A COMPARATIVE STUDIES ON GROWTH, YIELD AND CHEMICAL CONSTITUENTS OF *NIGELLA SATIVA* L., (BLACK CUMIN) PLANTS AS AFFECTED BY APPLIED DIFFERENT SOURCES OF ORGANIC AND MINERAL FERTILIZERS

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ABSTRACT

A filed experiment was carried out during the two successive seasons of 2005/2006 and 2006/2007 on a private farm at Sennouris, Fayoum Governorate of to evaluate the effect of some organic manures, i.e., farmyard manure; sheep manure and poultry manure added at the rates of 20, 25 and 30 m^3/fed., as compared to the recommended doses of minerals "NPK" (control), i.e., 300 kg/fed. of ammonium sulphate (20.5%N); 200 kg/fed. of calcium superphosphate (15.5%P_2O_5) and 100 kg/fed., of potassium sulphate (48%K_2O) on growth and chemical constituents of black cumin (*Nigella sativa* L.) plants, taking into consideration the economical and healthy aspects. The obtained results indicate that, the studied growth parameters i.e., plant height, number of branches/plant, herb fresh weight/plant, number or weight of capsules/plant, weight of seeds/plant or feddan, volatile and fixed oil %, volatile or fixed oil yield/plant or feddan, chlorophyll a and b, caroteniods, NPK% and total carbohydrate of % in the herb were tended to decrease by applying farmyard and sheep manures at the rates of 20 , 25 and 30 m^3/fed.as well as poultry manure at rate of 20 m^3/fed as compared to the applied mineral "NPK" fertilizers (control). On the other hand poultry manure at the rate of 30 m^3/fed. showed similar or slightly increases for all the studied growth parameters and chemical constituents of black cumin plants as component to the mineral "NPK" (control). Also, data show that increasing the applied rate of organic manure significantly increased all growth parameters, chemical constituents of plants as well as yield and its components. At the meantime both farmyard manure and sheep manure at the rate of 30 m^3/fed, poultry manure at the rates of 25 and 30 m^3/fed and mineral fertilizers "NPK" (control), were statistically insignificant for the growth parameters and chemical constituents black cumin plants. So, the highest values of the previous plant parameters were obtained when black cumin plants received poultry manure at the rate of 25 m^3/fed. From economically and healthy aspects, it should be recommended to use the organic manures such as farmyard manure at the rate of 30 m^3/fed. and poultry manure at the rate of 25m^3/fed.

Key world: Black cumin, organic manure, mineral "NPK" fertilizers

INTRODUCTION

Black cumin *(Nigella sativa* L.,) is winter annual herb of Ranunculaceae family, and it is considered as one of the most important and widely cultivated medicinal and aromatic plants grown in Egypt. It is involved in different pharmaceutical preparation. The seeds contain volatile oil at 0.94% and fixed oil at 29% **(Somida, 1998)**. Such oil is the most important component in Nigella

seeds because it contains the active ingredient, nigellone that is used as an antiasthmatic drug, in strengthening the immunity system and some other clinical purposes

Nigella sativa, L. is one of the recently introduced plant to obtain. So it should be compared between the effect of both chemical and organic fertilization on *Nigella sativa*, L plants to choose the best media for producing an economic yield.

Frequent and high application of organic manure are necessary to maintain soil fertility and to provide the growing plants with their nutritional requirements without having an undesirable impact on the environment. Organic fertilization also provides a means for alleviating the problem of residues chemical fertilizers in the exporting market.

Several investigators such as **Mohamed (1997); Somida (1998) and Mohamed *et al.*, (2000)** studied the relationship between mineral fertilization on one hand and growth, yield and chemical constituents *of Nigella sativa*, L. The beneficial effect of organic manure (farmyard, sheep and poultry manure) on growth, yield and chemical constituents of *Nigella* sativa, L., and other ornamental plants was reported by several workers i.e., **Aly (1999)** on *Nigella sativa* plants; **Abd El-Raouf (2001) , El-Gendy *et al.* (2001), El-Yazal *et al* (2005)** and **Matter and Somida (2006)** on sweet basil; **Mohamed and Matter (2001) and Somida (2002)** on *Tagetes minuta* L.; **Sakr (2001)** on *Mentha piperta* L. plants; **Rizk, Fatima (2002) and Mohamed (2006)** on roselle plants.

