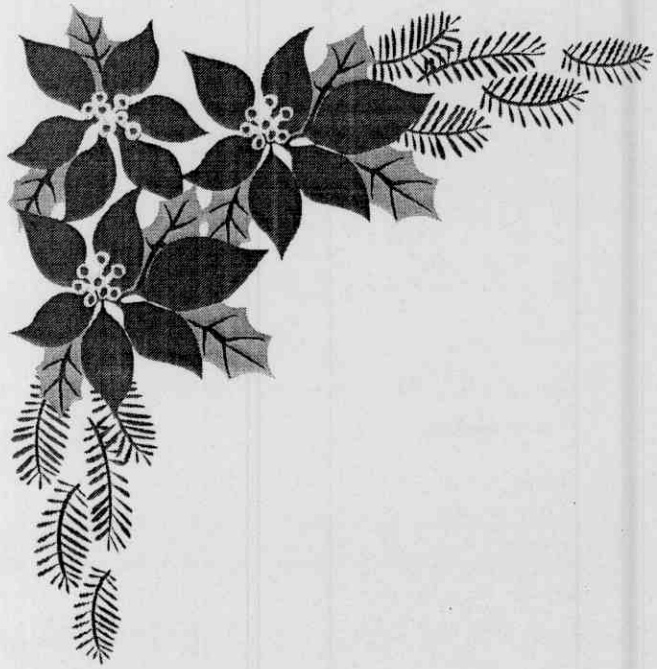
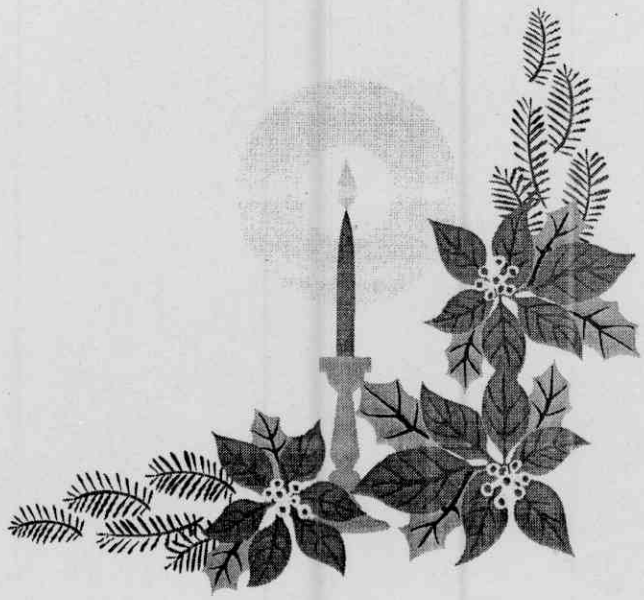


SUMMARY & CONCLUSION



V. SUMMARY

The present study was carried out during the period of 2004,2005, 2006 and 2007 growing seasons at Etay El-Baroud Agricultural Research Station, Behaira Governorate, Egypt.

The objective of this study was to estimate the response to different methods of plant breeding *i.e.*, pedigree, bulk and single pod descent (SPD). Also, direct and indirect selection for increased seed yield were carried out. The selection intensity of 5% approximately was used with direct selection (selection for seed yield it self) and with indirect selection using yield component in soybean, *i.e.*, number of pods/plant, no of seeds/pod and 100-seed weight. The genetic parameters were estimated in F_3 and F_4 generations.

Two F_2 populations derived from the two crosses (Forrest x H_2L_{20}) and (L86k-73 x H_2L_{20}) were used.

The obtained results could be summarized as follow:

A- First cross (Forrest x H_2L_{20}):

A-1- F_3 and F_4 generations:

1- The mean squares associated with F_3 families were found to be significant for all studied traits. High estimates of heritability in broad-sense in the F_3 families were detected for all studied traits.

2- In the F_3, genetic gain was rather higher for no. of pods/plant, no., of seeds/pod and seed yield/plant. However, low to moderate genetic gain from selection was obtained for

maturity date and seed index, respectively. Also, high G.C.V%. was detected for number of pods/plant and seed yield/plant. However, low to moderate G.C.V%. was obtained for other traits.

3- The percentage of superior selected families was 82.86 % having higher seed yield than better parent.

4- From the previous mentioned data, it is observed that the pedigree method was more effective for selected superior families or lines.

5- In the F_3 high heritability values were detected for maturity date, number of pods/plant and number of seeds/pod, indicating the effectiveness of selection in this material for these traits. However, moderate values were obtained for 100-seed weight and seed yield/plant. The values of expected gain (ΔG) and ΔG % reported the possible gain from selection as percent increase in the F_5 over the F_4 are selected. Also, genetic gain was rather higher for number of pods/plant, number of seeds/pod and seed yield/plant. However, low gain was found for maturity date and 100-seed weight.

A-2- F_5 generation:

A-2-a- Breeding methods:

1- The mean squares due to breeding methods were significant for maturity date, yield and its components.

2- The bulk method was considered the best breeding method for seed yield/plant and 100-seed weight and ranked the second for number of seeds/pod, than those pedigree and SPD in this cross.

3- The best lines of seed yield/plant were number 1 (32.31g) no. 8 (29.51 g), no. 3 (28.44 g), no. 7 (28.44 g) and no. 11 (28.25 g) in bulk method and no. 11 (28.58g) and no. 5 (28.20 g) in pedigree method.

