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CHRYSANTHEMUM AND GAILLARDIA AS STUNTED WINTER ANNUALS
I. TRICOLOR CHRYSANTHEMUM (*CHRYSANTHEMUM CARINATUM* SCHOUSB.)

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ABSTRACT: *Chrysanthemum carinatum* Schousb. is a tall annual herb with a thin, weak stems suffers from slanting, but it is used excessively in Egypt for beautifying of beds and borders. So, a study was conducted at Orman Botanical Garden, Giza, Egypt during 2012/2013 and 2013/2014 seasons to reveal the effect of foliar spraying with either paclobutrazol (PP-333) at the rates of 0, 50 and 100 ppm or cycocel (CCC) at the rates of 0, 1000 and 2000 ppm, twice with 3 weeks interval on growth performance, flowering and quality of 75-days-old seedlings of *Chrysanthemum carinatum* grown in 15-cm-diameter plastic pots filled with about 1.5 kg of sand + clay mixture (1:1, v/v).

The obtained results have shown that means of all vegetative and root growth parameters were significantly decreased as a result of spraying with either PP-333 or CCC at various levels of each. The low level of both did not reduce the size of plants to the optimum size, as they caused a reduction mostly ranged between 20-25% only. The high level of CCC (2000 ppm), however induced a great decrement in most growth criteria reached about 65% or more compared to control in the two seasons. So, the plants appear more compressing than required, and that was accompanied by crinkled and smaller leaves. On the other hand, the high level of PP-333 (100 ppm) gave the most suitable plant size going with the pot size without any disorders. Flowering was delayed and the other flowering characters were decreased by the low and high levels of the two used growth retardants with the different significance levels relative to control in both seasons, except for inflorescence diameter and its fresh and dry weights traits which were significantly increased in response to spraying with any concentration of PP-333. The shortest stalk length was scored by PP-333 at 100 ppm treatment and that was benefit in preventing head nutation in the dwarfed plants. The results also indicated that PP-333 at either level increased the leaf content of chlorophyll a and b, total soluble sugars, total indoles and total phenols, but decreased content of carotenoids. On the other side, CCC treatments decreased content of chlorophyll a and b, total soluble sugars and total indoles but raised content of carotenoids and total phenols.

Accordingly, it is recommended to spray the foliar of 75-days-old seedlings of *Chrysanthemum carinatum* Schousb. cultivated in 15-cm-diameter plastic pots with PP-333 aqueous solution at the rate of 100 ppm, twice with 3 weeks interval to get a unique flowering-pot-plant suitable for commercial marketing.

Key words: *Chrysanthemum carinatum*, stunting, PP-333, CCC, vegetative growth and flowering.

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INTRODUCTION

Chrysanthemum carinatum Schousb., Tricolor chrysanthemum that belongs to Fam. Asteraceae (Compositae) is a glabrous annual, 2-3 ft.; leaves more or less succulent, pinnatified into linear lobes, heads to 2.5 inch across, solitary, long peduncled, involucral bracts keeled, disc flowers purple, ray flowers white, yellow, red or purple, often with band of different colour at base, achenes winged; native mostly to Morocco. Annual chrysanthemums are grown as ornamentals for mass colour and raised readily from seeds (Bailey, 1976).

Often, shortening stems of the excessively elongated plant is favorable because some tall herbaceous plants appear spindle, unpleasant, weak and more exposed to slanting and head nutation. Among of these plants may be chrysanthemums which usually need staking to stay upright. In this respect, Sacks and Kofranek (1963) have shown that Amo-1618, CCC and phosphon-D, all inhibite subapical cell expansion and division in *Chrysanthemum morifolium*. Qrunfieh and Al-Wir (1987) elicited that PP-333 at 1000, 2000 and 4000 ppm as soil drench significantly reduced shoot length in five chrysanthemum cvs., namely: Tom Pearce, PR. Armgard, Pandion White, Pandion Lilac and Bornholm. All rates significantly delayed flowering and reduced dry weight of vegetative and root growth. PP-333 at 2000 and 4000 ppm significantly reduced flower diameter, whereas at 1000 ppm, it was not effective. On some chrysanthemum species, Wei and Han (1997) reported that B9 at 3000, 4000 and 5000 ppm progressively reduced plant height and delayed flowering as the concentration increased. Likewise, Yewale *et al.* (1997) revealed that flowering of *Chrysanthemum spp.* was descendingly delayed with increasing PP-333 concentration from 25 to 50, 75 and 100 ppm with reducing plant height and shoot number.

