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EFFECT OF COTONGEN AND POTASSIUM SOURCES ON VEGETATIVE GROWTH AND OIL PERCENTAGE OF SWEET BASIL (*Ocimum basilicum* L.) PLANT.

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ABSTRACT

A field experiment was conducted at Kaha Farm of the Horticulture Research Institute, at Kalubia Governorate, Egypt during the two successive seasons of 2008and 2009.

Seeds of basil were coated with cotongen (seed coating agent) was prepared by dissolving 800g of cotongen in 1liter water which containing iron, manganese and zinc as chelated compounds plus agricultural sulfur, potassin-P (a foliar plant nutrient containing potassium K_2O 30% and phosphorus P_2O_5 8%) used with rates of 1.5, 3 and 4.5 ml/liter and the feddan. the treatment with cotongen and the different levels of potassium sources gave a positive effect on growth characters (plant height), number of branches, fresh and dry weights plant $^{-1}$, fresh herb yield fed $^{-1}$ and volatile oil percentage and its component in comparison with other treatments, the data also revealed that, treating plants with cotongen and potassin-p (4.5 ml/l.) showed a significant effect on growth and volatile oil.

INTRODUCTION

The Ocimum genus, belonging to the Lamiaceae family (syn. Labiatae), which includes more than sixty species of herbs and shrubs indigenous to tropical and subtropical regions of Asia, Africa and the Americas (story, 1991). The most important specie of Ocimum genus is *O. basilicum* L.; this specie, usually named common basil or sweet basil, it is known locally in Egypt as "Rehan" and in other Arabic countries as "Habaq" (Boulos, 1983 and Cherijej, 1984). The economically potential refers to the basic natural characteristics as volatile oil producers (Lawrence, 1993). Sweet basil is a popular culinary herb used in food and oral care products (La-Chowicz *et al.*, 1996; Machale *et al.*, 1997). The volatile oil of the plant is used as perfumery, basil is well known as a plant of a folk medicinal used as carminative, galactogogue, stomachic and antispasmodic tonic and vermifugem, basil tea taken hot is good for treating nausea, flatulance and dysentery (Ozcan and Chalchat, 2002; Sajjadi, 2006). Basil is used in pharmacy for diuretic and stimulating properties, in perfumes and cosmetics for its smell

Shadia and El-Mogi (2003) on *Castor Bean* found that potassin (as foliar spray) gave the highest values of vegetative growth, seed yields as well as fixed oil yield.

Shadia and Zayed (1994) on Fenugreek plant found that, 200 kg Calcium super phosphate and 100 kg potassium sulphate gave the highest values of plant height, number of pods, fresh and dry weight of plant in both locations.

Khater *et al* (1994) on *plantago psyllnium* found that, treating plants with 100 kg potassium sulphate significantly increased plant height, number of branches and fresh and dry weight of plant.

Shadia (1988) on *Perlargonium graveolens* found that using potassium sulphate 55 kg / fed. and calcium super phosphate (130 k/fed.) significantly increased plant height and fresh and dry weight in the first cut during two seasons

MATERIALS AND METHODS

A field experiment was conducted at Kaha Farm of the Horticulture Research Institute, Kalubia Governorate, Egypt during the two successive seasons of 2008and 2009.

Seeds of Ocimum basilicum L. were obtained from the Medicinal and Aromatic Plants Dept., Horticultural Research Institute.Befor sowing the seed, part of seed was coated with cotongen and the other was incoated and the seeds of basil were sown in the nursery bed on 1st March of both seasons. After 45 days seedlings were transplanted to the experiment field plots with area (3x3.5m). On rows, with 60 cm a part and 20 cm in between. The experimental layout was a complete randomized block design with three replications.

The treatments of this experiment were Cotongen (seed coating agent) containing iron, manganese and zinc as chelated compounds plus agricultural sulfur), Potassin-P (as foliar plant nutrient containing potassium K_2O 30% and phosphorus P_2O_5 8%) and potassium Sulfate 48% K_2O (soil fertilizer). Cotongen and potassin p produced by General organization for Agriculture Equalization Fund (G.O.A.E.F.), Ministry of Agric. Egypt.

Cotongen solution for treatment was prepared by dissolving 800g of cotongen in 1liter water (15g of cotongen is sufficient to 1kg seeds), the seeds blended well with a suitable volume of the solution and left to dryness, potassium Sulfate 48% K_2O as soil fertilizer was used with three levels 25, 50, 75 kg/fedden (recommended doses), they were added in two batches. The first was after 45 days from transplanting the seedlings and the second was one month intervals. Potassin-P (PO) foliar spray was used with three levels of 1.5, 3, 4.5 ml per liter were sprayed at three times of 30, 45 and 60 days from transplanting and one spray after every cut; during the two seasons.

