# ABSTRACT

Selection for Row-Cropping Phenotypes and a Study of Physiological Factors Influencing Flowering and Dry Matter Distribution in Pigeon Pea (*Cajanus cajan* (L.) Millsp.)

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Selection for early, row-cropping pigeon pea plant types beginning with individual $F_3$ plant selections, was successful in producing $F_6$ families with improvements in earliness, dwarfness and with some degree of daylength-insensitivity. These families were determinate and earlier, shorter and more compact than the three commercial cultivars, UW17, UW26 and 'Chaguaramas Pearl', which were used as standards.

The effect of daylength/night-temperature combinations on vegetative and reproductive growth parameters in a number of $F_7$ pigeon pea families and 'Chaguaramas Pearl' was studied with the use of growth chambers. Two photoperiods and two night-temperatures were tested. The results showed that genetic control of vegetative and reproductive growth components was highly influenced by both daylength and night-temperature but moreso by photoperiod. Long days generally stimulated vegetative growth, delayed flowering time and reduced reproductive growth, whereas, short days increased flower production,

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flower abscission and harvest index. As with long days, high night-temperature for the most part increased vegetative growth, delayed flowering time and reduced reproductive growth whereas low night-temperature increased flower production, flower abscission, harvest index and pod and seed yields.

Studies on the effect of increased $CO_2$ concentration subsequent to flowering and on tripped versus untripped flowers indicated that $CO_2$-enrichment produced increases in the overall plant biomass without affecting the allometric relationships within the plant or harvest indices. The results suggest that, in addition to bud and flower abscission, pod abscission at various stages of development also contributes to the inherent low pod production observed in pigeon pea. Total pod number at harvest was greater in plants with manually tripped flowers, and this effect was due to a reduction in pod abscission rather than an increase in pod set for even the plants with untripped flowers had a proportionally large number of pods set.