# EFFECTS OF AZADIRACHTIN ON THE SUNN PEST, EURYGASTER INTEGRICEPS PUT. (HETEROPTERA, SCUTELLERIDAE) IN THE LABORATORY

**Müjgan KIVAN**

Trakya University, Faculty of Agriculture, Department of Plant Protection, 59030 Tekirdag, Turkey
e-mail: kivan@tu.tzf.edu.tr or mujgankivan@hotmail.com, Tel: +90-282.2931442,Fax: +90.282.2931454

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## ABSTRACT

To investigate the effect of azadirachtin on different stages of the sunn pest, Eurygaster integriceps Put. (Het., Scutelleridae) in the laboratory, a commercial neem insecticide (NeemAzal T/S) was applied at dose of 0.5 % by dipping insects. No effect was observed for 1. instar nymphs at 1 day after application, although adults had slightly effect (20 %). Adults and nymphs were influenced 7 days after the treatment and mortality rates for adults and nymphs were recorded 44.0 and 51.9 %, respectively. The hatching of treated eggs was reduced than control. These results indicate that NeemAzal T/S may be used in integrated sunn pest management, but should be evaluated for field efficacy.

**KEY WORDS: The sunn pest, Eurygaster integriceps, azadirachtin, pest control**

## INTRODUCTION

In recent years, use of natural insecticides has increased because of some problems, for example environmental pollution, development of resistance and effects on nontarget organisms in use of synthetic insecticides. Azadirachtin is one of natural insecticide from the neem tree (Azadirachta indica A. Juss.). Different commercial neem insecticides probably have several modes of action. Primary of which is an interference with the neuroendocrine system in insects which controls the synthesis of ecdysone and juvenile hormone, and others are a more direct role in the inhibition of molting, the antifeedant and growth regulating effects. Other secondary effects that have been studied include repellency, antioviposition, sterility, fecundity reduction, loss of flying ability, disrupting sexual communication, and reducing guttural motility [8].

This active ingredient is reported to have numerous effects on about 400 insects [15, 10]. Because of toxicity with minimal effect of natural enemies, neem-based insecticides seems to have a potentially important in integrated pest management (IPM).programmes [15, 19, 2, 11, 17].

The sunn pest, Eurygaster integriceps Put. (Het., Scutelleridae) is a Palearctic species and the most destructive pest of wheat and other Graminae. It causes important economic injuriousness in Turkey. Control of sunn pest is mainly based on chemical control, but control operations are conducted in an IPM context [3].

There are various commercial azadirachtin formulations. In this study, one of different commercial neem insecticides, NeemAzal T/S was tested. The objective was to determine the potential insecticidal effect of the preparation against E. integriceps.

## MATERIAL AND METHODS

E. integriceps adults were collected from overwintering sites on leaf litter of oak and Cistus sp. in Tekirdag, Turkey and maintained on potted wheat plants covered with cages (20x27 cm) at 26±1 °C and 16 h light : 8 h dark conditions [9]. The eggs and nymphs were reared from the adults.

NeemAzal T/S, containing 1 % azadirachtin (Trifolio-M GmbH, Lachnau, Germany) was applied at dose of 0.5 %. The overwintered adults, 1. instar nymphs and newly laid eggs (1 day old) were dipped into the neem concentration for 3 second. Control eggs were dipped in distilled water. After application, all individuals were left to dry on desiccate paper and then the adults were placed on potted wheat mentioned above. The treated eggs were put into 5 cm diameter petri dishes. The treated nymphs were transferred on a wheat leaf and ear in 10 cm diameter petri dishes, with the bottom covered with fitler paper. The wheat leaf was renewed in 3 days. 10 adults, 20 nymphs and two egg masses (27-28 eggs) were used for each replication. The adult and egg treatments were replicated five times and the nymph treatment was replicated four.

The mortality was recorded after 1, 3, 7 and 10 days for nymphs and adults and after only 7 days for the eggs because of waiting to hatch. The data of mortality were corrected by Abbott's Formula [1]. Percentage egg hatch, mortality adults and nymphs were normalized through arc-sin (angular) transformation before they were submited to t-test (p=0.05).

## RESULTS AND DISCUSSION

### Effects on nymphs and adults

Initial contact mortality of all individuals of E. integriceps is shown Figure 1. No effect was observed for 1. instar nymphs at 1 day after application, although adults had slightly effect (20 %). It is evident that NeemAzal T/S did not give significant mortality on both adults and nymphs during the first 3 days after treatment. However, the mortality was significantly different at 7 days after application for all the stages of E. integriceps (Table 1, p=0.05). At the same time, the effectiveness became not significant at 10 days after application for the nymphs, although mortality increased (Table 1).

