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STUDY OF SOME ENVIRONMENTAL SIDES AND CONTROL METHODS FOR THE MOST IMPORTANT CUTWORMS ON OKRA CROP WITH THE DIAGNOSIS AND EFFICIENCY OF ITS MOST BIO ENEMY IN BASRA PROVINCE, IRAQ

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ABSTRACT

The results of the study of the most important types of cutworms in the province of Basra on okra crop showed the presence of several types of cutworms, the main cause of infection was *Vanessa cardui, Heliothis armigera, spodoptera exigua,* where the sugar beet worm *s. exigua* was found. Most cutworms are present if found in the spring and autumn veins of the crop and the most harmful is that damage results from larvae attacking the *s. exigua* For leaves and fruits, where the larvae of small sizes feed on the leaves and there is nothing left of the leaf except for the sweat for the skin, while the large larvae dig holes in the parts of the plant, and thus make the product not marketable. The results showed that all the studied varieties of okra (local (forty) at a pace Hassinawi, Clemson,) were infected with cutworms, but some varieties were very susceptible to infection than other varieties. The highest infection rate was 18.6% in the local cultivar (forty), while the lowest infection rate was 9.7% during the spring agricultural season of the okra crop in the Clemson the variety and the statistical analysis indicated the presence of significant differences in the rate of infection with cutworms for the studied okra varieties and the enemies were recorded. The natural predator, the aphid lion *Chrysopa Carnae*, which goes back to the order Neuroptera of the Chrysopidae family on okra plants, and laboratory and field observations showed that *Chrysopa Carnae* lion larvae prey on eggs and larval stages (first, second, third, quarter, and fifth) of the *S. exaiga* diabetic beet worm.
Keywords: cutworms, okra crop, Lepidoptera, Noctuidae

Introduction

The okra crop, *Ablemoschus esculents* (L.), goes back to the *Malvaceae* family, which is one of the most important economic crops cultivated in Iraq and the countries of the world. It contains a polysaccharides complex. (Kumar *et al.*, 2010 and Haydar *et al.,* 2011). Okra is grown for its green fruits that are eaten after cooking, dried, frozen, or canned (Kumar *et al*., 2010).

The cultivation of okra is spread in tropical and warm regions of Asia, as well as in the southern part of Europe and America and its original home in Ethiopia (Gemede *et al.,* 2017).

Statistics for (2014) indicate that the area cultivated for okra in Iraq is about 16,75 thousand / hectare and productivity reached 74 kg/hectare, and the total production is 142 thousand tons (Arab Organization for Agricultural Development, 2016).

Agricultural pests are one of the families specific to the cultivation of okra crop, which has an economic impact, including insect pests, especially cutworms belonging to the order *Lepidoptera*, the most important of the *Noctuidae* family, and includes many species, including the diabetic beet worm *Spdoptera exigua* that infects okra, sugar beets, onions, jets, cotton and sunflowers . As for the cotton leaf worm *Spdoptera liitoralis*, it infects okra, cotton, jet, sunflower, and sugar beet, the spiny cotton-nut worm, *Erais insulana*, infects okra, cotton, jet, and baker and *Helicovepa (Helithis) armiger* infects okra, cotton, jet, baker, and sunflower (Qasim, 1999).

Kabkaew *et al.* (2004) that chemical pesticides have major negative effects, including their bioaccumulation and their effect on the genetic systems of living organisms as a result of the frequent and irrational use of chemical pesticides manufactured for this. Many pesticides have been used that do not show any resistance to pests and are safe for the environment, which gives them the importance to be included in the integrated management program. Avaunt has indicated that several researchers, including (McKinley *et al.*, 2002). Indicated that the chemical pesticide Avaunt was selected among the low-risk products by the US Environmental Protection Agency and the researchers confirmed (Welty, 2001 & Luau 2003). This pesticide provides effective integrated control for many insects, especially Lepidoptera in the United States However, we cannot neglect the role of chemical pesticides in protecting the agricultural yield despite the negative harms they cause to the environment, to humans and their animals and to the imbalance in the ecological balance and their negative impact on vital enemies, but we can look at the other side of pesticides. This is why recent studies have directed towards the use of biological resistance from For the protection of the environment and humans and one of the most important elements of biological resistance, bacterial preparations

Bacillus thuringiensis (Bajwa & Kogon, 2001) Al-Zumaini (1997) asserted that exposure to chitin synthesis inhibitors leads to the insect's inability to remove its old skin and may ultimately cause its death. Its biochemical effect is consistent with the fact that it prevents the natural deposition of the pistol at larval ages. Treatment during molting and poisoning with these compounds is death as a result of not possessing The larva ice is hard enough to get out of the old cuticle at the time of molting. There are also solutions proposed to overcome the problems left by pesticides, which is the use of plant extracts to control pests (Belmain *et al.*, 2001).

