Mesopotamia J. of Agric. (ISSN 1815-316X) Vol. (36) No. (1) 2008

EFFECT OF HIGH LEVELS OF NITROGEN AND PHOSPOURS FERTILIZER, PINCHING, AND SEED RATE ON GROWTH AND YIELD COMPONENTES OF *Nigella sativa* L. 1-VEGETATIVE GROWTH AND SEED YIELD

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ABSTRACT

Field experiment was conducted during the season 2005-2006 in Singar - Mosul city to investigate the effects of high level (280 N, 260 P_2O_5) kg ha^{-1} and very high level (320 N, 300 P_2O_5) kg ha^{-1} fertilizer, pinch and without pinch, and plant seed rate sowing (0.6, 0.8, 1.0, 1.2) g/10m^2 cultivated within 3, 4, 5, 6 rows respectively in (10) m^2 plot area on growth and yield of *Nigella sativa* L. The experiment was laid out in randomized complete block design with three replications. The results indicated that. Very high level of nitrogen and phosphorus caused a significant increase in plant length, stem diameter, fresh weight, plant seed yield and total seeds yield kg/ha, were as branches number, and fruits number cannot be effected significantly by previous factor. Pinching causes a significantly increased in branches number, fruits number, while plant high decreased significantly. Increased seed rate sowing from 0.6 to 1.2 g/10m^2 caused a significant increasing in branches number, fresh weight, and plant seeds yield, while stem diameter, and fruits number didn't effected significantly by this factor except total seeds yield kg/ha which increased significantly when seed rate sowing are increased to 1.2g/10m^2 and they reach 651.85, 843.56, 1076.51, 1232.67 kg/ha for the four seed rate consecutively.

INTRODUCTION

Nigella (*Nigella sativa* L.) is an annual herbaceous plant belonging to the family Ranunculacea. (Majed and Mahmod, 1988). It is grown in Mediterranean region and widely cultivated throughout Syria, Egypt, Iraq, Iran, and Turkey (Al-Dagawi, 1996). Mature seeds are consumed for edible purposes as seasoning for vegetables, legumes and different types of baked products (Atta, 2003). It has been used as herbal medicine for more than 2000 years such as bronchodilator, (El-Kadi and Kandil, 1987), antibacterial (Hanafy and Hatem, 1991). Also it used In folk medicine as a natural stimulant of immunity, anti-inflammatory cough, analgesic, diuretic, anti-diabetic, (Al-Dagawi, 1996; Tierra, 2002). To realize the full yield potential of Nigella many agricultural practices will have to be optimized for its yield. Seed rate is the key factor determining effecting the yield and yield components. Ahmed (1997) show that there were no significant effect in plant high, branch number when increasing planting distant from 20 - 40 cm between nigella plants, while 30 cm caused an increment in vegetative dry weight, fruit number, and seed yield per plant. Al-khatony (2003) on *Nigella sativa* found that increasing plants distance from 15 to 35 cm had significant effects on seed components except fixed and volatile oil which significantly decrease.

Received 15/8/2007 accepted 21/11/2007.

Hand pinching is a common floricultural practice (Ecke and Matkin, 1976) designed to encourage auxiliary shoot development and increasing flower number for display purposes (Love, 1975; Larson, 1980). Phetpradap *et al*. (1994) found that hand Pinching of Dahlias had no significant effect on lateral branch length, seed yield of plant but reduced the spread of flowering. Al-khatony (2003) on *Nigella sativa* obtained that pinching increase stem diameter, branches number, vegetative dry weight, fruit numbers, plant production, seed yield , essential , and volatile oil production with 8.1%, 6.1%, 14.9%, 11.4%, 8.1%, 7.4%, 7.0%, 5.8% when compared with without pinch. The other important factor is nitrogen and Phosphorus which is a major component an effect on aspects of growth and metabolism then in plants yields (Wikipedia, 2007). Abu Zaid (1986) mentioned that nigella plants need high quantity of phosphorus and potassium fertilized and he recommended to add (200) kg supper phosphate /Feddan (4200 m^2). Ahmed (1997) found that foliar *Nigella sativa* plants with triple calcium super phosphate fertilizer (20, 40, 60) P_2O_5 /feddan caused a significant increase in plant high, stem diameter, branch numbers, dry weight, fruit number. Singh *et al*. (1999) found that increasing nitrogen fertilizer levels (0, 30, and 60) kg N ha^{-1} increased the seed yield production of nigella plants. Hammo and Al-Atrakchii (2006) on *Nigella sativa* found that increase fertilizer level of nitrogen and phosphorus to 240 N and 220 kg P_2O_5 kg ha^{-1} causes significant increases in plant high, stem diameter, branches number, vegetative dry weight, fruits number, and seed production. This study were done to clarify the influence of very high levels of fertilizers, seed rate sowing, and pinching on vegetative growth and seed yield of nigella plant.

