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STUDY OF GROWTH, YIELD AND CHEMICAL CONSTITUENTS OF CORIANDER PLANTS AS AFFECTED BY USING ORGANIC FERTILIZATION, AND SOME NATURAL SUBSTANCES.

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ABSTRACT

This study was conducted during 2015/2016 and 2016/2017 seasons at the experimental farm,. Fac. of Agric, Azhar Univ Assiut, Egypt. To investigate the effect of organic fertilization namely cattle at 0, 10 and 20 m3/ fed and poultry manure at 0, 5 and 10 m3/ fed and also foliar spray with three natural substances namely vitamin E at 0, 100 and 200 ppm, thiamine at 0, 50 and 100 ppm and amino acids at 0, 100 and 200 ppm, as well as, their interactions on branching, herb dry weight, fruit yield, essential oil % and yield and N, P and K% of coriander plants. The most results showed that fertilizing the plants with organic Fertilization at all levels, mostly led a significant increase in number of main branches / plant, herb dry weight/plant, fruit yield /plant and /fed. Essential oil % and essential oil yield /plant and /fed. and the examined elements N, P and K %. The application of poultry manure at the high level (10 m3/ fed.) proved to be more increasing in the pervious traits than those obtained by other organic fertilization treatments. However, foliar spray with the three natural substances at all concentrations, mostly, resulted a significant augment in all studied parameters. The highest values of branching, herb dry weight, fruit yield /plant and /fed. and the element of K % were obtained by foliar

spray with thiamine at the high concentration (100 ppm), while the use of amino acids at the high concentration (200 ppm) gave the highest values of essential oil yield /plant and / fed. and essential oil %, as well as, the percentages of N and P. Clearly, most of combined treatments significantly increased these abovementioned characteristics, comparing to untreated ones. Apparently, the maximum values of most traits were given by the application of poultry manuer at 10 m3/fed with thiamine at 100 ppm and amino acids at 200 ppm in comparison with those obtained by other combination treatments. It could be recommended to supply coriander plants with poultry manure at 10 m3/fed .and foliar spray with thiamine at 100 ppm and amino acids at 200 ppm to enhancing the growth and obtain higher production of fruits and essential oil.

INTRODUCTION

Coriander (*Coriandrum Sativum*, L.) is an annual herb in winter, it belongs to family apiaceae and it is one of the most important medicinal and aromatic plants. The seeds contain 0.2 _ 1.0 % essential oil. It has been used as a flavor for meat, spicy, sauces, canned foods, bached goods, confectionery and perfumes **(Khattab and Helmy, 2003).** The leaves are used as a garnish and in salsas. They enhance the flavor of salads and tacos. coriander promotes the flow of digestive secretion that beneficial as carminative and laxative, besides in the treatment of intestinal disorders and as antispasmodic and expectorant properties **(Bedoukian, 1967)**the application of organic Fertilization is one of the most important agricultural practices which have resulted clean product. Organic manuers improved the application of chemical fertilizer efficiency **(Gedam *et al*., 2008).** Also, organic manures can serve as alternative to chemical fertilizer for improving soil structure **(Dauda *et al*., 2008)** and microbial biomass. **(Suresh *et al*., 2004)** Other advantages of organic agriculture including minimizing chemical fertilizers, consequently reducing the costs and raising soil fertility, improving product quality, safe of pollution environment and very save for human, animal and environment.

Several investigators reported that organic fertilization and elements of N,P and K augmented branch number., herb weight and fruit yield (**Salem and Awad, 2005**, **Abd El-Gawad, 2007, Abdalla, 2009, Rekaby, 2013** on coriander, **Helmy, 2016a** on cumin, **Ali *et al.*, 2016** on fennel, **Ali *et a*l, 2016** on *Ammi visnaga* , **Ali *et al*, 2017**

and **Hamed, 2017** on anise. Regarding essential oil % and yield (**Aly *et al*, 2007, Abdalla, 2009**, **Rekaby, 2013** on coriander, **Abarghouei (2014)** and **Abo_Kutta 2016** on fennel, **Mahmoud, 2017** on *Ammi visnaga* and **Hamed, 2017** on anise. The promoting effect of vitamin E on enhancing plant growth was studied by many authors such as **Ismail (2008)** on black cumin, **Ayad., *et al*. (2009)** on geranium, **Abd El- Naeem (2012)** on mint, **Abdou., *et al*. (2013)** on caraway, **Hassan (2013)** on roselle, **Abdou., *et al*. (2014)** on *Ammi visnaga* , **Abdou., *et al*. (2016)** on cumin and **Marzok (2017)** on basil)., It increased seed yield (**Ismail 2008** on *Nigella sativa*, **Soltani *et al*., 2012** on *Calendula officinalis*, AL- **Qubaie, 2012** on sunflower, **Hassan (2013)** on roselle, **Botros (2013)** on caraway. and **Ibrahim (2014)** on *Ammi visnaga*). and also stimulated essential oil % and yield, as well as, N, P and K (**Ismail, 2008** on black cumin, **Abdou *et al*., 2013a** on caraway and **Ibrahim, 2014** on *Ammi visnaga*. The role of thiamine in augmenting the growth, fruit yield, essential oil % and yield and the elements of N,P and K was demonstrated by some researchers (**Haridi, 1987** on sage, **Khater *et al*, 1992** on *Tagetes minuta*, **Ali *et al*., 2003** on coriander, **Hendawy,** and **Ezz El-Din, 2010** on fennel. **Abdou *et al*., 2013b** on caraway, **Abd El- Salam, 2014** and **Marzok,2017** on basil. and **Ali *et al*.(2016)** and **Abd El-Rahman (2016)** on chamomile. The stimulating influence of amino acids on increasing the growth, Fruit yield, essential oil % yield and chemical constituents was proved by many authors such as, **Talaat (2005)** on *pelargoniun graveolens*, **Hendawy** and **Ezz El-Din (2010)** on fennel, **Rahmatzadeh., *et al*. (2012)** on *Catharanthus roseus*, **Hassan (2013)** on roselle, **AI-Qubaic (2012)** on *Helianthus annus*, **Sarojnee *et al* (2009)** on pepper, **Talaat** and **Youssef (2002)** on basil, **Shaheen *et al* (2010)** on onion, **Hassan (2013)** on roselle. **Ali *et al*. (2006)** on anise, **Omer *et al*. (2013)** and **Ali *et al*.(2016)** and **Abd El-Rahman (2016)** on chamomile. **Ali** and **Hassan (2013)** on *Tagetes erecta*, **Aly *et al* (2013a)** on roselle, **Rafiee *et al***. (2013) on *Calendula officinalis*, **Aly *et al* (2014a)** on Kapok and **Nia., *et al*. (2015)** on *Gazania rigens*. The objective of this study was to examine the influence of organic manures and natural substance treatments for to find out the most suitable treatments for enhancing the growth, fruiting, essential oil production and chemical constituents of coriander plants.

