Effect of Growth Retardant ALARR on Some Anatomical and Chemical Changes in local Cultivar of Chrysanthemum morifolium

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ABSTRACT

The growth retardant ALAR was applied at different concentrations to study its effects on some anatomical and chemical Changes in growing stem cuttings of local cultivar of Chrysanthemum morifolium in terms of leaf area, leaf thickness and chlorophyll content in additions to measuring the ability of stem cuttings to resist drought conditions. The results showed that treated leaves were normal in shape but, a reduction in the leaves area have been achieved associated with darker green colour (high amount of chlorophyll Content) with respect to the ALAR concentrations applied. Treated plants showed some resistance to dry conditions.

Key words: ALAR; Chrysanthemum; Chlorophyll content; Leaf diameter; Leaf thickness; Drought tolerance.

INTRODUCTION

Many researches clearly reported that growth retardants posses the ability to convert the shape of many plant species (Basra, 1994; Barras, 2002). Growth retardant ALAR was highly effective ones, especially in a wide rang of ornamental plants. It improved rooting of Carnation and Poinsettia cutting (Read & Hoysler, 1971),

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treated plants were less likely to wilt and recovered more quickly from stress

(EL- Meleigy et al., 1999), reduced plant height of pot chrysanthemum (EL-Sheibany. et al., 2007), growth and yield of nerium (Nerium oleander L) (Ananth & Kumar, 2012), dried flower and plant hight of calendula (Calendula officinalis L.) (Hashemabadi, 2012), reduced apical dominance to tendency of shoot to grow without breaking (EL-Keltawi, et al., 1996). ALAR treated leaves were thicker in texture with Euphoibia pulcherrima and Chrysanthemum (Crittendon, 1966). Its effect was studied in fruit and vegetable plants like, delicious cultivar of apples, mature beans leaves of Amo-1618 treated expanded 4.7% and were 20% thicker (Crittendon, 1966). A little works have been explained the actual mode of action chemicals. Basra, 1994 and Bsrras-Ali, 2002 reported that ALAR is attributed to the formation of 1-1 dimethyl hydrazine on vivo, this hydrazine strongly inhibited tryptamine oxidation in pea epicotyls homogenates. However, the aim of this study was performed to determine the effect of growth retardant ALAR on some anatomical and chemical changes in terms of leaf area, leaf thickness, chlorophyll content and drought tolerance in a local cultivar of Chrysanthemum morifolium.

EXPERIMENTAL

Stem cutting of local cultivar of Chrysanthemum morifolium

L. Asteraceae family supplied from a local arboretum in

Benghazi were planted in 12 cm pots in Al-Fateh center for gifted students. The growth retardant ALAR was prepared at four (Concentrations 0, 1250, 2500, and 5000 ppm). Method of ALAR application, and all other procedures applied described in

(EL-Sheibany et al., 2007). The size of the leaves

have been measured using a planimeter, to calculate the area of

the leaf blade, after that, measuring of leaf thickness was carried out in the fourth and eighth week from last ALAR treatment, this approach performed by using microtechnique procedures using a rotary microtome in wax embedding samples as described by

(Crittendon, 1996). For determination of chlorophyll content

in the leaves spectrophotometer was used according to the procedures described by (Crittendon, 1966). After When all

measurements finished (after 8^{th} week), drought tolerance

measurement was applied, the samples were taken at four

stages of wilting, with the elapse of time between each stage.

Both treated and control plants were selected at the same time as they appeared to dry out (10 days without irrigation) at the same

rate. The plants were selected on a visual basis as follows:

Stage1) slight wilting all plants expected to recover after rewatering

Stage2) moderate wilting, most plants expected to recover.

Stage3) sever wilting, approximately half the plants expected to

recover. Stage4) very sever wilting, most plants not expected to recover. During the whole experiment the temperature and the humidity were under control. Statistical analysis has been done as described in (El-Sheibany et al., 2007).

