Original Research Article

A Gentle Illustration of a Process for Sericulture in India: GISELE Algorithm

ABSTRACT

Silk is a natural fiber that is cultivated from the leaves of the Mulberry tree by rearing cocoons and then tending to the yarn in many ways. A silk-yarn is first spun, then wound, dyed, and finally put to production by careful Sericulture workers. Sericulture provides an interesting opportunity to many semi-skilled laborers in rural and urban India so that these people may achieve a source of their livelihoods. Sericulture has utility in sectors other than textile – like medicinal uses. In this research article an algorithm called GISELE (A Gentle Illustration of Process of Sericulture) is discussed which leads to a procedure called Ceylon (Combinatorial Longitudes) and finally culminates in a process called Savon and later all of these techniques can lead to efficient weave of silk in Sericulture concerns in the Indian sub-continent.

Keywords: Ceylon, GISELE, Savon, Sericulture.

1. INTRODUCTION

The Indian agrarian economy comprises of ~ 7 lakh villages and the population contained in rural India is ~ 10 crore people. The various sectors of an Indian rural economy are (1) Agriculture (2) Farming (3) Trading (4) Artisans (5) Banking (6) Learning (7) Networking (8) labour and (9) Postal Services.

Sericulture provides employment to ~ 80 Lakh people in the rural and urban population of India.Sericulture is defined as a field which involves careful production of silk and related commodities like textile, medicine etc.The major processes in Sericulture are (1) Cultivation of mulberry (2) Rearing of Cocoons (3) Gathering of yarn (4) Winding (5) Weaving (6) Dyeing (7) Printing (8) Processing (9) Shipment and (10) Supply Chain Management (SCM).

Sericulture is one of the most important cottage industry in the countries of India, Japan, China, Korea, Brazil, Russia, and certain European countries.The discovery of Silk can be dated back to an era in China when an emperor discovered the yarn in a cup of tea.
Silk has some important characteristics as (1) Strength (2) Durability (3) Sheen (4) Color Absorption capacity (5) Light Weight (6) High rate of acceptance and (7) Excellent weavibilty.

This research article describes an algorithm called GISELE (A Gentle Illustration of a process for Sericulture) for the careful cultivation of silk. Also the following procedure is derived from GISELE in order to attain a superior cultivation characteristics of silk - Ceylon (Combinatorial Longitudes) : Combinatorics are generated longitudinally to rear silk. Finally, as the procedure Ceylon is derived from Gisele, a process called Savon (Statistical Novella) is infered which can help further the cultivation of silk.

2. RELATED WORK

The scientists (Giora, D., Marchetti, G., Cappellozza, S., Assirelli, A., Saviane, A., Sartori, L., Marinello, F. (2022)) in the last twenty years, there has been a flurry of activity in the literary world related to sericulture.It has been observed tha sericulture has far reaching consequences not just in silk production but in the fields of pharmacology, beauty, design and development.
In order ot evaluate how the field of sericulture is evolving, the authors suggest scientometric analysis of the literature in order that a measured suggestion may be observed for the benfit of scholars, business leaders and innovators.

The author (Bhat, T. A. (2014)) registers a study of collaboration in the private and the public sector on sericulture in the state of Jammu and Kashmir in India. Sericulture is a predominant part and parcel of the lives of industrial workers in the state. In the past, Sericulture has had its shining stars, but lately there has been not much involvement in the development of Sericulture or the export of silk commodities. Despite of the fact, that the environment of the state of Jammu and Kashmir is suitable for the production and sustenance of Sericulture, there has been little incentive for producers to develop this field in all its contrivances. The main objective of this research article is to showcase the evolution of Sericulture in that state through partnerships in the public and the private sector, while at the same time it observes the fete de jour in the metamorphosis of cocoons harvested as part of Sericulture.
Just like other sectors of the economy of the state of Jammu and Kashmir, Public Private Partnerships would herald a new star in the Sericulture domain by bringing about joie de vivre in the antiquated enterprise.

The researcher (Naik, A. H. (2017)) found in a survey that a large population of the world resides in the rural areas. Source of income in the rural areas can be seasonal and varying. MSME (Micro Small and Medium Enterprise) can be a good employer of the rural populace while ensuring at the same time that rural areas can keep pace with the urban gentry. Also, a good economical pace of development in the rural areas can check the influx of marginalized workers into the urban landscapes.

