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Xanthopimplapredator- A Major Pupal Parasitoid on the Cocoons of Tropical Tasar Silkworm *Anthereaemy Littadrury*

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ABSTRACT

Present study has been carried out to analyse the percentage loss ofAnthereaemylittadrury(Daba T.V) cocoonsat various durations of open environmental exposure due to Xanthopimpla infestation.The results revealed that the cocoons of first,second and third crops reared under rearing netexposed to open environment for 10,20 and 30 days have shown 1%,8-13% and 9-15%infestation and cocoon loss.Metamorphosis of Xanthopimpla in the three crops found to vary between 14-15 days, 13-15days and 15-16 days in 10, 20 and 30 days of open exposure.The results also show that the Xanthopimpla mortality in the infestedcocoons of first, second and third crops was 1-2% on 10 days exposure,1-2% in 20 days exposure and 1-3% in 30 days of open exposure. It was also recorded that Xanthopimpla predators have sexual preference for males in parasitism. It was recorded that the cocoons of first, second and third cropskept under captivity even after rearing have been protected from Xanthopimpla attack.The larval parameters like duration and weightrecorded during three crops found to be increased from first crop to third crop as 32-43days and 30.6-39.8gm.The effective rate of rearing also increased from first crop to third crop as 78-85%.

Key words: Infestation,Mortality,Metamorphosis,Xanthopimpla, Anthereaemylittadrury.

I.INTRODUCTION

The tasar silk is produced by *Anthereaemylitta Drury* (*Lepidoptera: Saturnidae*), a wild polyphagous tropical sericigenous insect distributed over central India. The insect feeds primarily on, *TerminaliatomentosaShorearobustaand Terminaliaarjuna* in addition to secondary and tertiary food plants [1]. The species has wide distribution over diverse ecological niche as forty four ecoraces but only a few are semi-domesticated and applied commercially for seed (egg) and silk production [2]. The physiological potential of life performance of the insect is always challenged by abundance of food and its quality, various abiotic factors, presence of predators, parasites and diseases which affect the cocoon yield. Tasar rearing being outdoor, there is a certain extent of cocoon loss due to parasites, predators and vagaries of nature. It has been estimated that in hibernating stock about 20-30% loss of seed cocoons due to pupal mortality and unseasonal emergence which in turn reduces themultiplication rate of tasar cocoons. *Ichneumons* are important endoparasitoids of insect hosts mainly larvae and pupae of *Lepidoptera*. Among that,*Xanthopimpla(hymenoptera*), *Blepharipa(diptera*) are

pupal and larval parasites of silkworm[3]. The species of pupal parasitoid, *Xanthopimplastemmator*, was recorded from Maharashtraand Andhra Pradesh [4].*Ichneumonidae* was also the dominant pupal parasitoid of the *painted apple moth*[5].

II. MATERIALS AND METHODS

The present work was conducted in BSM and TC (Basic seed multiplication and training centre), Central silk board, Chennoor, Adilabad, Andhra Pradesh,India.About 1000 newly hatched larvae of *Anthereaemylitta* (*DabaT.V.)* were reared under rearing net on the *Terminaliaarjuna* plantation available in the field till cocooning. The cocoons harvested from first crop and second crop were subjected for selection for second crop. In the second and third cropscocoons were preserved in the cages made up of wire mesh of size 2ftx2ftx2ft under temperature of 29±1ºC and humidity70±1percent. The emerged moths were tested for *pebrine* disease by a method derived from that used in sericulture **[6]**.The eggs laid by healthy moths were collected and incubated for hatching.First,second and third crop *DabaT.V*cocoons were reared under rearing net to prevent *Xanthopimpla*infestation during cocoon spinning.Based on duration of open environment exposure cocoons obtained from first, second and third crop were divided into four batches of 100 each, as T1-10 days exposure,T2-20daysexposure,T3-30daysexposure and T4-30 days exposure(control).T1,T2andT3 batch cocoons were exposed to the open environment whereas T4 batch cocoons were kept under captivity. An electric balance of Dhona-make was used to measure the weight of fifth instar larvaein three crops. Larval duration was also recorded in the threecrops. The effective rate or rearing in first, secondand third crop was recorded as follows

ERR% = (Total number of cocoons produced / Total number of larvae brushed) X 100.

III. RESULTS AND DISCUSSION

Table 1 explains the rearing performance of *Daba T.V.* Among 1000 larvae brushed during first, secondand third crops, 780, 800 and 850 cocoons were formed. The larval duration recordedduring the three cropswas 32, 38 and 43days and thus increased from first crop to the thirdcrop. Larval weight also found increased from first crop to the third crop and it was 30.6,35.8 and 39.8gm.Larval duration and weight increases from first crop to third crop[7].Number of cocoons harvested, increased from first crop to the third crop and so the effective rate of rearing found increased from 78%-85%.

