



# Evaluating Some Insecticides for Controlling the Sunn Pest *Eurygaster Spp. Puton (Hemiptera: Scutelleridae)* Under Field Conditions



Mohammed Z Khalaf<sup>1</sup>, Hussain F Alrubeai<sup>1</sup> and Ali A Sultan<sup>2</sup>

<sup>1</sup>Integrated Pest Control Research Center, Directorate of Agricultural Research, Iraq

<sup>2</sup>Directorate of Plant Protection, Ministry of Agriculture, Iraq

\*Corresponding author: Mohammed Z Khalaf, Integrated Pest Control Research Center, Directorate of Agricultural Research, Iraq

Submission: 📅 September 13, 2017; Published: 📅 February 23, 2018

## Abstract

The Sunn pest *Eurygaster integriceps* is the most insect of cereals in Iraq and other countries. Field efficacies of ten different kinds of insecticides with various mode of action were evaluated against Sunn pest *Eurygaster integriceps* infested wheat on field at middle of Iraq. Experiments were conducted in eleventh wheat fields each measuring 1/2 ha located in the Middle of Iraq (Wasit and Salahudain governorates) at season 2015, contained common varieties of wheat planting in Iraq. The population density of the pest was at its highest level (start of April 2015) of mostly nymphs, adults and eggs. The results indicated that the recommended dose for each insecticides used showed high efficacy (80.1-93.8) in reducing numbers of *E. integriceps* adults after one week of treatment, reaching 0.2-0.8 insect per 1m<sup>2</sup> compared to 3.6 per 1m<sup>2</sup> in the control treatment. These results will assist the control program of this pest and in implementing pest management practices to reduce resistance development chances.

**Keywords:** Efficacy; Insecticides; Sunn pest; *Eurygaster spp*; Wheat

## Introduction

The Sunn pest *Eurygaster integriceps* Puton (*Hemiptera: Scutelleridae*) is the one of the most important pests of wheat and barley in West and Central Asia, including Iran, Turkey, Iraq and in the Eastern Europe [1,2]. *E. integriceps* attacks and feeds on both the vegetative stages of the plant and maturing grain [3]. Have pointed the transmission of toxic enzymes into the maturing grain can reduce the milling quality, rendering the flour useless for human consumption [2,4], feeding on vegetative stages can cause withering and dead hearts, leading to a reducing in yield. Turkish governments have conducted sunn pest management program, mainly based on chemical control since 1927 [5,6] evaluated six insecticides for control overwintered adults of sunn pest under field conditions in Turkey.

Mermithid nematode, *Hexameris eurygasterin* sp. used as a biological control agent in an integrated control program of the sunn pest in Turkey [7]. Turkish government has been changing sunn pest overwintered adults control policy by wheat growers after shifting from aerial areal to ground application. Therefore, control application made according to the plant protection technical guidelines would improve effect the struggles to reduce the economic losses in wheat production and developing control application [8,9] used the entomopathogenic fungus *Beauveria*

*bassiana* an oil-based formulation to control sunn pest *E. integriceps* in wheat field. The present investigation was conducted to evaluate field efficacies of some insecticides of different mode of action to be used in the control campaign of the sunn pest *Eurygaster spp*.

## Materials and Methods

Experiments were conducted in eleventh wheat fields each measuring 1/2 ha located in the Middle of Iraq (Wasit and Salahudain governorates) at season 2015, contained common varieties of wheat planting in Iraq. The population density of the pest was at its highest level (start of April 2015) of mostly nymphs, adults and eggs. Ten insecticides with different mode of action were used to spray the wheat fields with doses as it shown in (Table 1) [10]. Selecting more than one brand of Alphacypermethrin was due to the registration of all these brands by the national committee for pesticides registration and approval and to compare between products of the same active ingredient.

Each treatment contains three replicates (=1000 m<sup>2</sup>). Numbers of nymphs and adults *Eurygaster spp*. present per 1m<sup>2</sup> were counted carefully directly on the wheat plants of ten m<sup>2</sup> Choose randomly per each replicate before and after treatments with one, three and seven days (one week) taken from different parts of plant. Two Sprayer of 100 L EC and 2 L ULV Guarany was used for whole

replicates from up to down to insure exposing the pest individuals to the insecticides tested. Complete randomized block design was used in conducting all experiments. Genstat program and LSD (0.05 level) were implied in statistical analysis and determine the

## Results and Discussion

**Table 1:** Tested insecticides used in the experiments of measuring their efficacies on Sunn pest *Eurygaster integriceps*.

