

Foliar application of potassium silicate reduces the intensity of soybean rust

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Abstract

This study aimed to determine if potassium silicate (KSi) sprays could reduce the intensity of soybean rust. In the field experiment 1, soybean plants were sprayed with KSi (pH 10.5) at rates of 8, 20, 40 and 60 g/L. In the field experiment 2, with the same treatments, the pH of the KSi solutions was 5.5. In experiment 3, the treatments were KSi (40 g/L, pH 10.5), potassium hydroxide (KOH) (6.5 g/L, pH 10.5), epoxiconazole + pyraclostrobin, and control. In experiment 4, the treatments were the same as in experiment 3, but the pH of the KSi and KOH solutions was adjusted to 5.5. Plants sprayed with water served as a control treatment for all field experiments. Plants were artificially inoculated with *Phakopsora pachyrhizi* before the application of products. Even though there was no relationship between silicon (Si) concentration in leaf tissue and KSi rates, Si concentration increased by 67% and 73% respectively above the control, when averaged across all KSi rates for experiments 1 and 2. The relationship between the severity of soybean rust and KSi rates at pH 10.5 and 5.5 was, respectively, linear and quadratic. Soybean rust severity at the highest KSi rate (pH 5.5) was 70% less than the control. In experiments 3 and 4, the highest disease severity was observed on the control treatment which differed from other treatments. The application of KSi at pH of 10.5 (Exp. 3) and 5.5 (Exp. 4) decreased soybean rust severity by 36% and 43%, respectively, over the control. No significant difference in disease severity was found between KSi and KOH treatments, but they were significantly different, regardless of pH used, from the epoxiconazole + pyraclostrobin treatment. In greenhouse experiments, Si concentration in leaf tissue was higher with the application of KSi, regardless of the pH of the solutions, as compared with water spray. Soybean rust severity and the number of pustules were higher on leaves of plants sprayed with water, as well as on those sprayed with phosphoric acid + NaOH, and phosphoric acid + KOH, when compared with the application of KSi. There was no difference between the KSi and KOH treatments, regardless of the pH, and epoxiconazole + pyraclostrobin sprays for disease severity and number of pustules. This is the first study where field and greenhouse experiments have demonstrated a reduction of soybean rust intensity with foliar application of KSi. This information may be valuable in areas where soybean is grown as a monoculture, and where high yielding but susceptible cultivars cannot be grown because of the occurrence of frequent severe epidemics.

Key words: *Glycine max*, *Phakopsora pachyrhizi*, Potassium salts, Silicon