One of the proposed solutions is to rely on other means of resistance to the pest such as biological resistance by using the biological enemies of the pest such as parasites and predators, which helped helped cut the reduce the population density of the pest for the purpose and reduce the use of chemical pesticides (Al-Adil and Abd, 1979).

Al-Zubaidi (1992) explained that plant resistance is the outcome of the interaction between the phylogeny and behavior of insects on the one hand and the distinct plant traits on the other hand, and that these traits change according to environmental conditions (such as soil and climate), which affects the nature of resistance and makes those plants more sensitive to infection and this varies. From one region to another depending on the prevailing environmental conditions.

Materials and Methods

Field numbers and initialization

The field experiment was applied in Basra Governorate /Al-Karma District/Agricultural Research Station in the spring agricultural season 2019 to study the sensitivity of okra varieties to cutworms infestation. From okra crop (local Hassinawia, local and local Battery (Arbaeen) and Clemson spineless), the experiment was designed according to the Randomized Block Design (CRBD) global experiment design. Complete Planted 8 mars, the length of one mole is 50 m and a width of 80 cm, and each mooring contains 120 jars distributed on two sides. The marrow was planted before planting and the seeds of the aforementioned okra varieties were planted on both sides of the meadow with a laboratory germination rate of 80-90% on 2019/12/29, and put in Al-Jura 5-6 seeds, the distance between the gour and another 20-25/ cm (Al-Ansari and Abd Ali, 1980) the plants were reduced to two plants in the Jura after the formation of 4-6 of the permanent leaves of the plant. Signs indicating each variety were placed.

Field experiment picture (1)

The sensitivity of okra cultivars to cutworm infestation

To find out the susceptibility of okra varieties to infection with cutworms, four varieties of okra seeds were planted and the rate of infection was calculated twice in a month on the four varieties of okra, namely (local, henawiya, and local (forty) and Clemson Spinless) planted in the spring season on 2019/12/29 in the greenhouse after the emergence The first infestation, dated 2020/3/22, identified 30 plants for each variety in (each marrow select 15 plants). The affected and healthy plants were calculated after inspecting the insect on all parts of the plant (stem, leaves and fruits). The percentage of infestation was calculated according to the formula and method mentioned above in The greenhouse planted in the spring season on 2019/29/12

Chemical control in the field

This experiment was conducted in the Agricultural Research Station affiliated to the College of Agriculture / University of Basra, where a section of the greenhouse was selected on 4/22/2020 for the purpose of finding out the effect of some pesticides on the infection rate, okra varieties grown with sugar beet worm, as 15 plants were tested for each repeat. In each plantation for each variety to estimate the percentage of insect infestation, the percentage of infestation was calculated before and after the treatment with pesticides for each experimental unit as well as the comparison by taking (15 plants per five plants okra. For each repeated of each variety of okra plant. According to the previously mentioned formula, the plants were treated with four The chemical pesticides A vaunt, the insect growth inhibitor, Match, the biocide, neem oil, Azadirachta indica, and the treatment of B. thuringiensis, at the recommended concentrations, respectively. Only, then examined the plants after (7, 14, 21) days to find out the percentage of infection.

Calculation of the predatory efficiency of the predator, aphid *Chrysopa carnea*

Predatory efficiency was calculated for the predator larvae on the eggs and larvae of the *S. exigua* diabetic beet worm., with their different stages, the newly hatched aphid larvae were placed individually in plastic containers 9 x 5.1 cm punctured with several holes and covered for the purpose of ventilation and with three duplicates of eggs and for each of the larval stages (first, second, third, fourth, and fifth), provided daily with a calculated surplus number of worm eggs and larvae *S. exigua* diabetic beet. s with 3-4 okra leaves and a piece. of wet cotton to feed the larvae. The experiment was conducted under laboratory conditions at a temperature of + 18 °C and a relative humidity of 45-55% for the purpose of obtaining the eggs of the predator. 10 adult pairs of males and females of the insect were booked in 9 x plastic plates 5.1 Poison was punched with several holes for the purpose of ventilation with okra leaves from 3-6 sheets and a piece of wet cotton to feed insects, as well as okra leaves and different larval stages that were collected from the study site (Issa, 2018).