RESULT AND DISCUSSION

The foliage of ALAR treated plants was consistently much darker green (high amount of chlorophyll content). The most colourfull leaves were achieved in the plants that received 5000 ppm of ALAR after eight weeks (Table 1). The reduction in leaf area was also

Table 1

Analysis	ALAR conc. (ppm)			
	0	**1250**	**2500**	**5000**
Leaf thickness (µ)	322 a	354 b	373 c	434 d
Palisade cells length (µ)	98 a	118 b	156 c	173 d
Number of upper epidermal cells per 400 micron	4.0 a	5.0 a	7.0 b	8.0 b
Total chlorophyll	3597 a	3620 a	3703 b	4067 c

Effect of applying retardant ALAR on chrysanthemum leaves dimensions, anatomical and chemical changes.

Means followed by the same letter, within rows, aren't significantly different at 0.05 level

of significance according to Duncan multiple rang tests

affected by concentration of ALAR. It has been notced that The area was inversely proportion to ALAR concentration applied (r = -0.95). However, these effects were time and concentration dependent manner (fig. 1). Barras- Ali, 2002 reporeted that the darker colour was directly related to the action of growth retardant and not to mineral nutrition. It has been noticed that the reduction of Leave area observed in treated plants caused some change in leaf

structure. Photomicrograph of leaf cross section showed that ALAR treated leaves sample were significantly thicker than those of untreated ones. Moreover, it has been found that there were some

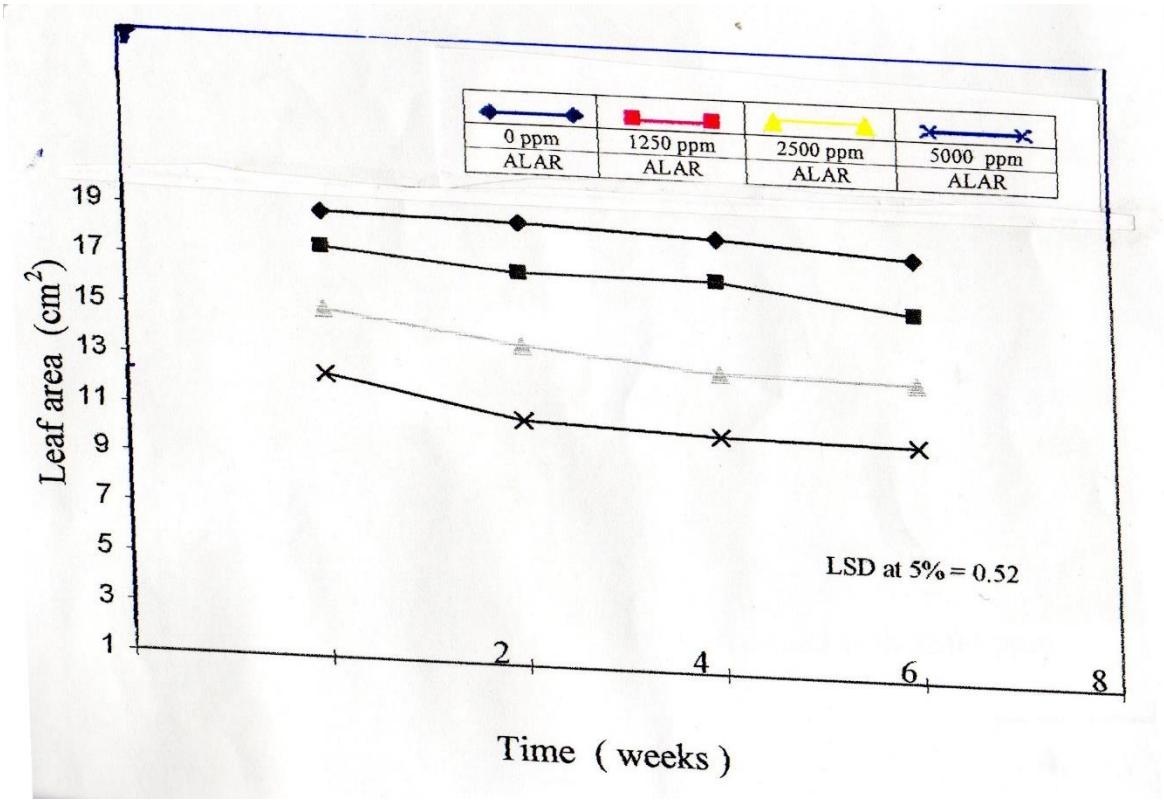


Fig. 1. Effect of retardant ALAR on leaf area.

