

**Center for Applied Horticultural Research (CfAHR)
Research Report**

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Prepared for: Fine Americas, Inc.

Project Title: Evaluation of Piccolo 10XC Spray and Drench Applications on Poinsettias

Abstract

More effective plant growth regulators (PGR) are desirable in the field of ornamental horticulture; these products are likely to result in fewer applications, better plant growth control and lower costs. In this trial, Piccolo (paclobutrazol) at the standard concentration of 0.4% and Piccolo 10XC (4% paclobutrazol) were tested for height control of poinsettia 'Freedom', 'Ice Punch' and 'Prestige Early'. Two rates (1X and 0.75X standard grower rate) and two application methods (spray and drench) were studied. Plants grown under commercial standard practices were transported to the center on September 30th 2010; after treatment application, all plants were kept in a climate controlled greenhouse at 65/75 °F night/day temperature and under drip irrigation. At 0, 7, 14, 28 and 50 days after application, plant height, the number of days to color initiation and the % bract coloration were measured. The plants were screened for phytotoxicity symptoms at 0, 7, 14 and 28 days after treatment application. The effect of the products varied among cultivars; Piccolo 10XC was more effective than Piccolo for height control of 'Ice Punch' but equally affective when compared to Piccolo for height control of 'Freedom' and 'Prestige Early'. The products did not affect the initiation of bract color but a decrease in the % bract coloration at the higher rates tested was observed. None of the treatments caused phytotoxicity in any of the cultivars tested.

Objective:

- Determine the relative efficacy and crop safety of Piccolo 10 XC (4% paclobutrazol) compared to a 'standard' Piccolo (0.4% paclobutrazol) treatment on 3 cultivars of poinsettia.

Materials and Methods

Plant Material:

Poinsettia cultivars 'Freedom', 'Prestige Early' and 'Ice Punch' were transported to the center on Sep. 30th 2010. Cuttings had been planted in June 2010 in 6" containers filled with Sunshine Mix#1 (Sun Gro Horticulture) and grown under commercial cultural practices. Applications of Cycocel and B-nine had been made to the crop when needed, however, there were no applications in the 45 days prior to the beginning of the trial. Cultivar 'Freedom' had approximately 1% bract coloration when received, the rest of the cultivars did not have any color development in the bracts

Plant Care and Treatment:

Plants were placed in a climate-controlled greenhouse at 65/75 °F night/day temperature and watered using a drip irrigation system. Irrigation frequency was determined by visual observation of the plants. Approximately 400ml per plant per irrigation were applied.

Treatments:

No.	Product	Formulation	App. Method	Rate	Rate ¹ in ppm
1	Control	NA	NA	NA	N/A
2	Piccolo	0.4%	Spray	0.75 X	0.23
3	Piccolo	0.4%	Spray	1 X	0.3
4	Piccolo 10XC	4%	Spray	0.75 X	0.23
5	Piccolo 10XC	4%	Spray	1 X	0.3
6	Piccolo	0.4%	Drench	0.75 X	0.11
7	Piccolo	0.4%	Drench	1 X	0.15
8	Piccolo 10XC	4%	Drench	0.75 X	0.11
9	Piccolo 10XC	4%	Drench	1 X	0.15

¹ Grower standard rates for the cultivars selected and the physiological stage of the crop.

Applications:

Spray treatments were applied using a Flow master Model 1101HD 1 gallon sprayer with an adjustable spray pattern nozzle at a rate of 2 quarts per 100 sq. ft. Products were measured with a Pipetman® micropipette model P200 (Gilson, Inc.). Drench treatments were applied at a rate of 4 fl oz per plant, the volume was uniformly applied to each pot when the medium was moist but not saturated.

Measurements:

The height of each plant was recorded at 0, 7, 14, 28 and 50 days after application. Plants were screened for symptoms of phytotoxicity measured as chlorosis, necrosis, stunting, distortion and spotting at 0, 7, 14 and 28 days after treatment application. The days to initiation of bract coloration was recorded as well as the % bract coloration at 0, 21, 28 and 50 days after treatment application using as a reference the Poinsettia Bract Meter™ developed by Ecke Ranch.

Experimental Design and Sampling:

Plants were arranged in a complete randomized block arrangement with 5 replicates per treatment per cultivar.

Analysis:

An arcsine \sqrt{x} transformation was applied to the variable % bract coloration prior to analysis to satisfy the assumptions of analysis of variance. Data were analyzed using JMP version 9.0. Following a significant treatment effect, means were separated using LSD ($\alpha = 0.05$).

Results:

None of the treated plants had symptoms of phytotoxicity at any time after the application of the treatments. All plants initiated bract color at approximately the same time within each cultivar,

however, the % bract coloration was different among treatments depending on cultivar. Height was affected by treatments and the effect was variable among the poinsettia cultivar.

