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Parasitism preference of a Braconid wasp *Apanteles creatonoti* Viereck (Hymenoptera: Braconidae) Towards insect pests of agricultural and forest importance

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ABSTRACT

Apanteles creatonoti Viereck (Hymenoptera : Braconidae) is potential bicontrol agent of insect pests such as *Spilosoma obliqua* (Walker), *Amsacta moorei* Butler, *Amsacta albistriga* Walker and *Thiocidas postica* Wlk. Host specificity plays a very crucial role in enhancing biocontrol programs of a pest. Hence, host specificity and host preference of *A. creatonoti* have been studied. *S. obliqua, A. moorei, A.albistriga, T. postica, Spodoptera litura* Fab. and *Exelastis atomsa* Walsingham have been tried as hosts. Out of which *A. moorei* was found to be most suitable host for maximum progeny production. While, *E.atomosa* larvae were rejected for parasitism. The order of preference for parasitism was *A. moorei* > *A. albistriga* > *T. postica* > *S. obliqua* > *S. litura.*

Key words: *Apanteles creatonoti,* Host preference, biocontrol potential.

INTRODUCTION

Apanteles creatonoti Viereck (Hymenoptera: Braconidae) is larval, internal and polyphagus parasitoid which parasitize *Spilosoma obliqua* (Walker), *Amsacta moorei* Butler, *Amsacta albistriga* Walker, *Thiocidas postica* Wlk. *Spodoptera litura* Fab. and *Exelastis atomosa* Walsingham. The host parasitoid association is complex phenomenon (Vinson, 1976; Sathe, 2014). High rate of per cent parasitism and wide host preference are vital features of parasitoid used in biological pest control (Sathe and Oulkar, 2010, Sathe 2014). For effective implementation of biocontrol programs periodic introduction, colonization and mass production of biocontrol agents are essential aspects.

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A. creatonoti is potential bio-control agent of above said insect pests both in agro and forest ecosystems. Therefore, enhancing its biocontrol potential through parasitism on pest insects has practical value in pest control. Parasitism of a parasitoid can be affected by the size, movement, sound, age and specificity of host insect (Vinson, 1976; Sathe 2015). Host selection by parasitoid is divided into four steps: host habitat location, host location, host acceptance and host suitability. Therefore, the present work was aimed to find out most suitable host for maximum progeny production. Review of literature indicates that Cardona and Oatman (1971), Odebiyi and Oatman (1972), Thurston and Postley (1978), Jackson *et al*. (1979), Hopper and King (1984), Sathe (1984, 1987), Sathe *et al*. (1987a,b), Sathe and Margaj (2001), etc. worked on host suitability and host preference by braconid parasitoids.

MATERIALS AND METHODS

Initial culture of *A. creatonoti* and its hosts *S. obliqua, A. moorei, A. albistiga, T. postica, S. litura* and *E. atomosa have* been started by collecting the species from fields. Under laboratory conditions (27±1°C, 75-80% R.H. and 12 hr photoperiod) the parasitoid and

hosts were reared on their respective hosts and host plants. 4-5 day old hosts with 20 density of each species have been exposed to mated females of *A. creatonoti* for two hours for parasitization. The parasitized hosts were isolated from oviposition unit with their host plants. Then per cent parasitism of each host species has been recorded and on the basis of highest per cent parasitism, optimum preference of parasitoid to hosts has been finalized. The experiments were replicated for five times for confirmation of results.

RESULTS

Results are recorded in Table-1 and Figures. 1-4. *A. creatonoti* parasitized the larvae of *S. obliqua, A. moorei, A. albistriga, T. postica* and *S. litura* with 30.00%, 45.00%, 40.00%, 35.00% and 15.00% respectively.

The larvae of *E. atomosa* were not parasitized by the parasitoid. The order of preference was *A. moorei* > *A. albistriga* > *T. postica* > *S. obliqua* > *S. litura*. The most suitable host for *A. creatonoti* for maximum progeny production was *A. moorei.*

DISCUSSIONS

Host specificity in parasitic hymenoptera discloses many of the factors that determine whether or not any two given species are to be associated as host and parasitoid (Sathe and Margaj, 2001). According to Sathe & Santhakumar (1992) parasitoids may breed in the laboratory on unnatural hosts is often of great importance in the mass culture of parasitoids or field colonization. Some insects are more amenable to insectory production than others and breed on factious

