Biolife 9(1):1-5
AN INTERNATIONAL QUARTERLY JOURNAL OF BIOLOGY & LIFE SCIENCES
ISSN (online): 2320-4257
www.biolifejournals.com
BIOLIFE ORIGINAL ARTICLE

Incidence of borers on *Terminalia arjuna* W. & A. and their control in Osmanabad, Marathwada region

Chandani Kamble[1] and T.V. Sathe[2]

[1]Department of Zoology, M. H. Shinde Mahavidyalaya, Tisangi
[2]Dept. of Zoology, Shivaji University, Kolhapur 416 004
Email : profdrtvsathe@rediffmail.com

ABSTRACT

Terminalia arjuna W. & A. is an important food plant for rearing *Antheraca mylitta* Drury for wild silk production. *T. arjuna* is attacked by three borers viz., *Aeolesthes holocericea* Fab., *Sphenoptera cupriventris* Kerr. and *Inderbela quadrinotata* (Walk.). *I. quadrinotata* lay eggs on the crop plant in February-March while, other species lay in May-June. Grubs cause death of side branches later the entire plant by boring. The above borers were controlled by using chloropyriphos 20% EC 0.05%, 0.1%, dichlorvos 76% EC .75%, .15% and Azadirachtin 10000 EC 0.05%, 0.1%. Sealing bored holes with petroleum oil and mud, killing pests in bored holes with iron hooks and collecting larvae as early in the morning from bored frass helped controlling the pest species.

Key words: Incidence, borers, *Terminalia arjuna*, control, wild sericulture, Marathwada.

INTRODUCTION

Osmanabad is situated on 18°119.8376" N longitude and 76°230.9804" E altitude in Marathwada. Its rainfall is comparatively low 312-633 mm. Therefore, *T. arjuna* is supposed to be good source of wild sericulture and economy in the region. *Terminalia arjuna* is very important food plant of wild silk moth *Antheraea mylitta* Drury. *T. arjuna* (Family - Combretaceae) is widely scattered in India specially Andhra Pradesh, Bihar, Chhatisgarh, Jharkhand, Karnataka, Kerala, Maharashtra, Madhya Pradesh, Odisha, Telengana, Tamil Nadu, Uttar Pradesh and West Bengal (Dwivedi, 2007). *T. arjuna* has medicinal and sericultural value. Its bark is cardio-protective (Dwivedi & Chopra, 2014). Central Silk Board of India has paid serious attention for the cultivation and utilization of this plant in wild sericulture. *T. arjuna* is used for systematic plantation for seed purpose and for forest plantations for cocoon production in wild sericulture industry.

How to Cite this Article:
Chandani Kamble and T.V. Sathe (2021). Incidence of borers on *Terminalia arjuna* W. & A. and their control in Osmanabad, Marathwada region. *Biolife*. 9(1), 1-5.
DOI: https://dx.doi.org/10.5281/zenodo.7823067

Received: 7 November 2020; Accepted : 12 December 2020; Published online: 26 January 2021

Due to increasing demand of tasar silk, farmers are paying tremendous attention for plantation and utilization of *T. arjuna* in wild silk production. Since wild silk has better medicinal value than domestic silk (Kavane & Sathe, 2011). Therefore, tasar sericulture is considered to be a potential area in the agriculture sector (Pastakia *et al*., 2015).

T. arjuna is susceptible for good number of insects (Kavane & Sathe, 2011) defoliators, leaf miners, cell sap suction and borers are important groups of pest insects on *T. arjuna.* Among the above groups borers are most dangerous since they are internal feeders and have long life cycles and difficult to control with insecticides. Borers affect vigor and growth of the plants and cause death of side branches and main trunk.

T. arjuna has been considered as economically important crop in India due to its multipurpose utility in the diversified fields. It has been used as potential source of food for *A. mylitta* in Osmanabad region.

T. arjuna is attacked by mainly three borers viz. *Sphenoptera cupriventris* Kerr. (Coleoptera : Buprestidae), *Aeolasthes holosericea* Fabr. (Coleoptera : Cerambycidae), *Indarbela quadrinotata* (Walker) (Lepidoptera : Cossidae) Patil *et al*., (2016). All above species cause severe damage to *T. arjuna* by causing death of side branches and later the entire plant. Both, larval and adult stages are destructive in coleopterous species and only the larvae are

destructive in lepidopterans (Sathe, 2018, Kamble & Sathe, 2016; & Sathe & Kamble, 2015).

MATERIALS AND METHODS

Studies were conducted at Osmanabad region of Marathwada. Osmanabad is situated at 18°119.8376" N longitude and 76°230.9804" E altitude At ISL five year old plants were taken into account for observations during 2019-20. The rainy season starts from mid of June & remains till the end of Sept. From Oct. & Nov. climate is humid. Feb. & March climate is dry.

