

CONSUMER PREFERENCE FOR POINSETTIAS (EUPHORBIA
PULCHERRIMA WILLD.) AS AFFECTED BY CULTIVAR
AND CULTURAL TREATMENT

By

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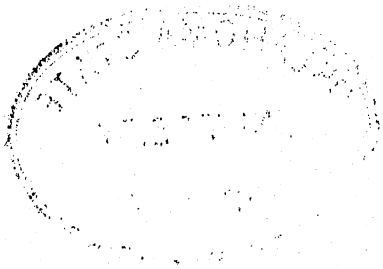
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CHAPTER I

INTRODUCTION AND LITERATURE REVIEW

Background

The poinsettia is said to have been assigned its botanical family name, Euphorbiaceae, from King Juba's physician(51). The genus, Euphorbia, contains between 700 and 1100 species. It is characterized by a single female flower without petals and it may or may not have sepals. The female flower is surrounded by male flowers enclosed in a cup-shaped structure called a cyathium. From one to four glands are found on the cyathium (11). Other members of the genus, Euphorbia, are Euphorbia splendens, or Crown-of-Thorns, Euphorbia fulgens, or Scarlet Plume, Euphorbia marginata, commonly known as Snow-on-the-Mountain, and many other succulents (11, 51).

The poinsettia was cultivated by the Aztec Indians long before Christianity arrived in the Western Hemisphere (51). The brilliant red bracts were considered to be a symbol of purity, as well as serving a more practical purpose. The red bracts yielded a brightly colored dye and the latex from the plant was used medicinally to counteract fever (11, 51).

The poinsettia was introduced in the United States in 1825 by Joel Robert Poinsett, the first United States ambassador to Mexico. Poinsett visited the city of Taxco and it was there that he found the plants growing on the hillsides. He then sent plants back to his home in

South Carolina and also supplied several botanical gardens with specimens as well (11, 51).

The first poinsettia commercially sold was listed as Euphorbia poinsettia. However, the plant was named by a German taxonomist in 1833 as Euphorbia pulcherrima Willd ex Klotz (11), and this is the botanical name for poinsettia today. The poinsettia remains as a profitable greenhouse crop and is grown virtually worldwide.

'Eckespoint C-1 Red' is considered to be the "cadillac" of poinsettias. It has very full bracts and usually needs a growth retardant. 'C-1' branches reasonably well and requires eleven weeks from start of short days to maturity. Water stress causes premature lower leaf drop. Bract color is deep red (11).

'Annette Hegg Lady' is a dark red cultivar of poinsettia with dark green contrasting leaves. It is a medium height poinsettia that requires 8 weeks to flower from start of short days (11). 'Annette Hegg Lady' is a self-branching cultivar.

'Gutbier V-14 Glory' is similar in color to 'C-1' and is medium height. 'V-14' retains its leaves well and has large bracts. 'V-14' also is a self-branching cultivar (11).

Growth Retardants

The use of quaternary ammonium compounds as growth inhibitors for use with poinsettia was first established in 1959 (25,26). The most effective compound was 2-chloroethyl trimethylammonium chloride, marketed commercially as Cycocel. The chemical, N-dimethylaminosuccinamic acid, B-9, or Alar was used in the mid-60's to retard the growth of poinsettias but is used to a lesser degree today. B-9 is less effective than Cycocel

in most instances (2, 3, 10, 16, 17, 18, 20, 21, 22, 23, 29, 30, 32, 35, 36, 47). With either chemical compound, the problem of phytotoxicity arises with high rates of application sometimes causing a burning of the leaves. This, however, may be linked to high temperatures in some cases. Temperatures in the 80-90^oF range increase the likelihood of phytotoxicity to the plant (2, 8, 11, 43). Phytotoxicity does not occur if the retardant is applied as a drench. By controlling temperatures at time of foliar application, phytotoxicity dangers are lessened considerably.

Cycocel is available as a liquid concentrate. It is sometimes applied as a foliar spray. Soil drench with Cycocel is preferred because one application is more effective than several foliar sprays. Soil drench is more expensive (1, 11).

Some of the undesirable effects of growth retardant application include crinkling of bracts, leaf abscission, yellow blotching of leaves, and delayed flowering (2, 8, 9, 11, 14, 17, 18, 27, 39, 48). These problems can be avoided by early application of the retardant if a spray application is used. Correct rate of application can also eliminate foliar damage (11).

A favorable side effect of growth retardant spray is the darkening of foliage or 'toning' (10, 11, 14, 35). Higher chlorophyll concentration has been observed in plants receiving a growth retardant spray (10, 11).

Methods of Application

The two primary methods used for applying growth retardants are as a foliar spray and as a soil drench. Cycocel is rarely used as a foliar spray. As a foliar spray, rate recommendations range from 1500 ppm to 3000 ppm for Alar (2, 10, 11, 13, 15, 16, 18, 19, 22, 24, 27, 28, 29, 30,

36, 37, 48, 49). Foliar spraying should be completed before November 1, for effective height control (11). Foliage should be thoroughly covered on the upper leaf surface. Foliar sprays should be applied only to the point of runoff to avoid wasting material and increasing production costs. The earlier the date of application, the stronger the rate recommended (6, 11, 15, 50). One strong application is also recommended over several weaker applications (2, 6, 13, 14, 20, 27, 30, 40).

