'Malai'-from the NATURE back to NATURE - an alternative to leather from mature coconut water

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Using mature coconut water, which is often disposed as a waste product - Zuzana and Susmith create vegan leather- Malai for fashion and furnishings

Vegan alternatives to leather is a novel concept and alternatives are coming up from the most unlikeliest sources like mushroom caps, pineapple, seaweed etc. Coconut water is the latest and novel addition to the list. Zuzana Gombosova from Slovakia and Susmith Suseelan from Kottayam, Kerala have been working on mature coconut water to create a sustainable material, named 'Malai', flexible, durable, biodegradable and water resistant alternative to leather which has naturally sparked interest at Design Festivals across the world.

Malai, is a safely biodegradable bio-composite material made from mature coconut water and natural fibres. 'Malai' refers to the creamy flesh of coconut and its water that sustains the bacteria that grows cellulose, the primary constituent of this material. One of the first of its kind in world, Malai aims to become a safer and sustainable substitute for animal leather, a product of the industry that brings high foreign exchange to India

Malai is developed by Malai Biomaterials Design Pvt Ltd, a material research and design studio based in Kerala with Zuzana Gombosova and Susmith Suseelan as Co-founders. The duo shares the process of developing Malai and the future applications of the material.

> **Malai reconciles a pure, simple philosophical approach to manufacturing with a sophisticated understanding of enviornmental science and technological process resulting in a product that is unique.**

The Beginning

Zuzana Gombosova initially started working with bacterial cellulose during her Master's degree in London. Her job as Material Researcher brought

her to Mumbai, India. She was keen to explore the possibility of growing bacterial cellulose in India in similar lines to the traditional 'Nata de Coco'in Phillipines where it is an important part of food industry. Susmith,is a Product Designer with background in Mechanical Engineering. A graduate from IISc Bangalore, he joined the in-house Design studio of a large manufacturing company in Mumbai, where he met Zuzana. Susmith who hails from 'the land of Coconuts' was also interested in bacterial cellulose and 'Nata De Coco'.

Zuzana and Susmith found that they shared more similar profound values, passion for craft and making as well as a concern for sustainability and the environment. Malai started as a result of their personal experiences of what it takes to produce a material. They wanted to produce healthy material that has more to offer and causes least damage to the environment. Both left their corporate jobs and focused more on material development. The first sample was developed after six months and almost 100 recipes later. The journey had the humblest beginnings with their personal savings.

What Is Malai

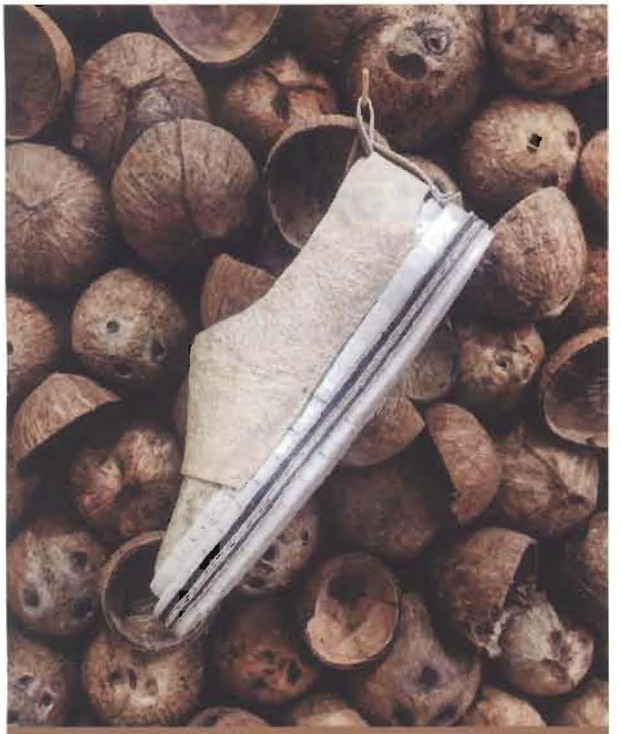
Malai is a cellulose-cellulose biocomposite material which look, feel and functions similar to animal leather made primarily from coconut water and natural fibres. Malai is strong as leather and the durability of the material is better than artificial leather and is coloured using natural dyes such as indigo, madder or cutch. Seemingly a cross between leather and handmade paper, Malai can be cut, glued, stitched and embossed, and has since been used to create footwear, upholstery and accessories.

