Effect of Cultivar and Thinning on Growth of Poinsettia

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Abstract

Effect of thinning to 3, 4, 5 or 6 lateral shoots on vegetative growth parameters of nine poinsettia cultivars was studied by consecutive measurements of growth in two separate experiments. During growth season apparent differences in vegetative growth parameters between cultivars were observed. In both experiments cultivars affected plant height and diameter, and diameter of lateral stem. The number of laterals affected final plant height in one experiment, and lateral stem diameter in both experiments. Stem diameter decreased as number of laterals increased. There was not much justification to recommend shoot thinning in poinsettia production.

Key words: Euphorbia pulcherrima, lateral stem diameter, number of shoots, plant diameter, plant height

Introduction

Greenhouse production of colorful (red, mottle red, white and red and white) poinsettias is usually scheduled for sale during December (Kannangara and Hansson, 1998). Depending on market demands, poinsettia can be grown without pinching to produce single-stem plants (Fisher et al. 1996) or can be pinched (apical meristem removed) to promote growth of lateral shoots for production of more compact plants (Berghage et al. 1989, Black and Schoellhorn, 2002). Plants pinched to have more lateral shoots might have fewer developed shoots that are more prone to stem breakage (Kuehny et al., 2000). Manipulation of the sink-source ratio by removing vegetative or generative organs is used in vegetable and ornamental production to control growth and yield (Heuvelink and Buiskool, 1995; Jovicich et al., 1999). Poinsettia growth control throughout sink limitation has not been extensively studied and there is a possibility that cultivars might respond differentially.
Material and methods

Poinsettia cultivars for both experiments were received from commercial company (Selecta Klemm GmbH & Co. KG, Stuttgart, Germany). The poinsettia plants in both experiment were grown in a greenhouse located in Split, Croatia (lat. 43°30'N, long. 16°25' E) under natural photoperiod. Cultivars were thinned by hand to 3, 4, or 5 lateral shoots (lateral) in the first experiment (Expt. 1), and on 3, 4, 5, or 6 laterals in the second experiment (Expt. 2). At the end of August all cultivars were transplanted into 1.5 L pots (15 cm diameter) filled with peat-based organic substrate (Type 4; Brill Substrate, GmbH & C. K.G. Georgsdorf, Germany) blended with perlite (Agrilit 3; Perlite Italiana, Milan, Italy) at a 3:1 (by volume) ratio. Experiments were a factorial combination of cultivars and number of laterals. Plants were grown on benches at 30 x 30 spacing (density of 11 plants m⁻²). In Expt. 1 plants were fertilized four times, from the middle of September to the end of November, with nutrient solution of pH 5.5, electrical conductivity (EC) 1.7 dS m⁻¹ using Terroflex –T (18 N, 8 P₂O₅, 25 K₂O, 3.5 MgO + microelements, Doctor Tarsa, Antalya, Turkey). In Expt. 2, plants were irrigated with nutrient solution [pH 5.5, EC 1.7 dS m⁻¹] recommended for cultivation of poinsettia in organic substrate by Sonneveld (1989). In both experiments the nutrient solution was delivered via drip system with four outlet emitters of 3 L h⁻¹ capacity (Toro Co., El Cajon, CA) with one spigot placed in each pot. Amount of applied nutrient solution ranged from 0.15 to 0.45 L per plant, depending on size of the plant and the environmental conditions in the greenhouse.

Plant height (from substrate surface to the top of the longest vertical lateral shoot), plant canopy diameter (the average of two measurements taken at the widest and shortest diameter), and stem diameter of lateral shoots (on the most developed lateral shoot on plant) were measured from October through December, in 10 day intervals (in Expt. 1), and from September through December, in 4-week intervals (in Expt. 2). All data were subjected to analysis of variance (ANOVA) using PROC GLM of SAS (version 6; SAS Institute, Cary, NC) to determine the difference between cultivars and number of laterals as well as presence of interaction.

Results and discussion

In Expt. 1 ‘Christmas Wish’ had the tallest plants of all cultivars from 21 Nov. to 9 Dec., whereas there were no differences in plant height among other cultivars (Fig. 1A). Number of laterals affected plant height on 29 Nov., and plants with four laterals were the shortest (Fig. 1B). The interaction between cultivar and number of laterals was significant on 9 Dec. The plant height of ‘Christmas Dream’ and ‘Christmas Season’ increased as the number of laterals per plant increased, while in other cultivars there were no differences in height between plants with three or five laterals per plant (data not show). In Expt. 2, plant height increased in all cultivars from Sept. to Dec. over a range from 8 cm to 13.5 cm per month (Fig. 2A). During entire growing period ‘Primero Roso’ had the tallest plants of all cultivars whereas from Oct. through Dec. ‘Cortez Candy’ was among the shortest cultivars. The number of laterals affected plant height only on 5 Oct., when plant height linearly increased with number of laterals (Fig. 2B). The interaction between treatments was not significant.

Differences in plant canopy diameter were observed among cultivars for all measurement in both experiments (Fig. 1C and 2C). There was no significant difference in plant canopy diameter between ‘Christmas Dream’ and ‘Christmas Wish’ from 31 Oct. and they were the narrowest (Fig. 1C). The number of laterals had no effect on canopy diameter during the entire growing period (Fig. 1D). In the period from Sept. to Dec., the plant canopy diameter of ‘Primero Roso’ increased from 36.4 to 71.8 cm, reaching the highest values among the tested cultivars in Expt. 2 (Fig. 2C). Just like in Expt. 1 in Expt. 2 no. of laterals had no effect on canopy diameter during the growing period (Fig. 2D). Berghage et al. (1989) found that the method of pinching affected plant architecture, but according to our results, thinning appeared to have no effect.

Cultivars affected lateral stem diameter until 9 Dec. with the narrowest stem diameter measured for ‘Christmas Dream’ (Fig. 1E). Plants with 3 laterals had the widest stem diameter on 21 and 29 Nov. (Fig. 1F). Diameter of the lateral shoot stem in Expt. 2 was doubled in all cultivars except ‘Cortez Candy’ from 6 Sept. to 5 Oct., after which the diameter growth slowed down (Fig. 2E). A significant decrease of lateral stem diameter was observed as number of laterals per plant was increased from 3 to 6 on 5 Nov. and 6 Dec. (Fig. 2F).
Figure 1.
Plant canopy height (A, B) and diameter (C, D), and lateral stem diameter (E, F) of five poinsettia cultivars thinned to 3, 4, or 5 lateral shots. Vertical bars indicate LSD-values ($P \leq 0.05$) for cultivar or laterals comparison on each date.
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Figure 2.
Plant canopy height (A, B) and diameter (C, D), and lateral stem diameter (E, F) of five poinsettia cultivars thinned to 3, 4, 5, or 6 lateral shots. Vertical bars indicate LSD-values ($P \leq 0.05$) for cultivar or laterals comparison on each date.
Conclusions

Differences for all growth parameters were observed among the tested cultivars. Thinning had effect on final plant height in Expt. 1 and in Expt. 2 only on 5 Oct. Also, at the end of growing season plants with more laterals had smaller lateral stem diameter in both experiments. According to our results, it appears that there is no justification to recommended shoot thinning in potted poinsettia production. This procedure did not substantially improve growth or quality of the product that may compensate for the increased cost of labor needed for a thinning operation.

References


sa2008_0424