THE UNIVERSITY OF ADELAIDE

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MASS SELECTION OF FABABEAN, (*VICIA FABA* L.)

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STATEMENT

This thesis contains no material which has been accepted for the award of degree or diploma in any University and, to the best of my knowledge and belief contains no material previously published or written by another person, except where due reference is made in the text.

SAHABUDDIN ACHMAD

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SUMMARY

1. Field experiments were conducted during 1982 and 1983 to investigate the efficiency of mass selection in fababeans (*Vicia faba* L.). In 1982 a population of 3200 plants of the cultivar Fiord was grown from seed, each of a known weight. The plants were in 40 rows with 80 plants per row. The respective spacing was 12.5 cm and 25 cm which gave a density equivalent to that recommended for the crop. In anticipation that there may be micro-environmental variation in the block the total area of 10m x 10m was considered for selection purposes as consisting of 100 sub-blocks each 1m x 1m. Mass selection was practised by selecting the two highest yielding plants out of the 32 plants in each sub-block. Grain yield per plant and its components the number of pods, seeds per pod and mean seed weight were measured but selection was based only on yield. Open pollinated progenies of the 200 selected plants were grown in 1983. Twenty four seeds from each of these selected plants were grown in a Randomized Block Trial (there were 6 plants per plot and 4 replicates). In addition in each replicate there were 40 control plots sown with seed collected as a bulk from the 1982 trial. Plant density was the same as in 1982.

2. For the population of 3200 plants grown in 1982 it was found that the date of emergence was determined by the seed size sown and seedlings from the small seeds emerged earlier. However larger seeds resulted in higher yielding plants. The date of emergence was not related to yield. Some seed did not germinate and some plants died before maturity or were unproductive and bore no pods. These characteristics were not related to the size of seed sown. It is suggested on a basis of the evidence available that the plants that died did so as a result of an application of simazine.

3. Differences in the mean yields of the sub-blocks demonstrated that environmental effects within the selection block were not random possibly as a result of soil heterogeneity. The variation and its non-randomness indicated the need for mass selection to be based on a subdivided block basis.

4. There were very strong correlations between grain yield per plant and both pod number and seed number per plant. Only small correlations were found between grain yield per plant and seeds per pod or weight per seed. The frequency distributions of these various characters were positively skewed except for seeds per pod which was negatively skewed.

5. When the progenies of the 200 selected plants were grown in 1983, the analyses of variance for all characters revealed significant differences between progenies and non-significant differences between the controls. However as the mean yields of the selection progenies were no greater than the controls and because the regression of selection progenies on their parents was not significant it is concluded that mass selection for yield was not effective. Reasons for this result and for the variation in yields of selected plants are discussed.

6. It was found that mean grain yields were again strongly correlated with both pod number and seed number per plant, but only slightly correlated with weight per seed and seeds per pod. Except for seeds per pod which had a frequency distribution that was negatively skewed, all the other characters were positively skewed.

7. The possible reasons for the lack of success of the mass selection are discussed. If the experiment were repeated it may be worthwhile to base selection on a technique that takes even more account of micro-environmental variation than does square sub-blocks. One such technique could be a moving mean.

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