

EFFECT OF DIFFERENT LEVELS OF MINERAL COMPOUND FERTILIZERS ON TWO ONION CULTIVARS UNDER BANI WALEED GOVERNORATE, LEBIYA

M.M. Arafa¹ and H. Abo- Koreen²

1-Lecturer of vegetables crops , Horticulture Departments, Institute of Environmental Studies and Researches, Minufiya University, Egypt.

2-Horticulture Department, Fac. Agric, El-Fateh – Lebiya

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ABSTRACT : *This study was carried out to study the effect of three levels of mineral compound fertilizers (NPK + micro elements) (24+8+16+ micro elements) i.e., 20, 40 and 80 kg/ha. and two cultivars of onion (Red Amposta and Taxes yellow Grano 502) and their interaction on vegetative growth, yield and its components and quality under sandy soil conditions at wady Ghbeen, Bani Waleed Governorate, Lebyia during winter seasons of 2004 and 2005.*

The results showed that the third level of mineral compound fertilizer (NPK + micro elements) (24+8+16+ micro elements) with used rate 80kg/ha. significantly increased the plant height, number of leaves, fresh weight/plant, fresh weight of bulbs, total yield /ha., % of dry weight, % of early flowering and % of double bulbs. While, the % of marketable yield significantly increased by used the first level of mineral compound fertilizer (20 kg /ha.) . In addition, cv. Red Amposta compared with cv. Taxes Yellow Grano 502 showed significant increasing in the vegetative growth and yield and its components. While the quality of bulbs i.e., % of early flowering and % of double bulbs , the cv. Taxes Yellow Grano 502 showed significant increases compared with cv. Red Amposta.

In addition, the results show that, the interaction between the cv. Red Amposta and the highest level of mineral compound fertilizer (80kg/ ha.) resulted significant increases in plant height, number of leaves, fresh weight/plant, fresh weight of bulbs, total yield /ha. and %of dry weight , except , the % of marketable yield significantly increased by used the cv. Red Amposta in combination with the first level of mineral compound fertilizer (20 kg /ha.) while, cv. Texas yellow Grano 502 with the third level of mineral compound fertilizer significantly increased % of early flowering and % of double bulbs in both growing seasons .

Key words: *Fertilizer mineral compound, Agree feed yield.*

INTRODUCTION

Onion (*Allium cepa* L) is one of the most important vegetable crops in Libya , Egypt and many countries in the world because it cultivated in a large escape for local market, processing as well as exportation. So, great

attention was detected to increase the onion cultivated area with high yield and quality of onion .

The fertilization levels of N, P and K had a marked effect on vegetative growth. *Anez et al (1996), Singh et al(1997), Abd EL-Latif (1999) and Yousef (2000)* found that increasing fertilization levels to 100:60:125 kg NPK/ha. increased vegetative growth characteristics. *Katwale and Saraf(1994), Abd EL- Latif(1999) and Yousef (2000)* reported that, yield and its components of onion significantly increased with increasing fertilization levels. *Abd EL-Latif (1999) and Yousef (2000)* indicated that the highest used level of NPK significantly increased % of early flowering and % of double bulbs.

In a comparative study between different cultivars regarding their vegetative growth characteristics *Gabal et al. (1989), Abd EL-Latif (1999) and Yousef (2000)* found significant differences between cultivars in plant height, number of leaves /plant and fresh weight /plant. *Anez et al. (1996) , Salazak Munoz et al (1995) and Jaiswal and Subedi(1996)* indicated that cultivar of Texas Yellow Grano 502 significantly increased in yield and its component , % of early flowering and % of double bulbs compared with other cultivars.

The combination between NPK and cultivars were found to be more effective to increase vegetative growth characteristics. *Rops (1996)* indicated that using the highest level of NPK with some cultivars increased vegetative growth characteristics. Cultivar Jumbo with the highest used level of NPK significantly increased vegetative growth characteristics compared with cvs. Hyfield and Hyskin . *Resende et al. (1996) and Rops (1996)* study the effect of interaction between cvs. Pera , Roxa and compound fertilizer (8:14:14NPK) , they found that the cv Roxa with 80kg./ha. of compound fertilizer significantly increased yield and its components , % of early flowering and % of double bulbs than cv. Pera .