Samplings were from area of Osmanabad Tahasil and visualized as blooks infected and non-infected. The percentage and pattern of infection was estimated and healthy plants were recorded. Infected branches and trunks of plants were recorded at weekly interval. The number of branches infected and non-infected were noted and damage percentage was calculated. As a part of chemical control measures, Chloropyrifos 20 EC @ 0.05% and 0.1%, dichlorvos 76 EC 0.75% and 0.15% and Azadirachtin 10000 mm (EC) 0.005% and 0.01% were tried and reduction in infestation was noted. Observations were recorded 30 days after insecticidal applications. For bark eating caterpillar fresh feeding areas was taken into account. Other control measure like sealing the borer portions with petroleum and mud and killing borers inside bored portion by iron hooks was also followed.

RESULTS

Results are recorded in Tables 1 & 2 and Figures 1-3.

***A. holocericea* :** Both grubs and adults damaged the crop plant by feeding on bark and stem and cause the death of side branches and main trunk. Eggs were deposited on the wounds of plants and the angles between two branches. After hatching grubs bored into the bark and later main stem. Within 5 to 10 days eggs were hatched. The grub was with strong mandibles. It bored deeper upto sapwood as a result side branches and main trunk died. The grub had galleries in the stem and pupated in gallery. Grub period was 12-14 months while pupal period was 1 week to 4 weeks depending on climate. Adults were found in May & June. They mated with 2-3 weeks and started to egg laying on wounded portions of the plant.

***S. cupriventris* :** Life cycle and nature of damage of this species was more or less same as in *A. holocericea.* Both adults and grubs caused damage to *T. arjuna* by feeding on bark and stem by boring. The eggs were laid on small pits on the bark. After hating the eggs, the grubs fed on bark and later on the stem by boring into it. At the time of adult emergence from the plant, the individual prepared an exit (outlet) which was also destructive to crop plant. The symptoms of damage caused by the species were the gum exudation, bark splitting, rotting and fungus growth on damaged parts. Severe damage led the death of plants.

I. quadrinotata : Whitish eggs were laid on the bark of the crop plant in February and then in May-June. They hatched with 10 days. Newly emerged larvae bored into the bark and cause death of side branches. The larval period was 280-290 days. While pupal period was 20 to 30 days depending on climates. Only larval stage of the pest was destructive.

Table-1. Comparative damage by pest insects

Pest species	Percent damage	Control
A. holocericea	90.50%	a) Sealing bored holes with petroleum and mud. b) Killing of pests in bored portion by iron hooks. c) Catching larvaes from bored holes and frass at early morning.
S. cupriventris	98.00%	
I. quadrinotata	78.00%	

Table-2. Effect of insecticides on borers of *T. arjuna* after 30 days of application

Insecticide	Qty. applied	Reduction in damage by *A. holocericea*	Reduction in damage by *S. cupriventris*	Reduction in damage by *I. quadrinotata*
Chlorophyriphos 20% EC	0.05% 0.1%	65.00 80.00	60.00 82.00	68.00 88.00
Dichlorvos 76%EC	0.75% 0.15%	45.00 60.00	46.00 59.00	51.00 62.00
Azadirachtin 10000 ppm EC	0.05% 0.1%	45.00 57.00	47.00 57.00	48.00 58.00

Figure-1. Larva *A. holocericea*

Figure-2. T. arjuna* damage by *A. holocericea

Details of results are shown in table 1 & 2 and figs. 1 to 4. Highest damage (98.00%) to *T. arjuna* was caused by *S. cupriventris* which was followed by *A. holocericea* 90% and *T. quadrinotata* 78.00%. Out of 3 insecticides viz. Chlorophyriphos 20% EC, Dichlorvos 76% EC and Azadriachtin 10000 EC. Chloropyriphos was most effective which reduced highest 80.00%, 82.00% and 88.00% reduction in damage in *A. holocericea, S. cupriventris* and *T. quadrinotata* respectively and Azadriachtin 10000 EC was least effective which reduced maximum 57.00%, 57.00% and 58.00% damage in *A. holocericea, S. cupriventris* and *T. quadrinotata* respectively while Dichlorvos was found moderate for reduction of damage by above three pest species (Table-2). Sealing bored holes of crop with petroleum and mud, killing of larvae and beetles by injecting iron hooks in bored portion were effective control measures against these borers. As a part of behaviour of larvae, they come out from bore for throwing waste and frass at early in the morning watchfully. They should be collected and killed by dipping into kerosinized water or insecticidae.

***Figure-3. T. arjuna* plant**

DISCUSSION

Wild sericultural food plants are widely attacked by pests and diseases and difficult to control in open environment (Kavane & Sathe, 2011). The food plants used in wild sericulture must be pest and disease free. Both biotic and abiotic factors devitalize the host food plants and ultimately reduces the quantity and quality of food in sericulture. In the present study, *A. holocericea, S. cupriventris* and *T. quadrinotata* were dominant pests in Osmanabad area of Marathwada region where farmers are more attracted to wild sericulture rather than traditional agricultural practices. The highest incidence of pest species may be due to continuous cultivation of the crop and low resistance capacity of *T. arjuna.* The host plants might have less energy for maintaining immunity to defend the biotic and abiotic factors (Preeti Tirkey *et al*., 2019).

