

MORPHOLOGICAL, PHYSIOLOGICAL AND YIELD TRAITS OF PROMISING PIGEON PEA, (*Cajanus cajan* L.) LINES FOR VARIETAL DEVELOPMENT

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Sri Lankan pulse production is inadequate, leading to reliance on costly imports, particularly lentils. Pigeon pea, *Cajanus cajan* (L.) is a promising alternative due to its high protein content, drought tolerance, and ability to enhance soil fertility through biological nitrogen fixation. However, the limited genetic potential of current varieties has restricted its adoption. This study assessed the morphological, physiological, and yield, traits of seven (07) pigeon pea lines and the recommended variety *Prasada* to identify resilient, high-yielding candidates for varietal development. An open-field experiment was conducted at the Grain Legumes and Oil Crop Research and Development Center, *Angunakolapelessa*, Sri Lanka using a randomized complete block design (RCBD) with three replications. Growth attributes: height, number of branches, flowering and maturity duration and yield attributes: number of pods, seeds, and seed weight were recorded. Data were analyzed using one-way ANOVA and repeated measure ANOVA in SAS software. Breeding line WWPL 21-02 exhibited significantly ($p < 0.05$) higher branching, while WWPL 21-01 recorded significantly greater plant height and stem circumference. Variation in flowering and maturity was observed, with varieties *Prasada* and WWPL 21-01 showing significantly longer flowering periods, while ICPL 7629, ICPL 9739, and WWPL 21-02 matured earlier. Breeding line WWPL 21-01 had a significantly ($p < 0.05$) higher pod count and yield. Both WWPL 21-01 and WWPL 21-02, recorded a significantly highest yield per net plot, indicating their potential for improved productivity. ICPL 7636 exhibited significantly ($p < 0.05$) high seeds per pod, while ICPL 7629 had the highest seed weight. In conclusion, pigeon pea lines WWPL 21-01 and WWPL 21-02 were identified as high-yielding and superior for most evaluated traits. The findings support developing high-yielding pigeon pea varieties to boost pulse production, reduce reliance on imports, and ensure food security in Sri Lanka.

Keywords: Breeding lines, Genetic diversity, Pulse production, Yield potential