This study aims to evaluate the effect of mineral "NPK" fertilization and organic manures (farmyard manure; sheep manure and poultry manure) added alone on the growth, oil yield and chemical composition of the black cumin (*Nigella sativa* L.) plants.

MATERIAL AND METHODS

The present investigation was represented by a field carried out during two successive seasons of 2005/ 2006 and 2006/2007 on private farm at Sennouris, Fayoum Governorate of to study effect of some organic manures (farmyard manure "FYM"; sheep manure "SM", and poultry manure "PM".) on growth and chemical constituents of black cumin (*Nigella sativa* L.) plants as compared to recommended mineral fertilization "NPK". Seeds of *Nigella sativa* L were obtained from the Research Center of Medicinal and Aromatic plants in Giza, Egypt in both seasons of the current study. On October 15th of each season, seeds were sown in hills 25 cm apart (4 seeds/hill) each plot (2×2 m) contained 4 rows (50 cm wide with 2 m length). Each plot contained 32 hills and plants were thinned to two plants per hill after 5 weeks from planting.

The tested organic manures farmyard manure; sheep manure, and poultry manure at the rate of 20, 25 and 30 m^3/fed. were incorporate of with the soil two weeks before sowing. Control plants were treated with the recommended doses of mineral "NPK" fertilizers at rate of 300, 200 and 100 kg/fed., of ammonium sulphate (20.5%N,), calcium superphosphate (15.5 P_2O_5%), and potassium sulphate (48 K_2O%). Calcium super phosphate was added to soil during preparing soil for cultivation; nitrogen and potassium fertilizers were added in two equal doses at 30 and 90 days after planting. Samples were taken before flowering after 110 days from planting, to determine the chemical constituents, i.e. Photosynthetic pigments: chlorophyll a, b and total caroteniods were extracted from fresh leaves by acetone (80%) then, their concentrations were determined mg/100g fresh weight according to **Welburn**

and Lichtenthaler (1984). mg/g dry weight were determined colorimetrically by using phenol-sulphoric acid reagent according to the method described by **Herbert *et al.* (1971).** Nitrogen and phosphorus percentage were determined according to **A.O.A.C. (1995)**. Potassium was determined by Flame Photometer, Parkin–Elmer model 52 with acetylene burner according to **Page *et al.* (1982))**. Plant samples of representing the applied three rate of organic manures and control plants were randomly taken from each harvest ones after 170 days from planting to study parameters of plant i.e., height (cm), number of branches/plant, herb fresh weight/plant (g), number of capsules/plant, weight of capsules/plant(g), weight of seeds/plant(g) and feddan (kg). Volatile oil % in the seeds (crushed) was extracted by water distillation, and then dried over anhydrous sodium sulphate and determined according to **Guenther(1961)**.Fixed oil % in seeds (residue left) after complete distillation of volatile oil was dried and subjected to determination by Soxhelet apparatus using n-hexane as a solvent according to **A.O.A.C. (1973)**, volatile oil%, fixed oil%, yield per plant (ml) and feddan (Liter) were calculated. The physical and chemical properties of used soil and organic fertilizers were estimated according to the method described by **Jackson *et al.* (1973)** and **Chapman,** and **Paratt, (1978)** and **Page *et al.*(1983)** are shown in Table (1).

Table (1): Some physical and chemical analysis of used soil and organic fertilizers

Properties		Soil		Organic manures					
				FYM		SM		PM	
		1st	2nd	1st	2nd	1st	2nd	1st	2nd
Sand		72.06	72.15	-	-	-	-	-	-
Silt		15.02	15.12	-	-	-	-	-	-
clay		12.92	12.73	-	-	-	-	-	-
Texture grade		Sand loam		-	-	-	-	-	-
pH		7.59	7.55	7.42	7.46	7.35	7.39	6.95	6.99
ECe (ds/m)		1.42	1.40	6.21	6.29	4.61	4.65	5.55	5.62
Total N %		0.05	0.07	1.49	1.52	0.81	0.85	1.97	1.99
P %		0.11	0.13	0.52	0.54	0. 78	0. 74	0.83	0.86
K %		1.39	1.41	1.09	1.11	0.75	0.77	1.32	1.37
mg/kg soil	Zn %	1.02	0.99	154	156	165	169	195	198
	Mn	1.2	1.25	125	129	161	161	185.12	186.23
	Cu	0.85	0.84	95	96	102	106	24.151	24.551
	Fe	5.17	5.21	195	191	198	188	225	233
Weight of 1 m^3 kg				755	761	459	464	510	515
Organic carbon%				19.4	20.48	19.32	20.41	24.01	24.34
Organic matter%				33.45	35.23	35.09	34.02	41.29	41.86
C/N ratio				24.01	24.10	13.25	13.36	12.19	12.33