Poinsettia 'Freedom':

All plants were uniform in height at the beginning of the study and 7 days after treatment applications (DATA), however, there were significant differences between treatments at 14, 28 and 50 DATA. Piccolo applied as spray was not effective at the concentrations studied to control height. When applied as a drench, it resulted in plants that were significantly shorter than the control group. Piccolo 10XC applied as spray or drench was equally effective to control plant height. Drenches of Piccolo were as effective as drenches and sprays of Piccolo 10XC to control height at 28DATA. At 50 DAAT, Piccolo 10XC at the higher rate caused a greater reduction in height than drenches of Piccolo (Figure 1). Piccolo and Piccolo 10XC did not have an effect on the number of days to development of bract color. At 21 DATA, 87.7% of the plants had developed some bract coloration while at 28 DATA all the plants had a degree of bract coloration. The % bract coloration 28 days after application was affected by treatments. Piccolo 10XC reduced the % bract coloration when drenched at 1X and sprayed at 0.75X and 1X the grower's rate compared to the control group. Fifty DATA plants treated with drenches of Piccolo 10XC had decreased % bract coloration when compared with the rest of the treatments, but these plants were not significantly shorter than the control group (Figure 2). The plants at 28 DATA can be seen in Figures 3 and 4.

Poinsettia 'Ice Punch':

All plants were similar in height before treatment application and 7 DATA. Plant height was significantly different among treatments at 14, 28 and 50 DATA. At 28 DATA, control plants were significantly taller than all treated plants except for the group treated with Piccolo as a spray at 1X the grower's rate. A comparison between groups of plants sprayed with Piccolo and Piccolo 10XC shows that Piccolo 10XC at the higher rate (1X) was more effective than Piccolo to control height. When the chemicals were applied as a drench, Piccolo 10XC was more effective than Piccolo to control height at all concentrations studied; this trend was observed at 14, 28 and 50 DATA (Figure 5). The treatments did not affect the initiation of bract coloration, 21 DATA all plants had started to develop bract color; however, drenches of Piccolo 10XC decreased the % bract coloration of the plants when compared to the control group (Figure 6). Representative plants of each treatment at 28 DATA are shown in Figure 7and 8.

Poinsettia 'Prestige Early':

All plants were uniform in height at the beginning of the study. At 7 DATA, drenches of Piccolo and Piccolo 10XC were effective to significantly reduce height of the plants compared to the control but only at the higher rates (1X grower's rate). At 14 DATA, plants sprayed with Piccolo 10XC at the higher rate were significantly smaller than the control; they were similar in height to the plants drenched with Piccolo 10XC (high and low rates) and with Piccolo at the higher rate (Figure 9). All plants outgrew the effect of the growth regulators at 28 DATA (Figure 9). Fifty DATA plants were still uniform in size (data not shown). All plants had started to develop bract color before treatment application. At 28 DATA, drenches of Piccolo at the higher rate, drenches of Piccolo 10XC and sprays of Piccolo 10XC at the higher rate resulted in decreased % bract coloration. At 50 DATA the same trend was observe but plants sprayed with Piccolo at the higher rate had developed the same % bract color as the control (Figure 10). Plants at 28 DATA can be seen in Figures 11 and 12.

Conclusions:

- The effect of Piccolo and Piccolo 10XC differed among cultivars.
- Piccolo and Piccolo 10XC had a visible effect on plant height of cultivar 'Prestige Early' 7 days after application and the plants outgrew the regulation effect 28 DATA.
- Piccolo and Piccolo 10XC height control in treated plants of cultivars 'Freedom' was observed 14 days after application and continued to be present at 50 DATA.

- The reduction in height by the studied products was evident in 'Ice Punch' at 14 DATA. Height regulation in Piccolo-treated plants was not present at 50 DATA; while Piccolo 10XC-treated plants continued to be shorter than the rest of the treatments at 50 DATA.
- Piccolo 10XC was more effective than Piccolo in controlling height of poinsettia 'Ice Punch', which is a very vigorous cultivar. Both products were equally effective in controlling plant height of cultivars 'Freedom and 'Prestige Early'; in this study Piccolo was more effective when drenched than when sprayed.
- Piccolo and Piccolo 10XC did not affect the initiation of bract color.
- Piccolo 10XC decreased the % bract coloration compared to the control in all cultivars. Piccolo, when applied as a drench at the higher rate decreased % bract coloration of cultivar 'Prestige Early'.
- None of the treatments caused phytotoxicity in any of the cultivars tested.

Figure 1. Mean (\pm SE) height of poinsettia 'Freedom' at 0, 7, 14, 28 and 50 days after application of Piccolo and Piccolo 10XC as spray or drench at 1X or 0.75X the standard rate. Bars followed by different letters are significantly different, t-test ($p=0.05$).

