Plant Archives Vol. 20, Supplement 1, 2020 pp. 2077-2080 **e-ISSN:2581-6063 (online), ISSN:0972-5210**

EVALUATION OF THE RELATIVE EFFICIENCY OF SOME BIOCIDES AGAINST DENSITY OF *AMRASCA BIGUTTALA BIGUTTALA* ISHIDA (HEMIPTERA: JASSIDAE) ON OKRA

Hussein Ali Mutney Al-Anbaki[1*], Liqaa Mohammed Ahmed Shiblawi[2] and Amna Naef Shaker Al–Aloosi[3]

[1*]Department Of Soil Science, College of Agriculture, University of Diyala, Iraq.
[2]Department of Plant Protection, Directorate of Diyala Agriculture, Iraq.
[3]Departmentof Plant Protection, College of Agriculture, University of Tikrit, Iraq.

Abstract

A field study was carried out in Al-Muqdadiya district, Diyala province on 2019 to compare the effect of some Entomo pathogenic Fungi in to control on the Okra leafhopper were identified as, *Amrasca biguttala biguttala* Ishida (Cicadellidae : Homoptera), is it Spinosad (*Saccharopolyspora spinosa*), BSA1 (*Beauveria bassiana*), Mycotal (*Lecanicillium muscarium*) and using chemical insecticide Actara 240SC (Thiamethoxam) at a concentration of 0.4 ml /L against nymphs and adults population Okra leafhopper, The results was showed that superiority of Spinosad treatment in mortality of nymphs of *A. biguttala biguttala* to (63.90%) with significant differences from other treatments followed by mycotal (51.9%), and then BSA1, which amounts to (37.01%). Spinosad was showed high mortality in the adults of *A. biguttala biguttala* to (52.09%) then Mycotal (41%) and BSA1 (30.7%). This study shows that the use of one of these biocides in the field may be sufficient to reduce the numbers of nymphs and adults during the study season.

Key words *:* Thiamethoxam*, Lecanicillium muscarium*, *Beauveria bassiana* ¡ *Amrasca biguttala,* Okra, *Amblemoschus esculentus.*

Introduction

Okra *Amblemoschus esculentus* L. (Moench) is one of the most popular summer crops in Iraq, and is an important source of proteins and vitamins A, B, C, carbohydrates, fats and Iron (Halder *et al.,* 2015). From the start of its cultivation until its harvest, this crop is afflicted with many pests, sometimes reaching more than 70 species (Srinivasa and Rajendran, 2003). One such pest is the cotton glove *Amrasca biguttala biguttala*, one of the perforating insects absorbing the okra crop (Dhandapani *et al.,* 2003). Where okra is considered one of the best families to feed the phases of the insect and lay eggs in its leaves, as nymphs and adults of the insect cause damage to the crop since the emergence of seedlings until the harvest is obtained and it is a phenomenon known about the infection of jasid, which is called phytotoxemia and thus the injury develops until the spots expand and scratch, especially on the leaves and the estimated production losses 40-50% (Bindra and Mahal, 1981). This insect is characterized by rapid jumping and flying. It is active during the spring. The female lays between 16-20 eggs in the veins and edges of the leaves after slitting them with the egg laying machine. After 4-11 days, small (nymphs) larvae are active in feeding. These larvae pass through several larval ages interspersed with cleavage. The nymphs stag takes 7 days in summer and 21 days in winter (Singh *et al.,* 2013). The chemical control method can be considered one of the easiest and least expensive methods that gives direct and quick results in reducing the incidence of insects, and as a result of its extensive uses in recent times and the lack of specificity of most types, which led to the development of the characteristic of pesticide resistance and the emergence of new insect pests that were among the secondary pests and that it is Preferred to use systemic and specialized pesticides (Shelton, *et al.*, 2003). One of the most widely