MATERIALS AND METHODS

The present investigation was carried out at the experimental farm, faculty of Agriculture, Azhar Univ. Assiut. During 2015/2016 and 2016/2017 seasons to study the effect of organic fertilization and natural substances (α-tocoferol (Vit. E), thiamine and amino acids), as well as, their interactions on branching, herb dry weight, fruit yield, essential oil % and yield and the elements of N,P and K% of coriander (*Coriandrum Sativum L*.) plants. A split plot design with three replicates was allowed in this work, organic fertilization levels were considered as the main plots (A), while natural substances concentrations were arranged the sub – plots (B). The seeds of coriander were sown on Oct 18th for the two seasons. The experimental unit was 2.5 X 1.8 m with 60cm distance between the rows, in hills 25 cm apart each plot contained 3 rows and 30 hills. The plants were thinned 45 days later to one plant / hill, therefore the number of plants/ plot was 30 plant**.** Physical and chemical properties of the used soil were determined according to. **Jackson(1973)** and are shown in **Table (1).** and chemical analysis of the two organic manures applied in this work are shown in **Table (2).**

Table (1):Physical and chemical properties of the used soil / (average of the two seasons).

character	Texture	$CaCo_3$ %	pH (1 : 2.5)	E.c (m.mohoscm)	O.M %	Total %	Available	
							P (ppm)	K(mg/100g soil)
value	loamy	2.10	7.5	2.02	0.56	0.11	17.0	2.7

Table (2): chemical analysis of the two organic manures applied in this investigation (average of the two seasons).

Content	Cattle manure	poultry manure
PH	7.5	8.4
Organic matter%	17.5	39.1
C:N Ratio	1:18	10.3:1
E.C(m.mohs/(m))	6.7	2.37
Total N %	1.25	3.0
Total P %	0.63	1.47
Total K %	1.15	2.55
Fe ppm	6287	2950
Mn ppm	650	384
Zn ppm	257	423

Organic manures were cattle manure (FYM) at 0,10 and 20 m^3/fed. and poultry manure at 0,5 and 10 m^3/fed. The assigned amounts of them were added during the soil preparation. The three examined natural substances, namely α- Tocoferol (Vit.E) at 0,100 and 200 ppm, thiamine at 0,50 and 100 ppm and amino acids (treptophan + methionine) at 0,100 and 200 ppm. Foliar spray was applied for there materials three times at 2 week intervals starting Dec. 7 th in both seasons. Two days period were allowed between foliar spray with each substance. All agricultural practices were performed as usual. At the end of the experiment (April 25th in both seasons), the following data were recorded: The main branches number / plant and herb dry weight /plant, fruit yield (g) / plant and fruit yield (Kg)/fed was calculated. Fruits yield (g) / plant was recorded and fruit yield (Kg)/fed. was calculated. Essential oil % in fruits was estimated according to the methods described by **Perason (1962**), then Essential oil yield (ml)/plant was calculated by multiplying Essential oil estimated in fruit yield (g)/plant. and Essential oil (Liter)/Fed. was calculated. The three studied elements N,P and K% in the dried herb were determined according to the modified micro kjeldahel method as described by **Wilde *et al.(*1985)** concerning to N% and P% was estimated colorism ethically by the spectra photometer according to **Chapman and Pratt (1975),**as well as, K% was determined by using the flame-photometer method according to **Cottenie *et al*(1982).** The obtained data

were statistically analyzed using **MSTATE-C Program (1986)** using the L.S.D at 5% according to **Mead *et al* (1993).**

RESULTS AND DISCUSSION

Number of main branches / plant :

The presented data in **Table (3)** showed that supplying coriander plats with organic fertilizers, during the two experimental seasons, except for cattle manure at the low level, led to an increase in number of main branches / plant comparing to the check treatment. No significant differences between the low and high levels of poultry manure in the second season. Besides, no significant differences were morticed among the high level of cattle manure and the low one of poultry manure in the second season. The superiority of organic fertilization on stimulating branch number was also reported by **Salem and Awad (2005), Abd El-Gawad (2007) and Abdalla (2009)** on coriander, **Hamed (2017)** on anise**.**

In relation to natural substance treatments, the revealed data in **Table (3)** cleared that treating coriander plants with these substances at all concentrations, in both seasons, except for the low concentration of vitamin E in the second season and amino acids at the low concentrations, in both seasons, significantly augmented number of main branches / plant as compared to no sprayed ones. The maximum number of main branches / plant was obtained due to applying the high concentration of thiamine (100ppm) comparing to other treatments during the two experimental seasons. Numerically, the previous superior treatment augmented such parameter by 28.6 and by 22.4 % over untreated plants, during the two growing seasons, respectively.The capability of vitamin E on enhancing number of branches was also detected by **Ismail (2008)** on black cumin, **Abd El- Naeem (2012)** on mint, **Abdou *et al* (2013)** on caraway **Hassan(2013)** on roselle and **Helmy,2016** on cumin.

The positive effect of thiamine on increasing branch number was also insured by **Ali *et al*., 2003** on coriander, **Hendawy** and **Ezz El-Din, 2010** on fennel. **Abdou *et al*., 2013** on caraway. and **Shehata, *et al*.,(2013)** on guar **Abd El- Salam, 2014** on sweet basil and **Marzok ,2017** on basil. and **Ali *et al*.(2016)** and **Abd El-Rahman (2016)** on chamomile.The role of amino acids in stimulating branch number had also demonstrated by **Omer *et al*. (2013)** and **Ali *et al*.(2016)** and **Abd El-Rahman (2016)** on chamomile. **Ali** and **Hassan (2013)** on *Tagetes*

erecta, and **Rafiee *et al*. (2013)** on *Calendula officinalis*.The combined effect between the two studied factors had no significant on number of branches / plant, during the two experimental seasons, as clearly emphasized in **Table (3).**

Table (3): Influence of organic fertilization levels and natural substance concentration on number of main branches /plant of coriander during the two seasons of 215 /2016 and 2016 /2017.

