

Improvement of Seed Quality of Six Traditional Rice Varieties of Sri Lanka through Seed Priming and Evaluation of Best Storage Method and Effect of Seed Priming on Microbial Activity

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Currently demand for traditional rice varieties has increased. However, poor germination and storability is a major problem in cultivating traditional rice varieties. Thus, the study was conducted to determine treatments to enhance seed quality and storability of six traditional rice varieties from Sri Lanka; Batapolael, Suwendal, Kaluheenati, Kuruluthuda, Maawee and Madathawalu. Seed priming was tested using distilled water and three neem seed extract concentrations (100, 50 and 25 %) for 24, 48, and 72 hours. Primed seeds were dried at ambient laboratory conditions until initial weight was achieved. Prior to germination, all seeds were soaked in water for 0, 24, 48, and 72 hours. Germination of primed and unprimed seeds was tested at ambient temperature (~27 °C) and light conditions using AOSA-paper towel method. Seed vigour was evaluated using seedling emergence (SE) in an uncontrolled glasshouse condition. Effect of seed priming on microbial activity was determined by testing microbial contamination of seeds before and after neem priming. Best storage method (package material [gunny, plastic and polythene bags] and temperature [27, 25 and 8 °C]) were determined to stored seeds of Batapolael and Suwendal for 2, 4 and 6 months. Seed quality was evaluated using seed germination and vigour (conductivity test) after the storage. Four to three replicates of 100 seeds were used in each treatment. Data were arcsine transformed and analyzed using one-way ANOVA. Germination percentages of unprimed Suwendal, Batapolael, Kaluheenati, Kuruluthuda, Maawee and Madathawalu seeds were 89, 91, 62, 32, 24, and 20%, respectively, while the SE were 76, 79, 65, 10, 12 and 40%, respectively. Hydro-priming for 72 hours has improved the seed germination (98%) and the SE (>94%) of Suwendal and Batapolael. Fifty percent neem priming (NP) for 24+24 hours presoaking has significantly improved seed germination (83%) and SE (83%) of Kaluheenati, while 25% NP for 72+24 hours presoaking has improved seed germination (64%) and SE (25%) of Kuruluthuda. Furthermore, 25% NP for 48+48 hours presoaking was effective in improving seed germination (49%) and SE (30%) of Maawee, whereas 100% NP for 72+48 hours pre-soaking was needed to improve the seed germination (55%) and SE (53%) of Madathawalu. Batapolael and Suwendal seeds stored in polythene bags at 8 °C for 6 months germinated to higher percentages (91 and 89%, respectively) than those stored under other methods ($P < 0.001$). Microbial experiments revealed the antifungal and antibacterial activity of neem extract by reduction of microbial contamination of seeds after NP. NP improved the seed quality of Kaluheenati, Kuruluthuda, Maawee and Madathawalu. Hydro-priming for 72 hours could be recommended to improve the seed quality of Batapolael and Suwendal varieties while, storage in polythene bags at 8 °C could be recommended to store them.

Keywords: Germination, Hydro-Priming, Neem Priming, Storage, Vigour

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