Assiut J. of Agric. Sci 43 2012(Special Issue) (81-92)

How to Improve Lemon Cypress As A Pot Plant Using GA3 And Urea

El-Keltawi N.E.[(1)]; A.E. El-Naggar [(1)]; S.Sh. Abdien[(1)] and M.A. Ibrahim[(2)]

[1.] Dep of Horticulture, Fac of Agric , Assiut Univ, Assiut 71562, Egypt.

[2.] Fac of Agric, South Valley Univ, Qina, Egypt.

Abstract:

Lemon cypress *"Cupressus macrocarpa"* is a handsome pot plant used widely. The required for the commercial production is unsufficient to meet the demand as a result of slow growth of that plant. Therefore, a trial was done to use urea and GA3 to induce rapid growth. The present study was directed towards the effect of GA3 at certain levels(0, 125, 250 and 500 ppm) as foliar sprays separately or in combination with soil addition of urea at the rates of 2.5 or 5 g/plant beside the control. The experimental design was complete randomized block design in a split plot with three replicates during the 2007 and 2008 seasons. The study included the desired pot plant characteristics and explained on the mineral as percentages of N, P, K, Ca and Mg, as well as total carbohydrate and protein in the leaves. The obtained results indicated that spraying 250 ppm GA3 improved most of the studied vegetative parameters as well as N, P, K, Mg and protein contents. On the contrary, it reduced the contents of Ca and total carbohydrate compared to 125 or 500 ppm GA3.The obtained results recommended that spraying 250 ppm GA3 and soil adding 5g Urea/plant to improve lemon cypress as a pot plant under the condition of this experiment.

KEYWORDS: *Cupressus macrocarpa*, Urea, GA3, Growth regulators, leaf mineral content.

Introduction:

Cupressus macrocarpa C.V. Goldcrest is a Montery Cypress cultivar, endemic to Montery Bay on the central coast of California, Hogan and Frankis (2009).It is a handsome ornamental tree tolerates high salts and excellent choice for seaside plantings. It can be pruned to form a hedge whilst smaller cultivars such as 'Goldcrest' are grown in containers.

Several investigators reported that GA3 spraying on *Cupressus sempervirens;* El-Sallami and Makary (1997) and on Eucalyptus; Scurfield and Moore (1958) within the range of 100 to 300 ppm improved plant growth parameters to certain limits except stem diameter and number of branches per plant.El-Keltawi *et al* (2012) found that foliar sprays of GA3 at 100 ppm resulted in significant increament of all vegetative parameters and

Received on:11/10/2012 **Accepted for publication on**:14/11/2012

Referees:Prof.Dr.Gamal.Taha.Mousa Prof.Dr.El-saady.M.Badwi

nutrient contents of Montery Cypress plants. Meanwhile, calcium and total carbohydrate contents were decreased with the application of 100 ppm GA3. Emrah *et al* (2010) found that application of urea nitrogen at 15, 25 and 50 g/tree on *Fraxinus angustifolia* had a large and positive effect on diameter and growth height during the first three years, without significant differences between the treatments in terms of tree diameter and growth height .

Recently El-Keltawi *et al* (2012) reported that fertilizing *Cupressus macrocarpa C.V. Goldcrest* plants with Kristalone(19-19-19+1) NPK+MgO at 0, 5 and 10 g/plant enhanced all recorded plant growth characteristics.

Therefore, Montery Cypress growth is characterized with slow growing rate, particularly during juvenile years. The presented study directed to investigate the effect of foliar spray of GA3 and Urea as soil addition separately or in combination on the growth parameters and chemical composition of the Montery Cypress leaves.

Materials and Methods:

A pot experiment was carried out during the two successive seasons of 2007 and 2008 at the Floriculture Experimental Farm, Faculty of Agriculture, Assiut University, Assiut, Egypt.

1- Materials :

A-*Plant materials:* Homogenously two-years old vegetivley propagated *Cupressus macrocarpa*,seedlings obtained in 15cm polyethylen bages from commercial nursery in the Mansoreya area of Giza, Egypt were used.

B - Potting media**:** Growing medium was clay(Local soil of Floriculture Experimental Farm, Faculty of Agricutlure, Assiut University, Assiut, Egypt) mixed with cattle manure at a ratio of 3:1(v/v), respectively. The constituents and characteristics of the media used are represented in Table (1).

