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SUITABILITY OF SOME NON-SERICIGENOUS MACROLEPIDOPTERA AS ALTERNATE HOSTS FOR THE INDIAN UZIFLY *EXORISTA SORBILLANS* (WIED): (DIPTERA TACHINIDAE)

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Knowing the importance of alternate hosts in the maintenance of population dynamics of insects, the host suitability of 4 lepidoplerous insects of Indian Uzifly, *Exorista sorbillans* (Wied) was studied. The present paper contains a new information on the ovipositional preference and life cycle of *E. sorbillans in Paralellia algira* L., a non-sericigenous insect, under laboratory conditions for the first time.

Key words: Silkworm, *E. sorbillans,* Oviposition, Alternate host, *P. algira.*

Introduction

Exorista sorbillans, the Indian Uzifly, is a serious endoparasite of mulberry silkworm, *Bombyx mori* L. It was first recorded in the eastern regions of Indian, namely West Bengal, Bihar and Assam [1-3]. This parasite was unknown in South India until May 1980. When it was introduced through human agency (by transport of parasitized bivoltine cocoon) from West Bengal to Karnataka [4]. Due to Uzi infestation there is an economic loss of 15-20% to the silk industry.

Several workers have studied biology, mating and courtship behaviour, parasitism methods and the history of its prevalence [1,5-11].

Ovipositional preference of Uzifly on certain lepidopterous larvae was reported earlier [12]. However, there is no quantitative data to date on rearing *E. sorbillans* in hosts other than sericigenous insects. The objective of the present study was to evaluate the extent of Uzifly oviposition and larval survival on a variety of crop pests, in the vicinity of silk worm rearing houses. This may help understand the host relationships of the Uzifly and help facilitate effective control of it in future.

Materials and Methods

Puparia of *E. sorbillans* (Wied), procured from Karnataka State Sericulture Development Institute, Banglore, were kept in the laboratory cages in the insectary at 27±2° and 70% R. H. Adults after emergence were fed on resins and 10% glucose for honey solution.

Rearing host insects. The lepidopterous insects selected for the present study included *Achaea janata* (L), (*Paralellia algira* L., *Diacrisia obliqua* Walker, *Spodoptera litura* Fabr and the natural host of Uzi, the mulberry silkworm *Bobmyx mori* L. Of these *A. janata* and *P. algira* mostly feed on castor. *D. obliqua* is a polyphagous pest which is commonly found attacking mulberry leaves, and causes serious damage to a variety of crops. *S. litura* is also an important polyphagous pest causing heavy damage to various crops. Disease freelaying of *Bombyx mori* procured from State Sericulture Department, Shad Nagar, were reared in the laboratory insectary at 27±2°, 70% RH on mulberry leaves beloging to K_4 variety.

Host preference was studied in a choice test in which equal numbers of larvae of silkworm and other lepidopterous insects, *A. janata, P. algira, S. litura* and *D. obliqua* were exposed simultaneously for 24 hrs to one female and one male Uzi confined in a cage. The experiment comprised five replicates of equal numbers of different host species. Host preference was evaluated by counting the number of eggs deposited on each of the larval species under investigation.

In no choice tests, a sigle Uzi pair was released into cages containing separately the five species of lepidopterous insects. Egg number, percentage hatch, development time of maggots, pupariation etc. of Uzi in each of the host species provided were recorded.

Results and Discussion

The results of host preference and total number of eggs laid by *E. sorbillans* by free choice trials is presented in Table 1. *E. sorbillans* laid eggs on all the four lepidopterous species though there were wide variations in the egg count. The least number of eggs were recorded on *S. litura.*

In no choice trials, maximum fecundity of parasite was observed on *A. janata* followed by *P. algira, D. obliqua* and *S. litura.* The number of eggs recorded on each larva of all the 4 species under investigation was always observed to be more in comparison with free choice trials, in which all four species were provided for oviposition and confined to a single cage (Table 1). The average number of eggs obtained per host species is figured in Table 1.