MATERIALS AND METHODS

Field experiment was carry out during the season 2005-2006 in Singar/ Mosul city to investigate the effects of some agricultural factors on vegetative growth and seed yield of *Nigella sativa* L. Seeds which were obtained from the herbal market in Mosule was cultivated at 10^{th} Oct 2005 with Sowing rate of (0.6, 0.8, 1.0, 1.2) g/plot 4×2.5m (10 m^2) by hand within 3, 4, 5, 6 rows for each seed rate respectively, pinch and without pinch was done after 3-4 pear of leaves emerge on plant. Fertilize with two level of nitrogen and phosphorus high level (280 N, 260 P_2O_5) kg ha^{-1} and very high level (320 N, 300 P_2O_5) kg ha^{-1} added to plant at two time, the half amount of nitrogen and all phosphorus fertilizer were added after 3- 4 pears of leave emerge on plant and the other half added after one month of the first. All plants received 60 kg ha-1 potassium fertilizers as potassium sulfate. Weeds were controlled by hand and all agriculture practices were done as needed. Harvesting was done on 15^{th} June 2005 manually by pulling the dry plants out of the soil. Some physical and chemical properties of soil are measured in laboratory of horticulture department (table 1). The experiment was laid out in randomized complete block design with three replications. All measured Characters (plant height, stem diameter, number of branch per plant, fresh

weight, number of fruit per plant, seed yield per plant, total seeds yield kg/ha) were subjected to the analysis of variance. And all data obtained were analyzed and compared statistically at a significance level of 5%, using SAS program (SAS, 1996).

N	P	K	EC	pH	Organic mater	$CaCO_3$
%	%	%	mmhos/cm		%	%
0.024	0.007	0.082	1.8	7.65	1.06	25.04
Clay %		Sand %		Silt		Texture
16.96		59.64		23.4		Silty sand

Table (1): some physical and chemical properties of soil

RESULTS AND DISCUSSION

Plant high: Data presented in table (2) showed that very high level of fertilizer (320 N , 300 P_2O_5)kg ha^{-1} lead to significantly increased in plant high 5.72% when compared with high level of fertilizer (280 N, 260 P_2O_5)kg ha^{-1}, The reason may be due to very high nitrogen application which in itself increases plant growth then promoting processes such as cell division, cell enlargement, metabolic processes (George, 2000) or may be due to very high Phosphorus application which is important in plant bioenergetics as a component of ATP during photosynthesis Since ATP can be used for the biosynthesis of many plant bimolecular, also its use to modify the activity of various enzymes by phosphorylation, so phosphorus is important for plant growth and flower then seed formation (Wikipedia, 2007). Pinching case significantly decrease in plant high 38.14 cm when comparison with without pinching plants 42.00 cm, these results are in agreement with those found by Cavins (2003), and Abdul Allah (2006). This may be relate to negative correlation between plant high and branches number(r=- 0.027) as shown in table (10). Decreased seed rate sowing to 0.6 g/10m^2 and increased it to 1.2 g/10m^2 give plant high 40.50, 41.16 cm respectively which significantly differ when comparison with those sowing at seed rate 1.0, and 0.8 g/10m^2 39.11, 39.49 cm respectively. The reason may be relate to few competition between plants when seed rate sowing are very few 0.6 g/10m^2 and for elongation of plants when number of plants are very high due to increase seed rate sowing 1.2g/m^2 (Hussen, 1981). Dual and triple interaction between the levels of studied factors has a significant influence on this character.

