Minufiya J. Agric. Res. Vol.37 No. 1: 153 - 167 (2012) **"http://www.mujar.net"**

إستجابة نباتات الجهنمية جلابرا المنزرعة فى بيئات مختلفة مع الرش بالسيكوسيل

إبتسام محمد محمد عبدالله[١] ، جمال فرج محمد[٢]

[١] قسم البساتين– كلية الزراعة– جامعة الفيوم

[٢] قسم النبات – كلية الزراعة –جامعة الفيوم

الملخص العربى

أجريت تجربتى أصص خلال الموسمين ٢٠١٠، ٢٠١١ وذلك لدراسة تأثير مخاليط مختلفة من البيئات (البيت موس، البيرليت، الفيرميكيوليت) والسيكوسيل بتركيزات (صفر، ١٠٠٠، ٢٠٠٠، ٣٠٠٠ جزء فى المليون) على النمو الخضرى والمحتوى الكيماوى والتركيب التشريحى لنبات الجهنمية. وقد أوضحت النتائج ما يلى:-

عند زراعة النباتات فى مخلوط بيت موس+ بيرليت (٢:١) أدى إلى نقص معنوى فى النمو الخضرى للنباتات (إرتفاع النبات– عدد الأفرع– عدد السلاميات على الساق– والوزن الطازج للأجزاء الهوائية) خلال موسمى الزراعة.

كما أدت المعاملة بالسيكوسيل بتركيز ٣٠٠٠ جزء فى المليون إلى نقص معنوى فى إرتفاع النبات وعدد الفرع– بينما أدت إلى زيادة معنوية لكل من عدد السلاميات والوزن الطازج للأجزاء الهوائية لنبات الجهنمية مقارنة بباقى التركيزات.

وعلى صعيد آخر وجد أنه عند زراعة النباتات فى مخلوط من البيت موس+ الفيرميكيوليت(٢:١) أدى إلى زيادة محتوى النبات من النيتروجين والمنجنيز والمغنيسيوم والحديد والكلوروفيل (أ+ب) . بينما أعلى زيادة معنوية لكل من البوتاسيوم والزنك كانت عند الزراعة فى مخلوط البيت موس+ الفيرميكيوليت (١:١) أو (١:٢) على الترتيب. وأعلى محتوى من الكربوهيدرات الكلية والكاروتينات الكلية كان عند الزراعة فى مخلوط بيت موس+ بيرليت (٢:١). كما وجد أنه عند الرش بالسيكوسيل بتركيز ٣٠٠٠ جزء فى المليون أدى إلى زيادة محتوى النبات من العناصر الكبرى والصغرى محل الدراسة بالإضافة إلى الكلوروفيل (أ+ب).

أظهرت النتائج أنه بتشريح الورقة أعلى نقص فى التقديرات محل الدراسة كان عند زراعة النباتات فى مخلوط من البيت موس+ الفيرميكيوليت(٢:١) مع الرش بالسيكوسيل بتركيز ١٠٠٠ جزء فى المليون.

RESPONSE OF *BOUGAINVILLEA GLABRA* L. PLANTS GROWN UNDER DIFFERENT GROWING MEDIA IN RELATION TO CYCOCEL

Ebtsam M. M. Abdella[(1)] and G. F. Mohamed[(2)]
[(1)] Hort. Dept., Fayoum Univ., Egypt
[(2)] Agric. Bot. Dept., Fayoum Univ., Egypt

(Received: Oct. 31 , 2011)

ABSTRACT: ***Two pot experiments were conducted in 2010 and 2011 to evaluate the effect of different mixtures of selected growing media (peat moss, perlite and vermiculite) and CCC at the rates of 0.0, 1000, 2000 and 3000 ppm on vegetative growth, chemical composition, as well as, anatomical structure of Bougainvillea glabra L. plants.***

The obtained results indicated that, peat moss+ perlite (1:2) mixture resulted in significant poorest growth parameters such as plant height, number of branches, number of internodes and fresh weight of aerial parts, compared with the other mixtures of growing media. On the other side, the results clearly showed that foliar spraying with the highest concentration of CCC (3000 ppm) affected negatively or positively on plant height and number of branches, respectively. While, plants sprayed with CCC at 2000 ppm gave the highest significant values of number of internodes/ stem and fresh weight of aerial parts compared with the other CCC concentrations. Growing the plants in the mixture of peat moss + vermiculite (1:2) promoted the highest content of N, Mn, Mg, Fe and chlorophyll (a+b). While the highest values of K and Zn were obtained resulted in grown the plants in the mixture of peat moss + vermiculite by (1:1) or (2:1), respectively. The highest content of total carbohydrates and total carotenoids were observed when plants were grown in peat moss + perlite (1:2) mixture. Spraying the plants with CCC at 3000 ppm increased plant macro and micro nutrients contents, as well as, chlorophyll (a+b). The greatest reduction in all leaf blade parameters was due to growing the plants in the mixture of peat moss+ vermiculite (1:2) and sprayed with CCC at 1000 ppm.

Key word: ***Growing media, CCC application, chemical composition, anatomy, Bougainvillea glabra.***

INTRODUCTION

Problems of containers growing plants which relate to the growing media are often due to physical characteristics of the soil. Most types of soils tend to become compacted when used in containers. These compactions are often accompanied by reduction in water holding capacity, drainage, aeration, water infiltration rate and perhaps root penetration. Commercial nursery men desire to standardize their growing programs and, therefore, require a growing medium which can be reproduced from year to year. So, growing media is a key material to produce high quality, container grown plants. There is a number of light weight media currently available on market and more constantly being added to the trade such as, peat moss, perlite and vermiculite.

Growth regulators play an important role in improving plant growth. Cycocel (CCC) is plant growth retarding substance affecting plant growth and metabolism in a wide range of plant species. For instance, Hassanain *et al.* (2001) on *Hibiscus rosa-sinensis* , Vahid *et al.*(2004) on *Rosa damascena*, Ebtsam Abdella (2005) on snapdragon, Hoda and Heikal (2008) on *Encellia farinose*, Balkies (2009) on *Zinnia elegans* and Mushtaq *et al.* (2011) on *Erysimum marashallii* reported that, CCC application depressed plant height while the most of the other vegetative growth characters, as well as, chlorophyll and total

carotenoides contents in leaves were increased compared with control plants.