The experimental design used was complete randomized block design with three replications; each replicated included 9 organic rate of plus the mineral fertilizer treatment. Results were statistically analyzed using the LSD at probability level of 5% for comparisons (**Gomes and Gomes, 1983**).

RESULTS AND DISCUSSIONS

A - Vegetative growth characteristics:

1 – Plant height (cm):

Data in Table (2) revealed that plant height increased by increasing the applied organic manure rate of in the two successive seasons. The best result was obtained when the poultry manure used at the rate of 25 m^3/fed, which recorded relative increase of 2.78 and 1.37% for both the studied seasons as compared to the control (mineral "NPK" fertilization) respectively in the both seasons. Moreover minor differences in plant height between mineral NPK fertilizers and the rate of 30 m^3/fed, applied the three different sources of the used organic manures were obtained, however, insignificant differences between both organic manures farmyard manure and sheep manure at the rate of 30 m^3/fed and poultry manure at the rates of 25 and 30 m^3/fed)on one hand and mineral "NPK" fertilization (control) on the other hand in both seasons. These results are in agreement with the findings reported by **Mohamed (1997)**, **Somida (1998)** and **Mohamed *et al.*, (2000)** on *Nigella sativa* L., plants, **Khattab and Gomaa, (2004)** on coriander plants, **Sharaf and Khattab (2004)** on fennel plants and **Mohamed (2006)** on roselle plants.

2- Number of branches per plant:

Increasing organic manures rates of was accompanied by increasing the number of branches/plant as compared to the low rate of in the two seasons. In this respect poultry manure at rate of 25m^3/fed increased the number of branches/plant more than the farmyard manure, sheep manure and mineral "NPK". At the meantime the effect of applied of both poultry manure at rates of 25 and 30 m^3/fed, farmyard manure and sheep manure at rate of 30m^3/fed and mineral "NPK" showed insignificant differences in number of branches/plant in the two seasons. These findings are in agreement with those obtained by **Somida (1998)** and **Mohamed *et al.* (2000)** on *Nigella* sativa L., plants, **Khattab and Gomaa, (2004)** on coriander plants, **Sharaf and Khattab**, **(2004)** on fennel plants and **Mohamed (2006)** on roselle plants.

3 – Herb fresh weight per plant (g):

Data in Table (2) revealed that herb fresh weight/plant increased by increasing all the applied rates of organic manures (farmyard manure, sheep manure and poultry manure) But the medium rate of (25m^3/fed)of poultry manure gave the heavy herb fresh weight/plant, which reached 121.1 and 123.2 g when compared to the mineral "NPK"(control) at the two seasons respectively. Moreover, minor differences in herb fresh weight/plant between mineral NPK fertilizers and the rate of 30 m^3/fed, of the three different sources of the used organic manures were obtained. So, insignificant increase in the herb fresh weight/plant were recorded among different organic manures fertilizers (farmyard manure and sheep manure at rate of 30 m^3/fed as well as poultry manure at rate of 25 and 30 m^3/fedon one hand) and mineral "NPK"(control)on the other hand. These results are in agreement with the those obtaned by **Mohamed (1997), Somida (1998), Aly (1999)** and **Mohamed *et al.* (2000)** on *Nigella sativa* L., plants**, Khattab and Gomaa, (2004)** on coriander plants, **Sharaf and Khattab**, **(2004)** on fennel plants, **El-Yazal, *et al.* (2005)** on *Ocimum basilicum* and **Mohamed (2006)** on roselle plants.

