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Toxicity of Pesticides to the Red Spider Mite, *Tetranychus macfarlanei* Baker and Pritchard and the Predatory mite, *Amblyseius longispinosus* (Evans) on cotton

MAHABALESHWARE HEGDE AND B.V. PATIL

Department of Agricultural Entomology, College of Agriculture, Raichur

Red spider mite, *Tetranychus macfarlanei* Baker and Pritchard assumed major pest status on cotton in Tungabhadra Project area of Karnataka (Patil, 1986). A potential phytoseiid predator *Amblyseius longispinosus* (Evans) was reported to occur in the same agro ecosystem (Thulsiram, 1991). The effect of different pesticides on *T. macfarlanei* and other mite species on cotton (Furr and Davis, 1969; Furr and Laster 1971; Chakravarthy and Balsubramanian, 1980; kumar *et al.*, 1990; Thulsiram, 1991) and on predator *A. longispinosus* and other species of genus *Amblyseius* (Krishnamoorthy, 1983; Osman *et al.*, 1985; Hamamura, 1987; Babcock and Tanigoshi, 1988; Machizukic, 1990; Anil, 1990) has been reported in the past. The present study was undertaken to evaluate and identify chemicals which are more toxic to *T. macfarlanei* but least toxic to *A. longispnosus*.

The toxicity of ten pesticides at the recommended concentrations to both *T. macfarlanei* and *A. longispinosus* was evaluated separately under laboratory conditions at room temperature (23.47 to 29.60^{0}C) and relative humidity (49.96 to 79.78 per cent) with three replications. Twenty five adult females of *T. macfarlanei* were released on to cotton leaf bits (42 cm dia) maintained on wet cotton kept in a Petri dish. On the next day, ten adult females of *A. longispinosus* were released on to leaf bits after ensuring sufficient prey stages on the leaf bits.

The leaf bits with sufficient prey population were sprayed with different chemicals by the help of a potter's tower. The toxicity of pesticides for *T. macfarlanei* was separately evaluated without releasing *A. longispinosus*. The data were statistically analysed by following completely randomised design.

Among the pesticides tested against *T. macfarlanei*, dicofol at 0.05 per cent and wetteble sulphur 80 WP at 0.44% were the most effective producing 83.33 and 76.67 per cent mortality respectively even on the first day which significantly differed from other pesticides (Table 1.). This is in accordance with the reports of Furr and Davis (1969) and Furr and Laster (1971). Synthetic pyrethroids alphamethrin and cypermethrin at 0.05% effected only 23.33 and 20.00 per cent mortality of red spider mites respectively even after 48 h of spray. This is in agreement with the study conducted by Patil (1986).

The 76.67% mortality of *T. macfarlanei* caused by monocrotophos 36 SL at 0.09 per cent (Table 1) is in agreement with the findings of Chakraverthy and Balasubramanian (1980), whereas the mortality of 53.33 per cent caused by carbaryl 42 SL at 0.10% was not in accordance with the findings of Patel and Yadav (1988). The difference might be due to the added effect of sulphur present in the formulation. Phosalone, Cotton seed oil, ethion and wettable sulfur also showed significant toxicity to *T. macfarlanei*. The efficacy of ethion 50 EC and phosalone 35EC (Table 1) against *T. macfarlanei* has been reported earlier by Chawla *et al.* (1988).

All pesticides tested at the same concentration against *T.macfarlanei* were also imposed on *A. longispinosus* (Table 1) and per cent mortality recorded was higher in all cases when compared with the mortality of *T. macfarlanei*.

The mortality of *A. longispinosus* caused by dicofol 18.5 EC, monocrotophos 36SL, wettable sulphur 80 WP, ethion 50 EC was 100 per cent (Table 1) after 24h of spray treatment and

Table 1. Toxicity of pesticides to *T.macfarlanei* and *A. longispinosus* under laboratory condition

Pesticide	Conc. (per cent)	Mortality (per cent) h after spray			
		T. macfarlanei		*A. longispinosus*	
		24	48	24	48
Alphamethrin 10 EC	0.05	23.33^{e}	23.33^{d}	86.67^{c}	90.00^{b}
Cypermethrin 10 EC	0.05	20.00^{e}	20.00^{d}	83.33^{c}	83.33^{c}
Dicofol 18.5 EC	0.046	83.33^{a}	96.67^{a}	100.00^{a}	100.00^{a}
Endosulfan 35 EC	0.07	60.00^{cd}	63.67^{c}	80.00^{c}	83.33^{c}
Monocrotophos 36SL	0.09	70.00^{bc}	76.67^{b}	100.00^{a}	100.00^{a}
Wettable sulphur 80WP	0.44	76.67^{a}	86.67^{b}	100.00^{a}	100.00^{a}
Ethion 50 EC	0.10	53.33^{d}	83.33^{b}	100.00^{a}	100.00^{a}
Cotton seed oil	0.20	63.33^{c}	83.33^{b}	86.67^{c}	90.00^{a}
Carbaryl 42SL	0.105	53.33^{d}	53.33^{c}	83.33^{c}	86.67^{bc}
Phosalone 35EC	0.07	63.33^{c}	83.33^{b}	93.33^{b}	100.00^{a}

Means denoted by the same letter in each column are not statistically different (P=5%) by DMRT

mortality caused by phosalone reached 100 per cent after 48h of spray. This is in accordance with the findings of Krishnamoorthy (1983) and Anil (1990).

The pyrethroids alphamethrin 10EC and cypermethrin 10EC which were found to be least toxic against the cotton red spider mite caused 86.67 and 83.33 per cent mortality respectively of predator, after 24 h of spray and mortality rose up to 90 per cent in case of alphamethrin and remained at 83.33 per cent in the case of cypermethrin after 48 h of spray (Table 1). These observations are in accordance with the findings of Osma *et al.* (1985) on *Amblyseius gossypii* and those of Hamamura (1987) on *A. longispinosus*. Similarly, reports of Babçock and Tanigoshi (1988) on *Typhlodromus occidentalis* and findings of Machizukic (1990) on *A. longispinosus* against permethrin support the results obtained in the present investigation.

Endosulfan 35EC, cotton seed oil and carbaryl 42SL produced more than 50 per cent mortality of the predator *A. longispinosus* (Table 1). The above findings are also in conformity with the reports of Krishnamoorthy (1983), Osman *et al.* (1985) and Babcock and Tanigoshi (1988).

The results of the present investigation indicates that spraying of pesticides which are more toxic to *A.longispinosus* should be avoided in order to conserve the predators.

KEY WORDS : *Amblyseius longispinosus, Tetranychus macfarlanei,* toxicity, pesticides

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