

Evaluation of Root and Shoots Performance of F3 Progeny Lines of Four- Rice Crosses Under Iron Toxicity Conditions

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Abstract

Iron toxicity plays a crucial role in determining rice yield, particularly in the wet zone (WZ) of Sri Lanka. This scenario causes a substantial impact on above-ground biomass, limits grain yield, and leads to poor root growth of rice. Therefore, identifying iron toxicity-resistant varieties is essential for sustaining rice production. The objectives of this research were to determine the F3 progeny lines derived from four rice crosses. To evaluate the root and shoot performance of F3 progeny lines derived from four rice crosses under iron toxicity conditions to identify variations in root morphology and growth patterns. Four rice crosses and their parents were tested in Randomized Complete Block Design (RCBD) with 02 blocks. Data were analysis, using ANOVA and Duncan multiple range test was derived from SAS statistical software. Cross 2 showed better performance for plant height (127.95cm) and culm height (100.33), flag leaf length (30.71cm) and width (1.1cm) , number of tillers (8.88/plant), number of effective tillers (7.09/plant), Number of unproductive tillers (0.83), root volume (72.73cm³), root length (22.90cm), root width (6.55cm), number of roots (115.4/plant), root dry weight (24.76g/plant), panicle length (23.49cm), number (7.09), weight (7.10g/panicle), seeds (124.92) showed better mean performance. All the crosses recorded positive heterosis and heterobeltiosis for important yield related characteristics and morphological characteristics. Among the four crosses, cross 2 and cross 3 showed better growth and yield performance when compared with their respective parental lines. Therefore Ld20-14-12/Ld20-15-14 and Ld20-11-03/Ld21-06-18-12 have the potential to develop rice lines with better root structure in the future rice breeding programs.

Keywords: F3 progeny, Heterosis, Iron toxicity