

## Modelling the Impact of Changes in Rainfall Distribution on the Irrigation Water Requirement and Yield of Short and Medium Duration Rice Varieties Using APSIM During Maha Season in the Dry Zone of Sri Lanka

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**ABSTRACT:** Rice (*Oryza sativa* L.) production in Sri Lanka is heavily dependent on the rainfall distribution pattern of the cultivating season. Estimation of the variation in yield and resource use efficiency of commonly grown rice varieties will be of immense importance when predicting yields under variable and changing climate. In this context, a modeling approach was used to predict the yield and water productivity of commonly grown short and medium-duration rice varieties under different climate scenarios using APSIM-Oryza module, which was previously parameterised and tested with a strong model skill. Mahalluppallama (DL<sub>1B</sub>) and Thabbowa (DL<sub>3</sub>) in the Dry zone of Sri Lanka were selected as the study areas. Daily rainfall data for the past 35 years (1976-2011) were analysed and the normal onset time period of Maha rains was identified in terms of a two-week period for each year, separately. The onset of rain before and after the identified weeks was considered as an early or late onset, respectively. Yield of rice varieties Bg300 (short duration; 3 months age class) and Bg359 (medium duration; 3.5 months age class) was simulated under the rainfed condition. The yield of rice varieties BG300 and Bg359 and the irrigation water requirement were simulated under two scenarios namely, (1) Normal Rainfall Distribution (NRD), and (2) Intense Rainfall Distribution (IRD). The results revealed that the amount of rainfall received during the Maha season was higher when an early onset occurred (63 % to 94 %) than that observed with a late onset. Rainy season ceased by late February at both locations irrespective of the time of onset of rainfall. The simulated yield of Bg359 under the two scenarios tested (i.e. NRD and IRD) were similar. However, delayed onset would increase the irrigation water requirement by 10 -17 %. Furthermore, a yield advantage of 14 -51% under IRD was observed only during an early onset compared to the NRD. The results also revealed that under the IRD condition, the variability of rice yield of Bg300 was lesser irrespective of the onset compared to that of Bg359 indicating that a climate forecast for IRD during the Maha season would assist farmers to opt for short duration rice varieties compared to medium duration varieties due to lower estimated yield losses in the former.

**Keywords:** APSIM, onset of rainfall, intense rainfall distribution, rainfall regime

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