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Effect of Certain Botanicals on the Incidence of *Vairimorpha* sp. in *Helicoverpa armigera* Larvae*

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The gram pod borer *Helicoverpa (=Heliothis) armigera* (Hbn) is a serious pest on crops like chickpea, pigeonpea and cotton. Recently, laboratory colonies of *H.armigera* were found to be infected with a microsporidian which was identified as *Vairimorpha* sp. (Ha strain) by Dr.W.M.Brooks of North Carolina University, U.S.A. The incidence of the microsporidian was also observed in larvae collected from chickpea fields in late Feb.93. Infected larvae were lethargic with loss of appetite, and assumed yellowish colour. Tissue smears examined under the phase contrast microscope revealed the spores in large numbers (Fig.1). Some of the infected larvae moulted to larval-pupal intermediates with the anterior part being larval and the posterior pupal (Fig.2). During our investigation with the nuclear polyhedrosis virus, we found that certain plant extracts acted as stressors for the virus infection. Hence, laboratory studies were undertaken to see if these botanicals would also act as stressors for the microsporidian.

Leaves of *Vitex negundo, Prosopis juliflora, Tagetus patula* and *Calotropis gigantea* were extracted with water using an all-glass pestle and mortar with a little acid - washed sand and the final concentration adjusted to 10 per cent. Similarly, seed kernels of neem *Azadirachta indica* were extracted with water and adjusted to one per cent concentration. The extracts were passed through a muslin cloth. Teepol was added at 0.1 per cent concentration. Chickpea shoots were dipped in the different extracts and shade-dried. The shoot ends were kept immersed in water to prevent wilting of the shoots. A laboratory culture of *H.armigera* known to carry the microsporidian infection was selected for the study. Second instar larvae of *H.armigera* were made to feed on the treated shoots for 24h. Then they were removed individually to vials containing semisynthetic

Table 1. Effect of certain botanicals on the incidence of *Vairimorpha* sp. in *H.armigera* larvae (II instar)

Treatment	% mortality due to *Vairimorpha* sp.*	% incidence of *Vairimorpha* sp. in surviving larvae $	Total % incidence*
Vitex negundo leaves 10%	42.5 ^{bc}	69.6	80.0 ^{bc}
Prosopis juliflora leaves 10%	40.0 ^{c}	62.5	76.7 ^{c}
Tagetus patula leaves 10%	35.0 ^{cd}	61.5	76.7 ^{c}
Calotropis gigantea leaves 10%	57.5 ^{b}	76.5	90.0 ^{ab}
Neem (*Azadirachta indica*) Seed kernel extract 1%	85.0 ^{a}	66.7	96.7 ^{a}
Control	20.0 ^{c}	56.3	66.7 ^{c}

* Means followed by similar letters are not different statistically (p=0.05) by DMRT
$ Differences between the means not significant

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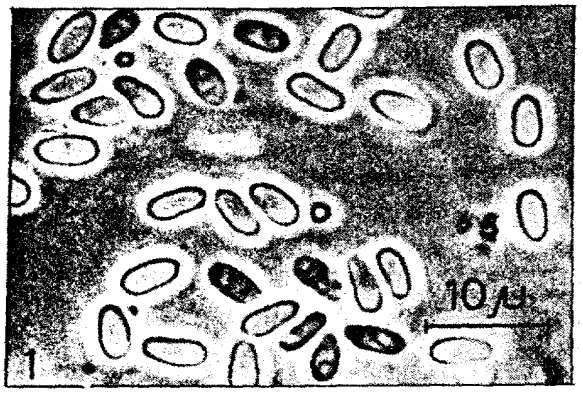

Fig. 1. Phase contrast photomicrograph of spores of *Vairimorpha* sp.

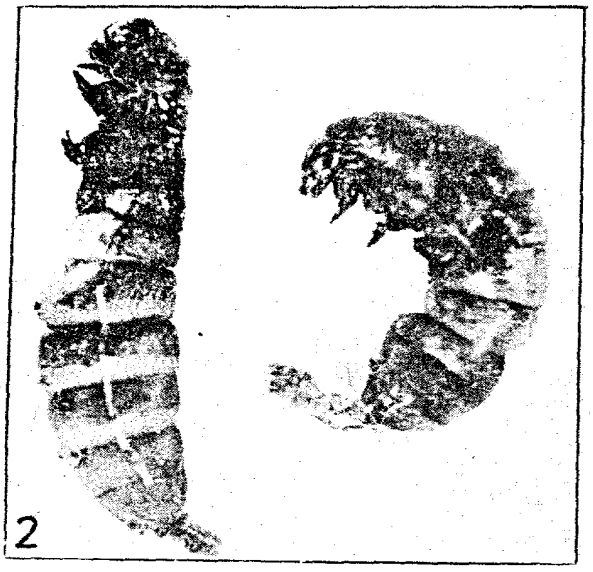

Fig. 2. Larval-pupal intermediate forms of *H.armigera* produced by *Vairimorpha* sp.

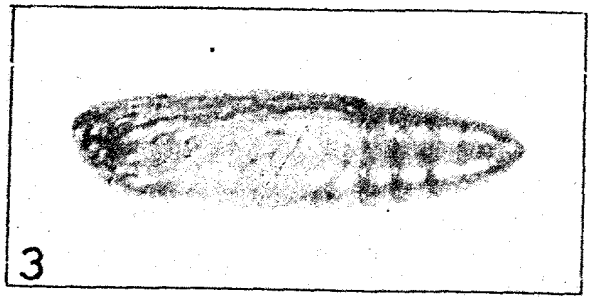

Fig.3. Normal pupa of *H.armigera*

diet and observed daily for mortality. For each treatment, 30 larvae were used in three replications. Tissue smears of dead larvae were examined under the phase contrast microscope to identify the cause of death. Fifteen days after the experiment, the surviving larvae were sacrificed and their smears examined for the spores of the microsporidian.

The data showed that the mortality due to *Vairimorpha* sp. was 20.0 per cent in control larvae, while in the different treatments, it was higher. *V.negundo, P.juliflora,* neem seed kernel and *C.gigantea* extracts recorded significantly higher mortalities than control larvae (Table 1). Neem seed kernel extract (NSKE) recorded the highest mortality. Examination of tissue smears of the surviving larvae revealed that the incidence of the microsporidian ranged from 56.3 to 76.5 per cent in the different treatments and the differences were not significant. When the total incidence was considered, NSKE and *C.gigantea* leaf extracts recorded significantly higher mortalities than control.

These data indicate that aqueous leaf extracts of *V.negundo, P.juliflora* and *C. gigantea* and NSKE can act as stressors for the microsporidian *Vairimorpha* sp. Smirnoff (1967) also reported that extracts of leaves of *Salix perifolia, Pisea mariana* and *Alamus rugosa* increased the mortality due to the microsporidian *Nosema cerasivoranus* in the uglynest caterpillar *Archips cerasivoranus. V. negundo* possessing insecticidal properties by itself (Bai and Kandasamy,1985) was found to enhance the activity of nuclear polyhedrosis virus in *H.armigera* (Rabindra *et al.,* 1991). Microsporidians have a fairly long incubation period and hence are not useful for short term control of pests. The results of the present studies however indicate the possibility of using botanicals for enhancing the activity of *Vairimorpha* sp. against *H.armigera* in integrated pest management programmes.

KEYWORDS: Botanicals, *Vairimorpha* sp., *Helicoverpa armigera*

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