Table 2,3 and 4 shows the various durations of *Daba T.V.*cocoons exposed to open environment and *Xanthopimpla*infestation. It has observed that the cocoons of T1, T2 and T3 batches were infested by *Xanthopimpla* and laid with an egg. In all the three batches it was found that *Xanthopimpla*attacks the cocoons between 6-10 a.m and 4-6 p.m.Several species of hymenopteran parasitoids are able to locate concealed pupal hosts by vibrational sounds[8]. Parasitic wasps can accurately find the location of their hidden hosts and parasitiseby using olfactory semiochemicals from larvae and adults [9].It was also found that the parasitoid during ovipositionattains inverted “U” shape and leaves the cocoon after oviposition. It was observed that during oviposition by *Xanthopimpla*,tasar pupa flutters vigourously.Active pupa of *Actiasmaenas* when disturbed by an external stimulus found heard rolling in the papery cocoon [10].

The T1 batch cocoons of first crop which were exposed to open environment for 10 days did not show any *Xanthopimpla*infestation. Whereas T1 batch cocoons of second crop which were exposed to open environment for 10 days have shown 8% infestation of which 7 were male and 1 was female cocoon. In these cocoonsX*anthopimpla*has taken 14 daysfor metamorphosis. It was also noted that 7 cocoons were with live*Xanthopimpla* and 1 with dead *Xanthopimpla*.T1 batch cocoons of third crop exposed to open environment for 10 days have shown 9% infestation in which 7 were male and 2 were female cocoons.*Xanthopimpla*predators has sexual preference for males in parasitism of host [11, 12]. It was also recorded that, the predator had taken 15 days for metamorphosis.

The T2 batch cocoons of first crop which were exposed to open environment for 20 days have shown 1% of *Xanthopimpla* infestationof which the one is the male cocoon. After 15 days of metamorphosis, the infested cocoon found bearing the dead *Xanthopimpla.* It was also observed that on 20 days of open exposure, T2 batch cocoons of second crop have shown 11% of infestation of which 2 female and 9 were male cocoons. The cocoons observed with live *Xanthopimpla* were 10 and with dead was 1. The period of metamorphosis of *Xanthopimpla*in T2 batch cocoonswas 13 days during secondcrop. In the third crop cocoons,on 20 days of open environment exposure 14% of infestation was recorded of which 13 were male and 1 was female cocoon. In this crop 13 cocoons were found with live *Xanthopimpla* and 1 cocoon with dead *Xanthopimpla* after 14 days of metamorphosis.

It was observed that on 30 days of open exposure, T3 batch cocoons of first crop have shown 1% of*Xanthopimpla* infestation of which the one is the male cocoon. After 14 days of metamorphosis, the infested cocoon found bearing the live *Xanthopimpla*It was also recorded that during second crop 13% of T3 batch cocoons were infested of which 12 were male and 1was female cocoon.After 16 days of metamorphosis 12 cocoons were found with live *Xanthopimpla* and 1 with dead *Xanthopimpla*. During third crop, 15% ofT3 batch cocoons were infested of which 13 were male and 2 female cocoons.After 15 days of metamorphosis it was recorded that 14 cocoons were bearing live *Xanthopimpla* and 1 with dead.

It was also noted that in comparison with the control,duringsecond and third crops as the duration of open environment exposure of cocoons increases the infestation rate also increased of which almost all the infested were male cocoons whereas in first crop the effect was not found.In contrast with the control, it was also recorded that in second and third crops as the duration of open exposure increases the number of live *Xanthopimpla*emerging from cocoons were recorded more.It was also noted that the rate of infestation and cocoons bearing live *Xanthopimpla* increased from first crop to third crop. It was also recorded that the cocoons of first, second andthirdcrops kept under captivity have been protected from *Xanthopimpla* attack.

Thus in conclusion *Xanthopimplapredator*has sexual preference in parasitism and the infestation rate on the cocoons of tropical tasar silkworm was high andincreased from first crop to third crop causingcocoon loss, thereby constituting the most important mortality factor of tasar cocoons which can be controlled by keeping the cocoons under captivity.