The treatments of the experiment were a combination of the following:

1-C0+PS 25 Seeds untreated with cotongen + potassium sulfate at 25kg/fed.
2-C0+PS 50 Seeds untreated with cotongen + potassium sulfate at 50 kg/fed.
3-C0+PS 75 Seeds untreated with cotongen + potassium sulfate at 75kg/fed.
4-C0+PO1.5 Seeds untreated with cotongen + potassin-p at 1.5 ml/l
5-C0+PO 3 Seeds untreated with cotongen + potassin–p at 3 ml/l
6-C0+PO4.5 Seeds untreated with cotongen + potassin-p at 4.5 ml/l
7-C1+PS 25 Seeds treated with cotongen + potassium sulfate at 25kg/fed.
8-C1+PS 50 Seeds treated with cotongen + potassium sulfate at 50 kg/fed.
9-C1+PS 75 Seeds treated with cotongen + potassium sulfate at 75kg/fed.

10- C1+PO1.5 Seeds treated with cotongen + potassin-p at 1.5 ml/l
11- C1+PO 3 Seeds treated with cotongen + potassin at 3 ml/l
12- C1+PO4.5 Seeds treated with cotongen + potassin-p at 4.5 ml/l

The physical and chemical properties of the soil sample were determined according to (Jackson, 1967), Table 1.

Growth characters and volatile oil determinations were carried out at the three cuts after 90,180 and 270 days from transplanting, respectively. The following data were recorded, plant height (cm), number of branches plant^{-1}, fresh and dry weights g plant^{-1} and fresh herb yield ton feddan^{-1}. The volatile oil percentage was determined in the air dried herb using a modified Clevenger apparatus according to method described by (Guenther, 1961).

Table (1):The physical and chemical properties of the experimental soil.

Analysis	value	
	Season1	**Season 2**
Physical analysis		
Sand %	18.50	17.00
Silt %	22.40	21.80
Clay %	60.20	61.50
Texture	Clay loamy	Clay loamy
Chemical analysis		
Soluble cations (meq/L.)		
Ca^{++}	1.38	1.65
Mg^{++}	0.85	1.32
Na^{+}	1.60	2.00
K^{+}	0.34	0.12
Soluble anions (meq/L.)		
CO^{--}	-	-
HCO_3^{--}	2.25	2.18
Cl^{-}	1.24	1.88
SO_4^{--}	0.56	0.93
Available N (ppm)	87.9	64.9
Available P_2O_5(ppm)	56.4	58.2
Available K_2O(ppm)	85.2	77.0
pH	7.90	8.10
E.C. ds/m (1:5 water extract)	0.49	0.59

The GC analysis of the volatile oil samples was analyzed of some treatment was carried out using Gas chromatography instrument estimated in the Medicinal and Aromatic Plants Dept. Laboratory, H.R.I., with the following specifications: DsChrom 6200 Gas Chromatograph equipped with a flame ionization detector, Column: BPX-5, 5% phenyl (equiv.) polysillphenylene-siloxane 30m x 0.25mm ID x 0.25µm film., Sample size: 1µl, Temperature program ramp increase with a rate of 10º C / min from 70º to 200º C, Detector temperature (FID): 280 °C, Carrier gas: nitrogen, Flow rate: N2 30 ml/min; H2 30 ml/min; air 300 ml/min. Main compounds of the volatile oils were identified by matching their retention times with those of the authentic samples injected under the same conditions. The relative percentage of each compound was calculated from the area of the peak corresponding to each compound.

Data were statistical analysis of variance according to (Snedecor and Cochran, 1990). (L.S.D) were used compare between means according to (Waller and Duncan, 1969) at probability 5%.

RESULTS

Effect of cotongen and potassium Sulfate and potassin p on vegetative growth of basil plant

Data in table (2.3and 4) show the effect of different treatments on the vegetative growth of *Ocimum basilicum* plant.

Plant height

The data indicate that, different treatments significantly increased plant height compared with recommended dose of potassium sulphate, when the plant treated with cotongen with different levels of potassium sulphate or with potassin p, the data showed significant effect in plant height and the highest values was obtained when the plants treated with cotongen and potassin-p 4.5cm/l these results were obtained in the three cut during two season

Number of branches

The data clear that, the number of branches significantly affected with different treatments all different treatments increased the number of branches compared with the recommended doses of potassium sulphate. Treatment of potassium sulphate and there were significant deference between different treatment and the plant treated with cotongen and potassin-p 4.5cm/l gave the highest values of branch number

