Simulation-based Assessment of Maize Sowing Windows under Current and Future Climate Conditions in the Dry Zone of Sri Lanka

H. Uduwawala*, and B.A.I.S.L. Bandara
Department of Plant Sciences, Faculty of Agriculture, Rajarata University of Sri Lanka, Sri Lanka
*hashanuduwawala@gmail.com

Maize production in the dry zone of Sri Lanka is increasingly vulnerable to climate change, requiring adaptive strategies such as optimising sowing dates. This study assessed the impact of different sowing dates on maize (*Zea mays* L.) yield and phenology under current and future climate scenarios. Five sowing dates representing early and late planting periods were selected based on Department of Agriculture recommendations. The APSIM maize model for the Pacific variety, previously calibrated and validated, was used to simulate crop performance. 30 years of historical weather data from *Mahailupallama* meteorological station represented current dry zone conditions, while future climate projections under RCP 8.5 scenario for mid-century (2050) and late-century (2100) were taken from the latest IPCC report. Soil parameters were obtained from published literature, and simulations were conducted for both *Maha* and *Yala* seasons. Results indicated differential responses of sowing dates to climate conditions. In the *Maha* season, early sowing on 30th September produced the highest yield of 5066.65 kg ha^{-1} under the present climate, while yields declined across all sowing dates under projected 2050 and 2100 climates to 4463.49 and 4735.68 kg ha^{-1}, respectively. Conversely, the *Yala* season demonstrated greater resilience and higher productivity with early sowing on 30th March producing an optimized yield of 6555.80 kg ha^{-1} under present conditions. Yields were similar or higher under future scenarios, reaching 6659.94 kg ha^{-1} in 2050 and 7057.68 kg ha^{-1} in 2100. Days to flowering remained relatively consistent at 26 to 31 days, with slight reductions under warmer 2050 conditions These projections may vary with soil quality, management practices, and new varietal improvements. However, the findings suggest that shifting maize cultivation to the *Yala* season and adjusting sowing dates to seasonal climate are viable strategies for maintaining productivity in the dry zone of Sri Lanka under future climate uncertainty.

Keywords: Climate change simulation, Dry zone Sri Lanka, Maize production, Sowing window optimization