A-2-b- selection criteria:

1- Mean squares for selection criteria *i.e.* number of pods/plant, 100-seed weight, number of seeds/pod (indirect selection), and high seed yield/plant (direct selection) were significant.

2- The present investigation expressed the selection for high number of pods/plant was more efficient as indirect selection for seed yield/plant and ranked the second for number of pods/plant, seed index and number of seeds/plant.

With respect to the effect of selection criteria on 100-seed weight, the results revealed that selection for 100-seed weight gave significant heavier seed index followed by selection for high number of pods/plant. However, selection of high no. of seeds/pod gave the lowest one

3- The comparison of selection criteria revealed the efficiency of selecting for number of pods/plant followed by number of seeds/pod and then by heavier seed index in improving mean yield of F_5 lines in this cross and also extracting a higher number of high yielding lines.

B- Second cross (L-86k-73 x H_2L_{20}):

B-1- F_3 and F_4 generation:

1- Significant F_3 mean squares were detected for all the five studied traits indicating wide differences between the F_3 families'

2- All the selected F_3 families significantly surpassed the better parent for number of pods/plant except the families' number.1, 2, 22, 24 and 27.

3- The families' number 3, 4, 5, 17, 26 and 28 exhibited significantly higher number of seeds /pod than the better parent.

4- Regarding 100-seed weight, the two families' number 7 and 30 surpassed significantly the heavier parent. With respect to seed yield/plant all F_3 families' except families' number. 1, 2, 9, 11, 24 and 27 surpassed significantly higher than the best parent (H_2L_{20}).

5- The genetic components of variation showed the high estimates of ΔG and $\Delta G\%$ and G.C.V% for number of pods/plant, number of seeds/pod and seed yield/plant. However, moderate values were detected for maturity date and 100-seed weight. The high heritability values in broad sense were detected for five traits under study.

6- Significant mean squares for F_4 selected families were detected for all studied traits except 100-seed weight.

7- As for number of pods/plant, the range of the selected F_4 families varied from number 39 (57.00) to number 12 (88.67) pods/plant.

8- For seed yield/plant, all selected F_4 families surpassed significantly than the better parent. The range of selected families varied from 33.88 (family no. 7) to 26.21 (family no. 44).

9- In the F_4 families' high heritability values were detected for maturity date, number of seeds/pod, number of pods/plant and seed yield/plant, indicating the effectiveness of selection in these materials for these traits.

B-2- F_5 generation:

B-2-a- Breeding methods:

1- Mean squares due to breeding methods were significant for maturity date, yield and its components.

2- The pedigree method considered the best breeding method for early maturity, high seed yield/plant, number of seeds/pod and 100-seed weight, than those bulk and SPD methods in this cross.

3- The efficiency of breeding methods revealed that pedigree method produced consistently more superior lines compared to the best parent or the average population.

4- The best lines were number 10 (34.09g), no. 4 (33.34 g), no. 3 (33.29 g), no. 1 (33.27 g) and no. 11 (32.19 g) in pedigree method and number 1 (32.90g), no. 4 (32.22 g) and no. 5 (32.36 g) in bulk method.

5- For maturity date, two lines showed significant earlier than average over lines for each of pedigree, bulk and SPD methods.

6- For number of pods/plant the results indicated the SPD method produced more superior lines followed by pedigree and then by bulk compared with the best parent or average over lines with six, one and zero lines, respectively.

7- Regarding to 100-seed weight, the heavier lines were number 8 (13.68) followed by no. 2 (13.62 g) and then by no. 1 (13.51 g) in pedigree method

8- For number of seeds/pod, five lines showed significant higher seed number than the average of all lines or best parent for pedigree breeding method. The line number 1 and 8 in pedigree method gave the highest no. of seeds/pod.

B-2-b- selection criteria:

1- Mean squares due to selection criteria *i.e.* number of pods/plant, 100-seed weight, number of seeds/pod (indirect selection), and high seed yield/plant (direct selection) were significant.

2- Generally, the selection of high number of pods/plant, gave the highest seed yield/plant and the second for number of seeds/ pod and third for seed index.

3- Selection for number of pods/plant and 100-seed weight for three successive generations was successful in improving the mean seed yield in the F_5 lines.

4- The best lines for no. of pods/plant were number 10 followed by no. 2 and no. 1.

5- For number of seeds/pod, five and two lines exhibited significant higher seeds than the best parent and over all

grand mean when selected plants with high seed yield/plant only. None of the lines surpassed the grand mean or the best parent when selected plants with heavier seed index, number of seeds/pod and high number of pods/plant.

6- The comparison between selection criteria revealed the effectiveness of selecting for number of pods/plant in improving mean yield of F_5 lines in this cross and also extracting a higher number of high yielding lines (selection for high number of pods/plant and heavier seed index). It also appeared that indirect selection for yield via number of pods/plant was more efficient than direct effects of selection for yield.

C. Oil and protein percentage:

In the first cross for oil percentage, the line number 5 in pedigree method gave the highest significant value relative to other genotypes. The line number 8 in single pod descent gave the highest value of protein percentage but without superiority than the best parent (H_2L_{20}).

In the second cross the all selected promising lines except number 4 and 11 in bulk method and number 10 in pedigree method gave significant higher oil percentage compared with the best parent. The parent H_2L_{20} had the highest protein percentage and significantly differed when compared with other genotypes, followed by lines number 4 and 2 in bulk and single pod methods, respectively.