

Effects of Soil Silicon Enrichment on the Growth and Dry Matter Partitioning in Rice (*Oryza sativa* L.)

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Although Silicon (Si) is not an essential element for plant growth, Si enhances stress tolerance, strengthens cell walls, and promotes plant growth; however, its bioavailable forms in soil are often limited. The study investigated the effects of soil Si enrichment on growth, root anatomy, and dry matter partitioning of rice. The experiment was conducted in a glasshouse at the University of Peradeniya as a pot experiment, using the drought-tolerant rice variety BG250, to evaluate its response under different levels of water supply. The soil used in the experiment belonged to Low Humic Gley. A completely randomized design with two treatments and 20 replications was adopted, including treatments as Si applied and not applied. As reported in the literature, a basal application of powdered silicic acid at 3 g kg⁻¹ was incorporated into the soil for the experiment. A month after transplanting, plants were harvested. The variables, namely, stomatal density, specific leaf area (SLA), root dry weight, root length, root average diameter, shoot dry weight, and plant height, were quantified. Si fertilization significantly improved shoot dry weight by 45% compared to the non-fertilized control. Increased dry matter accumulation in shoots relative to roots indicated significantly improved biomass allocation of 62%, which was attributed to strengthened cell walls and better nutrient uptake. However, no significant differences were observed in root biomass, average root diameter, SLA, or stomatal density. Si-treated plants also showed a significant increase in height of 28%, indicating enhanced plant vigor during the vegetative phase. These results demonstrate how Si may improve biomass partitioning and rice growth. To evaluate the long-term effects of Si under natural circumstances, field trials may be necessary. Moreover, future studies must address how other nutrients interact with Si to enhance grain quality and yield.

Keywords: Dry matter accumulation, Rice, Shoot dry weight, Specific leaf area