Soil drenching is a safer method of application in that it produces fewer of the undesirable side effects caused by foliar spraying. A soil drench should be made as early as possible, usually after the plants are well-rooted in the container (11, 12, 34, 39). Application should be made no later than November 1, (11). Rates vary from 1500 ppm to 6000 ppm for Cycocel (11, 18, 47). Branched plants should be drenched approximately two weeks after pinching (11, 32) in order to allow the plant to establish new growth following the pinch. Rates for soil drench are somewhat higher, which increases the cost of materials. Labor is also an important factor since foliar spraying can be done on a large scale very easily while drenching is more time consuming. However, the soil drench is often more effective than a foliar spray (2, 16, 18, 20, 23, 26, 36, 37, 43, 49).

When applying growth retardants as a soil drench, a soil mix should be chosen without bark as a component. The growth retardant is absorbed onto the bark and does not move through the soil (33).

Very little research has been done to date with combinations of growth retardants. Love, Larson and Hilliard (31) experimented with several combinations, the most successful being a combination of Cycocel and Alar and a combination of Cycocel and F-529. Shanks (41) also had

encouraging results with a combination spray of Alar and Cycocel. Much of the determination of rates lies with the cultivar chosen, as many respond more readily to growth retardants than others.

A fungicidal drench is used in poinsettia culture (4, 5, 11, 23, 46). In 1968, Boodley hypothesized that the fungicides commonly used, Dexon and Terraclor, stunted the poinsettia's growth (4, 5). However, Kiplinger, Tayama and Staby (23) observed no phytotoxic symptoms even at the high rate of one teaspoon of Dexon per six inch pot. The damage incurred was primarily due to dry application. Under moist conditions no damage occurred.

A fungicidal drench is recommended at each stage of transplanting. Subsequent drenches with Dexon or Truban should occur at minimum 30 day intervals. The first drench should include Terraclor or Benlate (11).

Pinching

Pinching of poinsettias is becoming more popular as a commercial practice to control plant height (33) and eliminate the need for three cuttings per pot. Labor costs and growing time, will increase because of the need for hand pinching but the reduction in number of plants needed will reduce costs dramatically.

Pinching normally removes from one-half to three-fourths of an inch from the growing tip of the plant (1, 7, 37, 43, 44). No data was available on the possibilities of double-pinching. Pinching will increase the number of bracts from one to six or seven, depending upon the cultivar selected (7, 37, 42, 43, 44). Bract size is reduced when the plant is pinched but this is usually proportional to the reduction in size. Therefore, the overall appearance of the plant may be more

attractive because of the increased number of bracts (7, 37, 42, 43, 44).

Consumer Preference

Consumer preference should help commercial producers determine the growing practices they should use. Research indicates that pinched plants are preferred over unpinched plants and generally rate higher in evaluations (7, 48). Wade (48) found that on some cultivars, hard pinching resulted in branching with three or four heads per plant, while light pinching induced multiple branching with around seven heads. Coleman, Lindstrom and Larzelere (7) found that their consumer panel preferred plants with four or five bracts over those with three or seven bracts. The height of plant preferred by these same consumers was a medium height plant of 18.5 inches, including pot.

Research Objectives

The objectives of this study were:

1. To establish consumer preferences for poinsettias based on cultivar.
2. To establish consumer preferences for poinsettias based on cultural treatment.
3. To observe mature plant characteristics in four cultivars, manifested as a result of cultural treatments involving no-pinch vs. pinch treatments and no growth retardant vs. growth retardant treatments.

CHAPTER II

MATERIALS AND METHODS

Experimental Treatments

Four cultivars of poinsettia were selected for their different flowering and branching characteristics. 'Eckespoint C-1 Red,' 'Annette Hegg Lady,' 'Annette Hegg White,' and 'Gutbier V-14 Glory' were used.

Twenty-four treatments resulted from using six cultural methods on all four cultivars.

- Treatment 1: Single stem, three plants per six inch pot, no growth retardant
- Treatment 2: Single stem, three plants per six inch pot, growth retardant
- Treatment 3: Single pinch, one plant per six inch pot, no growth retardant
- Treatment 4: Single pinch, one plant per six inch pot, growth retardant
- Treatment 5: Double pinch, one plant per six inch pot, no growth retardant
- Treatment 6: Double pinch, one plant per six inch pot, growth retardant

Propagation

Plants in the single stem treatments were propagated under mist August 25, using 2½ inch clay pots containing 3 parts peat, 1 part Perlite, 1 part Vermiculite mix (Pro-Mix _{Bx}). They were given additional

fertilizer applications while under mist. The pots were double-filled with a liquid fertilizer solution on September 8 and September 13. A 20-20-20 formulation was used at the rate of 28 grams per 11.3 liters of water.

Single and double pinch plants were propagated August 7 using the same method.

