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## Relationship between Shoot Elongation and Dry Matter Weight During Submergence in *Oryza sativa* L. and *O. glaberrima* Steud. Rice Cultivars

[Naoyoshi Kawano](#)<sup>1)</sup>, [Osamu Ito](#)<sup>1)</sup> and [Jun-Ichi Sakagami](#)<sup>1)</sup>

1) Japan International Research Center for Agricultural Sciences

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**Abstract:** Rice plants are damaged by flash floods with a rapid increase in water level caused by a heavy rain. However, rice plants cope with the flash floods either by an “escape strategy” involving rapid shoot elongation or by a “quiescence strategy” involving surviving under water with minimal activity. As we found in previous experiments, Saligbeli cultivar adapted well to flash floods through rapid shoot elongation. To understand the vigorous growth process during submergence, we studied the relationship between shoot elongation and changes in dry matter weight (DMW) during submergence. *O. glaberrima* Steud. cv. Saligbeli and *O. sativa* L. cv. Ballawé and IR 49830-7-1-2-2 were used. Saligbeli and Ballawé exhibit shoot elongation, and IR 49830-7-1-2-2 exhibits flash-flood tolerance due to the presence of the *Sub-1* gene. Twelve-day-old seedlings were submerged for 7 days and the plant length and DMW were measured. The plant length ratio of submerged to control plants in Saligbeli was higher than that of other cultivars during 2-6 days of submergence but IR 49830-7-1-2-2 shoot elongation was inhibited by submergence. In all three cultivars, the elongation of the developing leaf sheath conferred shoot elongation during submergence. The plant length of all submerged plants showed a strong positive correlation with DMW of the leaves developed during submergence. Submerged Saligbeli and Ballawé showed strong negative correlations between DMW of the leaves developed before and during submergence ( $r = -0.786$  for Saligbeli and  $-0.772$  for Ballawé,  $P < 0.05$ ), suggesting that the enhancement of shoot elongation during submergence is accomplished by using dry matter of the leaves developed before submergence. However, the correlation was not observed in the submerged IR 49830-7-1-2-2. Further details from studies using isotopes are also needed to understand the plant

growth during submergence.

**Keywords:** [African rice](#), [Flash floods](#), [Flood tolerance](#), [Oryza glaberrima](#), [Oryza sativa](#), [Shoot elongation](#), [Sub-1](#), [Submergence](#)

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