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Beyond Silk: Exploring the Hidden Value of Eri Sericulture Waste

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Eri sericulture is much more than the production of silk yarn. Across Northeast India, it is closely connected with traditional farming, household livelihoods, weaving and rural entrepreneurship. From growing castor plants to rearing eri silkworms and spinning silk, every stage of the process offers opportunities to make better use of local resources. Yet, the value of eri sericulture is often measured mainly in terms of silk. Materials such as leftover castor leaves, silkworm frass, pupae, short silk fibres and other processing residues are sometimes overlooked, even though many of them can be put to useful purposes. The idea of a circular bioeconomy encourages us to look at these materials differently. Instead of treating everything left over as waste, it promotes the recovery and reuse of resources wherever practical and safe (Yaashikaa *et al.,* 2022). In eri sericulture, this could mean turning suitable organic residues into compost, transforming short silk fibres into attractive handicrafts and exploring additional products from castor cultivation. Such an approach can help make eri sericulture more resource-efficient while opening new possibilities for farmers, women's self-help groups, artisans and small rural enterprises.

Castor: The Beginning of the Eri Journey

The eri production chain begins with the castor plant, whose leaves serve as the primary food for eri silkworms. Healthy plants and a regular supply of good-quality leaves are essential for successful silkworm rearing. Castor, however, offers more than leaves for silkworm feeding. Its seeds are an important source of castor oil, which has several industrial and commercial applications. This creates an opportunity to combine eri rearing with castor seed production and oil-related activities. The challenge is to maintain a balance between leaf harvesting and plant growth. Excessive removal of leaves can weaken plants and affect seed production. Farmers therefore need to manage leaf collection carefully, ensuring that sufficient foliage remains for the plant to grow and produce seeds. Retaining healthy seed cocoons is equally important for sustaining future generations of silkworms. With proper management, castor cultivation can support more than one source of value within the same farming system.

Turning Rearing Residues into Useful Resources

Silkworm rearing generates organic residues, including frass, leftover leaves and other plant material. Although these materials may appear insignificant individually, their proper management can contribute to a more efficient production system. Suitable organic residues can be collected and composted under appropriate conditions. They may also be used in managed vermicomposting systems, where earthworms help convert organic matter into a more stable soil amendment. Once adequately decomposed and assessed for suitability, the finished compost can be used in fields according to soil and crop requirements. Leftover plant material may also be considered for mulching or compost preparation. Returning suitable organic matter to agricultural land can help recycle nutrients and reduce the amount of material discarded (Shen *et al.,* 2024).

However, not every residue is automatically suitable for direct application to the soil. Its condition, decomposition and possible contamination must be considered. Proper handling and composting are essential to ensure that the material can be used responsibly.

From Silk Scraps to Beautiful Handicrafts

One of the most interesting opportunities for adding value to eri sericulture lies in its leftover fibres. During spinning and textile production, short fibres, broken strands and yarn remnants may accumulate. These materials may not be suitable for every conventional textile application, but they can still be useful in creative work. With imagination and appropriate techniques, eri silk waste can be explored for making decorative wall hangings, tassels, handmade flowers, jewellery, hair accessories, greeting cards, table mats, coasters and small home-decoration products. Combining eri fibres with materials such as jute, bamboo or cane can also create distinctive craft items that reflect the traditional skills of Northeast India. For rural artisans, such products offer an opportunity to transform leftover material into something attractive and potentially marketable (Lu *et al*., 2022; Sashina and Yakovleva, 2023). Women's self-help groups could organise the collection and sorting of silk waste, develop designs and produce handicrafts for local markets, exhibitions and other sales channels. The success of these activities would depend on more than creativity alone. Product quality, durability, finishing, labour costs, packaging and customer preferences would all play an important role. Starting with small batches and gathering feedback from buyers could help artisans identify products that are practical to make and easier to sell. In this way, silk waste could become a starting point for new craft-based livelihood activities rather than simply another discarded material.

Eri Pupae: A Valuable By-product

Eri silkworm pupae are another important component of the production chain. In several communities of Northeast India, pupae are traditionally consumed as food and form part of local food practices. Their utilisation after cocoon processing can therefore provide value beyond the silk itself. Where pupae are not used for food, alternative applications may be explored only when permitted and supported by appropriate safety standards and processing methods. Their handling, storage and intended use must be carefully considered, particularly when food or feed is involved (Mishra *et al.,* 2003; Longvah *et al.,* 2011). At the same time, cocoons intended for seed production should be retained to maintain the continuity of eri rearing. Responsible utilisation means making the best possible use of available materials without compromising hygiene, safety or future production.

Castor Seeds: Oil and Beyond

Castor seeds provide another source of value within the castor–eri production system. Castor oil is used in various industrial and commercial applications, making seed production a useful complementary activity for farmers who also grow castor for silkworm feeding. Oil extraction generates seed cake, which may have a role as organic manure when handled appropriately. However, castor seed cake contains toxic substances, including ricin, and must never be assumed safe for livestock feed (Fonseca and Soto-Blanco, 2014). Any proposed feed use would require an appropriate, validated detoxification process and compliance with relevant safety requirements. Other castor residues, such as stalks and plant material, may also be considered for composting, mulching or other suitable applications, depending on their properties and local conditions. The important point is that castor cultivation can generate several distinct product streams. With careful planning, these streams may complement eri rearing and contribute to a more diversified farm enterprise (Chuang *et al.,* 2025).

Connecting the Different Value Streams

The real potential of circular utilisation lies in connecting the different stages of production. Castor leaves support silkworm rearing, cocoons provide silk and pupae and leftover fibres can be explored for handicrafts. Suitable organic residues may be converted into compost, while castor seeds provide oil and the resulting seed cake may be used for soil enrichment where

appropriate. These activities need not operate independently. Farmers, rearers, spinners and artisans can work together to identify materials that are available locally and determine how they can be collected, processed and put to productive use (Yaashikaa *et al.,* 2022; Lu *et al.,* 2022). For example, silk spinners could supply sorted fibre waste to local craft groups, while suitable rearing residues could be directed towards composting. Such arrangements may create additional livelihood opportunities and strengthen links between agricultural production and small-scale enterprises. However, circular utilisation does not mean that every residue can be reused or that every new activity will automatically be profitable. Collection, transportation, processing, labour, quality control and access to markets all affect feasibility. Local trials and market assessments are therefore important before introducing new products on a larger scale.

Conclusion

Eri sericulture has the potential to offer much more than silk yarn. By looking beyond the main product, farmers and rural entrepreneurs can identify opportunities to use suitable residues, develop new handicrafts and connect castor cultivation with additional sources of value. Composting organic residues, exploring silk-waste products, utilising pupae appropriately and making productive use of castor seeds are all possible parts of this broader approach. These activities may also create opportunities for women's self-help groups and local artisans to build enterprises around traditional skills and locally available materials. The next step is to identify which practices are safe, affordable and suitable for individual communities. Field-level testing, product development and market assessment will help determine which options offer genuine benefits. Ultimately, the goal is simple: to look at eri sericulture as a connected system in which resources are used thoughtfully, useful materials are not discarded unnecessarily, and new livelihood opportunities can grow alongside traditional practices.

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