synthesis of gibberellins (3, 12, 16) and it is generally felt that these compounds affect growth and development through their affect on endogenus gibberellin levels. However, the mechanism for control of stomatal function is not well understood. Not all retardants have the same effect, and method of application is important (Table 3). A common side effect of chlormequat foliar applications is a slight chlorosis. This is not observed with the other retardants, thus the stomatal closure may be an injury response. Orton and Mansfield (8) examined the effect of daminozide on stomatal function and suggested that stomatal closure was due to an increase in internal CO_2 concentrations. The stomatal closure response is probably not due to the chemical's affect on gibberellin levels because there is little evidence to indicate that gibberellin plays a role in stomatal function (4).

Table 3. Effect of ancymidol and chlormequat on transpiration in tomato during the first 24 hours after treatment.

Treatment	Transpiration (g/day)
Control	40.8
Ancymidol drench 0.5 mg/pot	38.3
Ancymidol 100 ppm (foliar spray)	34.8
Chlormequat drench 308 mg/pot	38.0
Chlormequat 1715 ppm (foliar spray)	26.8
LSD 5%	12.0

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AN EVALUATION OF NEW POINSETTIA SEEDLINGS AND COLOR MUTANTS[1]

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Abstract. **Advanced lines of poinsettia (**Euphorbia pulcherrima **Willd.) were compared with standard commercial cultivars to determine their value for production in central Florida. Two seedlings and 2 color mutants were grown in 1979 and compared to 3 named cultivars. Plants were maintained in a polypropylene covered house (25% shade) with 2 irrigation systems (capillary mat and hand-watering). Five new lines were evaluated in 1980 and were compared to 3 commercial cultivars grown in polypropylene mesh and fiberglass structures. Plants were grown as single cuttings pruned to 5 nodes in 6 inch diameter pots. Plants irrigated with the capillary mat were up to 2.5 inches taller and had a greater diameter than those hand-watered. Water source had no effect on inflorescence diameter, number of colored bracts per inflorescence, and the number of laterals. 'Glory (V-14),' with light rose-red bracts, strong upright stems, and a self-branching growth habit was rated the most desirable of the seedlings in these studies. 'Annette Hegg Top White' was an improvement over 'Annette Hegg White' because of its early bract coloration, its white (not cream) bracts, and its strong stems. 'R-13,' with vivid red bracts and dark green oak-leaf shaped foliage, was inconsistent in development of lateral shoots after removal of the terminal. 'Annette Hegg Brilliant," with red-orange bracts, could replace 'Annette Hegg Supreme' in Florida production.**

Production of potted poinsettias (*Euphorbia pul-*

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cherrima Willd.) in Florida has expanded in the last few years to a 2,312,000 dollar industry which sold 903,000 units in 1980 (9). Unlike production in most geographic areas of the United States where poinsettias are grown in high energy requiring temperature controlled greenhouses, Florida growers utilize existing favorable climatic conditions to produce this crop in open fields or in a variety of low energy structures, such as plastic covered sawtooth and saran (polypropylene) shade houses. The increase in fuel costs has forced the modification of production centers of poinsettias in the U.S. From 1976 through 1980 poinsettia production increased 31.7% in the northeastern and midwestern states while it increased 68.9% in the southern states (7, 9). A further reflection of the higher energy costs was a 6.0% decrease in units produced in the northeastern and midwestern states from 1978 through 1980 while there was a 5.6% increase in the southern states during this period (8, 9).

Since temperatures cannot be controlled completely in most of the structures used in Florida, plant growth is dependent upon ambient conditions which limit the ability of the grower to manipulate the plants. In cooler areas of the U.S., plant height, flower initiation, and flower development can be modified by night temperatures below 65°F (4, 5) and bract color on the red cultivars is more intense when the plants are finished in December at temperatures of 58° to 60°F (3, 6) as compared to higher night temperatures. Florida growers must utilize lights to delay flower initiation (1), growth retardants to limit plant height (2, 10), and cultivars which are self-branching and vigorous (11).

