

GENETICALLY ANALYSIS OF DIFFERENT ECORACES OF TASAR SILK MOTH OF ANTHERAEA SPECIES

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Abstract

Tasar silk is delivered from the tasar silkworms (Insecta: Lepidoptera: Saturniidae) which has numerous ecoraces chiefly constrained by winning ecological conditions. The tasar silkworms are developed ex-situ in regular woodlands, in any case, a few endeavors have been made for its semi-training. Tasar culture is a conventional occupation for lakhs of innate populace in our nation. The present investigation portrays the variety in the various phases of tasar silkworm Antheraea mylitta Drury which is dispersed as ecoraces in changed geological regions. From the examinations it is seen that rich organic decent variety of Antheraea mylitta Drury principally is because of its wide scope of dissemination, climatic variables, and nourishment plants and so forth. Which have prompted varieties in their ethology and physiology. The various strains of the tasar silkworm, Antheraea mylitta were examined utilizing the straightforward grouping rehash tied down polymerase chain response (SSR and ISSR - tied down PCR).

Keywords: tasar silkworm, Antheraea mylitta drury, SSR primers, phylogeny

INTRODUCTION

Silkworm rearing has won in the vast majority of Sericulture nations with a mind-boggling improvement in the silk creation and delivered conspicuous economically significant silkworm breeds. However tropical tasar silkworm Antheraea mylitta D is one of the significant sericigenous creepy crawly species is monetarily abused for the generation of tasar silk in India. Tasarculture being rehearsing in Focal, Northern and Eastern districts generally on Terminalia arjuna (Arjun) and T. tomentosa (Asan) woodland plants just as monetary ranch. Furthermore, huge number of tasar cases is additionally gathered from Shorea robusta (Sal) and other optional nourishment plants. Tropical tasar silkworm has a wide scope of appropriation in differed geo-climatic condition (Happy et al., 1968; Sengupta et al., 1993; Singh and Srivastava, 1997; Srivastava et al., 2003 and Suryanarana and Srivastava, 2005). Scrounging of silkworm on assortment of nourishment plants, yearly precipitation, day length, plant progression entomb alia factors like scope, longitude, the height and so forth.

A century back, Antheraea sp were generally dispersed all through the tropical and subtropical belts of India (Siddique et al., 1992). Regardless of the monstrous deforestation they are as yet found in well-outlined ecozones (Sprightly, 1974) and for the most part separated dependent on phenotypic characteristics (cover weight, shading, and so on.). Subsequently legitimate hereditary portrayal is a significant advance for fitting protection and use of wild hereditary materials in reproducing program (Chatterjee, et al., 2004). A few sub-atomic markers like RAPD, RFLP, SSR, ISSR and SNP have been created if there should be an occurrence of Bombyx mori (Yasukochi, 1998, Tan et al., 2001, Reddy et al., 1999, Nagaraju, et al., 2002, Cheng et al., 2004). In 2006, Mahendran et al., have recognized and portrayed a MboI-processed genomic DNA section, which were utilized as RFLP markers to recognize the firmly related ecoraces of tropical tasar silkworm A. mylitta D.

Tropical tasar silkworm *Antheraea mylitta* speak to variety for various subjective and quantitative attributes of essential natural and financial interests, for example, silk quality, fertility, malady obstruction and resistance to different ecological elements in its populaces. It is polyphagous in nature, however principally adjusted to three significant nourishment plants, yet benefits from number of other host plants in various topographical locales of India. The biochemical parameters have been end up being important apparatuses for considering hereditary variety in characteristic populaces and have been utilized as valuable markers in plant and creature rearing projects.

Populaces of a few animal varieties are additionally characterized by taxonomists into subspecies, races, demes, clines, etc, of which just cline and deme have non-self-assertive definitions. Ecotypes comprise of hereditarily unmistakable subsets of populaces in an animal varieties that are specific to specific situations. All the for the most part, ecotypes can be characterized as subsets of populaces inside an animal types that have distinctive principal specialties. The Indian tasar silkworm, *Antheraea mylitta* is a characteristic fauna of tropical India, disseminated in various land areas and natural surroundings in this nation. Conceivably, in view of the unmistakable environmental conditions winning in these various regions, a few morphological variations, generally called ecoraces, have been distinguished in *A. mylitta*. As high as 44 ecoraces are accounted for in this species, which feed fundamentally on *Terminalia* (Family: Combretaceae) species and *Shorea robusta* (Family: Dipterocarpaceae), and furthermore on various auxiliary nourishment plants. The sort *Terminalia* and *Shorea* are very far phylogenetically. Albeit both are Rosids, *Terminalia* have a place with request Myrtales and *Shorea* to Malvales. The ecoraces are uni, bi or trivoltine relying on the geo-biological conditions and vary from one another in a few subjective and quantitative attributes, for example, cover weight and shading, larval shading, etc. Albeit the vast majority of these ecotypes don't interbreed in nature, some of them produce posterity when mated in bondage.

