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Efficacy of Two Insecticides Against Two Species of *Tetranychus* spp. (Acari: Tetranychidae)

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Abstract: The *Tetranychus* spp. are the most important pest which cause more economic lose in the field crops so its more important to have more methods for controlling. The toxicity of abamectin 1.8% and Abamectin 2%+ Imidacloprid 3% EC are evaluated against adult female of carmine spider mite, *Tetranychus cinnabarinus* (Boisduval) and the two spotted spider mite, *Tetranychus urticae* Koch under laboratory conditions. Also, LC_{50} and LC_{90} of each acaricide are determined. The obtained results reveal that, abamectin 1.8% acaricide is more effective in controlling *T. cinnabarinus* than *T. urticae* with LC_{50} 0.06 and 1.7 ppm, respectively; while Abamectin 2%+ Imidacloprid 3% EC has low effect especially on *T. urticae* than *T. cinnabarinus* with LC_{50} 10.3 and 4.1 ppm, respectively.

Key words: *Tetranychus* spp. · Abamectin · Imidacloprid

INTRODUCTION

The two spotted spider mite, *T. urticae*, is a polyphagous arthropod herbivore that feeds on a remarkably broad array of species, with more than 150 of economic crops. Spider mite is a major pest of greenhouse crops especially in solanaceae and cucurbitaceae (e.g., tomatoes, eggplants, peppers, cucumbers, zucchini) and greenhouse ornamentals (e.g., roses, chrysanthemum, carnations), field crops (e.g., maize, cotton, soybean and sugar beet) and in perennial cultures (alfalfa, strawberries, grapes, citruses and plums where it is infests 3, 877 host plants in both field and greenhouse crops [1, 2]. The carmine spider mite, *Tetranychus cinnabarinus* (Boisduval), is one of the major agricultural pests' worldwide, infesting vegetables and many other crops including cotton, maize and tobacco [3, 4].

Abamectin is widely used as an insecticidal, acaricidal and nematicidal agent. As a macrocyclic lactones compound, it belongs to the family of avermectins (AVMs) which are derived from the soil organism Streptomyces avermitilis [5]. Neonicotinoid insecticides (imidacloprid, acetamiprid, etc.) have lower mammalian toxicity than other new generation insecticides and this advantage has resulted in broad registrations for their use [6]. The present work was aimed to evaluate the toxic effect of abamectin alone and with imidacloprid against *T. urticae* and *T. cinnabarinus*.

MATERIALS AND METHODS

Rearing Mites: *T. urticae* and *T. cinnabarinus* adults were collected from unsprayed castor bean plants and reared at 25± 2°C and 60± 5%RH.

Treatments:

- Abamectin 1.8%EC.
- Abamectin 2%+ Imidacloprid 3% EC.

Preparing the Concentrations of the Insecticides: Four diluted concentrations of each insecticide were prepared on basis of the tested material weight and the volume of the distilled water (w/v) to draw the LC-P lines. Three replicates were used for each concentration.

Toxicity Test: The toxicity of Abamectin 1.8%EC and Abamectin 2%+ Imidacloprid 3% EC were tested against *T. urticae* and *T. cinnabarinus*. Thirty newly emerged adult females were transferred to the lower surface of castor leave discs (2.5 cm diameter) which treated by dipping with acaricide placed separately on moist cotton wool in Petri dishes. Each petri dish contains three replicates, ten individuals in each replicate. Each acaricide had four concentrations which were dipped on leaves. Mortality was recorded for 12 hours after treatment. The mortality percentage was estimated and corrected

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according to the Abbott's [7]. LC_{50} values were determined using probit analysis statistical method of Finney [8].

Equation of Sun [9] to determine LC_{50} index

$$\text{Toxicity index for } LC_{50} = \frac{LC_{50} \text{ of the most effective compound}}{LC_{50} \text{ of the least effective compound}} X100$$

RESULTS AND DISCUSSION

Effect of Abamectin 1.8%EC and Abamectin 2%+ Imidacloprid 3% EC Against *T. urticae* and *T. cinnabarinus*: The data in Table (1) indicated that, Abamectin 1.8% alone caused high mortality proportion on *T. urticae* and *T. cinnabarinus* specially in high concentrations but the effect was more high against *T. cinnabarinus* than *T. urticae*. However the effect of Abamectin 2%+ Imidacloprid 3% EC was effective against the two species of Tetranychus but this effect was less than the effect of Abamectin 1.8% alone. Khairia [10] proved same results about the effectiveness of Abamectin 1.8% than the other insecticides when applied on *T. urticae*.

The Lethal Concentrations of Abamectin 1.8%EC and Abamectin 2%+ Imidacloprid 3% Ec Against *T. urticae* and *T. cinnabarinus*: Results in Table (2) and Fig. (1) indicated that, abamectin 1.8% was more effective against *T. cinnabarinus* than *T. urticae*, with LC_{50}: 0.06 ppm

Table 1: Corrected mortality % of *T. urticae* and *T. cinnabarinus* treated with Abamectin 1.8%EC and Abamectin 2%+ Imidacloprid 3% EC under laboratory conditions 25±2°C

			Mortality after treatments %			
Pests	Treatments	Conc.(ppm)	3 hours	6 hours	12 hours	Total Mortality %
T. urticae	Abamectin	1.25	26.67	6.67	3.33	36.67
		.2.5	40	10	16.67	66.67
		5	53.33	16.67	16.67	86.67
		10	66.67	20	10	96.67
	Abamectin + Imidacloprid	7	23.33	10	6.67	40
		14	33.33	13.33	6.67	53.33
		28	63.33	16.67	6.67	86.67
		56	73.33	16.67	6.67	96.67
T. cinnabarinus	Abamectin	1.25	73.33	6.67	3.33	83.33
		2.5	80	6.67	3.33	90
		5	83.33	10	-----	93.33
		10	90	6.67	-----	96.67
	Abamectin + Imidacloprid	7	43.33	13.33	6.67	63.33
		14	56.67	16.67	13.33	86.67
		28	66.67	23.33	3.33	93.33
		56	90	3.33	3.33	96.67

