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## Evaluation of Submergence Tolerance Characteristics on Nepalese Rice

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### Abstract

Flash flood is one of the major yield limiting factors in rice growing areas specially the South Asia. Use of the Sub1A gene in rice breeding enhances the tolerance for this abiotic stress in rice production. However, the identification of the new flash flood tolerant rice genes and their use in regular breeding programme is very important to enhance the efficiency of rice varietal development for incoming climate change hazards. Ninety five rice lines including Nepalese rice landraces, modern varieties and breeding lines were used in this study to evaluate submergence tolerance characteristics. Sambha Masuli Sub<sup>-1</sup> was used as resistance check while IR64 was used as susceptible check. The 14 days old seedlings were submerged in the water tank for another 14 days. The survivability was scored 7 days after de-submergence. Highest survival was observed in Sambha Masuli Sub<sup>-1</sup> (93.73 %), Radha-4 (89.87 %) and Sugapankhi (88.29 %). Rice landrace Sugapankhi showed good survival and regeneration ability but lacks Sub1A<sup>-1</sup> allele while screening using molecular markers. Increase on plant height during submergence showed the lowest survival and regeneration rate ( $r=-0.61171$ ,  $p = 0.000$ ,  $N=97$ ). Similarly, the SPAD value during submergence showed the positive correlation ( $r=0.429$ ,  $p = 0.000$ ,  $N=97$ ) with survivability. However, average leaf area just before submergence showed negative relationship ( $r=-0.3929$ ,  $p = 0.005$ ,  $N=97$ ) with it. No any accessions showed tillering during submergence, however, accessions with high tillering habit on normal condition showed high survival percentage during submerged condition ( $r=0.327992$ ,  $p = 0.02$ ,  $N=97$ ). Based on this study, we concluded that Sub1A<sup>-1</sup> allelic form is not the only one to confirm the tolerance.

**Keywords:** Leaf area, rice, SPAD, Sub1A<sup>-1</sup>, submergence