A lepidopteran creepy crawly of the Saturniidae family creates tasar silk of business significance. This species is endemic and conveyed in various land districts of India as environmental races (Table 1). They show variety in their phenotypic qualities, for example, fertility, voltinism, casing weight, silk proportion and furthermore in their host plant inclination. Two significant issues of this non-mulberry silkworm are (1) slowly diminishing number of ecoraces and (2) their recognizable proof. In this manner, to comprehend the hereditary closeness and furthermore for the distinguishing proof of the wild silkworm ecoraces, improvement of atomic marker is significant. A few sub-atomic markers have been created in the event of *Bombyx mori* like irregular enhanced polymorphic DNA (RAPD), limitation piece length polymorphism (RFLP), straightforward arrangement rehash (SSR) examinations, fluorescent-color named nucleotide notwithstanding ISSR-PCR response (FISSR-PCR) and single nucleotide polymorphism (SNPs) for high throughput genotyping for different silkworm strains. Sailor transposable component was utilized as a marker to order the efficient places of silk, creating bugs.

LITERATURE REVIEW

Vineeta Ateesh, Sunita Thakur, P.K. Tewary, P.K. Kar, O.P. Dubey(2016), Tasar culture is an agro backwoods based industry of the indigenous clans, who are in desperate need of high yielding, season explicit and safe breed(s) of tasar silkworm (*Antheraea mylitta* Drury) and of nourishment plants (*Terminalia* spp.). The biotechnology munitions stockpiles worked through genomics, proteomics, bioinformatics and transgeneticism hold the way to encourage the raising of wanted items in tasar culture. The paper depicts about the most recent biotechnological devices and their relevance. A far reaching audit on the atomic hereditary qualities works endeavored so far in tasar silk worm and host plant has been investigated. followed by appropriation of reasonable procedures on utilization of the biotechnological apparatuses so understand the requirements of tasar culture.

Meena Singh, R.K. Singh and Shweta Sao (2017), Sericulture otherwise called silk cultivating where the silkworm are raised to deliver silk. There are varieties of silk delivered everywhere throughout the world. This article tosses knowledge into the development of silkworm and production of the perfectly refined silk. Numerous cabin and little scale material ventures, agribusiness yields

including, take part in such homestead based work serious business financial action giving work to the provincial ranchers and pulls in benefit looking for entrepreneurs as it requires low speculation with moderately more significant yields and the creation of top notch materials. An endeavor has been made to detail a vital model of sericulture in Ambikapur, Area – Surguja, Chhatisgarh State. We report aftereffects of the near investigations identifying with the silk generation and productivity at Ambikapur, Area – Surguja from the silkworm species *Antheraea mylitta* and *Bombyx mori*.

A. K. SRIVASTAVA, P. K. KAR, M. K. SINHA, S. RAI AND B. C. PRASAD (2011), Tasar silkworm, *Antheraea mylitta* Drury is a monetarily used sericigenous bug disseminated over a wide backwoods scope of Indian subcontinent. Fluctuated land highlights, climatology, vegetation and edaphic factors in various areas have brought about the decent variety in the phenotypic, physio-hereditary, social and business characters of this silkworm. It is fluctuation, which had driven the taxonomists to the foundation of a few animal categories and sub-types of this creepy crawly. A point by point study was completed to comprehend the wide varieties and for the reason, exploratory overviews were led in 10 conditions of India and 28 ecoraces were gathered. Perceptions on territorial environment, regenerative conduct and business qualities were made. Investigation demonstrated colossal bury just as intra-populace changeability between and inside the ecoraces of *A. mylitta*. In light of multivariate investigation, 28 ecoraces were assembled in seven groups. Perceptions uncover that there is no obvious association with the hereditary assorted variety and topographical cause of the ecoraces of *A. mylitta*.