Figure-4. T. arjuna* branch damaged by *T. quadrinotata

According to Dhar *et al*. (1989) various stem borer species *Psiloptera tastuosa* and *S. kanbierensis* damaged *T. arjuna* and *T. tomentosa* with 40%. They concluded that highest infestation was due to continuous cultivation of crop for 10 years while in some blocks of Kargikota, the infestation was low due to less cultivation period. According to Buwai & Trlica (1977) *S. cupriventris* damage was more in the block plantation on which tasar silkworm rearing has been practiced since several years. Drought stressed, newly planted or those with trunk wounds enhanced the flat headed borer (*S. cupriventris*) infection (Taun Beedes, 2014). According to George Mathew (1997) alternative hosts as well as age, were the major factors influencing *T. Quadrinotata* and build-up in the plantation of *T. arjuna*. Once the pest had infested, its persistence behaviour helped to multiply continuously.

The present study was conducted for the first time in Marathwada region which is comparatively dry and with less rainfall compared to Western Maharashtra and Vidarbha regioin of Maharashtra is considered to be base line report of wild sericulture.

Phylogenetic and ecological research on insect species gives valuable information on population structure, gene flow, speciation and genetic diversity, and gives a clarification on insect diversity based on their relations with ecological factors, either biotic or abiotic. Molecular marker data help to distinguish populations of a species as well as to resolve taxonomic relationships of a species under study. The marker allows breeders to produce different new variety with desirable characters. The molecular markers data are also considered very much useful in the conservation of species (Bakkappa *et al*. 2011; Bindroo and Moorthy 2014; Wani *et al*. 2013).

ACKNOWLEDGEMENT

Authors are thankful to Principal Dr. N.K. Shinde, M.H. Shinde Mahavidyalaya, Tisangi and Shivaji University, Kolhapur for providing facilities to authors.

Conflicts of Interest

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

References

[1] Buwai M. & Trlica M.J. Multiple defoliation effects on herbage yield, vigor and total non-structural carbohydrates of five range species. *Journal of Range Management* (3), 164-171 (1977).

[2] Dhar, S., Mandal K.C.; Singh R.N.; Bhengara S.R. and Sen Gupta K. Biocoenology and Community Structure of pests and predators in tropical tasar region, Ranchi, India. *Sericologia* 29, 67-86 (1989).

[3] Dwivedi, S. & Chopra, D. Revisiting *Terminalia arjuna.* An Ancient cardiovascular drug. *Journal of Traditional and Complementary Medicine*, 4(4), 224-231 (2014).

[4] Dwivedi, S. *Terminalia arjuna* Wight and Arm. A useful drug for cardiovascular disorders. *J. Ethnopharmacol*., 1, 114-129 (2007).

[5] George Mathew 1997. Management of bark caterpillar *Indarbela quadrinotata* in forest plantations of Paraserianthes falcataria KFRI. Research report-122, Kerala Forest Research Institute, Peechi, Trissur.

[6] Kamble C.S. & T.V.Sathe. Diversity, seasonal abundance, distribution & damage of Jassids to crop from Western Maharashtra, *Biolife* 4(2), 357-363 (2016).

[7] Kavane R.P. & T.V. Sathe. Wild Silk Technology. Daya Publishing Housing, New Delhi pp 1-224 (2011).

[8] Pastakia, A.; Alam, S.; Satyanarayan, K.; Pandya H.; Dahal B.R. and Khandai, R. Reel of fortune building inclusive value chains : the case of tasar silk in Bihar and Jharkhand PRADAN, New Delhi (2015).

[9] Patil S.S.; Sutar M.V. and T.V. Sathe Diversity, biology and control of insect pests of teak *Tectona grandis* (Linnueus) from Western Maharashtra. *Biolife,* 4(1), 141-146 (2016).

[10] Preeti Tirkey, Chandrashekhraiah, M., Rathore M.S.; Singh, R.K.; Sinha, R.B. and Alok Sahay. Studies on level of infestion of flat headed borer and

Bark eating caterpillar on *Terminalia arjuna* and their management using insecticides. *Int. J. Curr. Microbiol. App. Sci*. 8(1), 598-605 (2019).
[11] Sathe T.V. & Kamble C. First report, occurrence, Biology, ecology & control of fig psylla Homotoma indica (Hemiptera:Homotomidae) from Kolhapur region, India *Biolife* 3(3) : 702-709 (2015).
[12] Sathe T.V. A text book of forest Entomology. Daya Publishing Housing, New Delhi, a division of Astral International Pvt. Ltd., pp. 1-233 (2018).
[13] Taun Beddes, 2014. Pacific Hat headed borer and Utah State University Extension and UPPD Lab. Ent-170-14PR, February 2014.