https://doi.org/10.31426/ijamsr.2018.1.10.1011

IJAMSR

International Journal of Advanced Multidisciplinary Scientific Research (IJAMSR) ISSN:2581-4281

ASSESSMENT OF BARK EATER INFESTATIONS AND ITS MANAGEMENT IN TERMINALIA ARJUNA, PRIMARY FOOD PLANT OF TASAR SILKWORM

J. Singh[1], Kishan Singh Rawat[2], Vishal Mittal[1], T. Pandiaraj[1], S. Kujur[1], G. P Singh[1], Alok Sahay[1]

[1]Central Tasar Research and Training Institute, Ranchi, Jharkhand, India
[2]Centre for Remote Sensing and Geo-Informatics, Sathyabama Institute of Science and Technology, Chennai, India.

Email: jitendrasingh.iari@gmail.com,

Keywords: *Bark eater infestation-Outer layer of the tree-protection against pest and diseases.*

ABSTRACT

An experiment was conducted with an aim to assess the bark eater infestation in Terminalia Arjuna, a primary Tasar food plant at different plots viz., 1, 5, 6, 11, 18 and 22 of research farms at the Central Tasar Research and Training Institute, Ranchi. The results revealed that infestation of bark eater was observed at decreasing trend in the order of plot number 18 (20.12%) > 11 (19.57%) >5 (11.73%) >1 (10%) > 22 (8.75%) > 6 (5.54%). The highest infestation was observed in the plot in 18 where recorded 20.12%, whereas, less infestation as 5.94% in 6th plot with an average infestation of bark eater was 13% in Arjuna plants. The overall average severity of bark eater infestation was observed low (93), moderate (38) and high (33) respectively. Regards management, treatment includes remove web with the help of the knife along with Neem extract and water @ 1:5 ratio showed highest shining (80%) of outer bark with 75% successful control bark eater in Arjuna plantation.

Citation: *J. Singh, Kishan Singh Rawat, Vishal Mittal, T. Pandiaraj, S. Kujur, G. P Singh, Alok Sahay (2018). Assessment Of Bark Eater Infestations And Its Management In Terminalia Arjuna, Primary Food Plant Of Tasar Silkworm. International Journal of Advanced Multidisciplinary Scientific Research (IJAMSR) ISSN:2581-4281 Vol 1, Issue 10, December, 2018, #Art.1011, pp 1-5*

Introduction

The bark is the outermost layer of the stem of a tree which transports nutrients from the leaves to the rest of the tree and also protects the tree from dehydration. It is a sort of blanket, enveloping the exposed surfaces of trunks, branches and roots. It protects the plants from

https://doi.org/10.31426/ijamsr.2018.1.10.1011

IJAMSR

International Journal of
Advanced Multidisciplinary Scientific Research (IJAMSR) ISSN:2581-4281

insects and pathogens. The bark also functions as a medium for plant excretion and protects the plant from abrupt climatic changes **(Ghosh, D., 2013)**. Arjuna, Terminalia Arjuna, is an important primary food plant of Tasar silkworm, Antheraea mylitta Drury. In Tasar production the plantation of Arjuna plants had more than others food plants at Basic Seed Multiplication and Training Centre (BSM&TC), Regional Tasar Research Station (RTRS) and Regional Extension Centre (REC). Several pests are damaging Arjuna plants. Among these pests, the bark eater is a serious pest of Arjuna, Terminalia Arjuna. Early stages of bark eaters' damages cannot easily identify. The damage symptoms will be expressed after the formation of elongated zigzag ribbon-like messy web or galleries made by fragments of bark pieces & excreta with silk, near the fork or angles of the stem or branches. When remove the web, it can be visible as small hole in the angle of the matured branches and larva can be observed. Tasar food plants would not die when a slight attack of bark eater but as an increasing attack by bark eater the tree may die as the sap movement blocked.

The caterpillar is nocturnal in nature and feeds on the bark of the host plant under a frass ribbon and remains hidden inside the galleries formed at the forking points on the trunk and branches during the day, making its management difficult. Different methods have been suggested from time to time for the management of bark caterpillar which include; injecting kerosene, chloroform and petrol Srivastava, 1972), insecticides (Verma et al., 1972), granule placement in the galleries (Verma, 1985) and spot treatment through insecticide sprays (Sandhu et.al., 1987; Mathew and Rugmini, 1998). For taller trees under forest situations, insecticide sprays using power sprayers have been recommended (Sangha and Makkar, 2005). Still identification of bark eater infestation in plants, direction of plants, area of plots which had a high infestation and selection of suitable management practices for their management, which is economically viable, socially acceptable and eco-friendly is a challenging task for scientists.

