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Silicon requirement for growth and yield of *indica* rice (*Oryza sativa*. cv 'Bw 367')

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Abstract

It has been estimated that a 50% increase in the major food crop yields, including rice, is needed to feed the projected population by 2050. In this regard, Silicon fertilization, has been identified as an effective approach to increase the growth and yield of rice. Continuous cultivation of high-yielding rice genotypes removes silicon from the soil. Therefore, soil available silicon must be replenished to ensure sustainable production. As a scanty of information is available on the silicon requirement of the *indica* rice, a pot experiment was carried out to identify the silicon requirement of an *indica* rice using Bw 367, a high yielding, silicon responsive, and popular genotype. Each experimental unit contained four uniformly grown seedlings. The experiment was arranged in RCBD with three replicates. Silicon was applied to the soil at the rates of 0, 50, 75, 100, 125, and 150 kg SiO₂/ha as a basal dressing. At harvesting, plant height (PH), shoot dry weight (SDW) and yield attributes such as number of tillers per plant (TP), total number of grains per panicle (TG), total number of filled grains per panicle (TFG), total unfilled grains per panicle (TUG), 1000-grain weight (TGW) and grain yield (GY) were recorded. Data were analyzed using SAS. Both PH and SDW were significantly increased with added silicon, and a 52% increment in SDW was observed at 100 kg SiO₂/ha rate, while TP and TGW were not significantly affected by silicon. The TFG was increased with the application of Si at 100 kg SiO₂/ha over the control by about 51%. With the application rate of 100 kg SiO₂/ha, a 30% reduction in TUG was found, which was statistically equal to 125 kg SiO₂/ha. Plants fertilized with 100 kg SiO₂/ha produced the highest TG (392 grains). According to the quadratic function, the optimum grain yield was found at a rate of 115 kg SiO₂/ha. It could be concluded that addition of silicon improved the growth and yield of rice. Basal application at the rate of 115 kg SiO₂/ha was identified as the best rate to achieve the optimum yield.

Keywords: Optimum yield, Silicon rates, Silicon uptake, Yield attributes

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