Table 2: Efficiency of Abamectin 1.8%EC and Abamectin 2%+ Imidacloprid 3% EC against *T. urticae* and *T. cinnabarinus*

Pests	Treatments	Conc.	Corrected mortality%	LC_{50}	LC_{90}	Slope± S.D.	Toxicity index LC_{50}	LC_{90}/ LC_{50}
T. urticae	Abamectin	1.25	36.67	1.7	5.8	2.4± 0.3	3.8	3.4
		2.5	66.67					
		5	86.67					
		10	96.67					
	Abamectin + Imidacloprid	7	40	10.3	36.4	2.3± 0.2	0.6	3.5
		14	53.33					
		28	86.67					
		56	96.67					
T. cinnabarinus	Abamectin	1.25	83.33	0.06	3.3	0.7± 0.3	100	55
		2.5	90					
		5	93.33					
		10	96.67					
	Abamectin + Imidacloprid	7	63.33	4.1	21.7	1.8	1.6	5.3
		14	86.67					
		28	93.33					
		56	96.67					

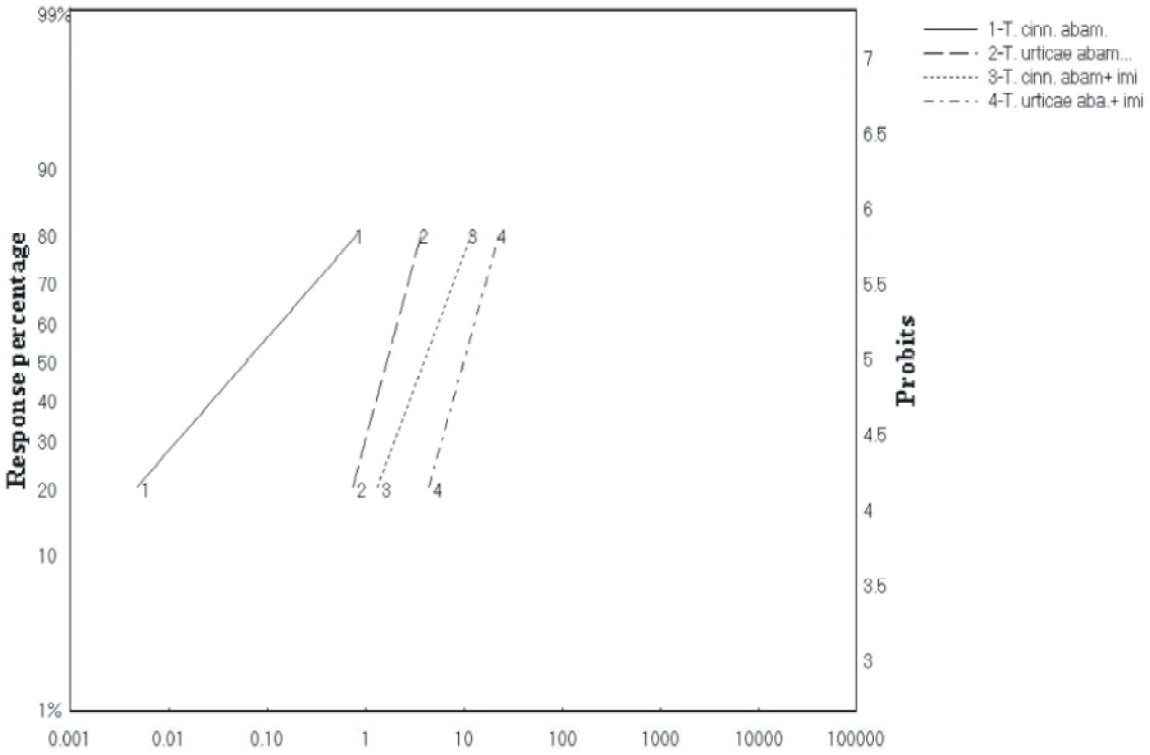

Fig. 1: LC-P lines of abamectin 1.8% and Abamectin 2%+ Imidacloprid 3% EC against *T. urticae* and *T. cinnabarinus*

and 1.7 ppm, respectively. LC_{90} value was 3.3 ppm and 5.8 ppm for *T. cinnabarinus* and *T. urticae*, respectively. Also, the effect of Abamectin 2%+ Imidacloprid 3% EC on *T. cinnabarinus* was more effective than the effect on *T. urticae* with LC_{50}: 4.1 ppm and 10.3 ppm, respectively and LC_{90} 21.7 and 36.4 ppm, respectively. The toxicity index was 100% for abamectin 1.8% and *T. cinnabarinus* and 3.8% for abamectin 1.8% and *T. urticae* while it was 1.6% for *T. cinnabarinus* and Abamectin 2%+ Imidacloprid 3% EC and 0.6% for *T. urticae* and Abamectin 2%+ Imidacloprid 3% EC. Alyaa [11], proved the quickest action of abamectin against *T. urticae* compared with other tested acaricides. Khairia [10] indicated the lowest effect of Abamectin 1.8%EC and Abamectin 2% than abamectin against *T. urticae*. Meng [12] proved the highly effectiveness of abamectin against more effective than *T. cinnabarinus*. All these results were in agreement with our results.

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