.35a | 0.36ab | 0.33b | 0.35ab | 0.39a |
| Seed cotton yield (K/F) | 9.80bc | 9.01c | 10.24ab | 11.18a | 13.01a | 10.99b | 12.12a | 13.78a |
| Effect of varieties x years interaction | | | | | | | | |
| Mean maturity date (MMD in days) | 144.1de | 173.36a | 156.72c | 145.90d | 138.12f | 164.9b | 141.64e | 136.07f |
| Production rate index (PRI-g.) | 0.26e | 0.26e | 0.29d | 0.35b | 0.36b | 0.33c | 0.35b | 0.39a |

Table 3 Cont.

| Characters | Effect of growing season | | Effect of varieties | | | |
|---|---|---|---|---|---|---|
| | 2000 | 2001 | Giza 86 | Giza 87 | Giza 88 | Giza 89 |
| Position of the main stem node (PFN) | 6.25a | 5.67b | 6.00b | 6.83a | 5.83b | 5.17c |
| Days to first flower (DFF) | 77.25 | 76.25 | 77.33b | 81.00a | 74.00c | 74.17c |
| Earliness percentage (Er %) | 64.84b | 65.52a | 65.35c | 61.00d | 66.82b | 68.05a |
| Mean maturity date (MMD in days) | 155.03a | 145.18b | 141.11c | 169.13a | 147.18b | 140.99c |
| Production rate index (PRI-g.) | 0.29b | 0.36a | 0.31c | 0.29d | 0.32b | 0.37a |
| Seed cotton yield (K/F) | 10.06b | 12.48a | 11.40ab | 10.00c | 11.18b | 12.48a |

Means followed by the same letter within a character are not significantly different .

Table 4. Mean of PCH% measures through ten picks in the four Egyptian cotton varieties at the two growing seasons 2000, 2001 effect of interaction between varieties x season variety and growing season.

| Pick number | 2000 | | | | 2001 | | | |
|---|---|---|---|---|---|---|---|---|
| | Giza 86 | Giza 87 | Giza 88 | Giza 89 | Giza 86 | Giza 87 | Giza 88 | Giza 89 |
| $P_1$ | 11.87b[z] | 16.50b | 25.43a | 16.85b | 14.58c | 22.10bc | 35.40a | 23.95abc |
| $P_2$ | 40.74 | 47.02 | 55.88 | 46.26 | 28.22 | 47.51 | 68.42 | 51.77 |
| $P_3$ | 74.57 | 73.91 | 78.56 | 70.51 | 50.06 | 73.55 | 87.01 | 70.25 |
| $P_4$ | 88.27 | 86.43 | 86.94 | 87.28 | 72.69 | 87.19 | 92.95 | 87.67 |
| $P_5$ | 89.97 | 89.46 | 89.32 | 89.2 | 82.13 | 92.28 | 94.02 | 93.18 |
| $P_6$ | 90.14 | 91 | 89.46 | 89.99 | 89.62 | 93.28 | 94.08 | 94.88 |
| $P_7$ | 90.8 | 92.05 | 89.98 | 90.81 | 92.5 | 94.57 | 94.49 | 95.38 |
| $P_8$ | 92.47 | 93.82 | 91.49 | 92.39 | 96.52 | 96.33 | 95.09 | 96.02 |
| $P_9$ | 95.58 | 96.23 | 94.5 | 95.75 | 99.89 | 97.5 | 98.14 | 97.83 |
| $P_{10}$ | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Effect of varieties x years interaction | | | | | | | | |
| P4 | 88.27ab | 86.43b | 86.94b | 87.28ab | 72.69c | 87.19ab | 92.95a | 87.67ab |

Table 4 Cont.