Stem diameter: Pinching and seed rate haven't any significant effect on stem diameter as shown in table (3), these results are in agreement with those found by Cavins (2003). Very high level of fertilizer have significant effect on this character 4.15 mm when compared with high level 3.90 mm. these results are in agreement with those found by Ahmed (1997) and may refer to nitrogen and its role in create amino acids, which are the building blocks of proteins and forming protoplasm, the site for cell division and thus for plant growth and development then increased stem diameter. (Al-Naimi, 1987; Uchida, 2000). The interaction between fertilizer and pinching have a significant influence and the highest value 4.26 mm obtained in plants without pinch and fertilized with

very high level fertilizer, other dual and third interactions haven't any effect except non pinched plant at sowing rate 0.6 g/10m^2 and fertilized with very high level of fertilizer which superior significantly on pinching plant sowing at 0.8 g/10m^2 seed rate and fertilized with high level.

Branch number: Very high level of nitrogen and phosphorus haven't any significant effect on branch number, as shown in table (4). Pinching effect significantly on this character 6.83 branch/plant when compared with non pinching 6.01 branch/plant. This may be relate to lateral shoot development which be stimulated and promoted by either hand or chemical pinching as a result to remove inhibiter substance witch create in apical buds and transferred to lateral bud then inhibit ts sets and grown (Asiah *et al*. 1992; Phetpradap *et al*.1994).

Table(2):Effect of very high level of nitrogen and phosphorus fertilization, pinching, and Seed rate sowing on plant high (cm) of *Nigella sativa* l. plant

Fertilizer Levels	Pinch	Seed sowing rate g/10m^2				Fertilizer × pinch	Fertilizer effect
		1.2	1.0	0.8	0.6		
Very High	Pinch	40.00b-e	40.2 7b-e	38.00d-f	40.72b-d	39.75b	41.18a
	Without	44.53a	43.13ab	41.75a-c	41.03b-d	42.61a	
High	Pinch	38.83c-f	33.92g	36.19fg	37.15ef	36.52c	38.95b
	Without	41.29a-d	39.13c-f	42.00a-c	43.11ab	41.38a	
Fertilizer × Seed rate sowing	Very High	42.27a	41.70ab	39.88bc	40.88a-c	Pinch effect	
	High	40.06a-c	36.53c	39.10bc	40.13a-c		
Pinch × Seed rate sowing	Pinch	39.42bc	37.10d	37.10d	38.94 cd	38.14 b	
	Without	42.91a	41.13ab	41.88a	42.07 a	42.00 a	
Seed rate sowing		41.16a	39.11b	39.49b	40.50ab		

Each means in row for one or interactions factors with different letters are significantly different at P = 0.05 using Duncan's multiple range test.

Table(3):Effect of very high levels of nitrogen and phosphorus fertilization, pinching, and Seed rate sowing on stem diameter (mm) of *Nigella sativa*l. plant.

Fertilizer Levels	Pinch	Seed sowing rate g/10m^2				Fertilizer × pinch	Fertilizer Effect
		1.2	1.0	0.8	0.6		
Very High	Pinch	3.72 ab	3.93 ab	4.30 ab	4.25 ab	4.05 ab	4.15 a
	Without	4.18 ab	4.22 ab	4.22 ab	4.42 a	4.26 a	
High	Pinch	3.82 ab	4.14 ab	3.49 b	3.74 ab	3.80 b	3.90 b
	Without	4.00 ab	3.83 ab	4.24 ab	3.92 ab	4.00 ab	
Fertilizer × Seed rate sowing	Very High	3.95 a	4.08 a	4.26 a	4.34 a	Pinch Effect	
	High	4.00 a	4.18 a	3.86 a	4.08 a		

Pinch × Seed rate sowing	Pinch	3.77 a	4.04 a	3.90 a	3.99 a	3.92 a
	Without	4.09 a	4.03 a	4.23 a	4.17 a	4.13 a
Seed rate sowing		3.93 a	4.03 a	4.06 a	4.08 a	

Each means in row for one or interactions factors with different letters are significantly different at P = 0.05 using Duncan's multiple range test.

