The effect of calcium silicate as foliar application on aerobic rice blast disease development.

ABSTRACT

The bio-efficacy of calcium silicate as foliar application in enhancing physical barrier mechanism against Pyricularia oryzae in aerobic rice was investigated. A blast-partially resistant cultivar, MR219–4 and a resistant cultivar MARDI Aerob 1 were cultivated under aerobic conditions with foliar application of calcium silicate at 3, 6 and 9 mg/L. Foliar application of calcium silicate at 9 mg/L indicated the highest rice blast disease reduction for both cultivars, MR219–4 (89.21%) and MARDI Aerob 1 (97.87%). Scanning Electron Microscope (SEM) with energy dispersive X-ray (EDX) demonstrated that MARDI Aerob 1 has uniform distribution on the dumbbell shape of silica bodies in leaf epidermis compared with MR219–4 where there was a fractured on the dumbbell shape with non-uniform distribution of silica dumbbell bodies. Besides, MARDI Aerob 1 has significantly higher Silicon (Si) weight (34.49%) compared with MR219–4 (18.29%). Both rice cultivars exhibited significant increases in Si deposition for plant treated with calcium silicate through foliar application, especially when P. oryzae was inoculated. The Si content in rice leaf shown a consistence result with the Si distribution. However, the lignin content in Si-treated rice plant was significantly increased only with P. oryzae inoculation. MARDI Aerob 1 demonstrated higher lignin content (0.74%) compared with MR219–4 (0.60%) for Si-treated and P. oryzae inoculated treatment. This study revealed that foliar application of calcium silicate at 9 mg/L enhanced the resistance of aerobic rice against P. oryzae infection through accumulation and fortification of Si in the epidermal cell wall and increased lignin content in the leaf.

Keyword : Calcium silicate; Foliar application; Rice blast disease; Pyricularia oryzae; Aerobic rice.