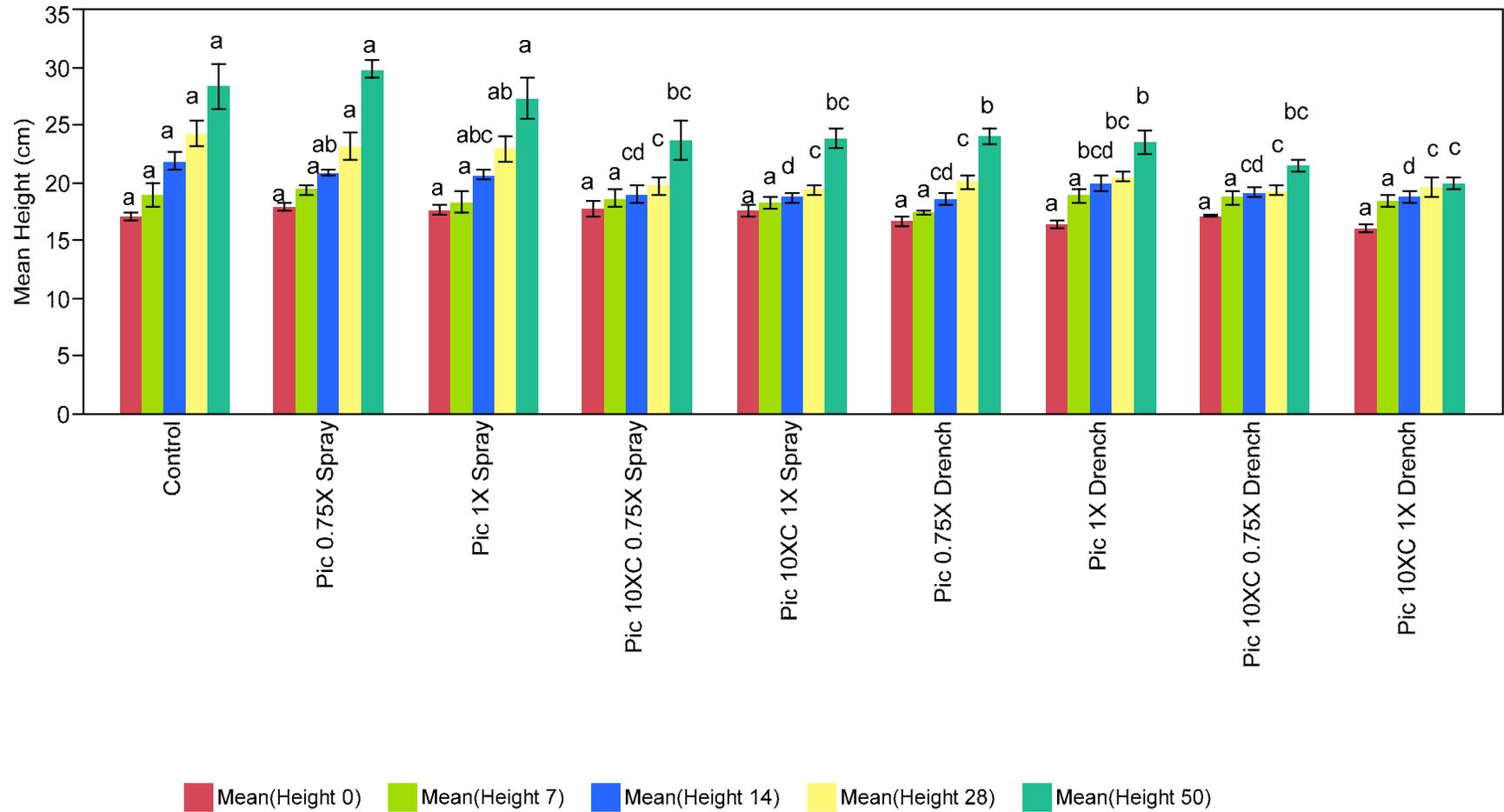


Figure 2. Mean (\pm SE) % bract coloration of poinsettia 'Freedom' after application of Piccolo and Piccolo 10XC as spray or drench at 1X or 0.75X the standard rate. X-Axis represents days after treatment application within treatments. Bars followed by different letters are significantly different, t-test ($p=0.05$).