C -Chemical fertilizers: Urea (46.5% N) distributed by Factory of Fertilizers Abo Qir, Alexandria, Egypt was used.

D – Growth regulators :

- Gibberellic acid :Berlex tablets containing1gram Gibberellic Acid as GA3. a.i. Imp. Chem. Ind.Ltd ,ICI , product was used .

Table (1): Constituents and characteristics of the used medium at the beginning of the experiment:

Particle size Distribution (%)				pH	EC	Calcium carbonate (%)	Organic matter (%)	Total nitrogen (%)
Clay	Silt	Fine sand	Coarse sand		dSm^{-1}			
52.47	32.86	8.23	6.10	7.72	1.15	1.74	2.74	0.23

Soluble cations mg/100g soil			Soluble anions mg/100g soil			
$Ca^{2+} + Mg^{2+}$	Na^{+}	K^{+}	$CO^{2-}_3 + HCO^{-}_3$	Cl^{-}	Available K	Available P
0.72	0.28	0.09	0.41	1.55	2.02	15.66

2. Methods:

On March of both seasons, uniformal healthy seedlings, which had been grown in peat-moss in 15cm plastic bags were transplanted singly into 25cm diameter clay pots filled with clay soil mixed with cattle manure as { 3 (clay soil) : 1 (cattle manure). Plants were grown under lath shade condition until the end of the experiment for both seasons. All plants were fertilized with Urea (0.0, 2.5 , 5.0 g/plant, and sprayed with Gibberellic acid (0 , 125 , 250, and 500 ppm) at biweekly intervals. Gibberellic acid was applied as foliar spray until the point of run off starting one month after potting . Each spray from each concentration of GA3 follwed by adding the urea one day later .Control plants were sprayed with distilled water.Irrigation, weeding and other agricultural practices were carried out for the experiment as usual.

Experimental design:

The present experiment was arranged in a complete randomized block design (split-plot), where it consisted of 12 treatments (3 Urea rates x 4Gibberellic acid concentrations) replicated three times and each contained 4 plants (4 pots). The treatments of Urea fertilizer (control, 2.5 and 5 g) were considered as main-plots and Gibberellic acid concentrations (0, 125, 250 and 500 ppm) as sub-plots.

Collected data and analysis :

A – Vegetative parameters :

At the end of the experiment (at the beginning of December) ; data recorded were plant height (cm), number of branches per plant, stem diameter (cm) and foliage fresh and dry weight per plant (g).

B – Chemical analysis :

Leaf mineral nutrients content :

Plant samples were collected, prepared and digested according to Piper (1967). The following nutrient minerals were estimated:

- **Nitrogen** content was determined using the modified micro Kjeldahal method, Black *et al* . (1965).
- **Phosphorus** content was determined spectrometrically, Jackson (1973).
- **Potassium** content was determined by the flame photometer method, Jackson (1973).
- **Calcium and Magnesium** contents were determined by titration method, Jackson (1973).
- **Protein percentage** was estimated according to the method by Ranganna (1978).
- **Total carbohydrate percentage:** was calorimetrically determined, Fales (1951).

IV- Statistical analysis :

Data were subjected to statistical analysis using “F” test according to Snedecor and Cochran (1973) and L.S.D. value for comparisons according to Gomez and Gomez (1984).

RESULTS AND DISCUSSION

Vegetative growth:

Data presented in Tables (2 and 3) showed that different

growth measurements were markedly affected by the various treatments.

Concerning the specific effect of gibberellin (GA3) application (Tables 2 and 3), it was observed that plants treated with any concentration, showed better results comparing to untreated ones during both seasons, It was noticed that increasing the concentration of GA3 led to a significant increase in plant height, branch number and foliage fresh and dry weights, with the best results attained by applying GA3 at 250 ppm. Applying the highest concentration (500 ppm) showed lower values. Meanwhile, the highest concentration of GA3 (500 ppm) exhibited the thickest cypress plants.

similar results were obtained by El- Salami and Makary (1997) on *Cupressus sempervirens*, L. Seedlings, Ibrahim *et al* (2010) on croton plants; and on Anna apple trees Mostafa and Saleh (2006).