These results were observed during three cuts in the two seasons

Fresh and dry herb weights

Data in the same table revealed that, all the treatments significantly increased fresh and dry herb compared with recommended dose of potassium sulphate Potassium sulphate as soil fertilizer with three levels, cotongen and potassin-p caused enhancement of the growth and the highest value of fresh and dry herb were obtained when the plant treated with cotongen and potassin p 4.5cm/l

Effect of cotongen, potassium sulphate and potassin p on oil content and its composition

Oil percentage and its composition

Data presented in table (1,2 and 3) show the effect of cotongen and sources of potassium on the oil percentage during three cuts in two seasons

The data in different treatment generally significantly increased oil percentage compared with recommended dose of potassium sulphate.and the data also cleared that there were significant deferent between treatments each other

Data in table (5) and fig. (1-8) clear that, G..L.C analysis of oil in the third cut contain 13 components. The treatment (cotongen and PO 4.5cm/l) gave the highest value of α-pinene, geranyl acetate and β-caryophyllene

Table (2): Effect of cotongen , potassium sulphate and potassin-p on vegetative growth and volatile oil (%) of *Ocimum basilicum* L. plants at 1st cut in 2008 and 2009 seasons.

	Plant height (cm)		Branches number plant $^{-1}$		Fresh weight g plant^{-1}		Dry weight g plant^{-1}		Fresh yield ton fed. $^{-1}$		Volatile oil (%)	
	Season 1	Season 2	Season 1	Season 2	Season 1	Season 2	Season 1	Season 2	Season 1	Season 2	Season 1	Season 2
C0+PS 25	44.33	43.67	8.67	9.33	157.33	176.33	34.90	35.88	2.47	3.73	0.54	0.63
C0+PS 50	46.00	47.67	9.67	11.67	176.17	185.30	37.36	37.44	2.94	4.09	0.60	0.65
C0+PS 75	47.67	51.00	11.00	13.67	186.17	191.51	41.50	40.03	3.21	4.19	0.66	0.66
C0+PO1.5	45.33	44.33	10.67	10.00	166.50	187.83	36.98	36.49	2.86	3.96	0.68	0.66
C0+PO 3	48.33	48.67	11.33	12.00	179.83	191.85	39.64	39.53	3.07	4.07	0.69	0.64
C0+PO4.5	51.00	52.33	12.67	13.67	190.30	197.00	42.48	41.14	3.64	4.24	0.69	0.68
C1+PS 25	50.33	48.67	11.67	12.00	191.13	195.50	37.66	39.06	3.04	4.01	0.66	0.73
C1+PS 50	51.67	53.67	12.00	13.67	195.43	214.67	39.65	42.43	3.44	4.20	0.69	0.75
C1+PS 75	53.67	55.67	13.00	14.00	208.57	222.33	43.11	43.57	3.97	4.31	0.74	0.76
C1+PO1.5	51.67	52.67	12.00	12.67	210.33	208.33	39.97	40.85	3.58	4.19	0.73	0.76
C1+PO 3	52.33	54.33	14.00	14.67	216.33	214.67	42.40	44.88	3.97	4.34	0.77	0.82
C1+PO4.5	54.33	57.00	15.67	15.67	223.33	226.00	45.90	48.66	4.33	4.72	0.79	0.85
LSD at 0.05	5.98	6.45	2.57	2.93	24.92	30.48	5.14	4.92	0.90	0.47	n.s.	n.s.

C0	cotongen incoated seeds	**PO1.5**	potassin-p at 1.5 ml/l	**PO4.5**	potassin-p at 4.5 ml/l	**PS 50**	potassium sulfate at 50kg/fed.
C1	cotongen coated seeds	**PO 3**	potassin at 3 ml/l	**PS 25**	potassium sulfate at 25kg/fed.	**PS 75**	potassium sulfate at 75 kg/fed.

Table (3). Effect of cotongen , potassium sulphate and potassin-p on vegetative growth and volatile oil (%) of *Ocimum basilicum* L. plants at 2^{nd} cut in 2008 and 2009seasons.