Panning

Single pinch and double pinch plants were panned into 15 cm pots and placed in the final bench location on September 2.

Single stem plants were panned into 15 cm pots and placed in the final bench location on September 19.

The growing medium used was Pro-Mix_{Bx}¹. The contents of Pro-Mix_{Bx} are:

Sphagnum Peat	.465 m ³ (13.2 bushels)
Vermiculite	.155 m ³ (4.4 bushels)
Perlite	.155 m ³ (4.4 bushels)
Dolomite	4.540 kg (10 pounds)
0-20-0	1.134 kg (2½ pounds)
KNO ₃	680 g (1.5 pounds)
Fritted Trace Element	85 g (3 ounces)
Wetting Surfactant	142 g (5 ounces)

After panning, a constant liquid fertilizer solution of 200 ppm of N, P₂O₅, and K₂O was applied at every watering. The plants were given a

¹Pro-Mix_{Bx} is a product of Premier Brands Peat Moss Corporation New York, New York.

soil drench with 200 ml. of a Dexon (Lesan)-Benlate solution per pot.²

Experimental Design and Physical Arrangement

The experimental design was a Randomized Complete Block design with four single pot replications. Each bench held 24 pots placed on 38 cm centers (Figure 1).

Cultural Practices

Night temperatures ranged from 17.2°C to 18.3°C. Temperatures on sunny days were maintained as near as possible to 22.7°C to 25.5°C and on cloudy days, from 20°C to 21.6°C.

Dexon (Lesan)-Benlate drench was applied as a soil drench on September 21 and October 25 to reduce susceptibility to Pythium and other rot organisms. Two hundred milliliters of drench was applied per pot. Single pinch and double pinch plants were pinched on September 11. The double pinch plants were soft pinched on September 21.

Plants on Treatments 2, 4 and 6 were treated with a combination growth retardant solution of 2500 ppm Alar and 2000 ppm Cycocel. This was applied as a foliar spray to the point of runoff, using approximately 50 milliliters per pot.

Beginning December 1, plants were watered with unfertilized water.

²Two grams of Dexon (Lesan) 35 WP and 2 grams of Benlate 50 WP in 3.78 liters of water.



Figure 1. Overall View of Poinsettia Crop
Showing Randomized Block Design

Data Recorded

Midpollen

Tagging plants for midpollen date was begun on November 15, designated as day number one. Midpollen was determined when half the bracts per pot had three cyathia each showing ripe pollen. On single stem pots, two of the three bracts had to have three ripe cyathia to qualify as a mature plant. All plants were tagged by December 8.

Height

At maturity, plant height was measured in centimeters above the pot rim. On single stem plants, heights for all three plants were measured and recorded. These were later averaged. For single pinch and double pinch plants, one height per pot was recorded using the tallest point on the plant.

Number of Bracts

The common usage of the term "bract" was employed in this study, designating all of the showy bracts surrounding one stem's cyathia as a "bract".

All single stem treatments were recorded as containing three bracts. Undergrowth was not recorded. On pinched plants, any small bract which did not significantly contribute to the overall appearance was not counted.

Bract Diameter

Bract diameter was measured in centimeters perpendicularly across the face of each bract. This was averaged during statistical analysis.

Consumer Preference

The consumer preference study took place on December 8, 1978. Two separate evaluations were made by consumers. Consumers consisted of a total of 75 people ranging in age from approximately 17 to 70. In each of the 2 consumer preference evaluations, each person was asked to rank each poinsettia pot within the class from first, or most preferred to last, or least preferred. Pots were assigned random numbers. No ties were allowed.

Treatment Preference Evaluation

For this portion of the evaluation each person was given 16 cards, for the four replications and 4 cultivars. Pots were grouped by cultivar and by replication, so each group of plants would contain one pot of each treatment. Thus, every pot in every replication was included in the evaluation. This portion of the evaluation was 51 percent male and 49 percent female.

Cultivar Preference Evaluation

For this part of the evaluation the pots were grouped by treatment so that each group contained one pot of each cultivar. Twenty-three people were given 6 cards each and again, placed the plants from most preferred, or first place to least preferred, or fourth place. There were six

classes set up with a representative pot from each treatment being selected. Forty-four percent of those evaluating were male and 56 percent female.

CHAPTER III

RESULTS AND DISCUSSION

Statistical Analysis Consumer Preference

Consumer preferences in both evaluations (treatment and cultivar) were analyzed by ranked total scores. Significant differences were indicated by LSD at the five percent level.

Treatment Preference Evaluation

'Eckespoint C-1 Red'

For the 'C-1' cultivar all the nontreated plants placed generally above those that received the growth retardant. The Alar-Cycocel growth retardant severely affected 'C-1' and delayed overall development. The single pinch nontreated plant and the double pinch nontreated plant were most preferred, followed by the single stem nontreated. The ranked total scores (Table I), showed that if 'C-1' is to be treated with a growth retardant it should be of lower concentration (Figures 2, 3, 4).

Probably the most common commercial treatment for 'C-1' is the single stem, no regulator treatment, yet in the evaluation it ranked third, significantly below the single and double pinch treatments.