4- Number of capsules/plant:

Data in Table (2) revealed that number of capsules/plant of *Nigella sativa* L., plants significantly increased as a resulted of applied by using organic manures fertilizers. The medium rate of poultry manure (25m^3/fed) from slightly

increased the number of capsules/plant compared to the mineral "NPK"(control) by 2.98 and 1.35% in the two seasons, respectively. Moreover, minor differences in number of capsules/plant between mineral NPK fertilizers and the rate of 30 m^3/fed, from the three different sources of the used organic manure were obtained. Both, farmyard manure and sheep manure at rate of 30m^3/fed., poultry manure at rate of 25 and 30 m^3/fed, and mineral "NPK" were statistically insignificant in obtaining number of capsules/plant in the two seasons *on Nigella sativa* L, plants. These results are in agreement with the findings reported by **Mohamed (1997), Somida (1998), Aly (1999)** and **Mohamed *et al.* (2000)** on *Nigella sativa* L., and **Mohamed (2006)** on roselle plants,

5- Weight of capsules/plant (g)

Data in Table (2) showed that the organic manures (farmyard manure, sheep manure and poultry manure) at rate of 25 and 30 m^3/fed significantly increased the weight of capsules/plant as compared to the rate of 20 m^3/fed from the same manures. The medium rate of 25 m^3/fed from poultry manure gave the best values, which slightly increased the weight of capsules/plant compared to the mineral "NPK"(control) by 1.45 and 1.25%, respectively in the two seasons. These results are in agreement with those reported by **Mohamed (1997), Somida (1998), Aly (1999)** and **Mohamed *et al.* (2000)** on *Nigella sativa* L., plants.

6- Weight of seeds per plant (g) and per feddan (kg)

Organic manures (farmyard manure, sheep manure and poultry manure) at the rates of 25 and 30 m^3/fed significantly increased the seeds weight per plant and per feddan as compared to the 20 m^3/fed of the same manures. Poultry manure at rate of 25 m^3/fed gave the best values than other treatments, which slightly increased the seeds weight per plant and per feddan when compared to the mineral "NPK"(control) by 6.71 and 3.83% in the two seasons, respectively. Moreover minor differences in seeds weight per plant and per feddan between mineral NPK fertilizers and the rate of 30 m^3/fed, of the three different sources of the used organic manure were obtained. Farmyard manure and sheep manure at the rate of 30 m^3/fed of poultry manure at rate of 25 and 30 m^3/fed. and mineral "NPK", were statistically insignificant in obtaining seeds weight per plant and per feddan in the current experimental seasons as shown in Table (2) on *Nigella sativa* L., plants. These results are in agreement with the findings reported by **Mohamed (1997), Somida (1998), Aly (1999)** and **Mohamed *et al.*, (2000)** on *Nigella sativa* L., plants, **Khattab, and Gomaa, (2004)** on coriander plants , **Sharaf, and Khattab, (2004)** on fennel plants

In order to discuss the promoting effects of organic manures on growth and yield of *Nigella sativa* L. plants, it could be suggest that organic manure contained some macro and microelements which enhance the vegetative growth as well as yield, its component and oil production of *Nigella sativa* L., plants. Such nutrients play an important role in physiological aspects, i.e., nitrogen is a constituent of most organic compounds such as amino acids, chlorophyll, many enzymes and energy transfer materials such as ADP, ATP and form new cells as well as the rate of growth is proportional to the rate of at which nitrogen is supplied. The other macronutrient involved in the present study is potassium. It is needed in relatively large amounts by all plants. It aids in the uptake of other nutrients and their movement within the plant. **Beringer (1978)** and **Mengel and Kirkby (1987)** reported that, the role of K in plant metabolism, growth and yield formation can be characterized by two major function: as an activator

Table (2): Effect of mineral and organic fertilization on plant height, number of branches/plant, herb fresh weight/plant, number of capsules/plant, weight of capsules/plant, weight of seeds/plant and weight of seeds/feddan of *Nigella sativa* plants on seasons 2006/ 2007.