The objective of this experiment was to compare effects of various growing media, different rates of CCC and their interaction on growth, chemical composition and anatomical structure of *Bougainvillea glabra* L plants during 2010 and 2011 seasons.

MATERIALS AND METHODS

Vegetative terminal cuttings of *Bougainvillea glabra* L were cut uniformaly to 15 cm in length. Leaves at the basal T of the cuttings were removed while those at the top were retained. The basal 5cm of the cuttings was dipped for 5 minutes in IAA at 500 ppm concentration, then the cuttings were planted in plastic pots (30cm) diameter filled with the experimental growing media. Rooted cuttings obtained from the local nursery producer were potted in 15th of February in 2010 and 2011 seasons in uncontrolled green house at the Experimental Farm in Faculty of Agriculture, Fayoum University. This study was conducted to evaluate the effect of different mixtures of growing media and different rates of CCC on vegetative growth, some chemical constituents and anatomical characteristics of bougainvillea plants.

Different mixtures of growing media were used:

Peat moss+ perlite (1:1), peat moss+ perlite (1:2), peat moss+ vermiculite (1:1), peat moss+ vermiculite (1:2), peat moss+ vermiculite (2:1) and peat moss+ perlite+ vermiculite (1:1:1).

Foliar application of cycocel (CCC) at 0.0, 1000, 2000 and 3000 ppm were performed three times at monthly intervals. The first application was add 45 days after potting the cuttings. Tween-80 (0.01%) was used as wetting agent. Plants were irrigated as needed.

The experimental layout was factorial experiment in complete randomized block design with five replicates and three pots for each one.

Data recorded:

1. Vegetativ growth characters:

In termes of plant height (cm), number of branches on the main shoot/ plant, number of internodes/ stem, fresh weight of aerial parts/ plant (gm) were recorded at the end of each season; (at 15th of September):

2. Chemical composition:

At the end of the second season, leaf plastid pigments, i.e., concentration of chlorophyll (a+b) and total carotenoids mg/ 100 gm f.w. leaves by 80% acetone (at the ages 6 weeks from planting), were determined according to the methods described by Cherry, (1973). Total carbohydrates % in dry leaves was estimated colorimetrically as outlined by Dubois *et al.,* (1956). In dry leaves some macro and micro nutrients were determined. Total nitrogen was colorimetrically determined by using orange G dye, according to method described by Hafez and Hichelson, (1981). Phosphorus was colorimetrically determined according to Jackson (1973). Potassium, was estimated using a Flame-photometer Perkin–Elmer model 52 with acetylene burner as described by Page *et al.,* (1982). Mg, Fe, Zn and Mn concentrations were determined using a Zeiss Atomic Absorption AASS spectrophotometer according to Page *et al.,* (1982).

3. Anatomical study:

For anatomical study, samples were taken at the end of first season (2010) from the fully expanded leaf including leaf blade. Samples were killed and fixed in F.A.A. solution (10 ml formalin + 5 ml glacial acetic acid + 50 ml ethyl alcohol 95% + 35 ml distilled water) for 72 hours, then dehydrated and cleared in n-butyl alcohol series, and embedded in paraffin wax of 56-58ºC m.p. Cross sections of 20µ thickness were cut, using a rotary microtom, adhesived on slides by "Haupt's adhesive" then stained with the crystal violet–erythrosin combination, cleared in carbol xylene and mounted in Canada balsam (Nassar and El-Shhar, 1998).

The obtained data were statistically analyzed according to the different treatments were achieved using Least Significant Difference test (L.S.D.) at p= 0.05 (Snedecor and Cochran, 1980).

RESULTS AND DISCUSSION

1.Vegetativ growth characters:

1.1. Plant height:

Concerning the effect of growing media the results in Tables (1&2) indicate that the highest significant increase or decrease in plant height were obtained in plants grown in the mixture of peat moss+ vermiculite (2:1) or peat moss + perlite (1:2), respectively, compared to the other growing media, in both seasons of study. This results may be due to vermiculite when combined with peat promotes faster root

Table 1

Table 2

growth and gives quick anchorage to young roots. This mixture may helps in retaing air, plant food and moisture and releasing them as the plant requires.

Regarding the effect of different concentrations of CCC data presented in the same Tables (1&2) revealed that, in both seasons, the gradual increase in CCC concentration followed by gradual decrease in plant height. While, plant height at any concentration of CCC were significantly increased compared with unsprayed plants. This reduction in plant height as for treatment with ccc may be due to hindering the stem length due to prevented the cells division in sub apical meristems Fisher and Heins, (1996). Also it has been found that the effective substance in the CCC works contrary or opposing to the GA_3 activity or the effective concentrate of the CCC cease the natural production of the GA_3 in the plant since it check the production of ceranyl- pyroprossphate in the special pathway of GA_3 production, Al-Ghitani (1984). This results matches well with those reported by Vahid *et al.*, (2004) on *Rosa damascena*, Ebtsam Abdella (2005) on snap dragon, Hoda and Heikal (2008) on *Encellia farinose*, Balkies (2009) on *Zinnia elegans* and Mushtaq *et al.* (2011) on *Erysimum marashallii* .

As for effect of interaction between different mixtures of growing media and different concentration of CCC at the respective seasons, data cleared that the tallest plants were obtained when *B. glabra* cuttings grown the mixture of peat moss+ vermiculite (2:1) or peat moss+ vermiculite (1:1) and unsprayed withCCC. While, the shortest plants were observed when the cuttings grown in the mixture of peat moss+ perlite+ vermiculite (1:1:1) and sprayed with cycocel at 3000 ppm, in both seasons of study. These records were resulted in significant enhancement compared with the other interaction treatments.

1.2. Number of branches / plant:

As seen in the same Tables (1&2) the results of growing media effect indicated that, in both seasons, growing the plants in the mixture of peat moss+ perlite+ vermiculite (1:1:1) gave the highest significant value of number of branches compared with the other mixtures. While, the plants grown in the mixture of peat moss+ perlite (1:2) or peat moss+ vermiculite (1:1) in the first and second seasons, respectively, gave the lowest significant records of number of branches/ plant.

