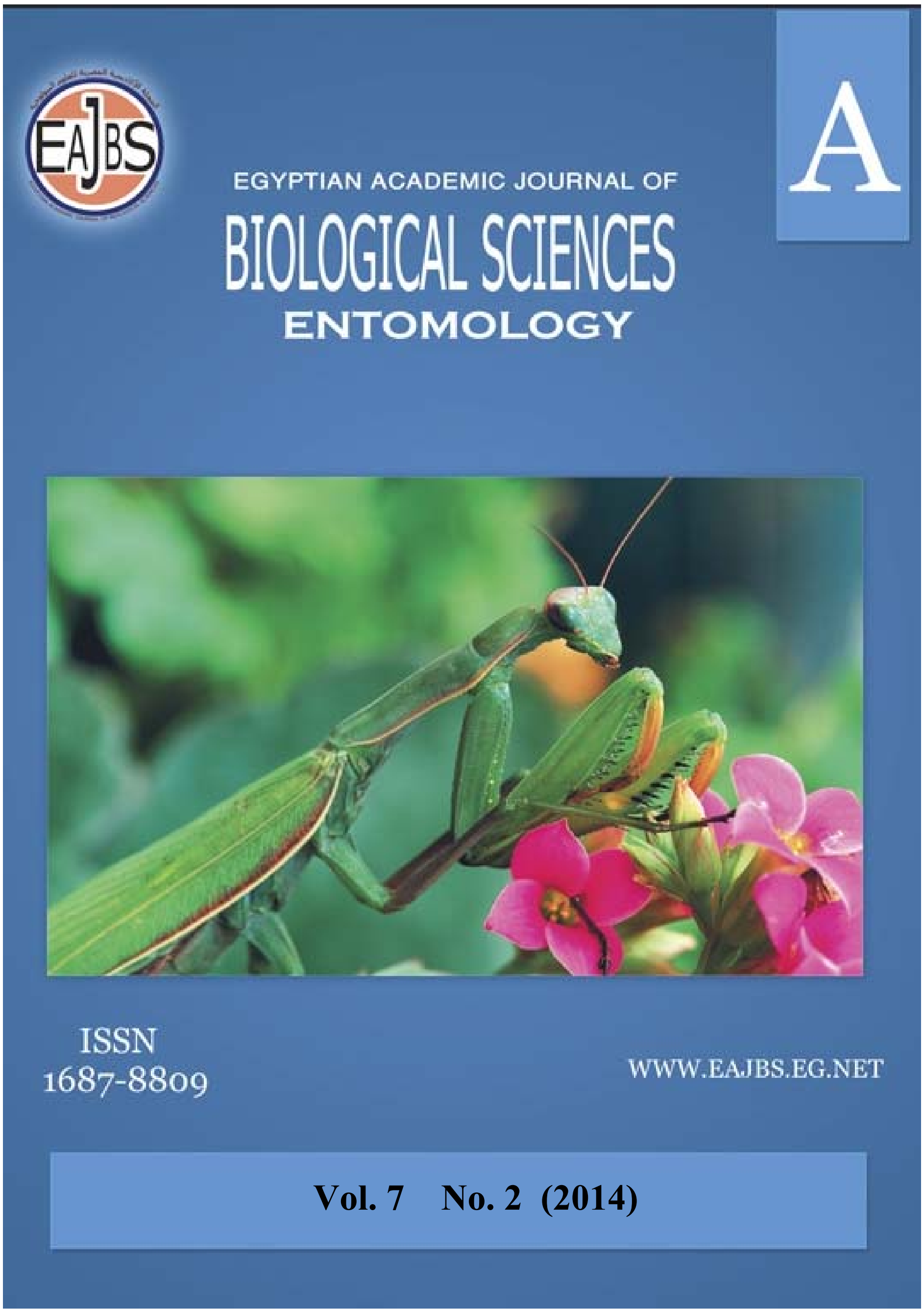


Egyptian Academic Journal of Biological Sciences is the official English language journal of the Egyptian Society for Biological Sciences, Department of Entomology, Faculty of Sciences Ain Shams University.

Entomology Journal publishes original research papers and reviews from any entomological discipline or from directly allied fields in ecology, behavioral biology, physiology, biochemistry, development, genetics, systematics, morphology, evolution, control of insects, arachnids, and general entomology.