This result is to be expected, as azadirachtin has sublethal and chronic effects on pests and it has generally antifeedant activity [13, 14]. It is not known for its ability to kill insects outright (18) and may take well in excess of seven days to do so.

There are no literature on effect of NeemAzal T/S against E. integriceps. However, some research has been done on heteropteran insects with some different neem products.

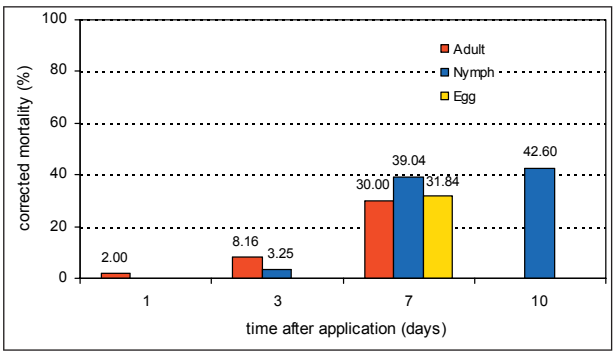


Figure 1. Corrected mortality on different stages of Eurygaster integriceps after NeemAzal T/S application at 1, 3, 7 and 10 days.

Table 1. Contact toxicity of NeemAzal T/S on different stages of Eurygaster integriceps

| Stage | Treatment | Statistical value | Mortality (%) | | |
|---|---|---|---|---|---|
| | | | 3 days | 7 days | 10 days |
| Adult | Control | | 2.0±2.0 | 20.0±4.5 | |
| | NeemAzal T/S | | 10.0±4.5 | 44.0±9.3 | |
| | | t value | 2.05 | 2.39 | |
| Egg | Control | | | 6.1±1.9 | |
| | NeemAzal T/S | | | 36.0±3.9 | |
| | | t value | | 8.01 | |
| Nymph | Control | | 10.8±7.8 | 21.1±12.2 | 66.2±4.7 |
| | NeemAzal T/S | | 13.8±5.5 | 51.9±9.7 | 80.6±7.7 |
| | | t value | 0.70 | 2.58 | 1.48 |

The duration of the fifth instar nymphs of Nezara viridula (L.) (Het., Pentatomidae) did not affected by the treatment with azadirachtin, however, at the highest doses all the insects died during the moulting process and it caused the appearence of a high percentage of adults with some nymphal characteristics [12] Durmusoglu et al. [5] recorded that NeemAzal T/S have no significant effect on adults, although it was more effective on nymphs. Authors concluded that this product had potential with insecticidal efficacy of 60 %.

Azadirachtin was found to significantly decrease the number of feeding sites by the pentatomid N. viridula on pecan nuts [16]. Sutherland et al. [18] assessed that antifeedant and ovipositional deterrent tests demonstrated good activity in reducing Oebalus poecilus (Dallas) (Het., Pentatomidae) feding damage but not oviposition.

Topical application of neem seed extract to third instar nymphs of Perillus bioculatus (F.) (Het., Pentatomidae) delayed moulting and caused deformities after the moult in some insects [7]. It was effective as the synthetic insecticide widely recommended for pod sucking bugs, Clavigralla spp. (Het., Coreidae), Aspavia armigera (F.) (Het., Pentatomidae) and Riptortus dentipes (F.) (Het., Alydidae) in Ghana [20] Direct toxicity tests on 1st instar nymphs of the predator Macrolophus caliginosus Wagner (Het., Miridae) showed azadirachtin was harmful to the insects, but the short persistence made this active ingredient a promising solution in integrated pest management programmes [21].

**Effects on eggs**

The effectiveness of azadirachtin on the eggs was recorded significantly high rates after 7 days when it was compared with control eggs (Table 1). Although the hatching of treated eggs was reduced than control, it was slightly effect. Because the mortality of eggs was recorded 36.0 % only.

There are not results regarding E. integriceps eggs and there are different results according to different heteropteran species. Dorn [4] assessed that topical treatment of normal eggs with an acetone solution of azadirachtin had no effect on hatchability of Oncopeltus fasciatus Dallas (Het., Lygaeidae) eggs. Volatiles of neem seed had also no effect on egg hatch in Clavigralla tomentosicollis Stal (Het., Coreidae), but egg viability was found to decrease with increasing concentrations of the extracts [6] NeemAzal T/S have no significant effect on newly laid eggs, but more effective on old laid eggs for N. viridula [5].

As a result of this study, it is concluded that NeemAzal T/S gave slightly insecticidal efficacy against E. integriceps with concentration of 0.5 % according to manufacturers' recommendations, but this effect was significantly different than control. So that, higher concentrations of NeemAzal T/S could provide suitable alternatives into an IPM program, nevertheless, further research is needed to determine the chronic antifeedant and antioviposition effects on E. integriceps. In addition, it should be assessed for field efficacy.

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