

Growth and Development of Poinsettia (*Euphorbia pulcherrima* Will.) Var. Freedom Red on Different Concentration of Cycocel Application

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ABSTRACT

The objective of this research is to analyzed the growth and development of poinsettia (*Euphorbia pulcherrima* var. 'Freedom Red') under different rates of cycocel. This research was conducted at Saung Mirwan Nursery, Bogor, West Java from December 2005 to April 2006. The experiment used single factors cycocel concentration (1000, 1500, 2000, 2500 ppm) that was applied on plants by spraying methods. The experiment was arranged in complete randomized block design. The results of this research showed that the concentration of cycocel affected the plant growth especially for plant size (height, leaves, length of internode, diameter of stem and bractea). The optimal treatment of cycocel was 1000 ppm with 11 times of application that can result the proporsional size of pot plant poinsettia.

INTRODUCTION

Pot plant Poinsettias (*Euphorbia pulcherrima*) are known as symbol of Christmast. The plants are native of Tropical areas of central America and Mexico (Hartley 1992). Nowadays, they have been produced commercially in a few nurseries in West Java, Indonesia. The demand of pot poinsettias increases every year especially in Christmas season. Poissetias attracted because of the colour of bracteas like red, yellow, white, pink and others (Adams *et al.* 1995). Naturally, poinsettias can growth reach 3 metres in high, but for pot plants, the plant high should be controlled for the proportional size between container and plants.

Controlled of plant height can be done by retardants. Most plant growth retardants inhibit the formation of growth-active gibberellins (GAs) and can, thus, be used to reduce unwanted shoot elongation (Rademacher, 1995). Faust *et al.* (2001) reported the effect paclobutrazol on poinsettia growth and flowering. Retardants can be applied on plants by spraying plants or drenching to the soil (Prue and Gregory, 2002). Many kinds of retardant namely A-Rest, B-Nine, Bonzi, Cycocel, and Sumagic have been tested for control of poinsettias height. According to Lopes and Berg Stack (2003), the rates and methods of application of retardants for poinsettias are A-Rest (0.5 – 2 ppm, drench), B-Nine (2000-3000 ppm), B-nine (800 – 1250 ppm) mixed with Cycocel (1000-2000 ppm spray), Bonzi (10-30 ppm spray or 0.25-3 ppm drench), Cycocel (800-1500 ppm spray or 3000 – 4000 ppm drench), and Sumagic (2.5-10 ppm spray). The recommendation rates are specific for certain location in New England. We need to examine the optimal rates of retardant in control of poinsettias height in Indonesia, especially in certain nursery

in West Java. The aimed of the research was analyzed the growth and development of poinsettia var 'Freedom Red' under different rates of cycocel.

MATERIALS AND METHODS

Poinsettia cuttings around 10 cm in length (contain 6-8 nodes) were rooted in styrofoam medium. Rooted cuttings were planted in pot 15 cm (diameter) using mixed medium of rice husk and cocopeat (1:1 v/v). Pinching were carried at 2 weeks after planting. Cycocel treatment were started at 4 weeks after planting (2 weeks after pinching), used 4 level of concentration (1000, 1500, 2000, 2500 ppm) by spraying 20-30 ml of cycocel on plants. The experiments used complete randomized block design with single factors of cycocel concentration. Every treatment was repeated three times and every repetition contained 3 plants. Cycocel application were done for 9 weeks. Plants were placed under greenhouse with long day photoperiod (light from incandescent lamp 100 watt since 8 o'clock PM until 4.00 o'clock AM) at weeks 1 to weeks 8 after planting (8 weeks) and follow by short day photoperiod using polyethylene black (covering plants since 4 o'clock PM until 8 o'clock AM) at week 9 to week 15 after planting (7 weeks). The observation was done on plant height, leaves size, long of internodes, mainstem diameter, side branches length, number of leaves colouring, number of flowering plants.

RESULTS AND DISCUSSION

Concentration of cycocel affected most of character which observed in the experiments. Plant height was more retarded by increasing of cycocel concentration (Table 1). The highest plants were resulted in the lower concentration of cycocel and the shortest one in the highest concentration of cycocel. Leaves length and wide was also significantly affected by cycocel concentration (Table 2). Leaves length were decreased by the increasing of cycocel concentration although leaves length at 1000 and 1500 ppm of cycocel were not significantly different and leaves at 2000 and 2500 ppm of cycocel. Length of internodes were affected significantly by cycocel concentration. Internodes were shorter at the higher concentration of cycocel (Table 3). Mainstem diameter was affected by cycocel concentration (Table 4). Increasing of cycocel concentration can caused decreasing of stem diameter. Cycocel not only decreased plant height, length of leaves, internode, and mainstem diameter but also controlled the length of side branches (Table 5). The lowest concentration of cycocel (1000 ppm) resulted the most length of side branches, adversely the highest concentration caused the shortest one.