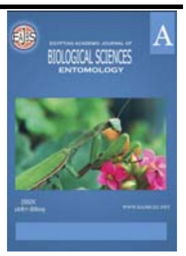
www.eajbs.eg.net

Received :1/5/2014 Accepted :20/6/2014

Egypt. Acad. J. Biolog. Sci., 7(2): 1 – 8 (2014)

Egyptian Academic Journal of Biological Sciences
A. Entomology

ISSN 1687-8809
www.eajbs.eg.net



Impact of different types of fertilizers to reduce the population density of the sap sucking pests to bean plants

Mona M. Ghallab[1]; Marguerite A. Rizk[1]; Wahba, B.S[1]. and Zaki,A.Y[2].
1- Plant Protection Research Institute, A. R. C. Dokki, Giza
2- Plant Protection Research Institute, Fayoum Regional. Res. Station.

ABSTRACT

The experiment was laid out in a randomized complete block design with three replicates. The aim of the work is to investigate the effect of different fertilizers on the rates of beans infestation by different piercing sucking pests *Tetranychus urticae, T. cucurbitacearum*, *Bemisia tabaci* and *Thrips tabaci* and on the resulting crop yield. The fertilizer treatments are Ammonium sulfate, Calcium super phosphate, Potassium sulfate, a mixture of NPK and Micro-elements (Zn, Mn, Fe, Cu, Bo & Mo). Results showed that means of green pods yielded by NPK fertilizer was significantly higher than other fertilizers in the two seasons.

Keywords: Ammonium sulfate, beans, calcium super phosphate, fertilizers, potassium sulfate, micro-elements, NPK, sap sucking pests.

INTRODUCTION

Bean plant, *Phaseolus vulgaris* L. is a member of family Leguminosae, rich in nutrients containing relatively high percentage of protein where consumed freshly as green pods or as dry seeds. Also its leaves encourage pest development, increased their fecundity and longevity (Braikel and Post, 1959) which threatens both quality and quantity of the resultant yield and cause serious damage either directly by sucking plants juice or indirectly as vectors of virus diseases.

Fertilizers are sources of mineral elements which plants required for growth and development. Essential mineral elements are ammonium sulfate, potassium sulfate, super phosphate, mixture of NPK and Microelements which have great effects in plant growth and development; their deficiencies or excesses result in marked effects on growth and yield crops.

The effect of NPK and Microelements were studied on parameters such as insect pests' numbers. The fertilizer NPK is one that contain three keys constituent chemical elements that are Nitrogen which promotes vegetative growth and green coloration of foliage; Phosphorus plays a major role in root growth, photosynthesis, respiration, energy storage, cell division and maturation; Potassium is important in flower and fruit growth, a plant metabolism, protein synthesis and chlorophyll development Yagoub *et al*. (2011). Researchers have demonstrated that high Nitrogen levels in plant tissue can decrease resistance and increase susceptibility to pest attack. Most studies assessing the response

Received :1/5/2014 Accepted :20/6/2014

of mites to nitrogen fertilizers have documented dramatic expansion in post numbers with increases in fertilizer rates Altieri and Nicholls (2003). Alternatively, reduced susceptibility to pests may be reflection of differences in plants health as mediated by fertility management, Phelan *et al.* (1995).

Some microelements have toxic effect for pests (Tomlin, 1994) by losing a part of body water content of these pests as result of osmotic force and indirect mechanism due to that foliar fertilizer increase, also, the natural plant immunity through improving the plant nutritional status (Nowosielski *et al.*, 1988). Zinc is required for normal plant growth. It is necessary in synthesis of indol of acetic acid, an important growth hormone in plant (Meyer and Anderson, 1961) and it accelerates protein synthesis and encourages phospholization and green plastids enzymes (Tsui,1948). Iron is an indispensable element for the synthesis of chlorophyll in green plants (Ferry and Ward, 1969). Manganese acts as an activator of many enzymes and essential for formation of chlorophyll (Pandy and Sinha, 1978). Cupper concentration of 9 mg. caused toxic effects in the insect species, i.e. egg sterility, decreased fecundity and morphological abnormalities when these insect larvae fed on contaminated with cupper (Habuštová and Weismann, 2001). Buzuk (1986) stated that microelements especially Mn, Zn, Fe and Cu increased alkaloids in plant tissues. Alkaloids contain toxic substances which protect plants from insect attack (Paech and Tracey, 1955).