Also decreased seed rate sowing cased significant increased in branch number ranged between 6.08 - 6.56 branch/plant for seed rate sowing 1.2, 1.0, 0.8, 0.6 g/10m^2. All dual interaction between factors have significantly effect and the highest value 7.10 branch/plant obtained in pinched plants fertilized with very high level, so triple interaction have superior significantly on this characters and the highest value 7.52 branch/plant for pinching plant sowing at 0.8 seed rate and fertilized with high level .

Table(4):Effect of very high levels of nitrogen and phosphorus fertilization, pinching, and Seed rate sowing on branch number of *Nigella sativa* l.

Fertilizer Levels	Pinch	Seed sowing rate g/10m^2				Fertilizer × pinch	Fertilizer Effect
		1.2	1.0	0.8	0.6		
Very High	Pinch	6.62 a-c	7.13 ab	7.52 a	7.13 ab	7.10 a	6.54 a
	Without	5.54 e	5.80 c-e	6.23 b-e	6.37 b-e	5.99 c	
High	Pinch	6.33 b-e	6.43 b-e	6.33 b-e	7.15 ab	6.56 b	6.30 a
	Without	5.80 c-e	6.57 a-d	6.20 b-e	5.60 de	6.04 c	
Fertilizer × Seed rate sowing	Very High	6.08 b	6.46 ab	6.88 a	6.75 ab	Pinch effect	
	High	6.07 b	6.07 ab	6.07 ab	6.07 ab		
Pinch × Seed rate sowing	Pinch	6.48 b-d	6.78 a-c	6.93 ab	7.14 a	6.83 a	
	Without	5.67 e	6.18 c-e	6.22 c-e	5.98 de	6.01 b	
Seed rate sowing		6.08 b	6.48 ab	6.57 a	6.56 a		

Each means in row for one or interactions factors with different letters are significantly different at P = 0.05 using Duncan's multiple range test.

Fresh weight: Data in table (5) showed that very high level of fertilizer lead to significantly increased in fresh weight 6.71 g/plant when compared with high level 6.12 g/plant with increments percentage 9.64%. The reason may be refer to adequate nitrogen which promotes aerial vegetative growth, increases the top/root ratio, and essential for fruit and seed formation so affects both yield and quality characteristics of vegetable production (Okeno, 2001). Or to nitrogen and its effect on improves the quality and quantity of dry matter in leafy vegetables and protein (Tucker, 1999). Pinching also significantly increased fresh weight 6.69 g/plant when comparison with non pinched 6.14 g/plant. Decreased seed rate to 0.8 g/10m^2 lead to significantly increase in

fresh weigh from 5.96 g/plant for plants sowing at 1.2 g/10m^2 to 6.72 g/plant for plants sowing at 0.8 g/10m^2. triple interaction have a significant influence

Fertilizer Levels	Pinch	Seed sowing rate g/10m^2				Fertilizer × pinch	Fertilizer effect
		1.2	1.0	0.8	0.6		
Very High	Pinch	7.26 a	7.44 a	7.11 a	6.85 ab	7.17 a	6.71 a
	Without	5.95 ab	6.32 ab	6.64 ab	6.11 ab	6.26 b	
High	Pinch	5.34 b	6.19 ab	6.69 ab	6.65 ab	6.22 b	6.12 b
	Without	5.28 b	6.15 ab	6.43 ab	6.21 ab	6.02 b	
Fertilizer × Seed rate sowing	Very High	6.61 a	6.88 a	6.88 a	6.48 a	Pinch effect	
	High	5.31 b	6.17 ab	6.56 a	6.43 a		
Pinch × Seed rate sowing	Pinch	6.30 ab	6.81 a	6.90 a	6.75 a	6.69 a	
	Without	5.61 b	6.24 ab	6.54 ab	6.16 ab	6.14 b	
Seed rate sowing		5.96 b	6.52 ab	6.72 a	6.46 ab		

and the highest value 7.26 g/plant obtained in pinching plants fertilized with very high level of fertilizer and sowing at seed rate 1.2 g/10m^2. All this results may be refer to significant and high significant effect for stem diameter, branch number, fruit number, and plant yield on this character as shown in correlation coefficient(r=0.478, 0.301, 0.499, 0.447 respectively) (table 9).