Similar observations were also gained by Yoo *et al.* (1999) on *Chrysanthemum zawadskii* ssp. naktongense treated with daminozide, Million *et al.* (1999) on *Begonia semperflorens*, chrysanthemum, *Petunia hybrida* and *Salvia splendens* treated with either ancymidol or PP-333 and Roepke *et al.* (2013) who noticed that flavons and flavonols were accumulated in ray florets of bronze chrysanthemum cv. "Pelee" following daminozide application at 5000 ppm.

On other ornamentals, several reports were also declared by Criley (2000) on rhododendron, Auda *et al.* (2002) on *Barleria cristata*, Mahmoud *et al.* (2008) on *Nerium oleander*, El-Sayed *et al.* (2010) on *Jasminum officinale*, Li (2013) on Achillea "Coronation Gold" and *Coreopsis verticillata* "Moonbeam", Baloch *et al.* (2013) on snapdragon cv. Coronette, petunia cv. Dreams and annual verbena cv. Obsession, Ismael *et al.* (2013) on *Verbena* x *hybrida* and Pethybridge *et al.* (2014) who claimed that a rate of 100 mg/l uniconazole significantly reduced the height of *Pyrethrum* stem, increased green leaf area and number of flowers/unit area. Besides, Shahin *et al.* (2006) mentioned that the best dwarfing effect on shoot and root growth of *Rudbeckia hirta* annual plant was due to spraying with CCC at 2000 ppm. This treatment also delayed flowering and decreased flower heads number/plant, flower head diameter, flowering stalk length and flowering period. Total indoles content in the leaves was cumulatively decreased with CCC concentration, while total phenols content was increased. Chlorophyll a and b, carotenoids, total carbohydrates, N and K in the leaves and roots were linearly decreased with increasing CCC level, meanwhile P content slightly increased.

The purpose of this study is to investigate the effect of paclobutrazol and cycocel at various levels on growth, flowering and active constituents in the leaves of Tricolor chrysanthemum when produced as flowering-pot-plant.

MATERIALS AND METHODS

A pot experiment was carried out at Orman Botanical Garden, Giza, Egypt

during the two consecutive seasons of 2012/2013 and 2013/2014 to study the response of Tricolor chrysanthemum to foliar spraying with pacloburazol and cycocel at the different concentrations, and to detect the most suitable treatment for production of a miniature and picturesque specimen from such plant in an appropriate size.

Therefore, seeds of *Chrysanthemum carinatum* Schousb. (obtained from Orman Botanical Garden, Giza, Egypt) were sown in nursery bed on mid of September for the two seasons. After 75 days from sowing (on December, 1st), the resulted seedlings with 15-17 leaves were transplanted into 15-cm-diameter plastic pots (one seedling/pot) filled with about 1.5 kg of sand + clay mixture at equal parts by volume (1:1, v/v). Some physical and chemical properties of the used sand and clay in both seasons are shown in Table (a).