Treatments		Plant height (cm)		Number of branches/ plant		Herb fresh weight/plant (gm)		Number of capsules /plant		Weight of capsules/ plant (gm)		Weight of seeds/plant (gm)		Weight of seeds/feddan (Kg)	
		2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
Minerals 'NPK' (control)		63.23	64.66	31.33	32.66	117.9	120.2	42.66	44.56	43.33	44.69	13.11	13.56	839.04	867.84
Farm yard manure m^3/fed.,	20	56.29	57.98	27.55	28.15	102.2	103.5	33.66	35.69	32.25	34.26	9.42	10.09	602.88	645.76
	25	59.13	61.02	29.96	30.69	111.2	112.5	37.26	39.59	36.15	38.12	10.72	11.37	686.08	727.68
	30	63.02	64.55	30.58	31.88	115.6	117.2	41.23	42.56	40.55	41.66	12.18	12.55	779.52	803.20
Sheep manure m^3/fed.,	20	54.26	56.36	26.12	27.09	99.85	101.5	32.05	34.12	31.66	33.66	9.22	9.89	590.08	632.96
	25	58.39	59.89	28.18	29.12	107.5	109.1	35.69	38.63	34.56	37.99	10.19	11.33	652.16	725.12
	30	61.95	62.02	30.23	31.18	114.9	116.8	39.66	40.52	38.15	40.25	11.38	12.08	728.32	773.12
Poultry manure m^3/fed.	20	58.45	59.96	28.15	28.15	107.7	109.4	35.89	36.25	34.56	35.45	10.19	10.48	652.16	670.72
	25	64.99	65.55	31.95	32.98	121.1	123.2	43.95	45.16	43.96	45.25	13.99	14.08	895.36	901.12
	30	63.82	65.12	31.19	32.18	118.1	119.0	42.18	43.58	43.09	43.88	13.08	13.49	837.12	863.36
LSD 5%		3.60	3.45	1.75	1.80	6.49	6.54	3.64	3.55	3.99	3.77	1.63	1.56	104.33	99.12

of enzymes and as K^+ ions are very mobile within the plant as well as within a cell are transported through biological membranes with high rate of and specificity. Moreover, micronutrients in sort of tested manures are necessary because the soil is usually deficient of them or they are not readily available for plants. The increased rate of absorption of these elements from the soil, of the treated *Nigella sativa* L., plants, enhanced vegetative characters and chemical components.

B-Chemical composition

1 – Volatile oil percentage of seeds:

The use of organic manures (farmyard manure, sheep manure and poultry manure) at the rates of 25 and 30 m^3/fed for *Nigella sativa* L., plants significantly increased the volatile oil percentage/plant as compared to the 20 m^3/fed.of the same manure. Moreover, minor differences in volatile oil percentage/plant between mineral NPK fertilizers and the rate of 30 m^3/fed, of the three sources of the used organic manures were obtained. Farmyard manure at the rate of 30 m^3/fed of poultry manure at the rates of 25 and 30 m^3/fed and mineral "NPK", were statistically insignificant in producing volatile oil percentage/plant in the two experimental seasons. These results are in harmony with those reported by **Mohamed (1997), Somida (1998), Aly (1999)** and **Mohamed *et al.* (2000)** on *Nigella sativa* L., plants, **El-Ghadban (1998)** and **Mansour *et al.* (1999)** on ***Origanum majorana*** L., plants **Khattab and Gomaa, (2004)** on coriander plants, **Sharaf, and Khattab, (2004)** on fennel plants **El-Yazal, *et al.* (2005)** and **Matter and Somida (2006)** on *Ocimum basilicum* L.

2 - Fixed oil percentage in seeds:

Data in Table (3) indicated that the middle and the highest rates of organic manure (farmyard manure, sheep manure and poultry manure) fertilization significantly increased the fixed oil yield percentage/plant in the seeds as compared to the lowest rate of from the same fertilizers. The medium rate of 25 m^3/fed from poultry manure gave the best values of this oil when compared with the other treatments, whether a slightly increases the fixed oil yield percentage/plant in the seeds compared with the mineral "NPK"(control) by 0.23 and 0.67% in the two seasons respectively. Farmyard manure rate of 30 m^3/fed poultry manure at rate of 25 and 30m^3/fed and mineral "NPK", were statistically insignificant in producing fixed oil percentage/plant in the second season. These results are in harmony with those reported by **Mohamed (1997), Somida (1998), Aly (1999)** and **Mohamed *et al.* (2000)** on *Nigella sativa* L., plants.