Table (5): Effect of very high levels of nitrogen and phosphorus fertilization, pinching, and Seed rate sowing on fresh weight (g)of *Nigella sativa* l.

Each means in row for one or interactions factors with different letters are significantly different at P = 0.05 using Duncan's multiple range test.

Fruits number: Although very high level of fertilizer and seed rate haven't any significant effect on fruit number, as shown in table (6) Pinching has significant effect 29.94 fruit/plant when compared with non pinching 26.70 fruit/plant. The interaction between fertilizer levels and pinching have a significant influence and the highest value 30.55 fruit/plant obtained in plants pinched and fertilized with very high level of fertilizer were as the lowest value 25.81 fruit/plant obtained in non pinched plants fertilized with high level fertilizer. Other dual and triple interactions have significantly effect and the lowest value 21.87 fruit/plant obtained in non pinching plant which sowing at 1.2 seed rate and fertilized with high level. All superior results may be refer to high significant effect for stem diameter, branch number, and fresh weight on this character as in correlation coefficient(r=0.566, 0.479, 0.499 respectively) (table 9).

Plant yield: Although pinching haven't any significant effect on plant yield as shown in table (7) Very high level of nitrogen and phosphorus has significant effect on this character 5.60 g/plant when compared with high level 5.13 g/plant and the percentage of increase reach 9.16%. This result is in agreement with Singh et al. , (1999.)and it may be refer to nitrogen which plants require it in large amounts and its a role in almost all plant metabolic processes so it

effect on promotes rapid growth, increases leaf size and quality, hastens crop maturity, and promotes fruit and seed development. Or to phosphor which aids in root development, flower initiation, and seed and fruit development (Tucker, 1999; Uchida, 2000). The medium seed rate lead to significant increased in this character 5.84, 5.72 g/plant for plant sowing at seed rate 1.0 and 0.8 g/10m^2 respectively while highest 1.2 g/10m^2 and lowest 0.6 g/10m^2 sowing seed rate give lowest value 5.02, 4.87 g/plant respectively. The dual interaction between fertilizer levels and pinching have a significant influence on this characters and the highest value 5.82 g/plant for pinched plants fertilized with very high level of nitrogen and phosphorus fertilizer while lowest value 5.02 for non pinched plants fertilized with high level of nitrogen and phosphorus fertilizer. Other dual and triple interactions also have significant effect on this character. All superior results may be refer to significant and high significant effect for plant high stem diameter, and fresh weight of plant on this character as shown in correlation coefficient(r=0.288, 0.356, 0.447 respectively) table 9).

Table(6):Effect of very high levels of nitrogen and phosphorus fertilization, pinching, and Seed rate sowing on fruit number of *Nigella sativa* l.

Fertilizer Levels	Pinch	Seed sowing rate g/10m^2				Fertilizer × pinch	Fertilizer effect
		1.2	1.0	0.8	0.6		
Very High	Pinch	29.68ab	32.38a	30.56ab	29.58ab	30.55a	29.07a
	Without	29.63ab	28.13a-c	27.20a-c	25.41bc	27.60ab	
High	Pinch	28.26a-c	31.23ab	30.06ab	27.75a-c	29.33a	27.57a
	Without	21.87c	24.67bc	29.33ab	27.37a-c	25.81b	
Fertilizer × Seed rate sowing	Very High	29.66a	30.26a	28.88ab	27.50 ab	Pinch effect	
	High	25.06b	27.95ab	29.70a	27.56ab		
Pinch × Seed rate sowing	Pinch	28.97ab	31.81a	30.31ab	28.66ab	29.94a	
	Without	25.75b	26.40b	28.27ab	26.39b	26.70b	
Seed rate sowing		27.36a	29.10a	29.28a	27.53a		

Each means in row for one or interactions factors with different letters are significantly different at P = 0.05 using Duncan's multiple range test.