Author for correspondence : E-mail : humamalanbaki@gmail.com

used fungi in the world to control more than 100 species of insects is the pathogenic insect, especially the fungus *Beauveria bassiana* (Padmaja and Kaur, 2001). This fungus is very prepared for nymph-of Hemiptera and larva of Lepidoptera (Kaaya and Hassan, 2000). Thompson, et al. 1997 reported that Spinosad has a rapid effect on digestion and contact with a broad spectrum of insects through continuous stimulation of the insect's nervous system, leading to death within 1-2 days of treatment.. In Iraq, Saleh *et al.*, (1999) used fungi *B. bassiana*, *V. lecanii* and *Paecilomyces* sp. as biological agents in controlling white fly *Bemessia tabaci* over eggplant, and fungi *V. lecanii* outperformed the nymphs mortality rates after 19 days of treatment. The aim of this study was to evaluate the efficacy of *B. Bassiana* and *L. muscarium* and Spinosad biomass by percentage mortality ratios and their adoption as biocides against cotton Leafhopper *A. biguttala biguttala.*

Materials and Methods

Initialize the field

On 1 April, 2019, an experiment was conducted in Al-Muqdadiya region - Diyala governorate, where the seeds of *Amblemoschus esculentus* (local variety - Petra) were planted after preparing and plowing a one-donum area of land in hole on a 3-meter long grove in an open field, and the distance Between Border and another 75 cm and the distance between plants and another 30 cm (Al-Kafagi and Al- Mukhtar, 1989). irrigation was melt down, and after the plants reached 10 days after the seedlings dawned, spraying of the vegetative system was carried out with the following pesticides was watered, and after the plants reached 10 days after the seedlings dawned, spraying of the vegetative system was carried out with the following pesticides was watered, and after the plants reached 10 days after the seedlings dawned, spraying of the vegetative system was carried out with the following pesticides :

1. (BSA1) *Beauveria bassiana* obtained from the National Center for Organic Agriculture - Ministry of Agriculture, which was loaded with millet seeds and used at a rate of 4 g / liter of water where millet seeds bearing the blackboards were soaked in a sterile glass mug of capacity 1 liter for one hour at room temperature, then millet seeds were separated from the suspension by Perforated of a cloth. The recommended concentration of 1×10^9 spores / ml was calculated by calculating the number of spores for the fungal cell suspension (Hemacytometer) according to the Equation: Number of spores per ml = sum of the number of spores in the four terminal cells x 2500 x 10^6 (Hansen, 2009). Then, to the fungal suspension, add a drop of 20-Tween concentration of 0.01, which is a substance that helps spread the blackboards in the suspension (Al Amery, 2009).
2. The commercial preparation of the fungus *Lecanicillium muscariium* (Mycotal) was used at a rate of 4 g / liter to obtain a concentration of 1 x 10^7 spores / ml, according to the recommendations of the manufacturer produced by the Netherlands company Koppert.
3. Spinosad (*Saccharopolyspora spinosa*), produced by Dow Agro Sciences, was used according to the recommendations at 0.25 ml / l.
4. The chemical pesticide Actara 240SC (Thiamethoxam) produced by Syngenta of France at a concentration of 0.4 ml /L as recommended by the company.
5. The comparison treatment is sprayed with water only.

The number of insects from nymphs and adults in this experiment was estimated using direct counting method, and they were calculated after 3, 5, 10, 14, 21 and 30 days after of the treatment and used the Abbott equation (1925) to estimate the insect population reduction percentage was computed through Abbott formula (Abbott, 1925).:

$$\text{Corrected \%} = \left(1 - \frac{\text{n in T after treatment}}{\text{n in Co after treatment}}\right) \times 100$$

Sample collection

Samples of okra leaves were collected during the crop growth stage until 30 days for the period from 1/5 to 1/6/2019. The samples were taken in the morning by cutting 1 leaves / repeats / at the rate of 3 replicates / treatment and placed in bags of marked polyethylene (all leaves Separately and according to the parameters), then the samples were transferred to the laboratory and examined by a magnifying glass or the use of optical microscopy when needed, and after placing the samples in the refrigerator for 1-2 hours to inhibit the movement of insects.

