

Effect of Fungicides on the Infection of Grey Semilooper Larvae (*Rivula* sp.) by *Beauveria bassiana* (Balsamo) Vuill. in Soybean

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Larvae of grey semilooper, *Rivula* sp. (Lepidoptera : Noctuidae) have become a serious pest of soybean (*Glycine max* (L.) Merrill) in Madhya Pradesh, causing 33.19 per cent yield losses (Singh and Singh, 1989). In nature, upto 93.6 per cent of these larvae have been reported to be infected by *Beauveria bassiana* (Balsamo) Vuill. (Singh and Singh 1988) which is also known to infect many other insect pests (Nayak and Srivastava, 1979; Gopalakrishnan and Narayanan, 1988). Use of fungicides to protect the soybean crop from different diseases (Srivastava and Agrawal, 1989) may be lethal to this entomopathogen. Hence, to select fungicides that are safe to this fungal pathogen, seven fungicidal formulations that are being used for disease control in soybean, were screened.

A field experiment was conducted during the rainy season of 1989 in randomized block design with three replications. The plot size was 5.0 x 3.2m, with 8 rows 40 cm apart. Soybean cv JS 72-44 (Gaurav) was sown on 27 June 1989, and except plant protection, all recommended package of practices were followed. After the appearance of the fungal infection *B. bassiana* on the host larvae, the crop was sprayed with seven fungicidal formulations at the recommended doses (Table 1) on 18th August 1989, using 3.5 l capacity hand compression sprayer. Control was maintained with water spray. Total larval population of grey semilooper as well as those infected with *B. bassiana* was recorded from 1 meter row length of the crop at 3 places in each plot by shaking the plants on a muslin cloth one day before and eight days after spraying fungicides. Percentages of infected larvae were transformed to angles for statistical analysis.

Larval infection by *B. bassiana* was first noticed on 17th August 1989, and the level of infection ranged from zero to 5.88 per cent in different treatments before spraying of fungicides, the differences being non-significant. Eight days after treatment, the larval infection ranged from zero to 55.55 per cent in fungicidal treatments and 30.0 to 62.50 per cent in untreated control (Table 1). Thus, larval infection was significantly reduced by fungicidal sprays. The entomopathogenic fungi, *Myiophagus*, *Hirsutella* and *Entomophthora* are known to be inhibited by fungicides (Fischer and Griffiths, 1950; Hall and Dunn, 1959). Spray of organic fungicides is known to drastically reduce the infection of apple sucker *Psylla mali* by *Entomophthora sphaerosperm*, thereby increas-

Table 1. Effect of fungicides on the infection of grey semilooper by *B. bassiana* in soybean

Treatment	Dose %	% infected larvae
Captafol (Foltaf 80 W)	0.25	39.35 (38.63)
Carbendazim (Bavistin 50 WP)	0.05	19.34 (25.99)
Carbendazim (Derosal 50 WP)	0.05	20.00 (26.45)
Mancozeb (Dithane-M 45 75 WP)	0.25	27.67 (31.72)
Thiophanate Methyl (Topsin-M 70 WP)	0.05	0.00 (0.00)
Prochloraz (Sportak 40 EC)	0.10	11.88 (20.08)
Mancozeb (Zebthane 75 WP)	0.25	37.50 (37.58)
Control	-	48.37 (43.98)
C.D. at 5%		(10.89)

Figures in parentheses are angular transformed values

ing the build up of insect population in apple orchards (Bell, 1974). Among the different fungicidal treatments, thiophanate methyl (topsint M 70 WP) was highly toxic to *B. bassiana*. It significantly affected the natural control of *Rivula* sp., bringing down the ratio of infected larvae to zero as compared to 48.37 per cent in untreated control. Derosal 50 WP, bavistin 50 WP and sportak 40 EC were moderately toxic to the pathogen as the plots treated with them had 26.45, 25.99 and 20.08 per cent infected larvae respectively, though in all the three cases reduction in larval infection over control was significant. Foltaf, zebtane and dithane M-45 with 38.63, 37.58 and 31.72 per cent larval parasitization were least toxic to *B. bassiana* fungus. Foltaf and zebtan were statistically on par with untreated control and were safe for *B. bassiana*. In soybean fields having infection of *Rivula* sp. larvae by this fungus, these two fungicides may be safely used against crop diseases.

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