

Progress Report

Potassium Silicate Enhances Resistance of Floriculture Crops to Insect Attack

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Report Date: March 1, 2007 (2006-07 Midterm Report)
Funded by the Joseph H. Hill Memorial Foundation, Inc.
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Thrips and aphids are both key economic pests in rose greenhouses and nurseries. There is overwhelming scientific evidence that silicon is a beneficial plant nutrient. Increasing the plant silicon level may enhance plant growth, quality and yield. Moreover it can increase plant resistance to abiotic stress, diseases and insect pests. Our study hypothesis that silicon has the potential to afford protection to rose plants from thrips and aphids will be tested. If this is proven correct, the use of silicon will be even more beneficial than it is considered now, since it may reduce pesticide applications while enhancing plant quality. This experiment is in progress in one of my greenhouses on the Davis campus. We were late in getting this started, so there are no results to report at this time. I have outlined what the experiment looks like. We will submit a report when data collection is sufficient for us to analyze.

This greenhouse experiment is underway using rose plants (*Rosa hybrida*, 'Freedom'). Plants have been planted in a 434 ft² greenhouse in hydroponic buckets (n=120, 4 plants per bucket). A supplemental lighting (780,000 lumens) has been added with metal halide and high-pressure sodium lamps. Greenhouse conditions are being recorded every 5 minutes using a HOBO[®] data logger. Three irrigation treatments are in the process of being tested: (I) nutrient solution only – containing all essential elements for rose production, (II) nutrient solution with an additional 100 ppm potassium silicate (Pro-

Tekt[®]), and (III) nutrient solution with additional 500 ppm (Pro-Tekt[®]). If needed, the pH will be adjusted to 5.8-6.0 value using phosphoric acid. Nutrient solutions and potassium silicate are being applied at each irrigation using 3 'SMITH' liquid fertilizer injectors. In a separate set of experiments, we have established a potassium only control, to rule out the possible influence of potassium on thrips and aphids. Treatments have been assembled in a completely randomized design with plants irrigated equally (rates and volumes) as needed. To keep non-target pest populations (such as whiteflies, spider mites, and fungus gnats) under control, biological control agents (*Encarsia formosa*, *Eretmocerus californicus*, *Phytoseiulus persimilis*, *Amblyseius californicus* and *Steinernema feltiae*) will be released regularly. Since these plants have just been established, no pests have been released onto them yet. The plan is that every 3 months (over a two year period) the plants will be infested with 3 'Western flower thrips' (WFT) and 3 green peach aphids (GPA) per plant. A month later, the population sizes will be assessed (i.e., the number of WFT per flower, and number of GPA per stem will be counted). Leaf samples from each plant will be taken, and laboratory methods will be used to determine the accumulated amount of silicon and potassium in the treated and control plants. In addition, choice and no-choice laboratory experiments will be conducted in order to test the silicon uptake effect (at different levels) on pest preferences and the number of eggs laid.