

CLIMATE-SMART CROP MODELLING FOR RICE PRODUCTION IN SRI LANKA

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Rice, a vital staple food for billions globally, faces a significant threat from climate change, impacting both crop productivity and quality. This study was conducted to predict the yield and growth changes of the six most popular rice varieties (Bg300, Bg352, At362, Bg360, Bg94-1, Bg366). Field experiments were conducted in the Rice Research and Development Institute (RRDI), *Bathalagoda* during the 2023/24 *Maha* season. This research aimed to predict future rice yields compared to projected weather conditions for the selected rice varieties. Two experiments were established with broadcasting and transplanting using a Randomized Completely Block Design with three replicates. Predictions for six rice varieties were done using a decision support system for agrotechnology transfer (DSSAT-v.4.7.5). Crop management practices, schedules, crop growth, and development data including yield, were collected from the field experiments. Soil parameters were collected from seasonal soil analysis and climate data were collected from the daily meteorological records of the RRDI. “Weatherman” and “SBuild” functions were used to incorporate weather and soil data consecutively, establishing a new weather station and a soil class in the DSSAT for RRDI. The “Experimental-Data” function was utilized to add yield and yield components. Finally, the “XBuild” function was used for incorporating crop management data and developing simulation options. The performance of the six different varieties under two establishment methods was simulated for thirty years, considering the average period for a newly improved variety to be categorized as the most popular. Field experiment data, analysed using SAS software, reveal At362 and Bg366 as the top-yielding rice varieties. According to the simulated results obtained from the DSSAT software, our study forecasts a decline in rice yield across all varieties within the next thirty years under the RCP 8.5 climate change scenario. The results show that the increasing temperature and rainfall affect the yield of paddy plants. The outcomes of this study provide valuable insights into improving rice production and ensuring food security and optimized crop management supported by DSSAT simulations.

Keywords: Climate change, Daily weather data, Decision making