DRENCHING DILEMMAS II

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One major component of a greenhouse crop disease control program, including poinsettias, is substrate drenching with fungicides to prevent root rot diseases. When DuPont dropped the ornamental label for Benlate, thiophanate methyl (Cleary's 3336, Domain, etc.) was the logical substitute. Growers were warned against mixing two liquid fungicides together back in 1991 (Powell, 1991). In the articleby Powell, concern was raised over the possibility of damage due to high salts, especially under high temperature conditions; wetting agents were also implicated as a possible cause of phytotoxicity in the article. We first reported on our studies that address the possible phytotoxicity of combined liquid fungicide drenches last August. Those studies were looking at Subdue 2E + Cleary's 3336F on bedding plants (Jones and Bailey, 1992), and we saw no damage on any species tested, when the fungicides were applied at label rates. The treatments combined with 3× Aqua Gro® were also void of phytotoxic side effects. During 1992, we conducted a study to evaluate the potential phytotoxicity of Subdue 2E + Cleary's 3336F substrate drenches on poinsettias.

Rooted cuttings of six poinsettia cultivars ('Annette Hegg Dark Red', 'Celebrate 2', 'Lilo', 'Supjibi', 'V-14 Glory', and 'V-17 Angelika') were potted one-per-pot into 6" diameter azalea pots on 1 October 1992 using Fafard 4P amended with 0 or 6 oz/yd^2 of Aqua Gro®. We assumed that the soil mix would already contain a 1× concentration of wetting agent, so enough Aqua Gro® was added to create a treatment approximating 3× the recommended concentration of wetting agent for a substrate (Boodley and Sheldrake, 1982). The pH and electrical conductivity (EC) of each of the two substrate treatments were measured prior to planting using a 2 water : 1 substrate (by volume) dilution. The substrates had an initial pH of 5.1 ± 0.1 and an EC reading of 60 ± 5 mho × 10^{-5}/cm. The addition the wetting agent had no effect on either the pH or the EC of the substrate. After potting, the cuttings were watered in thoroughly with clear water, then each pot was drenched with 8 fl. oz. of one of four solutions: 1) clear water; 2) 20 fl. oz. Cleary's 3336F + 1 fl. oz. Subdue 2E per 100 gal; 3) 60 fl. oz. Cleary's 3336F + 3 fl. oz. Subdue 2E per 100 gal; or 4) 120 fl. oz. Cleary's 3336F + 6 fl. oz. Subdue 2E per 100 gal. These treatments equate to an untreated control, and 1×, 3×, and 6× the recommended concentrations of the two fungicides. No significant difference in the pH or EC of the drench solutions was observed (tap water pH = 6.6 and EC = 20 mho × 10^{-5}/cm; 1× drench pH = 6.5 and EC = 25 mho × 10^{-5}/cm; 3× drench pH = 6.5 and EC = 30 mho × 10^{-5}/cm; 6× drench pH = 6.5 and EC = 30 mho × 10^{-5}/cm). Treatments were applied to six plants of each of the six cultivars tested.

The cuttings were rooted and the plants were grown under long day conditions using a 10:00 PM–2:00 PM night break nightly beginning 14 September 1992 and continuing until the final data collection date of 9 December 1992. After the fungicide treatments were applied, plants were randomized on benches in a 65°F/75°F (night/venting) glass greenhouse here at N.C. State. The plants were fertilized with 250 ppm nitrogen at each irrigation throughout the experiment rotating between a 20-10-20 formulation amended with micronutrients and calcium nitrate + potassium nitrate injected through a hozon. Edge burn was evident 7–10 days after potting along with interveinal chlorosis on lower leaves and was attributed to magnesium deficiency. Epsom salts was applied as a substrate drench on October 16 to correct the deficiency. Plant height data was collected on November 12 and the number of leaves with marginal necrosis per plant was recorded on 9 December 1992.