'Annette Hegg Lady'

The single stem plants with no growth retardant were most preferred,



Figure 2. 'Eckespoint C-1 Red', Single Stem
Left: No Growth Retardant
Right: Growth Retardant



Figure 3. 'Eckespoint C-1 Red', Single Pinch
Left: No Growth Retardant
Right: Growth Retardant



**Figure 4. 'Eckespoint C-1 Red', Double Pinch
Left: No Growth Retardant
Right: Growth Retardant**

TABLE I
 DIFFERENCES IN RANKED TOTAL SCORES FOR CULTIVAR
 'ECKESPOINT C-1 RED'

Pinch	Retardant	Total Score ^z
Single	No	481 a ^y
Double	No	496 ab
None	No	751 c
None	Yes	836 cd
Double	Yes	942 e
Single	Yes	1030 e

^ySignificant differences by LSD at 5 percent level.

^zLower Score indicates higher preference.

followed by the single stem, retardant treated plant. Plants in the double pinch, no retardant treatment placed significantly higher than the remaining treatments. In comparing growth retardant treated plants with those not receiving retardant, but with the same pinch treatment, the only significant difference was in the single stem treatment where nonsprayed plants ranked higher than sprayed plants (Table II). The common commercial production practice on 'Annette Hegg Lady' is to grow it as a single pinch plant. This treatment was the least preferred in this study. The single stem plant placing highest displayed very large bracts. This particular cultivar responded strongly to the retardant spray but in a more favorable way than the 'C-1'. Growth retardant treated plants were very compact and full since this cultivar branches readily (Figures 5, 6, 7).

'Gutbier V-14 Glory'

The 'V-14' cultivar displayed less effect from the retardant spray. It responded well to pinching with the single pinch nontreated plants and double pinch nontreated plants placing highest. They were followed by the single pinch, sprayed plants and the single stem, non sprayed plants. Double pinch and no pinch plants receiving growth retardant ranked lowest (Table III). The 'V-14' is self-branching and the single stem pots displayed many secondary bracts, which added a great deal of color, and to the overall attractive appearance (Figures 8, 9, 10).

'Annette Hegg White'

This cultivar and 'Annette Hegg Lady' responded to growth retardant treatment very similarly with very compact plants containing a great

TABLE II
 DIFFERENCES IN RANKED TOTAL SCORES FOR CULTIVAR
 'ANNETTE HEGG LADY'

Pinch	Retardant	Total Score ^z
None	No	491 a ^y
None	Yes	689 b
Double	No	756 bc
Double	Yes	811 cd
Single	No	888 d
Single	Yes	901 d

^ySignificant differences by LSD at 5 percent level.

^zLower score indicates higher preference.

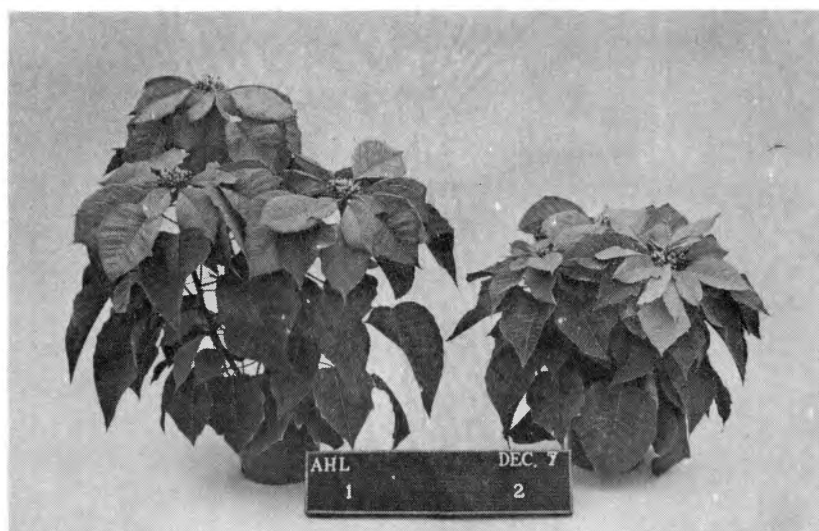


Figure 5. 'Annette Hegg Lady', Single Stem
Left: No Growth Retardant
Right: Growth Retardant