| Pick number | Effect of growing season | | Effect of varieties | | | |
|---|---|---|---|---|---|---|
| | 2000 | 2001 | Giza 86 | Giza 87 | Giza 88 | Giza 89 |
| $P_1$ | 17.66b | 24.01a | 13.23c | 19.30b | 30.41a | 20.40b |
| $P_2$ | 51.98 | 48.98 | 34.48c | 47.27b | 62.15a | 49.01b |
| $P_3$ | 74.39 | 70.22 | 62.32 | 73.73 | 82.78 | 70.38 |
| $P_4$ | 87.23 | 85.13 | 80.48 | 86.81 | 89.94 | 87.47 |
| $P_5$ | 89.49 | 90.40 | 86.05 | 90.87 | 91.67 | 91.19 |
| $P_6$ | 90.15b | 92.97a | 89.88 | 92.14 | 91.77 | 92.44 |
| $P_7$ | 90.91b | 94.24a | 91.65 | 93.31 | 92.24 | 93.10 |
| $P_8$ | 92.54b | 95.99a | 94.50 | 95.08 | 93.29 | 94.20 |
| $P_9$ | 95.52b | 98.22a | 97.74 | 96.62 | 96.32 | 96.79 |
| $P_{10}$ | 100 | 100 | 100 | 100 | 100 | 100 |

Means followed by the same letter within a character are not significantly different .

**Correlations among measurements:**

Simple correlation coefficients between all possible pairs of seed cotton and five earliness measurements are presented in Table (5). Highly significant positive correlations were obtained between seed cotton yield and each of earliness percentage (0.700) and PRI (0.855) and between position of first fruiting node and each of DFF (0.704) and MMD (0.629). Also between earliness percentage and PRI (0.636). At the same time, highly significant and negative correlation coefficient was calculated between seed-cotton yield and PFN (-0.641), DFF (-0.530) and MMD (-0.730), position of first fruiting node and each of earliness percentage (-0.428) and PRI (-0.626), earliness percentage and MMD (-0.571) and between MMD and PRI (-0.714). Awaad (1994) Evidently, four measurements of earliness i.e. PFN, Er %, MMD and PRI were found to be significantly correlated in this study and therefore it was concluded that any of them could have been used with confidence to estimate earliness in cotton.

The same results were obtained by Richmond and Radwan (1962); Awaad (1994) and they added that the combined weight of the first and second picking expressed as percentage of total seed cotton harvested was considered to be the most practical.

Table 5. Simple correlation coefficients between studied characters.

| Characters | Correlation coefficient | | | | |
|---|---|---|---|---|---|
| | X2 | X3 | X4 | X5 | X6 |
| Seed cotton yield (K/F) X 1 | -0.641** | -0.530** | 0.700** | -0.730** | 0.855** |
| Position of the main stem node (PFN) X 2 | | 0.704** | -0.428* | 0.629** | -0.626** |
| Days to first flower (DFF) X 3 | | | -0.283 | 0.496* | -0.533** |
| Earliness percentage (Er %) X 4 | | | | -0.571** | 0.636** |
| Mean maturity date (MMD in days) X 5 | | | | | -0.714** |
| Production rate index (PRI g.) X 6 | | | | | 1.000 |

r 5% = 0.4018 r 1% = 0.5118

* and ** significant at 5% and 1% probability levels, respectively.

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# تقييم بعض أصناف القطن المصرى من حيث المحصول وسبع طرق لقياس التبكير في النضج

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*معهد بحوث القطن - مركز البحوث الزراعية بالجيزة*

تهدف هذه الدراسة إلى تقييم أربعة أصناف من القطن المصرى من حيث محصول القطن الزهر وسبع طرق لقياس التبكير فى النضج والعلاقات بين الصفات المدروسة خلال موسمى ٢٠٠٠ - ٢٠٠١ حيث أخذت قراءات التزهير اليومى للحصول على متوسط عدد الأزهار لعشر نباتات لكل أسبوع لرسم منحنيات التزهير الأسبوعى ، ثم تم الجنى كل أسبوع لحساب النسب المئوية للجنيات ومتوسط (DFF) وتاريخ أول زهرة (PFN). هذا بالإضافة الى قياس موقع أول عقدة ثمرية (PCH) تاريخ النضج (MMD) ومعدل الإنتاج (PRI)، ومحصول القطن الزهر . وتم حساب معامل الإرتباط البسيط لخمس طرق تبكير الأخيرة مع محصول القطن الزهر . وكانت الأصناف فى تلك الدراسة هى : ( جيزة ٨٧ وجيزة ٨٨) منطبقة الأقطان فائقة طول التيلة ، أما طبقة طويلة التيلة فمثلها (جيزة ٨٦ وجيزة ٨٩).