The objective of this study was to investigate the effectiveness of different fertilizer treatments on the rate of pests' infestation to bean plants and their effects on the resultant yield.

MATERIALS AND METHODS

Field study: A field experiment was conducted for two successive seasons 2012-2013 in the Horticultural Research Station at Kanater El- Khairiya, Qualiobeya Governorate to focus on the effect of the different fertilizer treatments on the rates of beans infestation by different pests *Tetranychus urticae* Koch, *T. cucurbitacearum* (Sayed), *Bemisia tabaci* (Gennadieu) and *Thrips tabaci* Lindquist and on the resulting crop yield.

Seeds of "Paulista" variety of beans were sown in March 1st in two successive years. The experimental area was about 84 m^2 divided into 18 equal plots of about 3.6 m^2 each for the five different fertilizers and the control. Each plot with two rows of 1.8 m^2 length and 60 cm apart. Plots were distributed in a randomized complete block design with three replicates for each treatment. The tested fertilizer used as follow:

1- Ammonium sulfate, 20% N_2 used by the rate of 200 kg/feddan.
2- Calcium super phosphate, 15% P_2O_5 used by the rate of 200 kg/feddan.
3- Potassium sulfate, 48% K_2O used by the rate of 100 kg/feddan.
4- A mixture of the 3 previous fertilizers N, P & K at the rate of 200, 200 and 100 kg/feddan respectively.
5- Micro-elements solved in water as Folifert (Zn 7.06 %; Mn 4.20 %; Fe 2.80 %; Cu 2.0 %; Bo 0.60 % & Mo (Molibidium) 0.05 %
6- The control plots (without any fertilizer).

Spraying the Micro-elements fertilizer was applied by using plastic atomizer and were sprayed two times, the first after complete germination and the second spray on leaves at the time of flowering. The Ammonium sulphate and the other different fertilizers applied by adding them around the plant in the bottom of the straight and they sprayed also two times. The control plots were treated with water in the same days of spraying fertilizers. Precautions had been done to prevent contamination among fertilization treatments.

All plots received the normally recommended agricultural practices and kept free from any insecticidal treatments throughout the two seasons. At the end of each season, the green pods of each treatment were picked and weighted to estimate the final yield.

Sampling technique

Sampling started four weeks after sowing beans and continued weekly until harvest. Sampling continued for 10 weeks throughout the two years 2012 & 2013. Adults of *B. tabaci* were counted on 10 plants /replicate in the morning before sunrise when they are more stable on the undersides of leaves. Samples of 10 leaflets from each replicate were randomly picked up every week from three levels of plants, then kept in tightly closed paper bags and transferred to the laboratory where the observed pests were counted by the aid of stereomicroscope. The total individuals of *T. urticae* and *T. cucurbitacearum* (eggs and moving stages), *B. tabacci* (eggs, nymphs & pupae) and *T. tabaci* (nymphs and adults) were estimated by counting the total numbers on the upper and lower surfaces of the leaflet.

Estimation of beans leaves components:

The phytochemical components of leaves for beans (Paulista) variety were estimated to determine the relation between the plant components and the high infestation by white fly *Bemisia tabaci* in different fertilization treatments under field condition in 2012 and 2013seasons.

Leaves of each sample were cleaned and washed with distilled water, then quickly dried by placing them gently between filter papers to remove the excess of water. The fresh weight of leaves was recorded. The leaves were placed in dry oven at 60°C for one day. The dry powder of leaves was stored in glass bottle to determine the percentages of total protein, reduced sugar, non reduced sugar and total sugar according to A.O.A.C. (1995).

Statistical analysis

Statistical analysis for ANOVA was carried out by using SAS 9.3.1 Portable. Whereas the means were compared through LSD tests, least significant differences at P= 0.05 level.