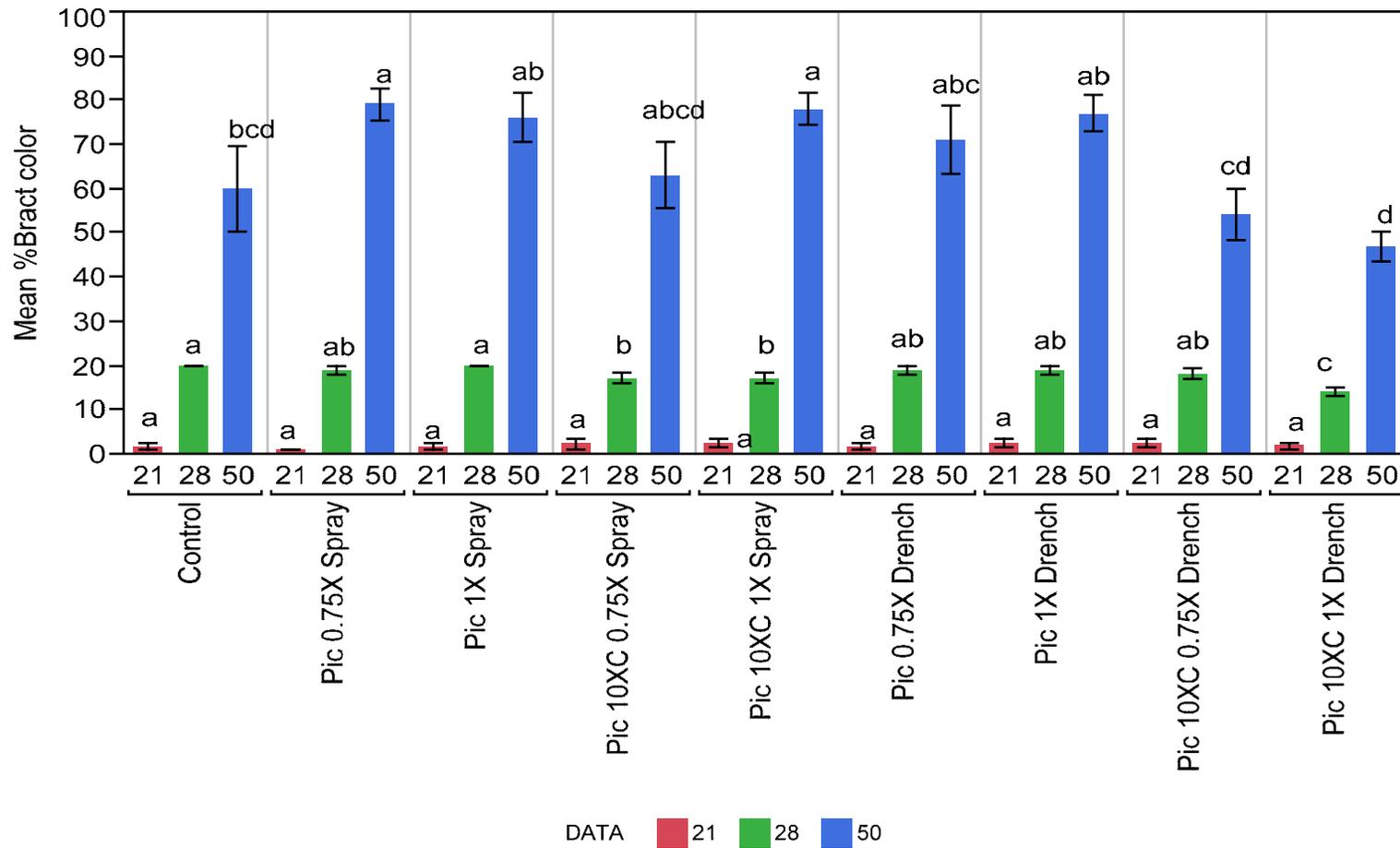
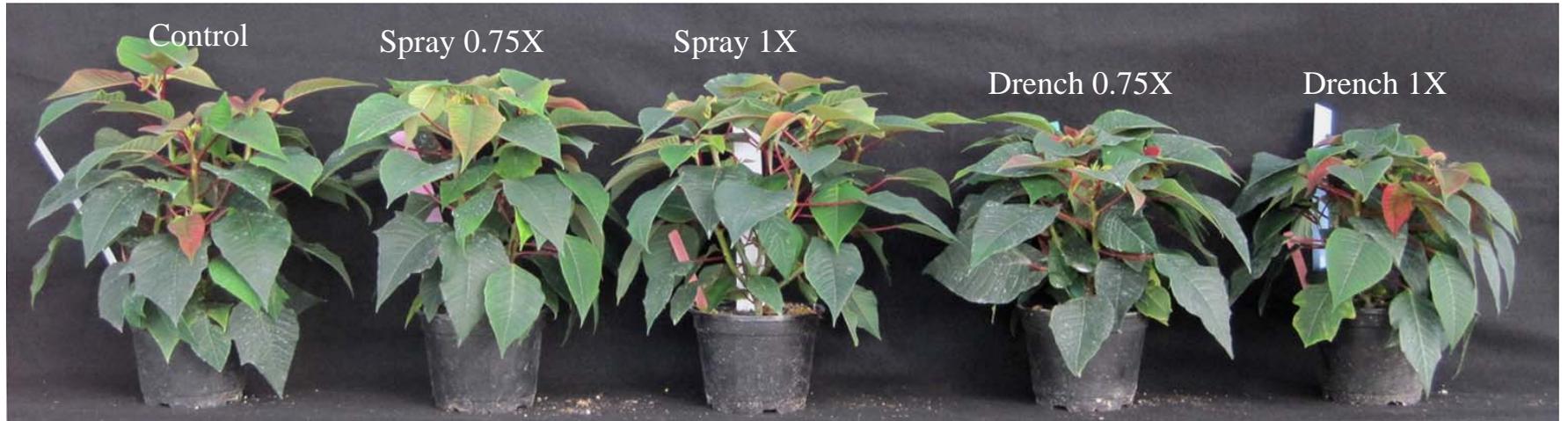


Figure 3. Poinsettia 'Freedom' 28 days after treatment application. Comparison within Piccolo and Piccolo 10XC-treated plants.