Pesticides used in the study

(i) Match insect growth inhibitor

Insect growth inhibitor, the active substance Lufenuron 50 ml / liter, belongs to the Acylurea group produced by Syngenta for the prevention of plantings in Basel Switzerland obtained from the agent of Syngenta in Iraq, Basra province, used in the world Under many names, including Axor, sorba, Match A184699 C.G. (Ciba & Gige 1996).

(ii) Chemical herbicide A vaunt

An insecticide belonging to the oxadiazzin group with a wide range and a severe effect against a large group of insects. It works by contact and has high efficacy and low doses to combat a wide range of lepidoptera insects and has high efficacy in all larval stages in addition to its effectiveness on eggs Each liter contains 150 g/liter of Indoxacarbu In the form of emulsifiable concentrate EC per liter. The recommended concentration is 1.5 ml / liter of water on many beneficial insects that are less toxic to humans and animals. Honey is not toxic to bees.

(iii) The biocide Neem oli

It is an oil extracted from the seeds of the neem tree and the active ingredient in the oil i*s Azadirachtin*. It is used at a ratio of 150 ml of the biocide per 100 liters of water and 100 g of the diffuser produced by Russell

(iv) Bacteria *Bacillus thuringiensis*

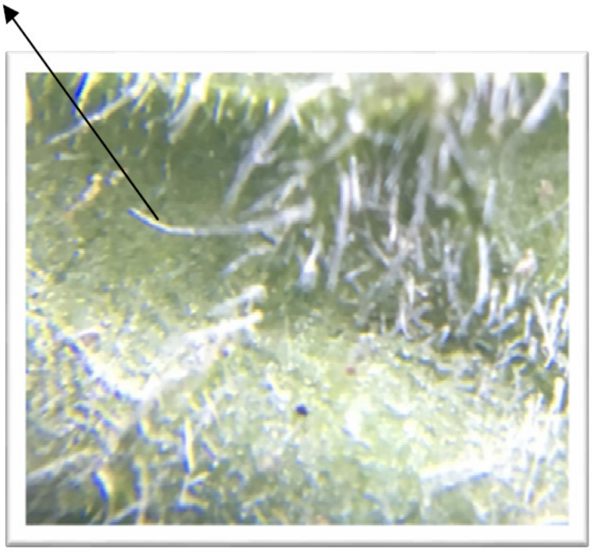
Strain *B. thuringiensis* kurstaki in the form of preparations ready for field use that act as microbial insecticides that are classified as IIIslightly toxic (class :) and are sold as commercial preparations under the name (peltirol) produced by the Spanish company (Probelte Fito) equipped with wettable powder forms containing pearly bodies and spores The active ingredient, Delta–endotoxin, acts as an infectious toxin, especially for the scaly-winged larvae, on tomato, okra, cotton and corn (Meister, 1998), and is used at a rate of 25-50 g / per 100 liters of water.