Materials and Methods

2.1 Description of the Study Area

The study area is situated in the Central Tasar Research and Training Institute, Piska-Nagri, district of Ranchi, Jharkhand state. Lying between 22º 30' and 24º 30' N Latitude and between 83º22' and 85º 06' E Longitude at an altitude of 651 meters above MSL. The region enjoys a humid to sub-tropical climate and receives a mean annual rainfall of 1323.00 mm in 100 rainy days. The maximum temperature ranges from 29.3 °C to 36.2 °C and the minimum temperature ranges from 4.5 °C to 19.8 °C.

2.2 Experimental design

2.2.1 Bark eater infestation assessment study

The study was conducted at arboriculture research plot (plot no. 1, 5, 6, 11, 18 and 22) of CTR&TI, Ranchi during 2017-18. Based on severity, bark eater infestation was scored into four types, i.e., Score 0 meant healthy tree with no borer attack, Score 1 meant tree infested by one bark eater as low infestation, Score 2 meant tree affected by two barks eater as moderate infestation, Score 3 meant tree affected by 3 or more as heavy infestation. Based on infestation of symptom, one, two and three ribbons found per web per hole in the plant were categorized into low moderate and high, respectively.

https://doi.org/10.31426/ijamsr.2018.1.10.1011

IJAMSR

International Journal of
Advanced Multidisciplinary Scientific Research (IJAMSR) ISSN:2581-4281

2.2.2 Management of Bark eater infestation

Further, the study was adopted by different management in host plants (*Terminalia arjuna*,) based on cost effective, eco-friendly and socially acceptable. In this study, the treatments were control (T_1), Remove web with the help of knife (T_2), Remove web with the help of knife + kill pest with iron wire (T_3), agrozyme @ 5ml/litre (T_4), agrozyme @ 10ml/litre (T_5), agrozyme @ 15ml/litre (T_6), neem extraction and water @ 1:5 ratio (T_7), neem extraction and water @ 1:10 ratio (T_8), neem extraction and water @ 1:15 ratio (T_9), T_2 + T_4 (T_{10}), T_2+T_5 (T_{11}), T_2+T_6 (T_{12}), T_2+T_7 (T_{13}), T_2+T_8 (T_{14}), T_2+T_9 (T_{15}). The neem extraction was prepared by one kg neem leaf mixed with 2 litre butter milk or 0.5kg curd and diluted to 2 litres with water. The mixture was stored in earthen pot air tightly covered with lid and muslin cloth in dark room. After fifteen days, the solution was mixed thoroughly and filtered. This filtered content was used as a base solution for preparation of bio-pesticides.

2.2.3 The efficacy of different methods on bark eater infestation and shining of the outer bark

The different treatment combinations were evaluated and given a rating as below

1. Control of new web formation up to 25% (A)
2. Control of new web formation up to 50% (B)
3. Control of new web formation up to 75% (C)
4. Control of new web formation up to 100% (D)
5. Recovery of outer part of bark up to 20% (*)
6. Recovery of outer bark up to 40% (**)
7. Recovery of bark up to 60% (***)
8. Recovery of bark up to 80% (****)
9. Recovery of bark up to 100% (****)
10. Recovery of outer part of bark up to 20% and no control in web formation (*)
11. Recovery of outer bark up to 40% and control 25% web formation (**A)
12. Recovery of bark up to 60% and control 50% web formation (***B)
13. Recovery of bark up to 80% and control 75% web formation (****C)
14. Recovery of bark up to 100% and control 100 % web formation (*****D)

3. Results and Discussion

3.1 Bark eater infestation assessment in plots

The bark eater infestation assessment was done on all the selected plots. The low infestation was observed in 6th plot followed by 22nd, 1st, 5th and 11th plots. The infestation was higher (20.12%) in 18th plot (Table 1). The minimum infestation of bark eater (5.94%) in plot 6th might be due to proper management, *i.e.* right time pruning, outer bark removal, right time application of balanced organic and inorganic fertilizer and suitable soil moisture conservation practices followed in respective plot. Further, regular monitoring and mechanical measures against bark infestation could reduced severity of infestation upto 50%. In general, higher infestation was associated with weak, unhealthy and old, plant as compared to healthy and new plants. In our investigation, more than 10% of bark eater infestation was observed in 1st, 5th, 11th and 18th plots.

https://doi.org/10.31426/ijamsr.2018.1.10.1011

IJAMSR

International Journal of
Advanced Multidisciplinary Scientific Research (IJAMSR) ISSN:2581-4281

On the other hand, plot number 6 and 22 had observed less than 10% of bark infestation.

