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Major threat of extinction to Tropical Tasar culture in forest based ecosystems of Eturnagaram wild regions, JS Bhupalpally District: An analytical survey on silkworm-*Antheraea mylitta*.

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Abstract

Tasar culture is an age-old traditional practice of backward tribal populations in India. Tasar silkworm, *Antheraea mylitta* Drury with two ecoraces, Daba TV and BV are culturing in forests of Eturnagaram sanctuary. Tasar culture is supported by 323 tribals families' in 6 villages located in the different regions of forest. *A mylitta* is a wild, polyphagous, sericigenous insect feed on *Terminalia arjuna*, *Terminalia tomentosa*. Daba silk worms contain high quality of protein composition (70-75% Fibroin and 25-30% sericin) with numerous applications in textile industry, cosmetics, and biomaterials preparation, and pharmaceuticals, medical and surgical fields.

Tasar silkworms facing serious threats from diseases such as *Virosis, Bacteriosis, pests, predators etc., and abiotic hazards* like *temperature, humidity* and rainfall. The massive deforestation, improper management and poor marketing systems, lack of awareness, technology and research add 80-90% crop loss. According to the Central Silk Board Report of 2018, In the year 2016-17 the national output of tasar productivity is 3268 (Metric Tons), but it is declined to 2998 (Metric Tons) in 2017-18. This decline indicates that the wild silkworm culture will be in danger and surrender to extinction. There is an urgent need to develop the proper systems to save this vast and valuable genetic diversity. The present project study is a survey undertaken in the Eturnagaram wildlife sanctuary forest areas in Jayashankar Bhupalpally Dist. to study the threats in tropical tasar culture of silkworm *A. mylitta*.

Back ground of research work (Literature review)

Sericulture is an agro-based cottage industry involving rearing of *vanya* silkworms for the production of raw silk, which the yarn is obtained out of cocoons spun by mulberry and non mulberry silk worms during larval stage and spin cocoon. The life cycle of the silkworm includes egg, larva, pupa, cocoon and adult moth stage.



Fig 1:A.mylitta moths, female (left side 3 yellow).
Male (right brown 6) .

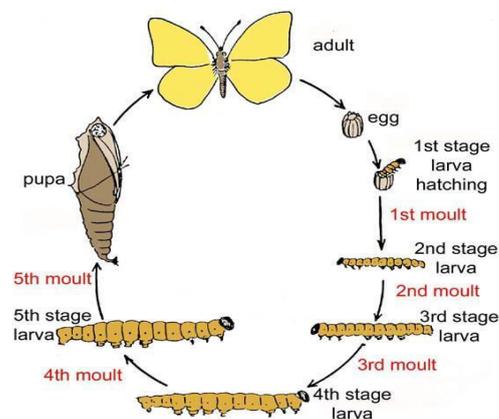


Fig 2: Life cycle of tasar silk worm
Showing different stages.

The tasar silkworm, *Antheraea mylitta* Daba ecoraces distributed in diverse geographic and varied eco-climatic conditions like temperature, humidity, photoperiod, rainfall etc. Tasar rearing is practicing in southern and south west states of India, include Karnataka, Andhra Pradesh, Bihar, Madhya Pradesh, Orissa, Jharkhand, Chhattisgarh, Maharashtra ,and Telangana in on forest plants terminalia *arjuna*, terminalia *tomentosa*, Shorea *robusta* etc. providing employment to the back tribals, especially women and unskilled workers. "Silk is the Queen of textiles" with high quality of protein (70-75% **Fibroin** and 25-30% **sericin**) with numerous applications in textile industry, cosmetics, biomaterials preparation, pharmaceuticals, medical and surgical fields.

The rich biological and genetic diversity of *A. mylitta* is largely due to its wide range of distribution (G Renuka, G Shamitha, 2015). The majority of crop loss in tasar silkworm rearing is resulting due to viral disease and considerable loss from *bacteriosis* 10-15% to silk production (G.P. Singh et al.,).



Figure3: Virus attacked larvae of 5 th instar stage.

As the rearing is conducted completely outdoors in the forest, and thereby the rearing of tasar silkworms are subjected to many fluctuations in the climatic conditions (temperature and humidity) that often lead to viral attacks. The predators like *Ichneumon fly*, *Canthecona bug*, *reduviid bug*, *Hierodula bipapilla* (*Praying mantis*) etc., which are natural enemies in abundance in the rearing field which cause crop loss. Numerous insects thrive on tasar silkworm, of these *Xanthopimpla* (*hymenoptera*), *Blepharipa* (*Diptera*) are pupal and larval parasites, *Cantherona*, (*hemiptera*), *Hierodulla bipapilla* (*dictyoptera*), and predators of different age groups cause 30 - 40% crop loss (Shiva Kumar G. and Shamitha G, 2013). Diverse groups of animals like *frogs*, *bats*, *birds*, *snakes*, *lizards* etc and parasitic *nematodes* (*Hexamormis sp.*), further increase the extent of larval damage. Pests attack food plants *T. arjuna* and *T. tomentosa* include *Coleoptera* and *Chrysomelids* which are chlorophyll suckers and root destroyers (G. Shiva Kumar and Shamitha G, 2013).

Therefore, a survey was undertaken at Eturnagaram forest areas in Jayashankar Dist. to study the damage and crop loss of parasites and predators of tropical tasar silkworm *A. mylitta*. The crop loss caused by both the parasites and predators was studied and mortality of tasar silkworm *A. mylitta* was estimated. In addition, predation by birds, lizards, squirrels, and rats was also recorded. (Ganesh B et al.,2016).



