

Effect of root application of soluble silicon on white rust disease in *Alternanthera sessilis* ('Mukunuwenna') leaves

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Soluble silicon (Si) is reported to elicit resistance against fungal pathogens in many plants. Si can get accumulated beneath the cuticle to form cuticle-Si double layer interfering the pathogen penetration and also could induce defense responses similar to systemic acquired resistance by producing antifungal compounds. Generally, plants can be categorized as high Si accumulators (> 1% tissue dry weight), intermediate accumulators (0.5-1%) and excluders (<0.5%). This study investigated the effectiveness of soluble Si in controlling white rust disease caused by *Albugo* sp. In the leafy vegetable *Alternanthera sessilis* ('Mukunuwenna') and the mechanisms underlying Si-induced disease resistance. *A. sessilis*, cultivar 'Piliyandala' was grown in bags containing sand: top soil: compost 1: 2: 2 ratio as the medium. Si concentrations, 50 ppm and 100 ppm, as potassium silicate (K_2SiO_3) were applied to the growth medium. For positive controls, potassium (K) fertilizer was added to compensate the effect of K as K_2SiO_3 in 100 ppm and 50 ppm treatments. Media without added Si served as negative controls. Si was applied on the day of planting and until harvest at two week intervals. Each treatment contained 10 replicate bags arranged in randomized complete block design. Four weeks after planting, aerial parts were harvested. The trials were continued up to the 2nd and 3rd harvests. White rust severity (% leaf area diseased) was rated weekly. Harvested parts of 100 ppm, 50 ppm and negative control treatments were analysed for total Si content through colorimetry. Antifungal activity was assayed with *Cladosporium* bioassay for leaf extracts. Deposition of Si in leaf tissues was observed microscopically after staining with silver-amine chromate. Si treatment did not have a significant effect ($P > 0.05$) on the severity of white rust disease of *A. Sessilis*, cultivar 'Piliyandala'. However, Si-amended plants showed significantly higher ($p < 0.05$) total Si versus negative controls. Neither Si deposition sites nor antifungal activity was observed in any of the treatments. *A. sessilis* can be categorized as a 'Si excluder' considering Si levels in leaves (0.261%-0.337%). Ineffectiveness of soluble Si to control white rust may be due to the plant's failure, it being a 'Si excluder', to elicit disease resistance.