Therefore, the objective of this investigation was to study the effect of different levels of mineral compound fertilizers and cultivars, each alone or in combination on vegetative growth characteristics, yield and its components and quality of plants under sandy soil conditions.

MATERIALS AND METHODS

Two field experiments were carried out during the two winter growing seasons of 2004 and 2005 at the farm of Faculty of Agriculture Bany Walled, 7 October University ,Libya to study the effect of three levels of mineral compound fertilizer (Agree feed) (NPK + micro elements) (24+8+16+ micro elements) on two onion cultivars (Red Amposta and Texas Yellow Grano 502) and their combination on vegetative growth , yield and its components and bulbsquality. The soil of the experimental field was sandy in texture. The physical and chemical analyses of the soil was carried out by means of Pipet method (Piper 1950) and shown in Table (1).

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The experiment included six treatments, which were the combination between three rates of NPK, as mineral compound fertilizer and two cultivars of onion as follows :-

A) NPK + micro elements

- 1- 20 Kg/ha., referred as level one.
- 2- 40 Kg/ha., referred as level two.
- 3- 80 Kg/ ha., referred as level three.

B) Cultivars:

- 1- Red Amposta.
- 2- Texas Yellow Grano 502.

Seeds of the two onion cultivars were sown in the nursery on 5th October, while transplanting took place on 15th December of both winter seasons. The mineral compound fertilizer (NPK + micro elements) was added to the soil at three times, 7, 30 and 60 days after transplanting.

Spilt plots in a randomized complete blocks design with three replicates was used. The mineral compound fertilizer rates were situated in the main plots while cultivars were randomly distributed in subplots. The sub-plot area was 10.5 m², cultivars were grown in the field on ridges of 60cm width at 10 cm apart. The agriculture practices were done as commonly followed in the district. Harvesting was done when 50% of plants foliage were bended done showing symptoms of ripening. The two cvs. were harvested at 20th April . Plants of two cultivars were left in the field after harvesting for 15 days for curing and then roots were removed leaving a neck about 2 cm long.

Data of vegetative growth were recorded at 90 days after planting, as, plant height, number of leaves per plant and fresh weight per plant in random samples of 5 plants from each plot, while data of yield and its components (fresh weight of bulbs, total yield,% of marketable yield , % of dry weight of bulbs and % of double bulbs) are recorded after harvesting and also % of early flowering recorded during two seasons. All recorded data were statically analyzed according to the methods described by *Gomez and Gomez (1984)*.

Table (1): The chemical and mechanical analysis of the soil used

PH	EC ds/m	C% Total	N Ppm	P Ppm	K P.P.m +	CaCo3 %	Mn P.P.m	Fe Ppm	Zn Ppm	Cu. Ppm
7.8	1.75	0.45	11.2	6.02	295	4	3.01	13.9	1.54	1.01

1:2.5 Suspension, soil water

Coarse sand %	Fine sand %	Silt %	Clay %	O.M. %
77.6	17.34	3.0	2.06	0.22

RESULTS AND DISCUSSION

1- Vegetative growth:

a) Effect of NPK:

Data recorded in Table (2) show that all the studied growth aspects i.e., plant height, number of leaves and fresh weight/plant were significantly increased with increasing the amounts of compound fertilizer applied during both growing seasons . In this respect , the highest values in all the studied growth measurements were recorded in case of using the highest level of compound fertilizer (80 Kg/ ha.) (NPK + micro elements) (24+8+16+ micro elements). Obtained results are true during both seasons of study. In this regard ,the increasing effect of compound fertilizer on vegetative growth of plant may be due to the main role of used macro-elements on cells division and cell elongation as well as the physiological function of the cells which consequently affect plant growth. Such results are agree with those reported by Anez et ai (1996), Singh et al (1997), Abd EL-Latif (1999) and Yousef (2000) whofound that increasing fertilization levels to 100:60:125 kg NPK/ha. increased vegetative growth characteristics.

b)Effect of cultivar :

Data in Table (2) illustrate also that there were a significant differences in all the studied growth traits. In this concern, the highest values in plant height, number of leaves per plant as well as fresh weight per plant were recorded in case of cv. Red Amposta compared with cv. Texas Yellow Grano 502. Such results are true during both seasons of study. In this connection the differences in morphological aspects between the tested cvs. might be due to the variation in genetic pool between the two tested onion cultivars. Similar results were reported by *Gabal et al. (1989)*, *Abd EL-Latif (1999)* and *Yousef (2000)*who found significant differences between cultivars in plant height, number of leaves /plant and fresh weight /plant .

