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Acclimative responses of shoots in some lowland rice (*Oryza sativa* L.) varieties to complete submergence

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Flooding is a serious naturally occurring disaster for rice in many regions of the world. Tolerance to submergence stress is an important breeding objective in areas where rice cultivars are subject to complete inundation for a week or more. Submergence tolerance is controlled by a single major quantitative trait locus (QTL) named submergence-1 (*Sub1*) locus, on chromosome 9. The present study was conducted to determine acclimative shoot responses to complete submergence, in *Sub1* containing mega varieties, and few local varieties, under greenhouse conditions. Completely randomized design was followed as the experimental design. Fourteen days old seedlings of Swarna-*Sub1*, IR64-*Sub1*, IRRI 119, and Samba Mashuri-*Sub1* which are submergence tolerant enhanced mega varieties, a known tolerant traditional local variety (Goda Heenati) and intolerant local varieties (Bg 360, Bg 94-1 and Bw 363) with 15 replicates were submerged for 14 days in 60 cm deep tank. De-submerged plants were then allowed to recover for 14 days. Complete length of the longest leaf was recorded and survivability, in terms of development of new leaves was scored during submergence and de-submergence. During submergence the longest leaf length increased at a rate of 0.7-1.0 cm day^{-1} in intolerant varieties and leaves became chlorotic whereas in submergence tolerant varieties and Goda Heenati showed an elongation rate of 0.02 - 0.09 cm day^{-1} with green leaves. Thus, susceptible genotypes displayed significantly greater elongation of leaves than Swarna-*Sub1*, IR64-*Sub1*, IRRI 119, Samba Mashuri-*Sub1 and* Goda Heenati during submergence. There were no significant differences ($p>0.05$) of the leaf length of the tolerant varieties between submergence and normal conditions whereas susceptible plants indicated a significant difference. During 14 day de-submergence (recovery) period all submergence susceptible genotypes had turned brown and died while all submergence tolerant varieties including Goda Heenati showed 100 % survivability with new shoot development & elongation of existing shoots. According to the results obtained, submergence tolerant and intolerant varieties can be clearly distinguished by using shoot related responses following submergence and de-submergence.

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