

Impact of Inbreeding on Growth and Leaf Anatomical Traits in Selected Elite Traditional Maize (*Zea mays* L.) Accessions of Sri Lanka

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Abstract

Inbred maize lines (*Zea mays* L.) play a crucial role in creating novel hybrids. However, there is a lack of understanding regarding the growth and leaf anatomical traits of the inbred collection derived from elite traditional maize germplasms in Sri Lanka. The objective of this study was to quantitatively estimate the variations in growth and leaf morphological characteristics attributed to inbreeding depression within the selected maize germplasm. Three elite maize accessions, namely SEU2, SEU10, and SEU16 seeds of S1, S2, and S3, were established in the plant-net house facilities in soil media, and the plant response was compared with the variety *cv. Bhadra*, which served as the control. The results of our study indicated that significant variations among the tested maize accessions in terms of traits related to seed germination, growth, and leaf morphology. Our findings showed that the number of days taken to tasseling (56–62 days) and silking (64–68 days), plant height (75–125 cm), number of leaves (17–20), flag leaf width (2.2–3 cm), and length (21–38 cm), as well as stem girth (4.3–4.7 cm), exhibited significant variations. Furthermore, variations were also observed in leaf vein density (17.5–18.8 in 2mm width) and stomatal density (215–232 in 10x10 magnification) among the selected maize accessions. Based on our analysis, plant height, leaf length, and width declined progressively, while stem girth did not vary. Flowering dates increased and had a negative impact. In contrast, leaf stomatal density and leaf vein increased significantly with the inbreeding process compared to the variety *cv. Bhadra*.

Keywords: *Leaf vein density, Maize inbred lines, Stomatal density, Tasseling date*