

# Influence of Temperature on the virulence of the Entomopathogenic Nematode *Steinernema feltiae* Filipjev (DD-136 strain) to *Spodoptera litura* (Fab.) and *Heliothis armigera* (Hbn)\*

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## ABSTRACT

The virulence of *Steinernema feltiae* Filipjev to *Spodoptera litura* Fab. (Noctuidae:Lepidoptera) and *Heliothis armigera* Hbn. (Noctuidae: Lepidoptera) was reduced as the temperature increased from 24 to 30°C. Between the two insects, *H. armigera* was more susceptible than *S. litura*. The LC<sub>50</sub> values for both the insects were higher at the final instar when compared to the third instar.

Key words : Entomopathogenic nematode, *Steinernema feltiae*, *Heliothis armigera*, *Spodoptera litura*

A study conducted to find out the influence of temperature on the virulence of *Steinernema feltiae* Filipjev (Steinernematidae:Rhabditida) to the third and the final instar larvae of the tobacco cut worm *Spodoptera litura* Fab. (Noctuidae:Lepidoptera) and the gram pod borer *Heliothis armigera* Hbn. (Noctuidae:Lepidoptera) is reported in this paper.

## MATERIALS AND METHODS

The generally accepted parameters, LC<sub>50</sub> and LT<sub>50</sub>, were used for assessing the virulence of *S. feltiae* to the third and the final instar larvae of *S. litura* and *H. armigera* at 24 and 30°C. *S. litura* larvae were reared on castor (*Ricinus communis* L.) leaves while the larvae of *H. armigera* were reared on chickpea (*Cicer arietinum* L.) plants till they reached the third instar and thereafter, on a semi-synthetic diet (Shorey and Hale, 1965) without the antifungal methyl paraben and the antibiotic streptomycin sulphate which are detrimental to *S. feltiae*.

The larvae were released into a 10 cm diam Petri dish having a filter paper inoculated with nematode suspension at the rate of 0, 5, 10, 20 or 40 infective juveniles (IJs) per individual. Each treatment was replicated five times and the inoculated Petri dishes were kept in a BOD incubator adjusted to 24 ± 1°C or 30 ± 1°C. Each replicate contained six to ten larvae. The control Petri dishes

were treated with sterile distilled water only. The mortality was recorded in all the above mentioned treatments 72h after inoculation for determination of LC<sub>50</sub>. The LT<sub>50</sub> was determined from the mortality data recorded at six hourly intervals, from the control (0 IJs/insect) and the treatment receiving 10 IJs per insect until more than 75 percent of the insect larvae had died. The dosage and time-mortality responses were subjected to probit analysis (Finney, 1962).

## RESULTS AND DISCUSSION

The third and final instars of *S. litura* and *H. armigera* larvae were found susceptible to *S. feltiae*. In all the experiments, LC<sub>50</sub> values increased with increasing temperature. Irrespective of the insects, the final instar larvae recorded comparatively higher LC<sub>50</sub> values than their third instars (Table 1).

Between the two insects, *H. armigera* was found to be more susceptible to *S. feltiae*, since both the third and the final instars recorded lower LC<sub>50</sub> values. Mortality occurred earlier in the third and the final instar larvae of *S. litura* and the third instar larvae of *H. armigera* at 24°C than at 30°C, while it was delayed at 24°C for the final instar of the latter.

The results demonstrate that the host insect species as well as its stage of development and temperature, determine the virulence of *S. feltiae*. Temperature induced modification in the virulence of *S. feltiae* to *Galleria mellonella* has been reported by Dunphy and Webster (1986). Kondo

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**Table 1** Influence of temperature on dosage and time mortality responses of *S. litura* and *H. armigera* to *S. feltiae*.

Insect species and stage	24°C				30°C			
	LC <sub>50</sub>	Slope (b)	LT <sub>50</sub>	Slope (b)	LT <sub>50</sub> (dauers/larva)	Slope (b)	LT <sub>50</sub> (h)	Slope (b)
<i>S. litura</i>								
Third instar	4.94	1.14	25.48	7.58	12.19	1.23	43.65	3.08
Final instar	10.62	2.02	36.25	4.63	20.69	2.07	90.00	3.57
<i>H. armigera</i>								
Third instar	1.48	2.02	14.28	5.64	2.87	2.79	17.00	10.35
Final instar	7.57	1.48	50.13	2.53	12.29	2.47	33.43	3.52

(1987) also observed lesser susceptibility of later instars of *S. litura* to *S. feltiae*.

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