Renuka, G., NagaTeja Natra and Shamitha G.(2018), The wild tropical tasar silkworm, *Antheraea mylitta* polyphagous sericigenous lepidopteran bug, delivering tasar silk of business significance is conveyed in different pieces of India as ecoraces, with varieties in phenotypic attributes like fertility, voltinism, case weight, silk proportion, and so forth. Regardless of their unrivaled quality silk, they experience issues like their continuous decline in number and recognizable proof. These populaces are hard to isolate dependent on morphological characteristics. The appraisal of hereditary structure of every populace is considered as essential for comprehension and protecting regular biodiversity. Henceforth in the present examination, genomic DNA of particular populaces of *A. mylitta* was separated and screened for polymorphism by utilizing EST-inferred SSR markers.

G. RENUKA and G. SHAMITHA (2016), the tropical tasar silkworm, *Antheraea mylitta*, polyphagous sericigenous creepy crawly generally found in the tropical regions of India. It is found in these locales as ecotypes or ecoraces. It nourishes essentially on plants, an assortment of optional plants like *Terminalia Arjuna* and *T. tomentosa*. Tasar culture is a conventional employment for lakhs of ancestral masses in the territories of Jharkhand, Chhatisgarh, Orissa, Maharashtra, Andhra Pradesh, West Bengal and Uttar Pradesh. In the present investigation, the hereditary assorted variety of these ecoraces is recognized by DNA markers; in particular simple sequence repeats (SSRs), the majority of which created polymorphic groups. The DNA profiles dependent on these markers propose that they could be successfully used for recognizing the hereditary inconstancy among tasar ecoraces. The arrangement of sequences acquired from genomic PCR items has distinguished potential EST-SSR marker to perceive single nucleotide polymorphism by looking at different tasar ecoraces.hgs

RESEARCH METHODOLOGY

Molecular Phylogenetic aspects

Under atomic phylogeny perspectives various endeavors have been made for building up phylogenetic relationship among the developmental branches of the phylogenetic tree. Prasad et al., (2002) have detailed the phylogeny and example of disparity of sailor like components (MLEs) in silk moths corresponding to the phylogeny of the host species. Practically all the silk moths MLEs contain preserved highlights that are trademark to MLEs, for example, the D, D (34) D theme. Out of 33 fractional MLEs sequenced 31 were damaged because of stop codons or casing shifts in the transposes ORF. So additionally was the situation with the three duplicates of the full-length sailor components disconnected from *A. mylitta*. Their outcomes showed that, by and large, phylogenetic connections

between MLEs got from different silk moths are like the phylogeny of the host species predictable with the vertical inactivation phase of the MLE life cycle. It looks plausible that the greater part of these components were available in the genealogical ancestry preceding the difference of these species and nonpartisan development has happened autonomously in each duplicate regarding coding of amino acids in the transposes quality. For instance, the MLEs from *Antheraea* species, *A. roylei*, *A. pernyi*, *A. proylei*, *A. mylitta*, and *A. yamamai* obviously have a place with a subgroup of firmly related components inside the *Cecropia* subfamily. *A. assama* is considered unique in relation to the next *Antheraea* species, and all the more near the normal precursor of *Antheraea* and *Philosamia*.

Prasad and Nagraju (2003) revealed that Mariner like elements (MLEs) are generally dispersed sort II transposons with an open reading frame (ORF). Near phylogenetic development and inverted terminal (ITR) preservation of MLEs from Indian saturniid silk moth *A. mylitta* were considered with other full length MLEs. They have portrayed that full length MLEs were latent with different changes. Many preserved amino corrosive squares were recognized subsequent to adjusting transposase sequences. Mariner mark sequences were practically perpetual albeit a couple of new classes of elements had various marks.

Molecular Characterization aspects

Under portrayal for building up relationship among the ecotypes or breeds or developed lines, different endeavors have been made, utilizing for the most part the dominant sub-atomic markers. Chatterjee et al., (2004) attempted molecular portrayal and took a shot at ISSR profiling of hereditary inconstancy in the Raily ecotypes of *A. mylitta* and exhibited the DNA polymorphism unraveled by 12 ISSR introductions for 11 populace of *A. mylitta* having a place with 6 ecotypes and 41 people of Raily ecotypes gathered from five zones. This gives atomic proof on hereditary differences between eleven ecotype populaces and features the genotypic enhancements of a solitary ecotype into further separate discrete genetic supplies. The investigation uncovered gathering of the five populace of raily ecotype into two bunches. The examination additionally identified nine markers which can be used to portray explicit populace. In one set 34 promotions of tasar silkworm were PCR enhanced utilizing 13 ISSR preliminaries (UBC) a sum of 274 groups were gotten of which 259 groups were polymorphic. Variety was seen inside and between ecotypes. The examination demonstrated that critical variety exist inside a solitary populace.