differences in the number of upper epidermal palisade and lower epidermal cells per unit length of the leaf stem between all treated and untreated leaves (Table.1), which initiated a significant in leaf area between them. Again, these reductions caused by compression of palisade cell, which leads to increases of the number of cells per unit area (fig. 2), for that, the increase in colour was influenced by the increase of green cells per unit area. However, this result agree

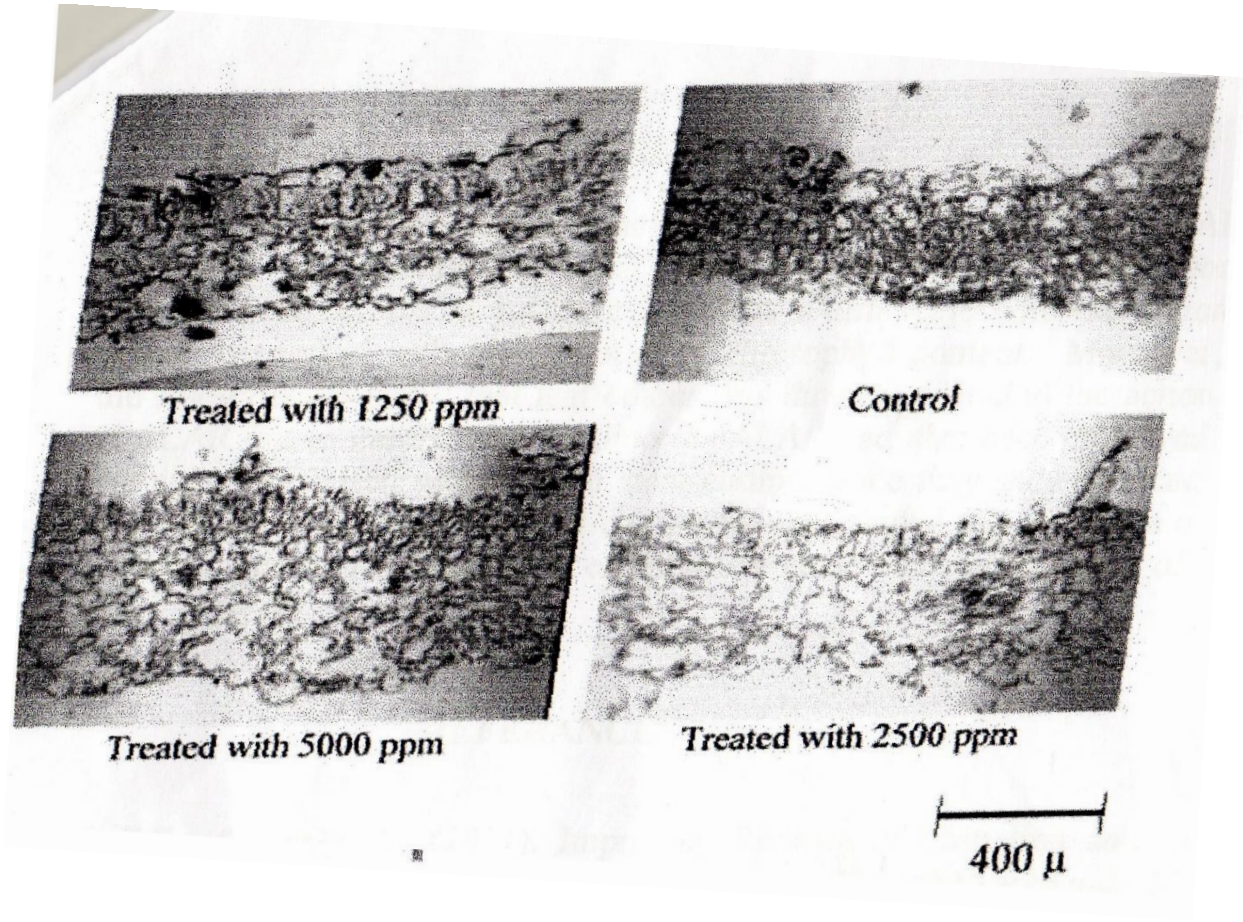


Fig. 2. Effect the retardant ALAR on the leaf section as seen in cross sections by using photomicrograph technique.