Results and Discussion

The sensitivity of different varieties of okra to cutworm infection

The results of Table (1) showed that all okra cultivars were infected with cutworms, but some varieties were very sensitive to infection more than other varieties. The highest infection rate was 18.6% in the local cultivar (forty) while lowest infestation rate was 9.7% during the spring agricultural season of okra in the Clemson variety. The statistical analysis indicated the presence of significant differences in the rate of infection with cutworms for okra cultivars grown in the same field. As for the effect of the overlap between the varieties and the months, the highest rate of infection was 28.4% during the month of 4/15, while the lowest infection rate was 1.9% during the month of June 6/15, and this is due to the different environmental conditions due to the high temperatures. We conclude from the results of the table that we obtained during the spring season of the crop in the field for okra varieties cultivated between the same table, that the percentage of infection rates for the crop began to rise gradually as the age of the okra plant progressed, and at the end of March, the infection was very little in the seedling stage of the plant, and in April it began The incidence increased gradually due to suitable environmental conditions of temperature and humidity. As for the effect of the overlap between the varieties and the date of sampling, the highest infection rate was 36.4% on the local cultivar on 4/22, while the lowest was 0.6% on the Clemson cultivar on 6/15. We deduce from the study the local variety (the forty) is the most vulnerable to infection with worms. The biting, while the Clemson variety is the least affected. The reason for the variation in the incidence and severity of the studied okra varieties is due to the differences in some characteristics of the vegetative growth and the outcome of the cultivated okra varieties where the local variety (forty) is distinguished by its early maturity which is commensurate with the appearance of the insect and the fruits of light green color and color The plant, the small thickness of the leaves, and the advantage of increasing the leaf area compared to the Clemson variety, which was characterized by the small size of the fruits, the roughness of the surface of the fruit and the delay in ripening, in addition to the local variety containing high proportions of carbohydrates and nitrogen compared to other varieties. Also, the physical nature of the taste does not interfere with the feeding stimulus while influenced by the chemical components. (Thangavelu, 1978). Al-Zubaidi (1992) indicated that there are many real traits in the plant variety that make the pests more ready to infect them, and among these characteristics are the characteristics of the leaf surface, whether rough or smooth, as well as the presence of capillaries, especially glandular, all have an effect on increasing resistance to the plant variety, and upon examining a group of Vegetable leaves for each of the cultivated okra varieties as in the was noticed that there was a rough texture of the leaves of the cultivar Clemson compared to the rest of the varieties and the presence of glandular filaments and the small size of the paper compared to the rest of the varieties, where the variety Clemson was distinguished by the small and thick coarse leaves to the E nematode Researcher Nadu (2017) confirmed in his study of identifying okra varieties resistant to the E nematode worm E. Vittella, where it found that fruit length, fruit width and hair density on fruits and leaves correlated inversely with the resistance of okra cultivars to the thistle worm.

(Glandular capillaries)



Vegetable leaf of okra clemson cultivar 40X) picture(3 Vegetable leaf of okra Local cultivar 40X)picture(2

Table 1 : Shows the estimation of the percentage of infection with cutworm species on different varieties of okra under field conditions.

Date of sampling	% Of infestation for okra varieties				
	Variety Local	Variety Hasinawi	Variety Pace	Variety Clemson	average Months
2020/3/22	19.2	17.3	14.1	12.3	15.7
2020/4/1	32.3	27	24.7	17.3	25.5
2020/4/15	36.4	31.4	27.8	19.3	28.4
2020/5/1	12.9	10.25	8.1	6.3	9.4
2020/5/15	17.5	16.6	13.2	10.2	14.3
2020/6/1	10.5	8.1	6.3	2.1	6.7
2020/6/15	3.5	2.6	1	0.6	1.9
the average	18.6	16.2	13.6	9.7	

Values LSD For periods = 0.75 Values LSD variety = 0.1 Values LSD To overlap= 2.12

Chemical control in the field

The results of Table (2) showed that there were significant differences in the rate of infection between the studied okra varieties, as well as that the rate of cutworm infection was greatly affected by the type of pesticide used and also affected by the type of cultivar studied. The statistical analysis indicated the presence of significant differences between pesticides and varieties, it reached the highest rate The effect of the variety was 17.8% on the local cultivar, and the lowest rate of 9.94% on the clemson cultivar.

As for the effect of the overlap between the treatments and the periods of taking the readings after spraying, it was recorded better for overlapping if the highest percentage of infection was 24.74 %% on the local cultivar after 21 days of spraying while, events with the lowest incidence rate of 5.20% after 7 days of spraying on the cultivar Clemson, as I explained. The results are that the best duration of the events with the lowest incidence of injury was after 7 days of spraying, if the rate of infection reached 10.33%, while the highest rate of injury was after the lapse of 21 days of spraying, if the infection rate reached 13.04%.

The statistical analysis indicated that there are significant differences between the varieties and the percentage of cutworm infection, as cutworms were affected by the type of plant variety, and the reason for this may be due to the existence of a difference in the shape and size of the plant leaves for the varieties if the leaves are broad and are exposed to a greater amount of pesticides. The nutritional preference has an effect on that leads to an effect on the appetite of cutworms and that eating a larger amount of food leads to an increase in the dose in the juice, which leads to an increase in the dose of the pesticide entering the body of the insect's stomach (Hussein, 2010).

