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Special Research Report #532 Production Technology Using Soil Moisture Sensors for Poinsettia Height Control

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BACKGROUND

In general, plant height control is a critical issue with floricultural crops. With potted poinsettia production, it is very important. Sale contracts for poinsettias commonly include plant height specifications and growers must produce plants that fall within a specified height range. The most common method to control plant height is through the application of plant growth retardants (PGRs). PGRs can be applied as a spray or drench, but their efficacy is not always predictable. Some PGR applications to poinsettia can result in excessive stunting and decreased bract size; thus, reducing plant quality.

Figure 1. Overview of the study near the beginning (top) and end of the study.

In other crops, PGRs may not be very effective. Research at the University of Maine has shown that the height of aquilegia can be controlled by exposing the plants to water deficits. Drought stress has long been used to control plant height. However, it is difficult to control the severity of the drought and the effects on the plants, unless soil moisture sensors are used to monitor and control the water content of the substrate. Our objective was to determine if precise control of substrate water content can be used to control the height of poinsettia.

Figure 2. Graduate students Mandy Bayer and Lucas O'Meara assist Alem Peter collect plant height data.

MATERIALS & METHODS

Rooted poinsettia 'Classic Red' cuttings were obtained from the Davis Floral Co. and transplanted into 6" pots filled with a peat-lite (80:20 peat-perlite) substrate. A controlled release fertilizer (Osmocote 14-14-14) was incorporated into the substrate before planting. Plants were hand-watered for the initial two weeks to give the plants time to get established.

After two weeks, plants were irrigated using an automated system that used soil moisture sensors to determine when the plants needed to be irrigated. Irrigation was initiated when the substrate water content dropped below 40%, unless otherwise mentioned.

Plants were pinched at 33 days after transplanting, after which their height was measured weekly. The target height for the crop was 17 ± 1 inches. Growth tracking curves from the University of Florida were used to determine when height control was needed.

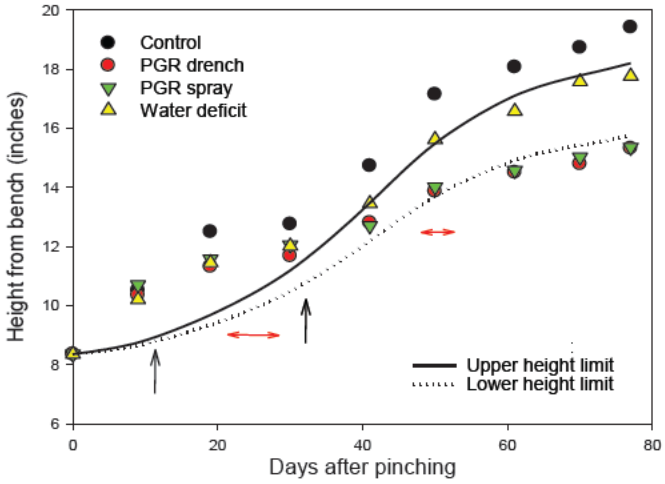

Figure 3. Plant height of poinsettias cv. Classic Red in response to PGR applications or controlled water deficit. Vertical, black arrows indicate PGR applications, while horizontal red arrows indicate the imposition of water deficit.

The study included four treatments: a control without imposed height controls, a drench treatment (0.25 ppm Bonzi), a spray treatment (1000 ppm B-Nine and Cycocel), and a water deficit treatment. In the water deficit treatment, substrate water content was allowed to drop to 20% and then maintained at 20% until plant height was within the range specified by the growth-tracking curve. At that time, substrate water content was increased back to 40%.

RESULTS

Plant height exceeded the upper height limit soon after pinching (Fig. 3). Thus, PGR sprays and drenches were applied twice, at 12 and 33 days after pinching. Elongation was slow after the second PGR application and the final height of plants treated with PGRs was slightly below the lower acceptable limit of 16 inches. Substrate water content was applied twice, the first application was 21 till 28 days after pinching and the second application was from 54 till 57 days after pinching. This resulted in a final plant height of 17.8 inches. This water deficit treatment was the only treatment with plant height within the final target height of 16 – 18inches (Fig. 3, 5).

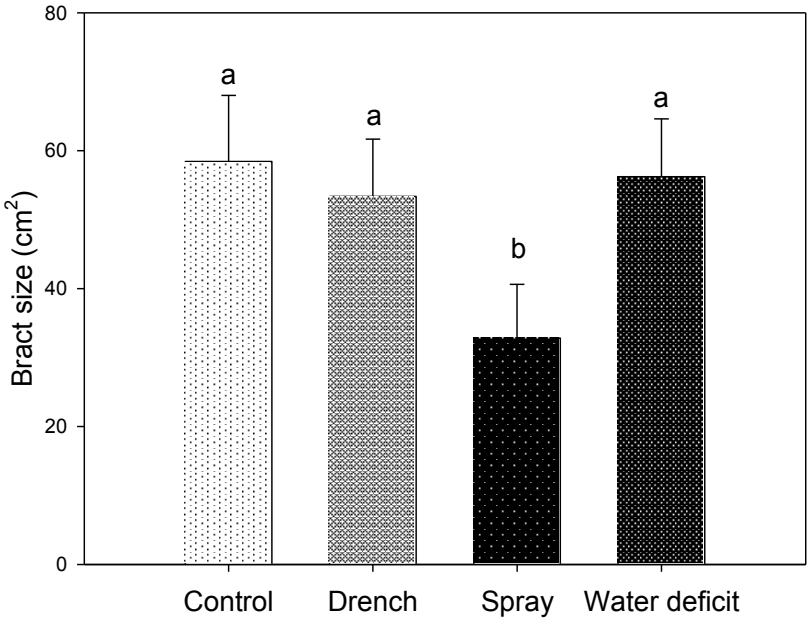

Figure 4. The effect of different height control methods on the final plant height of poinsettias Cv. Classic Red.

In addition to stunting the plants, PGR sprays reduced the size of the bracts by 44% compared to untreated plants (Fig. 4). The PGR drench and controlled water deficit did not have any negative impact on bract size. None of the treatments impacted the color of the bracts.

CONCLUSIONS

Soil moisture sensor-controlled irrigation systems can be used to apply a controlled water deficit to poinsettias. This is an effective way to regulate stem elongation and to control the marketable plant height. We did not observe any negative side effects of the water

deficit on the plants. PGR treatments reduced height more than desired. In addition, the PGR spray reduced bract size and, thus, plant quality.

Figure 5. Representative plants poinsettias Cv. Classic Red from the various treatments. From left to right: control plants without any height control, plants drenched with PGRs, plants sprayed with PGRs, and plants exposed to controlled water deficit. Only plants exposed to controlled water deficits had a final height within the 16 – 18" target range.

INDUSTRY IMPACT

The use of soil moisture sensor-controlled irrigation allows growers to apply a specific water deficit to their crop. This can be used to manipulate the elongation of the plants. This occurs through the application of a water deficit when plants are taller than desired. It slows their growth, but it resumes after normal irrigation is resumed. This provides growers with a new, non-chemical method to control plant height. With the increasing consumer preference for reduced chemical use, plants that have not been treated with PGRs might be preferred by many consumers.

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