Concerning the effect of CCC on *B. glabra* the illustrated data, in both seasons, indicated that the treated plants with CCC at 3000 ppm concentration increased, significantly, number of branches/ plant compared with the other CCC concentrations, as well as, untreated plants. As for CCC effect in increasing the number of sub-branches it will be due to its effect on the apical dominant of the side blossoms by affecting on reducing the natural oxygen and that motivate the growth of the side blossoms on the plants, Armitage *et al.* (1981). Or may be due to hindering the stem length due to prevented the cells division in sub apical meristems Fisher and Heins, (1996). These results confirm the conclusion reached by Hoda and Heikal (2008) on *Encellia farinose* and Balkies (2009) on *Zinnia elegans*.

Regarding to the effect of interaction between growing media and CCC data showed that the maximum number of branches have been scored when plants were grown in the mixture of peat moss+ perlite+ vermiculite (1:1:1) and sprayed with CCC at 3000 ppm. While, the reverse trend of number of branches have been recorded when plant grown in the same abovementioned growing media and unsprayed with CCC . These records were different significantly, compared with the other interaction treatments.

1.3. Number of internodes/ stem:

Illustrated data in Tables (1&2) showed that there was significant increase or decrease in the number of internodes/ stem resulted in grown the plant in the mixture of peat moss+ vermiculite (2:1) or peat moss + perlite (1:2), respectively, in the first season. On the other wise, in the second season the highest and lowest significant records were observed when plant grown in the mixture of peat moss+ vermiculite (2:1) or peat moss + perlite (1:1), respectively.

Concerning the effect of CCC on *B. glabra* plants data showed that, the number of internodes/ stem were significantly, increased resulted in plants treated with CCC at any concentration compared with unsprayed plants, in both seasons of study. The maximum numbers of internodes/ stem have been scored with the concentration of 2000 ppm. These results are in agreement with those obtained by Ebtsam Abdella (2005) on snap dragon plants.

Regarding to the effect of the interaction between growing media and CCC concentrations, in both seasons, data revealed that the highest record of number of internodes/ stem was obtained when plants grown in the mixture of peat moss + perlite (1:1) and unsprayed with CCC followed by plants grown in the mixture of peat moss + perlite + vermiculite (1:1:1) and sprayed with CCC at 2000 ppm. On the other side, the lowest number of internodes/ stem was observed resulted in plant grown in the mixture of peat moss + perlite + vermiculite (1:1:1) and unsprayed with CCC.

1.4. Fresh weight of aerial parts / plant (gm):

Data regarding the effect of growing media on *B. glabra* the results indicate that, highest and lowest significant increase or decrease in fresh weight of aerial parts were obtained in plants grown in the mixture of peat moss + vermiculite (2:1) or peat moss + vermiculite (1:2), respectively, in both seasons.

Concerning the effect of CCC on *B. glabra* plants, data in Tables (1&2) revealed that, foliar spraying the plants with CCC at the highest concentration (3000 ppm) promoted significant reduction in fresh weight of aerial/ plant parts compared with the other concentrations (1000 and 2000 ppm). These results may be attributed to the decrease in plant height, internodes length and branches length and thickness as mentioned by Mostafa (2000) on Senecio and Hoda and Heikal (2008) on *Encellia farinose*. Also CCC retarted cell division and/ or cell expansion in lamina tissues which resulted in depressed leaf fresh weight.

In both seasons, regarding to the effect of the interaction between growing media and CCC on aerial parts fresh weight data indicate that, the highest significant increase or decrease in fresh weight of aerial parts were obtained resulted in grown the plants in the mixture of peat moss + vermiculite (2:1) and sprayed with CCC at 2000 ppm or peat moss + perlite (1:2) and unsprayed with CCC, respectively.

2. Chemical composition:

2.1. Macro nutrients contents:

Data regarding the effect of growing media mixtures, ccc concentrations and their interaction on macro nutrient contents are tabulated in Table (3).

2.1.1. Total nitrogen %

According to the effect of growing media the results show that, the highest or lowest percentages of N (3.90 and 3.04%, respectively) were obtained when plants grown in the mixture of peat moss+ vermiculite (1:2) or peat moss + perlite (1:1), respectively. These results may be due to vermiculite possesses cation exchange properties, thus it can hold available to growing plant ammonium.

Concerning the effect of CCC on N% data illustrated in Table (3) cleared that, using CCC at any concentration caused significant increase of the determined nitrogen compared with the unsprayed plants. The obtained results are in harmony with those reported by Ebtsam Abdella (2005) on snapdragon plants.

Regarding the effect of interaction between growing media and CCC illustrated data cleared that, grown *B. glabra* plants in the mixture of peat moss+ Perlite (1:2) or peat moss+ Perlite (1:1) and unsprayed with CCC gave the highest or lowest content of N%, respectively, compared with the other interaction treatments.

2.1.2. Phosphorus %

As seen in Table (3) data revealed that, there were slight differences in phosphorus content in *B. glabra* plants under different growing media mixtures.

On the other hand, foliar spray *B. glabra* plants with CCC produced significant increase in P%. This increasing was proportional to the increase in the used concentrations as compared with untreated plants. As for effect of interaction between growing media and CCC data cleared that,

Table 3

plants grown at any mixture of growing media and unsprayed with CCC have the lowest percentage of phosphorus compared with the other interaction treatments. The highest significant record (0.44%) was obtained when plants grown in the mixture of peat moss+ Perlite (1:1) and sprayed with CCC at 3000 ppm.

2.1.3. Potassium %

Tabulated data in the same Table (3) revealed that, the highest or lowest significant records of K% were promoted resulted in grown the plants in the mixture of peat moss+ vermiculite (1:1) followed by peat moss+ vermiculite (1:2) or peat moss+ perlite+ vermiculite (1:1:1), respectively. These results may be due to vermiculite possesses cation exchange properties, thus it can hold available to growing plant potassium. Concerning to the effect of CCC data showed that, foliar spray with CCC at the highest concentration (3000 ppm) gave the highest significant percentage of K compared with the other concentrations, as well as, untreated plants.

As for the effect of the interaction between growing media and CCC presented data revealed that, ***B. glabra*** plants grown at any growing media mixtures and unsprayed with CCC have the lowest percentages of K compared with the other interaction treatments. While, plants grown in the mixture of peat moss+ vermiculite (1:2) and sprayed with CCC at 3000 ppm have the highest significant value of K%.