Tasar Food Plants

Molecular Genetic Studies

Tewary and Suryanarayana (2007) built up the convention for segregation and filtration of genomic DNA from the tasar silkworm host plants viz. *Terminalia tomentosa*, *T. arjuna*, *T. belerica* and *T. chebula*. They have likewise utilized these DNA for PCR intensification utilizing arbitrary decamer preliminaries. Very little work has been done on essential nourishment plants species, along these lines chips away at partnered species are checked on. Pither et al., (2003) have examined *Terminalia Amazonia* utilizing RAPD investigation. In all out 30 RAPD groups were produced by five decamer preliminaries which were utilized to look at the hereditary assorted variety of six populaces in two gatherings. Hereditary variety inside the populace as evaluated by Shannon decent variety list extended from 0.32 to 0.38 with a general assorted variety of 0.38. Examination of sub-atomic change uncovered that the majority of the variety was inferable from contrasts among individual inside populace. Populace separation was fundamentally lower among the fragmented populace than among the consistent woods populace. On a normal the fragmented populace additionally had somewhat however measurably noteworthy lower level of hereditary decent variety. One exhibition timberland site had more significant level of hereditary decent variety than two of the ceaseless woodland destinations. It is recommended that long haul fragmentation of hereditary decent variety of tropical trees will rely on the measure of nearby backwoods spread in closeness to the fragmented populace.

Rearing of tasar silkworm

The raising of the tasar silkworm *Antheraea mylitta* D (Andhra nearby, Daba television/BV) ecoraces were raised on the *Terminalia manor* raised at Kakatiya College grounds (Figure 1) and the larval range, moth shading, voltinism and so on were watched. During raising, natural variances were seen, which in some cases included ominous conditions like downpour, tempest or hail. As the hatchlings were likewise assaulted by irritations and predators, use of net for their avoidance was guaranteed. Temperature and relative stickiness were estimated normally.



Figure 1: Rearing of tasar silkworm, *Antheraea mylitta*, Andhra local and Daba TV ecoraces at Kakatiya University

DISCUSSION

Tropical tasar silkworm, *Antheraea mylitta* Drury is a business assortment, which exists in different structures as 44 natural populaces or ecoraces in various topographical specialties of our nation rely upon nourishment plants and ecological conditions. In the present investigation out of the seven ecoraces examined, aside from Andhra nearby and Bhandara, which are transcendently found in dry tropical woods region, all different ecoraces develop in soggy deciduous woodland territories of red loamy and dark clayey locales inside most extreme temperature scope of 30-34 °C and at least 18-21 °C, the yearly precipitation running from 925-939 mm in dry deciduous and 1000-1275mm in sodden tropical deciduous backwoods areas¹³. The voltinism (uni/bi/tri) in *Antheraea mylitta* Drury is controlled by ecological variables like temperature, relative moistness, day length and precipitation.

Among different ecoraces of tasar silkworm, *Antheraea mylitta* D, Andhra neighborhood ecorace is a tropical tasar assortment accessible just in Warangal and Karimnagar areas of Telangana state. Andhra nearby, the select ecorace of Telangana state is outstanding for its exceptional business characters like minimized and hard covers, high reelability, high shell proportion, low denier and high fiber length. It is nearly eradication because of specific shortcomings like poor egg - laying conduct, voltinism, unpredictable development, non-uniform silk statement in casings and pupal mortality.

When all is said in done, the point of silkworm reproducing isn't just to upgrade of fruitfulness, continuation of value case generation in factor climatic and geographic conditions prompting hereditary improvement of attributes either joining alluring qualities and along these lines productivity of sericulture industry. While trying to conquer the issues looked by Andhra nearby ecorace, an extensive rearing system was proposed by before works (Shamitha et al., 2008, Shiva et al., 2011).

CONCLUSION

The atomic characterisation utilizing SSR and ISSR markers propose that these markers could be adequately used for distinguishing the hereditary fluctuation among tasar ecoraces. Among the ecoraces considered, Andhra neighborhood ecorace was seen as hereditarily near Bhandara and Daba BV inside the populaces corresponding to hereditary separation dependent on SSR and ISSR phylogenetic trees individually and found to have grouped by geological conveyance. The present work, in light of hereditary portrayal of 7 tasar ecotypes utilizing ISSR produced polymorphism, accentuated not just on the hereditary closeness of Andhra neighborhood ecorace comparable to different ecoraces, however it went further examining its similarity to mate with them.

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