

TOXICITY OF DELTAMETHRIN AND BIOSAL® AGAINST *EYSARCORIS MODESTUS* (DISTANT) BY FILTER PAPER IMPREGNATION METHOD

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Abstract

Deltamethrin (DM) And Biosal were tested against *Eysarcoris modestus* by Filter Paper impregnation method (FIM) at different concentrations. The effects of different concentrations & on mortality were observed after 48 and 96 HAT (hours after treatment). The results suggested that deltamethrin is more effective pesticide than neem pesticide. Percent mortality at 48 and 96 HAT of the pesticides was found to be 18 and 19% in deltamethrin and 7 and 8% in biosal, respectively at of 2.0% respectively.

Introduction

Eysarcoris modestus is found in different areas of Pakistan on *Oscimum spp.* Abbasi (1974), Ahmad (1979) and Cheema *et al.*, (1973) the genus *Eysarcoris* also recorded from graminaceous plants & damages our crops field. According to (FAO) 5 – 10% of grain is lost between harvest and consumption. The species *Eysarcoris modestus* badly damage the vegetables i.e. *Solanum melongena*, *Hibiscus esculantus* and fodder crops. The World scientists has worked out for the establishment of plant pesticides usually called phytopesticides, botanical pesticides, natural pesticides or biopesticides (Ravikant *et al.*, 2007; El-Nahal *et al.*, 1994; Ermel *et al.*, 1991). Different types of insecticides are used to control the insect pests and stored commodities from insect infestation. Horowitz and Ishaya (2004) there is a growing use of phytopesticides or botanicals to reduce health risks. According to Menash *et al.*, (1979) the regular misuse of pesticides leads the problem of undesirable residues. Uvah and Ishaya (1992) worked out the effect of some vegetable oils on bean weevil *Callosobruchus maculatus* (F.) and pesticides showed resistance (Parker *et al.*, 2006).

In this study biosal used as a phytopesticide. Azadiractin is the active ingredient of biosal which is extracted from neem. Jayakumar (2010) described the oviposition deterrence on cowpea *Vigna unguilata* (L.) against *C. maculatus* using phytopesticide. The synthetic Pesticides are hazardous. According to Naqvi *et al.*, (1996) there is trend to use phytopesticides for pest control. Different Pyrethroids groups play an important role in Pest control. Deltamethrin is a non cumulative insecticide and act as a fast neurotoxic agent and easily available in Pakistan (Arif *et al.*, 2012). Deltamethrin (Pyrethroid) used as a synthetic pesticide in this work. Kaur *et al.*, (1998) *Chrysanthemum indicum* is the growth inhibitor of *Dysdercus similes*. Don Pedro (1989) reported the effect of fixed vegetable oils on oviposition and adult mortality of *Callosobruchus maculatus* (F) on cowpea.

Materials and Methods

Experiment: The insects, *Eysarcoris modestus*, were collected from the field of Murad Memon Goth Malir Karachi from *Oscimum spp* with the help of insect net, aspirator and picking method, then released on *Oscimum* plants in the backyard of Zoology Department of FUUAST. The suitable number of insects was brought to laboratory, Zoology Department for experiment and supplied with natural diet. In this experiment Filter paper Impregnation Method was used for the determination of toxicity of five concentrations of deltamethrin and biosal (0.00078%, 0.0312%, 0.125%, 0.5% and 2.0%) prepared from 1.5 % stock solution.

In this method filter paper is used in 9cm petri dishes and suitable doses were applied on each filter paper with the help of pipette then 10 pairs of adult *Eysarcoris modestus* kept in each petri dishes with the supply of natural diet, at 30± 2 °C and 75± 5 relative humidity for the observations of percent mortality, arranged three replicates for each concentrations and this experiment conducted for 48 and 96 HAT separately. All petri dishes were washed dried and sterilized. Toxicity of Deltamethrin and Biosal was determined in 5 sets of 9cm petri dishes by applying prepared concentrations pesticide impregnated in filter papers. The mortalities were corrected with formula given below (Tatters field and Morris, 1924; Abbot, 1925)

$$\text{Corrected mortality: } \frac{\text{observed mortality} - \text{control mortality}}{100 - \text{control mortality}} \times 100$$

Results

The results of both treated insecticides Deltanor, 15 EC (deltamethrin) and Biosal (neem pesticide) against *Eysarcoris modestus* were mentioned in tables 1 and 2.