RESULTS AND DISCUSSION

Data presented in tables (1&2) show mean numbers of spider mite, *Tetranychus urticae* (motile stages & eggs), *Tetranychus cucurbitacearum* (motile stages & eggs), whitefly, *Bemisia tabaci* (eggs, nymphs, pupae and adults), and *Thrips tabaci* (adults and nymphs) on leaflet plants in each treatment in two seasons 2012 &2013.

Spider mite, *Tetranychus urticae* Koch

Among the different treatments in the two seasons 2012 &2013, the lowest effects on the motile stages of spider mites were noticed in plots treated with N_2 with mean seasonal numbers 4.96 and 2.21 individuals / leaflet for motile stages in the two seasons, respectively, which were insignificant compared to the untreated plants (Control) and the other treatments in the first season, and significantly with plants treated with K_2O and mixture (4.22 & 4.30 individuals / leaflet), respectively in the second seasons.

Baidoo and Mochiah (2011) indicated these results, in which increasing nutrient application enhances plant growth; however growth can make the plant more attractive to pests attack due to the better growth of plants which supported their survival and reproduction.

***Tetranychus cucurbitacearum* (Sayed)**

Plots treated with Mixture (NPK) and Micro-elements showed the greatest mean numbers of eggs and motile stages recorded (15.13&15.13 eggs/ leaflet) and (7.14&7.14 individuals/ leaflet) in the first season, and (3.25&3.01eggs/ leaflet) and (0.84 & 0.65 / leaflet individuals) in the second season, respectively, with highly significant differences compared to control. Plots treated with N_2 showed the lowest mean numbers of eggs and motile stages recorded (10.21 & 1.55 eggs/ leaflet) and (3.91 & 0.28 individuals/ leaflet) in the two seasons, respectively. Our results are agreement with Habashi *et al.* (2007), they proved that chelated micro-elements (12% Zinc, 12% Cupper, 12% Manganese and12% Iron) had a high incidence of spider mite, *T. urticae* compared to the effective microorganisms (EM) and a mixture of microorganisms and micro-elements together.

According to L.S.D values, there were significant differences between plots treated with N_2 and plots fertilized by Mix. (NPK) and Micro-elements, while insignificant differences between the other treatments.

White fly, *Bemisia tabaci* (Gennadieu)

More whiteflies were found on fertilized plants than on non-fertilized plants. Higher deposit eggs of whiteflies were found in plots treated with N_2, with means of 0.77 &1.02eggs/ leaflet compared to control (0.39& 0.19 eggs/ leaflet) in the two seasons, respectively, with significant differences between them. While plots treated with Micro-elements revealed the minimize infestation by eggs of whiteflies (0.40 & 0.78 eggs/ leaflet) in the two seasons, respectively, with a significant differences comparing to N_2 treatment in the first season only while insignificant differences compared to control and between treatments. This finding agrees with Jo-Ann *et al.* (1995) who reported that acceptability of a plant by whitefly is in response to plant tissues; these tissues reflect changes in N_2 or K_2O content and are perceived during probing of the leaf surface by female whiteflies. Moreover, Reddy and Rao Appo (1982) proved that plants received more N_2 fertilizers become more vulnerable to whiteflies attack.

More crawlers hatched from eggs, laid on plants treated with N_2 fertilizer, were more than those treated with other fertilizers without significant differences between means in the first season. In the second season, the application of Micro-elements considerably reduced the mean population of whitefly nymphs (1.27 nymphs/ leaflet) with a significant differences between Mix, N_2 fertilizers (1.99 & 2.23 nymphs/ leaflet), respectively.

Table 1: Effect of fertilizers on population of four sap sucking pests infesting bean plants during 2012 season

Treatments	*T. urticae*		*T. cucurbitacearum*		*Bemisia tabaci*			
	Eggs	Mot.	Eggs	Mot.	Eggs	Nymphs	Pupae	Adults.
Control	6.23	5.41	10.22	6.47	0.39	0.77	0.13	2.40
N	5.92	4.96	10.21	3.91	0.77	0.84	0.09	6.23
P	7.04	5.32	15.10	4.12	0.71	0.77	0.07	4.60
K	7.30	6.05	13.56	5.64	0.42	0.51	0.08	2.73
Mix.	8.40	7.44	15.13	7.14	0.52	0.60	0.06	3.60
Micro-elements.	7.69	5.21	15.13	7.14	0.40	0.34	0.04	2.53
LSD at 5%	2.63	2.49	4.4	2.54	0.21	0.23	0.07	1.6