The pots were arranged in the open field under the full sun in a complete randomized design (Das and Giri, 1986) for the two seasons, with 3 replicates, as each replicate contained 5 plants. All plants were fertilized with 2 g/pot of kristalon fertilizer (19:19:19 + micronutrients, manufactured by DSM Agrospecialists, Holland), twice, as the first batch drenched in the pot mixture 3 weeks after transplanting, while the second one was added 3 weeks after the first. Three weeks later (on January, 31st), the plants received the following treatments as a foliar spray till the solution was run-off, 2 times with 3 weeks interval:

1- No treatment, as the foliage was sprayed with a tap water, referred to as control.
2- Paclobutrazol (PP-333) at the concentrations of 50 and 100 ppm as an aqueous solution.
3- Cycocel (CCC) at the concentrations of 1000 and 2000 ppm, also as an aqueous solution.

During the course of this study, all agricultural practices needed for such plantation were carried out. At the end of each season (on March, 30th), data were recorded as follows: plant height (cm), stem diameter at the base (cm), branch number/plant, branch length (cm), leaf number/plant, leaf length (cm), as well as fresh and dry weights of top growth and roots (g). Furthermore, number of days from transplanting to the first inflorescence opening (day), number of inflorescences/plant, inflorescence stalk length (cm), inflorescence diameter (cm), number of petals (ray florets)/inflorescence and fresh and dry weights of inflorescence (g). In fresh leaf samples taken from the middle parts of the plants after the second spray by 10 days in the only 2nd season, photosynthetic pigments (chlorophyll a, b and carotenoids, mg/g F.W.) were determined according to the method of Moran (1982), total soluble sugars content as g/100g F.W. (Dubois *et al.*, 1966), total indoles (A.O.A.C., 1980) and total phenols (William *et al.*, 1965) as ppm were also measured.

Data were then tabulated and subjected to analysis of variance using SAS Institute Program (1994) and Duncan's Multiple Range Test (Duncan, 1955) was employed to test the significancy among the means of various treatments.

RESULTS AND DISCUSSION

Effect of paclobutrazol and cycocel treatments on:

1-Vegetative and root growth parameters:

From data averaged in Tables (1 and 2), it is evident that means of all vegetative and root growth traits, expressed as plant height (cm), stem diameter at the base (cm), branch and leaf number/plant, branch and leaf length (cm), as well as fresh and dry weights of top growth and roots (g) were declined with the different significance levels relative to control means in the two seasons. The low level of both PP-333 (50 ppm) and CCC (1000 ppm) did not reduce the size of plants to the optimum size, wherefrom height, and

Table a. Physical and chemical analysis of the used soils in the two seasons.

Soil type	Particle size distribution (%)				S.P.	E.C. (dS/m)	pH	Cations (meq/L)				Anions (meq/L)		
	Coarse sand	Fine sand	Silt	Clay				Ca^{++}	Mg^{++}	Na^{+}	K^{+}	HCO_3^{-}	Cl^{-}	SO_4^{--}
Clay	7.46	16.75	34.53	40.89	41.76	2.18	8.33	16.93	9.33	20.44	0.37	3.82	1.46	41.79
Sand	18.72	71.28	4.76	5.34	21.83	1.58	8.20	2.65	2.48	21.87	0.78	3.85	13.00	10.93

Table 1. Effect of paclobutrazol and cycocel concentrations on some vegetative growth traits of *Chrysanthemum carinatum* Schousb. plants during 2012/2013 and 2013/2014 seasons.

Growth retardants concentration	Plant height (cm)	Stem diameter (cm)	Branch No. per plant	Branch length (cm)	Leaf No. per plant	Leaf length (cm)
First season: 2012/13						
Control	63.00a	1.70a	30.33a	12.10a	250.00a	13.43a
PP-333 at 50 ppm	40.10c	1.10b	30.00a	6.27c	85.00d	6.50c
PP-333 at 100 ppm	29.40d	0.72cb	25.90b	4.98d	96.47c	6.00c
CCC at 1000 ppm	50.44b	1.40ab	24.30b	9.68b	196.50b	10.75b
CCC at 2000 ppm	22.15e	0.60c	10.63c	4.50d	88.00d	4.70d
Second season: 2013/14						
Control	61.76a	1.65a	29.58a	11.36a	247.00a	14.00a
PP-333 at 50 ppm	38.81c	1.03b	31.46a	5.53cd	83.16c	6.80c
PP-333 at 100 ppm	28.78d	0.70c	27.00b	4.50d	85.18c	5.83cd
CCC at 1000 ppm	52.39b	1.36ab	23.60bc	9.10b	200.00b	10.33b
CCC at 2000 ppm	21.70e	0.56d	10.31c	4.00d	83.76c	3.98d

