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Further Studies on the Cross Infectivity of Granulosis Viruses of Sugarcane Borers

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The sugarcane shoot borer, *Chilo infuscatellus* Snell. and internode borer, *C.sacchariphagus indicus* (Kapur) (Crambidae: Lepidoptera) were found susceptible to two granulosis viruses (GV) (Easwaramoorthy and David, 1979; Mehta and David, 1980). The GV of shoot borer (CiGV) propagated in the laboratory and applied in the field was effective in the suppression of the pest (Easwaramoorthy and Santhalakshmi, 1988). The GV of internode borer (CsiGV) was highly pathogenic to the host in the laboratory (Easwaramoorthy, 1984). It is difficult to mass rear *C.infuscatellus* and *C. sacchariphagus indicus* on artificial diets, though a diet is available for limited multiplication of internode borer (Mehta and David, 1978), Hence attempts were made to infect other related hosts (Easwaramoorthy and Jayaraj, 1987) so that they can serve as alternate hosts for production of the viruses. But none of them was found susceptible to the GVs. In the present study, some more hosts were tested for their susceptibility to the two GVs.

The laboratory cultures of insects maintained on artificial diets at the NERC Institute of Virology and Microbiology, Oxford, were utilised for the studies. In all the species, early second instar larvae were used for the bioassay. The diet plugs were prepared from Singh's diet poured to a depth of 0.5 cm in petri dishes. Finn tips cut to the required diameter were attached to a diet plug dispenser and used to dispense the diet plugs directly into clean microtitre plates at the rate of one plug per well.

The GVs were propagated in larvae of their respective hosts and the virus purified on sucrose gradient in the presence of 0.1% sodium dodecyl sulphate. The virus was tested at 10^4 and 10^7 IB/larva. The diet plugs were contaminated with 1 μl of the virus suspension containing the required concentration. The lower concentration of the virus i.e. 10^4 IB/larva was dispensed first. Care was taken that the Finn tip did not get blocked and the entire 1 μ l droplet was dispensed each time.

One larva was placed in each microtitre well using fine forceps. The larvae were kept in position in the wells by placing a glass slide on the top. When all the wells were placed with larvae, the microtitre plate was covered with lightly moistened tissue paper and cling film. Fifty larvae were used per tretment. The plates were placed at 22°C in a BOD incubator. After 24 hours, the larvae that have eaten the entire diet plug were transferred to individual polypots containing the required quantity of the diet. The polypots were placed at 22°C and the larvae were observed daily for mortality or pupation. The dead larvae were smeared, stained with Giemsa and examined for the presence of the GV inclusion bodies. In the case of overwintering species, the diapausing larvae were examined for virus infection by making smears. Data were collected on per cent pupation.

The two GVs, at both the doses tested, were not infective to the 17 species of insects (Table 1). The per cent pupation in virus-fed and control larvae was normal and the dif-

Table 1. Cross infectivity of GVs of shoot and internode borer to other insect species

Family and species	Pupation (%)				
	CiGV		CsiGV		Control
	10^4 IBs	10^7 IBs	10^4 IBs	10^7 IBs	
NOCTUIDAE					
Agrotis segetum (Schiff)	100	100	96	100	100
Autographa pulchrinia (Haworth)	*	*	*	*	*
Heliothis armigera Hub.	92	92	92	88	90
Heliothis zea (Boddie)	100	100	100	100	100
Mamestra brassicae Linn. (Wild)	100	100	100	92	100
M. brassicae Linn. (Lab)	100	100	100	100	100
Melanchra persiceriae Linn.	100	100	100	100	100
Spodoptera exigua Hub.	88	92	100	100	92
S. frugiperda (J.E.Smith)	100	100	100	92	100
S. littoralis (Boisduval)	100	100	100	100	100
Trichoplusia ni Hub.	76	84	88	80	80
Xestia baja Dennis & Schiff	*	*	*	*	*
SPHINGIDAE					
Acherontia atropos Linn.	92	88	100	100	92
Hylles euphorbiae Linn.	80	88	80	80	82
Manduca sexta (L.)	*	*	*	*	*
SATURNIDAE					
Antherea pernyi	96	96	96	100	98
GEOMETRIDAE					
Campaea margaritata Linn.	*	*	*	*	*

* Larvae overwintered.

ferences observed were not significant (Table 1). The blood smears of dead/overwintering larvae also did not indicate the presence of viral inclusion bodies. This observation is in agreement with the known specificity of GVs in general (Ignoffo, 1968; Hurpin, 1973). Earlier success of cross infection was mostly restricted to the insect species of the same genus (Yamado and Oho, 1976; Payne *et al.*, 1981; Huber, 1982; Wan and Hu, 1986; Easwaramoorthy and Jayaraj, 1987). This indicates the need to develop artificial diets for *C.infuscatellus* and *C. sacchariphagus indicus* which will facilitate the large scale propagation of the viruses.

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KEY WORDS : Granulosis viruses, *Chilo infuscatellus, C. sacchariphagus indicus,* cross infection

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