3-Volatile oil yield of seeds per plant (ml) and per feddan (Liter):

Organic manure fertilizer (farmyard manure, sheep manure and poultry manure at rate of 25 and 30 m^3/fed.,) significantly increased the volatile oil yield per plant and per feddan as compared to the 20 m^3/fed from the same fertilizers as indicated the data in Table (3) on *Nigella sativa* L., plant. The medium rate of 25 m^3/fed from poultry manure gave the best result than the other treatments a slightly increased of the volatile oil yield per plant and per feddan compared to the mineral "NPK"(control) by 7.77 and 4.63 in the two seasons, respectively. At the meantime both farmyard manure rate of 30 m^3/fed; poultry manure at rate of 25 and 30m^3/fed. and mineral "NPK", were statistically insignificant in producing volatile oil percentage/plant in the two experimental seasons. These results are in harmony with those reported by **Mohamed (1997), Somida (1998), Aly (1999)** and **Mohamed *et al.* (2000)** on

Table (3): Effect of mineral and organic fertilization on volatile oil %, fixed oil % volatile oil yield / plant, Fixed oil yield/plant, volatile oil yield / Feddan and fixed oil yield / feddan of *Nigella sativa* plants on seasons 2006/ 2007.

Treatments		Volatile oil %		Fixed oil %		Volatile oil yield/ plant (ml)		Fixed oil yield/ plant (ml)		Volatile oil yield/fed., (Liter)		Fixed oil yield/fed., (Liter)	
		2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
Minerals 'NPK' (control)		0.79	0.80	25.16	25.22	0.103	0.108	3.296	3.419	6.592	6.912	211.102	218.869
Farm yard manure m^3/fed.,	20	0.74	0.75	23.36	23.99	0.069	0.076	2.200	2.420	4.416	4.864	140.832	154.917
	25	0.76	0.77	23.89	24.12	0.081	0.087	2.561	2.742	5.184	5.568	163.904	175.516
	30	0.77	0.78	24.12	24.55	0.094	0.098	2.937	3.081	6.016	6.272	188.020	197.185
Sheep manure m^3/fed.,	20	0.73	0.74	23.09	23.25	0.067	0.073	2.128	2.299	4.288	4.672	136.249	147.163
	25	0.75	0.76	23.12	23.56	0.076	0.086	2.355	2.669	4.864	5.504	150.779	170.838
	30	0.76	0.78	23.89	24.09	0.086	0.094	2.718	2.910	5.504	6.016	173.995	186.244
Poultry manure m^3/fed.	20	0.76	0.77	24.25	24.50	0.077	0.081	2.471	2.567	4.921	5.184	158.148	164.326
	25	0.79	0.80	25.22	25.39	0.111	0.113	3.528	3.574	7.073	7.210	225.809	228.794
	30	0.79	0.80	25.09	25.13	0.103	0.108	3.281	3.390	6.592	6.912	210.033	216.962
LSD 5%		0.02	0.02	0.74	0.70	0.012	0.012	0.400	0.380	0.495	0.484	16.220	15.390

Nigella sativa L., plants, **El-Ghadban (1998)** and **Mansour *et al.* (1999)** on *Origanum majorana* L., **Somida (2002)** on *Tagetes minuta* L. plants, **Khattab, and Gomaa, (2004)** on coriander plants, **Sharaf and Khattab (2004)** on fennel plants and **Matter and Somida (2006)** on *Ocimum basilicum* L.

4 - Fixed oil yield of seeds per plant (ml) and per feddan (Liter):

Data in Table (3) indicated that organic manure fertilizer (farmyard manure, sheep manure and poultry manure at rate of 25 and 30 m^3/fed) significantly increased the fixed oil yield per plant and per feddan compared to the 20 m^3/fed. from the same fertilizers. Poultry manure at rate of 25 m^3/fed gave the best values when compared with the other treatments, a slightly increased the fixed oil yield per plant and per feddan compared with the mineral "NPK"(control) by 7.04 and 4.53 % in the two seasons, respectively. At the meantime both farmyard manure rate of 30 m^3/fed; poultry manure at rate of 25 and 30 m^3/fed and mineral "NPK", were statistically insignificant in producing volatile oil percentage/plant in the two experimental seasons. These results are in harmony with those reported by **Mohamed (1997), Somida (1998), Aly (1999)** and **Mohamed *et al.* (2000)** on *Nigella sativa* L., plants.