Natural substances treatment (B)	Organic manure levels (A)					
	First season					
	control	Cattle 10 m3	Cattle 20 m3	poultry 5 m3	poultry 10 m3	Mean (A)
control	5.7	6.0	6.3	6.7	7.0	6.3
Vitamin E (100ppm)	6.0	6.3	7.0	7.7	8.3	7.1
Vitamin E (200ppm)	6.3	6.4	8.0	8.3	9.0	7.6
Thiamine (50ppm)	6.7	7.0	7.3	8.0	8.3	7.5
Thiamine (100ppm)	7.0	7.4	8.0	8.7	9.3	8.1
Amino acids (100ppm)	5.3	5.7	6.7	8.0	8.3	6.8
Amino acids (200ppm)	6.3	6.7	7.3	8.3	9.1	7.5
Mean (B)	6.2	6.5	7.2	8.0	8.5	
L.S.D. for 5%	A: 0.5 B: 0.8 AB: N.S					
Second season						
control	6.0	6.3	6.7	7.0	7.3	6.7
Vitamin E (100ppm)	6.0	6.3	7.3	7.7	8.0	7.1
Vitamin E (200ppm)	6.3	7.0	8.0	8.3	8.3	7.6
Thiamine (50ppm)	6.4	6.8	7.4	7.7	8.0	7.3
Thiamine (100ppm)	7.3	7.4	8.0	8.3	9.7	8.2
Amino acids (100ppm)	6.3	6.7	7.5	7.7	8.0	7.2
Amino acids (200ppm)	6.0	6.7	7.7	8.0	9.0	7.5
Mean (B)	6.3	6.7	7.5	7.8	8.3	
L.S.D. for 5%	A: 0.7 B: 0.6 AB: N.S					

Herb dry weight / plant :

data in **Table (4)** Shown revealed that fertilizing coriander plants with organic manures at the two levels, in both seasons, except for the low level of cattle manure in the first season led to a significant increase in herb dry weight / plants as compared to the check treatment. However, it could be noticed that supplying poultry manures at the high level (10

m^3/fed.) registered the heaviest herb dry weight reached 12.2 and 15.1 % over unfertilized plants , during the two experimental seasons, respectively. The positive effect of organic fertilization on herb weight was also reported by **Abd El-Gawad (2007), Abdalla (2009)** and **Rekaby (2013)** on coriander, **Ali *et al.* (2016a)** on fennel, **Ali *et al.* (2017)** on anise. In regard to natural substance treatments, the obtained results in **Table (4)** emphasized that foliar spray with the three examined materials at all concentrations, during the two seasons, caused a significant augment in herb dry weight / plant comparing to control. Obviously, the application of thiamine at the high concentration (100 ppm) followed by amino acids at the high one (200ppm) gave the highest values of herb dry weight as ranged 14.6, 14.9, 12.5 and 12.7 % over no sprayed ones in the first and second seasons, respectively. The augment in herb weight due to applying vitamin E was also demonstrated by **Ismail (2008)** on black cumin, **Abd El- Naeem (2012)** on mint, **Abdou *et al.* (2013a)** on caraway, **Hassan(2013)** on roselle, **Helmy,2016** on cumin, and **El-Leithy,(2010)** on flax.The role of thiamine on increasing herb weight was also insured by **Ali *et al.*, 2003** on coriander, **Hendawy** and **Ezz El-Din, 2010** on fennel. **Abdou *et al.*, 2013** on caraway, **Abd El- Salam, 2014** on sweet basil and **Marzok ,2017** on basil. and **Ali *et al.*(2016)** and **Abd El-Rahman (2016)** on chamomile and **Shehata, *et al.*,(2013)** on guar and **Abdou *et al.*, 2015** on coriander.The beneficial effect of amino acids on herb weight was also observed by **Ali** and **Hassan (2013)** on *Tagetes erecta,* **Rafiee *et al*. (2013)** on *Calendula officinalis*.**Ali *et al*.(2016)**chamomile. The interaction between the two examined factors organic manure treatments and natural substance had significant effect on herb dry weight during the two consecutive seasons **(Table 4).** It is clear that such trait was significantly increased by the most combined treatments, in both seasons, as compared to no sprayed ones. However, the addition of poultry manure at the high level (10 m^3/fed.) with thiamine at the high concentration (100 ppm) gave heavier herb dry weight in comparison with those obtained by other combination treatments, during the two growing seasons.

Table(4): Influence of organic fertilization levels and natural substance concentration on herd dry weight /plant of coriander during the two seasons of 215 /2016 and 2016 /2017.

Natural substances treatment (B)	Organic manure levels (A)					
	First season					
	control	Cattle 10 m3	Cattle 20 m3	poultry 5 m3	poultry 10 m3	Mean (A)
control	45.9	47.0	48.2	48.6	50.3	48.0
Vitamin E (100ppm)	46.7	46.9	52.2	54.9	56.3	51.4
Vitamin E (200ppm)	48.8	50.1	52.7	56.0	56.3	52.8
Thiamine (50ppm)	50.2	51.3	52.8	53.9	55.0	52.6
Thiamine (100ppm)	52.6	53.4	55.3	55.6	58.1	55.0
Amino acids (100ppm)	49.6	50.7	52.3	52.8	54.0	51.9
Amino acids (200ppm)	51.4	52.3	54.3	56.1	57.1	54.2
Mean (B)	49.3	50.2	52.5	54.0	55.3	
L.S.D. for 5%		A: 1.1	B: 1.5	AB: 3.4		
Second season						
control	46.9	49.0	49.8	50.6	52.6	49.8
Vitamin E (100ppm)	47.7	48.9	53.8	56.8	58.6	53.2
Vitamin E (200ppm)	49.8	52.1	54.3	57.9	58.5	54.5
Thiamine (50ppm)	51.2	53.3	54.4	55.9	57.3	54.4
Thiamine (100ppm)	53.6	55.4	57.0	57.6	62.4	57.2
Amino acids (100ppm)	50.6	52.7	53.9	55.0	56.3	53.7
Amino acids (200ppm)	52.4	54.3	56.0	58.2	59.4	56.1
Mean (B)	50.3	52.2	54.2	56.0	57.9	
L.S.D. for 5%		A: 1.6	B: 1.8	AB: 4.0		

Fruit yield / plant and / fed.:

The illustrated data in **Tables (5) and (6)** postulated that fertilizing coriander plants with organic fertilizers, in the two seasons, led to a significant increase in fruit yield /plant and / fed. as compared to control plants. Obviously, the maximum value of fruit yield / plant and / fed was observed when supplemented the plants with poultry manure at the high level (10 m3 / fed.) which increased it by 23.9 and by 22.5 % over the check treatment, during the two growing seasons, respectively. Such treatment yielded 1135.1 and 1158.8 Kg /

fed. Fruits in relative to unfertilized ones (915.8 and 946.3) in the first and second seasons, respectively.