Table(7):Effect of very high levels of nitrogen and phosphorus fertilization, pinching, and Seed rate sowing on plant yield (g/plant)of *Nigella sativa* l.

Fertilizer Levels	Pinch	Seed sowing rate g/10m^2				Fertilizer × pinch	Fertilizer effect
		1.2	1.0	0.8	0.6		
Very High	Pinch	5.92 a	5.96 a	6.02 a	5.39 ab	5.82 a	5.60 a
	Without	5.15 ab	5.70 ab	5.92 a	4.73 ab	5.37 ab	
High	Pinch	4.53 b	5.85 a	5.60 ab	4.97 ab	5.24 ab	5.13 b
	Without	4.46 b	5.86 a	5.36 ab	4.40 b	5.02 b	
Fertilizer × Seed rate sowing	Very High	5.53 a-c	5.83 ab	5.97 a	5.06 b-d	Pinch effect	
	High	4.50 d	5.86 ab	5.48 a-c	4.69 cd		

Pinch × Seed rate sowing	Pinch	5.23 a-c	5.90 a	5.81 a	5.18 a-c	5.53 a
	Without	4.81 bc	5.78 a	5.64 ab	4.56 c	5.20 a
Seed rate sowing		5.02 b	5.84 a	5.72 a	4.87 b	

Each means in row for one or interactions factors with different letters are significantly different at P = 0.05 using Duncan's multiple range test.

Total seeds yield kg/ha: Data in table (8) show that total seed yield cannot effected significantly with pinching while very high level of nitrogen and phosphorus fertilizer have significant effect on this character 1010.4 kg/ha when compared with high level 891.9 kg/ha and the percentage of increase reach 13.29%. This result is in agreement with Hammo and Al- Atractii, 2006 and Ahmed, 1997. Increased seed rate sowing from 0.6 to 1.2 g/10m^2 lead to significant increased in this character from 651.9 to 1232.7 kg/ha respectively and the highest increase percentage between high and low value reach 89.10%. These results are in agreement with those found by Ghosh *et al*., (1981) which found that large distant between nigella plants may decrees total yield for unit area. The main reason for total seeds yield refer to plants number in unit area which increase with seed sowing rate increase. With increase seed sowing rate the interaction between fertilizer and pinching have a significant influence on this characters and the highest value 1078.7 kg/ha for pinched plants fertilized with very high level of nitrogen and phosphorus fertilizer while lowest value 876.7 kg/ha for non pinched plants fertilized with high level of nitrogen and phosphorus fertilizer. Other interactions also have significant effect on this characters, and the highest plant yield for triple interaction are 1454.8 kg/ha for pinched plant sowing at seed rate 1.2 g/10m^2 and fertilized with very high level fertilizer while the lowest value 540.7 kg/ha obtained in non pinched plant sowing at seed rate 0.6 g/10m^2 and fertilized with high level fertilizer. All superior results may be refer to high significant effect for branches number, plant yield on this character as shown in correlation coefficient(r=0.399, 0.531, respectively) table (9) **.**

Table(8):Effect of very high levels of nitrogen and phosphorus fertilization, pinching, and Seed rate sowing on total seed yield (kg/ hectare) of *Nigella sativa* l.