The majority of the commercially grown cultivars have developed by mutation from 'Annette Hegg,' 'Paul Mikkelsen,' and 'Eckespoint C-1.' They were selected for specific bract, folioge, and general growth characteristics when grown in northern greenhouses. The purpose of this study was to evaluate new poinsettia cultivars and numbered seedlings when grown in central Florida with 2 irrigation systems and compare them to the most widely grown cultivars.

Materials and Methods

General: Single poinsettia cuttings, which were established in 2 inch diameter Oasis® blocks, were planted in 6 inch diameter plastic pots (RT600). The medium consisted of a mixture of Florida Peace River peat, coarse white builders' sand, coarse vermiculite, and perlite (5:3:3:1, by volume). Each pot had four 0.375 inch diameter holes in the bottom and four 0.5 x 0.6 inch holes at the base of the sides. Amendments, per cubic yard of medium, were 13.2 lbs. Osmocote® 18-6-12 (N, P_2O_5, K_2O), 2.1 lb. 6-6-6 dry fertilizer (30% organic), 20.0 lb. dolomite, 8.0 lb. hydrated lime, 6.0 lb. superphosphate, and 2.0 lb. Perk® (a minor element mixture manufactured by Esteech General Chemical Corp., Winter Haven, FL). Initial pH was 6.2. Transplants were drenched once with a Truban® (35W)-Benlate® (50W) mixture (0.5 lb. + 0.5 lb./100 gal) and and hand-watered thoroughly. Disease and insects were controlled by weekly sprays. Plant height above the pot rim, plant diameter, number of laterals which had colored bracts, diameter of terminal inflorescence, and number of colored bracts per infllorescence were recorded.

1979. Plants were potted on August 29 and placed on the hand-watered or capillary mat beds in the shade house covered with black polypropylene (25% shade). Plants were pruned manually to 5 nodes on September 19 and each pot was drenched on October 8 with 6 oz of an ancymidol solution which contained 0.375 mg ai. Water was distributed on the Vattex® capillary mat with 2 Chapin® twin-wall tubes (4 inch hole spacing) spaced 12 inches apart down the length of the 72 ft bed. The mat and tubes were covered with a 1.25 mil white-on-black polyethylene mulch with the white side up. Plants were set 3 across on the 3.3 ft wide beds, with the center row staggered from the outer two. Pots were spaced on 16 inch centers and the plastic under each pot was cut and discarded. The capillary mat was irrigated every 6 hours in an amount to thoroughly wet the mat without run-off. The mat (237.6 ft^2) was irrigated for the first 6 weeks with 18-20 gal. of water per 24 hours, divided into 4 equal intervals. After 6 weeks the water was increased to 23-24 gal. per 24 hours for the duration of the crop. The hand-watered beds required 23-24 gal. of water every other day for the first month. Daily watering of 29-34 gal. per bed was required starting 3 weeks following the manual pruning. Cultivars evaluated were 'Annette Hegg Diva,' 'Annette Hegg Supreme,' 'Annette Hegg Brilliant,' 'Eckespoint C-1 Red,' 'Eckespoint C-1 Hot Pink,' 'Glory (V-14),' and 'R-13.' The experimental design was a split plot and each cultivar contained 3 replications of 3 pots each. Data were recorded on December 12.