The promotive effect of organic fertilization on fruit yield was also studied by **Salem and Awad (2005), Aly *et al*.(2007)** and **Rekaby (2013)** on coriander plant, and **Acimovic (2013), Ali *et al*. (2016)** on fennel, and **Ali *et al*. (2017)** on anise. Concerning to natural substance treatments, the data indicated that fruit yield / plant and / fed. of coriander was significantly increased by foliar spray with the three tested materials at all concentrations as compared to no sprayed ones, during the two growing seasons. Apparently, the application of thiamine at the high concentration (100 ppm) registered the highest value of fruit yield / plant as ranged 25.3 and 27.4 % over untreated plants in both seasons, respectively and amounted 1151.3 and 1190.8 Kg fruits / fed. comparing to the check treatment gave 919.0 and 934.5 Kg fruits / fed. during the two consecutive seasons, respectively, as clearly demonstrated in tables 5 and 6. The role of Vitamin E in stimulating fruit yield was also reported by **Ismail 2008** on *Nigella sativa*, **Soltani *et al.*, 2012** on *Calendua officinalis*, **Al- Qubaie, 2012** on sunflower, **Hassan (2013**) on roselle, **Botros (2013)** on caraway. and **Helmy, 2016** on cumin.

The augment of fruit yield due to thiamine had also proved by **Ali *et al*., 2003 and Abdou *et al*., 2015** on coriander**. Ali *et al*. (2016)** and **Abd El-Rahman (2016)** on chamomile. **Botros (2013) on** caraway.The positive effect of amino acids on fruit yield was also observed by **Hendawy** and **Ezz El-Din, 2010** on fennel., **Soltani *et al.*, 2012** on *Calendua officinalis*, **AI- Qubaie, 2012** on sunflower, **Hassan(2013)** on roselle. and **Ali *et al.* (2016**) on fennel. Regarding to the interaction, the obtained results in **Tables 5 and 6** showed that it was significant effect on fruit yield/ plant and / fed. During the two experimental seasons. However, most of combined treatments caused a significant augment in these traits, during the two seasons, comparing to untreated plants. Moreover, adding poultry manure at the high level (10 m3/ fed.) plus thiamine at the high concentration (100 ppm) proved to be more effective in increasing fruit yield / plant and/ fed. Than those obtained by other combination treatments and yielded 1295.0 and 1353.7 kg fruits / fed., while control plants gave 862.4 and 881.1 kg fruits / fed., during the two consecutive seasons, respectively.

Table (5): Influence of organic fertilization levels and natural substance concentration on fruit yield /plant of coriander during the two seasons of 215 /2016 and 2016 /2017.

Natural substances treatment (B)	Organic manure levels (A)					
	First season					
	control	Cattle 10 m3	Cattle 20 m3	poultry 5 m3	poultry 10 m3	Mean (A)
control	32.3	33.6	34.5	35.1	36.6	34.4
Vitamin E (100ppm)	33.0	35.6	37.5	38.4	39.3	36.8
Vitamin E (200ppm)	33.3	37.3	39.5	40.4	43.3	38.8
Thiamine (50ppm)	33.6	37.6	40.8	41.4	42.0	39.1
Thiamine (100ppm)	36.6	42.3	43.5	44.7	48.5	43.1
Amino acids (100ppm)	35.0	41.6	42.8	43.1	43.6	41.2
Amino acids (200ppm)	36.3	42.3	43.2	43.4	44.3	41.9
Mean (B)	34.3	38.6	40.3	40.9	42.5	
L.S.D. for 5%		A: 1.0	B: 1.1	AB: 2.4		
Second season						
control	33.0	34.0	35.0	35.7	37.3	35.0
Vitamin E (100ppm)	33.7	36.0	38.0	39.0	40.0	37.3
Vitamin E (200ppm)	34.0	37.7	40.0	41.0	44.0	39.3
Thiamine (50ppm)	34.3	39.5	41.3	42.0	42.7	40.0
Thiamine (100ppm)	38.9	42.7	44.4	46.3	50.7	44.6
Amino acids (100ppm)	35.7	42.0	43.3	43.7	44.3	41.8
Amino acids (200ppm)	38.5	43.2	43.7	44.0	44.8	42.8
Mean (B)	35.4	39.3	40.8	41.7	43.4	
L.S.D. for 5%		A: 1.2	B: 1.4	AB: 3.1		

Table(6): Influence of organic fertilization levels and natural substance concentration on fruit yield /fed of coriander during the two seasons of 215 /2016 and 2016 /2017.

Natural substances treatment (B)	First season					
	control	Cattle 10 m3	Cattle 10 m3	poultry 5 m3	poultry 10 m3	Mean (A)
control	862.41	897.12	921.15	937.17	977.22	919.0
Vitamin E (100ppm)	881.10	950.52	1001.25	1025.28	1049.31	981.5
Vitamin E (200ppm)	889.11	995.91	1054.65	1078.68	1156.11	1035.0
Thiamine (50ppm)	897.12	1003.92	1089.36	1105.38	1121.40	1043.4
Thiamine (100ppm)	977.22	1129.41	1161.45	1193.49	1294.95	1151.3
Amino acids (100ppm)	934.50	1110.72	1142.76	1150.77	1164.12	1100.6
Amino acids (200ppm)	969.21	1129.41	1153.44	1158.78	1182.81	1118.7
Mean (B)	915.8	1031.0	1074.9	1092.8	1135.1	
L.S.D. for 5%	A: 26.5		B: 29.4	AB: 65.8		
Second season						
control	881.10	907.80	934.50	953.19	995.91	934.5
Vitamin E (100ppm)	899.79	961.20	1014.60	1041.30	1068.00	997.0
Vitamin E (200ppm)	907.80	1006.59	1068.00	1094.70	1174.80	1050.4
Thiamine (50ppm)	915.81	1054.65	1102.71	1121.40	1140.09	1067.0
Thiamine (100ppm)	1038.63	1140.09	1185.48	1236.21	1353.69	1190.8
Amino acids (100ppm)	953.19	1121.40	1156.11	1166.79	1182.81	1116.1
Amino acids (200ppm)	1027.95	1153.44	1166.79	1174.80	1196.16	1143.8
Mean (B)	946.3	1049.3	1089.7	1112.6	1158. 8	
L.S.D. for 5%	A: 32.0		B: 37.5	AB: 83.9		

Essential oil percentage:

The obtained data in **Table (7)** Cleared that essential oil % in coriander fruits was significantly increased due to the application of organic fertilization at all levels, except for the low level of cattle manure (10 m3 /fed.), during the two experimental seasons, as compared to the check treatment. Obviously, the maximum value of essential oil % was noticed by using the high level of poultry manure which augmented it by 36.5 and by 37.7 % over control plants, during the two consecutive seasons, respectively.

