Special Research Report # 450: Post Production

Supplementing Nutrition with Calcium and Potassium Silicate to Manage *Botrytis cinerea* on Poinsettia

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Background

The Botrytis Blight, caused by *Botrytis cinerea,* is one of the most common fungus diseases that routinely limit the postharvest longevity of unrooted poinsettia cuttings. Management of this disease is mainly through prophylactic applications of protective chemical pesticides and manipulation of greenhouse environmental conditions. Silicon (Si) has been shown to enhance plant resistance to biotic and abiotic stresses and may be an option for Botrytis Blight management.

The objectives of this study were: (1) to determine the effects of supplementing macronutrients with silicon applied to potted poinsettia plants on *B. cinerea* infection; (2) to assess the effects of two sources and varied concentrations of silicon on *B. cinerea* infection and disease development on poinsettia; and (3) to determine the effects of *B. cinerea* in the postharvest and propagation environment on unrooted poinsettia cuttings harvested from silicon-treated stock plants.

Materials

Two mid-season poinsettia (*Euphorbia pulcherrima*) cultivars (Peterstar Red and Snowcap White) known to be highly susceptible to *B. cinerea* were used.
Two silicon sources were used throughout this study: potassium silicate and calcium metasilicate. The two sources of silicon were applied either as a drench or a foliar spray four weeks after the plants were potted. Thereafter, applications were made weekly.

Seventeen isolates of *B. cinerea* collected from leaves and bracts of greenhouse-grown poinsettia plants in South Carolina with known sensitivities to the fungicides vinclozolin and thiophanate-methyl were recovered from conidia stored at -80°C in 15% glycerol. Cultures were started on V8 Juice agar and three weeks later were transferred to half-strength potato dextrose agar (PDA). After sporulation, hyphal tips of the isolates were sub-cultured on PDA. In addition to these 17 isolates, another isolate was collected from poinsettia stock plants in the greenhouse at Clemson University. Due to its aggressiveness *in vitro*, this isolate was used in all subsequent experiments.

Disease severity was evaluated on 9-mm leaf disks of poinsettia cultivars Peterstar Red and Snowcap White treated by drenching stock plants with 0, 125, 250, or 500 ppm calcium or potassium silicate.

Additionally, cuttings were harvested from treated stock plants and then kept in postharvest packaging until *B. cinerea* lesions appeared.

Results

All spray applications caused phytotoxicity; thus, only the results with drench applications will be discussed. Disease severity and incidence of plants treated with calcium or potassium silicate did not differ significantly; therefore, data from calcium and potassium silicate treatments were pooled.

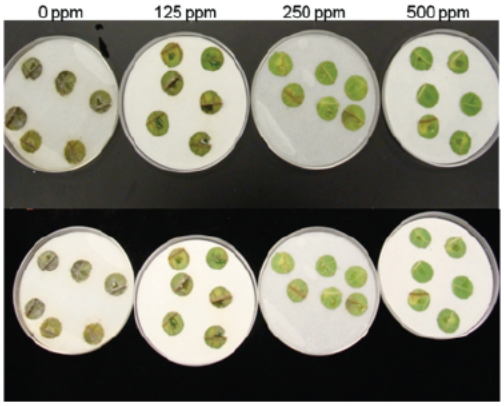

Fig. 1 Leaf disk assay. **Leaf disks with calcium silicate (*top*) or potassium silicate (*bottom*). The controls were rapidly infected by *B. cinerea* while those receiving 250 and 500 ppm had significantly lower disease incidence and severity as noted by the greener color of the leaf disks.**

Leaf disks obtained from stock plants (Fig. 1) treated with 250 or 500 ppm of potassium or calcium silicate had significantly lower disease incidence and severity than the control and the plants receiving 125 ppm (Fig 2A & B).

Effects of silicon on postharvest performance and storage of unrooted cuttings did not differ significantly between the two cultivars. For both cultivars, development of Botrytis Blight in storage was reduced significantly by adding silicon (Fig. 3). Disease incidence was lowest at the two higher concentrations (250 and 500 ppm).

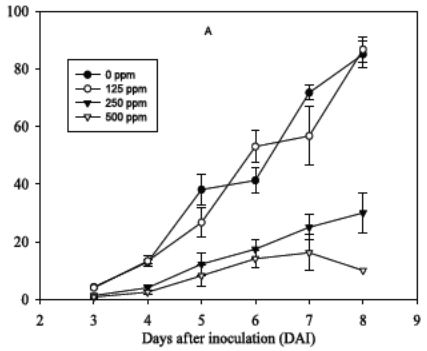

Fig. 2A. Disease severity over time on 'Peterstar Red' leaf disks.

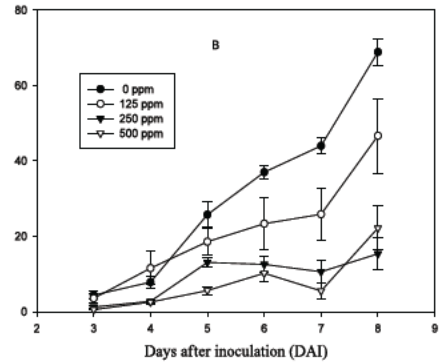

Fig. 2B. Disease severity over time on 'Snowcap White' leaf disks.

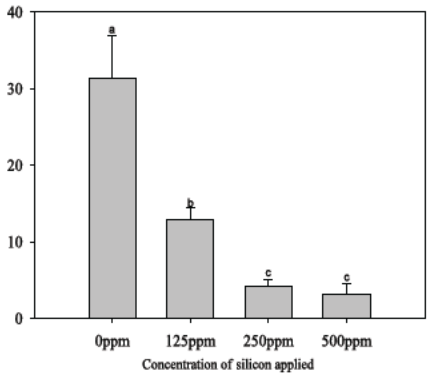

Fig. 3. Effect of silicon on disease incidence of unrooted poinsettia cuttings in postharvest storage.

Conclusions

Many studies have demonstrated the efficacy of silicon based compounds in managing fungus diseases on several crops. The results from our study corroborate those results on *B. cinerea* infection of poinsettia leaves. They provide evidence that silicon applications can improve protection against Botrytis Blight on poinsettia plants when applied weekly as a drench at concentrations of 250 or 500 ppm.

Industry Impact

Infection by *Botrytis cinerea* routinely limits poinsettia postharvest longevity of unrooted cuttings. This project demonstrates the potential for using silicon supplements to inhibit infection by *B. cinerea*. Increased postharvest longevity could improve shipping and storage options for cuttings, which should lower shipping costs without decreasing cutting viability and quality.

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