A. Piccolo



B. Piccolo 10XC

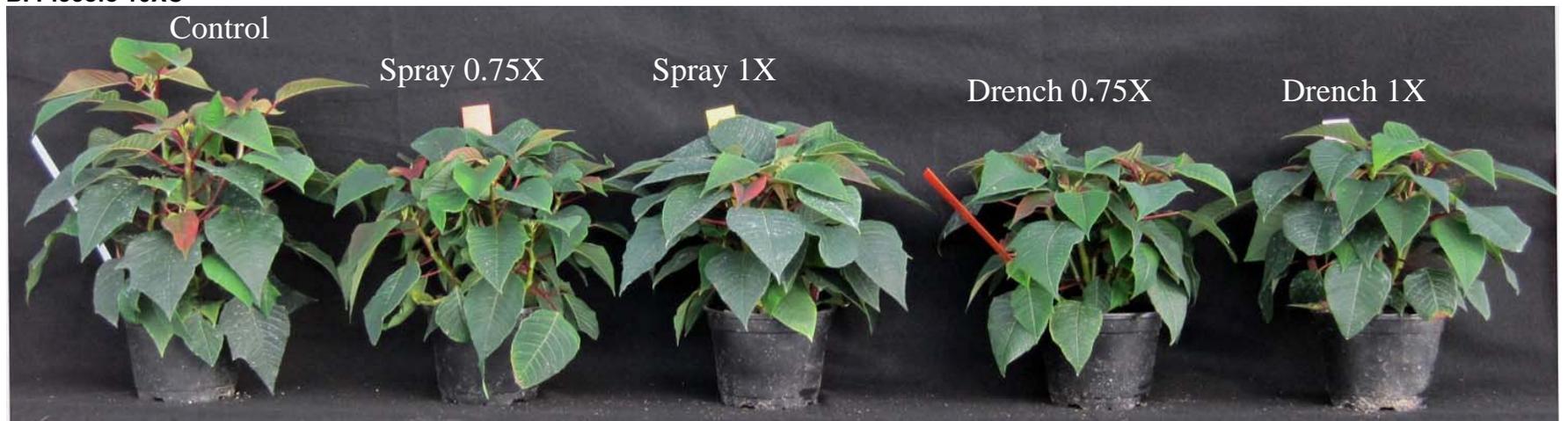


Figure 4. Poinsettia 'Freedom' 28 days after treatment application. Comparison of Piccolo and Piccolo 10XC-treated plants among application methods

A. Spray



B. Drench



Figure 5. Mean (\pm SE) height of poinsettia 'Ice Punch' at 0, 7, 14, 28 and 50 days after application of Piccolo and Piccolo 10XC as spray or drench at 1X or 0.75X the standard rate. Bars followed by different letters are significantly different, t-test ($p=0.05$).

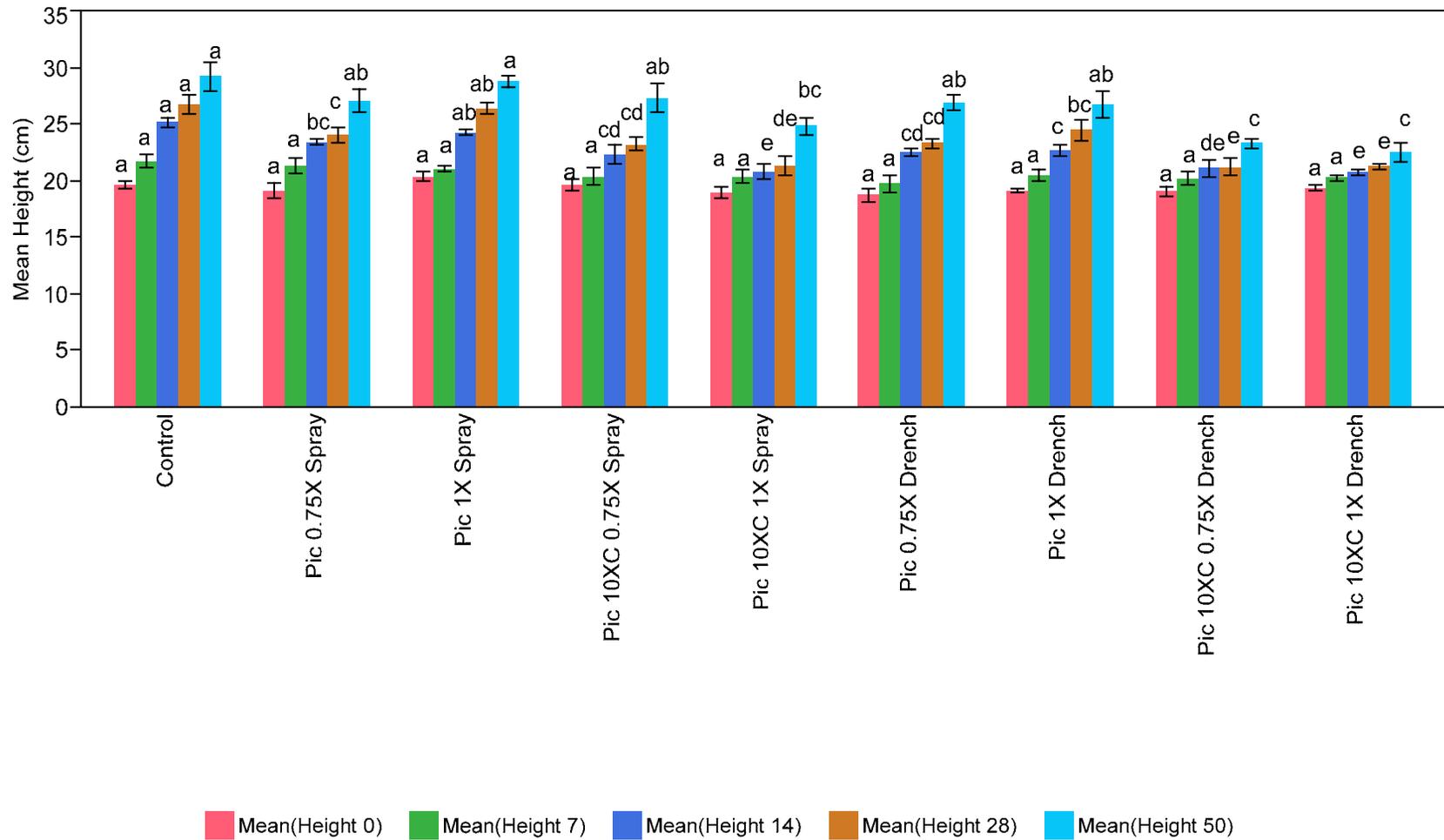


Figure 6. Mean (\pm SE) % bract coloration of poinsettia 'Ice Punch' after application of Piccolo and Piccolo 10XC as spray or drench at 1X or 0.75X the standard rate. X-Axis represents days after treatment application within treatments. Bars followed by different letters are significantly different, t-test ($p=0.05$).

