NTU scientists turn discarded durian husks into antibacterial gel bandages

By **The Bharat Express News** - March 25, 2021

SINGAPORE: Discarded durian husks may soon have a second life – in the form of antibacterial hydrogel bandages.

The bandages, created by scientists at Nanyang Technological University (NTU), were developed in line with Singapore's zero waste efforts, Professor William Chen said on Thursday (March 25).

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Professor Chen, director of NTU's food science and technology program, is the scientist behind the durian husk project.

"Twelve million durians are eaten every year. However, most of the durian fruit is thrown away, "he said.

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The husk, which is about 60 percent of the durian, is typically thrown away and incinerated, "posing an environmental problem," NTU said in a press release.

The low-cost bandage is both biodegradable and non-toxic, meaning it has a smaller environmental footprint than conventional synthetic bandages, the university said.

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MAKE THE BANDAGE

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Professor Chen and his team created the bandages by extracting high-quality cellulose from the durian husks. They transformed the balls into cellulose powder by slicing, freeze drying and ball milling, before removing impurities.

This is a "significant reduction" in costs compared to traditional methods of using enzymes, said Professor Chen. The traditional method costs around S $ 27,000 per kg, while Professor Chen's method costs around S $ 120 per kg to extract the same amount of cellulose.

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After extracting the cellulose, the researchers combined the extract with glycerol – a waste byproduct of the biodiesel and soap industry – to make a soft gel. The gel, which is similar to silicon sheets, can be cut into bandages of different shapes and sizes.

Scientists then added organic molecules produced from baker's yeast, making the bandages deadly for bacteria.

Hydrogel and plaster patch made from durian shell. (Photo: Nanyang Technological University)

The bandages remain functional in extreme weather conditions, Professor Chen added.

He estimates that he can extract 200 g of pod powder from a 3 kg durian, including 40 g of pure cellulose. These 40 g are enough to make 66 pieces of hydrogel measuring 7 cm by 7 cm, which is sufficient for about 1,600 dressings measuring 1 cm by 2 cm each.

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WHY HYDROGEL?

There are various applications for hydrogels, including dressings and wearable electronics, Professor Chen said.

About 80 to 90 percent of the hydrogel is water, said Associate Professor Andrew Tan, who was invited to Thursday's press conference as an independent expert. He is Associate Dean (Faculty) of the Lee Kong Chian School of Medicine at NTU.

The hydrogel patch derived from discarded durian shells can help wounds heal better. (Photo: Nanyang Technological University)

It is "well established" in many clinical trials that the hydrogel helps heal wounds, added Professor Assoc Tan. For example, water keeps the wound area cool and moist, speeding up healing. The hydrogel also reduces scars.

While durians were not the only possible choice for making these bandages, Professor Chen said he chose the fruit because there was a "sustainable supply" and it was high in fiber.

However, he noted that this is a platform technology and the cellulose extraction method can be used on other materials.

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CHEAPER THAN CONVENTIONAL HYDROGEL PATCHES

According to Professor Chen, conventional hydrogel patches on the market are made from synthetic materials. Those with antimicrobial properties use metal compounds like silver or copper ions.

These materials make conventional hydrogel patches more expensive than Professor Chen's hydrogel, which is made from natural waste.

A typical hurdle for academic research in the market is scalability and cost reduction, Professor Chen said. It was therefore important to keep the process simple, inexpensive and environmentally friendly, he added.

Durian husks are inexpensive, and Professor Chen's extraction method – which uses an environmentally friendly detergent – is straightforward, so the project could be scaled up for production, he said.

Although this is currently only a proof of concept, if cellulose can be extracted sustainably and cost effectively, durian shell hydrogel has "great potential" to replace existing hydrogels already. in the market, Professor Chen said.

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