Kafr El-sheikh University
Faculty of Agriculture
Agronomy Department

Genetic Behavior of Some Cotton Genotypes (*G. barbadense* L.) under Late Planting Date Conditions

By

Aml Sayed Ahmed Abdel-Hafez

B. Sc. Agric. (Fiber crops), Fac. of Agric. Ain Shams University
2013

THESIS

Submitted in Partial Fulfillment of the Requirements for the Degree of

MASTER OF SCIENCES

IN
AGRICULTURAL SCIENCE

(AGRONOMY)

Department of Agronomy
Faculty of Agriculture
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5. SUMMARY

The present investigation was conducted in Agronomy Department-Faculty of agriculture -Kafr El-Sheikh University and Sakha Agricultural Research Station, A.R.C., Egypt, during the 2014 and 2015 growing seasons.

The genetic materials used in the present study involved seven parents were { Karsheneski-2, Suven, CB58, Giza 94, Giza 80, Giza 93 and promising line from the cross [Giza 84 x (Giza 70 x Giza 51 B)] x S62 } and twenty one crosses (G. barbadense L.), resulting through half diallel crosses mating design in the 2014 growing season.

In 2015 growing season, two experiments were designed in a randomized complete block with four replications to evaluate all genotypes (seven parents and twenty one F_1 crosses) under two planting dates.

The main objectives of the present investigation were carried out to:

1. Evaluate the performance of seven genotypes of cotton and their F1 crosses under the two environments (conventional and late planting dates conditions).

2. Study the effects of general and specific combining ability and their interactions with planting dates.

3. Study the effects of heterosis relative to mid-parents and better-parent for growth traits, yield and its components and fiber properties.

4. Select the suitable parents and combinations for suitable to late planting date of cotton.

Studied traits

1) Growth traits:

1- First fruiting node (F.F.N.)

2- Number to first flower opining (DFF).

3- Number of fruiting branches per plant (NO.F.B/P.)

4- Plant height (P.H.)

5- Earliness index (E.I.)

2) Yield and yield component traits:

1- Seed cotton yield (S.C.Y.) / plant.

2- Lint yield (L.Y.) / plant.

3- Lint percentage (L %).

4- Boll weight (B.W.).

5- Seed index (S.I.) (g).

6- Lint index (L.I.) (g).

3) Fiber properties:

1- Fiber elongation (%).

2- Fiber fineness (micronaire value).

3- Fiber strength (g/tex).

4- Fiber length (F.L.) (mm) .

3- Uniformity ratio (U.R).

The obtained results could be summarized as follows:

Analysis of variances:

1. The mean squares of planting dates were significant or highly significant for most growth traits studied.

2. The genotypes, parents and crosses mean squares were highly significant for all studied traits in the two planting dates and their combined data except for crosses for first fruiting node, number of fruiting branches/plant at conventional planting date, earliness index in both planting dates, parent for plant height at late planting date, boll weight at conventional planting date , parents and crosses for lint yield at conventional planting date, seed cotton yield at late planting date, parents for fiber strength at the conventional date and its combined and crosses for uniformity in both planting dates.

3. Parent versus crosses were significant or highly significant for all studied traits in both planting dates and their combined except for earliness index at conventional planting date and number of fruiting branches/plant, days to first flower at late planting date, boll weight and seed index in both planting dates.

4. General combining ability and specific combining ability were significant or highly significant for all studied traits in both planting dates and their combined except for SCA for days to first flower opining at its combined data, genotypes and SCA for boll weight at the conventional planting date and SCA for boll weight at combined data and lint yield at late planting date, SCA for fiber elongation, fiber strength at their combined analysis, fineness and uniformity at conventional planting date.

5. The interaction between planting dates and each of genotypes, general and specific combining ability mean squares were highly significant for all studied traits except for plant height, earliness, boll weight, seed index, uniformity for all interaction and fiber elongation for interaction between planting dates and GCA .

Mean performance of genotypes:

1. C.B58 exhibited the highest means for first fruiting node in late planting date and its combined analysis and days to first flower opining at conventional planting date as well as [Giza 84 x (Giza 70 x Giza 51 B)] x S62 for first fruiting node in both planting dates and its combined, while, Kar.2 x C.B58 expressed the best values for planting height in both planting dates and its combined analysis and earliness index at late planting date of growth traits.