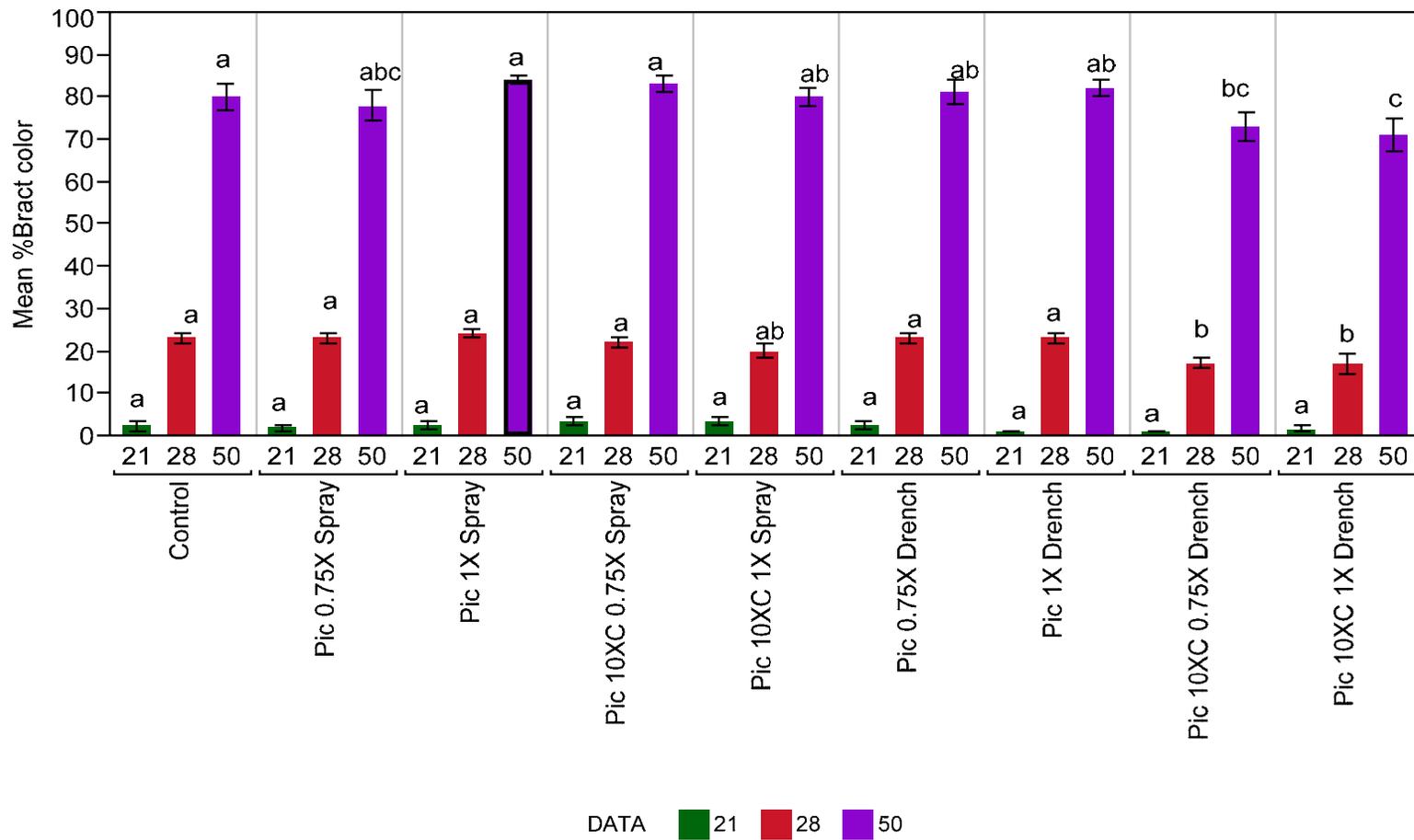


Figure 7. Poinsettia 'Ice Punch' 28 days after treatment application. Comparison within Piccolo and Piccolo 10XC-treated plants.

A. Piccolo



B. Piccolo 10XC



Figure 8. Poinsettia 'Ice Punch' 28 days after treatment application. Comparison of Piccolo and Piccolo 10XC-treated plants among application methods

A. Spray



B. Drench



Figure 9. Mean (\pm SE) height of poinsettia 'Prestige Early' at 0, 7, 14 and 28 days after application of Piccolo and Piccolo 10XC as spray or drench at 1X or 0.75X the standard rate. Bars followed by different letters are significantly different, t-test ($p=0.05$).