2.2. Micro nutrients contents:

Data presented in Table (4) show the effect of growing media mixtures, CCC concentration and their interactions on micro nutrients contents (Zn, Mn, Mg and Fe) in the leaves of ***B. glabra*** plants.

Concerning the effect of growing media on micro nutrients contents tabulated data cleared that, grown the plants in the mixture of peat moss+ vermiculite (1:2) gave the highest concentrations of Mn, Mg and Fe ppm. While, the highest record of Zn was obtained when plants grown in the mixture of peat moss+ vermiculite (2:1).

This records different significantly or unsignificantly, compared with the other growing media mixtures.

As for the effect of CCC concentrations illustrated data in Table (4) show that, increase CCC concentrations followed by significant or not significant increase in micro nutrients content (Zn, Mn, Mg and Fe) compared with unsprayed plants.

Regarding the effect of interaction between growing media and CCC data revealed that, the highest values of Zn, Mn, Mg and Fe were promoted resulted in grown the plants in the mixture of peat moss+ vermiculite (1:2) and sprayed with CCC at 3000 ppm compared with the other interaction treatments.

2.3. Total carbohydrates %:

Data presented in Table (5) show that, plants grown in the mixture of peat moss+ perlite (1:2) or peat moss+ perlite (1:1) promoted the highest or lowest significant values of total carbohydrates %, respectively, compared with the other growing media treatments.

On the other hand, foliar spray with CCC at any concentration cause significant increase in plants total carbohydrates % compared with unsprayed plants. CCC at 2000 ppm gave the highest value compared with the other concentrations.

The obtained results are accordance with the finding of Hosni (1996) on chrysanthemum plants and Ebtsam Abdella (2005) on snapdragon.

As for the effect of the interaction between growing media and CCC on total carbohydrates % data in the same Table (5) revealed that, plants grown in the mixture of peat moss+ perlite+ vermiculite (1:1:1) and sprayed with CCC at 2000 ppm or peat moss+ perlite (1:1) and unsprayed with CCC observed the highest increase or decrease in total carbohydrates %, respectively.

These records different significantly compared with the other interaction treatments.

2.4. Leaf pigments (chlorophyll a+b and total carotenoides mg/100 f.w. leaves):

Results tabulated in Table (5) clarified that, grown *B. glabra* plants in the mixture of peat moss + vermiculite (1:2) or peat moss+

Table 4

Table 5

perlite (1:2) resulted in a significant increase in chlorophyll (a+b) and total carotenoides, respectively, compared with the other growing media treatments. On the other hand, the lowest records of chlorophyll (a+b) and total carotenoides were observed resulted in grown the plants in the mixture of peat moss+ perlite (1:2) or peat moss+ perlite (1:1), respectively.

Regarding to the effect of CCC tabulated data revealed that, foliar spray with CCC at 3000 ppm significantly increase chlorophyll (a+b) content in leaves compared with the other concentrations, as well as, unsprayed plants. On the other hand, total carotenoides contents were significantly increased resulted in unsprayed with CCC, compared with sprayed plants. In this regard, CCC was reported to be used in inducing darke green leaves and delaying senescence of many foliage plants. Hassanain *et al.* (2001) on *Hibiscus rosa-sinensis* and Ebtsam Abdella (2005) on snapdragon.

Concerning the effect of interaction between growing media and CCC illustrated data in the same Table (5) clarified that, chlorophyll (a+b) concentration in *B. glabra* leaves significantly increase or decrease resulted in grown the plants in the mixture of peat moss+ vermiculite (1:2) and sprayed with CCC at 3000 ppm or grown in peat moss+ perlite (1:1) and unsprayed with CCC, respectively. On the other hand, the highest or lowest records of total carotenoides were obtained resulted in grown the plants in the mixture of peat moss+ perlite (1:2) or peat moss+ vermiculite (2:1) and unsprayed with CCC, respectively.

3. Anatomical structure:

Data presented in Table (6) and figure (1) show that, the response of *B. glabra* leaf blade structure to the growing media (with 0 ppm ccc) varied to some extent according to the type used. It is cleared as follows:

The dimensions of midvein in plants grown in the mixture of peat moss+ perlite (1:1) were (600µ x 570µ), midvascular bundle dimensions (130µ x 100µ), blade thickness 200µ, palisade tissue thickness 80µ and spongy tissue thickness 90µ. While, in peat moss+ Perlite (1:2) mixture, the dimensions of midvein were (450µ x 430µ), midvascular bundle dimensions were (110µ x 100µ), blade thickness 120µ, palisade tissue thickness 40µ and spongy tissue thickness 60µ.

Concerning the effect of peat moss+ vermiculite (1:1) growing medium, data in the same Table (6) cleared that, midvein dimensions were (600µ x 530µ), midvascular bundle dimensions (120µ x 120µ), blade thickness 240µ, palisade tissue thickness 110µ and spongy tissue thickness 90µ. Also, the response of leaf blade in peat moss+ vermiculite (1:2) growing medium was midvein dimensions (550µ x 540µ), midvascular bundle dimensions (150µ x 140µ), blade thickness 200µ, palisade tissue thickness 80µ and spongy tissue thickness 90µ. In the mixture of peat moss+ vermiculite (2:1) the dimensions of midvein were (400µ x420µ), midvascular bundle (120µ x 100µ), blade thickness 130µ, palisade tissue thickness 40µ and spongy tissue thickness 60µ. Data also revealed that, the combination between the three growing media by (1:1:1) increased the dimensions of midvein to (600µ x560µ), midvascular bundle (140µ x 120µ), but it did not affect leaf blade thickness greatly.

Application of all cycocel concentrations generally decreased most of leaf blade characters. Application of 1000 ppm CCC with peat moss + perlite (1:1) decreased midvein dimensions by (3.3 % x7.0 %) and blade thickness by (25%) which accompanied by a reduction in both palisade and spongy tissues thicknesses (25.0% and 22.2 %, respectively), in comparison with unsprayed plants. Also, grown the plants in the mixture of peat moss + perlite (1:2) and sprayed with cycocel at 1000 ppm decreased all leaf blade parameters, but with less extent.