However, such increase in plant height might be due to that GA_3 enhancement cell division and /or cell elongation within stem tissues leading to more height and internode length. GA_3 might promote cell enlargement and help in cell division. Similar results were obtained by Awad (1973) on roses, which showed that GA_3 at the lowest concentration increased branch number. Meanwhile, GA_3 may enhance the lateral buds growing to lateral branches by activating cell division.

Under the conditions of the present study, feeding lemon cypress with Urea at 5g/plant resulted in the highest values of vegetative measurements compared with the other treatments or the control.

The increase in plant growth due to using Urea could be explained that the effect of its nutrient contents could stimulate the biosynthesis of enzyme, protein and other fractions. The constituents of Urea are quite enough for increasing the growth. These results are in agreement with those obtained by Mazher *et al* (2008) on *Taxodium disticum*, Garciano *et al* (2006) on *Eucalyptus grandis*, and Emrah *et al* (2010) on *Fraxinus angustifolia* .

With regard to the interaction effects between GA_3 and Urea fertilizer on growth measurements, data showed that applying a combination of 250 ppm GA_3 and 5 g Urea /plant gave the best results of different growth measurements (Tables 2 and 3).

Nutrient contents:

Nutrient contents of cypress branches showed considerable responses to Urea andGA_3 (Tables 4 and 5). The highest concentrations of N, P, K and Mg and the lowest Ca were obtained from plants received Urea and GA_3,either medium or high level. Such results pointed out that these levels were the most suitable ones as they furnished plants with N, P, K and Mg at adequate levels and consequently obtaining the best plant growth. From the above mentioned results it

could be noticed that there was a close relationship between the nutrient contents in branches of cypress plants and their growth characters. Clearly, there are many possible roles by which these nutrients stimulate the growth of cypress seedlings. Among their vital roles are being constituents of plant tissues, catalysts in various reactions, osmotic regulators and performing an active role in biosynthesis of enzymes and amino acids; Devlin and Witham (1983).

Several reports concluded that GA_3 showed enhancement effect on increasing plant nutrient contents. Broughton and McComb (1967) demonstrated that GA_3 stimulated the synthesis of protein which was reflected in increasing the plant growth and consequently the absorption of N, P, K and Mg increased. Demisova and Lupinovich (1961) reported that GA_3 application increased the rate of mineral transport from the root system to the areal parts of plant.

El-Sallami and Makary (1997) recorded that, spraying *Cupressus sempervirens, L.* seedlings with NPK as a foliar fertilizer at the rates of (0.0, 0.2, 0.4 and 0.6%) increased the contents of N, P, K, Mg and Fe in cypress branches, while Ca content showed a negative effect. Barros *et el.,* (1975) pointed out that *Eucalyptus saligna* treated with NPK (3-15-3) at a rate of 5g/plant/month had improved contents of N, P and K. Meawad (1981) mentioned that GA_3 increased total N, P and K contents in gladiolus leaves.

On *Thuja orintales* ,. El-Sallami and Mahros (1997) reported that, the leaf contents of N, P, K and Mg were generally increased by mineral nutrition, especially at the rate of 6 g(6-8-6) per plant. El-Mahrouk (2000) on *Swietenia mahogoni, L.* found that, the percentages of N, P, and K in the leaves were increased by increasing different fertilizer treatments.

Concerning the interaction between GA_3 and Urea, the combined treatment of GA_3 (250 ppm) plus Urea (5g) proved to be the most effective on producing better nutritional status.

Total carbohydrates and protein contents:

It is clear from the data given in Table (6) that total carbohydrates were decreased with increasing the concentration of GA3 during both seasons. The reduction in total carbohydrates by using GA3 could be explained through the role of GA3 in decreasing the photosynthetic pigments in the branches, led to a decrease in the synthesis of sugars and starch, and cosequantly less accumulation of carbohydrates in plant organs. In this connection, some authors reported that application of GA3 decreased total carbohydrate content in plant; El-Khateeb and Selim (1988) on *Thuja orientalis*,L. and Matter (1992) on carnation.

On the contrary, fertilizing the cypress plants with Urea

increased total carbohydrates in leaves. Either Urea rate at 2.5 or 5 g/pot increased total carbohydrate comparing to the control. Meanwhile, the heigher level of Urea (5g/pot) was more effective in this respect. These results could be attributed to the role of all nutrients in this commercial fertilizer at their suitable rate in raising the physiological activity of the plant and consequantly increasing the photosynthates in branches. Similar results were obtained by Mantrova and Nikitina (1972) who stated that the optimum NPK rates stimulated carbohydrate synthesis which was accumulated in rose plants. On *Thuja orintales L.* El-Sallami and Mahros (1997) reported that, the leaf content of total carbohydrate were generally increased by mineral nutrition, especially at the rate of 6 g(6-8-6) per plant. Mohamed *et al*. (1987) reported that NPK fertilizer increased the total soluble sugars in leaves of *Eucalyptus camaldulensis*.