Statistical analysis

The global field experiment was carried out according to the design of the complete randomized sectors (RCBD) in the field, and the comparison of results using the test of the least significant difference (L.S.D) and under the probability level of 0.05 and used the ready program (2001) SAS for statistical data analysis and by computer.

Results and discussion

The effect of spraying some biocides in nymph of leafhopper *A. biguttala biguttala* on okra in the field

Results of Table 1 indicate that spinosad treatment exceeded five days after spraying over other biocides, as the mortality reached 77.11%, This is followed by the treatment of L. *muscarium* (Mycotal) of 50.33% and then the *B. Bassiana* isolate (BSA1) of 40%. in figure (1) Also to record the lowest number of *A. biguttala biguttala* nymphs for Spinosad treatment after 14 days of spraying, where the average number of them reached to less than 1 nymph / leaf, which recorded a mortality of 90.18%, The same applies to general rates, and through table 1, we note that the treatment of Spinosad in the percentage of homicide percentage exceeds the rest of the biological transactions, which is 44.76%, and this may be due to its effectiveness in the method of joint influence on the processes of digestion (Stomach) and by contacting, as it works.

Table 1: Efficacy of some biocides against of nymphs *A. biguttala biguttala* on okra in the field.

Treatment	% relative efficiency of transactions after spraying / days						
	3	5	10	14	21	30	Rate
B. bassiana (BSA1)	33.33	40.00	60.00	71.43	17.33	0.00	37.01
Spinosad	44.7	77.11	42.67	88.77	90.18	40.00	63.90
Mycotal	33.33	50.33	62.43	68.11	45.77	52.00	51.9
Actara	84.11	80.33	78.9	65.00	63.90	51.00	70.54
0.05 L.S.D.	2.509	5.42	6.55	3.2	2.9	5.1	2.1

To stimulate the nervous system of the insect treated and lead to loss of control of the muscles and continuous stimulation of nerves leads to insect death within 1-2 days (Thompson *et al.,* 1997), It affects the neurotransmitter receptors on the chemical carrier G-amino butric acid (GABA) and is similar in the mechanism of toxic effect of chemical pesticides from the neonicotimaide group (Salado, 1997, 1998). This biocides has been tried on many insect pests and has given satisfactory results on many field crops and fruit trees, especially sucking insects such as cotton (Banerjee *et al.,* 2000) and onion thrips (Al-Anbaki, 2012). The use of biocides is a non-chemical method that also helps in maintaining vital enemies, especially predators and parasites in the fields.

Immaraju *et al*., (1992) stated that the best way to use Spinosad is to spray it on the vegetative system, especially with absorbent insects. this safe for the environment, mammals, birds and fish, and has recommended its use on more than 100 crops, including apples, almonds, citrus and vegetables.

The effect of spraying some biocides in adult of leafhopper *A. biguttala biguttala* on okra in the field

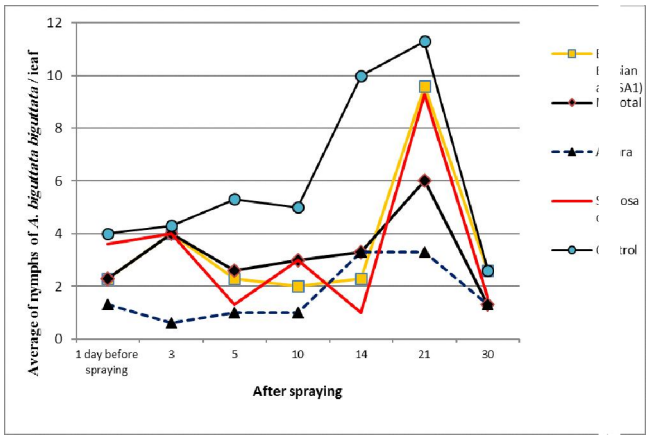

Fig.1: Average Numbers of nymphs of leafhopper *A. biguttala biguttala* /leaf before and after spraying on okra in the field.