The greatest reduction in all leaf blade parameters was due to grown the plants in the mixture of peat moss+ vermiculite (1:2) and sprayed with CCC at 1000 ppm which decreased midvein dimensions by (27.3% x 33.3%) which was accompanied also by a decrease in number of metaxylem vessels/bundle (while its diameter was not effected). Similarly, there was a reduction in blade thickness by 30.0 %. This reduction was due to the decrease in both palisade and spongy tissues, in comparison with unsprayed plants. The inhibitory effect of CCC on anatomical characters of *B. glabra* leaf blade could explain its retarding.

Table 6

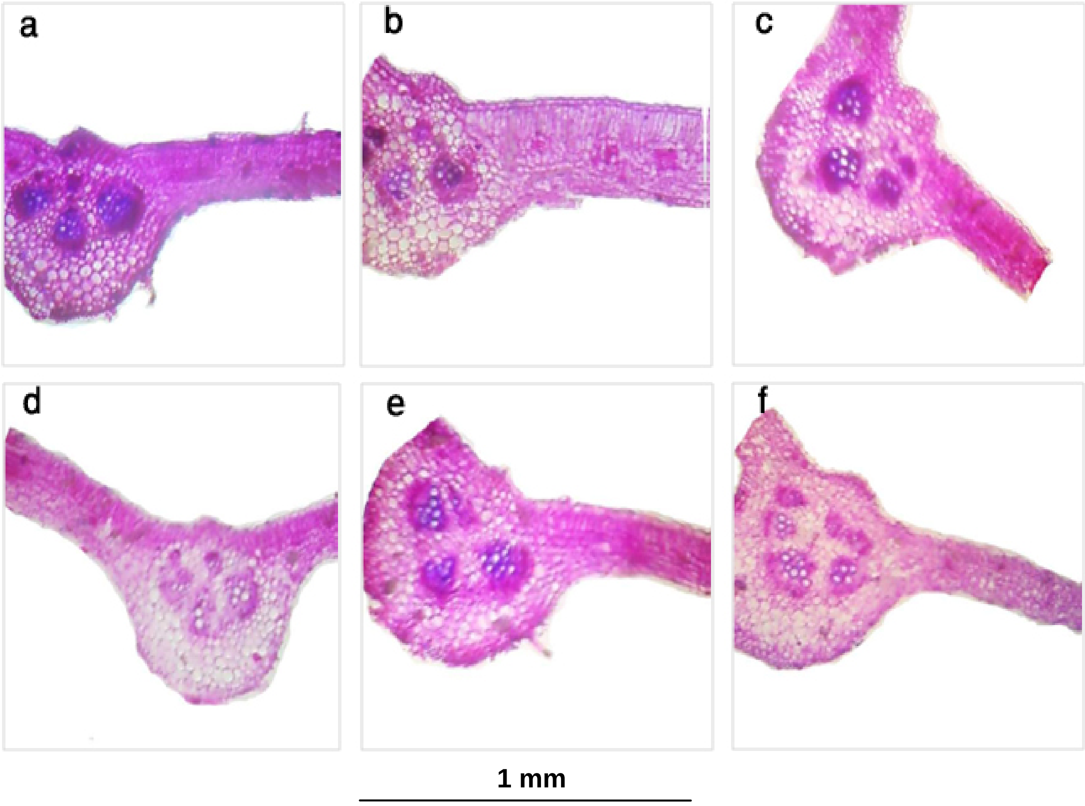

Fig. (1): Transections of *Bougainvillea glabra* L. leaf blade in the first season treated with:
a)- 0 ppm CCC+ Peat+ Per. (1:1)
b)- 0 ppm CCC+ Peat+ Ver. (1:1)
c)- 0 ppm CCC+ Peat+ Per+ Ver. (1:1:1)
d)- 3000 ppm CCC+ Peat+ Per. (1:1)
e)- 3000 ppm CCC+ Peat+ Ver. (1:1)
f)- 3000 ppm CCC+ Peat+ Per.+ Ver. (1:1:1)

Data also show that, plants growing in the mixture of peat moss+ perlite+ vermiculite (1:1:1) media and treated with 1000 ppm CCC revealed a reduction in midvein dimensions by (21.7 % x 10.7%), this reduction was due to the decrease in midvascular bundle dimensions by (14.3 % x 33.3 %) which accompanied mainly by the decrease in average diameter of metaxylem vessels. But, blade thickness was less affected. The effect of higher doses of CCC (2000 and 3000 ppm) was less clear mainly the former.

Finally, a contemplative look at the obtained results, it could be concluded that, the role on some morphological characters e.g. number of branches, number of internodes and fresh weight of aerial parts. Our results were supported by the results of Taha, (2007) on Flax and Sweet Potato plants. The role of CCC in decreasing shoot stem was due to its retarding effect on cell elongation and division Rademacher, (2000). This inhibitory effect role of CCC is desired in many plants as to shorten its shoots without changing its developmental patterns or evoking phytotoxic effects.

REFERENCES

Al-Ghitani, M.Y. (1984). The flowers and ornamental plants and landscaping. Tabapaiip. House Egyption Univ..

Armitage, A.M.; Bass, R.E.; Carlson, W.H. and Ewart, L.C. (1981). Control of plant height and flowering of Zinnia by photoperiod and growth retardants. Hort. Sci. 16: 218-220.

Balkies, G.S. (2009). Effect of cycocel spray and calcium chloride on the growth and flowering on *Zinnia elegans* Taeq. J. Duhok Univ. 12: 39-43.

Cherry, J. H., (1973). Molecular Biology of Plants (A text manual). Columbia Univ. Press. New York.

Dubios, M.; Smith, F.; Gillers, K. A.; Hamilton, J. K. and Robers, P. A., (1956). Colorimetric method for determination of sugar and related substances. Anal. Chem. 28:350.

Ebtsam, M. Abdella (2005). Influence of some growth regulators on vegetative growth, flowering, chemical composition and show value of snapdragon (*Antirrhinum majus* L.). Annals of Agric. Sc., Moshtohor, 43: 1949-1957.

Fisher, P.R. and Hines. R.D. (1996). Modling the stem elongation response of poinsettia to chloromequate. J. Amer. Hort. Sci. 121 : 861-868.

Hafez, A. and Hichelson, D.S. (1981). Colorimetric determination of nitrogen for evaluating the nutrition status of rice. Commun. Soil Sci. and Plant Analysis. 12 : 16-19.