Table-1. Host preference by *A. creatonoti* for maximum parasitism

Sr. No.	Host species	Host density	Per cent host mortality	Per cent moth emergence	Per cent parasitism
1.	*S. obliqua*	20	0.00	70.00	30.00
2.	*A. moorei*	20	5.00	50.00	45.00
3.	*A. albistriga*	20	5.00	55.00	40.00
4.	*T. postica*	20	0.00	65.00	35.00
5.	*S. litura*	20	0.00	85.00	15.00
6.	*E. atomosa*	20	5.00	95.00	0.00

Figure-1. *A. creatoniti- male and female*

Figure-2. Parasitoid larva

Figure-.3. *T.postica larva*

Figure-.4. *S.litura larvae*

hosts hence they have commercial basis in biological pest control.

A parasitoid may limit its attack to a fraction of suitable host species that occur in nature, has stimulated investigators for search for new hosts. According to Jackson *et al*. (1979) pinkboll worm *Pectinophora gossypiella* (Saunders), cotton boll worm *Heliothis zea* (Boddie), tobacco bud worm *Heliothis virescens* (F.), cabbage looper *Triplusia ni* Hubner and beet army worm *Spodoptera exigua* (Hubner) were suitable hosts for *Chelonus* (= *Microhelonus*) *blackburni* Cameron. However, salt marsh caterpillar *Estigmene acrea* (Drum) was not suitable for parasitism. According to Hopper and King (1984) *Microplitis croceipes* (Cresson) showed strong host instar preference towards *H. zea* and *H. virescens.* The parasitoid attacked 3rd instar larvae most and the preference was not dependent on total density or on the density of the most preferred instars. The sex ratio in parasitoid progeny production was not affected significantly by the instar parasitized and the development time in an instar was inversely correlated to the observed pattern of preferences. In an Ichneumonid parasitoid *Campoletis chlorideae* (Uchida) (Hymenoptera: Ichneumonidae) a wide range of hosts was noted; especially the parasitoid attacked the larvae of *Heliothis armigera* (Hubn.), *S. litura* and *S. exigua* but, the larvae of *E. atomosa* have been rejected (Sathe & Santhakumar, 1992). The order of preference was *H. armigera* > *S. litura* > *S. exigua.*

Sathe & Margaj (2001) studied host preference in *Apanteles arterus* Wilkinson, *Apanteles pusaensis* Lal and *Apanteles pectinophorae*. They reported that *A. arterus* gave preference to only *Erias insulana.* The other hosts *P. gossypiella, H. armigera, Sylepta derogata* Fab. and *S. litura* were rejected by this parasitoid. Similarly, *A. pectinophorae* only parasitized *P. gossypictla* and other hosts. *Earias insulana* (Boisd.) *H. armigera, S. derogata* and *S. litura* were rejected by the parasitoid. Likely, *A. pusaensis* also showed preference to single host viz., *S. derogata.* Other, above mentioned hosts has been rejected by the parasitoid *A. pusaensis*.

Sathe *et al*. (1988) studied the biology of *A. creatonoti* as a larval parasitoid of *T. postica*. They reported that the parasitoid completed its development from egg to adult within 14-15 days. However, they preferred 2nd instar larvae of *T. postica* for parasitization. Similarly, Sathe *et al*. (1987) studied the reproductive potential of *A. creatonoti* on *T. postica* with respect to host age. They reported that age groups 2-9 day old were susceptible for parasitism while, 4 day old hosts yielded maximum (41.33%) progeny production. Sathe (1987) recorded three natural enemies on *T. postica* including *A. creatonoti* which caused 30% mortality in second instar larvae.

Very recently, Jadhav & Sathe (2016) studied host preference by Uzifly *Exorista bombycis* L. in pure line bivoltine breeds Fc_1 and Fc_2 (*Bombyx mori* L.) and economical loss in seed cocoon production. Fc_1 produced more yield and was less susceptible to *E. bombycis* than Fc_2 pure line bivoltine breed. In the present study *A. creatonoti* showed good range of hosts with great biocontrol potential. Therefore, attention should be paid on mass propagation of *A. creatonoti* and their utility in biological control of insect pests (Sathe *et al*., 2003; Sathe & Chougale 2014; Sutar & Sathe, 2016).

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Conflict of Interests

Authors declare that there is no conflict of interests regarding the publication of this paper.

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