*** Means within a column having the same letters are not significantly different according to Duncan's Multiple Range Test at 5% confidence level.**

Table 2. Effect of paclobutrazol and cycocel concentrations on top growth and roots fresh and dry weights of *Chrysanthemum carinatum* Schousb. plants during 2012/2013 and 2013/2014 seasons.

Growth retardants concentration	Fresh weight (g)		Dry weight (g)	
	Top growth	Roots	Top growth	Roots
First season: 2012/13				
Control	194.53a	50.67a	17.50a	15.48a
PP-333 at 50 ppm	75.60c	12.68cd	8.63c	3.50d
PP-333 at 100 ppm	71.69c	9.65d	6.97c	1.53e
CCC at 1000 ppm	155.20b	40.50b	14.00b	12.40b
CCC at 2000 ppm	77.60c	20.24c	7.33c	6.16c
Second season: 2013/14				
Control	187.84a	49.50a	16.87a	15.08a
PP-333 at 50 ppm	72.41c	11.46d	8.26c	3.15d
PP-333 at 100 ppm	67.80c	9.08d	6.60c	1.45d
CCC at 1000 ppm	150.21b	39.60b	13.50b	12.10b
CCC at 2000 ppm	71.13c	19.80c	6.72c	6.00c

*** Means within a column having the same letters are not significantly different according to Duncan's Multiple Range Test at 5% confidence level.**

number of branches and leaves, as the reduction mostly ranged between 20-25%.

The opposite was the right concerning the highest level, as that of CCC (2000 ppm) caused a great reduction in the most growth parameters (about 65% or more compared to control in the two seasons), so plants appear more compressing than required, and that was accompanied with crinkled and smaller leaves, while high level of PP-333 (100 ppm) gave the most suitable plant size going with the pot size without any disorders (Photo, 1). Although, this treatment reduced number of leaves from 250 (control) to 96.47 leaves in the first season (about 61% reduction) and from 247 (control) to 85.18 leaves in the second one (about 65% reduction), this low leaf number was in good harmony with plant height and branch number and length. Moreover, the least fresh weight of top growth and roots was also achieved by this treatment giving plant weight fit with the weight of pot and soil mixture in it.

Photo 1. Effect of PP-333 at 100 ppm (left) compared to control (right).

Reduction of root system weight by growth retardants means reduction in its size, so it was restricted inside the pot. Therefore, these dwarfed plants did not need to weaning process as non-dwarfed ones, in which their roots go out the pot through the drainage holes and attached to the soil.

Such gains may be explained by the direct role of growth retardants used in retarding stem elongation by reducing cell division and extension in the subapical meristematic zone of the stem (Sacks and Kofranek, 1963) or by inhibition of cytokinin and gibberellin biosynthesis (Million *et al.*, 1999). Similar observations were also postulated by Wei and Han (1997), Yewale *et al.* (1997) and Yoo *et al.* (1999) on chrysanthemums. In this connection, Mahmoud *et al.* (2008) reported that the best stunting results for *Nerium oleander* transplants was found due to spraying with 100 ppm of PP-333 which declined the size of treated transplants to the optimum size suitable for commercial marketing.

2- Flowering parameters:

Data in Table (3) clear that the least number of days to flowering was attained by control plants, whereas the low and high levels of PP-333 and CCC delayed it by about 2, 4, 7-9 and 9-11 days, respectively with significant differences in comparison to control treatment in both seasons. Among the most important causes of flowering delay is using growth retardants that inhibit flower primordium initiation in some plant species by preventing synthesis of gibberellin-like substances in plant cells (Cathey, 1964).

