/. *Biol. Control,* 1 (1), 1-3, 1987

Competition and Survival of Two Parasites, *Chelonus blackburni* Cameron and *Trichogramma achaeae* Nagaraja and Nagarkatti in a Single Host During Multiple Parasitism

K. JAI RAO and YELSHETTY SUHAS
Department of Entomology
University of Agricultural Sciences, Dharwad 580 005

ABSTRACT

Competition and survival between the egg parasite *Trichogramma achaeae* Nagaraja and Nagarkatti and the egg-iarval parasite, *Chelonus blackburni* Cameron was studied in the laboratory on the eggs of *Corcyra cephalonica* Stainton. Considering the short life cycle, rapid development and feeding in its larval stage, *T. achaeaa* was found to compete and develop successfully irrespective of its initial or later parasitization,

Key words : *Chelonus blackburni* and *Tr ic ho gramma achaeae,* competition, survival in *Corcyra cephalonica*

Competition between two species of insects occurs when the food required is the same for both the species. Such a struggle will be more severe when the available food is in short supply. Some of the insect parasites which attack the host egg often meet with such a situation. *Chalonus blackburni* Cameron (Hymenoptera:Braconidae) is an egg-larval parasite which parasitises in the egg stage. *Trichogramma achaeae* Nagaraja and Nagarkatti (Hymenoptera : Trtchogrammatidae) also parasitises the egg stage. Both these species are being tried in India against cotton boilworms. Jn the present communication, an attempt has been made to throw light on the effect of competition on the development and survival of the two parasite species. Work on this aspect with different parasites has been reported by Smith (1 952), Salt (1961) and Pschorn-Walcher (1971).

MATERIALS AND METHODS

Competition and survival studies were made under laboratory condition with two species of parasites *viz.,* the egg parasite, *T. achaeaa* and the egg-larval parasite, *C. blackburni,* using fresh eggs of rice moth, *Corcyra cephalonica* Stainton as host In the first set of experiments, the eggs of C. *cephalonica* were parasitised by *T achaeae* and later exposed to *C. blackburni* for parasitisation after 6(T_L), 12(T_2), 18(T_3), 24(T_4K 36(T_S) and 48 (T_5);hours. in treatments 7(T_7) and 8(T_8), the eggs were exposed to only *T. achaeae* or *C. blackburni,* respectively. In another set, the eggs of *C. cephalonica* were initially parasitised jby *C. blackburni* and subsequently exposed to *T. achaeae* at regular intervals as mentioned above. There were three replications each consisting of 20 eggs glued on a piece of card and exposed to either parasitoid for twelve hours. Four days after parasi-

tisation, the number of eggs which turned black and found parasitised by *Tr/chogramma* were counted and percentage parasitisation was recorded. fn case of *Che/onus, Corcyra* larvae soon after hatching were dissected individually on a siide with the help of fine rnicro needles in glycerin solution and based on the presence or absence of *Chetonus* larva, % parasitisation was worked out. The experiment was conducted during December, 1986 when the average maxfmum and minimum temperature and relative humidity in the laboratory were 27.7°C and 27.2°C, and 81.5% and 46.5%, respectively.

RESULTS AND DISCUSSION

Extent of parasitisation (%) by *T. achaeae* and *C. blackburni* when the eggs of *C. cephalonica* were initially exposed to *T. achaeae* and subsequently parasitised by *C. blackburni* (set-1,) and vice versa (set-2) are presented in Table 1. !n the first set, successful parasitisation by *Tr/chogramma* ranged from 53.67 (in T_4) to 71.67% (T_3) but statistically they were on par with each other whereas, parasitisation by *Che/onus* ranged from 0.0 to 4.0%. In the second set of experiments where eggs were exposed to *Chelonus* first and later to *Tr/chogramma* for parasitisation, similar trend in parasitisation by *Trichogramma* was noticed Parasitisation by *Chelonus* was highest in Ti(3O.O0%) which was on par with T_c(19.33%).