1980. Plants were potted on August 30 and placed in a fiberglass covered greenhouse and a polypropylene shade house. They were pruned manually to 5 nodes on September 18 and treated on October 7 with ancymidol at 0.25 mg ai/pot, applied as a soil drench. Plants grown in the fiberglass house (30% shade) were hand-watered and spaced in 2 rows on 16 inch centers on 3.3 ft wide beds. Plants in the polypropylene house were irrigated with a capillary mat system designed as in 1979. Cultivars evaluated were 'Jingle Bells,' 'Annette Hegg Diva,' 'Annette Hegg Supreme,' 'Annette Hegg White,' 'Annette Hegg Top White,' 'Glory (V-14),' 'R-13,' '39-79,' and '4-80.' The experimental design in both structures was a randomized block. There were 3 replications of 4 plants each in the fiberglass house and 5 replications of 3 plants each in the polypropylene shade house. Data were recorded December 16 in the fiberglass house and December 18 in the shade house. Three plants of each line were placed in an air conditioned room (75°F and 100 ft-c) on December 20 and observed for 4 weeks to determine bract and leaf retention.

Results and Discussion

1979. The fall season was almost optimum for poinsettia production with daily rainfall and warm nights during the first month of the crop. Plants grown on the capillary mat were taller than those hand-watered (Table 1). Plants on the mat averaged 11.7 inches while those hand-watered averaged 9.8 inches. Also, plant diameter was greater when irrigated by the capillary mat. Watering technique had no effect on inflorescence diameter, number of colored bracts per inflorescence or number of laterals which matured after the manual pruning. No significant interaction was found between cultivar and water source. The hand-watered plants were slightly shorter than desired, possibly due to the effect of the high night temperatures affecting the activity of ancymidol. The 2-3 inch increase in height caused by the constant water source provided by the capillary mat produced more well-proportioned plants.

Plant and flower characteristics of each of the new lines are recorded in Table 1. A few comments on each are:

'Annette Hegg Brilliant': Plants were similar to 'Annette Hegg Diva.' Time of bract coloration was similar to 'Annette Hegg Supreme.' Stem strength was good and it retained its foliage after anthesis. A minor fault was the open center of the inflorescence at anthesis. This mutation could replace 'Annette Hegg Supreme.'

'Eckespoint C-1 Hot Pink': General growth habit of this genotype was similar to the other 'C-1' cultivars, with

Table 1. Plant and flower characteristics of poinsettia cultivars and seedlings grown with two irrigation systems in a shade house, 1979.

Cultivar	Plant height (inches)		Plant diameter (inches)		Inflorescence diameter (inches)		No. colored bracts		Number laterals	
	Hand water.	Cap. mat	Hand water.	Cap. mat	Hand water.	Cap. mat	Hand water.	Cap. mat	Hand water.	Cap. mat
Annette Hegg Diva	9.2 bc[z]	11.6 ab	22.0 a	24.1 ab	10.8 ab	11.1 b	20.8 a	18.7 a	7.6 a	7.2 a
Annette Hegg Supreme	10.0 b	12.0 a	22.1 a	24.2 a	10.6 b	11.6 ab	18.9 ab	19.2 a	5.8 ab	5.9 ab
Annette Hegg Brilliant	8.4 c	11.4 ab	18.7 c	22.5 a-d	11.2 ab	11.7 ab	20.0 a	20.1 a	5.5 ab	6.2 ab
Eckespoint C-1 Red	10.2 b	11.4 ab	19.2 c	22.0 d	11.7 a	12.3 a	15.7 bc	19.6 a	5.2 b	5.1 b
Eckespoint C-1 Hot Pink	8.6 bc	10.7 b	20.1 bc	24.0 abc	11.4 ab	11.7 ab	19.1 ab	18.8 a	5.4 ab	6.0 ab
Glory (V-14)	11.8 a	12.4 a	21.9 ab	22.2 cd	11.4 ab	11.5 ab	12.9 c	12.3 b	5.7 ab	5.5 ab
R-13	10.0 b	12.4 a	20.1 c	22.4 bcd	10.7 b	11.5 ab	14.5 c	13.6 b	7.2 ab	6.9 ab
Mean	9.8 b[y]	11.7 a	20.6 b	23.1 a	11.1 a	11.6 a	17.4 a	17.5 a	6.1 a	6.1 a

[z]Mean separation, within columns, by Duncan's multiple range test, 5% level.
[y]Mean separation, between water sources, by Duncan's multiple range test, 5% level.

strong stems and large inflorescences. Bract coloration was delayed compared to 'C-1 Red' and the 'Annette Hegg' lines. Bract color was a clear bright pink and the plants hold their dark green leaves. The delayed coloration of the bracts would make this a questionable entity for production in the shade houses in central Florida.