Other flowering variables were decreased in response to retarding treatments with various significant levels compared to control in both seasons, with the exception of inflorescence diameter (cm) and inflorescence fresh and dry weights (g) characters which were significantly increased as a result of spraying with PP-333 at either low (50 ppm) or high (100 ppm) levels when compared to control in the two seasons (Photo, 2).

Data also showed that the shortest length of inflorescence stalk (cm) was found due to PP-333 at 100 ppm treatment which diminished this trait to 1.86 and 2.15 cm against 7.80 and 6.58 cm for control in the

Table 3. Effect of paclobutrazol and cycocel concentrations on flowering traits of *Chrysanthemum carinatum* Schousb. plants during 2012/2013 and 2013/2014 seasons.

Growth retardants concentration	No. days to flowering (day)	No. inflorescence per plant	Inflorescence stalk length (cm)	Inflorescence diameter (cm)	No. ray florets per inflorescence	Inflorescence F.W. (g)	Inflorescence D.W. (g)
			First season: 2012/13				
Control	86.50e	28.00a	7.80a	4.60b	20.00a	1.35b	0.16b
PP-333 at 50 ppm	88.76d	14.33c	3.75c	6.50a	15.42b	2.18a	0.27a
PP-333 at 100 ppm	90.75c	16.00c	1.86d	5.50a	13.33cb	1.88a	0.20ab
CCC at 1000 ppm	93.50b	20.40b	5.50b	4.00cb	12.00c	1.30b	0.13c
CCC at 2000 ppm	95.76a	10.64d	2.97c	2.75c	10.00d	0.79c	0.06d
			Second season: 2013/14				
Control	85.33d	34.00a	6.58a	3.86b	20.00a	0.92b	0.13b
PP-333 at 50 ppm	87.67c	20.67c	3.47c	5.00a	16.58b	1.10ab	0.18a
PP-333 at 100 ppm	90.00b	26.33b	2.15d	4.90a	16.00b	1.36a	0.19a
CCC at 1000 ppm	94.68ab	24.92bc	5.21b	3.02bc	13.50c	0.74c	0.11b
CCC at 2000 ppm	96.50a	12.63d	3.10c	1.94c	10.00d	0.40d	0.05c

*** Means within a column having the same letters are not significantly different according to Duncan's Multiple Range Test at 5% confidence level.**

Photo 2. Inflorescence diameter as affected by PP-333 at 100 ppm (left) compared to control (right).

first and second seasons, respectively. Reduction of inflorescence stalk length was benefit in preventing head nutation in such plant, whereas shortening internodes and branches by growth retardants used in this work make inflorescence appear crowdedly at the top of some stunted plants (Photo, 3). On the other hand, CCC at 2000 ppm induced some deformates in the ray florets (Photo, 4).

Although decrement of inflorescence number born on the treated plants, the corresponding reduction in plant height and branching improved the general appearance of the stunted plants produced under conditions of such trial as a flowering pot plants.

Photo 3. Crowded heads at the top of some dwarfed plants.

Photo 4. Ray florets deformities by CCC at 2000 ppm.

The previous results could be interpreted and discussed as done before in case of vegetative and root growth parameters. On the same line, were those results of Qrunfieh and Al-Wir (1987), Wei and Han (1997), Yewale *et al.* (1997) and Million *et al.* (1999) on chrysanthemums, Barett *et al.* (2003) on *Petunia hybrida*, *Impatiens walleriana* and *Catharanthus roseus*, Shahin *et al.* (2006) on *Rudbeckia hirta* and El-Sayed *et al.* (2010) who stated that PP-333 at 50, 100, 150 and 200 ppm significantly delayed flowering of jasmine plant in a gradual manner. Number of flowers/plant was markedly decreased with increasing the rate of PP-333, except for 200 ppm rate that gave higher number of flowers than other rates.