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c) Effect of the interaction :

The same data in Table (2) show clearly that all the studied vegetative growth characteristics were significantly affected due to the interaction between the tested mineral compound fertilizer levels and onion cultivars.

In this connection the highest values in all measured growth parameters were noticed in case of using the highest level of compound fertilizer (80 Kg/ha.) (NPK + micro elements) (24+8+16+ micro elements) as applied to Red Amposta cv. during both seasons of study. These results are in agreement with those reported by Rops (1996) who indicated that the application of the highest level of NPK to some onion cultivars increased vegetative growth characteristic, in cultivar Jumbo compared with cvs. Hyfield and Hyskin .

Table (2): Effect of compound fertilization levels, cultivars and their interaction on some vegetative growth characteristics of onion plant during the two seasons of 2004 and 2005.

Treatments		Plant height (cm)		No. of Leaves / plant		Fresh weight /plant (gm)	
		2004	2005	2004	2005	2004	2005
Fertilization levels	Level 1	55.7	62.3	7.9	8.1	107.7	116.3
	Level 2	58.7	68.0	9.1	9.3	133.0	153.7
	Level 3	68.2	76.0	9.9	10.1	210.0	214.1
	L.S.D.at 5%	0.56	1.24	0.41	0.47	0.88	1.22
Cultivars	R. Amposta	66.3	76.7	9.1	9.3	184.4	194.2
	T.Y.Grano502	55.3	60.9	8.8	8.9	116.0	128.4
	L.S.D.at 5%	0.96	0.89	0.19	0.25	0.81	0.81
Level 1	R. Amposta	63.7	72.0	8.0	8.2	148.7	157.0
	T.Y.Grano502	47.7	52.7	7.8	8.0	66.7	75.5
Level 2	R. Amposta	65.3	76.0	9.2	9.5	170.7	197.6
	T.Y.Grano502	52.0	60.0	8.9	9.1	95.3	109.7
Level 3	R. Amposta	70.0	82.0	10.0	10.3	234.0	228.1
	T.Y.Grano502	66.3	70.0	9.8	9.8	186.0	200.0
	L.S.D.at 5%	1.66	1.54	0.33	0.44	1.41	1.40

3-Yield and its components:

a) Effect of NPK:

Data in Table (3) show that all parameters of yield and its components i.e., fresh weight of bulbs, total yield and dry weight of bulbs % ,significantly increased with increasing the used level of compound fertilizers. In this respect, the highest used level (80 Kg/ ha.) (NPK + micro elements) (24+8+16+ micro elements) reflected the highest produced yield either per plant or per ha., such results are true during both seasons of growth .While the marketable yield % significantly increased by used the first level of compound fertilizers (20 Kg/ha.) compared with using the highest levels of compound fertilizers ,this is true during both growing seasons. These results are in agreement with those reported by Katwale and Saraf (1994), Abd EL-Latif (1999) and Yousef (2000) who reported that, yield and its components of onion significantly increased with increasing NPK fertilization levels.

The response of yield and its components to raising NPK levels may be due to that the availability of N, P and K were not sufficient to growing plants in this soil (Table, 1), thus the highest level of added NPK positively affected plant growth ,that may reflected on bulbs yield .

b) Effect of cultivars:

The same data in Table (3) show that, the cv. Red Amposta significantly gave the highest values in all parameters of fresh weight of bulbs ,total yield /ha. marketable yield % and dry weight of bulbs % than cv. Texas Yellow Grano 502 this is true in both growing seasons. Such differences in total produced yield and its components among the tested cultivars are related to the differences in their vegetative growth vigor, Table (2). These results not agreement with those reported by Anez et al. (1995) , Salazak Munoz et al (1995) and Jaiswal and Subedi(1996) indicated that cultivar of Texas Yellow Grano 502 significantly increased on yield and its component compared with other cultivar.

