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Estimation of The Genetic parameters in some Inter-specific Cotton Crosses. (*Gossypium hirsutum* L. x *Gossypium barbadense* L.)

By

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.SUMMARY

Four local cotton varieties: G. 92, G. 93, G. 94 and G. 96 and three exotic cotton verities: Acala, D.B 27 and D.B 244 were crossed in all possible combinations without reciprocals to produce 21 interspecific crosses during summer 2016.

In 2017 season TheF_1 seeds and their parents were sown in randomized blocks design with three replications.

Part I: Half diallel experiments:

Studied traits:

A. Growth traits:

1**.** Flowering (days) 2. Number of fruit branches/plant 3**.** Plant height. (c.m)

B. Yield and yield component traits:

1. Seed cotton yield/plant in grams 2. Lint cotton yield/plant in gram
3. Lint percentage 4. Boll weight in grams 5. Number of bolls/plant

C. Fiber properties:

1. Fiber length at 2.5% span length in mm 2. Uniformity ratio
3. Fiber strength 2. Fiber fineness in Micronaire reading

The results of mean performance and heterosis coupled with specific combining ability effects in TheF_1 plants revealed that the three interspecific crosses ,(G92xD.B27), (G93xD.B244) and (G94xD.B244) were the top performing and could be promising crosses.

In 2019 season, the obtained seeds of the six population P_1, P_2, F_1, Bc_1, Bc_2 and F_2 for each of the three interspecific crosses were separately sown in a randomized blocks design with three replications.

The obtained results could be summarized in the following points:

Part 1: half diallel experiment

1. The mean square of genotypes, (parents and crosses) were highly significant for all the studied.

2. The results showed that the mean squares of parents vs. crosses were highly significant for all the studied traits except, number of fruiting branches and plant height were only significant suggesting the presence of significant heterosis for all the studied traits, thereby supporting the possibility of heterotic effects for all the studied traits.

3. Mean squares indicated significant heterotic values in the interspecific crosses between *Gossypium hirsutum* L. x *Gossypium barbadense* L.

4. Mean performances showed that the genotypes which belong to American cotton were the best of all the yielding traits so, (D.B27), Acala, and (D.B244) parents exhibited higher values for seed cotton yield, lint yield and lint percentage than the other Egyptian parental genotypes (G. barbadense).

5. The best general combiners for earliness were D.B27 (p6) and D.B244 (p7), for plant height (shortest) were Acala(p5) and D.B27 (p6) for yield and yield components were the American parents Acala(p5), D.B27 (p6)) and D.B244 (p7). Meanwhile, the best general combiners for fiber traits were the varieties G.92 and G93.

6. Negative heterotic effects relative to mid-parent and better-parent were found for the interspecific crosses G92xAcala, G92 x D.B27, G92 x D.B244 G93 x Acala, G93 x D.B244, G94 x Acala and G94 x D.B244.

7. The interspecific crosses G92 x D.B27, G93 x Acala, G93 x D.B244 and G94 x D.B244 for flowering and number of fruiting branches/plant, G92 x D.B27

for seed cotton yield, lint yield, lint percentage and boll number/plant and G.94 x D.B244, G96 x Acala and G96 x D.B27 for fiber length ,uniformity ratio fiber strength and fiber fineness had the most desirable specific combining ability effects for these traits.

8. The results of and heterosis coupled with specific combining ability effects in F_1 plants revealed that the three interspecific crosses ,(G92xD.B27), (G93xD.B244) and (G94xD.B244) were the top performing and could be promising crosses.

Part II: Six parameters:

The studied characters:

A. Yield and yield components trait:

1. Seed cotton yield/plant in grams 2.Lint cotton yield/plant in grams
3. Lint percentage 4. Boll weight in grams 5. bolls Number

C. Fiber properties:

1. Fiber length at 2.5% span length in mm 2. Uniformity ratio
3. Fiber strength 2. Fiber fineness in Micronaire reading (U.R.%)

The obtained results could be summarized as follows;

1. The F_1 mean values exceeded the mid-parent for all the studied traits in the three crosses except for micronir value which was exhibited negative values(desirable) for this trait indicating partial dominance.
2. Regarding F_2 mean, the values were intermediate between the two parents and less than the F_1 mean values, indicating the inbreeding depression has occurred.
3. BC_1 and BC_2 mean values varied according to the trait itself, it was in the direction of their respective recurrent parent for the studied traits with some exception .
4. Highly significant positive heterosis relative to mid-parent were found for all traits(yield, its component and fiber traits) except for maicronair

values were highly significant negative (desirable) for the three interspecific crosses. While, positive heterotic effects relative to the better-parent were found for fiber length in the first and third crosses uniformity ratio in the three crosses .

5. The dominance effects were more important and greater than additive effects for the traits, seed cotton yield/plant, lint cotton yield/plant, boll number/plant and uniformity ratio except fiber length which additive was more than dominance effects for all the three interspecific crosses.
6. Among the epistasis components the additive x additive was greater in magnitudes than additive x dominance and dominance x dominance for all the studied traits for the three crosses .
7. Heritability estimates in narrow sense were low to moderate for all the studied traits in all crosses, ranged from 10% for fiber strength in the first cross to 75% for lint percentage in the third cross.
8. High predicted genetic advance under selection associated with high narrow sense heritability estimates for seed cotton yield/plant and Micronair value and moderate estimates of heritability in narrow sense and moderates values of genetic advance were obtained for lint cotton yield/plant and boll number.