'Glory (V-14)': The large rose-red bracts exhibited color very early and were held erect on the strong stems. The plants were self-branching and very tolerant of the warm days and nights. Although bract number per inflorescence was less than the 'Annette Hegg" cultivars, their width produced a large inflorescence with a tight center. Foliage color was yellow-green rather than the dark green of the 'Annette Heggs.' Some marginal necrosis of the older bracts was noticeable late in the season. This European line from Gutbier has great possibilities for central Florida providing the bract necrosis can be controlled.

'R-13': This new line was reminiscent of 'Oak Leaf,' with large dark green leaves and vivid dark red bracts shaped like palmate oak leaves. The stems were very strong and upright. Bract number was less than the 'Annette Heggs' and time of bract coloration was intermediate between the 'Annette Heggs' and 'C-1' cultivars. Lateral development was slow and erratic following the manual pruning. Leaf number per lateral was a little sparse and the internodes were long, which gave the plant a very open appearance. This line may be grown better as a single stem with 3 plants per pot to create the appearance of fullness.

1980. Weather during this fall season was exceptionally wet during September with day and night temperatures exvessively high. Day temperatures in the fiberglass greenhouse were 95°F or higher through the middle of October and not much cooler in the shade house. The high temperature appeared to delay establishment of the plants and early growth was not as vigorous as in previous years. The lower 2-3 internodes of the laterals were a little longer than optimum but the plants finished with strong stems and were in proportion to their pots. Plant height of all the genotypes evaluated in the greenhouse ranged from 10.5 to 12.5 inches (Table 2), well within the marketable range for a 6 inch container. Only '39-79' was a little short and showed more heat delay than the other lines.

Comments on the new lines are:

'Annette Hegg Top White': This mutation of 'Annette Hegg White' developed bract color sooner than its parent and had darker green leaves. Plants were slightly taller than 'Annette Hegg White' and had many small (2-3 inch) secondary laterals developing at the nodes of the main laterals. This created the illusion of a very full plant of green and white. The excess weight of these secondary outgrowths made the stems slightly prostrate rather than upright. Bract color was whiter than 'Annette Hegg White.' This shows promise but an additional application of a growth retardant may be needed to maintain stem strength.

'Jingle Bells': This was more of a 'C-1' type with large inflorescences and delayed bract coloration. The novelty of chalky rose-red and white mottled bracts made this unique, where every plant was different. Stem strength and leaf color was excellent. This genotype is an improvement over 'Annette Hegg Marble' in bract color and stem strength but should be grown in temperature controlled greenhouses.

'Glory (V-14)': This line performed similar to the previous year. The large rose-red bracts produced a massive tight inflorescence. Leaf color in the greenhouse was darker than in the shade house. The marginal necrosis of the bracts present in 1979 was insignificant this season.

'R-13': This seedling continued to have the darkest foliage and most vivid red bracts of any cultivar grown. Time of bract coloration was similar to 'Annette Hegg Supreme' and lateral development was more uniform than in 1979. The lack of small secondary laterals at the plant base, as seen with the 'Annette Hegg' lines, made the plant too open. Plants need to be given a "soft-pinch" to get good

Table 2. Plant and flower characteristics of poinsettia cultivars and seedlings grown in a greenhouse, 1980.