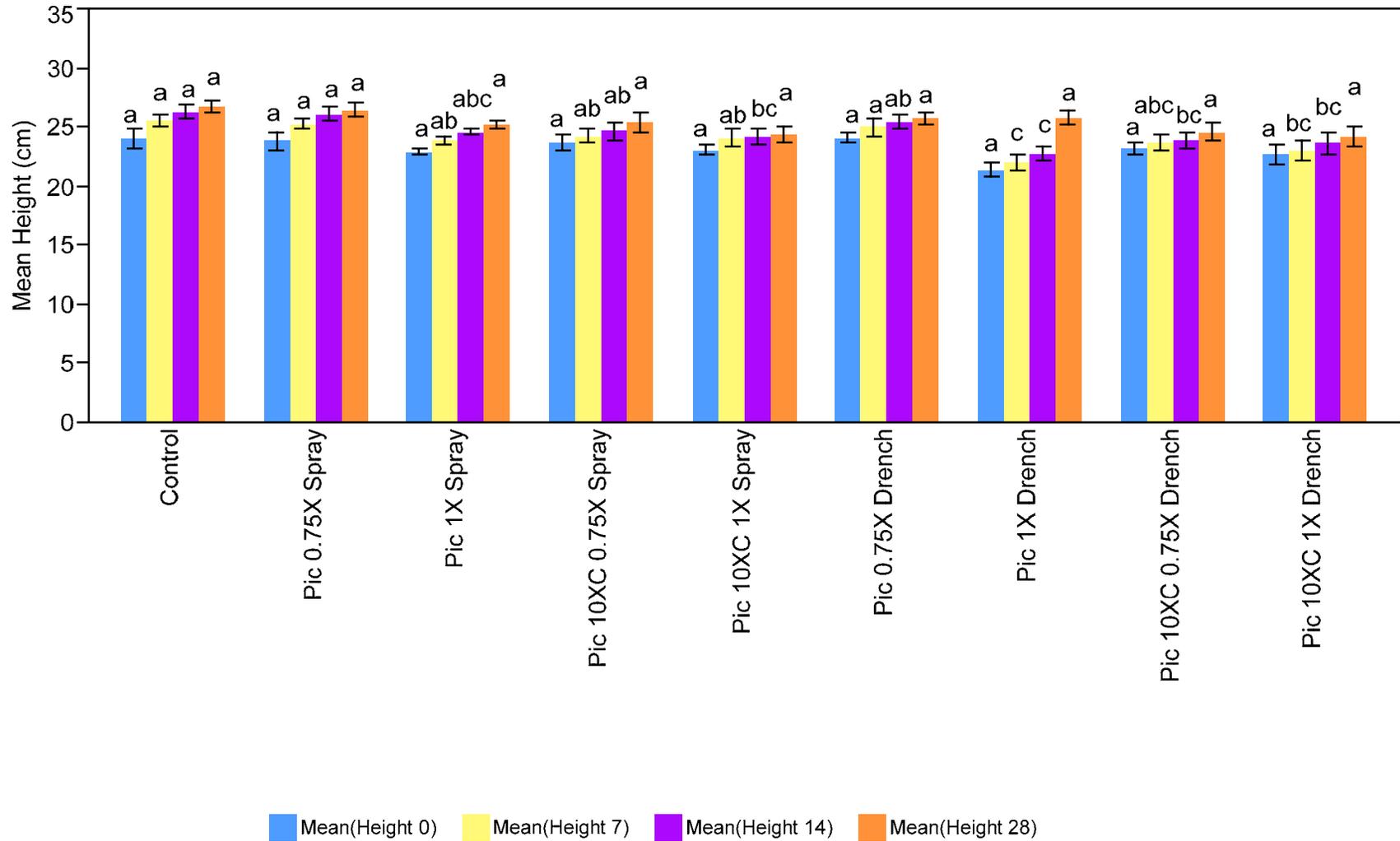


Figure 10. Mean (\pm SE) % bract coloration of poinsettia 'Prestige Early' after application of Piccolo and Piccolo 10XC as spray or drench at 1X or 0.75X the standard rate. X-Axis represents days after treatment application within treatments. Bars followed by different letters are significantly different, t-test ($p=0.05$).