Fertilizer Levels	Pinch	Seed sowing rate g/10m^2				Fertilizer × pinch	Fertilizer Effect
		1.2	1.0	0.8	0.6		
Very High	Pinch	1454.8 a	1098.0 c-d	886.8 c-e	875.3 c-e	1078.7 a	1010.4 a
	Without	1265.8 ab	1049.7 b-d	872.4 c-e	580.7ef	942.1 ab	
High	Pinch	1114.1 bc	1078.3 b-d	825.2 c-f	610.7ef	907.1 b	891.9 b
	Without	1096.1 b-d	1080.1 b-d	789.9 d-f	540.7 f	876.7 b	
Fertilizer × Seed rate	Very High	1360.3 a	1073.8 bc	879.6 cd	728.0 de	Pinch Effect	
	High	1105.1 b	1079.19 bc	807.5 d	575.7 e		

sowing						
Pinch × Seed rate sowing	Pinch	1284.4 a	1088.1 ab	856.01 c	743.0 cd	992.9 a
	Without	1180.9 ab	1064.9 b	831.1 c	560.7 d	909.4 a
Seed rate sowing		1232.67 a	1076.51 b	843.56 c	651.85 d	

Each means in row for one or interactions factors with different letters are significantly different at P = 0.05 using Duncan's multiple range test.

Table (9): correlation coefficients between characters

characters	Plant high	Stem diameter	Branches number	Fresh weight	fruits number	Total seeds yield kg ha^{-1}
Stem diameter	0.29 *					
Branch number	-0.027	0.244				
Fresh weight	0.249	0.478**	0.301*			
fruits number	0.226	0.566**	0.479**	0.499**		
Plant yield	0.288*	0.356*	0.22	0.447**	0.221	
Total seeds yield kg ha^{-1}	0.281	0.192	0.399**	0.234	0.207	0.531**

تأثير المستويات العالية من السماد النتروجيني والفوسفاتي، القرط، ونسبة البذور المزروعة في النمو الخضري ومكونات البذور لنبات حبة البركة (*Nigella sativa* L.)

١-نمو الخضري وحاصل البذور

يوسف حسين حمو
قسم البستنة / كلية الزراعة / جامعة دهوك / العراق

الخلاصة

أجريت هذه الدراسة خلال الموسم ٢٠٠٥-٢٠٠٦ في منطقة سنجار-الموصل. وذلك بهدف دراسة تأثير كل من المستوى العالي جدا (٣٢٠ N و ٣٠٠ P_2O_5) كغم/هكتار والمستوى العالي (٢٨٠N و ٢٦٠ P_2O_5) كغم/هكتار للتسميد النتروجيني والفوسفاتي، القرط، بدون قرط، إضافة إلى نسبة البذور المزروعة في وحدة المساحة ٥٠ و ١٠٠ و ١٥٠ غم/١٠م^2 والتي تزرع نثرا باليد في ٣ و ٤ و ٥ و ٦ صفوف على التوالي ولكل وحدة تجريبية (١٠) م^2 والتداخل بينهما في نمو وحاصل البذور لنبات حبة البركة. نفذت التجربة باستخدام تصميم القطاعات العشوائية الكاملة RCBD وبثلاث مكررات وتضمنت النتائج مايلي.أدى التسميد النتروجيني والفوسفاتي العالي جدا إلى زيادة معنوية في طول النبات، قطر الساق، الوزن الرطب، إنتاج النبات الواحد من البذور، الحاصل الكلي للبذور بالكغم لكل هكتار. بينما لم تتأثر صفات عدد الأفرع، عدد الثمار معنويا بهذا العامل. بينما تأثرت صفة ارتفاع النبات سلبيا وبشكل معنوي بقرط القمة النامية في حين كان تأثيرها معنويا على صفات عدد الأفرع وعدد الثمار. وأدى زيادة نسبة البذور المزروعة في وحدة المساحة إلى إحداث زيادة معنوية في عدد الأفرع، الوزن الطازج للمجموع الخضري، حاصل النبات الواحد من البذور، في حين لم تتأثر صفات قطر الساق وعدد الثمار في هذا العامل عدا صفة الحاصل الكلي لوحدة المساحة والتي زادت معنويا بزيادة نسبة البذور إلى ١٥٠ غم/١٠م^2 وبلغ الحاصل ٦٥١٩ و ٨٤٣٦ و ١٠٧٦٥ و ١٢٣٢٠ كغم/هكتار للنسبة ٥٠ و ١٠٠ و ١٥٠ غم/١٠م^{2}على التوالي.

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