Figure4: students visit a rearing centre in forest at Shapelly village, Eurnagaram mandal.

Due to these enormous loss dependent tribals were forced to other fields as labourers and may migrate to other places for their daily livelihood. These causes lead to neglecting tasar culture in forest areas of this district. There is no proper study and investigation on this issue to initiate the recoveries and modulate the research work. Therefore, a survey was undertaken at Eturnagaram forest areas in Jayashankar Dist. to study the damage and crop loss of parasites and predators of tropical tasar silkworm *A. mylitta*. The crop loss caused by both the parasites and predators was studied and mortality of Daba silkworm was estimated.

Methodology of research project.

To study the rearing procedures, causes, effects and threats of tasar culture, we are grouped with 6 students from B.Sc.BZC course of I, II and III years, and surveyed in 7 locations of tasar rearing units in the forest of Eturnagaram wildlife sanctuary during august - November in this year 2018. We were enquired 53 formers (rearers) and 32 labourers of tasar rearing villages of *Shapelly, Venkatapuram, A.Ghanapuram, Dodla Kothapally, Mangapeta, Thupakulagudem and Chalwai*. The grainage (egg production) centres of Government silk Boards also visited in *Warangal, Mahadevpur, Mulugu venkatapur and jakaram* and investigated for information regarding diseases attacked to *eggs, larvae, pupae and adult moths* and **mortality rate**. Forest plantations of *Terminalia sp. (maddi plants)* and nurseries of forest departments also enquired for their contribution to tasar rearing and socio economic status of tribal populations. The data gathered from the different sources is analyzed and interpreted.



Figure 5: Students visited Terminalia sp. plantation in the forest Department at Eurnagaram.



Fig.6: students observing cocoon productivity at Venkatapur yard.



Fig.5: Visited matured moths in Grainage Centre at Venkatapuram, Mulugu.



Figure5: Enquiring the tribal labourers at Shapelly forest, in Etunagaram mandal.



Figure 6: Students surveying for Terminalia (maddi) matured plants in the interiors of forest at D. Kothapally, Eturnagaram.

Results analysis

Pathogenic invaders and their severity is different in different geographical regions although they all belong to the same forest ecosystems. The viral attacks are predominant and damage majorly viz., **50-60% mortality** rates to the rearing silkworm during all stages of life cycle especially. The larval period is more susceptible to viral infections. Loss of bacterial diseases is **14-20%** and humid environments contribute to infection. **10-15%** crop loss is recorded in every crop due to predation from bats, birds, snakes, lizards, rats and squirrels etc. Fungal and protozoan diseases are mild (**5-8%**) except pebrine (**10-20%**) damage. Fluctuations of environmental stress also disappoint the tasar culture frequently.

Tribal formers of tasar culture converted to daily wage labourers and worked for their minimum daily livelihood either in tasar culture or in other fields due to the continuous loss in silk worm rearing. Terminalia (maddi trees) in the forest are rapidly disappearing from the anthropogenic damage of deforestation which increases the distance between villages and forests. This is an unbearable situation to the rearers and they do not pay interested in this task and searching for alternate work and forced into the agriculture or other fields as labourers.

Table1: Percentage of crop loss due to adverse biotic and abiotic conditions.

s.no.	type of damage	% of crop loss
1	viral	50-60
2	bacterial	14-20
3	Protozoan	10-12
4	Fungal	3-6
5	Predators	10-15
6	Abiotic stress	10-15

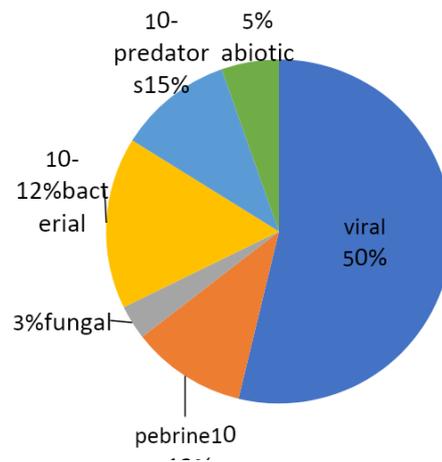


Chart1: Percentage of crop loss as depicted in table1.

Discussion

Tasar culture is a village based cottage industry that provides employment to backward populations in forest regions, especially women and unskilled or weaker. The major proteins of silk thread are fibroin and sericin with a wide range of applications in *textile cosmetic, pharmaceutical, biomedical and surgical* fields. Due to the wild nature of living some more unknown advantageous characters might be present in Tasar silkworm. Abiotic and biotic stresses causing **80-90%** of crop loss in every season (*G.Shiva Kumar and Shamitha.G, 2013*) may throw the vanya silk worms into vulnerable species list. Problems associated with tasar culture force the dependents as agricultural labourers and sometimes it leads to migration. Diseases, predation, improper management and poor marketing systems, lack of awareness, technology and research along with deforestation etc., are drastic damages to tropical tasar culture to a great extent.

Conclusion and suggestions

Proper management and marketing systems, implementation of technology and research can show some betterment in developing the tropical tasar culture Daba ecoraces of *Antheraea mylitta* in the forest area of Eturunagaram. Government involvement and encouragement is essential to enhance the conservation strategies immediately.

Future scope of research

Diseases caused by viruses and bacteria are major threats to tasar culture in forest ecosystems. There is a gap between specific research and sustainable development of vanya silk worm *A.mylitta*. Susceptibility to biotic and abiotic stresses also to be revealed through wide research to achieve success in natural genetic diversity conservation.

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