	Plant height (cm)		Branches number plant $^{-1}$		Fresh weight g plant^{-1}		Dry weight g plant^{-1}		Fresh yield ton fed. $^{-1}$		Volatile oil (%)	
	Season1	Season2	Season1	Season2	Season1	Season2	Season1	Season2	Season1	Season2	Season1	Season2
C0+PS 25	41.25	52.33	10.00	10.33	172.77	194.83	36.18	37.57	3.29	3.33	0.55	0.59
C0+PS 50	44.33	54.33	11.67	12.00	186.72	201.33	39.61	39.55	3.79	3.96	0.60	0.58
C0+PS 75	51.67	56.33	13.33	13.67	198.79	209.82	42.20	42.07	4.01	4.07	0.61	0.59
C0+PO1.5	49.00	53.67	11.67	11.00	186.17	199.82	38.39	39.19	3.67	3.41	0.60	0.60
C0+PO 3	52.67	55.67	13.33	13.67	197.14	208.48	40.64	41.38	3.90	3.88	0.66	0.65
C0+PO4.5	54.00	57.33	14.67	14.67	204.26	215.82	43.79	44.17	4.05	4.13	0.66	0.70
C1+PS 25	52.67	54.67	13.00	12.33	196.05	205.15	40.24	41.39	3.86	4.20	0.67	0.63
C1+PS 50	54.33	57.33	14.00	13.67	199.22	211.56	43.66	43.30	4.11	4.30	0.69	0.63
C1+PS 75	57.67	59.67	15.33	15.33	202.08	217.33	46.20	45.76	4.37	4.38	0.74	0.71
C1+PO1.5	53.67	55.67	13.33	13.33	205.07	210.33	42.39	43.97	4.56	4.21	0.76	0.70
C1+PO 3	56.67	57.00	14.33	15.33	210.78	216.50	45.87	45.53	4.97	4.33	0.75	0.75
C1+PO4.5	59.00	63.00	16.33	16.33	228.96	224.33	49.57	50.26	5.17	4.49	0.76	0.77
LSD at 0.05	5.38	5.98	2.13	3.41	18.13	29.68	5.28	4.38	0.65	0.60	0.13	n.s.

C0	cotongen incoated seeds	**PO1.5**	potassin-p at 1.5 ml/l	**PO4.5**	potassin-p at 4.5 ml/l	**PS 50**	potassium sulfate at 50 kg/fed.
C1	cotongen coated seeds	**PO 3**	potassin at 3 ml/l	**PS 25**	potassium sulfate at 25kg/fed.	**PS 75**	potassium sulfate at 75 kg/fed.

Table (4). Effect of cotongen , potassium sulphate and potassin-p on vegetative growth and volatile oil (%) of *Ocimum basilicum* L. plants at 3rd cut in 2008 and 2009seasons.

	Plant height (cm)		Branches number plant $^{-1}$		Fresh weight g plant^{-1}		Dry weight g plant^{-1}		Fresh yield ton fed. $^{-1}$		Volatile oil (%)	
	Season1	Season2	Season1	Season2	Season1	Season2	Season1	Season2	Season1	Season2	Season1	Season2
C0+PS 25	48.33	45.67	14.00	13.00	188.67	197.49	37.58	39.61	3.96	3.93	0.59	0.51
C0+PS 50	52.00	51.00	15.67	15.33	198.99	212.17	41.78	42.35	4.20	4.14	0.60	0.53
C0+PS 75	54.33	54.50	16.00	17.33	208.98	221.30	44.96	47.64	4.52	4.26	0.63	0.58
C0+PO1.5	51.67	46.67	14.33	13.67	195.50	211.47	41.67	41.01	4.16	4.11	0.65	0.72
C0+PO 3	54.00	52.67	16.33	17.00	200.69	218.06	45.60	44.37	4.43	4.33	0.67	0.63
C0+PO4.5	58.33	55.33	17.67	18.00	209.80	229.80	49.10	48.29	4.85	4.48	0.69	0.63
C1+PS 25	54.00	52.33	15.67	14.33	207.30	223.92	44.56	45.73	4.21	4.44	0.69	0.69
C1+PS 50	57.67	54.67	17.67	16.00	226.19	236.06	49.10	49.40	4.83	4.79	0.70	0.72
C1+PS 75	61.33	56.67	18.00	17.00	253.00	251.87	51.42	53.49	5.17	5.05	0.78	0.65
C1+PO1.5	60.33	53.67	16.67	16.33	231.03	242.27	47.58	51.73	4.81	4.83	0.78	0.75
C1+PO 3	62.67	55.33	17.33	17.00	253.29	248.73	50.93	56.37	5.17	4.93	0.79	0.79
C1+PO4.5	65.67	59.33	19.00	18.67	276.17	259.94	53.23	60.60	5.52	5.25	0.85	0.81
LSDaṭ□0.05	5.42	5.62	2.35	3.27	29.39	13.48	0.75	9.13	0.75	0.78	0.09	0.18

C0	cotongen incoated seeds	**PO1.5**	potassin-p at 1.5 ml/l	**PO4.5**	potassin-p at 4.5 ml/l	**PS 50**	potassium sulfate at 50 kg/fed.
C1	cotongen coated seeds	**PO 3**	potassin at 3 ml/l	**PS 25**	potassium sulfate at 25kg/fed.	**PS 75**	potassium sulfate at 75 kg/fed.

Table (5): Effect of cotongen , potassium sulphate and potassin-p on volatile oil components of *Ocimum basilicum* L. plants at 3rd cut in 2008 and 2009 seasons.