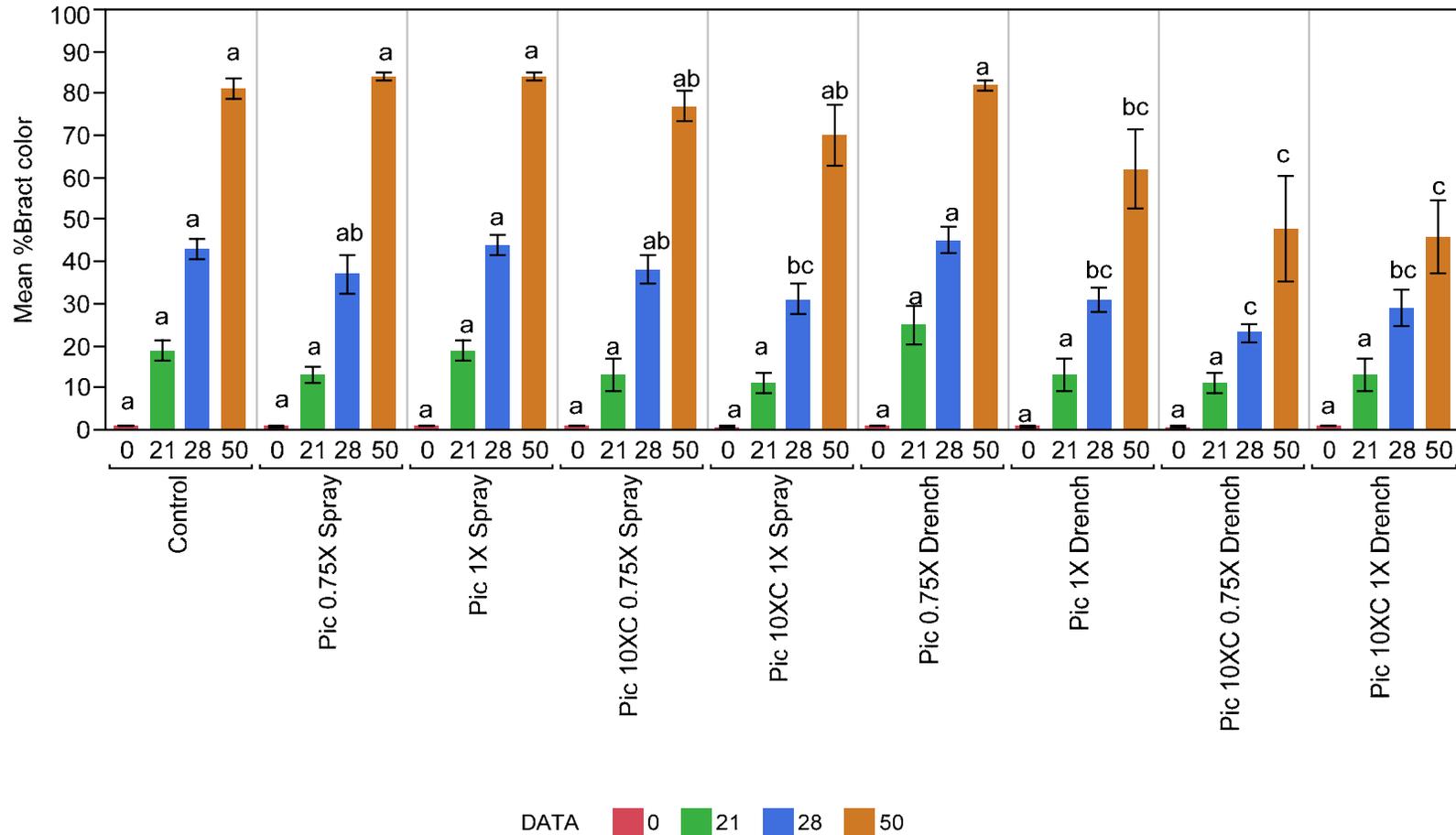


Figure 11. Poinsettia 'Prestige Early' 28 days after treatment application. Comparison within Piccolo and Piccolo 10XC-treated plants.

A. Piccolo



B. Piccolo 10XC

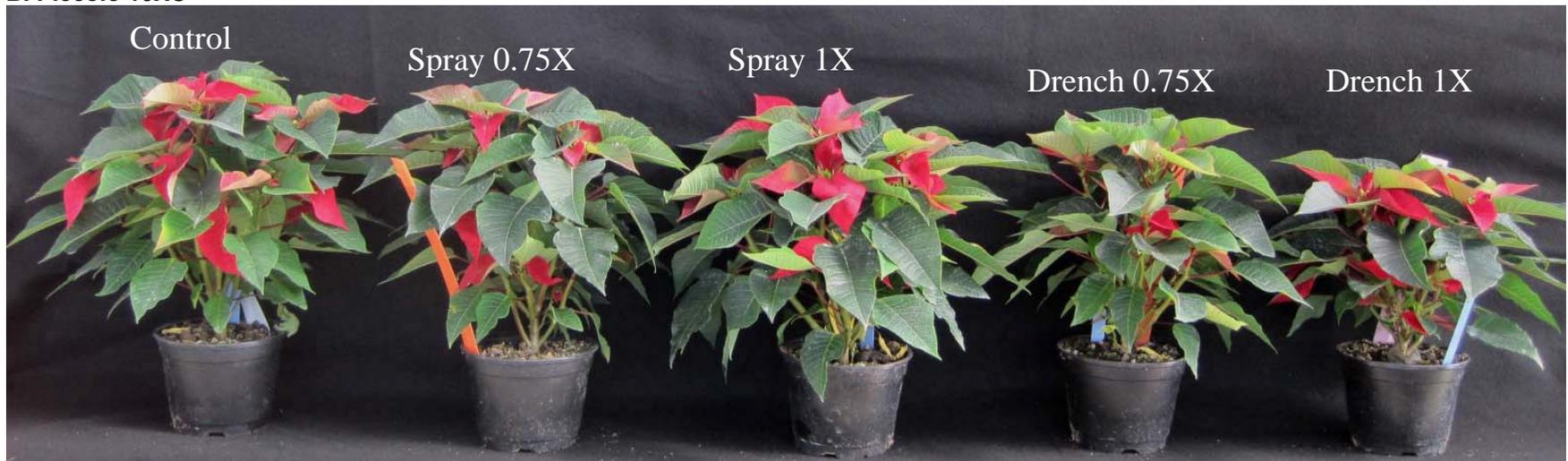


Figure 12. Poinsettia 'Prestige Early' 28 days after treatment application. Comparison of Piccolo and Piccolo 10XC-treated plants among application methods

A. Spray



B. Drench