How Is Malai Made

In the process of developing Malai, the duo discovered that using natural fibres along with bacterial cellulose can enhance the quality of the end product. The role of coconut water is to provide nutrients for bacteria while producing bacterial cellulose. This bacterial cellulose is a nano-material with a three-dimensional fibrous network and this glues together natural fibres via hydrogen bonding and physical entanglements forming the biocomposite. Starting from the raw materials, making of Malai takes 3-4 weeks depending on climatic conditions. They procure natural fibres from banana farmers, who otherwise discard the stems after the fruit is harvested. They have listed and are exhibiting Malai in different material libraries that helped them get enquiry from manufacturers. The team constantly researches on various other aspects on how to improve the quality of the material and replace animal leather in all applications

Future with Malai

Malai Biomaterials Design Pvt Ltd began liaising with independent Czech designers and companies to create and test products using Malai. One of the first ones to adopt Malai in their product line was 'Playbag' a company from Zlin,CZ (city of Bata) who made a wallet and hand bag. There has been a collaboration with Kazeto(CZ), traditionally known for paperboard products, especially suitcases. A biodegradable shoe, using Malai and Carfting, Plastics!, a bioplastics company, was designed by Berlin-based footwear designer Sophia Guggenberger. It was presented at Designblok Prague (a design show in the Czech Republic). TON, a traditional bent furniture brand,



Making of Malai – the Process

Zuzana and Susmit work alongside Southern India's coconut farmers and processing units who find themselves with the much 'waste' coconut water after they've removed the harvest of white flesh from inside the mature coconuts. Normally this waste water would be released into the drainage system, but this in itself causes pollution of water and the soil to become acidified.This coconut water is sterilised resulting in an energy rich, entirely natural nutrient upon which our bacterial culture can feed. The nutrient and the culture is combined and then just let the bacteria do its thing. The fermentation period takes between twelve to fourteen days, at the end of which a sheet of cellulose 'jelly' is produced. They harvest the jelly which then undergoes a process of refinement. It is enriched with natural fibres, gums and resins to create a more durable and flexible material which may then be formed into flat sheets in a range of thicknesses and textures, or moulded seamlessly into 3D structures. A range colours can be achieved through the addition of natural dyes, if so desired. The final stages for creating Malai include leaving it to air-dry, and then softening it whilst applying gentle water-resistant treatment (without adding any plastic coatings or synthetic ingredients)■

added Malai to one of their signature bar stool to create a striking seating option. "Two companies are currently testing Malai to create vegan watchstraps," says Zuzana, who participated at London Design Festival in September. Yoga bags and mats are next, given Malai's chemical-free nature. Associations with Indian designers are also on the cards. . "Malai has a nutty smell and a leather grain but it is stiffer than leather. That could explain why it is often kneaded by hand to achieve drape and softness, a process fittingly termed the massage says Zuzana

The duo is open for collaboration with manufacturers and designers who are looking for sustainable materials for making bags, wallets, clutches, pouches, etc. At the moment, the studio is working on the next stage of development where it is being tested for footwear and furniture use.

'At Malai Biomaterials Designs, we make sustainable materials and Malai is our flagship material. For a material to be sustainable the entire lifecycle has to be sustainable. We add value to waste streams like coconut water and banana fibres, our process of making Malai is efficient and clean, it is a perfect combination of aesthetics and functionality, the material can last as long as you wish to and end of life, the material safely composts and become soil: back to where it began. This is the sustainable future". concludes Susmith. ■

www.made-from-malai.com