Pineapple Waste Transformed into Sustainable Products

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ABSTRACT
The textile industry's ethical and environmental challenges are among the most sensitive topics today. Even with the increasing difficulty in obtaining skins, research into alternate alternatives to animal-derived materials has become a requirement. Pineapple is a favorite dessert of many health-conscious individuals. Through fibers that aid in correct digestion, it cleans the internal system to maintain our bodies healthy. Pineapple has other types of fiber as well. Pina, a textile fiber made from pineapple leaves, is used to produce fabrics. As a result, we are able to maintain not only the cleanliness of our internal system but also the appearance of an exquisite exterior. To make a textile fabric, it is sometimes mixed with silk or polyester. Pina fabric is hand loomed by only a few weavers, making it extremely valuable and scarce, as well as pricey.

INTRODUCTION
Pina's name is derived from the Spanish word pina, which means pineapple in English. Pina is a fiber manufactured from pineapple plant leaves that is widely used in the Philippines. Kalibo, Aklan is the Philippines' largest and oldest manufacturer of pina fabric, which is sold to many areas of the world, most notably North America and Europe. Although the pineapple plant was brought to the Philippines by Spaniards from the Americas, history records reveal that Kalibo's pina fabric was traded throughout Pre-Hispanic times and reached as far as Greece and Egypt during its heyday. Kalibo is also recognized for various indigenous handicrafts such as buri leaf wallets, which are popular among visitors of that area. Pineapple silk is regarded as the queen of Philippine fabrics and is the preferred fabric of the Philippine elite. It is grown in the high-rainfall, humid coastal districts of peninsular India, as well as the hilly sections of the North-
Eastern region. In recent years, it has been demonstrated that pineapple can be profitably cultivated in the central plains with medium rainfall and supplemental protective irrigation. On a big scale, it is grown in Assam, Meghalaya, Tripura, Mizoram, West Bengal, Kerala, Karnataka, and Goa, whilst on a small scale, it is grown in Gujarat, Maharashtra, Tamil Nadu, Andhra Pradesh, Orissa, Bihar, and Uttar Pradesh. In the domestic markets, Indian pineapples are always in high demand. It's also in high demand in the food processing business. India exports pineapple to Nepal, United Kingdom, Spain, and United Arab Emirates.

Pineapples are divided into four categories:

- **Red Spanish**
- **Abacaxi**
- **Queen**
- **Smooth Cayenne**

**PREPARATION OF PINA FIBRE**

Pina is made from a leaf; it must be cut from the plant first. The fiber is then separated from the leaf by being pulled or split. The majority of leaf fibers are lengthy and rigid. Each strand of pina fiber is scraped by hand and knotted one by one to make a continuous thread that may be weaved by hand.

According to Kannan et al. (2010), spinning, weaving, and processing of fibers and fabrics generated from leaf fibers is a new concept of recent origin, with pineapple leaf fiber (PALF) gaining significant relevance. South India Textile Research Association (SITRA) Coimbatore has undertaken a project in collaboration with United Nations Development Programme (UNDP) and successfully spun these fibers. Despite the fact that this fiber could not be blended with cotton or synthetic fibers due to its long length and high fiber weight, it is expected that in the not-too-distant future, these fibers will be exclusively used for a specific purpose, either in warp or in weft to produce carpet type fabrics, and in fact, handloom weavers in Tamil Nadu's SALEM region have begun making carpets using pineapple fibers.
Advantage of Pineapple leaf fiber

The fabric has a natural gloss similar to silk, and is better in quality. This gloss protects the fibers and as a result, pina does not require any toxic treatment. It is light weight, easy to wash and care, no dry cleaning required, wear-resistant, long, fine, lustrous. It is an ideal eco-textile for clothing. Pina weavers use only natural herbs and plants to add more color into a design.

How to take care of pineapple leaf fiber

Dissolve a small amount of mild detergent in warm water and soak to free dirt and stains, then gently hand wash. If the fabric turns yellow, add vinegar to the water and soak overnight. Use a soft toothbrush to scrub off stubborn dirt. Rinse in an up/down dipping motion. Do not twist or wring. Hang (on plastic hanger) and shape to drip dry or lay flat to dry.

Pineapple waste has been transformed into beautiful, sustainable "leather." A Spanish entrepreneur discovered that pineapple leaves can be used to make a 100% natural cloth that can be used to replace leather. After the introduction of synthetic leather to the market, which requires the use of environmentally hazardous chemicals, the real revolution comes from Carmen Hijosa, a Spanish designer who invented a new form of fabric made from pineapple leaf fibers. She developed Pinatex, a non-weaving material formed from pineapple leaves (one square meter takes roughly 480 fibers) after five years of research undertaken in Spain and the United Kingdom. It's an entirely eco-friendly and biodegradable fiber, as it is made from fruit wastes that don't require any additional water or fertilizers, and it can also be composted when it's no longer needed. Many companies, including Puma and Camper, have already experimented with this new material to create prototypes of shoes, backpacks, headgear, smartphone accessories, vehicle seats, and furniture.

The designers' continual search for new fashion materials led them to the gorgeous pina cloth created in the Philippines. Because pina cloth has been there for a long time, the proper term is re-discovering rather than discovery.

CONCLUSION

Pineapple leaf fiber is noted for its strength and tensile characteristics, and it's labeled as eco-friendly. When combined with other fibers, this queen fiber of Philippine history can reach greater heights. Pina fibers have proven to be versatile in a variety of applications, including...
textiles, handicrafts, apparel & accessories, furniture and utility products. Researchers and specialists must now explore new possibilities with this fiber in order to reach higher heights. Agro waste (pineapple leaf) will be used to make future handbags and many other products.

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