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

Mohammed Z Khalaf¹, Hussain F Alrubai² and Ali A Sultan²

¹Integrated Pest Control Research Center, Directorate of Agricultural Research, Iraq
²Directorate of Plant Protection, Ministry of Agriculture, Iraq

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

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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 1 m² compared to 3.6 per 1 m² 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, *Hexamermis 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 the efforts 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 significances between insecticides efficacies. Henderson-Tiltons formula [11] was used to calculate corrected insecticides efficacies % on nymphs and adults Eurygaster spp.

**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                   | Sineria | 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                  | Sineria | 75-100 mL/100 L           | Nicotinic acetylcholine receptor (nAChR) allosteric modulators | Acitamiprid 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 control of EC treatment. The reduction in number of live adults after one week of treatment reached 0.2-0.8 nymph or adults per 1m² and 3.6 in the control treatment. Significant differences were found between results of some tested insecticides and that of the controls and for all periods.

**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 1m² | Before treatment | After one day after | After three days | After one week |
|-----------|-------------------------------------|------------------|--------------------|-----------------|---------------|
|           | 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        |
| Megalalpha| 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        |
Insecticides efficacies after one week of treatment ranged between 81.3% for Matrixin plus (Abamactein+Oxymatrixin) 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 basiana for control of sunn pest, Eurygaster integriceps (Hemiptera: Scutelleridae) and aspects of the insects daily activity relevant to a mycoinsecticide. Biocontrol Science and Technology 17(1-2): 63-79.

4. El Bouhssini M, Canhila R, Aw Hassan A (2002) Integrated management of Sunn pest: a safe alternative to chemical control. Access.

5. Gal 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.

6. Hariri G, Williams PC, El Harmeen 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.

7. Henderson CF, Tilton BW (1955) Tests with acaricides against the brown wheat mite. J Econ Entomol 48: 157-161.

8. (2016) IRAC (Insecticide Resistance Action Committee) IRAC mode of action classification scheme, Version 8.1. Prepared by: International MoA Working group.

9. 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.

10. Moore D (1998) Control of Sunn pests, particularly Eurygaster integriceps put (Hemiptera: Scutelleridae): The role of mycoinsecticides in management schemes. Proceedings of the First Work Shop of Integrated Sunn Pest Control 6-9.

11. Tarla G, Poinar G, Tarla S (2011) Hexameris eurygasteri n. sp. (Nematoda: Mermitididae) the sunn pest Eurygaster integriceps Puton (Hemiptera: Scutelleridae) in Turkey. Syst Parasitol 79(3): 195-200.
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