In this research article, the state of Sericulture in India, relevant technology, the adoption of Sericulture as a means of livelihood, fashion, placement in the global economy and scientific pursuits have been discussed. This article would be fruitful in assessing the following aspects of Sericulture in India – talent, issues and firmness in order to bring about guidelines and advisories for monetary and social wellbeing.

The team of investigators (Ssemugenze, B., Esiumu, J., Nagasha, J., Masiga, Wandui (2021)) performed a survey of Sericulture as an agrarian utlity for monetary and social development. In the economies of the developing world, Sericulture has provided the much needed impetus for fostering and sustaining improved socio-economical conditions. As Sericulture gives a boost to the textile industry, it provides large amount of relief from poverty, salaries, financial growth, environmental gains, agrarian assimilation and ecological harmony.Sericulture involves people from all walks of life in growth of mulberry, ova generation, cocoon assembly, airing, winding, coupling, weaving and post-processing. Sericulture requires little capital investment, scarce technology, good gains in employment, with high ROI suitable for a rural economy.The industry can employ people from various ladders in society like youth, children, elderly people, labour, and underprivileged sections of the society.
This survey article exposes the gains and bentifts to be made with Sericulture in order to showcase this industry as an attractive option for investors that can help nurture economic gains and financial relief.

The technologists (Reddy, S. M. V., Jiragal, I., Naik, R., Naik, G. R.(2019)) take a closer look at information standards amongst the bettered schemes of Sericulture workers in Karnataka.
This investigation was carried out in certain districts of the state of Karnataka. All in all, around 140 participants were selected from two distinct Taluks of the state for conduction this survey in Sericulture (70 individual respondents in each Taluk). The main source of information for the Sericulture workers was by the application of pre-meditated questionnaries.

The scholars (Kumar, D. S. (2017)) look at the generation of livelihoods and pay through the application of Sericulture in India. Sericulture is an environment-friendly, agrarian, human resource intensive, and financially viable productive enterprise that comes under small and medium enterprise. Sericulture industry is an amalgamate of the production of

mulberry and generation of textile. India stands at the second place in overall silk production, while China takes the first spot. The employment generated from Sericulture falls into two major categorizations – 1. Straight labour – rearding of mulberry plant and leaves, cocooning. 2. Diverse labour – Bonding, melding, weaving, finishing.
Karnataka is a leader amongst all the states and produces around 50% of India's silk. Sericulture is adopted by ~ 55,000 villages and it secures employment for ~ 8 million people, a lot of them being small agrarian labour in the village areas. In lieu of the employment scenario of Sericulture and its importance in the various sectors of economy, this research article sheds light on the various aspects of employment generation through the practice of Sericulture.
The study also finishes with some recommendations on the betterment of the affordabilty, operating capacity and sustenance of Sericulture over large periods of time.

The authors (Kumar, A. (2021)) try to look at productization of Sericulture and maintainable growth from a fresh outlook. Sericulture can be dated back to ancient times (around 2nd Century B.C.) and it is a gifted enterprise for semi-skilled and poor labourers of India. It has phased production and every phase adds value to an economy. A large amount of secondary products are generated as part of this activity which can be utliized in a totalitarian way to help rural workers. Sericutlure not only prodvides textile but it also has medicinal uses for healing.
This research article helps in ascertaining gains in the rural sector through Sericulture. Weather and climatic conditions have a big say in the productitivy levels of the Sericulture industry. Finally, this work stresses out on products generated by Sericulture and the maintainablity of development in this marvellous concern.

The collaborators (Geetha, G. S., Rao, P. S. (2016)) evaluate a team based approach to the utilization of technology in Sericulture. There is not much homage to the role social networking in the dissemination of information amongst rural women related to the field of Sericulture.The creation of a group tending to Sericulture comprising of women would give them social upliftment, moral rights, economic wellbeing, increased participation, greater learning, and emotional resonance.
Moreover, women can acquire bargaining power when it comes to various concerns related to Sericulture.Group discussions, interviews, questionnaires, and team work can be the motto for any women oriented group when it comes to rearing silk in industrial establishments.

