

ABSTRACT**Inheritance and Combining Ability of Pod Quality Traits in Pigeonpea
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Non-adoption of many dwarf short-duration genotypes developed at the University of the West Indies has been attributed to poor consumer acceptance of the product. A consumer survey was conducted in Trinidad and Tobago to investigate the consumer preferences for pod quality traits in pigeonpea. In subsequent experiments, twenty determinate genotypes as well as six elite indeterminate genotypes grown in the Caribbean region were evaluated for pod physical and biochemical quality characteristics in two replicated field experiments at the University Field station. Seeds from each genotype were stored with replications for a period of 15 months and sampled at 0, 3, 10 and 15 months to determine loss of viability and seedling vigour. The mode of inheritance, combining ability and genetic correlation between the pod quality traits were investigated using a 5 x 6 factorial mating design and a 6 x 6 diallel mating design.

Preferences for pod physical characteristics was for longer, wider pods with numerous (> 5) and large seeds per pod. There were significant differences in preferences between consumers from Trinidad and Tobago. Further, preferences for genotypes based on pods and seeds were quite different. Generally the indeterminate genotypes had greater consumer preference than determinate genotypes.

Pod physical as well as biochemical characters were studied to determine the extent of variability in the Caribbean pigeonpea germplasm. Considerable variation was observed for all pod quality characteristics. Even the elite determinate genotypes were inferior in seed size and pod width compared to the indeterminate genotypes. There was a four-fold variation in the rate of loss of

seed viability between genotypes. There was however no correlation between pod physical and biochemical quality traits investigated and rate of loss of viability. Further, loss of viability in pigeonpea seeds was not associated with loss in seedling vigour in pigeonpea.

Analysis of pod quality data from the mating designs showed that pod length, pod width, seeds per pod and phenol content were under the control of additive genetic effects with the non-additive effects generally being not significant for most characteristics. Hundred seed weight was controlled by both additive and non-additive effects, while pod biochemical characteristics *viz.* sugar content, starch content and protein content, were governed by a preponderance of non-additive genetic effects. In addition, protein, starch and sugar contents had moderate to low broad-sense heritability estimates. The strong genetic correlation between pod length, pod width and locule number indicates that these characteristics could be simultaneously improved by selecting for one character. Combining ability analysis indicated the best general and specific combiners /heterotic combinations for the various characteristics to be used as parents in breeding programmes.

Based on the information generated a breeding strategy to improve pod quality characteristics in determinate, short-duration, dwarf varieties is discussed.

Keywords: correlations, heritability, additive, non-additive, genetic analysis.