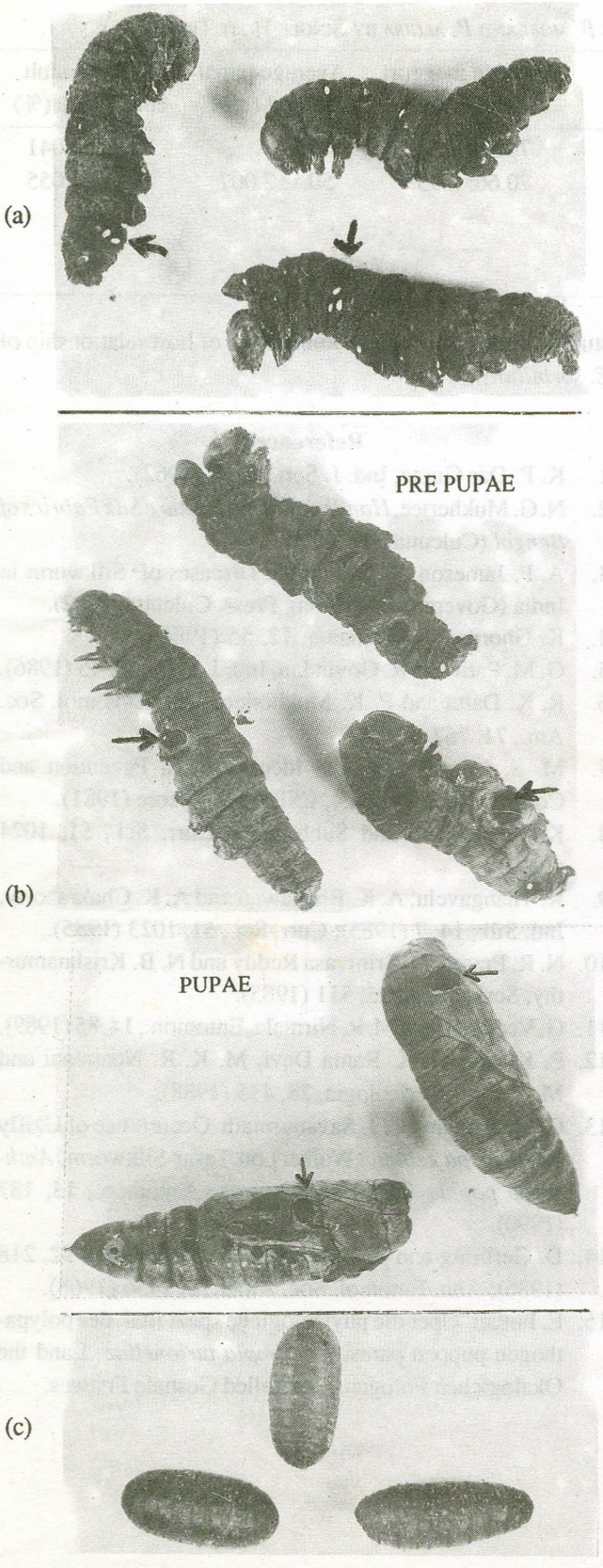

Fig. 1. Development of *E. sorbillans* in *P. algira*. (a) *P. algira* larvae with uzi eggs (arrow). (b) Pre pupae and pupae of *P. algira* showing the emergence holes made by *E. sorbillans* larvae. (c) Puparia of *E. sorbillans*.

Though oviposition was observed on all alternate hosts used, development to adult of *E. sorbillans* was observed only in *P. algira* (Fig. 1 a,b,c). Maggot and pupal weights of *E. sorbillans* developed in *P. algira* with, 1-2 eggs per host larva, compared with the natural host *B. mori* were not significantly different (Table 2). The life cycle of *P. algira* takes 25-30 days, as in the case of *B. mori*. Therefore, the results clearly indicate that neither the total development time nor the larval and pupal weights differ significantly in either species. On larvae of *P. algira* that contained 3-5 eggs of the parasitoid, egg hatch was observed to be normal but in such cases, due to competition for the host's nutrients, the maggots and puparia were undersized. This phenomenon of superparasitoidism was also common in the natural host *B. mori*, with insufficient host numbers.