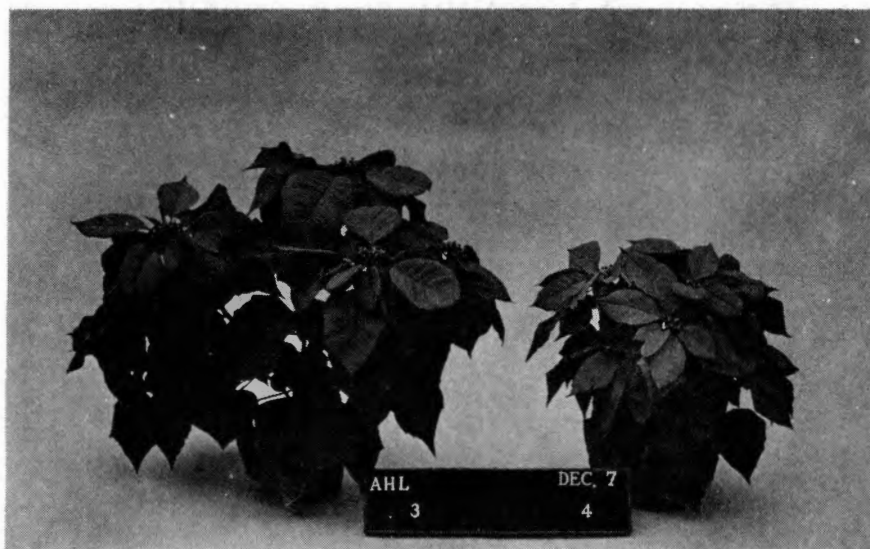


Figure 6. 'Annette Hegg Lady', Single Pinch
Left: No Growth Retardant
Right: Growth Retardant



Figure 7. 'Annette Hegg Lady', Double Pinch
Left: No Growth Retardant
Right: Growth Retardant

TABLE III
 DIFFERENCES IN RANKED TOTAL SCORES FOR CULTIVAR
 'GUTBIER V-14 GLORY'

Pinch	Retardant	Total Score ^z
Single	No	461 a ^y
Double	No	558 ab
Single	Yes	736 c
None	No	811 cd
Double	Yes	954 e
None	Yes	1016 e

^ySignificant differences by LSD, at 5 percent level.

^zLower score indicates higher preference.



Figure 8. 'Gutbier V-14 Glory', Single Stem
Left: No Growth Retardant
Right: Growth Retardant

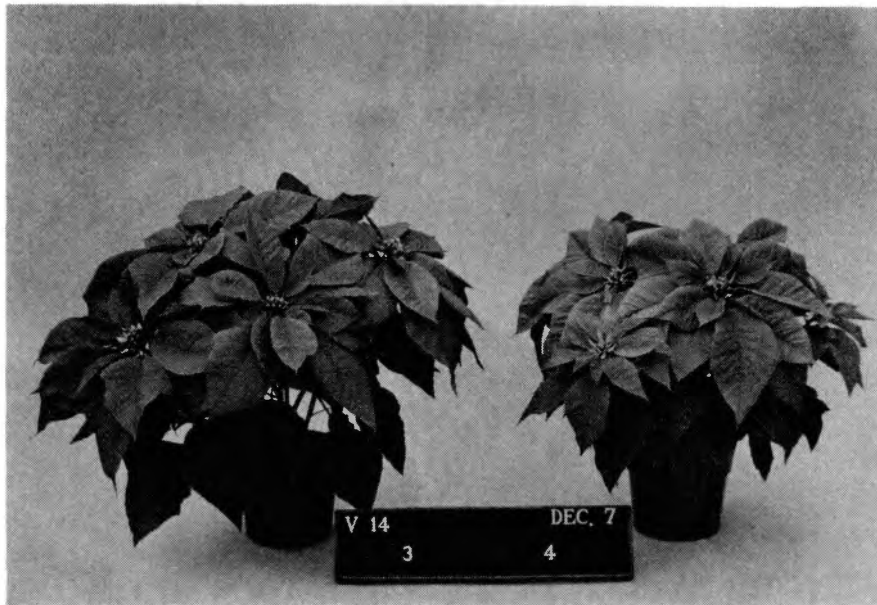


Figure 9. 'Gutbier V-14 Glory', Single Pinch
Left: No Growth Retardant
Right: Growth Retardant

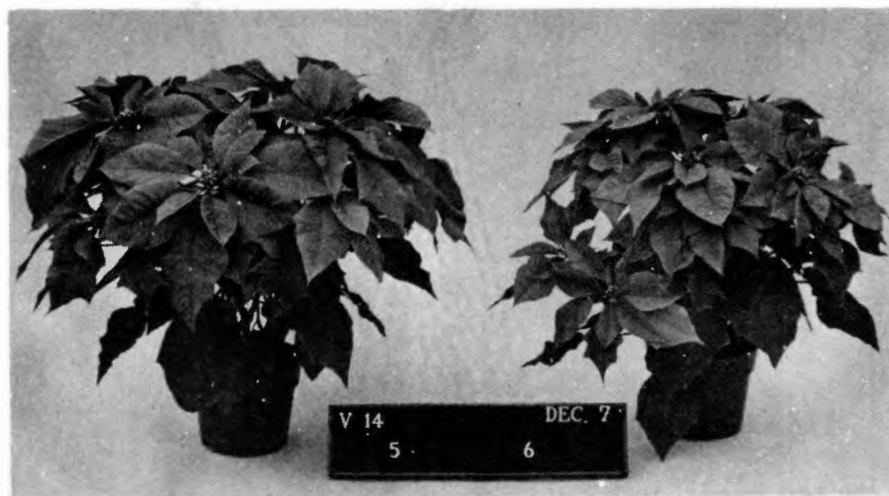


Figure 10. 'Gutbier V-14 Glory', Double Pinch
Left: No Growth Retardant
Right: Growth Retardant

number of bracts. The double pinch and single pinch nontreated plants ranked highest (Table IV). Again, the common commercial production practice is a single pinch. The only treated plant ranking fairly high was the single stem pot (Figures 11, 12, 13).