Insecticide Brand Name	Company	Recommended Concentration	Mode of Action according to IRAC 2016 [10]	Active ingredients and concentration	Chemical sub-group
Desis	Bayer	75 mL /100 L	Sodium channel modulators	Deltamethrin 2.5 g/L EC	3A, Pyrethroid
Megaalpha	Meghamani	30 mL/ 100 L	Sodium channel modulators	Alphacypermethrin 10% EC	3A
Alphasin	Sineria	30-40 mL/ 100 L	Sodium channel modulators	Alphacypermethrin 10% EC	3A
Levo	Seneria	4 L/ha. ULV	Uncertain mode of action Unknown	Oxymatrin	UN,Plant Extract
Flash	Tagros	35-40 mL/ 100 L	Sodium channel modulators	Alphacypermethrin 10%EC	3A
Matrixin plus	Russell IPM	60 mL/ 100 L	Glutamate-gated chloride channel allosteric modulators	Abamactein+Oxymatrin And UN, plant extract	6
Golan	Seneria	75-100mL/100 L	Nicotinic acetylcholine receptor (nAChR) allosteric modulators	Acitamidrid 20 SL	4A, Neonicotinoids
Talstar	FMC, USA	100-150 mL/100 L	Sodium channel modulators	Bifenthrin 10% EC	3A
Bestoy	FMC, USA	150-200 mL/100 L	Sodium channel modulators	Alphacypermethrin 10% EC	3A
Best Seller	FMC, USA	100-150 mL /100 L	Sodium channel modulators	Alphacypermethrin 5% EC	3A

The results showed that recommended doses of the tested insecticides as in (Table 1) gave high efficacies in reduction of field adults and nymphs numbers of *E. integriceps* on wheat plants. Results in (Table 2) indicate the significant reduction in the average number of nymph and, adults per 1m<sup>2</sup> (0.3-1.6) individuals after three days of treatment in comparison with 3.4 individuals in the

**Table 2:** Field efficacies of some insecticides in controlling sunn pest *Eurygaster integriceps* in wheat fields. LSD at 0.05= 5.1420, L= low dose, H= high dose.

Treatment	Average insect no. sunn pest per 1m <sup>2</sup>									
	Before treatment	After one day after			After three days			After one week		
	Insect	Insect	% Mortality	% Efficacy	Insect	% Mortality	% Efficacy	Insect	% Mortality	% Efficacy
Control	3.6	3.4	---	---	3.4	---	---	3.6 a	---	---
Desis	3.2	0.6	81.3	80.2	0.4	87.5	86.8	0.2	93.8	93.8
Megaalpha	2.6	0.8	85.7	84.7	0.3	87.3	85.9	0.41	84.1	83.2
Alphasin, (L)	3.8	0.8	78.9	77.7	0.6	84.2	83.3	0.7	81.5	81.6
Alphasin,( H)	3.6	0.6	83.3	82.3	0.4	88.9	88.2	0.5	86.1	86.1
Control/ULV	18.3	---	---	---	19	---	---	20	---	---
Levo/ ULV	17.3	--	--	--	1	94.2	94.4	0.3	98.3	98.4
Flash, L	3.1	0.6	80.6	79.5	0.4	87.1	86.3	0.3	90.3	90.3

Flash, H	3.6	0.6	83.3	82.4	0.45	87.5	86.7	0.3	90.7	91.7
Matrxin plus	5.0	1.1	77.3	76.0	0.98	81.3	80.0	0.8	84.0	83.1
Golan	5.1	0.9	82.4	81.3	0.5	90.2	89.6	0.3	94.1	94.1
Talstar, L	4.1	1.7	59.5	57.1	1.6	65.1	64.2	0.5	87.2	86.0
Talstar, H	2.6	0.8	68.3	76.0	0.6	77.7	76.5	0.2	92.0	89.8
Bestoy, L	3.5	0.5	84.2	82.6	0.4	87.4	86.5	0.5	83.0	81.3
Bestoyl, H	3.2	1.05	67.2	66.0	0.4	78.1	77.5	0.3	89.7	89.0
Bestseller, L	3.7	0.9	74.3	72.7	0.4	89.2	88.5	0.35	90.5	89.2
Bestseller,H	4.8	0.9	80.3	78.7	0.5	89.4	88.5	0.3	90.9	90.0

Insecticides efficacies after one week of treatment ranged between 81.3% for Matrxin plus (Abamactein+Oxymatrin) as Glutamate-gated chloride channel allosteric modulators and 98.4% for Levo ULV (a.i.Oxymatrin, is one of many quinolizidine alkaloid compounds extracted from the root of *Sophora flavescens*, a Chinese herb) [12]. Indicated that using insecticides with acetamiprid (SL, Soluble concentrate), chlorpyrifosethyl (EC, Suspension concentrate), lambda-cyhalothrin (CS, capsu Sodium channel modulators le suspension), monocrotophos (SC, Suspension concentrate), thiacloprid (SC) and zeta-cypermethrin (EC) as active ingredient gave high efficacies in controlling *E. integriceps* adults and reduced subsequent egg laying and the appearance of nymphs in the trial area in Turkey. The low mortality rate compared to the rate (93.8%) obtained during recent investigation could be attributed to the differences of the source and dose rate, in addition to the difficulty of counted adults. The results of treatment of nymphs and adults indicated that spraying with the recommended doses of the tested insecticides (Levo, Golan, Desis, Flash, Telstar, Bestoy and Bestseller) showed high efficacies in nymphs and adults mortality.