Hassanain, M.A.; Selim, S.M. and Abdella, E.M.M. (2001). Effect of spraying cycocel and pachlobutrazol on vegetative growth, flowering and chemical composition of *Hibiscus rosa-sinensis* L. shrub. J. of the adva. In Agric. Res. Fac. Agric., Saba-Basha, Alex. Univ., 6 : 809-820.

Hoda, E. El-Mokadem and Heikal, A. H. (2008). Induction of dowrfism in *Encelia farinose* by cycocel and evaluation of regenerants using RAPD and ISSR markers. Astralian I. of Basic and Applied Sci., 2: 331-342.

Hosni, A. M. (1996). Response of potted Chrysanthemum [Dendranthema* Grandiflorum (Ramat) Kitamura]c.v. Galaxy or medium drenches. Annals. Agric. Sci. Cairo, 41: 367-385.

Jackson, M. L., (1973). Soil Chemical Analysis. New Jersy Prentice. Hall, Inc.pp.448.

Mostafa, M. M. (2000). Effect of cycocel and potassium on the growth and flowering of *Senecio cruentus* plants. Alex. J. Agric. Res., 45 : 149-164.

Mushtaq, A. B.; Inayatullab T.; Waseem, S. and Sheikh, T.I. (2011). Effect of cycocel and B-nine (Growth retardants) on growth and flowering of *Erysimum marashallii* (Henfr.) Bois. J. of Plant Sci., 6: 95-101.

Nassar, M. A. and El-Sahhar, K.F. (1998). Botanical Preparation and Microscope Analysis (Microtechnique). Pp. 43-67 & 90-126. Academic Bookshop, Dokki, Cairo, Egypt.

Page, A.L.; Miller, R.H. and Kenney, D.R., (1982). Methods of Soil Analysis. Chemical and Microbiological properties, Part 2, pp; 39- 41. SSSP, Inc., Madison, Wisconsin, USA.

Rademacher,W. (2000). Growth retardants: Effect on gibberlline biosynthesis and other metabolic pathways. Ann. Rev. Plant Physiol. Mol. Biol., 51:501-531.

Snedecor, C.W. and Cochran, W.G. (1980). Statistical methods. 7th ed. Iwa Stat Sci., 20 (1-2): 81-84.

Taha, R. S. (2007). The effect of growth regulators on growth, anatomical structure, chemical composition and yield of flax (*Linum usitatissimum* L.) and sweet potato (*Ipomea batats* (L.) Lam.). M.Sc. Thesis, Faculty of Agric., Fayoum University.

Vahid, R.D.; Ahmad. K; Hossein, L.; Mesbah, B. and Julius, E. O. (2004). Effect of different plant growth regulators and time of pruning on yield components of *Rosa damascena* Mill. Int. J. Agric. Biol.,6: 1040-1042.

إستجابة نباتات الجهنمية جلابرا المنزرعة فى بيئات مختلفة مع الرش بالسيكوسيل

إبتسام محمد محمد عبداللا[١] ، جمال فرج محمد[٢]

[١] قسم البساتين– كلية الزراعة– جامعة الفيوم

[٢] قسم النبات – كلية الزراعة –جامعة الفيوم

الملخص العربى

أجريت تجربتـى أصص خـلال الموسمين ٢٠١٠، ٢٠١١ وذلـك لدراسـة تـأثير مخـاليط مختلفـة مـن البيئـات (البيت موس، البيرليت، الفيرميكيوليت) والسيكوسيل بتركيزات (صفر، ١٠٠٠، ٢٠٠٠، ٣٠٠٠ جزء فـى المليون) علـى النمو الخضرى والمحتوى الكيماوى والتركيب التشريحى لنبات الجهنمية. وقد أوضحت النتائج ما يلى:-

عند زراعـة النباتـات فـى مخلـوط بيت مـوس+ بيرليت (٢:١) أدى إلـى نقص معنـوى فـى النمـو الخضرى للنباتات (إرتفاع النبات– عدد الأفرع– عدد السلاميات على الساق– والوزن الطازج للأجزاء الهوائية) خلال موسمى الزراعة.

كما أدت المعاملة بالسيكوسيل بتركيز ٣٠٠٠ جزء فى المليون إلى نقص معنوى فى إرتفاع النبات وعدد الفرع- بينما أدت إلـى زيـادة معنويـة لكل مـن عدد السـلاميات والـوزن الطـازج للأجزاء الهوائيـة لنبـات الجهنميـة مقارنـة بباقى التركيزات.

وعلى صعيد آخر وجد أنـه عند زراعـة النباتـات فـى مخلـوط مـن البيت مـوس+ الفيرميكيوليت(٢:١) أدى إلـى زيـادة محتوى النبات من النيتروجين والمنجنيز والمغنيسيوم والحديد والكلوروفيل (أ+ب) . بينمـا أعلـى زيـادة معنويـة لكـل مـن البوتاسيوم والزنك كانت عند الزراعة فى مخلوط البيت موس+ الفيرميكيوليت (١:١) أو (١:٢) على الترتيب. وأعلى محتوى من الكربوهيدرات الكلية والكاروتينات الكلية كان عند الزراعة فى مخلوط بيت موس+ بيرليت (٢:١). كمـا وجد أنـه عند الرش بالسيكوسيل بتركيز ٣٠٠٠ جزء فى المليون أدى إلى زيادة محتوى النبات من العناصر الكبرى والصغرى محل الدراسة بالإضافة إلى الكلوروفيل (أ+ب).

أظهرت النتائج أنه بتشريح الورقة أعلى نقص فى التقديرات محل الدراسـة كـان عند زراعـة النباتـات فـى مخلـوط من البيت موس+ الفيرميكيوليت(٢:١) مع الرش بالسيكوسيل بتركيز ١٠٠٠ جزء فى المليون.

Table (1): Effect of growing media and cycocel on vegetative growth of *Bougainvillea glabra* L. plants in the first season (2010).