Treatments	*Thrips tabaci* Adults & nymphs	Yield
Control	3.43	191.67
N	3.99	238.67
P	5.77	253.33
K	4.65	165.00
Mix.	8.33	366.67
Micro .	4.34	250.00
LSD at 5%	2.15	95.15

The quiescent stage of whiteflies (pupae) were affected by the different fertilizers; the lowest means of pupae occurred in plots received the Micro-elements fertilizer (0.04& 0.05 pupae/ leaflet) without significant difference compared to control and between treatments.

More adults were produced from fertilized plants than from non fertilized plants; in the first season, plants treated with N_2 showed the highest infestation (6.23individuals/ leaflet) with highly significant difference compared to control , while the Micro-elements treatment showed the lowest incidence of whitefly population with means 2.53individuals/ leaflet with insignificant difference compared to control (2.40 individuals/ leaflet) and highly significant difference compared to N_2 and P_2O_5 fertilizers of means 6.23, 4.60 individuals/ leaflet, respectively.

Table 2: Effect of fertilizers on population of four sap sucking pests infesting bean plants during 2013 season

Treatments	*T. urticae*		*T. cucurbitacearum*		*Bemisia tabaci*			
	Eggs	Mot.	Eggs	Mot.	Eggs	Nymphs	Pupae	Adults
Control	5.58	2.85	1.76	0.50	0.19	1.17	0.09	0.27
N	4.06	2.21	1.55	0.28	1.02	2.23	0.18	0.39
P	4.71	2.91	2.36	0.44	0.78	1.33	0.08	0.23
K	5.86	4.22	2.36	0.48	0.95	1.46	0.16	0.33
Mix.	6.05	4.30	3.25	0.84	0.94	1.99	0.09	0.27
Micro-elements.	4.45	2.74	3.01	0.65	0.78	1.27	0.05	0.19
LSD at 5%	2.03	1.20	1.19	0.30	0.38	0.57	0.13	0.20

Treatments	*Thrips tabaci* Adults & nymphs	Yield
Control	0.25	261.67
N	0.30	323.33
P	0.31	315.00
K	0.42	228.33
Mix.	0.43	473.33
Micro .	0.38	311.67
LSD at 5%	0.13	93.01

The previously mentioned results agrees with Habashi *et al.* 2007 and El-Lakwah *et al.* (2010); they indicated that the population density of *B. tabaci* has a positive response to the applied rate of nitrogenous fertilizer and the plant, so plant treated with high level of N_2 harbored the highest numbers of whiteflies in different crops.

***Thrips tabaci* Lindquist**

The highest infestation level by *T. tabaci* on bean leaves was observed on plants received Mixture (NPK) fertilizer in the two seasons recorded 8.33& 0.43 individuals/ leaflet, respectively, with highly significant difference compared to untreated plants (3.43& 0.25 individuals/ leaflet). While the N_2 treatments recorded the lowest infestation (3.99 & 0.30 individuals/ leaflet) in the two seasons, respectively.

Statistical analysis showed that the infestation by *T. tabaci* was significantly with plants fertilized by N_2 compared to other fertilizers. These results are in agreement with Ukey *et al.* (2001), they indicated that the lowest means population of thrips was observed at the lower dose of N_2. Also, Ebaid and Mansour (2006) mentioned that Microelements (Zn, Mn, Fe and Cu) had significant differences in the reduction of thrips population on cotton plants.

Total fruit yield

From data in Table (1&2), the highest total green pod yields were obtained by applying the mix of NPK recorded (366.67& 473.33 Kg / fed.) in the two seasons, respectively, while K_2O fertilizer and untreated plants gave the lowest green pods (165.00 & 191.67 Kg / fed.) and (228.33 & 261.37 Kg / fed.), in the two seasons, respectively. Statistical analysis demonstrated that means of green pods yielded by NPK fertilizer was significantly higher than other fertilizers. Despite the fact that pest infestation on NPK treated plots were high, it did not significantly affect on the yields, this was due to the phenomena of tolerance; this result indicated by Huber 1989.