The increments of essential oil % as a result of applying organic manure was also detected by **Salem and Awad (2005), Aly *et al.*(2007), Rekaby (2013)** and **Acimovic(2013), Ali *et al.* (2016)** on fennel. and **Ali *et al.* (2017)** on anise.

It worthy mention that spraying coriander plants with the three examined natural substances, in both seasons, led to a significant augment in essential oil % of coriander fruits comparing to no sprayed ones. Clearly supplemented coriander plants with amino acids at the high concentration (200 ppm) proved to be more effective in increasing essential oil % than those obtained by other treatments in both seasons. Numerically, such abovementioned treatment augmented essential oil % by 36 and by 34 % over untreated plants, during the two growing seasons, respectively, as clearly indicated in **Table (7).**

The enhancing essential oil % due to utilizing Vitamin E had also emphasized by **Ismail 2008** on *Nigella sativa,* **Abd El- Naeem (2012)** on mint, **Abdou *et al*., (2013)** on caraway and **Helmy,2016** on cumin.

The beneficial effect of thiamine on augmenting essential oil % was also discussed by **Botros (2013) on** caraway, **Shehata, *et al.,(*2013)** on guar, **Abd El- Salam, 2014** and **Marzok,2017** on basil. **Abdou *et al*., 2015** on coriander**.** The capability amino acids on increasing essential oil % had also proved by **Ali *et al.*(2006)** on anise, **Aly *et al*., (2007), Hassan and Ali (2010)** on coriander. **Orabi,(2014) on** thyme. and **Hendawy,(2015)** on mint. With respect to the combined effect between the two examined factors, The listed data in **Table (7)** pointed out that it was significant on essential oil % of coriander fruits, during the two growing seasons. Apparently, most of combined treatments led a significant increase in such parameter as compared to the check treatment, during the two consecutive seasons. Clearly, the application of poultry manure at the high level (10 m3 / fed.) + amino acids at the high concentration (200 ppm) proved to be more effective in increasing essential oil % than those obtained by other combination treatments, during the two experimental seasons.

Table(7): Influence of organic fertilization levels and natural substance concentration on essential oil percentage of coriander during the two seasons of 215 /2016 and 2016 /2017.

Natural substances treatment (B)	Organic manure levels (A)					
	First season					
	control	Cattle 10 m3	Cattle 20 m3	poultry 5 m3	poultry 10 m3	Mean (A)
control	0.41	0.45	0.50	0.52	0.60	0.50
Vitamin E (100ppm)	0.42	0.46	0.57	0.66	0.70	0.56
Vitamin E (200ppm)	0.53	0.55	0.62	0.70	0.72	0.62
Thiamine (50ppm)	0.55	0.58	0.63	0.64	0.71	0.62
Thiamine (100ppm)	0.63	0.65	0.63	0.62	0.65	0.64
Amino acids (100ppm)	0.52	0.55	0.65	0.72	0.73	0.63
Amino acids (200ppm)	0.58	0.59	0.68	0.73	0.83	0.68
Mean (B)	0.52	0.55	0.61	0.66	0.71	
L.S.D. for 5%	A: 0.03 B: 0.04 AB: 0.09					
Second season						
control	0.46	0.49	0.53	0.55	0.62	0.53
Vitamin E (100ppm)	0.43	0.48	0.61	0.70	0.72	0.59
Vitamin E (200ppm)	0.51	0.57	0.65	0.74	0.73	0.64
Thiamine (50ppm)	0.56	0.60	0.66	0.73	0.70	0.65
Thiamine (100ppm)	0.64	0.63	0.64	0.70	0.72	0.67
Amino acids (100ppm)	0.55	0.57	0.69	0.75	0.73	0.66
Amino acids (200ppm)	0.59	0.60	0.71	0.76	0.88	0.71
Mean (B)	0.53	0.56	0.64	0.70	0.73	
L.S.D. for 5%	A: 0.04 B: 0.05 AB: 0.11					

Essential oil yield /plant and / fed . :

Data in **Tables (8) and (9)** revealed that supplying coriander plants with organic fertilizers at all levels, in both seasons, caused a significant augment in essential oil yield /plant and /fed. as compared to the check treatment. It is clear that applying poultry manure at the high level (10 m3 / fed.) produced the maximum value of essential oil yield /plant as ranged 66.7 and 68.4 % over untreated ones in both seasons, respectively. Such superior treatment yielded 8.0 and 8.5 L essential oil / fed., during the two experimental seasons, respectively. The positive effect of organic fertilization on promoting essential oil yield was also detected by **Salem and Awad (2005), Aly *et al.* (2007), Abdall (2009), Darzi *et al.*, (2013)** and **Rekaby (2013)** on coriander, **Ali *et al.*,**

(2016) on fennel. and **Ali *et al.*, (2017)** on anise.Concerning to natural substance treatments, data in **Tables 8 and 9** revealed that foliar spray with the three materials at all concentrations, in both seasons, led to a significant increase in essential oil yield /plant and /fed. Comparing to no sprayed plants. Clearly, the use of amino acids at the high concentration (200 ppm) proved to be more effective in augmenting essential oil yield /plant than those obtained by other treatments during the two seasons. Moreover, such previous superior treatment increased essential oil yield /plant by 70.5 and by 57.9 % over untreated ones and amounted 7.6 and 8.1 L essential oil /fed. in relative to control (4.5 and 5.0) L essential oil / fed. in both seasons, respectively. The stimulating effect of vitamin E on essential oil yield had also reported by **Ismail 2008** on *Nigella sativa*, **Abd El- Naeem (2012)** on mint, **Abdou *et al* (2013)** on caraway, and **Helmy,2016** on cumin.

The capability of thiamine on increasing essential oil yield was also observed by **Ali *et al.*, 2003** on coriander**, Botros (2013) on** caraway**, Ali *et al*.(2016)** and **Abd El-Rahman (2016)** on chamomile.