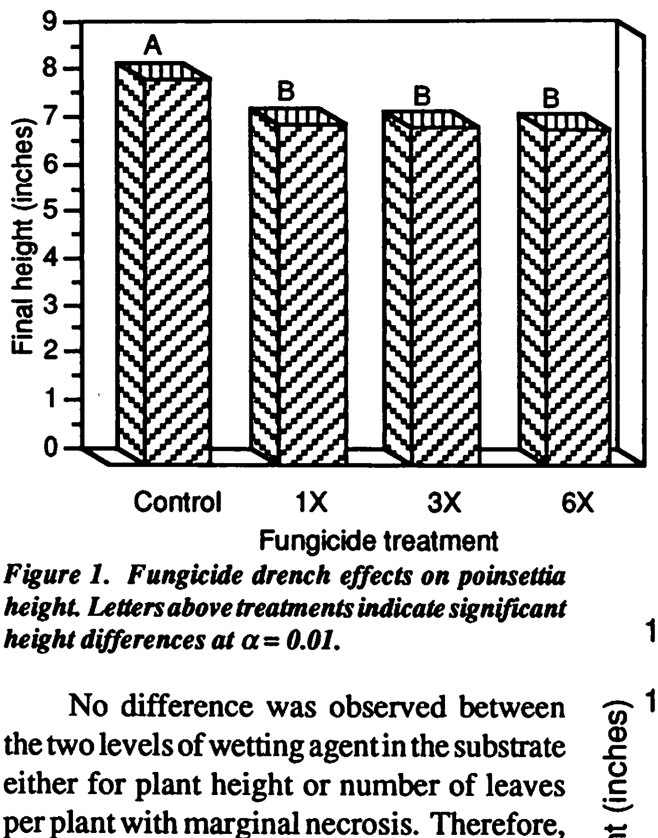

Figure 1. Fungicide drench effects on poinsettia height. Letters above treatments indicate significant height differences at $\alpha = 0.01$.

No difference was observed between the two levels of wetting agent in the substrate either for plant height or number of leaves per plant with marginal necrosis. Therefore, it does not appear that wetting agent is a factor of concern in phytotoxicity from tank mixed liquid fungicides.

There was no difference in final plant height among plants drenched with the fungicides at any concentration, however, all of the fungicide-treated plants were significantly shorter than the control plants (Figure 1). A reduction in poinsettia height has been reported to occur with fungicide treatments (See the article by D.M. Benson in this issue of the Bulletin). However, from a production standpoint, the decrease in final height would not be detrimental to the crop. As would be expected, cultivars varied significantly in final height, and 'Supjibi' and 'Lilo' were the shortest while 'V-17 Angelika' was the tallest cultivar in our experiment (Figure 2).

The only adverse effect observed from the fungicide treatments was an increase in the number of leaves exhibiting marginal necrosis. As mentioned above, the newly planted cuttings began to show these symptoms (regardless of treatment) soon after potting, and Epsom salts were applied to correct the magnesium deficiency. Soon after the Epsom salts drench, no further necrosis was observed. Cultivars varied in number of leaves exhibiting marginal necrosis as indicated by the controls in Figure 3. 'V-17 Angelika' appears to be very susceptible to magnesium deficiency, while 'Lilo', 'Supjibi', 'Celebrate 2', 'Annette Hegg Dark Red', and 'V-14 Glory' differed little in the number of leaves having marginal necrosis (comparison of controls). However, plants treated with the fungicide drenches did tend to have more leaves affected than untreated controls (Figure 3). Cultivars did differ in the degree of injury

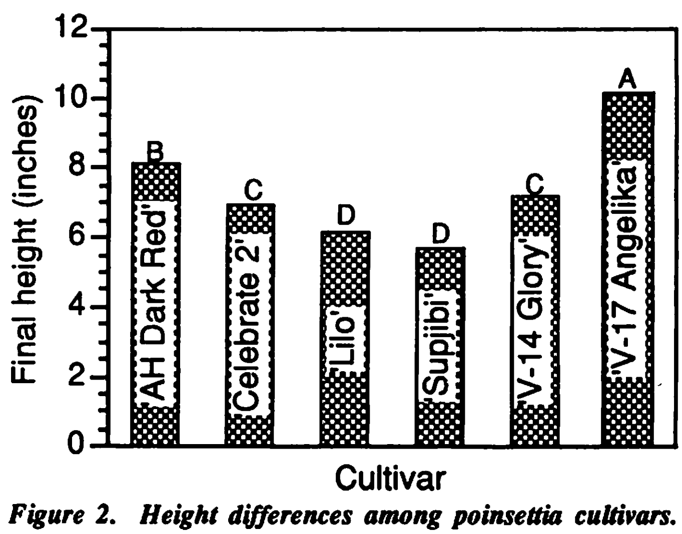

Figure 2. Height differences among poinsettia cultivars. Letters above cultivars indicate significant height differences at $\alpha = 0.01$.