The results of table 2 indicate, through the general rates of the efficacy values of the treatments, after 30 days of spraying, Spinosad treatment exceeds the rest of the other biological treatments by registering of 52.09%, followed by the treatment of the *L. muscarium* (Mycotal) of 41%, and then the treatment of *B. bassiana* (BSA1) of 30.7%, It is also clear from the table 2 that the same values for the treatment of Spinosad and the *L. muscarium* (Mycotal) are 41% after 14 days of spraying, but after 21 days of spraying, we notice that the Spinosad treatment is superior to other biological treatments. As shown in Fig. 2, also, the lowest population density was recorded for *A. biguttala biguttala* in the treatment of Spinosad, where the number of its preparation reached less than 3 adults / leaves, which recorded a mortality of adults 62.33%. This is in line with what he mentioned (Al-Anbaki, 2012) when sprayed on the onion vegetative variety of grano texas to combat onion *Thrips tabaci* in open field conditions.

It has been shown from the above that one sprinkle on the vegetative group of the Spinosad and the *L. muscarium* (Mycotal) during the planting season may be sufficient to reduce the lesion population density by half, compared to one sprinkle of the chemical pesticide Actara 240SC (Thiamethoxam) where the percentages of murder of nymphs and adults reached 70.54% and 58.58%, respectively. There is no doubt that the use of biocides in combating agricultural pests is of high value in the safety factor and the non-pollution of agricultural crops. The use of *Licanecillium muscarium* in open fields is also very safe for human health (Deacan, 1983).

However, one of its basic requirements for germination of spores of fungi is the availability of

Table 2: Efficacy of some biocides against of adults *A. biguttala biguttala* on okra in the field.

Treatment	% relative efficiency of transactions after spraying / days						
	2	5	10	14	21	30	Rate
B. bassiana (BSA1)	33.44	41.08	38.11	22.00	6.00	43.77	30.7
Spinosad	37.11	38.9	68.11	41.00	62.33	65.09	52.09
Mycotal	34.15	35.66	56.09	41.00	29.11	50.00	41.00
Actara	77.11	68.45	45.08	64.33	52.77	43.77	58.58
0.05 L.S.D.	3.33	4.37	2.9	3.5	3.31	4.15	3.1

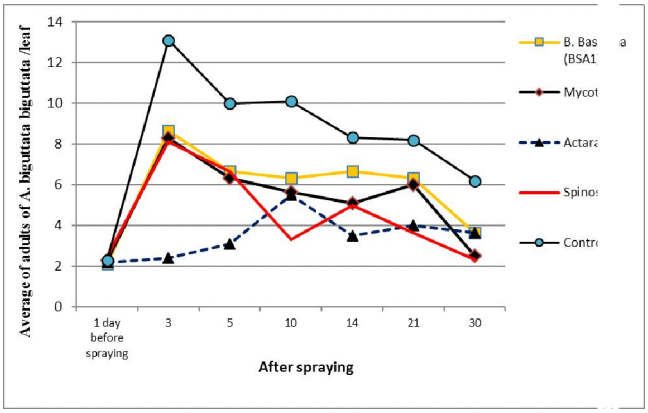

Fig. 2: Average Numbers of adults of leafhopper *A. biguttala biguttala* /leaf before and after spraying on okra in the field.

sufficient moisture, as the external environment must be saturated with them, while the opposite occurs for some other fungi, as spores are germinated at low levels of moisture, whether it is on the soil surface or on the body of the insect, especially when the cuticle is of low solidity. As in unfinished roles, and *V. lecanii* produces fungal toxins (depsipeptide bassianilide) which was first diagnosed in *B. bassiana* whose secreting enzymes contribute to the decomposition of host tissue such as Lipase and Proteinase as well as the chitinase enzyme for chitinase in the wall of the insect's body (Lacey, 1997).

Reference

Abbott, W.S. (1925). A method of computing the effectiveness of an insecticide. *Jou. Econ. Entomol.*, **18 :** 265 – 267.

Al Amery, S.A. (2009). Determination of variance resource and mechanism of 22 pathogenisity for some *Beauveria bassiana* isolates and evaluation their efficiency in control corn stem borer *Sesamia cretica* under field condition. Ph. University of Baghdad- College of Agriculture, 89.