3- Chemical composition:

As can be seen from Table (4), it can be noted that PP-333 at either 50 or 100 ppm markedly raised the content of chlorophyll a and b in the leaves (mg/g F.W.), while carotenoids content was decreased. The opposite was the right regarding the effect of CCC at both 1000 and 2000 ppm concentrations, as they greatly decreased chlorophyll a and b content, but increased carotenoids content. Thus, leaves of plants treated with PP-333 were more greening than those of plants sprayed with CCC. In general, the effect of high level of either PP-333 or CCC on pigments content was more pronounced than the low one.

A similar trend to that of chlorophyll a and b was also obtained with regard to total soluble sugars content (g/100 g F.W.), where it was increased in the leaves of plants sprayed with PP-333, but decreased in response to CCC treatments compared to control. This may be reasonable, as it took a parallel line to that of chlorophyll which are responsible of sugars biosynthesis in the leaves.

As for total indoles and total phenols content (ppm), data in Table (4) show that total indoles in the leaves of plants treated with PP-333 was slightly increased, but it was accompanied by a highly increment in total phenols content. So, flowering was delayed by about 2 and 4 days for the low (50 ppm) and high (100 ppm) concentrations, respectively. Cycocel, on the other hand, decreased total indoles content, especially at the high rate (2000 ppm) and that was coupled with a marked increase in total phenols content. Thus, delaying of flowering was greater relative to PP-333 treatments, as it reached 7-9 days for 1000 ppm level and 9-11 days for 2000 ppm one. Hence, flowering of *Chrysanthemum carinatum* plant under conditions of the present study is greatly controlled by the variable in content of both indoles and phenols after a specific period of vegetation.

Analogous results were also attained by Yoo *et al.* (1999) and Roepke *et al.* (2013) on chrysanthemums, Auda *et al.* (2002) on *Barleria cristata*, Li (2013) on *Achillea*, Ismael *et al.* (2013) on verbena and Pethybridge *et al.* (2014) on *Pyrethrum.*

From the foregoing, it can be advised to spraying 75-days-old seedlings of *Chrysanthemum carinatum* Schousb. with PP-333 at 100 ppm concentration, twice with 3 weeks interval to obtain stunted, compact and flowering pot plant from such tall winter annual.

Table 4. Effect of paclobutrazol and cycocel concentrations on some chemical constituents in the leaves of *Chrysanthemum carinatum* Schousb. plants during 2013/2014 season.

Growth retardants concentration	Photosynthetic pigments (mg/g F.W.)			Total soluble sugars (g/100g F.W.)	Total indoles (ppm)	Total phenols (ppm)
	Chl. a	Chl. b	Carotenoids			
Control	1.116	0.724	0.651	1.676	0.121	0.054
PP-333 at 50 ppm	1.588	1.225	0.647	1.861	0.152	0.212
PP-333 at 100 ppm	1.766	1.368	0.565	2.544	0.133	0.238
CCC at 1000 ppm	1.028	0.668	0.703	1.519	0.111	0.185
CCC at 2000 ppm	0.946	0.615	0.749	1.396	0.087	0.197

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المرجريت وعنبر كشمير كحوليات شتوية مقزمة

١- المرجريت (*Chrysanthemum carinatum* Schousb.)