Cultivar Preference Evaluation

Single Stem, No Retardant

In this treatment, the only significant difference indicated was between 'V-14' and 'C-1' (Table V). This is one of the most common commercial cultural treatments for 'C-1'. All cultivars exhibited large bracts. The significant difference in ranking indicates that the 'V-14' grown single stem may have commercial possibilities even though it tends to self-branch, (Table VI).

Single Stem, With Retardant

Again, 'V-14' was ranked highest among all cultivars, but was not significantly preferred over 'Annette Hegg Lady' (Table VI) even though there was a great difference in heights and overall appearances between the two cultivars. The 'C-1' plant was ranked lowest, along with 'Annette Hegg White', probably because of the severe response to the retardant spray.

Single Pinch, No Retardant

This treatment ranked 'V-14' significantly higher than the other cultivars (Table VII). There were no significant differences among 'Annette Hegg White', 'C-1' and 'Annette Hegg Lady'.

TABLE IV
 DIFFERENCES IN RANKED TOTAL SCORES FOR CULTIVAR
 'ANNETTE HEGG WHITE'

Pinch	Retardant	Total Score ^z
Double	No	570 a ^y
Single	No	617 ab
None	Yes	715 bc
None	No	759 cd
Double	Yes	857 de
Single	Yes	1018 f

^ySignificant differences by LSD at 5 percent level.

^zLower score indicates higher preference.



Figure 11. 'Annette Hegg White', Single Stem
Left: No Growth Retardant
Right: Growth Retardant

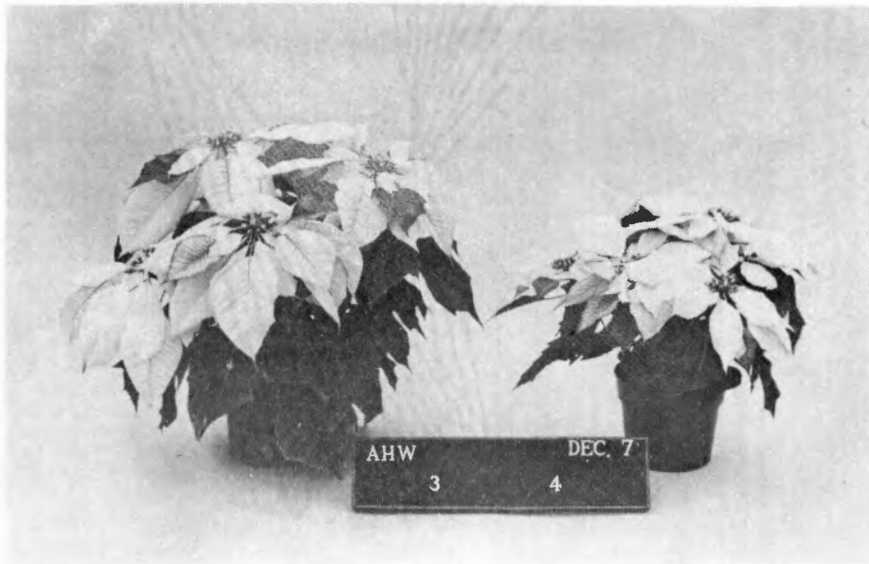


Figure 12. 'Annette Hegg White', Single Pinch
Left: No Growth Retardant
Right: Growth Retardant

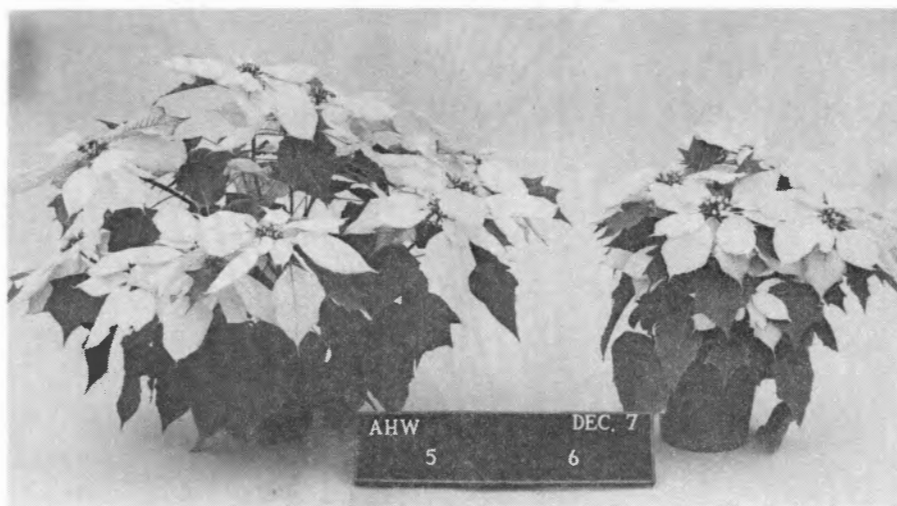


Figure 13. 'Annette Hegg White', Double Pinch
Left: No Growth Retardant
Right: Growth Retardant

TABLE V
DIFFERENCES IN RANKED TOTAL SCORES-ALL CULTIVARS
SINGLE STEM--NO RETARDANT

Cultivar	Total Score ^z
V-14	44 a ^y
AHL	57 ab
AHW	63 ab
C-1	66 b

^ySignificant differences by LSD at 5 percent level.