5 – Leaf plastid pigments (mg/100g fresh weight):

Data presented in Table (4) show that the application of organic manure fertilizers (farmyard manure, sheep manure and poultry manure) at the rates of 25, 30 m^3/fed. significantly increased chl a, b and caroteniods of *Nigella sativa* L., plant leaves as compared to the 20 m^3/fed of the same fertilizers. The medium rate of 25 m^3/fed from poultry manure gave the highest value when compared with the other treatments, a slightly increased the chl a, b and caroteniods contents than the mineral "NPK" (control) by 2.02 and 2.46 % for chl a ; 2.95 and 2.88 for chl b, and 2.09 and 1.50 % for caroteniods in the two seasons, respectively. These results are in agreement with the findings reported by with **Mohamed (1997), Aly (1999)** and **Mohamed *et al.* (2000)** on *Nigella sativa*, **El-Ghadban (1998)** and **Mansour *et al.* (1999)** on ***Origanum majorana*** L., **Mohamed and Matter (2001)** on ***Tagetes minuta*** L., **Sakr (2001)** *Mentha piperta* L. and **Mohamed (2006)** on roselle plants.

6– Mineral (Nitrogen, phosphorus and potassium percentage):

Table (4) show that organic manure fertilizers (farmyard manure, sheep manure and poultry manure) at the rates of 25, 30 m^3/fed. significantly increased mineral % (N, P and K) of black cumin (*Nigella sativa* L.,) plant as compared to the rate of 20 m^3/fed of the same fertilizers. Poultry manure fertilizer at the rate of 25 m^3/fed gave the highest value of mineral % (N, P and K) which amounted 2.85 and 2.89 for nitrogen ; 0.369 and 0.375 for phosphorus or 3.87 and 3.93 for potassium % in the two seasons, respectively. The results are agreement with those obtained by **Mohamed (1997), Somida (1998), Aly (1999)** and **Mohamed *et al.* (2000)** on *Nigella sativa* L., **El-Yazal, *et al.* (2005)** on *Ocimum basilicum* L , **Khattab and Gomaa (2004)** on coriander plants, **Sharaf and Khattab, (2004)** on fennel plants and **Mohamed (2006)** on roselle plants

Table (4): Effect of mineral and organic fertilization on chlorophyll a , b and caroteniods contents mg/100g leaves fresh weight, nitrogen, phosphorous, potassium and total carbohydrates percentage of *Nigella sativa* plant leaves on seasons 2006/ 2007.

Treatments		Ch a mg/100g fresh weight		Ch b mg/100g fresh weight		Caroteniods mg/100g fresh weight		Nitrogen %		Phosphorous %		Potassium %		Total carbohydrates %	
		2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
Minerals 'NPK' (control)		270.21	272.62	101.22	102.36	67.15	68.66	2.75	2.78	0.365	0.369	3.84	3.89	6.10	6.24
Farm yard manure m^3/fed.,	20	238.63	241.24	86.68	88.66	62.23	63.19	2.25	2.31	0.326	0.329	3.37	3.41	5.84	5.84
	25	249.94	252.67	91.23	93.63	65.36	67.00	2.39	2.46	0.339	0.345	3.45	3.49	5.97	6.06
	30	258.51	261.24	99.66	102.2	67.69	68.15	2.56	2.64	0.348	0.353	3.65	3.71	6.06	6.14
Sheep manure m^3/fed.,	20	231.25	236.61	85.10	86.12	62.00	62.44	2.10	2.21	0.318	0.323	3.32	3.39	5.77	5.86
	25	241.65	245.85	89.19	91.09	64.55	65.55	2.26	2.34	0.332	0.339	3.40	3.46	5.87	5.93
	30	251.64	254.26	97.99	99.13	67.19	67.99	2.44	2.50	0.341	0.348	3.60	3.64	5.93	6.03
Poultry manure m^3/fed.	20	248.22	255.83	93.99	94.86	64.58	65.99	2.48	2.54	0.353	0.358	3.43	3.47	6.03	6.17
	25	275.67	279.33	104.21	105.31	68.56	69.69	2.85	2.89	0.369	0.375	3.87	3.93	6.33	6.45
	30	273.17	278.11	103.51	104.11	67.80	69.25	2.83	2.87	0.365	0.372	3.79	3.89	6.22	6.24
LSD 5%		10.05	9.95	5.57	5.56	2.55	2.57	0.26	0.24	0.017	0.018	0.23	0.22	0.17	0.18

7 – Total carbohydrate of content (mg/g D.W.) :

Organic fertilization caused a significant increase in total carbohydrate content as compared to the relative low rate of as shown in Table (4). The increase in such constituent was gradual and parallel to that fertilized by poultry manure than farmyard manure and sheep manure. Poultry manure at the rate of 25 m^3/fed., gave the highest value of total carbohydrate content than the other treatments. These results are in agreement with **Mohamed (1997), Somida (1998)** and **Mohamed *et al.* (2000)** on *Nigella* sativa L, **El-Ghadban (1998)** and **Mansour *et al.*(1999)** on *Origanum majorana* **L., Matter and Mohamed (2001)** *Calendula officinalis* L, and **Mohamed (2006)** on roselle plants.