Table 1 Assessment of bark eater infestation damage (%) at arboriculture research plot of CTR&TI, Ranchi

Plot No.	Total No. of plants	Bark eater infested plants	% of pest infestations
1	970	97	10.00
5	2550	299	11.73
6	1127	61	5.94
11	1247	244	19.57
18	840	169	20.12
22	1063	93	8.75
Mean	1300	161	13.00

3.2 Severity of bark eater

Base on severity, the infestation of bark eater has been categorized and given in Table 4. The maximum and minimum infestation of low category was found in plot 1 (223 no's) and 6 (41 no's), respectively. The similar trend had also been noted under moderate category. However, the maximum and minimum infestation of high category was found in plot 11 (131 no's) and 5 (5 no's), respectively. The present investigation observed that the infestation of host plants by bark eater was higher in order to low category, followed by moderate and higher in all the plots except plot number 11th where maximum infestation was observed under the high category followed by low and moderate.

Table No. 4: Category of bark eater infestation based on Severity of damage in plots of CTR&TI, Ranchi.

Plot No.	Low	Moderate	High
1	58	26	13
5	223	67	10
6	41	15	5
11	81	56	131
18	118	34	18
22	37	32	23
Mean	93	38	33

3.4 Efficacy of management treatments

The management treatments for controlling of bark eater infestation have been provided In Table 5. The different treatments were assessed based on their controlling efficiency against bark eater pests. Of all the treatment combinations, the T_3 had proved an effective method against bark eater pests. The T_7 consisted with 1:5 Neem extract + water showed quick recovery of plants from bark eater infestation after applying measures. Further, the treatment T_{13} has shown that higher recovery of outer bark upto 80% with 75% the management of bark eater in tasar food plant. The fermented buttermilk contains billions of bacteria that suppress the growth of other bad bacteria, fungi and protozoa. The inhibitors released by these bacteria work against the unwanted pathogens. Moreover, fermented butter, milk also contains the useful nutrients for the growth and maturation of the crop plant (**Kumawat, *et, al.*, 2014)**

https://doi.org/10.31426/ijamsr.2018.1.10.1011

IJAMSR

International Journal of
Advanced Multidisciplinary Scientific Research (IJAMSR) ISSN:2581-4281

Table.5. The efficacy of different treatment combinations adopted against bark eater infestation and recovery of outer bark in *Terminalia Arjuna* plants

Sr.No.	Treatment combinations	Efficacy
1	Control	**Zero**
2	Remove web with the help of a knife	**B**
3	Remove web with the help of knife + kill pest with iron wire	**C**
4	5ml/litre agrozyme	**A***
5	10ml/litre agrozyme	**A***
6	15ml/litre agrozyme	**A***
7	1:5 Neem extract + water	**A****
8	1:10 Neem extract + water	**A***
9	1:15 Neem extract + water	**A***
10	Remove web with the help of knife + 5ml/litre agrozyme	**C****
11	Remove web with the help of knife + 10ml/litre agrozyme	**C****
12	Remove web with the help of knife + 15ml/litre agrozyme	**C****
13	Remove web with the help of knife + 1:5 Neem extract + water	**C****
14	Remove web with the help of knife + 1:10 Neem extract + water	**C*****
15	Remove web with the help of knife + 1:15 Neem extract + water	**C*****

Conclusion

From above the study it could be concluded that the outer layer bark of the tree is utmost important in relation to health and quality leaf production and protection against pest and diseases. Bark eater is a severe pest attack in Tasar host plants which affect the quality of the leaf and nutrient movement leads to tree susceptible to various pests and diseases. The plots 6th and 1st are showing less infestation of bark eater. All the plots showing the trend in severity category in declining order to low followed by medium and by high except plot number 11. The treatment T_{13} showed the highest percentage of outer bark recovery after applying control measures in tasar food plants. Therefore, the above treatment has proved Eco friendly, cost effective and practically adaptable approach to control bark eater infestations in tasar food plants.

References

1) ***Ghosh, D. (2013).*** *Living on the Bark, Journal of Science Education. 18 (1), 51-66.*
2) ***Narendra Kumawat1*, P. S. Shekhawat1, Rakesh Kumar2 and R. C. Sanwal1 (2014):*** *Formulation of bio-pesticides for insect pests and diseases management in organic farming, Popular Kheti Volume -2, Issue-2 ISSN: 2321-0001*
3) ***Sidhu, M. and Poon C.K., (1983).*** *Efficacy of insecticide soaked cotton plugs against caterpillars of Indarbela sp. (Lepidoptera: Metarbelidae) infesting guava trees. Pesticides, 22 (9): 19-20.*
4) ***Sandhu, G.S.; Sohi, A.S. and Batra, R.C (1987).*** *Comparison of different methods for the management of the bark-eating caterpillar Indarbela quadrinotata (Metarbelidae: Lepidoptera) infesting fruit and avenue trees in Punjab. Punjab Horticultural Journal, 27(3-4): 255-259.*
5) ***Verma. T.D (1985).*** *Incidence and chemical control of bark- eating caterpillar, Indar bela quadrinotata Walker on plum trees. Indian Journal of Agricultural Sciences.55 (2): 131-132.*