The effects of different concentrations i.e. 2.0%, 0.5%, 0.125%, 0.0312% and 0.00078% at 48 and 96 HAT of biosal and deltamethrin insecticides showed that, the time duration for both used insecticides are very valuable with the same applied concentrations. The results also indicated that neem pesticide (Biosal) have low toxicity as compared to deltamethrin after 48 and 96 HAT against *Eysarcoris modestus*. The highest toxicity effects of deltamethrin at concentration, ranging (0.00078 – 2.0%) i.e. 5 – 18 % and 6 – 19 % mortality were observed at 48 and 96 HAT respectively (Table: 1). The insecticide biosal at concentrations, ranging (0.0312 – 2.0%) indicated percent mortality i.e. 0.6 % - 7 % and 1 – 8 % at 48 and 96 HAT respectively and no mortality was observed at 0.00078% concentration (Table: 2). It means that if we increase the time duration of applied pesticides, it may increase the mortality rate with the same concentration. So in this case deltamethrin is more toxic and have high mortality rate than biosal against *Eysarcoris modestus* at same concentration and time duration.

Discussion

The present study based on the findings of high mortality rate with the use of low concentration of deltamethrin and biosal after 48 and 96 hours. Reddy and Singh (1998) worked out on neem oil toxicity against Pulse beetle *Callosobruchus maculatus* (Fab) (Coleopteran: Bruchidae). Olotuah *et al.*, (2007) used four botanicals powder in the prevention of *Callosobruchus maculatus* (Fab) (Coleopteran: Bruchidae) and *Sitophilus zeamais* (most) (Coleopteran: Curculionidae). It has been studied that azadirachtin have insecticidal effect against different aphid species in the laboratory (Monterio *et al.*, 2004). Tahir and Anwar (2012) reported insecticidal activity of neem oil and synthetic insecticides against stored grain Pest.

The species *Eysarcoris modestus* generally found on *Oscimum spp* near the crops field and were tested in the laboratory. Naem *et al.*, (2012) observed during laboratory study, the comparative effect of neem oil and insecticides on *Trichogramma chilonis* (Ishii). Like other pesticidal effects on different pests, this study also stream line observation of biosal and synthetic pyrethroid (deltamethrin) against *Eysarcoris modestus*. Naz *et al.*, (2013) worked on effect of some Pesticides against different pests. Arif *et al.*, (2013) studied on insecticidal activity of pyrethroid phytopesticides on Pulse beetle.

Table 1. Toxicity of Deltamethrin against adults of *Eysarcoris modestus* after 48 and 96 hours of treatment by filter paper impregnation method.

S.No	Hrs.	Concentration of Deltamethrin				
		0.00078%	0.0312%	0.125%	0.5%	2.0%
1	48	5.3±1.5	5.6±0.6	10.0±1	16.6±2.4	18.3±1.5
2	96	6.6±0.6	9.6±1.2	16.0±1	18.6±0.8	19.6±0.8

Table: 2-Toxicity of Biosal® against adults of *Eysarcoris modestus* after 48 and 96 hours of treatment by filter paper impregnation method.

S.No	Hrs.	Concentration of Biosal				
		0.00078%	0.0312%	0.125%	0.5%	2.0%
1	48	0.0	0.6±1.1	1.6±1.5	4.3±0.5	7.0±1
2	96	0.0	1.6±1.5	2.0±1	3.3±0.6	8.6±1.5

References

- Abbasi, Q. A. (1974) Morpho-taxonomic studies on the family pentatomidae Leach (Pentatomorpha: Heteroptera) of Pakistan with reference to phylogeny. Ph. D. thesis, Department of Zoology, University of Karachi.
- Abbot, W. S. (1925). A method of computing the effectiveness of an insecticide. *J. Econ. Entomol.* 18: 265-267.
- Ahmad, I., (1979). A revision of the check – list of Coreidae and Pentatomidae of the superfamilies Coreidea and Pentatomidea (Heteroptera: Pentatomomorpha) from Pakistan with phylogenetic considerations. *Kar. ent. soc. suppl.* 4 (1): 1-113.