It is interesting to note from the results of free choice trials, the ovi-positional preference of Uzifly on other lepidopterous larvae in the presence of its natural host. However, the tasar Uzi *Blepharipa zebina* (Walker), a major pest of tasar silkworm, does not cross infect mulberry silkworm *B. mori* in the presence of tasar larvae [13] but there are reports of *E. sorbillans* infecting tasar and eri [5,8]. However, there are no reports of Uzi preference to tasar and eri silkworms in the presence of mulberry silkworm.

In both free choice and no choice trials, the most preferred host was *A. janata* and the least preferred was *S. litura*. Although *A. janata* was preferred most, the parasitoid could not complete its life cycle due to the death of the host larvae. There are several cases where a host is accepted by a female as an ovipositional site, but no parasitoids emerge due to host death [14,15]. It appears that Uzi cannot reject an unsuitable host, due to the lack of an efficient behavioural mechanisms which prevents the risk of wasting eggs. The relative impor-

TABLE 1. OVIPOSITION PREFERENCE OF *E. SORBILLANS* IN DIFFERENT LEPIDOPTEROUS INSECTS (N=5).

Name of the insect	Total No. of eggs	Average No. of eggs
SINGLE HOST TRIALS		
A. janata	1065	213± 6.557
P. algira	875	175± 8
D. obliqua	65	13± 3.67
S. litura	50	10± 4.636
B. mori	465	93± 10.295
FREE CHOICE TRIALS		
A. janata	165	33± 8.774
P. algira	115	23± 5.7008
D. obliqua	20	4± 2.738
S. litura	20	4± 2.236
B. mori	100	20± 3.535

TABLE 2. COMPARATIVE LIFE TABLE OF *E. SORBILLANS* IN *B. MORI* AND *P. ALGIRA* BY SINGLE HOST TRIALS.

Site of oviposition	(%) egg hatch	Oviposition duration (hrs)	Pupal period (days)	Average maggort weight (mg)	Average pupal weight (mg)	Percent adult emergence (%)
B. mori	100	24-36	11± 1.41	70.3±1.587	49±2	79.66±4.041
P. algira	100	24-36	12.5±1.73	70.66±2.939	50.1±2.007	79.66±3.055
A. janata	—	—	—	—	—	—
D. obliqua	—	—	—	—	—	—
S. litura	—	—	—	—	—	—

tance of physical and chemical integumentary properties that influence host preference have not yet been determined, and the subject needs more detailed analyses.

The present observation indicates the *P. algira* would act as the best alternate host for the Uzifly, as the parasitoid could successfully complete its life cycle in it. Hence, there is possibility of switching over of Uzi from its natural host to alternate host caused by population depletion of the former, which in turn helps for the successful propagation of parasitoid. The successful development of Uzi in a non-sericigenous insect like *P. algira* would permit a population of *E. sorbillans* to exist outdoors aiding its dispersal. Therefore, control of such lepidopterous pests in and around sericultural areas is suggested for effective management of the parasitoid.

Conclusion

Ovipositional behaviour of Indian Uzifly *Exorista sorbillans* (Wied) towards certain lepidopterous larvae other than the natural host *Bombyx mori* L. was studied in the laboratory. When fifth instar larvae of *Paralellia algira, Achoea janata, Spodoptera litura* and *Diacrisia obliqua* were offered for oviposition to female of *E. sorbillans* by the choice and no choice methods, Uzifly females were found to oviposit in almost all of these even in the presence of its natural host. Laboratory records of Indian Uzifly life cycle in the lepidopteran larvae other than *B. mori* were made for the first time.

Although Uzifly showed high ovipositional preference to *A. janata*, the larvae were found unsuitable for the parasitoid development due to host larval mortality. Among the other hosts studied, *P. algira* was found to be most suitable as an alternate host for Uzifly. The duration of life cycle, the size and weight of the parasitoid reared in *P. algira* were not significantly different to individuals reared from its natural host. The study helps to increase the knowledge of host relationship of *E. sorbillans*.

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