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REFERENCES

1) U.S.P.Sinha, A.K.Siha, P.P.Srivastava and B.N. Brahmachari, Studies on the variation in chemical constituents in relation to maturity of leaves in three primary food plants of tropical tasar silkworm *AntheraeamylittaD.Indian Journal of Sericulture, 31(1),* 1992,83-86

2) U.N.Singh, Rajnarain, D. Chakravorthy and P.N.Tripathi, Sex preference in host parasitisation of *Xanthopimpla predator fabricus*(Hymenoptera:Ichneuminidae)a major parasitoid of tasarsilkworm,*Anthereaemylitta Drury, Sericologia,50(3),*2010,369-378.

3) Sabine Fischer, Jorgsamietz and Silvia Dorn, Host location of a pupal parasitoid in a tritrophic system compared to a model of fer in mechano sensory cues only, *Journal of insect behavior, 17(2),* 2004, 191-199.

4) A.H. Duale and K.F. Nwanze, Incidence and distribution in sorghum of the spotted stem borer *Chilopartellus* and associated natural enemies in farmers' fields in Andhrapradesh and Maharashtra states, *International Journal of pest management, 45(1),*1999, 3-7.

5) P.J.Gerard, J.G.Charles, M.R.McNeill, S.Hardwick, M.B.Malipatil and F.D.Page, Parasitoids of the painted apple moth *Teiaanartoides Walker* (Lepidoptera: Lymantriidae) in Australia, *Australian Journal of Entomology,50(3),* 2011,281-289.

6) L.Pasteur, Etudes sur la maladie des vers a soie, Gauthier-Villars, Paris,Tome I, pp.322 Tome II, pp.327, 1870.

7) M.Lakshmi,*Studies on the genome stability in Andhra local ecoracetassarsilkworm,A.mylitta.D with special reference to environmental factors*.Ph.DThesis submitted to Kakatiyauniversity,Warangal,AndhraPradesh,India, 2011.

8) N.Suryanarayana, Kumar and Rand Gargi, Monograph on Indian TropicalTasar silkworm food plants. Central Tasar Research and Training Institute, Central Silk Board, Ranchi, India, pp.1-9,2005.

9) N.Suryanarayana and A.K.Srivastava,Monograph on tropical tasarsilkworm.Centraltasar research and training institute,Central Silk board,Ranchi, India.pp.1-13,2005.

10)Wang Xiaoyi and Yang Zhongqi.Behavioral mechanisms of parasitic wasps for searching concealed insect hosts.*Actaecologica sinica,28(3),*2008,1257-1269.

11)A.WolfgangNassig and Richard stevenpeigler, The life history of *Actiasmaenas*(saturniidae), *Journal of lepidopteran society, 38(2),* 1984,114-123. .

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Table: 1 Rearing performance of *DabaT.V.*duringfirst, secondand third crops.

Crop	Number of larvae Brushed	Larval Duration (days)	Larval Weight (gm)	Number of cocoons produced	ERR% (Effective Rate of Rearing)
First crop	1000	32	30.6	780	78%
Second crop	1000	38	35.8	800	80%
Third crop	1000	43	39.8	850	85%

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Table:2 Infestation of *Xanthopimpla* on first crop cocoons

Batch	No. of cocoons	Period of Exposure (days)	No. of Cocoons infested	No. of Female Cocoons infested	No. of Male Cocoons infested	No. of Cocoons with live *Xantho pimpla*	No. of Cocoons with dead *Xantho pimpla*	Period of Metamo rphosis in *Xantho pimpla* (days)
T1	100	10	-	-	-	-	-	-
T2	100	20	1	-	1	-	1	15
T3	100	30	1	-	1	1	-	14
T4 (cont rol)	100	30	–	–	–	–	–	–

Table:3 Infestation of *Xanthopimpla* on second crop cocoons

Batch	No. of cocoons	Period of Exposure (days)	No. of Cocoons infested	No. of Female Cocoons infested	No. of Male Cocoons infested	No. of Cocoons with live *Xantho pimpla*	No. of Cocoons with dead *Xantho pimpla*	Period of Metamo rphosis in *Xantho pimpla* (days)
T1	100	10	8	1	7	7	1	14
T2	100	20	11	2	9	10	1	13
T3	100	30	13	1	12	12	1	16
T4 (cont rol)	100	30	–	–	–	–	–	–

Table: 4 Infestationof *Xanthopimpla* on third crop cocoons

Batch	No. of cocoons	Period of exposure (days)	No. of cocoons infested	No. of female cocoons infested	No. of male cocoons infested	No. of cocoons with live *Xantho pimpla*	No. of cocoons with dead *Xanthopimpla*	Period of metamo rphosis in *Xantho Pimpla* (days)
T1	100	10	9	2	7	7	2	15
T2	100	20	14	1	13	13	1	14
T3	100	30	15	2	13	14	1	15
T4 (Control)	100	30	–	–	–	–	–	–