Concerning the interaction effect, the highest total carbohydrate contents were determined in plants treated with the combination of Urea at 5g/pot and GA_3 at 0 (control).

On the other hand, protein content is typically related to the results obtained form nitrogen content in branches. This is obviously due to the statistical method by which protein content was calculated through multiplying nitrogen content by 6.25. Therefore, the best treatment regarding protein content is Urea at 5 g/pot and GA3 at 250 ppm.

References:

Abo El- Ghait, E.M. and H.E. Wahba(1994): Response of Viola odorata, L. to mineral nutrition. Annals of Agric. Sci., Moshtohor, Vol. 32 (1): 419-432.

Awad, A.E. (1973): Anatomical and physiological studies on growth regulators as affecting roses. Ph.D. Thesis, Fac. Agric. Cairo Univ.

Barros,N.F.; R.M. Brandi and A.C.Alfenas(1975): Application of fertilizers in the production of seedlings of *Eucalyptus saligna*. Barzip Florestal. 6(22): 25-29 (C.F.For. Abst. 37: 4456).

Black, J.H.; D.D, Evans and L.E. Ensminger (1965): Methods of Soil Analysis.J.Amer. Soc. Agron. Inc. Publ.,Madison, Wisconsin,U.S.A.

Broughton, W.J. and A.J. McComb (1967): The relationship between cell wall and protein synthesis in dwarf pea plants treated with gibberellic acid Ann. Bot. Land, 31: 359-366.

Demisova, A.Z. and I.S. Lupinovich (1961): The effect of gibberellic acid on the mineral nutrition of plants. Fiziol. Restenii 8 (4): 360-367. (C.F. Biol. Abst. Vol. 39 (2): 7773).

Devlin,R.M.and F.H.Witham (1983) Plant physiology. Willard Grand Press, Boston, USA.

El-Keltawi N.E.; A.E. El-Naggar; S.Sh. Abdien and M.A. Ibrahim (2012): Attempts to regulate growth of *cupressus macrocarpa*, hartw cv goldcrest through growth regulators and chemical fertilization. Assiut. J. of Agric. Sci., 43(Special Issue): 132-143.

El-Khateeb,M.A.and M.A. Salim (1988):Effect of chemical fertilization on growth and chemical composition of *Thuja orientalis*, L. seedling. KafrEl-Sheikh J. of Agric. Res. Fac. Of Agric., Tanta Univ., Nov. 1988.

El-Mahrouk,E.M.(2000): Response of *Swietenia mahogoni*(L)SACQ.to different levels of irrigation water and NPK fertilization treatments in a newly reclaimed land. J.Agric.Res.,Tanta Univ.,26(2)377-390.

El-Sallami,I.H. and B.S.Makary (1997): Response of *Cupressus sempervirens.* L seedlings to Gibberllic acid and foliar nutrition of Assiut.J of EL-

El-Sallami,I.H.and D.M.Mahros(1997)Agric.Sci, 28 (1) 21-35.

El-Sallami,I.H.and O.M. Mahros(1997).Growth Response of *Thuja orientalis*,L seedling to different potting media and NPK Fertilization Assiut J.Agric.Sai Vol.28No.(1):3-20.

Emrah,C.; F.Yilmez and M.Yilmez (2010): Effect of N and NPK Fertilizers on early field performance of narrow-leaved ash, *Fraxinus angustifolia*. J. Enviro. Bio. Vol. 31:109-114 .

Fales,F.W.(1951):The assimilation and degradation of carbohydrates by yeast cells.J.Bio.Chem.,193:113-124.

Garciano, C.; J.F. Goya.; J.L. Frangi and J.J.Guiamet (2006): Fertilization with phosphours increases soil nitrogen absorbtion in young plants of *Eucalyptus grandis*. For. Ecol. Manage., 236, 202-210.