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يعتبر المرجريت من النباتات العشبية الحولية، الطويلة، ذات السيقان الرفيعة الضعيفة والتي تستخدم بكثرة في تجميل أحواض ومراقد الزهور بمصر. وتتعرض هذه النباتات للميل بوضوح نحو الأرض بسبب طول سيقانها الضعيفة وحدوث انحناء في الرأس الزهرية (النورة). لذا، أجريت هذه الدراسة بحديقة الأورمان النباتية، الجيزة، مصر خلال موسمي ٢٠١٢/٢٠١٣، ٢٠١٣/٢٠١٤ للوقوف على تأثير الرش الورقي إما بالمحلول المائي للباكلوبيوترازول (PP-333) بتركيزات صفر، ٥٠ ، ١٠٠ جزء في المليون أو بالمحلول المائي للسيكوسيل (CCC) بتركيزات: صفر ، ١٠٠٠ ، ٢٠٠٠ جزء في المليون، مرتين وبفاصل زمني ثلاثة اسابيع فيما بينهما على مظهر النمو، الإزهار وجودة النباتات الناتجة من زراعة شتلات عمرها ٧٥ يوم من هذا النبات في أصص بلاستيك قطرها ١٥سم ملأت بحوالي ١,٥ كجم من مخلوط الرمل و الطمي (بنسبة ١:١ حجماً) وصلاحيتها كنباتات أصص مقزمة.

أوضحت النتائج المتحصل عليها ان متوسطات جميع قياسات النمو الخضري و الجذري قد انخفضت معنوياً نتيجة للرش بالمستويات المختلفة من الباكلوبيوترازول أو السيكوسيل. لم تحقق المستويات المنخفضة من هاتين المادتين إنخفاضاً مثالياً في حجم النباتات المعاملة، حيث أحدثتا فقط إنخفاضاً تراوح في معظم القياسات ما بين ٢٠-٢٥% مقارنة بالكنترول. أما التركيز المرتفع من السيكوسيل (٢٠٠٠ جزء في المليون) فقد أحدث إنخفاضاً شديداً في جميع قياسات النمو وصل في معظم الأحيان إلى ٦٥% أو أكثر مقارنة بالكنترول في كلا الموسمين. لذلك، ظهرت النباتات منضغطة بشكل زائد عن المطلوب، وكان ذلك مصحوباً بتجعد الأوراق و صغرها بوضوح. على الجانب الآخر، فقد أعطى التركيز المرتفع من الباكلوبيوترازول (١٠٠ جزء في المليون) نباتات ذات حجم أكثر ملائمة و تناسباً مع حجم الإصيص المنزرعة فيه وبدون أي إضطرابات أو تشوهات. ولقد تأخر الإزهار، كما انخفضت جميع قياسات النمو الزهري الأخرى عند الرش بالمستويات المنخفضة والمرتفعة من الباكلوبيوترازول و السيكوسيل بمستويات معنوية مختلفة عند المقارنة بالكنترول في كلا الموسمين، باستثناء قياسات قطر النورة الزهرية ووزنها الطازج والجاف والتي زادت معنوياً نتيجة للرش بأي من تركيزي الباكلوبيوترازول. أقصر حامل للنورة حققته معاملة الباكلوبيوترازول بتركيز ١٠٠ جزء في المليون، وكان ذلك مفيداً في منع انحناء النورة الزهرية. وهي احدى الظواهر السلبية في هذا النبات. أوضحت النتائج أن معاملات الباكلوبيوترازول أحدثت زيادة في محتوى الأوراق من كلوروفيللي أ، ب، السكريات الذائبة الكلية، الإندولات والفينولات الكلية، لكنها خفضت محتواها من الكاروتينويدات. على الجانب الآخر، أحدثت معاملات السيكوسيل إنخفاضاً في محتوى الأوراق من كلوروفيللي أ، ب، السكريات الذائبة الكلية و الإندولات الكلية، لكنها زادت محتواها من الكاروتينويدات والفينولات الكلية.

وعليه، يمكن النصح برش أوراق شتلات المرجريت عمر ٧٥ يوم النامية في أصص بلاستيك قطرها ١٥سم و مملوءة بحوالي ١,٥كجم من مخلوط متساوي من الرمل والطمي بمحلول الباكلوبيوترازول بتركيز ١٠٠ جزء في المليون، مرتين وبفاصل ثلاثة أسابيع فيما بينهما للحصول على نباتات أصص مزهرة، عالية الجودة وذات حجم مناسب يصلح للتسويق التجاري.