Estimation of beans leaves components

Data in Table (3) indicated that the percentages of total protein contents in bean plant leaves were high in the plant treated with N in the two seasons recorded 25.93 and 31.13 %, respectively, showed significant differences among other treatments and control in the two seasons. This finding are in accordance with the results obtained by Marschner (1995) who proved that an excess of N or a deficiency of K can lead to a higher accumulation of amino acids which, in turn, can increase attack rates of sucking insects such as *Aleurothrixus aepim* Goeldi (Homoptera : Aleyrodidae) in cassava plants.

Table 3:Chemical analysis of bean leaves at high infestation by whiteflies in 2012 & 2013

Treatments	2012				2013			
	Total protein %	Total sugar %	Reduced sugar %	Non reduced sugar %	Total protein %	Total sugar %	Reduced sugar %	Non reduced sugar %
Control	21.66	3.38	2.78	0.61	14.16	4.3	2.13	2.18
N	25.93	1.82	1.35	0.48	31.16	2.78	1.63	1.16
P	21.55	1.60	1.17	0.43	16.71	2.10	1.41	0.70
K	23.48	1.95	1.44	0.51	23.83	4.00	2.65	1.36
NPK	26.49	2.19	1.65	0.55	20.28	2.15	1.73	0.58
Microelements	24.7	3.24	2.65	0.59	19.75	5.70	3.25	2.46
LSD	4.06	0.16	0.13	0.09	2.85	0.03	1.29	1.33

The lowest percentage of total sugar contents were found in plants treated with phosphorus fertilizers in the two seasons recorded 1.6 and 2.1%, respectively being high significant differences compared to control and between other treatments in the two seasons. The reduced sugar contents were higher in the Microelement treatments (2.65 & 3.25 %) being insignificantly with other treatments and significantly with plants treated with phosphorus. Meanwhile, the non reduced sugar contents were higher in the Microelement treatments in the two seasons (0.59 & 2.46 %).

Population abundance of *B. tabaci*, adults on bean plants during high infestation showed significantly relation with total protein and total sugar. While, negative correlation value was calculated in case of phosphorus fertilizers.

CONCLUSION

Fertilizer management has several effects on plant quality which effects on insect abundance and on subsequently herbivore damage. Although more research is needed, preliminary evidence suggests that fertilizer can influence the relative resistance of agricultural crops to insect pests. In this research, sucking pests attracted to plants treated by NPK and Microelements fertilizers more than N_2, P_2O_3, and K_2O which used alone. That may be due to the better growth of treated plants which supported their survival and reproduction. Similar report by Baidoo and Mochiah (2011) which state that, NPK contains nitrogen which promotes better growth of plants on the other hand, attacking by sucking pests were increased.

REFERENCES

A.O.A.C. (1995): Methods of Analysis of the "Association of Official Analytical Chemists" 16^{th}. Ed., Washington, D.C., 226 pp.

Altieri, M.A. and Nicholls, C.I. (2003). Soil fertility management and insect pest : harmonizing soil and plant health in agro ecosystems. Soil &Tillage research, available on line at www. Sciencedirect.com, 72 : 201 - 211

Baidoo, P.K. and Mochiah, M.B. (2011).The incidence of nutrient application on the pests and natural enemies of the pests of okra *Abelmoschus esculentus* (L.) (Moench.) J. appl. Biosci. 41: 2765 - 2771.

Braikel, L.M. and Post, A. (1959). The influence of the monorial treatment of orchards on the population density of *Metatetranychus ulmi* (Koch) Entom. Exp. Appl. 2 (1): 38 – 47.

Buzuk, G. N. (1986): The influence of Microelements on The biosynthesis of alkaloid. Med. Inst. Vitebsk, (USSR) Rastit. Ressur, 22(2):272-279(Russ).

Ebaid, G. H. and E. S. Mansour (2006). Relative population abundances of sap-sucking pests and associated predators in relation to non-chemical treatments in cotton fields in Egypt. Egypt. J. Biol. Pest control, 16(1&2):11-16.

El-Lakwah, F.A.; E.F. El-Khayat; G.H. Rady; Mona M. Ghallab and B.S. Wahba (2010). Impact of varieties on infestation of common bean plants with pests Egypt J. Agric. Res. 88 (4): 1121 – 1140.