The role of amino acids in enhancing essential oil yield was also emphasized by **Yassen, (2010) on** anise, **Al- Qubaie, 2012** on sunflower, **Orabi,(2014) on** thume. **Tables (7 and 8)** postulated that the interaction between the two examined factors, in both seasons, on essential oil yield /plant and /fed. was significant effect. Clearly, the two charactericts were significantly increased by using most of combined treatments, during the two experimental seasons, as compared to untreated plants. Apparently, the addition of poultry manure at the high level (10 m3 / fed) in combination with amino acids at the high concentration (200 ppm) proved to be more effective in increasing essential oil yield /plant and produced 9.8 and 10.5 L essential oil / fed. Against control (3.4and 4.1), in both seasons, respectively.

Table (8) : Influence of organic fertilization levels and natural substance concentration on essential oil yield/plant of coriander during the two seasons of 215 /2016 and 2016 /2017.

Natural substances treatment (B)	Organic manure levels (A)					
	First season					
	control	Cattle 10 m3	Cattle 20 m3	poultry 5 m3	poultry 10 m3	Mean (A)
control	0.13	0.15	0.17	0.18	0.22	0.17
Vitamin E (100ppm)	0.14	0.16	0.21	0.25	0.28	0.21
Vitamin E (200ppm)	0.18	0.21	0.24	0.28	0.31	0.24
Thiamine (50ppm)	0.18	0.22	0.26	0.26	0.30	0.24
Thiamine (100ppm)	0.23	0.27	0.27	0.28	0.32	0.27
Amino acids (100ppm)	0.18	0.23	0.28	0.31	0.32	0.26
Amino acids (200ppm)	0.21	0.25	0.29	0.32	0.37	0.29
Mean (B)	0.18	0.21	0.25	0.27	0.30	
L.S.D. for 5%	A: 0.03		B: 0.04	AB: 0.09		
Second season						
control	0.15	0.17	0.19	0.20	0.23	0.19
Vitamin E (100ppm)	0.14	0.17	0.23	0.27	0.29	0.22
Vitamin E (200ppm)	0.17	0.21	0.26	0.30	0.32	0.25
Thiamine (50ppm)	0.19	0.24	0.27	0.31	0.30	0.26
Thiamine (100ppm)	0.25	0.27	0.28	0.32	0.37	0.30
Amino acids (100ppm)	0.20	0.24	0.30	0.33	0.32	0.28
Amino acids (200ppm)	0.23	0.26	0.31	0.33	0.39	0.30
Mean (B)	0.19	0.22	0.26	0.29	0.32	
L.S.D. for 5%	A: 0.03		B: 0.03	AB: 0.07		

Table (9) : Influence of organic fertilization levels and natural substance concentration on essential oil yield/fed of coriander during the two seasons of 215 /2016 and 2016 /2017.

Natural substances treatment (B)	Organic manure levels (A)					
	First season					
	control	Cattle 10 m3	Cattle 20 m3	poultry 5 m3	poultry 10 m3	Mean (A)
control	3.4	4.0	4.5	4.8	5.8	4.5
Vitamin E (100ppm)	3.7	4.2	5.6	6.6	7.4	5.5
Vitamin E (200ppm)	4.8	5.6	6.4	7.4	8.2	6.5
Thiamine (50ppm)	4.8	5.8	6.9	6.9	8.0	6.5
Thiamine (100ppm)	6.1	7.2	7.2	7.4	8.5	7.3
Amino acids (100ppm)	4.8	6.1	7.4	8.2	8.5	7.0
Amino acids (200ppm)	5.6	6.6	7.7	8.5	9.8	7.6
Mean (B)	4.7	5.6	6.5	7.1	8.0	
L.S.D. for 5%	A: 0.8 B: 1.0 AB: 2.2					
Second season						
control	4.1	4.4	5.0	5.2	6.2	5.0
Vitamin E (100ppm)	3.9	4.6	6.2	7.3	7.7	5.9
Vitamin E (200ppm)	4.6	5.7	6.9	8.1	8.6	6.8
Thiamine (50ppm)	5.1	6.3	7.3	8.2	8.0	7.0
Thiamine (100ppm)	6.6	7.2	7.6	8.7	9.7	8.0
Amino acids (100ppm)	5.2	6.4	8.0	8.8	8.6	7.4
Amino acids (200ppm)	6.1	6.9	8.3	8.9	10.5	8.1
Mean (B)	5.1	6.0	7.0	7.9	8.5	
L.S.D. for 5%	A: 0.8 B: 0.8 AB: 1.8					

Nitrogen , phosphorus and potassium % :

The obtained results in **Tables (10,11,and 12)** showed that the application of organic fertilization at all levels, except for the low level of cattle manure in the first season concerning N% led to a significant increase in the three examined elements, N, P and K % of coriander herb, as compared to unfertilized plants, during the two experimental seasons. Obviously, the utilization of poultry manure at the high level (10 M^3/fed.) gave the maximum values of N, P and K % comparing to other treatments, in both seasons. Numerically, such previous superior treatment increased N % by 7.2 and by 11.1, while increased P % by 38.8 and by 37.6 % and also augmented K % by 11.1 and by 13.9 % over control, during the two growing seasons, respectively.

The role of organic manures in increasing the studied elements (N , P and K %) had also proved by **Salem and Awad (2005), Aly *et al .(*2007) and Rekaby (2013)** on coriander, **Ali *et al.* (2016)** on fennel, **Ali *et al.* (2017)** on anise and **Ali *et al.* (2016)** on *Ammi visnaga*.It is evident from the obtained data that foliar spray with these substances at all concentrations, in both seasons, except for vitamin E at the low concentration (100 ppm) regarding N % and vitamin E at 100 and 200 ppm in both seasons concerning P % resulted a significant augment in N, P and K %, as compared to no sprayed ones. Clearly, the use of amino acids at the high concentration (200 ppm) registered the maximum values of N and P %, whereas the maximum value of K % was noticed by applying thiamine at the high concentration (100 ppm) comparing to other treatments in both seasons. These above mentioned superior treatments augmented the three tested elements by 4.9 and by 6.1 % for N %, while increased P % by 17.6 and by 19.7 % and also increased K % by 8.7 and by 9.7 % over the check treatment, during the two consecutive seasons, respectively, as clearly shown in **Tables (9, 10 and 11).**

The enhancing effect of vitamin E on the element of N, P and K also reported by **Ismail 2008** on *Nigella sativa*, **Abdou *et al* (2013)** on caraway. **Ibrahim, (2014)** on *Ammi visnaga*. and **Helmy,2016** on cumin.

The superioty of thiamine in augmenting the studied elements N,P and K was also insured by **Botros (2013)** on caraway**, Abd El- Salam, 2014** on sweet basil and **Marzok ,2017** on basil. **Ali *et al.* (2016)** and **Abd El-Rahman (2016)** on chamomile.