Gomez, K.A.and A.A.Gomez (1984): Statistical Procedures for Agricultural Research, 2nd ed., John Wily, NY. 680 pp.

Hogan,C.M.and M.P.Frankis (2009):Monterey Cypress: Cupressus macrocarpa, Global Twitcher.com ed. N. Stromberg.

Ibrahim ,S.M.M.; L.S. Taha and M.M. Farahat (2010): Vegetative Growth and Chemical Constituents of Croton plants as Affected by Foliar Application of Benzyladenine and Gibberellic Acid. J.Amer. Sci, 6(7)126-130.

Jackson, M.L. (1973): Soil Chemical Analysis. Prentic-Hall. Inc. Englewood,Cliffs.U.S.A.

Jepson, M (1993): University of California Press, Berkeley, Ca.(C.F. www.globaltwitcher.com/artspec_information.asp Montery cypress).

Mantrova E.Z. and G.N. Nikitina (1972): The characteristics of nutrition and carbohydrate metabolism in roses growing on their own roots in relation to winter hardiness. Agrokhini-

ya No.6: 95-101.(C.F. Hort. Abs. Vol. 44:2670).

Matter, F.M. (1992): Effect of some growth regulators and soil media on carnation. M.Sc. Thesis, Fac. Of Agric., Fayoum. Cairo Univ.

Mazher, A. A. M.; S.M.Zaghloul and T.El Mesiry (2008) : Nitrogen Forms Effects on the Growth and Chemical Constituents of *Taxodium distici-um* Grown under Salt Conditions. Aus.J of Basic and Appl. Sci, 2(3): 527-534.

Meawad, A.A. (1981): Physiological and anatomical study on gladiolus. Ph.D. Thesis, Fac. Of Agric., Zagazig Univ.

Mohamed, B.R.; H. El-Bagoury; S.M. El-Naggar; G.F. Ahmed and M.M. Farahat (1987): Effect of chemical fertilization on growth, chemical composition and essential oil of *Eucalyoptus camaldulinsis*, L. seedlings. Fayoum J. of Agric. Res. And Dev, 1(1): 189-204.

Mostafa, E.A.M. and M.M.S. Saleh(2006): Influence of Spraying with Gibberellic Acid on Behaviour of Anna Apple Trees. J. App. Sci. Res., 2(8): 477-483.

Piper, C.S. (1967): Soil and Plant Analysis. 2nd Ed., Asia Pub. House Bombay, India.

Ranganna,S.(1978):Manual of Analysis of Fruit and Vegetable Products.Tata Graw-Hill Publishing Company.Limited New Delhi, Second Reprint, 634 pp.Scott, A.D.,

Scurfield,G. and C.W. Moore (1958):Effect of Gibberellic acid on Species of Eucalyptus. Nature. 181: 1276-7.

Snedecor, G.W. and W.G. Cochran (1973): Statistical Methods. Sixth Edition, Iowa State Univ., Press, Ames., Iowa, USA.

Table (2) Effect of GA3 application and Urea fertilizer on plant height,number of branches and stem diameter of *Cupressus macrocarpa* during 2007/2008 seasons

GA3 ppm	Urea g/plant	Plant height (cm)		No.of branches /plant		Stem diameter (cm)	
		2007	2008	2007	2008	2007	2008
0	0	71.9	69.2	63.1	64.5	1.06	1.00
	2.5	92.4	89.1	78.2	80.6	1.44	1.37
	5	107.3	102.3	85.5	89.3	1.75	1.65
	mean	90.6	86.9	75.6	78.1	1.42	1.34
125	0	81.9	78.8	65.1	71.4	0.89	0.96
	2.5	101.5	98.7	82.5	85.3	1.31	1.28
	5	121.7	118.2	90.8	93.4	1.63	1.59
	mean	101.7	98.6	79.5	83.4	1.28	1.28
250	0	99.4	97.1	68.5	76.1	0.97	0.95
	2.5	122.7	121.1	90.5	93.7	1.28	1.25
	5	147.9	144.3	99.4	102.6	1.60	1.57
	mean	123.3	120.8	86.1	90.8	1.28	1.26
500	0	87.9	85.8	51.7	73.3	1.25	1.19
	2.5	109.2	106.7	78.2	81.1	1.66	1.62
	5	130.6	127.5	81.5	92.8	2.06	2.01
		109.3	106.7	70.5	82.4	1.66	1.61
Means of Urea levels	0	85.3	82.7	62.1	71.3	1.04	1.03
	2.5	106.5	103.9	82.4	85.2	1.42	1.38
	5	126.9	123.1	89.3	94.5	1.76	1.71
L.S.D. at 5% of							
GA3		8.2	8.5	8.0	9.2	0.05	0.05
Urea		7.7	7.5	7.3	8.3	0.06	0.06
GA3 x Urea		10.2	11.4	11.0	11.5	0.08	0.08