As well as the effect of pesticides varies according to the plant host that the effect of the Cyromazin growth regulator to control the *C. Maculates*. South Papyrus beetle, the effect of the pesticide differed according to the different plant host. For peas, the killing rate was 100%, and for cowpea, mash and chickpeas it reached 55.31, 50.19 47.69), respectively (Al-Mallah and Al-Mikhlafi, 2003).

Predatory efficiency of the predator, *C. carnae,* on the larvae of the diabetic beet worm *Spodoptera exigua* within 24 hours

The results of Table (3) showed that there were significant differences between what the larval stages of the predator aphid, *C. carnae* consumed if the consumption rate of the larval stages of the predator aphid aphid reached within 24 hours of eggs and the first, second, third, fourth and fifth larval stages of the insect of *S. exaiga* 6.1. 39.69%, 15.7%, and 15.7% for each of the first, second, and third larval stages, respectively, which constitutes a predatory efficiency ratio of 10%, 26.17%, 66.16% of the total rates consumed by the larval stage within 24 hours of the first, second and third larval stages of the predator on The results of the table showed that there were significant differences between the prey affect rates, with a maximum of 36.9% and a minimum of 5.8% in the fifth larval stage of the *S. exaiga* insect.

As for the effect of overlapping between the larval stages of the predator and between the larval stages of the prey, the results indicated that there were significant differences between the rates of prey by *C. carnae* larvae from eggs and the larval stages of the diabetic beetworm *S. exigua* and the highest predation rate was recorded at the third larval stage of the predator *C. carnae* and it was 58.6% and 26.3% for each of the eggs and larval stage of prey, respectively within 24 hours, and the lowest rate was recorded at the first larval stage of the predator and reached 5.1% for each larval stage. The fourth and fifth stages of larval stages of prey, respectively, during 24 hours.

Table 2 : Shows the effect of chemical pesticides, insect growth regulators and biocides on infection rate of studied okra varieties with diabetic beetworm *S. exigua*

Varieties	Pesticide	the days				Varieties Impact Rate
		7	14	21	The effect rate of the pesticide	
	Match	22.53	23.00	21.68	22.40	
	B .t	21.32	21.27	24.74	22.44	
local	Neem oli	13.24	14.16	16.68	14.69	
	Avanut	10.25	11.77	12.99	11.67	17.8
	Control	39.16	44.29	51.11		
	Average days	22.44	23.4	25.36		
	Match	14.16	17.30	18.16	16.54	
	B .t	15.20	17.51	19.35	17.35	
Hasinawi	Neem oli	9.30	14.16	16.68	13.38	14.24
	Avanut	8.16	9.30	9.44	9.69	
	Control	28.25	31.02	33.15		
	Average days	15.0	17.86	19.35		
	Match	19.36	20.81	21.77	15.48	
Pace	*B .t*	20	21.16	22.90	21.35	
	Neem oli	14.16	14.66	17.30	15.37	16.58
	Avanut	13.24	13.52	15.60	14.12	
	Control	33.14	36.42	35.88		
	Average days	19.98	21.31	22.69		
	Match	10.25	11.65	12.26	11.38	
	B .t	11.66	11.64	13.24	12.18	
Clemson	Neem oli	8.16	9.33	10.26	9.25	9.94
	Avanut	5.20	6.33	9.30	6.94	
	Control	19.16	19.35	20.16		
	Average days	10.88	11.66	13.04		

Values L.S.D Varieties = 0.173 For time= 0.150 For pesticides= 0.194
For binary interference= 0.300 For triple overlap= 0.671

Table 3 : Predatory efficiency of larval stages of the predator *C. Carnae* in feeding on eggs and larvae of the diabetic beetworm *spodoptera exigua* during 24 hours.

Predator larvae	Average rate of eggs and larvae of diabetic beet worm consumed within 24 hours						Predator impact rate	The ratio%
	Eggs	Larval instar the first	Larval instar The second	Larval instar The third	Larval instar The Fourth	Larval instar The Fifth		
the first	15.6	11.3	7.3	6.3	5.1	0	6.1	10
The second	36.4	25.3	23.3	15.3	9.3	5.3	15.7	26.17
the third	58.6	42.3	33.4	28.4	23.4	12.3	39.69	66.16
Prey impact rate	36.9	26.3	21.2	16.6	12.6	5.8		
the average							61.39	

Valuable L.S.D for a predator =0.4133 For prey= 0.7159 To overlap = 0.7159

References

Al-Ansari, M.M. and Hikmat, A.A. (1980). Fiber Crops, Ministry of Higher Education and Scientific Research, University of Baghdad, Dar Al-Kutub for Printing and Publishing, 237 pages.