Treatments	Plant height (cm)					No. of branches/plant					No. of internodes/stem					F.w. of aerial parts/ plant (gm)				
cccppm / g.m.	0.0	1000	2000	3000	Mean	0.0	1000	2000	3000	Mean	0.0	1000	2000	3000	Mean	0.0	1000	2000	3000	Mean
Peat+Per. (1:1)	27.67	50.33	36.33	35.67	37.50	9.33	3.67	3.00	6.33	5.58	43.33	18.00	32.00	23.33	29.17	22.33	9.00	28.67	11.67	17.92
Peat+Per. (1:2)	9.33	24.67	39.33	40.0	28.33	1.67	4.67	5.00	4.00	3.84	11.33	17.67	24.33	30.33	20.92	2.33	5.00	17.33	15.33	9.99
Peat+Ver. (1:1)	22.67	71.33	65.33	67.33	56.67	3.33	4.67	4.33	2.33	4.25	16.00	31.67	31.33	39.33	29.58	4.33	42.33	41.67	26.00	28.58
Peat+Ver. (1:2)	28.0	51.33	50.33	33.67	40.83	4.00	3.33	3.00	5.67	4.00	20.00	28.00	29.67	24.00	25.42	8.67	9.00	18.00	3.67	9.84
Peat+Ver. (2:1)	59.67	77.67	61.67	64.0	65.75	9.00	7.00	3.33	5.00	6.08	32.33	38.33	39.67	34.67	36.25	23.67	29.67	53.00	14.67	30.25
Peat+Per.+ver. (1:1:1)	8.67	55.33	41.0	48.0	38.25	1.33	3.67	9.33	11.0	6.33	9.67	25.33	40.00	36.67	27.92	3.00	7.67	32.33	9.67	13.17
Mean	26.00	55.11	48.99	48.11		4.78	4.5	4.67	5.72		22.11	26.50	32.83	31.39		10.72	17.11	31.83	13.50	
L.S.D. 5%																				
ccc	5.49					0.94					3.53					2.99				
g.m.	9.51					1.62					6.12					5.18				
ccc*g.m.	15.53					2.65					10.00					8.45				

Peat= peat moss, Per.= perlite, Ver.= vermiculite, ccc= cycocel, g.m.= growing media

Table (2): Effect of growing media and cycocel on vegetative growth of *Bougainvillea glabra* L. plants in the second season (2011)

Treatments	Plant height (cm)					No. of branches/ plant					No. of internodes/ stem					F.w. of aerial parts/ plant (gm)				
cccppm / g.m.	0.0	1000	2000	3000	Mean	0.0	1000	2000	3000	Mean	0.0	1000	2000	3000	Mean	0.0	1000	2000	3000	Mean
Peat+Per. (1:1)	26.67	49.00	37.67	37.00	37.59	9.33	4.00	2.67	7.00	5.75	44.33	19.0	31.67	22.67	19.42	21.67	9.67	30.33	9.67	17.84
Peat+Per. (1:2)	10.00	25.00	39.00	42.67	29.17	2.00	5.00	6.00	5.67	4.67	11.33	18.33	26.67	30.33	21.67	2.67	5.33	18.33	17.0	10.83
Peat+Ver. (1:1)	24.33	69.33	64.00	67.67	56.33	3.00	4.33	4.67	2.67	3.67	16.67	32.67	31.67	39.00	30.00	4.00	42.67	41.67	25.67	28.5
Peat+Ver. (1:2)	28.67	50.33	50.67	33.00	40.67	5.00	3.33	3.67	6.00	4.50	19.33	28.67	31.33	25.00	26.08	9.00	10.33	19.33	4.33	10.75
Peat+Ver. (2:1)	62.67	76.67	58.67	63.33	49.17	8.67	7.67	3.00	5.33	6.17	34.67	35.00	40.33	32.67	35.67	24.67	33.00	44.67	15.33	29.42
Peat+Per.+ver. (1:1:1)	8.67	55.00	45.33	52.00	40.25	1.33	4.00	9.67	11.67	6.67	10.00	25.33	42.67	37.33	28.83	3.33	7.67	33.33	9.33	13.42
Mean	26.84	54.22	49.22	49.28		4.89	4.72	4.95	6.39		22.72	26.50	34.06	31.17		10.89	18.11	31.28	13.56	
L.S.D. 5%																				
ccc	3.15					0.61					1.73					1.35				
g.m.	5.45					1.06					2.99					2.34				
ccc*g.m.	8.91					1.74					4.89					3.82				

Peat= peat moss, Per.= perlite, Ver.= vermiculite, ccc= cycocel, g.m.= growing media

Table (3): Effect of growing media and cycocel on macro nutrients contents of *Bougainvillea glabra* L. plants in the second season (2011).

Treatments	N%					P%					K%				
cccppm / g.m.	0.0	1000	2000	3000	Mean	0.0	1000	2000	3000	Mean	0.0	1000	2000	3000	Mean
Peat+Per. (1:1)	2.86	3.04	3.10	3.17	3.04	0.35	0.37	0.41	0.44	0.39	6.96	7.27	7.24	7.30	7.19
Peat+Per. (1:2)	3.29	3.08	3.21	3.21	3.19	0.36	0.40	0.42	0.42	0.40	6.97	7.27	7.31	7.30	7.21
Peat+Ver. (1:1)	2.89	3.12	3.17	3.21	3.10	0.37	0.39	0.40	0.42	0.40	6.98	7.31	7.30	7.32	7.23
Peat+ver. (1:2)	2.98	3.08	3.14	3.18	3.90	0.34	0.39	0.40	0.43	0.39	6.98	7.25	7.29	7.37	7.22
Peat+ver. (2:1)	2.99	3.11	3.17	3.21	3.12	0.36	0.43	0.41	0.41	0.40	6.99	7.27	7.24	7.28	7.20
Peat+Per.+ver. (1:1:1)	2.89	3.08	3.13	3.17	3.07	0.32	0.41	0.40	0.43	0.39	6.98	7.00	7.26	7.30	7.14
Mean	2.98	3.09	3.15	3.19		0.35	0.40	0.41	0.43		6.98	7.23	7.27	7.31	
L.S.D. 5%															
ccc	0.12					0.01					0.03				
g.m.	0.07					0.01					0.02				
ccc*g.m.	0.20					0.02					0.05				

Peat= peat moss, Per.= perlite, Ver.= vermiculite, ccc= cycocel, g.m.= growing media

Table (4): Effect of growing media and cycocel on some micro nutrients contents of *Bougainvillea glabra* L. plants in the second season (2011).