The beneficial effect of amino acids on increasing the examined elements N, P and K had also observed by **Yassen, (2010) on** anise, **Abd El-Rahman,(2016) on** chamomilla and **Ali** and **Hassan (2013)** on *Tagetes erecta.*Accordingly, the interaction between the two studied factors on the three elements N, P and K % had significant effect, during the two experimental seasons **(Tables 10, 11 and 12).** It is obvious that most of combined treatments, in both seasons, significantly increased these examined elements N, P and K % as compared to the check treatment. In connection, the maximum values of N and P % were noticed by using poultry manure at the high level (10 m^3/fed.) plus amino acids at the high concentration (200 ppm) comparing to that obtained by other combination treatments, during the two seasons. However, the application of poultry manure at the high level with thiamine at the high concentration(100 ppm) proved to be increasing K % then those obtained

by other combination treatments, during the two consecutive seasons. From the obtained results, it could be suggested that the enhancement of branching, herb weight, fruit yield, oil % and yield, as well as, N, P and K % of coriander plants may be due to the physiological and biological roles of organic manures and natural substances (vitamin E, thiamine and amino acids) which may reflect on improving the plant characteristics. **Follet *et al* (1981)** proved the positive roles of organic fertilization as follows. Soil properties and water holding capacity were enhanced, total N, humus in soil and organic wetter were increased faster release of essential nutrients by microbial decomposition and making most micronutrients. more readily available at wide range of PH.

Saber, 1997 Reynders and Vlassak (1982) demonstrated that organic manures contain microorganisms for examples : Azotobacter and Azospirillum which caused a fix in N and release phytohormones (IAA, GA and Cytokinins) which they promoted the plant growth, dry matter and nutrients absorption. **Bohn *et at.* (1985)** concluded that organic matter is considered as a main source of N,P and S is elements, as well as, a lot of B and MO, besides as a source of energy for the growth of Azotobacter. Organic manure minimized the lost nutrients. by leaching. The enhancement of growth, fruit yield, essential oil %, yield and N,P and K % may be due to the physiological and biological roles of examined natural substances which were explained by many investigators as follow : **Munne-Bosch** and **FalK (2004)** suggested that (vitamin E) is the main non – enzymatic antioxidants in the cell membrane, that plays an important role in plants protection against free radicals which were produced as a result of oxidation processes and assists in maintaining stability of membrane. Besides, vitamin E acts an intracellular signaling and electrons transport in the photosystem **(Munne- Bosch and Alegre, 2002)**. **Collin *et al.* (2007)** reported that vitamin E is an essential for the tolerance whereas it is believed to protect chloroplast membranes from photo oxidation and helps to provide an optimal environment for the photosynthetic. Thiamine (vitamin B1) is an essential for succinyl- Co A and glycerin synthesis and for the reaction of them to from amino clavulanic acid. (**Strove,1989**), it is the main intermediate for protoprophyrin formation in Chlorophyll pressures (**Hess,1981**) and plays as a factor in pyruvate decarboxylation. **Kawassaki (1992)** demonstrated that thiamine plays an important Co. Factor for translocation reactions of pentose phosphate cycle which provides pentose phosphate for

synthesis of nucleotide and for reduction of NADP required for various synthetic pathways. Vitamin B is one of the native vitamins, it is required for plant growth and development. It. Plays an active role in polar movement of mative auxin from theis syntheis site to presumed use site in root (**Buchta** and **Schmid, 1979**). Amino acids play an important role for promoting cell growth, stimulate cell division, cell elongation and cell enlargement (**Smith,1982** and **Pareek *et al*, 2000**). Amino acids play an important role in plant metabolism and assimilation of protein that are necessity for cell for motion and Consequently augment fresh and dry weights(**Phillips, 1971**, **Russel , 1982** and **Walter** and **Nawacki,1987**). Tryptophan is precursor of IAA and also methionine is ethyl ere precursor (**Taiz** and **Zeiger, 2002**). Available amino acids promote can enhance assimilation of fertilizer, augment both nutrients uptake and water uptake, improve photosynthetic rate and dry matter, as well as, augment crop yield (**El- Shabasi *et al*., 2005, Shaheen *et al*., 2010, Sarajnee *et al*.,(2009)** and **Papenfus *et al*., 2013)**.

Table (10): Influence of organic fertilization levels and natural substance concentration on Nitrogen percentage of coriander during the two seasons of 215 /2016 and 2016 /2017.

Natural substances treatment (B)	Organic manure levels (A)					
	First season					
	control	Cattle 10 m3	Cattle 20 m3	poultry 5 m3	poultry 10 m3	Mean (A)
control	2.03	2.06	2.09	2.13	2.16	2.09
Vitamin E (100ppm)	2.07	2.09	2.10	2.14	2.18	2.12
Vitamin E (200ppm)	2.09	2.10	2.11	2.16	2.20	2.13
Thiamine (50ppm)	2.06	2.08	2.12	2.16	2.28	2.14
Thiamine (100ppm)	2.09	2.10	2.13	2.20	2.27	2.16
Amino acids (100ppm)	2.09	2.10	2.11	2.22	2.23	2.15
Amino acids (200ppm)	2.10	2.12	2.13	2.30	2.32	2.19
Mean (B)	2.08	2.09	2.11	2.19	2.23	
L.S.D. for 5%	A: 0.03		B: 0.04	AB: 0.09		
Second season						
control	1.99	2.10	2.14	2.19	2.25	2.13
Vitamin E (100ppm)	2.02	2.07	2.13	2.18	2.19	2.12
Vitamin E (200ppm)	2.07	2.16	2.19	2.24	2.30	2.19
Thiamine (50ppm)	2.11	2.18	2.20	2.25	2.28	2.20
Thiamine (100ppm)	2.15	2.19	2.22	2.26	2.33	2.23
Amino acids (100ppm)	2.08	2.15	2.19	2.25	2.30	2.19
Amino acids (200ppm)	2.09	2.18	2.23	2.35	2.43	2.26
Mean (B)	2.07	2.15	2.19	2.25	2.30	
L.S.D. for 5%	A: 0.04		B: 0.05	AB: 0.11		

Table (11) : Influence of organic fertilization levels and natural substance concentration on phosphorus percentage of coriander during the two seasons of 215 /2016 and 2016 /2017.