Al-Mallah, N.M. and Al-Mukhlafi, M.A.H. (2003). The effect of the TIC inhibitor and trophic host type on some viability measures of the southern cowpea beetle *Collosobruchus maculates* Journal of Technologist, 18(1): 44-36.

Bajwa, W.L. and Kogan, M. (2001). *Bacillus thuringiensis* based biological control of insect pests .National IPM Network Bajwa Akogan. *Bacillus thuringiensis* based biological control. Htm Email bajwa boc orst .edu.

Belmain, S.R.; Neal, G.E.; Ray, D.E.; Golob, P. (2001). Insecticidal and vertebrate toxicity associated with ethnobotanicals used as post –harvest protectants in Ghana, food and chemical toxicology, 39: 278-291.

Ciba-Giegy (1996). Product profile, MATCH-CGA 184 699 Lufenuron. Ciba crop protection August: pp 10 .

Gemede, H.F.; Ratta, N.; Haki, G.D.; Woldegiorgis, A.Z. and Beyene, F. (2017). Nutritional quality and health benefits of okra (*Abelmoschus esculentus*): A Review. Journal of Food Processing & Technology, 6: 458-464.

Haydar, A.A.; Kamarlizam, B.S.N. and Che Man, R. (2011). Investigating drag reduction characteristics using okra mucilage as new drag reduction agent .journal of Applied sciences, 11: 2554-2561.

Hussein, A.J. (2010). Biological and chemical control study of the *colaphellus apicalis* mentr chrysomelidae (cole) beetle, master's thesis. faculty of Agriculture . Albasrah university . 18 p.

Issa, J.A. (2018). Study the effect of (Oxycarenidae: Hemoptera) of *Oxycayenus hyalinipennis* (costa) on the weight and germination rate of seeds of some okra cultivars and on their protein and oil content in the field. Master's thesis in plant protection (insects) - College of Agriculture, University of Basra.

Kabkaew, L.; Sukontason, N.; Sukontason, B.K. and Wej, C. (2004). Effects of eucalyptol on house fly (Diptera : Muscidae) and blow fly (Diptera: Calliphoridae) Rev. Inst. Med. Trop. S. Paulo., 46(2): 97-101.

Kogan, M. and Ortman, E.F. (1978). Antixenosis – a new term proposed to define Painter's “nonpreference” modality of resistance. Bull. Entomol. Soc. Am. 24: 175–176.

Kumar, S.; Dagnoko, S.; Haougui, A.; Ratnadass, A.; Pasternak, D. and Kouame, C. (2010). Okra (*Abelmoschus* spp.) in West and Central Africa: potential and progress on its improvement. African Journal of Agricultural Research, 5(25): 3590-3598.

Mckinley, N.; Kijima, S. Cook, G. and Sherrod, D. (2002). Avaunt (Lndoxacarb) Anew mode of action insecticide for control of several key orchard pest Dupont crop pyoduction wilmington, DE.

Meister, R.T. (1998). Farm chemicals Handbook 98 meister pubshing company ,Willoughby ,oH. UsA.

Nadu, T. (2017). Antixenosis resistance in okra and their hybrid derivatives against shoot and fruit borer Earias vittella (Fab.) Journal of Entomology and Zoology Studies; 5(4): 1884-1887.

Qasim, A.A. (1999). Diagnostic and environmental study of cutworm species of the order Lepidoptera on tomato crops with reference to their control in Zubair and Svan farms, MSc. College of Agriculture / University of Basra. 109 pages.

Thangavelu, K. (1978). Some aspects of host specificity in the indoian usky cotton bugs, oxcarenuss laetus Kirby (Heteroptera: lygaeidae). J. of Natural History, 12(5): 481-486.

Zubaidi, H.K. (1992). Biological resistance to pests. Mosul University Press, Iraq 440 pages **.**Alzmity, Muhammad Al-Saeed Saleh, 1997. Integrated pest control applications. Dar Al Fajr for publication and distribution. 455 pages.