In conclusion, it could be recommended, from the healthy and economical sides, to use poultry manure at rate of 25 m^3/fed. or farmyard manure at rate of 30 m^3/fed to produce black cumin *(Nigella sativa* L,) plants having the tremendous growth rate of and high volatile and fixed oil contents, at the same time to alleviate the hazard our effect such as soil pollution as a result of using chemical fertilizers in agricultural production.

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دراسات مقارنة على حالة النمو والمحصول والمكونات الكيماوية لنباتات حبة البركة ومدى تأثرها بإضافة مصادر مختلفة من الأسمدة العضوية والمعدنية

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أجريت تجربة حقلية خلال موسمين متتابعين ٢٠٠٥/ ٢٠٠٦ و ٢٠٠٦/٢٠٠٧م لمقارنة تأثير إضافة بعض المخصبات العضوية (سماد بلدي ومخلفات الأغنام و مخلفات الدواجن) بمعدلات ٢٠ و٢٥ و٣٠ م^3 / ف لكل منهما ومقارنتها (بالكنترول) مع المعدلات الموصى بها من الأسمدة المعدنية ٣٠٠ كجم من كبريتات الأمونيوم + ٢٠٠ كجم سوبر فوسفات الكالسيوم الأحادي +١٠٠ كجم كبريتات البوتاسيوم لاستبيان أفضل تلك المعاملات تأثير على النمو والمكونات الكيماوية لنبات حبة البركة أخذا في الاعتبار الناحية الصحية والاقتصادية.

وتشير النتائج المتحصل عليها إلى مايلى:

١- تناقص قيم صفات النمو مثل طول النبات، عدد الفروع للنبات، الوزن الطازج للعشب/ نبات، عدد الكبسولات، وزن الكبسولات، وزن البذور/للنبات والفدان، نسبة الزيت الطيار والثابت، محصول الزيت الطيار والثابت للنبات والفدان، محتوى النبات من الصبغات (كلوروفيل أ و ب الكاروتنويدات)، والمحتوى الكلى من النتروجين والفسفور والبوتاسيوم والكربوهيدرات باستخدام التسميد العضوي بعدلات٢٠و٢٥ و٣٠م^3/ ف من السماد البلدي للماشية ومخلفات الأغنام وحتى معدل ٢٠ م^3 / ف من مخلفات الدواجن بالمقارنة التسميد المعدني (الكنترول)

٢- تماثل أو تفوق تأثير سماد مخلفات الدواجن بدرجة طفيفة في زيادة قيم الصفات النباتية المشار إليها سابقا خاصة عند إضافته بمعدل ٣٠ م^3/ف مقارنة بالتسميد المعدني (الكنترول).

٣- زيادة قيم الصفات النباتية تحت الدراسة بزيادة معدل إضافة السماد العضوي

٤- لا توجد فروق معنوية بين كل من السماد البلدي ومخلفات الأغنام عند معدل ٣٠ م^3/ ف ومخلفات الدواجن بمعدل ٢٥ و٣٠م^3 / ف و الأسمدة المعدنية (الكنترول) ة فى تأثيراتها على صفات النمو السابقة.

٥- أعلى القيم المتحصل عليها من (عدد الأفرع للنبات، الوزن الطازج للعشب/ نبات، عدد الكبسولات، وزن الكبسولات، وزن البذور للنبات والفدان، نسبة الزيت الطيار والثابت، محصول الزيت الطيار والثابت للنبات والفدان، محتوى النبات من الصبغات (كلوروفيل أ و ب و الكاروتنويدات)، النتروجين والفسفور والبوتاسيوم والمحتوى الكلى من الكربوهيدرات تنمى إلى تأثير إضافة مخلفات الدواجن بمعدل ٢٥م^3/ف.

- ولذلك نوصى باستخدام الأسمدة العضوية المتوفرة ممثلة في (سماد بلدي بمعدل ٣٠م^3/ ف ، مخلفات الدواجن بمعدل ٢٥م^3 / ف لتسميد نباتات حبة البركة.