

INTRODUCTION

The present work on Cajanus cajan was started at St. Augustine in 1956. The aims were to produce dwarf and semi-dwarf, early podding strains with determinate bearing that were easy to pick. It was hoped that strains would be developed that would produce economic yields all the year round (Gooding, 1960).

The work began with the collection of strains from the West Indies, Southern Rhodesia and Ceylon. These strains were self-pollinated to produce the next generation, and only those that proved very susceptible to disease, or were very tall and late podding were discarded. The photoperiodic requirements of the strains were studied and it was concluded that although all the strains were short day, many of them were only weakly photoperiodic. These strains were also assessed as to their heights, time and duration of podding and their yields. It was found that dwarf varieties tended to be low yielding and attempts to improve the yield by crossing with taller, later varieties increased the yield but meant a loss in earliness and dwarf habit, at least in the F_1 .

Exploratory work by Gooding led, in 1963-64, to Johnson making a preliminary study of the cropping behaviour and yield components of three strains derived from crosses and one of the original selections. The yield components which he considered were: pod weight, seed weight, number of mature seeds per pod, number of abortive ovules per pod, and number of pods per tree. Results from this study which was undertaken on only a small number of trees for the four strains, suggested that yield improvement through selection on the basis of yield components may be effective.

One of the conclusions reached by Johnson was the necessity for larger samples from individual plants within a strain and a larger number of strains, in order to obtain accurate measurements of yield components and their interactions. In this study this is accepted and in order to accommodate the large amount of data, it was decided to concentrate on some of the components of yield. The components selected were the number of mature seeds per pod and the number of ovules failing to develop fully per pod, which together make up the pod's full complement of ovules.

The object of this study is to evaluate, in respect of these parameters, strains of pigeon peas which have been developed from the original collection. From this information it should be possible to see the effect that an increasing number of ovules per pod has on the rate of abortion of ovules and therefore on the number of peas per pod within these strains, and within the population as a whole.

If the effect of increasing ovule number is to increase pea number only to a small extent, due to much increased abortion of ovules, then there can be little economic advantage in a selection programme designed to increase the number of ovules per pod. If however the result is a proportional increase in the number of peas per pod, then even if overall yield is not raised, there will be an economic advantage in having the same weight of peas in fewer pods which will accrue from low harvesting costs.

It is difficult and unwise to try to isolate the effect of a few components of yield, from the other components. Nevertheless it is convenient to study a few closely related components in order to discover the relationship that exists between them, the mechanisms which control them, and the effect breeding and selection have on these components. This information may then be used in a wider study of the interaction between all components that make up the yield of a crop.

In considering the ovules which are formed, and the peas which develop from these ovules, the phenomenon of abortion is important. The position of these aborted ovules in the pod may indicate the factors which are responsible for abortion.

In the following investigation the components are measured for the nineteen strains, the degree of correlation between them is ascertained, and the position of abortive ovules in the pods is investigated.