The researchers (Raju, M., Sannappa, B., Manjunath, K. G. (2019)) look at case studies on information and utilization levels of agrarian workers related to the production of Mulberry under rainfed districts of Karnataka. Just like agriculture, the importance of knowledge in the development of Sericulture is of critical value.
The current research aims at harnessing information and the utilization levels of Sericulture in two different taluks of Karnataka. It is revelated that a lot of farmers possess a lot of knowledge on the planting of Mulberry, rearing of cocoons and amount of crops to be harvested per year.
The various important processes involved in the production of Mulberry are (1) Preparaion of land as an asset (2) Planting of Mulberry (3) Application of Farm Yard Manure (4) Watering of plants (5) Removal of weeds (6) Protection from anomalies and (7) Soil Additios.
The various activities that are in the purview of full adoption are ascertaining the types of Mulberry and the amount of crop to be harvested per annum.

The technologists (Savithri, G., Sujathamma, P., Neeraja, P. (2023)) discuss the Sericulture industry in India for helping sustain an agrarian society. Silk is part and parcel of any important ritual in Indian society. Sericulture is described as the art of production of slik. It can be learned back all the way till 2nd Century B.C. In India around 70% of the rural economy is dependent on agriculture and other related activities like Sericulture. While agriculture remains the driving force of a rural economy in India, Sericulture provides the much needed impetus to harbinger growth and development in the villages of India.

Amongst a total of ~ 7 lakh Indian villages, ~ 60,000 villages harness the power of Sericulture and it is a source of income for ~ 10 lakh families. As Sericulture is an important sector of the Indian rural economy, this research article brings about a discussion on its importance and highlights the various strategies to be adopted in order to make sure the Sericulture leads the rural brigade in guiding India's village towards greater socio-economic development.

3. METHODOLOGY

The GISELE algorithm (A Gentle Illustration for a Process of Sericulture) contains three steps namely (1) Generatrix, (2) Set, and (3) Learn.

The GISELE algorithm is utilized for the cultivation of a Mulberry tree as follows

- Generatrix: Use a random number generator to generate a set of random numbers. [what are those random number generator}
- Set : Set the numbers in a segment tree [what is that segment tree]
- Learn: Isolate a kernel in the tree root that can learn from the leaves of the tree. [kernel is part of the seed – where it is present in the tree root]

The kernel sits at the root and looks at the following:

For each root, left node, right node group in the GISELE tree, it computes the absolute difference between the following quantities:

1. The value of the root node.
2. The average of the sum of value of left node and the value of the right node.

[how to differentiate the left node or right node in the roots]

This value is considered to be error at one node.

Then the net error for the GISELE algorithm is the sum of errors for each node.

Ceylon and Savon are refinements of the GISELE segment tree.

In case of Ceylon, for every node computed bottom up from the leaf nodes the following is done. For each node, the new value at the node is the average of three elements – the node value, the left child value and the right value.Again the net error is computed for a GISELE tree and it's compared with the earlier net error.

It is observed that the net error of a Ceylon tree (The GISELE segment tree after applying the Ceylon procedure) is less than that of a GISELE tree.

For the Savon process, for every node the following is the computation in a bottom up way from the leaf nodes all the way up until the root node. For each node, a computation of the average of node value, left child value and right child value is taken – say orig_avg_value.

Finally, it is decided whether the left child is significant or the right child is significant. If the left child value is closer to the orig_avg_value as compared to the right child, then the left child is more significant. Otherwise the right child is more significant.Also, a value called the avg_weight is determined as follows:

avg_weight_increment = (difference between orig_avg_val and the node value) / (sum of left child value and the right child value) (1)

avg_weight = 1 + avg_weight_increment (2)

Now, a weighted average called wt_avg is computed by taking into account the avg_weight as the weight of the significant child, along with original values of the node and the non-significant child value.The weighted average, thus computed is the new node value.

It is observed that the Savon tree (The tree computed by applying the Savon process to a GISELE segment tree) has better net error value as compared to the original GISELE segment tree.

4. RESULTS

Here's an example of a simulation in which Savon outperformed Ceylon

/***** Savon over Ceylon Begin ********/
Init Gisele
Init Ceylon
Init Savon

Inside init_generatrix

Printing the original list of tree elements (sorted)
[3, 7, 26, 30, 31, 34, 53, 59, 75, 81, 85, 90, 92, 95, 97]

Printing Gisele Tree

Printing level 1: 59
Printing level 2: 30 90
Printing level 3: 7 34 81 95
Printing level 4: 3 26 31 53 75 85 92 97

Printing error at individual nodes

zero_error : 1.0
one_error : 9.5
two_error : 2.0
three_error : 7.5
four_error : 8.0
five_error : 1.0
six_error : 0.5