	Treatment	C0+PS 75		C0+PO 4.5		C1+PS75		C1+PO 4.5	
Component		Season 1	Season 2	Season 1	Season 2	Season 1	Season 2	Season 1	Season 2
1	α-pinene	0.16	3.90	4.60	0.27	0.77	1.46	3.71	-
2	β-pinene	0.21	0.12	-	0.77	0.56	0.59	0.13	0.89
3	Limonene	4.15	2.94	1.68	6.10	6.51	4.92	2.75	5.19
4	Linalool	32.98	34.86	31.20	21.92	37.77	27.01	33.40	53.22
5	Camphor	1.98	0.55	1.37	1.84	2.37	2.25	1.80	0.96
6	Borneol	1.53	1.82	1.85	2.04	2.48	2.52	0.30	1.42
7	Geranyl acetate	0.82	0.28	0.344	-	-	0.53	0.03	0.61
8	Methyl chavicol	26.49	25.62	27.19	30.30	33.23	15.71	28.20	26.47
9	Methyl cinnamate	26.36	21.42	18.89	29.09	5.00	36.56	20.80	2.45
10	Thymol	1.01	4.22	5.24	2.95	5.80	3.50	4.35	4.62
11	Eugenol	4.31	4.21	7.14	4.72	5.34	4.74	4.53	3.93
12	β-caryophyllene	-	-	0.40	-	-	-	-	-
13	Unknown	-	0.06	0.1	-	0.17	0.21	-	0.24
Total		100	100	100	100	100	100	100	100

C0	cotongen incoated seeds	**PS 75**	potassium sulfate at 75 kg/fed.
C1	cotongen coated seeds	**PO 4.5**	potassin at 4.5 ml/l

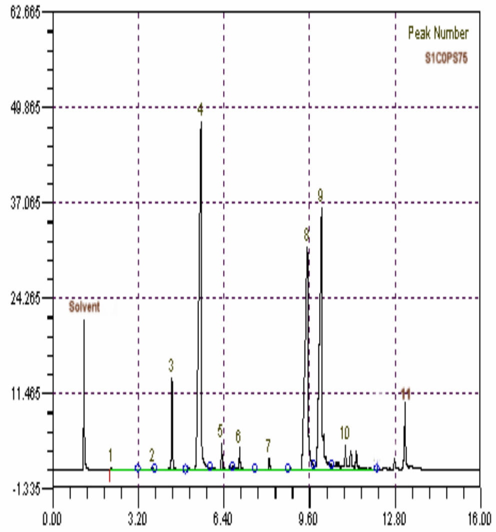

Fig.(1): G. L .C analysis of volatile oil of plant treated with C0 + PS75 1ST season

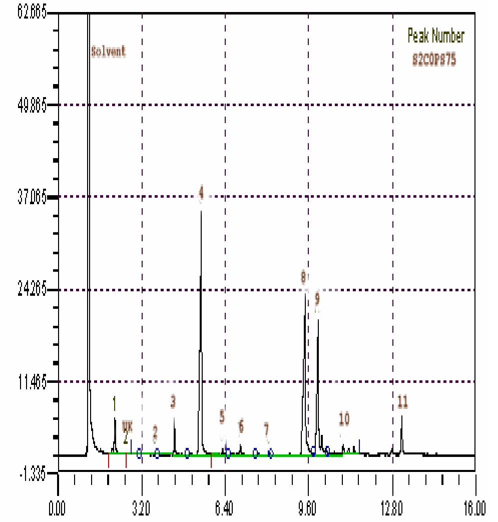

Fig.(2): G. L .C analysis of volatile oil of plant treated with C0 + PS75 2[nd] season

1	**α-pinene**
2	**β-pinene**
3	**Limonene**
4	**Linalool**
5	**Camphor**
6	**Borneol**
7	**Geranyl acetate**
8	**Methyl chavicol**
9	**Methyl cinnamate**
10	**Thymol**
11	**Eugenol**
12	**β-caryophyllene**
UK	**Unknown**

C0	cotongen incoated seeds	**PS 75**	potassium sulfate at 75 kg/fed.
C1	cotongen coated seeds	**PO 4.5**	potassin at 4.5 ml/l