The results of experiment showed that cycocel treatment affected poinsettia development. Flowers of poinsettia were formed in cyathia, and not all plants produced flower. Number of flowering plants was highest at the smallest concentration of cycocel (1000 ppm, 55.5% of flowering plants). Plants were treated by high concentration of cycocel showed inhibition in plant flowering (Table 6), where only about 7 percent of plants produced flower at 2500 ppm of cycocel.

Colouring plants mean the plants had change leaves colour from green to red, then the leaves were called as bracteas. Number of colouring plants were inhibited by high concentration of cycocel. Number of colouring plants at 8 weeks after cycocel application were showed on Table 7. Although the high concentration of cycocel inhibited plants to produced colouring leaves, at 11 weeks after cycocel

application all plants had colouring leaves. There was not significant different between number of leaves colouring (bracteas) in all treatment (Table 8). Each plant had around 14-15 bracteas and only around 50-59% of bracteas had perfect red (perfect colouring) (Table 8). Plants spread means the longest distance between the two outer leaves. Plants spread were affected by cycocel concentration (Table 9). The smallest plants spread were resulted at the highest concentration of cycocel (2500 ppm).

Cycocel is the kind of plant retardant that often using in controlled of poinsettia height (Kessler, 2005). The proportional size of poinsettia pot could reached by optimal concentration of retardant. Kessler (2005) said that the proportional size of poinsettia were got if plants height about twice of container height. If container height is 15 cm, the proportional of plant height is 15-30 cm. In this experiment, the proportional size of poinsettia could produced at all concentration of cycocel, but using the lower concentration was more efficient. The morphology of poinsettia at 15 weeks after planting (at harvesting time) are shown in figure 1.

CONCLUSION

Cycocel affected growth of poinsettia by inhibition of plant height, length of internodes, length and wide of leaves, length of side branches and diameter of mainstem. High concentration of cycocel also affected plant development by inhibition of plants to start flowering and colouring of leaves. The optimal concentration of cycocel for poinsettia pot production in this experiment was 1000 ppm.

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LITERATURE CITED

- Adams, C. R., K.M. Bramford and M.P. Early. 1995. Principles of Horticulture. 2nd Edition. Butterworth Heinemann. 204p.
- Faust, J.E., P.C Korezynski and R. Klein. 2001. Effect of Paclobutrazol Drench Application Date on Poinsettia Height and Flowering. Hort.Technology. Vol II (4). P. 557-560
- Hartley, D.E. 1992. Poinsettias. P.306-330. *In* : Larson, R.A. (Ed.). Introduction to Floriculture. Academic Press Inc. San Diego.
- Kessler, R. 2005. Poinsettia Commercial Greenhouse Production. <http://www.ag.auburn.edu/hort/landscape/poinset.htm>. Tanggal Akses 14 September 2005.
- Prue, D.V. and P.J. Gregory. Gardening in the greenhouse: p 203-219. *In* D.S. Inram, D.V. Prue, and P.J. Gregory (Eds.) Science and The Garden : The Scientific Basis of Horticultural Practice. Blackwell Science. Oxford.
- Rademacher, W. 1995. Growth Retardants : Biochemical features and application in horticulture. ISHS Acta Horticulturae 394.

Wilfret, G. J. and Barrett. 2000. Growth regulators. p. 27-30. *In*. B. O. Tjia. (Ed.). Commercial Poinsettia Production in Florida. Departement of Ornamental Horticulture. University of Florida. Florida.

TABLES

Table 1. Plant height of Poinsettia Var. Freedom Red on Different Level of Cycocel

Cycocel (ppm)	Weeks After Cycocel Application					
	0	2	4	6	8	11
	Plant height (cm)					
1000	7.65	10.46a	13.90a	17.12a	21.23a	30.42a
1500	7.61	9.96a	13.36a	15.51b	19.29a	27.67b
2000	7.91	9.41a	13.00ab	14.88b	17.76c	25.08c
2500	7.31	9.16b	12.27b	13.78c	16.92c	23.79c

The average showing the same letter in the same colom are not stastically different from each other according to Duncan Multiple Range Test (p=0.05).

Table 2. Leaves length and wide of Poinsettia Var. Freedom Red at Different Level of Cycocel

Perlakuan	Weeks After Cycocel Application		
	2	4	6
<i>Cycocel</i> (ppm)	Leaves length (cm)		
1000	5.23a	10.15a	10.75a
1500	5.04ab	9.89ab	10.65a
2000	4.92ab	9.06bc	9.58b
2500	4.78b	8.77c	9.35b
	Leaves wide (cm)		
1000	3.64a	8.19a	8.83a
1500	3.73a	8.16a	8.83a
2000	3.56a	7.61ab	8.31ab
2500	3.21b	7.22b	7.84b

The average showing the same letter in the same colom are not stastically different from each other according to Duncan Multiple Range Test (p=0.05).

Table 3. Internodes length of Poinsettia Var. Freedom Red at Different Level of Cycocel

<i>Cycocel</i> (ppm)	Weeks After Cycocel Application		
	2	4	6
	Internode length (cm)		
1000	1.63a	1.70a	1.70a
1500	1.53ab	1.56a	1.50b
2000	1.41cb	1.36b	1.36c
2500	1.37c	1.30b	1.34c