



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



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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 1m² compared to 3.6 per 1m² 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 m²). Numbers of nymphs and adults *Eurygaster spp*. present per 1m² were counted carefully directly on the wheat plants of ten m² 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 1m² (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 ²									
	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].

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