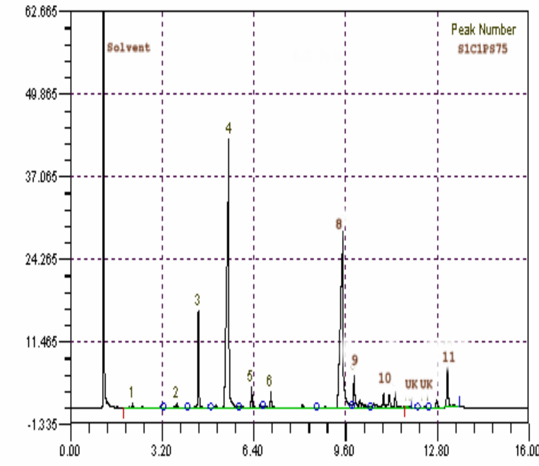

Fig.(3): G. L .C analysis of volatile oil of plant treated with C1 + PS75 1ST season

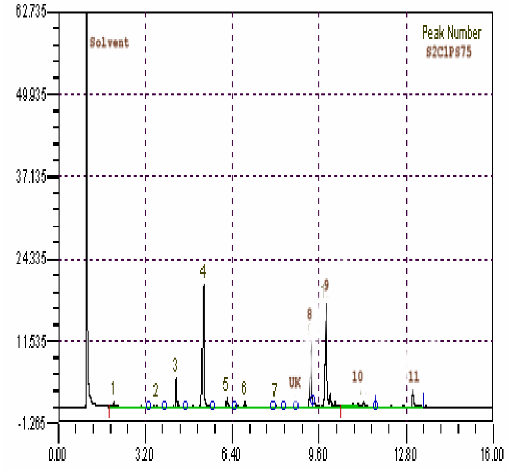

Fig.(4): G. L .C analysis of volatile oil of plant treated with C1 + PS75 2nd season

1	α-pinene
2	β-pinene
3	Limonene
4	Linalool
5	Camphor
6	Borneol
7	Geranyl acetate
8	Methyl chavicol
9	Methyl cinnamate
10	Thymol
11	Eugenol
12	β-caryophyllene
UK	Unknown

C0	cotongen incoated seeds	**PS 75**	potassium sulfate at 75 kg/fed.
C1	cotongen coated seeds	**PO 4.5**	potassin at 4.5 ml/l

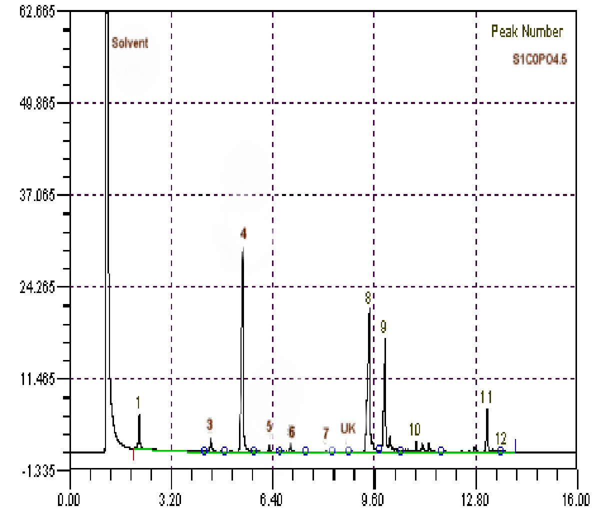

Fig.(5): G. L .C analysis of volatile oil of plant treated with C0 + PO 4.5 1ST season

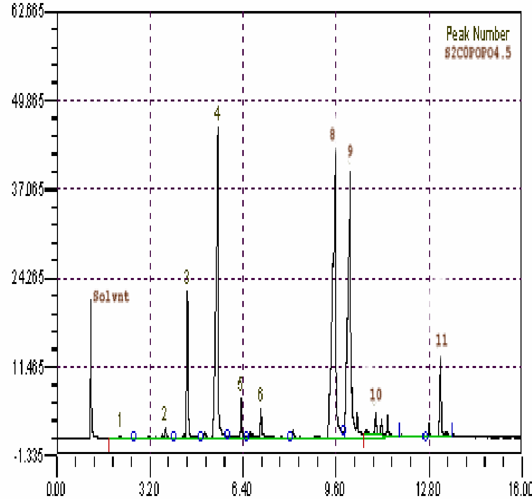

Fig.(6): G. L .C analysis of volatile oil of plant treated with C0 + PO 4.5 2nd season

1	α-pinene
2	β-pinene
3	Limonene
4	Linalool
5	Camphor
6	Borneol
7	Geranyl acetate
8	Methyl chavicol
9	Methyl cinnamate
10	Thymol
11	Eugenol
12	β-caryophyllene
UK	Unknown

C0	cotongen incoated seeds	**PS 75**	potassium sulfate at 75 kg/fed.
C1	cotongen coated seeds	**PO 4.5**	potassin at 4.5 ml/l