Cultivar	Plant height (inches)	Plant diameter (inches)	Inflorescence diameter (inches)	Number colored bracts	Number laterials
Annette Hegg Diva	11.5 ab[z]	17.8 bc	9.4 cde	14.7 abc	5.4 a
Annette Hegg Supreme	11.5 ab	17.6 cd	9.9 bcd	13.9 abc	5.2 a
Annette Hegg White	11.1 bc	16.0 d	8.5 a	11.3 d	4.8 ab
Annette Hegg Top White	12.3 a	18.1 bc	9.8 bcde	13.8 bcd	4.8 ab
Jingle Bells	12.4 a	17.9 bc	10.6 bc	16.3 a	4.2 b
Glory (V-14)	12.3 a	20.0 a	12.3 a	15.2 ab	5.3 a
R-13	12.5 a	19.6 ab	11.1 ab	15.8 ab	5.0 ab
39-79	10.5 c	15.9 d	9.1 de	12.2 cd	5.2 a

[z]Mean separation, within columns, by Duncan's multiple range test, 5% level.

Table 3. Plant and flower characteristics of poinsettia cultivars and seedlings grown on capillary mats in a shade house, 1980.

Cultivar	Plant height (inches)	Plant diameter (inches)	Inflorescence diameter (inches)	Number colored bracts	Number laterals
Annette Hegg Diva	13.4 ab[z]	17.6 ab	10.1 a	17.1 a	5.1 a
Annette Hegg Supreme	13.5 ab	18.0 a	9.8 a	16.5 a	5.1 a
Annette Hegg White	14.0 a	17.3 ab	8.7 bc	11.9 c	5.2 a
Annette Hegg Top White	13.5 ab	17.9 a	9.6 ab	16.6 a	5.3 a
Jingle Bells	12.5 bc	16.1 b	12.3 c	14.7 ab	4.5 a
Glory (V-14)	14.1 a	18.7 a	10.2 a	14.0 b	5.0 a
R-13	12.6 b	18.0 a	10.4 a	15.0 ab	4.3 a
4-80	11.3 c	17.6 ab	10.5 a	17.0 a	4.8 a
39-79	13.0 ab	17.7 a	9.6 ab	15.5 ab	5.1 a

[z]Mean separation, within columns, by Duncan's multiple range test, 5% level.

development of the laterals.

'39-79': This line had bracts similar in color to 'Annette Hegg Supreme' but the plants were delayed considerably in reaching maturity. Foliage was a medium green and inflorescence diameter was very small. This genotype is not adapted to the warm fall temperatures found in central Florida.

'4-80': This seedling had a bract color similar to 'Annette Hegg Diva) but had stronger stems. Time of bract coloration was intermediate between 'Annette Hegg Diva' and 'Annette Hegg Supreme.' Foliage color was darker and plants were slightly shorter than 'Annette Hegg Diva.' This should be evaluated further for production in Florida.

Plants grown in the shade house and irrigated with the capillary mat were slightly taller than those in the greenhouse and time of bract coloration was slightly later (Table 3). 'Annette Hegg Top White' did not develop as many secondary laterals and the stems were more upright in the shade house. Bract color of this line was white compared to cream of 'Annette Hegg White.' 'Glory (V-14)' was vigorous and very colorful with its large bracts and inflorescences. 'R-13' had dark green leaves even with the increased light intensity but still had an open appearance. '39-79' was delayed with small bracts and poor leaf coloration. All of the new lines retained their bracts and leaves in the air conditioned room similar to the commercial cultivars.

Selection of the proper poinsettia cultivar for a particular growing area is the first decision a producer must encounter. Although cultivars with "red" bracts are the most in demand, the grower must determine if his market prefers "orange-red" ('Annette Hegg Supreme'), rose-red ('Annette Hegg Lady'), or brick red ('Annette Hegg Diva') and then grow in proportion to the demand. Cultivars with white, pink, rose, or multi-colored bracts are available and are superior to many of those available a few years ago, but sales of these are limited. Comparison trials such as these will give the grower pertinent information on new genotypes available. 'Glory (V-14)' is a new cultivar that shows the most promise for central Florida growers if the marginal bract necrosis can be controlled.

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