2. The highest crosses of yield and yield component traits were Kar.2x Giza 94 for seed cotton yield at conventional planting date and lint yield in both planting dates and its combined analysis as well as Suven x Giza 94 at conventional planting date and its combined analysis for both mentioned traits and boll weight at late planting date. In the same trend,

the parent Giza 94 gave the highest values for seed index and lint index in both planting dates and its combined analysis then the cross Giza 94x Giza 80 at late planting date and its combined analysis.

3. Giza 93 gave the best values for fiber fineness in both planting dates and its combined analysis, uniformity at late planting date and its combined and fiber length at late planting date as well as the cross Giza 94 x Giza 93 for uniformity, fiber length at conventional planting date and its combined analysis and fiber strength at conventional planting date. In the same trend, the parent Giza 80 gave the highest values for fiber elongation in both planting dates and its combined analysis of fiber traits.

Combining ability:

General combining ability:

1. The parent Giza 80 showed significant positive general combining ability G.C.A effects in both planting dates for most growth habit traits.

2. The parent Giza 94 showed highly significant and significant positive values of G.C.A. effects in both planting dates and its combined analysis for most yield and yield component traits.

3. The parent Giza 93 exhibited significant and highly significant positive values of G.C.A. effects for most fiber traits, while, Giza 80 exhibited significant and highly significant negative values of G.C.A. effects in both planting dates and its combined for most fiber traits.

Specific combining ability:

1. The cross Kar.2 x C.B58 exhibited significant and highly significant SCA effects for most growth traits.

2. The cross Kar.2 x Giza 94 exhibited significant and highly significant positive SCA effects, while, the cross C.B58 x Giza 94 exhibited significant and highly significant negative SCA effects for most yield and yield components traits.

3. The cross Kar.2 x Suven exhibited significant and highly significant SCA effects for most fiber properties.

Heterosis:

1. Heterosis relative to mid-parents.

1. The crosses Kar.2 x Giza 94, Kar.2 x { [Giza 84 x (Giza 70 x Giza 51 B)] x S62 } and Kar.2 x G.80 showed highly significant heterosis relative to mid-parents at conventional planting date, while, the cross Suven x C.B58 showed highly significant in both planting dates and its combined analysis for most growth traits.

2. The crosses Kar.2 x C.B58, Kar.2 x Giza 80 and Kar.2 x Giza 93 gave highly significant positive heterosis relative to mid-parents for most yield and yield components traits at conventional planting date and their combined analysis, while, the cross Suven x{ [Giza 84 x (Giza 70 x Giza 51 B)] x S62 } showed significant and highly significant positive heterosis relative to mid-parents in both planting dates and its combined analysis.

3. The crosses Kar.2 x Suven and Kar.2 x C.B58 gave highly significant heterosis relative to mid-parents in both planting date and their combined analysis for fiber traits.

2. Heterosis relative to better-parent:

1. The crosses C.B58 x{ [Giza 84 x (Giza 70 x Giza 51 B)] x S62 } and Kar.2 x C.B58 exhibited significant or highly significant heterosis relative to better-parent for growth traits.
2. The crosses Kar.2 x C.B58, Kar.2 x Giza 94 and Suven { [Giza 84 x (Giza 70 x Giza 51 B)] x S62 }exhibited significant or highly significant heterosis relative to better-parent for yield and yield components traits.
3. The crosses Kar.2 x Suven, Kar.2 x C.B58 and C.B58 x Giza 80 exhibited significant or highly significant heterosis relative to better-parent for fiber traits.

6. CONCLUSION

Generally, the important findings in this investigation could be summarized as follows:

The results revealed that changes of combining ability for yield and fiber properties were observed in this study under both different planting dates. The breeders should select suitable parents or crosses which can realize their desire with the late planting to increase efficiency of selection in segregating generations. The parents (Suven, CB58 and Giza 93) were good combiners under late planting dates. Also, the best crosses were Kar.2 x Giza 94, Suven x {[Giza 84 x (Giza 70 x Giza 51 B)] x S62}, Suven x Giza 93 and CB58 x Giza 93 for seed cotton yield under late planting date. In addition, these crosses are characterized by high yield under late planting date. The parent G.93 and the crosses Suven x Giza 93, C.B58 x Giza 93 and { [Giza 84 x (Giza 70 x Giza 51 B)] x S62 } x Giza 93 exhibited the best values for fiber traits. Thus, Cotton Breeders can use these hybrids to improve breeding programs and to select the most promising genotypes for late-planting date. These crosses could be exploited in breeding program aiming to improve the genotypes under late-planting tolerance. This is necessary for better cultivated land use efficiency.