^zLower score indicates higher preference

TABLE VI
DIFFERENCES IN RANKED TOTAL SCORES--ALL CULTIVARS
SINGLE STEM--RETARDANT

Cultivar	Total Score ^z
V-14	37 a ^y
AHL	49 ab
AHW	62 c
C-1	82 c

^ySignificant differences by LSD at 5 percent level.

^zLower score indicates higher preference.

TABLE VII
DIFFERENCES IN RANKED TOTAL SCORES-ALL CULTIVARS
SINGLE PINCH--NO RETARDANT

Cultivar	Total Score ^z
V-14	26 a ^y
AHW	57 b
C-1	70 b
AHL	77 b

^ySignificant differences by LSD at 5 percent level.

^zLower score indicates higher preference.

Single Pinch, With Retardant

The 'V-14 Glory' once again ranked significantly higher than all cultivars (Table VIII). It was followed by 'Annette Hegg Lady', 'C-1' and 'Annette Hegg White', respectively. This may have been affected by the lack of response to retardant exhibited by 'V-14'.

Double Pinch, No Retardant

No significant differences were indicated between 'V-14', 'Annette Hegg White' and 'C-1', although 'V-14' was ranked numerically highest (Table IX). 'Annette Hegg White' and 'Annette Hegg Lady' responded to the double pinch with a great number of smaller bracts.

Double Pinch, With Retardant

The strength of the retardant spray caused 'C-1' to again be ranked lowest in the treatment along with 'Annette Hegg Lady' while 'V-14' again was ranked highest. There was no significant difference between 'V-14' and 'Annette Hegg White' (Table X).

Growth Data

Height

The height was affected by the cultivar, the pinch and the retardant, with interaction indicated between cultivar and retardant and also pinch and retardant (Table XI). Single stem, no retardant treatments averaged 11.8 cm. taller than single stem retardant treatments. On single pinch treatments, those receiving growth retardants averaged 10.9 cm. shorter than the nontreated plants. The double pinch treatments showed

TABLE VIII
DIFFERENCES IN RANKED TOTAL SCORES-ALL CULTIVARS
SINGLE PINCH--RETARDANT

Cultivar	Total Score ^z
V-14	27 a ^y
AHL	54 b
C-1	65 bc
AHW	84 c

^ySignificant differences by LSD at 5 percent level.

^zLower score indicates higher preference.

TABLE IX
DIFFERENCES IN RANKED TOTAL SCORES-ALL CULTIVARS
DOUBLE PINCH--NO RETARDANT

Cultivar	Total Score ^z
V-14	38 a ^y
AHW	58 ab
C-1	58 ab
AHL	76 b

^ySignificant differences by LSD at 5 percent level.

^zLower score indicates higher preference.

TABLE X
DIFFERENCES IN RANKED TOTAL SCORES--ALL CULTIVARS
DOUBLE PINCH--RETARDANT

Cultivar	Total Score ^z
V-14	38 a ^y
AHW	55 ab
AHL	65 b
C-1	72 b

^ySignificant differences by LSD at 5 percent level.

^zLower score indicates higher preference.

TABLE XI
 RELATIVE RESPONSE TO GROWTH RETARDANT IN
 TERMS OF HEIGHT

Cultivar	Retardant	Treatments			Mean ^y
		Single Stem (cm)	Single Pinch (cm)	Double Pinch (cm)	
V-14	No	37.5	34.1	34.9	35.5
V-14	Yes	32.6	29.9	29.8	30.7
AHL	No	43.5	39.1	36.8	39.8
AHL	Yes	23.8	21.9	34.6	23.4
AHW	No	43.9	37.6	34.0	38.5
AHW	Yes	27.2	23.5	28.6	26.4
C-1	No	42.8	39.3	34.4	38.8
C-1	Yes	36.8	31.5	29.5	32.6

^yError mean square is 973.5 with 69 df.

the least amount of difference in height with only 6.875 cm average difference in the heights of the plants receiving the growth retardant and those that did not receive the growth retardant.

'Annette Hegg Lady' was severely retarded by the Alar-Cycocel spray with a difference in treated and nontreated heights of 16.3 cm. 'Annette Hegg White' was also affected by the growth retardant treatment with a difference of 12.1 cm between untreated and treated plants. The 'C-1' plants heights were not dramatically affected with only 6.3 cm difference in average heights, but the retardant greatly affected bract size. The growth regulator affected 'V-14' least of all with only 4.8 cm difference.

Number of Bracts

Number of bracts was affected by cultivar and pinch, with interaction between cultivar and pinch indicated also (Table XII).