Treatments	Zn ppm					Mn ppm					Mg ppm					Fe ppm				
cccppm / g.m.	0.0	1000	2000	3000	Mean	0.0	1000	2000	3000	Mean	0.0	1000	2000	3000	Mean	0.0	1000	2000	3000	Mean
Peat+Per. (1:1)	0.227	0.230	0.236	0.240	0.233	0.241	0.252	0.261	0.267	0.255	18.52	19.02	18.98	19.08	18.90	8.64	8.79	8.79	8.81	8.78
Peat+Per. (1:2)	0.230	0.232	0.236	0.240	0.235	0.243	0.257	0.260	0.274	0.259	18.68	18.76	19.02	19.04	18.88	8.65	8.86	8.82	8.80	8.76
Peat+Ver. (1:1)	0.230	0.230	0.242	0.241	0.236	0.242	0.258	0.261	0.270	0.258	18.89	19.05	18.96	19.01	18.98	8.71	8.86	8.78	8.81	8.79
Peat+Ver. (1:2)	0.231	0.233	0.241	0.243	0.237	0.241	0.263	0.261	0.284	0.262	18.95	18.92	19.01	19.10	18.99	8.69	8.83	8.78	8.88	8.80
Peat+Ver. (2:1)	0.229	0.232	0.241	0.241	0.253	0.244	0.260	0.262	0.271	0.259	18.60	19.08	19.02	18.99	18.92	8.69	8.81	8.79	8.80	8.77
Peat+Per.+ver. (1:1:1)	0.230	0.228	0.240	0.241	0.235	0.241	0.257	0.259	0.270	0.257	18.70	19.09	18.98	18.97	18.94	8.64	8.78	8.79	8.79	8.75
Mean	0.229	0.231	0.244	0.241		0.242	0.258	0.261	0.273		18.72	18.99	19.00	19.03		8.67	8.82	8.79	8.82	
L.S.D. 5%																				
ccc	0.00					0.00					0.22					0.04				
g.m.	0.00					0.00					0.13					0.02				
ccc*g.m.	0.00					0.01					0.36					0.07				

Peat= peat moss, Per.= perlite, Ver.= vermiculite, ccc= cycocel, g.m.= growing media

Table (5): Effect of growing media and cycocel on total carbohydrates% and leaf pigments of *Bougainvillea glabra* L. plants in the second season (2011).

Treatments	Total carbohydrates %					Chlorophyll (a+b)/100 gm f.w. leaves					Total carotenoides/100 gm f.w. leaves				
cccppm / g.m.	0.0	1000	2000	3000	Mean	0.0	1000	2000	3000	Mean	0.0	1000	2000	3000	Mean
Peat+Per. (1:1)	3.72	3.96	4.11	4.11	3.91	209.7	215.3	214.9	215.9	213.9	30.2	31.0	30.9	31.1	30.8
Peat+Per. (1:2)	3.74	4.05	4.13	4.13	4.01	211.5	212.4	215.3	215.5	213.7	39.5	30.6	31.0	31.0	33.0
Peat+Ver. (1:1)	3.79	4.01	4.07	4.11	4.00	213.8	215.7	214.6	215.3	214.9	30.8	31.0	30.9	31.0	30.9
Peat+Ver. (1:2)	3.75	4.03	4.09	4.11	4.00	214.6	214.2	215.2	216.2	215.1	30.9	30.8	31.0	31.1	31.0
Peat+Ver. (2:1)	3.78	3.97	4.09	4.12	3.99	210.6	216.0	215.3	215	214.2	30.3	31.1	31.0	31.0	30.9
Peat+Per.+ver. (1:1:1)	3.73	3.99	4.14	4.08	3.99	211.6	216.1	214.8	214.8	214.3	30.5	31.1	30.9	30.9	30.9
Mean	3.75	4.00	4.11	4.02		211.9	214.9	215.0	215.5		32.0	30.9	31.0	31.0	
L.S.D. 5%															
ccc	0.08					1.33					0.36				
g.m.	0.05					0.77					0.21				
ccc*g.m.	0.13					2.17					0.58				

Table (6): Effect of growing media and cycocel on anatomical characters of *Bougainvillea glabra* L. leaf blade in the first season (2010)

Treatments	Characters	midvein length μ	midvein width μ	median vascular bundle width μ	median vascular bundle length μ	Av. number of metaxylem vessels/bundle	Av. Diameter of metaxylem vessels μ	blade thickness μ	palisade tissue thickness μ	spongy tissue thickness μ
0 ppm CCC	Peat+Per (1:1)	600	570	100	130	12	15	200	80	90
	Peat+Per (1:2)	450	430	100	110	9	15	120	40	60
	Peat+Ver (1:1)	600	530	120	120	7	20	240	110	90
	Peat+Ver (1:2)	550	540	140	150	9	15	200	80	90
	Peat+Ver (2:1)	420	400	100	120	6	20	130	40	60
	Peat+Per+Ver (1:1:1)	600	560	120	140	8	25	190	80	90
1000 ppm CCC	Peat+Per (1:1)	580	530	110	120	9	15	150	60	70
	Peat+Per (1:2)	450	420	100	110	5	15	120	40	50
	Peat+Ver (1:1)	650	650	120	150	14	15	240	100	100
	Peat+Ver (1:2)	400	360	100	100	6	20	140	50	60
	Peat+Ver (2:1)	480	480	140	150	8	15	180	70	80
	Peat+Per+Ver (1:1:1)	470	500	80	120	10	15	200	80	90
2000 ppm CCC	Peat+Per (1:1)	600	590	150	150	10	15	160	50	80
	Peat+Per (1:2)	550	540	110	130	7	25	150	50	70
	Peat+Ver (1:1)	630	610	160	120	8	20	160	60	70
	Peat+Ver (1:2)	610	660	140	130	8	15	130	40	60
	Peat+Ver (2:1)	650	580	140	140	8	25	150	40	70
	Peat+Per+Ver (1:1:1)	700	610	150	140	10	25	120	40	50
3000 ppm CCC	Peat+Per (1:1)	500	530	120	140	9	15	150	40	60
	Peat+Per (1:2)	620	570	130	130	8	25	150	50	70
	Peat+Ver (1:1)	550	600	110	140	8	20	150	50	50
	Peat+Ver (1:2)	500	600	120	120	13	15	160	60	70
	Peat+Ver (2:1)	650	600	150	140	9	25	130	40	50
	Peat+Per+Ver (1:1:1)	600	560	150	140	6	15	130	40	60