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Seasonal stability analysis of selected advanced rice breeding lines developed at Regional Rice Research and Development Center (RRRDC), Bombuwela in Sri Lanka

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Abstract

This study was focused to study the adaptability and stability of four newly developed rice lines i.e., Bw19-1410, Bw19-1458, Bw19-1468 and Bw19-1377 in RRRDC, Bombuwela with four recommended popular rice varieties i.e., Bg 359, At 362 and Bw 367 across *Yala* 2021, *Maha* 2021/2022 and *Yala* 2022 cropping seasons. AMMI and Biplot analysis of PB Tool 1.4 software showed the genetic and environment (GE) interaction for the grain yield. Based on the AMMI model, Bw 19-1468 is the most adaptable to all seasons which the mean closer to the grand mean (3.12 t/ha) and the PCA scores nearly zero. Further, Won where biplot graph give us which genotypes are doing well in which environments. Bw 19-1377 had given higher yield than At 362 in *Yala* 2021 but At 362 has given more yield than Bw 19-1458 in *Yala 2022*. As well as Bw 19-1377 has given more yield in *Yala* 2021 and *Maha* 2021/22 than Bw 19-1410 grown in same seasons. Although such an ideal genotype may not exist in reality, we consider genotype is more desirable if it is closer to the ideal genotype. Therefore, At 362 which fell into the center of the concentric circles, were most favorable genotypes in terms of higher yield ability and stability, compared with the rest of the genotypes. The performance of Bw 19-1377 was the most variable (least stable), whereas Bw 367 and At 362 were highly stable with high grain yield. The GGE biplot way of measuring representativeness is to define an average environment and use it as a reference or benchmark. The average environment is indicated by small circle of the figure. Therefore, *Maha* 2021/22 was the most desirable test environment followed by *Yala* 2021 and *Yala* 2022. Considering all facts that, AMMI and GGE biplot analysis is an effective tool for Gene by Environment data analysis to achieve understandings about the target environment, the test environments, and the genotypes stability analysis. According to the analysis, At 362 is the most stable over seasons and *Maha* 2021/22 was the most desirable environment for these lines/varieties.

Key Words: Adaptability**,** Rice, Stability, Yield

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