Printing Gisele error= Error: 29.5

Printing error at individual nodes
zero_error : 3.5
one_error : 1.9499999999999993
two_error : 1.2000000000000028
three_error : 2.5
four_error : 2.700000000000003
five_error : 0.29999999999999716
six_error : 0.20000000000000284

Printing Ceylon Tree

Printing level 1: 59.7
Printing level 2: 23.7 88.7
Printing level 3: 12.0 39.3 80.3 94.7
Printing level 4: 3 26 31 53 75 85 92 97

Printing Ceylon error = Error: 12.350000000000005

Printing error at individual nodes

zero_error : 2.549999999999997
one_error : 0.7000000000000028

two_error : 1.3000000000000114
three_error : 2.3000000000000007
four_error : 2.0
five_error : 0.5
six_error : 0.20000000000000284

Printing Savon Tree

Printing level 1: 59.7
Printing level 2: 25.4 88.9
Printing level 3: 12.2 40.0 80.5 94.7
Printing level 4: 3 26 31 53 75 85 92 97

Printing Savon error= Error: 9.550000000000015

/****** Savon over Ceylon End ********/

The following is an example of a simulation in which Ceylon outperformed Savon.

/***** Ceylon over Savon Begin ********/

Init Gisele
Init Ceylon
Init Savon

Inside init_generatrix
Printing the original list of tree elements (sorted)
[5, 19, 28, 29, 50, 55, 58, 60, 67, 70, 73, 89, 96, 99, 100]

Printing Gisele Tree

Printing level 1: 60
Printing level 2: 29 89
Printing level 3: 19 55 70 99
Printing level 4: 5 28 50 58 67 73 96 100

Printing error at individual nodes
zero_error : 1.0
one_error : 8.0
two_error : 4.5
three_error : 2.5
four_error : 1.0
five_error : 0.0
six_error : 1.0

Printing Gisele error= Error: 18.0

Printing error at individual nodes

zero_error : 0.8500000000000014
one_error : 1.5
two_error : 1.8499999999999943
three_error : 0.8000000000000007
four_error : 0.29999999999999716
five_error : 0.0
six_error : 0.29999999999999716

Printing Ceylon Tree

Printing level 1: 59.3
Printing level 2: 34.3 86.0
Printing level 3: 17.3 54.3 70.0 98.3
Printing level 4: 5 28 50 58 67 73 96 100

Printing Ceylon error= Error: 5.599999999999991

Printing error at individual nodes

zero_error : 1.1999999999999957
one_error : 1.3500000000000014
two_error : 2.3999999999999915
three_error : 1.3000000000000007
four_error : 0.5
five_error : 0.0
six_error : 0.4000000000000057

Printing Savon Tree

Printing level 1: 59.5
Printing level 2: 34.8 86.6
Printing level 3: 17.8 54.5 70.0 98.4
Printing level 4: 5 28 50 58 67 73 96 100

Printing Savon error= Error: 7.149999999999

/***** Savon over Ceylon End ********/

5. DISCUSSION

The GISELE algorithm is a well defined way of generating a Mulberry tree. Also Ceylon helps refine the tree by computing certain averaged and making sure that the GISELE tree has better net error. The Ceylon procedure, thus, can be utilized for rearing silk.

The Savon procedure takes a step forward from Ceylon to help optimize the GISELE tree and can be appropriately applied to further the cultivation of silk.

6. CONCLUSION

In this research work, various literary articles from journals and other such sources are studied to help understand the basic concepts of Sericulture, the different types of methods for cultivating silk while at the same time various issues that are involved in Sericulture are also addressed.

An algorithm called GISELE is then recommended which can help grow a Mulberry tree.

Also a procedure called Ceylon and a process called Savon are explained which can help in the refinement of a Mulberry tree (cultivated with GISELE) on order to raise yarn carefully for the consumption by the end-users and customers.

CONSENT (WHERE EVER APPLICABLE)

All authors declare that 'written informed consent was obtained from the patient (or other approved parties) for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editorial office/Chief Editor/Editorial Board members of this journal.

ETHICAL APPROVAL (WHERE EVER APPLICABLE)

All authors hereby declare that "Principles of laboratory animal care" (NIH publication No. 85-23, revised 1985) were followed, as well as specific national laws where applicable. All experiments have been examined and approved by the appropriate ethics committee.
All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

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