- Arif. S., Ahmad. V., Naqvi. S.N.H. and Tariq. R.M. (2013) Insecticidal activity of phytopesticides as compared to pyrethroid by direct application method on pulse beetle *Callosobruchus analis* (Fabricias, 1781). *Int. J. Biol., Biotech.*, 10(3): 439–440.
- Arif. S., Ahmad.V., Naqvi. S. N. H., Tariq. R. M., Faheem. Y. M., Imran. A., (2012) Effect of Acorus calamus, Biosal® and Deltamethrin on fecundity of *Callosobruchus analis*. *FUUAST J. Biol*, 2(1): 131-133.
- Cheema, M. A., Irshad, M., Murtaza. M. & Ghani, M. A. (1973). Pentatomids associated with Gramineae and their natural enemies in Pakistan. *Comm. Inst. Biol. cont. Tech. Bull.* 16: 47 – 67.
- Don Pedro K. N (1989) Effect of Fixed vegetable oils on oviposition and adults mortality of *Callosobruchus maculatus* (F.) on cowpea, *Interest pest control.*, 31 – 34.
- El-Nahal, A. K. M., Schmidt, G.H and Risha, E. M. (1994). Influence of vapours of *Acorus calamus* L. oil on the reproductivity of stored products Coleoptera. *Pak. J. Entomol. Karachi* 9 (1): 21-27.
- Ermel, K., Kalinowski, H. O. and Schmuiterer, H. (1991). Isolation and characterization of marrangin, a new insect growth regulating (IGR) substance from seed kernels of the marrayngo tree, *Azadirachta excelsal* (jack). *J. Appl. Entomol.* 112 (5): 512-519.
- Horowitz, A. R., and Ishaaya, I. (2004). *Insect pest management: field and protected crop*. Springer – Verlag. 344 pp.
- Jayakumar, M. (2010). Oviposition deterrent and adult emergence activities of some plants aqueous extract against *Callosobruchus maculatus* F. (Coleoptera: Bruchidae). *Journal of Biopesticides*. 3(1): 325-329.
- Kaur, A., Thakur, S. S. and Sabita-Raja, S. (1998). *Crysanthemum indicum* an effective growth and development inhibitor of *Dysdercus similis*. *J. Environ. Biol.*, 10 (4): 373 – 377.
- Menash, G. W. K., Waters, F. L. and Webster, G. R. N. (1979). Insecticide residues in Kiled fractions of dry or tough wheat treated eithmalthion, bromophiodofenphos and primiphos methyl. *J. Entomol.* 72: 728 – 731.
- Monterio Dos Santos, T., Costa, N.P., Torres, A. L. and Junior, A.L.B. (2004). Effect of neem extract on cotton aphid. *Pesquisa Agropecuaria Brasileira* 39:1071-76.
- Naeem, M., Farid, A., Khan. M.H., and Ali, S.K. (2012). Laboratory studies on the comparative effect of neem oil (*Azadirachta indica*) and insecticides on *Trichogramma chilonis* (Ishii). *Pak. J. Entomol. Karachi*. 27 (1): 33 – 38.
- Naqvi, S.N.H., Tabassum, R. and Khan, M.Z. (1996). Toxicity determination of neem compounds (Nfc and Nc) and dimilin by two methods against *Callosobruchus analis* PARC, Islamabad (Pakistan), P. 29 – 30.
- Naz, N., Ahmad, I., Tariq, R.M., Anwar, T. and Khatri. (2013). Toxic effect of Biosal , Chlorpyrifos and Lambda Chyhalothrin against Berry bug , *Halys fabricii* , *H. Sulcatus* , *Salixocoris sindellus* and *S. excavatus* . *Pak. J. Entomol.* 28 (1): 89 – 98.
- Olotuah, O.F., Ofuya, T.I. and Aladesanwa, R.D. (2007). Comparative of four botanical powders in control of *Callosobruchus maculatus* (Fab) (Coleoptera: Bruchidae) and *Sitophilus zeamais* (Mots) (Coleoptera: Curculionidae) proceeding Akure Humbolt 3rd SAAT Annual Conf. Fed, University of Tech. Akure, Nigeria 16 – 19th April 56–59.
- Parker, W.E., Howard, J.J., Foster, S.P. and Denholm, I. (2006). The effect of insecticide application sequences on the control and insecticide resistance status of the peach potato aphid, *Myzus persicae* (Homoptera: Aphididae), on field crops of potato. *Pest Manag. Sci.* 62(4): 307–15.
- Ravikant, U. Jaiswal, G. and Xadav, N. (2007). Toxicity repellency and oviposition inhibating activity of some essential oils against *Callosobruchus chinensis*. *Journal of Applied Bioscience* 33(1): 23-28.
- Reddy, A.V. and Singh, R.P. (1998). Fumigant toxicity of neem (*Azadirachta indica* juss) seed oil volatiles against pulse beetle *Callosobruchus maculatus* (Fab) (Coleoptera: Bruchidae) *J. Appl. Ent.*, 122: 601 – 611.
- Tahir, S. and Anwar, T. (2012). Toxicological studies of neem oil (a. i. Azadirachtin) and two synthetic insecticides against *Tribolium castaneum* Herbst. *Pak.J. entomol. Karachi* 27(2): 123–127.
- Tattersfield, F. and Morris, R.M. (1924). An apperatus for testing the toxic valmes of contact insecticides under controlled conditions. *Bull. Entomol. Res.* 14: 223-224.
- Uvah, II and Ishaya, A.T. (1992). Effect of some vegetable oils on emergence oviposition and longevity of the bean weevil *Callosobruchus maculatus* (F.) *Trop pest manage.*, 38: 257 – 280.