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Submergence tolerance of some *Heenati* type traditional rice accessions and modern rice varieties at the seedling stage

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Abstract

Among natural disasters, floods cause a 39% annual rice yield loss in Sri Lanka. The development of submergence tolerant rice cultivars using locally adapted rice accessions is the best solution to utilize the flood-prone lowlands of Sri Lanka. In the present study, sixteen modern rice cultivars and sixteen traditional rice accessions were screened at the seedling stage to evaluate their level of submergence tolerance. The traditional rice accessions used in the study belonged to *Heenati*, *Suduheenati*, *Rathuheenati*, and *Kaluheenati* groups. *Swarna Sub 1* cultivar was used as the standard check variety. Two weeks old seedlings were separately subjected to complete submergence stress for a continuous 9-day period and 14-day followed by two-week recovery in a randomized complete block design (RCBD). The survival rate of the submerged seedlings and the mode of seedling elongation during the submergence compared to the control plants. *Heenati-3707*, *Kaluheenati-4991*, and *Rathuheenati-4992* from the traditional rice accessions and *At-354*, and *Ld-371* from the modern rice cultivars scored 100% survival rates along with the standard positive control, *Swarna Sub-1* at 9-day submergence stress. *Swarna sub-1* had a 100% survival rate after 14 days of submergence, while *Heenati-4935*, *Kaluheenati-4621*, and *Kaluheenati-4991* had survival rates of 75%, 71%, and 60%, respectively. Traditional rice accessions scored more than 50% of survival rates. In modern rice cultivars, *Bw-400*, *At-405*, *Ld-371*, *At-354*, and *Bw-372* scored survival rates of 83.33%, 71%, 66.67%, 50%, and 50% respectively. Modern cultivars also secured more than 50% of survival rates. According to IRRI standard submergence scoring criteria, traditional rice accession *Heenati-4935* (75%) is moderately submergence tolerant, and *Kaluheenati* accessions (*4621*, *4991*) are moderately submergence susceptible. Among modern rice cultivars, *Bw-400* is moderately tolerant and *At-405*, *Ld-371*, *At-354*, and *Bw-372* accessions are moderately susceptible to submergence stress. Data analysis revealed the absence of a significant correlation between tolerant or susceptible rice cultivars and height gain or reduction under the submergence stress at 9-day or 14-day stresses of the studied rice accessions/cultivars. This emphasizes the functioning of diverse survival mechanisms in different rice accessions/cultivars under submergence stress. The identified moderately tolerant and moderately susceptible rice accessions/cultivars can be further studied at the field conditions for future breeding purposes.

Keywords: *Heenati* rice, Modern rice, Submergence tolerance

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