

The influence of seed production environment on seed development and quality of soybean *glycine max L. Merrill*

ABSTRACT

The aim of the study was to determine the effect of seed production environment in Sri Lanka on seed development, maturation, and subsequent seed quality. The experiment was conducted at six production environments, three locations (Mahalluppalama (M1), Polonnaruwa (POL), and Aluttarama (ALU), over two planting cycles (P1, P2). Seed development and maturation, seed and seedling quality characteristics were evaluated at five reproductive (R6, R7, R8, R8 + 5 and R8 + 10) maturity stages. The study infers that production environment at the late reproductive (LR) stage (R6–R8) was critical in determining the seed quality. If the LR stage coincided with cumulative rainfall (RF) over 100 mm or above 75% relative humidity (RH), categorized as wet environment, around 27.5 days was required for the completion of seed maturation compared with only 17.5 days in dry environment. Seed lots from dry environment during LR stage surpassed the minimum quality standards (75% final germination, germination index of 300, germination rate index of 25% per day, seedling vigor index of 2500 and 15 $\mu\text{mol}/\text{min}/\text{mg}$ FW catalase activity) at maturity stage R7 onwards, while this only occurred at maturity stage R8 for wet environment. A significant negative correlation ($r = -0.50^{**}$) was observed between glucose content, antioxidant enzyme activities and germination percentage. In conclusion, the findings provide useful information for the expansion of areas for seed production in Sri Lanka.

Keyword: Soybean; Harvest maturity stages; Seed quality; Habitat; Soluble sugar; Antioxidant enzyme