Table (3) Effect of GA3 application and Urea fertilizer on fresh and dry weight of *Cupressus macrocarpa* during 2007/2008 seasons

GA3 ppm	Urea g/plant	Fresh weight (g)		Dry weight (g)	
		2007	2008	2007	2008
0	0	96.5	99.0	31.7	36.8
	2.5	114.3	117.4	40.1	46.6
	5	119.9	123.3	44.0	51.1
	mean	110.2	113.2	38.6	44.8
125	0	110.3	112.6	40.4	45.9
	2.5	120.8	124.1	43.7	50.7
	5	132.3	135.9	48.1	55.8
	mean	121.1	124.2	44.1	50.8
250	0	115.8	118.8	42.1	48.8
	2.5	132.4	135.4	47.9	55.6
	5	145.3	149.7	53.5	62.1
	mean	131.2	134.6	47.8	55.5
500	0	112.5	115.7	40.9	46.5
	2.5	121.3	124.6	44.1	51.2
	5	132.4	136.1	48.7	56.5
		122.1	125.5	44.6	51.4
Means of Urea levels	0	108.8	111.5	38.8	44.5
	2.5	122.2	125.4	44.0	51.0
	5	132.5	136.3	48.6	56.3
L.S.D. at 5% of					
GA3		6.0	7.4	6.2	5.6
Urea		5.8	6.1	5.4	4.0
GA3 x Urea		7.1	8.6	8.3	7.2

Table (4) Effect of GA3 application and Urea fertilizer on Nitrogen,Phosphorus and Potassium contents in leaves of *Cupressus macrocarpa* during 2007/2008 seasons

GA3 ppm	Urea g/plant	N %		P %		K %	
		2007	2008	2007	2008	2007	2008
0	0	2.52	2.78	0.364	0.372	1.13	1.18
	2.5	2.86	3.14	0.382	0.389	1.07	1.11
	5	3.06	3.37	0.401	0.408	1.04	1.08
	mean	2.81	3.10	0.382	0.390	1.08	1.12
125	0	2.99	3.31	0.395	0.405	1.23	1.27
	2.5	3.39	3.75	0.412	0.418	1.16	1.19
	5	3.67	3.97	0.459	0.463	1.13	1.14
	mean	3.35	3.68	0.422	0.429	1.17	1.20
250	0	3.22	3.53	0.419	0.409	1.43	1.41
	2.5	3.65	3.99	0.438	0.445	1.36	1.33
	5	3.86	4.24	0.481	0.489	1.32	1.27
	mean	3.58	3.92	0.446	0.448	1.37	1.34
500	0	3.03	3.20	0.426	0.421	1.27	1.31
	2.5	3.43	3.62	0.448	0.455	1.21	1.23
	5	3.64	3.84	0.492	0.496	1.17	1.21
		3.37	3.55	0.455	0.457	1.22	1.25
Means Of Urea levels	0	2.94	3.21	0.401	0.402	1.27	1.29
	2.5	3.33	3.63	0.420	0.427	1.20	1.21
	5	3.56	3.86	0.458	0.464	1.16	1.17
L.S.D. at 5% of GA3		0.52	0.48	0.04	0.05	0.13	0.14
Urea		0.47	0.42	0.03	0.03	0.11	0.12
GA3 x Urea		0.68	0.63	0.05	0.06	0.20	0.18

Table (5) Effect of GA3 and Urea fertilizer on Calsium and Magnisium contents in leaves of *Cupressus macrocarpa* during 2007/2008 seasons