c) Effect of interaction :

Data in Table (3) show that cv. Red Amposta in combination with third level of compound fertilizer (80 Kg/ ha.) (NPK + micro elements) (24+8+16+ micro elements) significantly produced the highest values of fresh weight of bulbs, total yield /ha. and dry weight of bulbs % ,but marketable yield % significantly increased by interaction with cv. Red Amposta in combination with the lowest level of compound fertilizers (20 Kg/ha.) in both growing seasons. These results are in agreement with those reported by Resende et al. (1996) and Rops (1996),they studied the effect of interaction between cvs. Pera , Roxa and compound fertilizer (8:14:14NPK) and found that the cv Roxa with 80kg./ha. of compound fertilizer significantly increased yield and its components than cv. Pera.

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Table (3): Effect of compound fertilization levels, cultivars and their interaction on yield and its component of onion plant during the two seasons of 2004 and 2005.

Treatments		Fresh Weight of Bulbs (gm)		Total Yield (ton /ha.)		Marketable Yield %		Dry weight of Bulbs%	
		2004	2005	2004	2005	2004	2005	2004	2005
Fertilization levels	Level 1	122.5	128.5	23.9	25.8	76.9	78.0	10.6	10.6
	Level 2	140.5	147.5	28.5	31.3	74.9	74.5	10.9	10.8
	Level 3	152.5	172.5	31.6	35.1	68.2	70.4	11.0	11.0
	L.S.D.at 5%	2.07	0.80	1.02	0.14	1.11	0.44	0.26	0.16
Cultivars	R. Amposta	170.0	179.0	34.4	36.3	75.5	77.0	11.9	11.9
	T.Y.Grano 502	107.0	120.0	21.6	25.2	71.2	71.5	9.7	9.7
	L.S.D.at 5%	0.05	1.49	0.31	0.35	0.82	0.47	0.46	0.27
Level 1	R. Amposta	155.0	162.0	30.5	32.1	79.3	80.1	11.5	11.6
	T.Y.Grano 502	90.0	95.0	17.3	19.6	74.5	75.9	9.6	9.5
Level 2	R. Amposta	170.0	175.0	34.3	36.5	77.1	78.5	12.0	11.8
	T.Y.Grano 502	111.0	120.0	22.7	26.1	72.7	70.5	9.7	9.7
Level 3	R. Amposta	185.0	200.0	38.4	40.2	70.0	72.6	12.2	12.3
	T.Y.Grano 502	120.0	145.0	24.9	30.0	66.3	68.1	9.8	9.9
	L.S.D.at 5%	1.082	2.58	0.54	0.60	1.42	0.82	0.81	0.48

4- Quality of bulbs :-

a) Effect of NPK:

Data in Table (4) show that, the early flowering % and double bulbs % significantly increased with using the highest level of compound fertilizer (80 Kg/ ha.) (NPK + micro elements) (24+8+16+ micro elements) in both growing seasons and low temperature during growing seasons . These results are in agreement with those reported by *Abd EL-Latif (1999) and Yousef (2000)* , they indicated that the highest used level of NPK significantly increased % of early flowering and % of double bulbs .

b) Effect of cultivars:

Data in Table (4) indicate that the early flowering % and double bulbs % significantly affected by used cultivars. It is evident that cv. Texas Yellow Grano 502 showed the highest values in this respect than cv. Red Amposta during both growing season. These results are in agreement with those reported by *Salazak Munoz et al (1995) and Jaiswal and Subedi (1996)*

indicated that cultivar of Texas Yellow Grano 502 significantly increased in % of early flowering and % of double bulbs compared with other cultivars .

c) Effect of interaction :

Data in Table (4) show that the cv. Texas Yellow Grano 502 in combination with the third level of compound fertilizer (80 Kg/ ha.) (NPK + micro elements) (24+8+16+ micro elements) significantly recorded the highest values of early flowering % and double bulbs % compared with the cv. Red Amposta, this is true in both growing season. These results are in agreement with those reported by *Resende et al. (1996)* and *Rops (1996)* who study the effect of interaction between cvs. Pera , Roxa and compound fertilizer (8:14:14NPK) and found that the cv. Roxa in combination with 80kg./ha. of compound fertilizer significantly increased % of early flowering and % of double bulbs than cv. Pera.