وأوضحت النتائج المتحصل عليها ما يلى :

١ - معدل الأزهار الأسبوعى يتبع منحنى توزيع طبيعى لطبقة الأصناف فائقة طول التيلة « جيزة ٨٧ وجيزة ٨٨ ، أما الصنفين جيزة ٨٦ وجيزة ٨٩ طويلة التيلة فقد إنحرفت نسبياً عن التوزيع الطبيعى فى كلا الموسمين أما متوسط الموسمين فقد أخذت جميع الأصناف شكل منحنى التوزيع الطبيعى تقريباً .

٢ - تأثير التركيب الوراثى على عدد الأزهار كان معنوياً فى الأسبوع الثانى عشر والرابع عشر و السابع عشر و التاسع عشر و الواحد و عشرون من الزراعة، تأثير السنوات على عدد الأزهار كان معنوى فى الأسبوع الثانى عشر و الثالث عشر و السادس عشر و التاسع عشر و العشرين و الحادى و العشرون. أما تأثير تفاعل الصنف مع موسم الزراعة لم يكن معنوياً بالنسبة لعدد الزهر إلا فى الأسبوعين الثامن عشر و الحادى و العشرون فقط.

٣ - النسبة المئوية للجنيات (PCH) كان تأثير الأصناف معنوياً على هذه الصفة فى كل من الجنيتين الأولى والثانية فقط ٨/٢١ ، ٢٨/٨ أما تأثير موسم الزراعة فقد كان معنوياً على هذه الصفة فى الجنيات الأولى ( ٨/٢١) ومن السادسة ٩/٢٥ حتى الجنية التاسعة كان تأثيراً التفاعل بين الصفة وموسم الزراعة معنوياً على هذه الصفة فى الجينة الرابعة فقط ٩/١١ .

٤ - أظهرت قياسات أول فرع ثمرى (PFN) وتاريخ تفتيح أول زهرة (DFF) ومعدل الإنتاج ) أن تأثير الأصناف معنوى عليها وأن أبكر الأصناف المختبرة هو(MMD) ومتوسط تاريخ النضج (PRI) جيزة ٨٩ ، أما الصنف جيزة ٨٧ فقد كان أقل الأصناف تبكير ١ فى تلك الصفات ، كما أوضحت النتائج أن تأثير موسم الزراعة كان معنوياً على صفات التبكير التى درست فيما عدا تاريخ تفتيح

أول زهرة ، أما تأثير تفاعل الصنف مع موسم الزراعة فكان معنوياً على كل من متوسط تاريخ النضج ومعدل الإنتاجية (PRI).

٥ – تأثير الصنف كان معنوياً على محصول القطن الزهر حيث سجل جيزة ٨٩ أعلى محصول ١٢,٤٨ قنطاراً /فدان بينما كان جيزة ٨٧ أقل الاصناف انتاجية ١٠ق / ف ، كما كان تأثير موسم الزراعة معنوياً أيضاً على محصول القطن الزهر .

٦ – وجد إرتباط معنوى بين أربع طرق من طرق قياس التبكير وهى موقع أول فرع ثمرى والنسبة المئوية للتكبير ومتوسط تاريخ النضج (MMD) ومعدل الإنتاجية (PRI) لذلك يمكن الإعتماد على أى طريقة منها لقياس صفة التبكير فى محصول القطن . كما كان الإرتباط معنوياً بين تاريخ تفتيح أول زهرة وكل من إرتفاع عقدة أول فرع ثمرى ومتوسط تاريخ النضج ومعدل الإنتاجية .

٧ – الإرتباط بين محصول القطن الزهر كان معنوياً مع الخمس طرق لقياس التبكير أى كلما قلت قيم كل من إرتفاع عقدة أول فرع ثمرى وتاريخ أول زهرة ومتوسط تاريخ النضج وزادت قيم كل من نسبة التبكير فى النضج ومعدل الإنتاجية زاد محصول القطن الزهر ..