The results in (Table 2) showed high effect on nymphs and adults after one week of treatment ranged from 81.3-94.1% for bestoy (Alphacypermethrin as sodium channel modulators) and Golan (Acitamiprid as Nicotinic acetylcholine receptor (nAChR) allosteric modulators) respectively. 86.1%-89.1% for Alphasin (Alphacypermethrin, 10% EC) Sodium channel modulators, Talstar (Bifenthrin 10% EC) Sodium channel modulators and Matrxin (Abamactein+Oxymatrin) Glutamate-gated chloride channel allosteric.

The result also showed that insecticide flash (35 and 40 ml/100 ml) have the highest efficacy between brands with Alphacypermethrin as active ingredient.

In addition using ULV formula (levo, i.e. oxymatrin) gave the highest efficacy (98.4%) after one week of treatment in controlling sunn pest individuals. Therefore we recommend that application of insecticide must be timed correctly, targeting the most vulnerable life stage of the insect pest and mixing and applying insecticides carefully. In addition a key element of effective resistance management is the use of alternation, rotations, or sequences of different insecticide mode of action classes. It is important to

avoid selecting for resistance or cross resistance by repeated use within the crop cycle, or year after year, of the same insecticide or related products in the same mode of action class, but over-use of pesticides in sunn pest its effect on the environment, reduction of the beneficial fauna, costly human health and environment safety [2].

## References

- Babaroglu N, Kocak E (2006) Evaluating insecticides for control of overwintered adults of *Eurygaster integriceps* under field conditions in Turkey. *Phytoparasitica* 34(5): 510-515.
- Critchley BR (1998) Literature reviews of sunn pest *Eurygaster* spp. Put. (Hemiptera: Scutelleridae). *Crop Protection* 17(4): 271-287.
- Edgington S, Moore D, Elbouhssini M, Sayyadi Z (2007) *Beauveria bassiana* for control of sunn pest, *Eurygaster integriceps* (Hemiptera: Scutelleridae) and aspects of the insect's daily activity relevant to a mycoinsecticide. *Biocontrol Science and Technology* 17(1-2): 63-79.
- El Bouhssini M, Canhilal R, Aw Hassan A (2002) Integrated management of Sunn pest: a safe alternative to chemical control. Access.
- Gul A, Akbay C, Direk M (2006) Sunn pest control policies and effect pest damage on wheat quality and production in Turkey. *Springer* 40(3): 469-480.
- Hariri G, Williams PC, El Haremei FJ (2000) Influence of pentatomid insect on the physical dough properties and two layered flat bread baking quality of Syrian wheat. *J of Cereal Science* 31: 111-118.
- Henderson CF, Tilton EW (1955) Tests with acaricides against the brow wheat mite. *J Econ Entomol* 48: 157-161.
- (2016) IRAC (Insecticide Resistance Action Committee) IRAC mode of action classification scheme, Version 8.1. Prepared by: International MoA Working group.
- Kocak E, Babaroglu N (2006) Evaluating insecticides for the control of overwintered adults of *Eurygaster integriceps* under field conditions in Turkey. *Phytoparasitica* 34(5): 510-515.
- Mutlu C, Duman M, Karaca V, Bayram Y, Siray E, et al. (2016) A case study of consciousness level of farmers in control of overwintering adults sunn pest: Southeast Anotolia Region. *Turk J Agric and Natural Sci* 3(4): 280-287.
- Moore D (1998) Control of Sunn pests, particularly *Eurygaster integriceps* put (Hemiptera: Scutelleride): The role of mycoinsecticides in management schemes. *Proceedings of the First Work Shop of Integrated Sunn Pest Control* 6-9.
- Tarla G, Poinar G, Tarla S (2011) *Hexameris eurygasteri* n. sp. (Nematoda: Mermithidae) the sunn pest *Eurygaster integriceps* Puton (Hemiptera: Scutelleridae) in Turkey. *Syst Parasitol* 79(3): 195-200.



Creative Commons Attribution 4.0  
International License

For possible submission use the below is the URL

[Submit Article](#)

**Your subsequent submission with Crimson Publishers  
will attain the below benefits**

- High-level peer review and editorial services
- Freely accessible online immediately upon publication
- Authors retain the copyright to their work
- Licensing it under a Creative Commons license
- Visibility through different online platforms
- Global attainment for your research
- Article availability in different formats (**Pdf, E-pub, Full Text**)
- Endless customer service
- Reasonable Membership services
- Reprints availability upon request
- One step article tracking system