Table (4): Effect of compound fertilization levels, cultivars and their interaction on quality of onion plant during the two seasons of 2004 and 2005.

Treatments		Early Flowering %		Double Bulbs%	
		2004	2005	2004	2005
Fertilization levels	Level 1	21.9	22.5	1.1	1.2
	Level 2	23.8	24.8	1.3	1.5
	Level 3	30.3	29.1	1.6	1.8
	L.S.D.at 5%	0.95	0.27	0.19	0.18
Cultivars	R. Amposta	23.9	24.1	0.6	0.7
	T.Y.Grano502	26.7	26.8	2.1	2.3
	L.S.D.at 5%	0.70	0.32	0.13	0.15
Level 1	R. Amposta	20.3	21.0	0.4	0.4
	T.Y.Grano502	23.6	24.1	1.9	2.0
Level 2	R. Amposta	22.3	23.5	0.6	0.7
	T.Y.Grano502	25.3	26.1	2.0	2.2
Level 3	R. Amposta	29.3	28.0	0.8	0.9
	T.Y.Grano502	31.3	30.2	2.5	2.6
	L.S.D.at 5%	1.21	0.56	0.22	0.26

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تأثير إضافة مستويات مختلفة من السماد الكيماوي المركب على صنفين من
البصل تحت ظروف وادي غبين, بني وليد , ليبيا
ممدوح محمد عرفة^١ ، حسين أبو قرين فرج^٢

١- قسم محاصيل الخضار - معهد الدراسات والبحوث البيئية - جامعة المنوفية - مصر.

٢- قسم البستنة - كلية الزراعة - جامعة الفاتح - ليبيا.

الملخص العربي

تم إجراء هذا البحث لدراسة تأثير ثلاثة مستويات من التسميد المعدني المركب على صنفين من البصل هما ريدامبوستا وتكساس يلوجراتو ٥٠٢ على صفات النمو الخضري والمحصول وكذلك صفات الجودة تحت ظروف الأراضي الرملية بوادي غبين, بني وليد - ليبيا. وكانت النتائج كما يلي:

أدى استخدام مستوى التسميد الثالث (٨٠ كجم/ هكتار سماد مركب) (ن , فو , بو + عناصر صغرى) (٢٤+٨+١٦) للحصول على أعلى القيم للصفات محل الدراسة وهي صفات النمو الخضري مثل طول النبات، عدد الأوراق الأنبوبية والوزن الغض لكل نبات وكذلك المحصول ومكوناته وهي متوسط وزن البصلة، المحصول الكلي طن/هكتار، وكذلك النسبة المئوية للمادة الجافة أما النسبة المئوية للمحصول القابل للتسويق فإنها زادت باستخدام مستوى التسميد الأول.

تفوق صنف ريدامبوستا على صنف تكساس يلوجراتو ٥٠٢ في صفات النمو الخضري محل الدراسة وهي طول النبات، عدد الأوراق الأنبوبية والوزن الغض لكل نبات وكذلك المحصول ومكوناته وهي متوسط وزن البصلة، المحصول الكلي طن/هكتار، النسبة المئوية للمحصول القابل للتسويق وكذلك النسبة المئوية للمادة الجافة في حين حصل صنف تكساس يلوجراتو ٥٠٢ على أعلى القيم في صفة الإزهار المبكر و صفة الأبصال المزدوجة بالمقارنة بصنف ريدامبوستا .

وبالنسبة لتأثير التفاعل فقد أعطى صنف ريدامبوستا مع مستوى التسميد الثالث أعلى القيم في جميع الصفات محل الدراسة وهي صفات النمو الخضري والمحصول ومكوناته بينما حصل صنف تكساس يلوجراتو ٥٠٢ مع استخدام مستوى التسميد الثالث على أعلى القيم في صفة الإزهار المبكر و الأبصال المزدوجة.