From the above two sets of experiments, it is evident that the egg parasite *T. achaeae* competes with the egg-larvai parasite, *C. blackburni.* Such a successful development is possible due to its developmental advantage. The egg of *Tr/chogramma* hatches (in 16 to 18 h) earlier than *Che/onus* (24 h). As soon as the egg hatches, larval feeding on the embryonic content of the host egg may be quick and due to lack of food

Table 1. Multiple parasitism by *Trichogramma achaeae* and *Chelonus blackburni* on *Corcyr cephalonica* (Mean of three observations)

Treatments	Initial exposure to *Trichogramma* and subsequently parasitised fc>y *Chelonus* *Trichogramma-Che/onus* (First setj Parasitisation *(%)* by		T Initial exposure to *Chelonus* and later parasitised by *Trichogramma* *Chefonus-Trichogramma* (Second setj Parasitisation (%) by	
	T richogramma	*Chelonus*	*Trichogramma*	*Chelonus*
1.	59.36 ab	4.00 b	45.67 d	30.00.b
2.	68.00 ab	0.33 b	47.00 d	17.00 bed
3.	71 .67 ab	0.00 b	62.00 bed	0.33 e
4.	53.67 b	0.00 b	70.00 abc	5.67 cd
5.	63.67 ab	4.00 b	7 5.00 ab	3.67 d
6.	63.36 ab	3.25 b	55.00 cd	1 9 33 be
7.	78.00 §	*0.00* b	0.0O e	65.00 a
8.	00.00 c	63.67 a	83.67 a	0.00 e

In a vertical column, means followed by same letters are not different statistically (P = 0.05) by L.S.D.

the grub of *Che/onus* may die even if it hatches early. HageP (1964) reported that aggressive action between larvae of their own species or of different species may be due to biting with mandibles or by secreting a cytolytic enzyme by the first larva which is destructive to the iater appearing larvae. In majority of the egg-larva! parasites, larval development is very slow soon after hatching in the host and it is triggered only when it is-fuU grown. But in the egg parasites, larval feeding and development is very fast and the life cycle is completed in the egg itself. This advantage of fast development may eliminate the other parasites present in the egg. Further, it is desirable to know the extent of parasitisation by these two parasites under field conditions and later a decision has to be made as to the species advantageous for undertaking field releases.

REFERENCES

Hagen. K.S. 1964. Developmental stages of parasites. In : *Biological Control* of *Insect Pests* and *Weeds* (Paul DeBach ed). pp. 168-246.

Pschorn-Walcher, H. 1971. Experiments on interspecific competition between three sp^ectes ot T.^etunwis attack.r.o t-«* ?.<..; a cintf moth boiei, D/jr/j^a jj,\-flt;i.',s O) *Entomophaga,* 16,125-131.

Salt, G. 1961. Competition among insect parasitoids. *Symposia Soc. Exper. Biol.,* 1 5, 96-119.

Smith, O.J. 1952. Biology and behaviour of *Microctonus vittatae* Muesbeck (B raconid ae). *Univ. California Publ. Ent.,* 9, 315-144.

J. flioj Control. 1(1), 3—6, 1987

Seasonal History and Biologica] Control of San Jose Scale *Quadraspidiotus perniciosus* (Comstock;) (Diaspidae : Homoptera) on Apple in Kashmir

MASOODI M. AMIN AND A. R. TRALI
Division *of* Entomology, Sher-e-Kashmir University of Agricultural Sciences and Technology, Srinagar)9l 121

ABSTRACT

The San Jose scale completed two generations with a partially incomplete third generation which over-wintered from November on apple trees in Kashmir. The population entered hibernation in all stages but nymphs of first instar survived. The overwintering nymphs became active in middle of March. The winged males emerged in late April. The females gave rise to first generation crawlers in tha third waek of May, about one month after the emergence of males- The second generation crawlers started emerging in the third week of July and development was completed in the first week of September. Nymphs of the third generation started appearing in the last week of September which stopped development in the end of November and entered hibernation.