Ferry, J. F. and H. S. ward (1969): Fundamental of plant physiology. The McMillan Co New York. Pp.70-72.

Habashi, N.H; Ghallab, M.M.; Rizk, M.A. and Mansour, E.S. (2007). New approaches for controlling the spider mite and some insect pests on cucumber plants, associated predators and their impact on the crop yield Egyptian J. Biol. Pest Cont.17(2): 131-137.

Habuštová O. and Weismann ¼. (2001). Predominant criteria for evaluation of the toxic effect of Cd, Pb and Cu on insect in agroecosystems and natural ecosystems. *Ekológia (Bratislava)*: 447-453..

Huber, D.M. (1989). The roles of nutrition in the take all disease of wheat and other small grains in soil borne plant Pathogens Management of diseases with macro- and micro-elements. The American Psychopathological Society St. Paul Minnesota, USA, APS: 46 - 75.

Jo-Ann, B.; James, R.; Pedro, B. and Barry, F. (1995). Nitrogen fertilizer effect on selection acceptance and suitability of *Euphorbia palcherrinma* (Euphorbiaceae) as a host plant to *Bemisia tabaci* (Homoptera : Aleyrodiidae). Environ. Entom. 24 (1): 40-45.

Pandy, S. N. and B. R. Sinha (1978): Plant physiology 2^{nd} Revised Edition Ch., 6: 116-118.

Peach, K. and M.V. Tracey (1955): Modern methods of plant analysis. Springer Verlag Berlin – Gottingen – Heidelberg. Vol. 4,766 pp.

Phelan, P.L.; Mason, J.F. and Stinner, B.R. (1995). Soil fertility management and host preference by European corn born *Ostrinia nubilalis*, on zea may a comparison , a comparison of organic and conventional chemical farming. Agric. Ecosyst. Environ. 56:1–8.

Marschner, H. (1995). Mineral nutrition of higher plants. London: Academic Press

Meyer, B. S. and D. B. Anderson. (1961) Plant physiology. Sec. Ed. Seventh printing Ch. (25): 483 - 486.

Nowosielski, O.; W. dziennik; T. Kohinska J. Nar Kiewicz and I. Dobranska (1988): A biological basis for the efficiency of plant protecting foliar fertilizers in vegetable production . Acta Hortilizers, 222: 105 – 116.

Reddy and Rao Appa(1982). Importance of integrated control of cotton pests. Seminar integrated Pest Management System for cotton CICR Reg. Stn Coimbatore: 40 - 42.

Tomlin, C. (1994): The pesticide manual . Incorporating the Agrochemical Handbook, 10 th Ed., The Royal Society of Chemistry, Crop Protection Publications,1341 pp.

Tsui, C. (1948): The role of Zinc in Auxin synthesis. Amer. J. Bot., 35: 173 – 179.

Ukey, S.P.; Sarode, S.V.; Naitam, N.R. and Patil, M.J. (2001). Influence of fertilizers on thrips and mites of chili (*Capsicum annum* L.) pest management in Horticultural Ecosystem 7 (1): 72 -78.

Yagoub, S.O.; Wigdan M.A. Ahmed, and Mariod, A. A. (2011). Effect of Urea, NPK and Compost on Growth and Yield of Soybean (*Glycine max* L.), in Semi-Arid Region of Sudan. ISRN Agronomy, Volume 2012 (2012), Article ID 678124, 6 pages, http://dx.doi.org/10.5402/2012/678124.

ARABIC SUMMARY

تأثير أنواع التسميد المختلفة في خفض الكثافه العددية للآفات الثاقبة الماصة على نبات الفاصوليا

منى محمد أحمد غلاب[١]- مارجريت عدلى رزق[١] - باسم صبري وهبة[١] و أيمن يوسف ذكي[٢]