with (Hand, *et al*., 1996; Crittendon, 1966), also agree with (*Ananth et al*., 2012) how reported that Alar may act as growth retardant and thereby inhited biochemical processes resulting in less spreading of plants. It was noticed that all plants received high concentration of ALAR (5000 and 2500 ppm) have been recovered from wilting while two third of control plants died. Science all the plants received the same dose from mineral nutrition so; this reflectes the ability of ALAR treated plants to withstand drought condition. Barras-Ali, 2002 reported that aplity of ALAR treated plant to withstand drought condition may due to that ALAR treated plants have a more branched root system, providing firmer anchorage, bitter nutrient and moisture extracting capacity, also El Meleigy, *et al*., 1999

mentioned that, applying growth substance on stressed plant alleviate the adverse effect of drought stress by increasing carbohydrates content, amino acids and fatty acids. Conversely, (Martin & Lopushinsky, 1966) said that ALAR treatment didn't appear to have a consistent effect on the magnitude of deficit developed by plants subjected to drought or delay onset of wilting.

CONCULSSION

This study clearly showed that the effect of growth retardant ALAR appeared in reducing leaf area, increased stem leaf thickness, and increased the number of palsied cells which in turn achieved darker green colour correlated with high amount of chlorophyll content. Moreover, the study demonstrated that leaf colour was directly related to the action of ALAR not to the mineral conditions. ALAR had also been improved rooting system of chrysanthemum stem cutting, since they showed some resistance to dry conditions, so it can also be concluded that ALAR is a systematic growth retardant as its effect was noticed on a various parts of the plants.

REFERANCES

Ananth, A. V., & Kumar S, R. (2012). Effect of Growth Subbstances on Growth and Flowre Yield od Nerium (*Nerium oleander* L.). *Indian J. of pl. Sci. ISSN. vol* (02-03): 187-191.

Barras – Ali.A. (2002). Effect of Growth Retardant ALAR on Growth and Flowering of Chrysanthemum. *PhD Thesis. Garyuonis Univ*.

Basra. A. S. (1994). Mechanisms of Plant Growth and Improved Productivity (Modern Approaches). *Marcel Dekker. INC.* 18 – 42.

Crittendon. C. E. (1966). Effect of B-NINE and Cycocel on Anatomical Structure of Some Commercial Plants. *Ph.D thesis microfilm published on demand by Kansas University*. El-Keltawi. N. E., Mousa, G. T. & Makary B. S. (1996). Regulation of Chrysanthemum Growth Using GA_3 and ALAR to Over Come Salinity Depressions. *ActaHort.* 426: 657-665.

El-Meleigy. E. A., Hassanein, R. A & Abdelkader D. (1999). Improvement of Drought Tolerance in *Arachis hpogaea* L. Plant by Some Growth Substance. 1. Growth and Productivity. *Bull. Fac. Sci. Assiut Univ. 28: 159-185.*

El- Sheibany. O. M., El-Malki, N. A., & Barras-Ali A. (2007). Effect of Application of Growth retardant ALAR on Some Foliage Characters of Local Cultivar of *Chrysanthemum morifolium*. *J. Sci. App.*2(1): 16 -20.

Hand, D. W., Langton, F. A., Hannah, M. A & Cocshull, K. E (1996). Effect of Humidity on the Growth and Flowering of Cut Flower

Chrysanthemum (Dendranthema Grandiflora Tzvelev*). J. Hort. Sci*. 71: 227-234.

Hashemabadi, D., S, Lipaei., V, Shadparvar., M, Zarchini and B, Kaviani. (2012). The Effect of Cycocel and Daminozide on Some Growth and Flowering Characteristics of *Calendula officinalis* L., on Ornamental and Medical Plant. *J. Med. Plants Res*. 6(9): 1752-1757.

Martin, G. C. & Lopushinky, W (1966). Effect of B- Dimethy Amino-Succinic Acid (B-995), a Growth retardant, on Drought. *Nature* 209: 216-217

Read, P.E., & Hoysler V. (1971). Improving Rooting of Carnation and Poinsettia Cutting with Succinic Acid -2, 2- Dimethylhydrazude *Hortiscince* 6 : 350