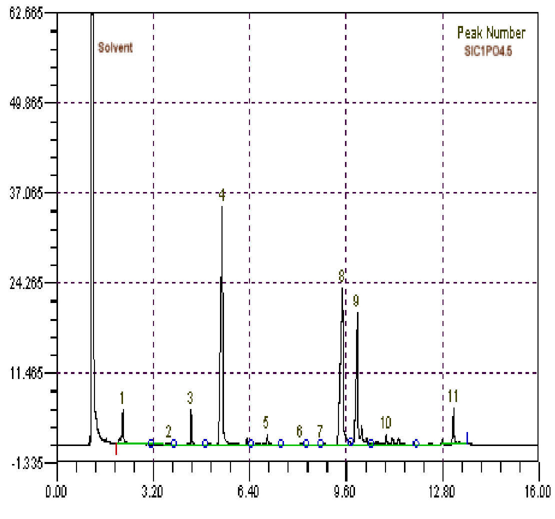

Fig.(7): G. L .C analysis of volatile oil of plant treated with C1 + PO 4.5 1ST season

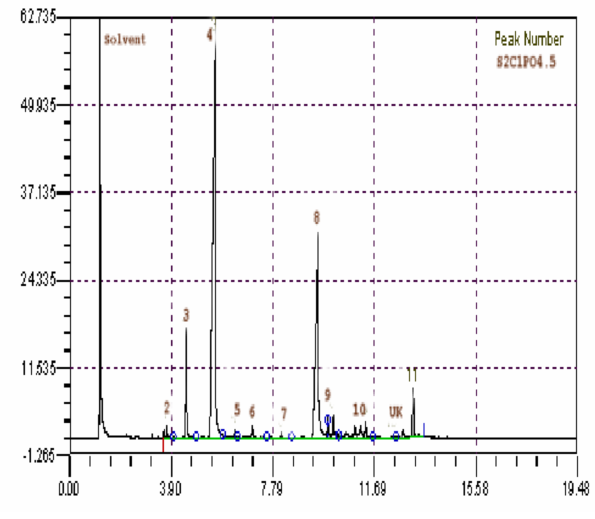

Fig.(8): G. L .C analysis of volatile oil of plant treated with C1 + PO 4.5 2nd season

1	**α-pinene**
2	**β-pinene**
3	**Limonene**
4	**Linalool**
5	**Camphor**
6	**Borneol**
7	**Geranyl acetate**
8	**Methyl chavicol**
9	**Methyl cinnamate**
10	**Thymol**
11	**Eugenol**
12	**β-caryophyllene**
UK	**Unknown**

C0	cotongen incoated seeds	**PS 75**	potassium sulfate at 75 kg/fed.
C1	cotongen coated seeds	**PO 4.5**	potassin at 4.5 ml/l

The data also indicate the plant treated with cotongen and potassium sulphate 75 kg/fed gave the highest value of limonene, methylchavicol, thymol, eugenol, camphore, Borneol and methyle cinnamate.

The treatment cotongen and potassin p 4.5cm/l gave the highest values of β-pinene, linalool and β-caryophyllene

DISCUSSION

From the data showed in different tables, the obtained results may be attributed to the role of micro and macro elements.

Cotongen is seed coating agent containing iron, manganese and zinc as chelated compounds plus agricultural sulfur. Iron (Fe) is a cofactor for approximately 140 enzymes that catalyze unique biochemical reactions (Brittenham, 1994). Hence, iron fills many volatile roles in plant growth and development, including chlorophyll synthesis, thylakoid synthesis and chloroplast development (Miller *et al.,* 1995). Iron is required at several steps in the biosynthetic pathways, soluble ferrous tended to become oxidized to ferric oxide which was insoluble as well as the limitation of iron uptake by root cell cytosol (Nikolic and Kastori, 2000) and inhibit iron transport to shoots and its transfer from apoplasm to cytoplasm in shoot tissues (Nikolic and Romheld, 2002).

Iron is a necessary element for plant nutrition, the role of iron in plant metabolism was achieved by Amberger (1974) who reported that iron is closely connected to chlorophyll protein complex of biosynthesis of chlorophyll.

He also added that the role of iron in plant metabolism is various, its main function concern growth, respiration, chlorophyll synthesis, and photosynthesis, symbiotic fixation of molecular nitrogen and some others interaction.

Zinc (Zn) is an essential element for plant that act as a metal component of various enzymes or as a functional structural or regulatory cofactor and for protein synthesis, photosynthesis, the synthesis of auxin, cell division, the maintance of membrane structure and function, and sexual fertilization (Marschner, 1995), zinc is necessary for root cell membrane integrity (Welch , 1982). As suggested by (Parker 1992), root cell membrane permeability is increased under zinc deficiency which might be related to the functions of zinc in cell membranes.