By cultivar, 'C-1' had the least number of bracts with 4.9, followed by 'V-14' with 6.3 average number of bracts. Very little difference was seen between 'V-14', 'Annette Hegg White' and 'Annette Hegg Lady'. 'Annette Hegg White' averaged 6.4 bracts per pot and 'Annette Hegg Lady' averaged 6.5 bracts per pot.

By pinch, there was a steady increase in number of bracts with number of pinches. Single stem plants always had three bracts. Single pinched plants averaged 5.7 bracts per pot and double pinched plants had an average of 9.3 bracts. 'Annette Hegg Lady' responded to zero, one and two pinches with 3, 6 and 10.4 average number of bracts, respectively. 'Annette Hegg White' was almost identical in its response with 3, 6 and 10.3 averages for zero, one and two pinches. Both 'Annette Hegg White' and 'Annette Hegg Lady' are self branching

TABLE XII
 RELATIVE NUMBER OF BREAKS BY CULTIVAR
 DUE TO PINCHING

Cultivar	Retardant	Treatments			Mean ^y
		Single Stem	Single Pinch	Double Pinch	
V-14	No	3.0	5.8	10.0	6.3
V-14	Yes	3.0	6.0	10.0	6.3
AHL	No	3.0	5.8	11.3	6.7
AHL	Yes	3.0	6.3	9.5	6.3
AHW	No	3.0	5.8	11.5	6.8
AHW	Yes	3.0	6.3	9.0	6.1
C-1	No	3.0	5.0	7.0	5.0
C-1	Yes	3.0	4.8	6.5	4.8

^yError mean square is 1.39 with 69 df.

cultivars as indicated when comparing them to 'C-1', which does not readily branch, and had 3, 4.9 and 6.8 averages for number of bracts per pot. 'V-14' also tends to branch quite easily and responded with 3, 5.9 and 10 bracts per pot averages for zero, one and two pinches.

Bract Diameter

Bract diameter was affected by cultivar, pinch and retardant, with interactions between pinch and retardant, and cultivar, pinch and retardant. 'V-14' produced the largest diameter bracts, with an average of 31.7 cm. It was followed by 'Annette Hegg Lady' with 27.1 cm, 'C-1' with 27.1 cm and 'Annette Hegg White' with 26.7 cm (Table XIII).

Number of pinches affected the bract diameter, with the average diameter for single stem plants being the largest with 31.2 cm average bract diameter. Single pinch treatments averaged 29.0 cm bracts, and double pinch treatments had the smallest bract diameter with 24.3 cm bracts.

Midpollen

Midpollen was recorded when half the cyathia were open. Very little difference was noted between those receiving the growth retardant spray and those that were not sprayed. The treated plants averaged anywhere from no difference in midpollen dates to 3.3 for the greatest difference, but even this was not significant. 'Annette Hegg Lady' was the first cultivar to reach maturity, followed by 'Annette Hegg White', 'C-1' and 'V-14', respectively.

TABLE XIII
 RELATIVE BRACT SIZE AMONG ALL CULTIVARS AND
 TREATMENTS

Cultivar	Retardant	Treatments			Mean ^y
		Single Stem (cm)	Single Pinch (cm)	Double Pinch (cm)	
V-14	No	38.3	36.4	29.4	34.7
V-14	Yes	32.1	30.3	23.3	28.6
AHL	No	35.8	33.8	25.4	31.6
AHL	Yes	25.5	21.7	20.5	22.6
AHW	No	32.9	34.2	24.3	30.5
AHW	Yes	27.0	21.8	20.2	23.0
C-1	No	35.1	29.7	27.2	30.7
C-1	Yes	22.7	23.7	23.9	23.4

^yError mean square is 2481.36 with 69 df.

Conclusions

In the survey conducted in this study, 'V-14' was the most popular cultivar. The most popular treatment of 'V-14', was a single pinch with no growth retardant. The large bract size and good bract and foliage color made the 'V-14' a very desirable plant. With its tendency to respond well to a single pinch, this cultivar becomes a profitable solution to the cost of three plants per pot. Bracts had a tendency to fade but this was not reflected in the results. Fading could be corrected by growing at cooler temperatures.

Most consumers preferred plants that had not been treated with a growth retardant to those that received the retardant spray. This seems to indicate that the grower who habitually applies a growth retardant may be increasing growing costs unnecessarily. However, the plants treated with retardant would be good for mass market.

Of the three pinch treatments, either single stem or single pinch would be recommended. The double pinched plants generally ranked somewhat lower and would increase labor costs. Growing three plants per pot also increases production costs. Therefore, for the 'V-14', 'Annette Hegg Lady' and 'Annette Hegg White', a single pinch is a preferred treatment. The 'C-1' with a single pinch and no growth retardant was the only pinched treatment for 'C-1' that was favorably ranked. The consumers surveyed seemed to prefer the standard red poinsettia over 'Annette Hegg White' in most cases.

For future consumer preference studies a more public location would be desirable where a greater number of people could participate. The use of several different rates of growth retardants would also be

recommended, due to the great variance in response shown by the cultivars used in this study.

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