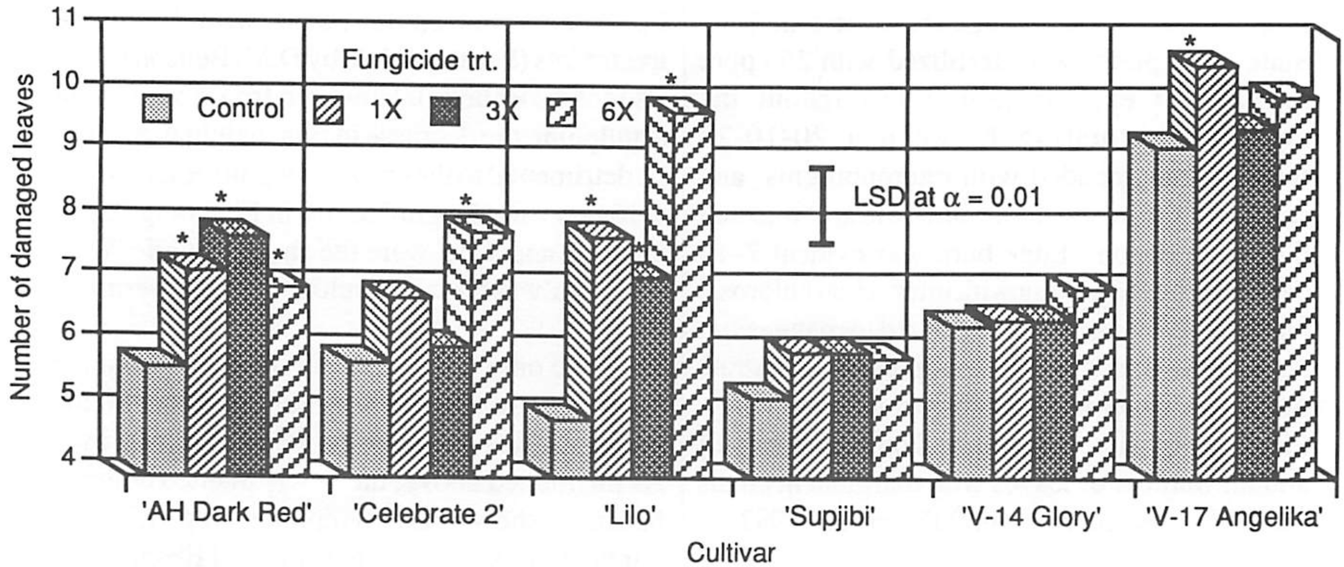

Figure 3. Cultivar and fungicide treatment effects on the number of leaves with marginal necrosis. Columns differing in height by more than the LSD bar differ significantly at $\alpha = 0.01$. A star above the column indicates that the fungicide treatment resulted in significantly more damaged leaves than observed on the untreated controls of the same cultivar.

caused by the drenches, and 'Annette Hegg Dark Red' and 'Lilo' plants had the greatest increase in damage from the fungicide treatments as indicated by the stars in Figure 3. By far, most of the damage observed on plants of the other five cultivars was caused by factors other than the fungicide drenches as evidenced by the data for control plants (Figure 3). It is unfortunate that we did not have enough plants to apply the fungicides independent of each other in order to evaluate which one or if the combination of both caused the increased amount of marginal necrosis. All of the affected leaves were at the base of the plant, and the damaged foliage would be difficult to observe at the end of the season on a commercially produced pinched crop of plants.

From these results, we have concluded that under our growing conditions, combining Subdue 2E and Cleary's 3336F and applying as a drench at the recommended concentrations is a safe treatment for controlling root rotting organisms in poinsettia production. Although the fungicide treatments led to an increase in the severity of marginal necrosis on lower leaves of some of the cultivars, the injury was not severe enough to warrant concern.

Literature Cited

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