

Effects of Commonly Used Fungicides on Longevity and Mortality of *Encarsia perniciosi* (Tower) and *Aphytis* sp. *proclia* group (Hymenoptera : Aphelinidae)

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ABSTRACT

Studies were carried out in the laboratory to determine the toxicity of three commonly used fungicides (carbendazim, captafol and captan) against apple scab in Himachal Pradesh to the adults of two important Hymenopterous parasitoids of San Jose scale, viz., *Encarsia perniciosi* and *Aphytis* sp. *proclia* group. Results revealed that carbendazim 0.025%, captafol 0.16% and captan 0.15% were not toxic to the adults of either *E. perniciosi* or *Aphytis* sp. *proclia* group. There were no significant differences in the mortality and longevity of adult parasitoids of both the species in treated and control batches.

KEY WORDS: *Encarsia perniciosi*, *Aphytis* sp. *proclia* group, fungicides

Encarsia perniciosi (Tower) and *Aphytis* sp. *proclia* group are among the important parasitoids of San Jose scale, *Quadraspidotus perniciosus* (Comstock) throughout the world. In India, these parasitoids were introduced by the Indian station of the Commonwealth Institute of Biological Control, Bangalore during 1958-60 and were distributed among the States of Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh (Rao, 1971). Subsequently, in Himachal Pradesh, Jolly (1961, 62) recorded 86.5% combined parasitism by these parasitoids. Severe outbreak of apple scab, *Venturia inaequalis* Wint. in Himachal Pradesh, necessitated the orchardists to use fungicides indiscriminately to control this dreaded disease. Frequent use of fungicides may contribute to the resurgence of the pest by inhibiting the biological activity of parasitoids. The present study was therefore carried out to find out the impact of three most commonly used fungicides viz., carbendazim (Bavistin 50WP), captafol (Difolatan 80WP) and captan (Hexacap 50WP) on the mortality and longevity of adult parasitoids of these two species.

MATERIALS AND METHODS

Both *E. perniciosi* and *A. sp. proclia* group were mass multiplied on San Jose scale - infested pumpkins in the laboratory at $27 \pm 2^\circ\text{C}$ and $70 \pm 10\%$ relative humidity. Newly emerged (0-24h old) adult parasitoids were collected and used for the study. Carbendazim, captafol and captan at recommended doses of 0.025, 0.16 and 0.15% a.i. were used in the study. Sel-wet 99 (0.13g / litre) was added to the

formulation as sticker. Filter paper strips (8 x 3 cm) and glass tubes (10 x 4 cm) were dipped in desired fungicidal formulation and dried in air. The fungicide-impregnated filter paper strips were put into glass tubes dipped in the same formulation. The newly emerged parasitoids were exposed by contact to these filter paper strips and glass tubes. Cotton pieces soaked in 50% honey were provided on the inner walls of glass tubes for adult feeding. Each treatment was replicated five times with 50 adults in each replication. For control, tap water was used in the place of fungicidal formulation. Observations were made at an interval of 8 h on adult mortality and were continued for three days. Life span of the parasitoids were also recorded. Data obtained were analysed statistically for its significance after transforming the percentage into angles.

RESULTS AND DISCUSSION

Data presented in Table 1 and 2 show that all the three fungicides (carbendazim, captafol and captan) at the field-recommended concentrations had no toxic effects on the adults of *Encarsia perniciosi* and *Aphytis* sp. *proclia* group. There were no significant differences in the per cent mortality and longevity of treated and control parasitoids. Non-toxic nature of 13 fungicides to these two hymenopterous parasitoids have been reported earlier (Anon., 1985), where parasitoids were exposed to fungicidal formulations for 8 h only. Ledieu (1979) tested the toxicity of 50 pesticides on *Encarsia formosa* Gahan and observed that all the fungicides tested had negligible effects. Hassan *et al.* (1987) tested five fungicides in the laboratory for their side effects on the pupae and adults of *Encarsia* sp. and reported that all the five fungicides were harmless to pupae while mancozeb, prochloraz and chlorothalonil proved

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harmless to adults, thiram was slightly harmful and chinomethionate harmful to the adults. Helyer (1982) after testing several insecticides, acaricides and fungicides against pupae and adults of *E. formosa* reported that fungicides and acaricides were relatively less harmful than insecticides.

Based on the results of the present studies, it may be concluded that carbendazim, (Bavistin), captafol (Difolatan) and captan (Hexacap) when sprayed at field recommended concentrations are quite safe for the two hymenopteran parasitoids of San Jose scale *i.e.*

E. perniciosi and *A. sp. proclia* group as far as mortality and longevity of the parasitoids are concerned.

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TABLE 1. Toxicity of commonly used fungicides against adults of *E. perniciosi*

Fungicide	Per cent mortality* (h after treatment)								
	8	16	24	32	40	48	56	64	72
Carbendazim	1.6	2.8	3.2	4.4	4.4	5.6	6.4	6.8	08.0
Captafol	1.2	2.4	2.8	4.0	4.8	5.6	6.8	7.6	08.8
Captan	2.0	3.3	4.4	4.8	5.2	6.4	7.6	8.8	10.0
Control	2.0	2.4	3.2	4.0	4.8	4.8	5.6	6.8	07.6

* Differences between the means not significant at all periods

TABLE 2. Toxicity of fungicides against adults of *A. sp. proclia* group

Fungicide	Per cent mortality* (h after treatment)								
	8	16	24	32	40	48	56	64	72
Carbendazim	2.4	4.0	5.2	6.0	7.6	8.0	08.8	10.0	10.4
Captafol	2.0	3.6	4.4	4.8	6.8	7.6	08.4	10.4	11.2
Captan	2.4	3.6	4.8	6.4	7.6	8.8	10.4	10.4	10.8
Control	1.6	2.8	4.4	5.2	6.4	7.2	08.0	08.4	09.2

* Differences between the means not significant at all periods

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