As for the role of zinc in the physiological process in plant, Amberger (1974) concluded that zinc functions as apart or cofactor for a lot of enzymes especially carbonic anhydrase , dehydrogenase, hexokinase, peptidase and so on. It also necessary for RNA and protein synthesis, as it control auxin metabolism via tryptophan and blocks phosphate utilization.

Manganese acts as cofactor, activating about 35 different enzymes (Burnell, 1988).

Potassium (K) is the only essential plant nutrient that is not a constituent of any plant part. K is a key nutrient in the plants tolerance to stresses such as cold/hot temperatures, drought and pest problems. K acts as catalysts for many of the enzymatic processes in the plant that are necessary for plant growth to take place. Another key role of K is the regulation of water use in the plant (osmoregulation). This osmoregulation process affects water transport in the xylem, maintains high daily cell turgor pressure which affects wear tolerance, affects cell elongation for growth and most importantly it regulates the opening and closing of the stomates which affect transpirational cooling and carbon dioxide uptake for photosynthesis. K also plays key role in increasing crop yield and improving the quality of produce (Tisdale , 1985). K plays an important role in the translocation of photosynthates from sources to sinks (Cakmak , 1994). Furthermore, K is important nutrient that has favorable effects on the metabolism of nucleic acids, proteins, vitamins and growth substances (Bisson , 1994; Bednarz and Oosterhuis, 1999).

The effect of potassium as nutrient element was studied by Chouretah and Bunemann (1970) on strawberry; they demonstrated that potassium increasing the content of glucose, fructose, sucrose, xylose and maltose increased. Whereas, the latter concluded that raising level of potassium, the content of reducing sugars increased.

Manganese probably plays a direct part in the oxidation reduction phenomena, especially in relation to iron compounds: Somer and Shive(1942) revealed that manganese plays the role of such an oxidizing agent and an excess of manganese may therefore induce symptoms of iron deficiency by converting the available iron in the physiologically inactive ferric condition .

Conclusions

It may be concluded that cotongen and potassin-p enhanced growth character and volatile oil content and its component of *Ocimum basilicum* L. Thus it may be recommended that using cotongen as a seed coating agent and potassin-p in the production of basil in Egypt.

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تأثير الكوتنجين ومصادر مختلفة من البوتاسيوم على النمو الخضرى والزيت الطيار ومكوناته لنبات الريحان البلدى

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اجريت هذه الدراسة خلال موسمين 2008، 2009 فى مزرعة قها- معهد بحوث البساتين- محافظة القليوبية، لدراسة تأثير الكوتنجين ومصادر مختلفة من البوتاسيوم على النمو الخضرى والزيت الطيار ومكوناته لنبات الريحان البلدى.

تم معاملة بذور الريحان قبل الزراعة بمركب الكوتنجين وهو مغلف بذور يحتوى على عناصر الحديد والزنك والمنجنيز فى صورة مخلبيية بالإضافة الى الكبريت الزراعى، وتم استخدام السماد الورقى بوتاسين(بو- فو) والذى يحتوى على البوتاسيوم (بو2أ 30%- فو2أ5 8%) بمعدل1.5، 3،4.5 مل/لتر واضافة سماد سلفات البوتاسيوم بمعدل25، 50،75كجم / فدان (تسميد أرضى).

وأظهرت النتائج تحسن الصفات الخضرية المختلفة للريحان (*Ocimum basilicum* L) مثل ارتفاع النبات، عدد الأفرع، الوزن الطازج والجاف / للنبات والمحصول الطازج للفدان ،النسبة المئوية للزيت الطيار ومكوناته نتيجة لمعاملات الكوتنجين والرش بالبوتاسين-بو خلال الموسمين المتعاقبين ، وقد كان التحسن معنويا. وكانت افضل المعاملات هى المعاملة بالكوتنجين مع الرش بالبوتاسين-بو بمعدل 4.5مل /لتر حيث اعطت أحسن النتائج خلال الموسمين.

اظهر التحليل الكروماتوجرافى للزيت أنه يحتوى على اللينالول والميثايل شافيكول والميثيل سينامات والفا بينين والبيتا بينيتن و البورنيول و الليمونين و كامفور و الثيمول والإيوجينول والبيتا كاريوفللين، وجيرانيل اسيتاتوقد تأثرت مكونات زيت نتيجة للمعاملات المختلفة.

و بذلك يمكن التوصية للحصول على محصول وافر من عشب و زيت الريحان ذو مواصفات أفضل يمكن المعاملة بالكوتنجين مع الرش بالبوتاسين-بو بمعدل 4.5مل /لتر بعد شهر من الشتل والثانية بعد 15 يوم من الرشة الأولى ثم الرشة الأخيرة بعد 15 يوم من الثانية ويتم الرش مرة واحدة بعد كل حشة.

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