Natural substances treatment (B)	Organic manure levels (A)					
	First season					
	control	Cattle 10 m3	Cattle 20 m3	poultry 5 m3	poultry 10 m3	Mean (A)
control	0.185	0.205	0.216	0.245	0.258	0.222
Vitamin E (100ppm)	0.189	0.223	0.227	0.253	0.266	0.232
Vitamin E (200ppm)	0.196	0.227	0.229	0.260	0.273	0.237
Thiamine (50ppm)	0.201	0.237	0.243	0.268	0.281	0.246
Thiamine (100ppm)	0.207	0.239	0.244	0.272	0.288	0.250
Amino acids (100ppm)	0.211	0.246	0.252	0.279	0.291	0.256
Amino acids (200ppm)	0.221	0.249	0.255	0.285	0.293	0.261
Mean (B)	0.201	0.232	0.238	0.266	0.279	
L.S.D. for 5%	A: 0.019 B: 0.023 AB: 0.051					
Second season						
control	0.186	0.206	0.217	0.246	0.259	0.223
Vitamin E (100ppm)	0.191	0.225	0.229	0.255	0.268	0.234
Vitamin E (200ppm)	0.199	0.230	0.232	0.263	0.276	0.240
Thiamine (50ppm)	0.205	0.241	0.247	0.272	0.285	0.250
Thiamine (100ppm)	0.212	0.244	0.249	0.277	0.293	0.255
Amino acids (100ppm)	0.217	0.252	0.258	0.285	0.297	0.262
Amino acids (200ppm)	0.227	0.255	0.261	0.291	0.299	0.267
Mean (B)	0.205	0.236	0.242	0.270	0.282	
L.S.D. for 5%	A: 0.021 B: 0.024 AB: 0.053					

Table (12) : Influence of organic fertilization levels and natural substance concentration on potassium percentage of coriander during the two seasons of 215 /2016 and 2016 /2017.

Natural substances treatment (B)	Organic manure levels (A)					
	First season					
	control	Cattle 10 m3	Cattle 20 m3	poultry 5 m3	poultry 10 m3	Mean (A)
control	1.65	1.69	1.71	1.75	1.79	1.72
Vitamin E (100ppm)	1.68	1.79	1.88	1.89	1.90	1.83
Vitamin E (200ppm)	1.70	1.78	1.87	1.89	1.91	1.83
Thiamine (50ppm)	1.73	1.82	1.83	1.85	1.93	1.83
Thiamine (100ppm)	1.77	1.86	1.89	1.90	1.95	1.87
Amino acids (100ppm)	1.71	1.78	1.82	1.87	1.89	1.81
Amino acids (200ppm)	1.75	1.81	1.84	1.89	1.91	1.84
Mean (B)	1.71	1.79	1.83	1.86	1.90	
L.S.D. for 5%	A: 0.03 B: 0.03 AB: 0.07					
Second season						
control	1.68	1.70	1.76	1.79	1.84	1.75
Vitamin E (100ppm)	1.70	1.82	1.92	1.94	1.97	1.87
Vitamin E (200ppm)	1.74	1.81	1.91	1.95	1.98	1.88
Thiamine (50ppm)	1.71	1.85	1.87	1.91	2.00	1.87
Thiamine (100ppm)	1.79	1.89	1.93	1.96	2.04	1.92
Amino acids (100ppm)	1.73	1.83	1.86	1.93	1.96	1.86
Amino acids (200ppm)	1.76	1.81	1.88	1.95	1.98	1.88
Mean (B)	1.73	1.82	1.88	1.92	1.97	
L.S.D. for 5%	A: 0.03 B: 0.04 AB: 0.09					

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دراسة مدى تأثر النمو والمحصول والمكونات الكيميائية لنباتات الكزبرة باستخدام التسميد العضوي وبعض المواد الطبيعية

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أجرى هذا البحث خلال موسمين متتاليين 2016/2015 ، 2017/2016 بمزرعة كلية الزراعة - جامعة الازهر - اسيوط لدراسة تأثير التسميد العضوي متمثلا في سماد الماشية بمعدلات صفر ،10 ،20 م3 / فدان وسماد الدواجن بمعدلات صفر ، 5 ، 10 م3 / فدان والرش بثلاثة مركبات طبيعية عبارة فيتامين هـ بتركيز صفر ، 100 ، 200 جزء في المليون ، ثيامين بتركيز صفر ، 50 ، 100 جزء في المليون والاحماض الامينية بتركيز صفر ، 100 ، 200 جزء في المليون وكذلك التفاعل المشترك على عدد الافرع الرئيسية والوزن الجاف للعشب ومحصول الثمار للنبات والفدان والنسبة المئوية للزيت الطيار ومحصول الزيت الطيار للنبات والفدان والنسب المئوية لعناصر النيتروجين والفوسفور والبوتاسيوم في نباتات الكزبرة . واهم النتائج المتحصل عليها أ ن التسميد العضوى غالبا بكل المعدلات قد أدى الى زيادة معنوية في عدد الافرع الرئيسية والوزن الجاف للعشب ومحصول الثمار للنبات والفدان والنسبة المئوية للزيت الطيار ومحصول الزيت الطيار للنبات والفدان والنسب المئوية لعناصر النيتروجين والفوسفور والبوتاسيوم . تبين من النتائج أن أكثر المعاملات تأثيرا على زيادة الصفات تحت الدراسة هي المعاملة بسماد الدواجن بمعدل 10م3 / فدان نلاحظ في معظم الحالات ان الرش بالثلاث مركبات بكل تركيزات قد تسببت في زيادة معنوية لكل الصفات السابقة . استخدام الثيامين بتركيز 100 جزء في المليون قد سجل اعلى القيم لعدد الافرع والوزن الجاف للعشب ومحصول الثمار للنبات والفدان والنسبة المئوية لعنصر البوتاسيوم . الرش بالأحماض الامينية بتركيز 200 جزء في المليون اعطى اعلى القيم لمحصول الزيت الطيارللنبات والفدان والنسبة المئوية للزيت الطيار والنسب المئوية لعنصرى النيتروجين والفوسفور اتضح من النتائج أن معظم معاملات التفاعل قد ادى الى زيادة معنوية للصفات تحت الدراسة . ومن الواضح ان اعلى القيم لمعظم الصفات قد تم الحصول عليها باستخدام سماد الدواجن بمعدل 10 م3 / فدان مع الرش بالثيامين بتركيز 100 جزء في المليون والاحماض الامينية 200 جزء فى المليون . من النتائج يمكن التوجيه بأمداد نباتات الكزبرة بسماد الدواجن بمعدل 10 م3 / فدان مع الرش بالثيامين بتركيز 100 جزء في المليون الاحماض الامينية 200 جزء فى المليون لتحسين النمو والحصول على أعلى إنتاج من الثمار والزيت الطيار .