

SUSTAINABLE LEATHER MADE OF COCONUT WASTE AND NATURAL FIBRES BY THE MALAI COMPANY IN INDIA

The [Malai Biomaterials](#) startup company in Kerala, India, has developed an innovative material made from organic and sustainable bacterial cellulose, grown on agricultural waste sourced from the coconut industry. It can serve as an alternative to animal leather in applications such as cases, bags, light footwear and different accessories.

The Malai coconut leather is strong, durable, water resistant, flexible, breathable and 100% biodegradable. Malai is PETA certified vegan material that doesn't contain anything of animal origin.

The whole study, design and production process was developed by Susmith C Suseelan (product designer and mechanical engineer) from India and Zuzana Gombosova (material designer and researcher) from Slovakia. The aim of these researchers is to develop a material that is circular in nature, doesn't harm the environment, and can be used in product design as a new sustainable solution for the fashion industry, the second most polluting in the world.

In 2018, they founded the Malai Biomaterials start-up company and began the production in a small-scale pilot manufacturing unit based in Kochi, Kerala, a region where the coconut cultivation is an important sector of the local economy.

The Malai company works with coconut farmers and their processing units where they generate 'waste' coconut water after having removed the harvest of white flesh from inside the mature coconuts. Normally this waste water would be released into the drainage system, causing pollution of water and of soil that becomes acid. Every day a small coconut processing unit disposes of almost 4000 litres of this water per day, which can be used to grow 25kg of cellulose and to make 320 sq. meters of the Malai material.

The company rescues this coconut water, which is placed into vats and sterilised, resulting in an energy-rich, entirely natural nutrient upon which the bacterial culture can feed. They combine the nutrient and the culture and then let the bacteria grow and reproduce. The fermentation period takes between twelve to fourteen days. The material is then enriched with natural fibres (from Banana stems, Sisal and Hemp plants) for strength, gums and resins to bound together, to produce a more durable and flexible product which may be formed into flat sheets with a range of thicknesses and textures. The selection of the base ingredients has been researched and tested over hundreds of trials to ensure the final properties of Malai. The company is committed not to add anything oil-based in order to maintain the disposal of materials hassle-free at the end of use.

The website highlights the main features of their new product:



- Malai is a flexible and durable material, comparable to leather. It is water resistant and because it contains absolutely no artificial components it will not cause any allergies, intolerances or illness. It is a completely vegan product.
- It consumes less resources in terms of energy and water during manufacturing, and uses no toxic chemicals in any stage of its production cycle.
- It is available in a range of beautiful earthy colors achieved through the use of mordant-free natural dyes. The company uses natural dyes extracted from the finest plants from all over India. No extra energy is used in their dyeing process unlike during other traditional dyeing production and a patented cold batch dyeing method is used for this process.
- A product from Malai will last from 4-8 years if properly cared for and it is designed to remain in good condition for many years. If the product becomes dirty it can be wiped with a damp cloth and then left to air-dry and when it has dried, applying beeswax or coconut oil will help restore it to its original condition.
- At the end of their life all the Malai products and materials are biodegradable and home compostable. Removing metal trimmings which can be recycled, the materials can be shred in smaller pieces and inserted in home compost where they will decompose within 90-120 days.

Malai is a small business consisting of a team of 10 people working in design, R&D, production, marketing and sales. It collaborates with an array of experts from microbiology, material science, chemistry, mechanical engineering and business development. Malai Biomaterials describes its work as a mix of art, craft, design, science and engineering. The company currently run a small pilot manufacturing unit with a capacity of producing 200 m sq. of sheets with a range of thicknesses per month. In 2019, to expand operations, they [launched a crowdfunding campaign in collaboration with the Fueladream.com](#) platform in India, proposing for purchase some unique products made from Malai leather, including laptop cases, backpacks, footwears and more. These products offer an idea of the wide range of possible applications of the innovative material created by the company. In 2021 ten products, bags and accessories included, are in production.

The company is working on upscaling the activity in the most sustainable way, collecting and validating the data from each step of the production. They are also developing a process to create seamless three-dimensional vessels or objects using a moulding technique. They also intend to introduce the Malai material everywhere in India, working with Indian manufacturers. However, their main focus is on material development, by growing other bio-based materials that can replace leather in all its applications.

Exhibiting their novel biocomposite material on platforms like the *London Design Week* and the *Prague Design Week*, the company has acquired great visibility, making it a PETA-approved label. They have also bagged several honours such as *Elle Décor Design Award* and *Grand Czech Design*. In February 2021, the Malai Biomaterials company won the [Circular Design sustainability in fashion challenge during Lakme Fashion Week](#). Malai products are now distributed and supplied to brands such as *Riti in India*, the UK-based *Ethical Living*, and *Lucky Nelly* in Germany.

To know more

[Malai biomaterials website](#)



[Malai in Facebook](#)

[Malai - Press Release](#)

[Malai in Fueladream – Crowdfunding India](#)

[Article in homegrown.co.in](#)

[Article in architecuraldigest.in](#)

[Article in designyatra.com](#)

[Article in materialinnovation.org](#)

[Article in mashindia.com](#)

[Article in thelovelythingsstore.com](#)

[Article in textilevaluechain.in](#)

[United Nations Alliance for Sustainable Fashion](#)