GA3 ppm	Urea g/plant	Ca %		Mg %	
		2007	2008	2007	2008
0	0	2.95	2.99	1.62	1.62
	2.5	3.06	3.07	2.01	2.02
	5	3.15	3.29	2.16	2.18
	mean	3.05	3.12	1.93	1.94
125	0	2.78	2.81	1.99	2.05
	2.5	2.69	2.72	2.37	2.61
	5	2.72	2.57	2.54	2.33
	mean	2.73	2.70	2.30	2.33
250	0	2.75	3.71	2.14	2.21
	2.5	2.36	2.35	2.65	2.99
	5	2.16	2.14	2.73	2.68
	mean	2.42	2.73	2.51	2.63
500	0	2.24	2.57	2.22	2.34
	2.5	2.03	2.11	2.74	2.91
	5	1.91	1.78	2.83	2.73
		2.06	2.15	2.60	2.66
Means of Urea levels	0	2.76	3.02	1.99	2.06
	2.5	2.68	2.56	2.44	2.63
	5	2.46	2.45	2.57	2.48
L.S.D. at 5% of GA3		0.27	0.24	0.29	0.27
Urea		0.22	0.21	0.24	0.22
GA3 x Urea		0.36	0.34	0.36	0.33

Table (6) Effect of GA3 application and Urea Fertilizer on Total Carbohydrate and Protein Content of Cupressus macrocarpa during 2007/2008 seasons

GA3 ppm	Urea g/plant	Total Carbohydrate (%D.M.)		Protein Content	
		2007	2008	2007	2008
0	0	22.7	21.9	15.8	17.4
	2.5	26.4	25.3	17.9	19.6
	5	32.5	31.5	19.2	21.0
	mean	27.2	26.2	17.6	19.4
125	0	21.2	20.5	18.7	20.7
	2.5	24.9	23.7	21.2	23.4
	5	30.7	29.1	23.0	24.8
	mean	25.6	24.4	21.0	23.0
250	0	19.6	18.1	20.1	22.1
	2.5	23.2	21.4	22.8	25.0
	5	28.6	27.3	24.1	26.5
	mean	23.8	22.3	22.4	24.5
500	0	17.9	18.2	18.8	20.0
	2.5	21.8	20.5	21.4	22.6
	5	26.9	25.8	22.8	24.0
		22.2	21.5	21.0	22.2
Means of Urea levels	0	20.4	19.7	18.4	20.1
	2.5	24.1	22.7	20.8	22.7
	5	29.7	28.4	22.3	24.1
L.S.D. at 5% of GA3		2.7	2.1	2.56	2.87
Urea		2.5	2.0	2.17	2.21
GA3 x Urea		3.5	2.8	3.32	3.86

تحسين نمو السرو الليمونى باستخدام حمض الجبريليك واليوريا

أ.د/نعيم عيسى القلتاوى(1)،أ.د/عبدالرازق إبراهيم النجار(1)،
.د/ سيد شحاته عابدين(1)،السيد/ ممدوح محمد أحمد
قسم الزينة – كلية الزراعة – جامعة اسيوط – مصر(1)
كلية الزراعة- قنا– جامعة جنوب الوادى – مصر(2)

ان اشجار السرو الليمونى تستعمل على نطاق واسع كنبات اصص جميل الشكل. لكن نموها البطئ يحول دون انتاجه بشكل تجارى لذلك اجريت هذه التجربه لدراسة استعمال اليوريا والجبريلين لزيادة سرعة نمو النبات .اما بالنسبة للجبريلين فقد استعمل بمستويات(0، 125، 250 و 500 جزء فى المليون) سواء بدون أو مع اليوريا والتى تضاف الى التربه بمستويات (0، 2.5 و 5 جرام/نبات). وجمعت التجربه فى قطاعات كاملة العشوائيه بثلاث مكررات وذلك فى موسمى 2007 و 2008 وشملت التجربة دراسة تأثير المعاملات السابقه على النمو الخضرى والمكونات الكيميائيه للنبات . أظهرت النتائج التى تم الحصول عليها تأثيرا ايجابيا كبيرا للمعامله بالجبريلين عند مستوى 250 جزء فى المليون سواء على قياسات النمو الخضرى او على محتوى العناصر الغذائية من النتروجين، الفوسفور، البوتاسيوم، المغنسيوم والبروتين ماعدا محتوى كلا من الكالسيوم والكربوهيدرات فلقد كان تاثيره سلبيا مقارنة بالمستويات الاخرى .لذلك يمكن التوصيه باستعمال الجبريلين عند مستوى250 جزء فى المليون مع 5جم يوريا/نبات لتحسين نمو السرو الليمونى .