١- معهد بحوث وقاية النباتات ، مركز البحوث الزراعية

٢- محطة بحوث الفيوم الإقليمية - معهد بحوث وقاية النباتات

أجريت التجربة بمحطة بحوث البساتين بالقناطر الخيرية لمدة عاميين متتاليين ٢٠١٢ و ٢٠١٣ لدراسة تأثير أنواع التسميد المختلفة (سلفات الأمونيوم، وسوبرفوسفات كالسيوم، سلفات البوتاسيوم ، وخليط من الأسمدة الثلاثة السابقة بنسبة (٢٠٠:٢٠٠:١٠٠)، وعناصر صغرى على درجة الإصابة بالآفات الثاقبة الماصة للعنكبوت الأحمر بنوعيه الأحمر والأخضر (البيض والأطوار المتحركة) والذبابة البيضاء (البيض و الحوريات و العذراى والحشرة الكاملة) ، و التربس (حوريات وحشرات كاملة) على نباتات الفاصوليا لصنف بوليستا وعلى المحصول الناتج.

وكانت النتائج المتحصل عليها من تأثير التسميد على درجة الإصابة بالآفات الثاقبة الماصة كالتالي:

كان أعلي معدل إصابة للعنكبوت الأخضر *T. urticae* من البيض والأطوار المتحركة معاملة الخلط حيث سجل (٨.٤٠ و ٦.٠٤ بيض / وريقة) و(٧.٤٤ و ٤.٣٠ طور متحرك / وريقة) للموسمين على التوالي بدون فرق معنوي بينهم في الموسم الأول بينما سجلت معاملة سلفات الأمونيوم أقل إصابة (٥.٩٢ و ٤.٠٦ بيض / وريقة) و (٤.٩٦ و ٢.٢١ طور متحرك / وريقة) للموسمين بفرق معنوي في الموسم الثاني بالمقارنة مع معاملتي الخلط و سلفات البوتاسيوم.

كان أعلي معدل إصابة للعنكبوت الأحمر *T. cucurbitacearum* من البيض والأطوار المتحركة للمعاملة الخلط (١٥.١٣ و ٣.٢٥ بيض / وريقة) و(٧.١٤ و ٠.٨٤ طور متحرك / وريقة) خلال الموسمين على التوالي ومن ناحية أخري أظهرت المعاملة N_2 أقل معدل إصابة من البيض وأطوار متحركة (١٠.٢١ و ١.٥٥ بيض / وريقة) و(٣.٩١ و ٠.٢٨ طور متحرك / وريقة) بفرق معنوي في الموسمين بالمقارنة مع معاملتي الخلط، والعناصر الصغرى و الكنترول.

كان أعلي معدل إصابة بالذبابة البيضاء *B.tabaci* على النباتات التسميد النيتروجيني N_2 في جميع مراحل النمو بيض، وحوريات، وعذارى، وطوركامل يتبعه المعاملة P_2O_5 بينما أظهرت المعاملة بالعناصر الصغرى أقل معدل إصابة من الحوريات والحشرات الكاملة(٠.٣٤ و ١.٢٧ حورية/ وريقة) و(٢.٥٣ و ٠.١٩ طوركامل/ وريقة) خلال الموسمين على التوالي بفرق معنوي بالمقارنة بالتسميد النيتروجيني والخلط والكنترول قي الموسمين لطور الحوريات، وكذلك الطوركامل في الموسم الأول فقط.

كان أعلي معدل إصابة بالتربس *Thrips tabaci* معاملة الخلط حيث سجل (٨.٣٣ و ٠.٤٣ فرد / وريقة) للموسمين على التوالي بدون فرق معنوي بينهم في الموسم الثاني بينما كان التسميد النيتروجيني أقل معدل إصابة N_2 (٣.٩٩ و ٠.٣٠ فرد / وريقة) بفرق معنوي بالمقارنة بمعاملات الخلط و سلفات البوتاسيوم وسوبرفوسفات كالسيوم في الموسم الأول.

أعطت معاملة الخلط أعلي محصول من القرون الخضراء بمتوسط ٣٦٦.٦٧ و ٤٧٣.٣٣ كيلو/ فدان للموسمين على التوالي بينما أعطى التسميد البوتاسي أقل محصول من القرون الخضراء بمتوسط ١٦٥.٠ و ٢٢٨.٣٣ كيلو/ فدان تقريباً بينما أظهرت كل من النباتات التي حفظت بدون تسميد (كنترول) وهؤلاء من التسميد النيتروجيني والفوسفوري والعناصر الصغر.