Al-Anbaki, H.A.M. (2012). Population density, and the efficacy of some integrated control elements for onion thrips, *Thrips tabaci* Lindeman (Thysanoptera: Thripidae) on onions. Master Thesis,University of Baghdad / College Of Agriculture : 108 pp. Al-Kafafaji, M. and AL- Mukhtar, F. (1989). Fruits and vegetables production, *Ministry of Higher education*, 468.

Banerjee, S.K., Turkar and R. Wanjari (2000). Evaluation of newer insecticides for the control of bollworms in cotton. *Pestology*, **24:** 14-6.

Bindra, O.S. and M.S. Mahal (1981). Varietal resistance in eggplant (brinjal) (*Solanum melongena*) to the cotton jassid (*Amrasca biguttula biguttula*). *Phytoparasitica,* **9:** 119–31.

Deacan, J.W. (1983). Microbial control of pests use of fungi. *Microbial control of Plant pests diseases.* (VNB) U. K., 31- 41.

Dhandapani, N., U.R. Shelkar and M. Murugan (2003). Bio-intensive pest management (BIPM) in major vegetable crops: an Indian perspective. *Food Agriculture and Environment,* **2:** 333–9.

Halder, J., S.K. Sanwal, A.K. Rai, A.B. Rai, B. Singh and B.K. Singh (2015). Role of physico-morphic and biochemical characters of different Okra genotypes in relation to population of okra shoot and fruit borer, *Earias vittella* Fabricius (Noctuidae: Lepidoptera). *Indian Journal of Agricultural Sciences,* **85(2):** 278–82.

Hansen, P.J. (2009). Use of a hemacytometer.University of florida. www.animal.ufl.edu/hansen/protocols/ hemacytometer.hum.

Immaraju, J.A., T.D. Paine, J.A. Bethke, K.L. Robb and J.P.N Ewman (1992). Western flower thrips (Thysanoptera: Thripidae) resistance to insecticides in coastal California greenhouses. *Jour. Econ. Entomol.*, **85:** 9-14.

Kaaya, G.P. and S. Hassan (2000). Entomogenous fungi as promising biopesticides for Stick control. *Experimental and Applied Acarology,* **24:** 913–926.

Lacey, L.A. (1997). Manual of Techniques in Insect Pathology. Academic Press, New York. USA., 409.

Padmaja,V. and G. Kaur (2001). Use of the fungus *Beauveria bassiana* (Bals).Vuill (Moniliales:Deuteromycetes) for controlling termites. *Jour. Current Sci.*, **18(6):** 645-647.

Salgado, V. (1997). The mode of action of spinosad and other insect control products. *Down to Earth*, **52:** 35-44.

Salgado, V. (1998). Studies on the mode of action of spinosad: insect symptoms and physiological correlates. Pestic. *Biochem. Physiol.*, **60:** 91-102.

SAS, (2001). SAS/STAT. User's Guide fore personal computers. Release6.12 SAS Institute Inc., Cary. NC, U.S.A.

Shelton, A.M., B.A. Nault, J. Plate and J. A. Zhao (2003). Regional and temporal variation in susceptibility to lambda-cyhalotrin in onion thrips, *Thrips tabaci* (Thysanoptera:Thripidae), in onion fields in New York. *Journal of Economic Entomology,* **96:**1843 –1848.

Singh, Y., A. Jha, S. Verma, V.K. Mishra and S.S. Singh (2013). Population dynamics of sucking pests and its natural enemies on okra. *Journal of Agricultural Research,* **8**: 3814-3819.

Srinivasa, R. and R. Rajendran (2003). Joint action potential of neem with other plant extracts against the leafhopper *Amrasca devastance* (Distant) in okra. *Pest manage.Economic Zoology* **10:**131-136.

Thompson, G.K. Michel and R. Yao (1997). The discovery of *Saccharopolyspora spinosa* and a new class of insect control products. *Own to Earth*; **52**: 1-5.