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In vitro safety of thiamethoxam 25 WG to *Bracon hebetor* say in tomato

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Abstract

In vitro safety studies of thiamethoxam to *Bracon hebetor* (Say) were conducted at the Department of Agricultural Entomology, Tamil Nadu Agricultural University, Coimbatore to study the safety of thiamethoxam 25 WG to the adults of *Bracon hebetor*. Bioassay method described by McCutchen and Plapp (1988) [2] was adopted with some modifications. Different doses of thiamethoxam 25 WG viz., 25, 50, 75, 100 g a.i. ha⁻¹ has been tested on *Bracon hebetor* and the per cent mortality was worked out at 24 and 48 Hours after treatment (HAT). All the doses of thiamethoxam were moderately toxic to *Bracon hebetor*.

Keywords: *Bracon hebetor*, Thiamethoxam 25 WG, Safety

Introduction

Bracon hebetor Say (Hymenoptera: Braconidae) is a gregarious larval ectoparasitoid occurs throughout the world. It is an important biocontrol agent against *Helicoverpa armigera* (Nikam and Pawar, 1993) [4]. Tomato is an important vegetable crop infested by various insect pests including whiteflies, aphids, leaf hoppers, thrips and fruit borer. Foliar application of conventional insecticides viz., organophosphorous and organochlorine compounds for control of sucking pests was not only hazardous to environment, but also wiped out the natural enemies resulting in turbulence of natural equilibrium. Therefore the natural enemies could be conserved through the use of selective insecticides at low dose. New molecules are now emerging as a viable component of IPM strategies on all crops in view of their good efficacy to pest control and safety to non-target organisms. Moreover these neonicotinoids are highly specific of low-toxicity and low use rate. Hence this study was undertaken to study the safety of newer source thiamethoxam 25 WG on *Bracon hebetor*.

Material and Methods

The larval parasitoid, *B. hebetor* was obtained from Biological Control laboratory, Tamil Nadu Agricultural University, Coimbatore. Bioassay method described by McCutchen and Plapp (1988) [2] was adopted with some modifications. Different concentrations of thiamethoxam 25 WG viz., 25, 50, 75 and 100 g a.i. ha⁻¹ were prepared using acetone and water in the ratio of 80:20.

Glass vials (Borosil) of 30 ml capacity with 1 mm thickness were evenly coated with 0.5 ml of insecticide formulations dissolved in acetone: water and dried by placing the vials horizontally on the table and rotating them using the hand. Adults of *B. hebetor* were released into the vials at the rate of 10 per vial, covered with muslin cloth and secured with a rubber band. After an hour of exposure, honey solution was provided as food to the adults. Mortality was recorded 24 and 48 h after treatment and per cent mortality of the adults was worked out using the formula,

$$\text{Per cent mortality} = \frac{\text{No. of dead adults}}{\text{Total number of wasps}} \times 100$$

Results and Discussion

All the doses of thiamethoxam were moderately toxic to *B. hebetor* (Table 1). The highest dose of thiamethoxam (100 g a.i. ha⁻¹) caused 50 per cent mortality 24 hours after treatment

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(HAT) and 57.78 per cent at 48 HAT, respectively. The recommended dose and lower dose of thiamethoxam at 50 and 25 g a.i. ha⁻¹ recorded 16.67, 10.00 and 24.07, 11.11 per cent mortality 24 and 48 HAT, respectively. No mortality was observed in the untreated control. The present finding is in line with Alexandre *et al.* (2005) [1] who found that thiamethoxam at 0.05 g a.i.l⁻¹ was harmless to *Trichogramma pretiosum* in tomato crop. Naveed *et al.* (2010) [3] also found that thiamethoxam proved less toxic to whitefly parasitoid, *Encarsia lutea* (Masi), *Encarsia sophia* (Girault and Dodd) and *Eretmocerus mundus* (Mercet) in cotton. Tabozoda *et al.* (2015) [5] also reported that the use of thiamethoxam for control of sucking pests in cotton is more safer for *Bracon brevicornis*. In the present study, the recommended dose of thiamethoxam (50 g a.i. ha⁻¹) caused less than 50 per cent mortality at 24 and 48 HAT and found to be least toxic to *B. hebetor*.

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Table 1: Toxicity of thiamethoxam 25 WG on the parasitoid, *Bracon hebetor* Say

Treatments	Dose (g a.i. ha ⁻¹)	Per cent mortality*	
		24 HAT	48 HAT
Thiamethoxam 25 WG (NS)	25	10.00 (18.43)b	11.11 (19.47)b
Thiamethoxam 25 WG (NS)	50	16.67 (24.09)b	24.07 (29.38)bc
Thiamethoxam 25 WG (NS)	75	36.67 (37.27)c	41.59 (40.16)cd
Thiamethoxam 25 WG (NS)	100	50.00 (45.00)d	57.78 (49.47)de
Thiamethoxam 25WG (Actara®) (ES)	50	30.00 (33.21)c	33.13 (35.14)c
Dimethoate 30 EC	300	63.33 (52.73)e	72.22 (58.19)e
Untreated control	-	0.00 (0.63)a	0.00 (0.63)a
SEd		3.097	6.028
CD (0.05%)		6.747	13.135

*Mean of three replications; HAT - Hour after treatment
NS - New Source; ES - Existing Source

In a column means followed by a common letter are not significantly different at P = 0.05 by DMRT
Figures in parentheses are arcsine Per cent transformed values

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