RISE TO THE CHALLENGE: PATAGONIA AND YULEX

Patagonia has teamed up with Yulex to produce the first wetsuit made from guayule, which they say is a green alternative to neoprene – and they hope other brands will follow suit.

On the crest of a wave

After four years of research and development, Patagonia would be forgiven for keeping its findings to itself. But the US outdoor brand hopes its collaboration with biosciences company Yulex might inspire other wetsuit brands and retailers to choose guayule, a renewable biorubber, over traditional fossil-based neoprene.

"When we started to build wetsuits we knew that neoprene, by nature of its production, was the most environmentally harmful part the product," says Jason McCaffrey, Patagonia's surf director. "Our initial approach was to use innovative materials, like wool, that are highly insulating and allowed us to use as little neoprene as possible. But we quickly realised that we needed to create a new material that could be a true alternative to neoprene."

An article in Patagonia's own publication about the search for a 'green neoprene' was, by chance, read by Phoenix-based Yulex, which contacted Patagonia on the premise that it could potentially apply its nascent technology to develop an alternative to neoprene. "It was really a bit of serendipity," says Yulex CEO Jeff Martin. "We have a solid background with materials engineers and polymer scientists but we really didn't know that application."

The companies joined forces, with Yulex working on the formulation, then supplying samples to Patagonia which provided the lab and field testing. One of the main aims was to create a wetsuit that bettered the properties of 100% neoprene as the material would initially be more expensive, and so they eventually settled on a suit that is 60% guayule and 40% neoprene.

"Frankly, if we'd just wanted to meet the specifications of neoprene, we likely would have had a product in the market quite some time ago – but that was not the objective," says Mr Martin. "In addition to having the same strength and durability as neoprene the objective was to have something that had a lower modulus, or more flexibility or elongation, so we could have a suit that was just as strong but would provide more flexibility for surfers, and in addition would provide better thermal properties at the same thickness."



In trials, surfers said the wetsuit felt the same but had a more pleasant smell than neoprene.

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Yulex CEO Jeff Martin.

Yulex

Clean crop

Yulex's biorubber material is made from guayule, a renewable, non-food crop that requires very little water, no pesticides and, in comparison to traditional neoprene, has a very clean manufacturing process. The plant produces terpene resins, which are natural pesticides, so it is resistant to many pests and diseases. It grows well in arid and semi arid areas of the southwestern US, North Central Mexico and regions with similar climates.

The process of extracting rubber involves homogenising the hedged guayule shrub, releasing rubber from the bark as the branches are ground, creating an aqueous suspension. The suspension is then placed in a centrifuge for separation and the rubber portion culled off the top and purified.

Aside from the manufacturing process being cleaner than that of neoprene, one of the main advantages is Hevea-derived [traditional] rubber contains proteins that can cause allergic reactions, while guayule does not. Yulex was established in 2000 to address this issue, focusing originally on the medical sector, for which it is currently undergoing certification with the US Food and Drug Administration (FDA). "Latex allergy is a significant problem both in the US and Europe," explains Mr Martin. "We're going through all the necessary approvals that we need before putting medical products in the marketplace, which is a step we don't take in the consumer market. However, we think that FDA approvals will be beneficial to consumers in markets such as apparel and wetsuits, especially with respect to biocompatibility and allergy issues."

Partnerships

In July 2012, Yulex received a $6.9 million US government grant as part of a research consortium to look at enhancing the manufacturing processes of guayule as a raw material in tires, and evaluating the remaining biomass as a source of bio-fuel for the transportation industry.

In May, it announced that it will provide the University of Arizona with a $3 million, five-year grant for agronomic development, to produce a higher-yielding crop and to decrease the harvest cycle time in what it describes as the "most comprehensive breeding programme ever undertaken". "We're looking to improve many aspects of the crop, which is a normal process with any new crop; keep in mind we've taken this from being a wild crop grown in Mexico to a domesticated crop," says Mr Martin. The university has supported Yulex since the company's inception, with its first experimental crops planted on the grounds of the campus.

It has also tied-up with Italian chemical company Versalis this year to develop an industrial production complex in Southern Europe. The partnership will cover the entire manufacturing chain from crop science and biorubber extraction to the construction of a biomass power station. Versalis' chief executive Daniele Ferrari highlighted the forecasted scarcity in the butadiene market and volatility of the chemical, which causes long-term pressure on the price of synthetic rubber, as one of the reasons for the collaboration. Yulex has also launched an operation in Australia.

"The objective with Patagonia and a number of other companies is to have local production for their products in many spots around the world; you can't do that with natural rubber because all the natural rubber in the world comes from one geographical area South East Asia, so it has to be produced and shipped all over the world for consumption," adds Mr Martin. A wider growing zone will theoretically lessen reliance on imported tropical rubber, and reduce transport costs by creating hubs on every continent.

The wetsuit, made from 60% guayule, was initially launched in Japan but is now available globally.

Patagonia



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The University of Arizona is working on agronomic development to speed up the crop's growing cycle.
Yulex

What's next?

Guayule has a number of other potential applications in the sportswear industry – primarily for footwear, including high-performance athletic shoes, rock climbing and cross-training shoes. "The rubber materials can be used in the outer sole, closed-cell foams for the midsoles or open-cell foams that are used in the construction of tongues and the upper surfaces of shoes," says Mr Martin, adding that the company is working with some of the "top marketers in the footwear industry" to bring the products to market, and that it has also had interest from yoga mat manufacturers.

"Patagonia walk their talk with respect to the goals, the objectives and the philosophy of their company, as far as doing things that are positive for the business and for the environment," says Mr Martin.

"Most companies would insist on a long-term exclusive agreement wherein they would be the only ones who would have access to the technology. Patagonia took the opposite route: their mindset was if the technology is good for our industry, we want to help you develop it, we want to help you be successful in this marketplace and we want to make the technology available to everyone. Which, frankly, in my business background, I've not run into before; it was quite a pleasant surprise."

The two companies teamed up on a joint stand and marketing initiative at Outdoor Retailer Summer Market, held in Salt Lake City at the start of August. Patagonia even set up meetings for Yulex with competing surf brands. Mr McCaffrey tells us, "People from both the industry and the consumer side of things have been incredibly excited and supportive. Our use of this material has helped bring Yulex some interest from various footwear, eyewear and yoga brands - basically anyone looking for a legitimate 'green' story."

Patagonia processed the material with its existing suppliers, Taiwanese neoprene and wetsuit manufacturers Sheico and Nam Liong, which work with most brands. "In that regard, all of the connections have been made," adds Mr McCaffrey. "Any other wetsuit brand can order sample material right now, they can use the same glues, their own proprietary fabrics, whatever they need to make the best suit they think they can. I have to say meeting the wetsuit teams from the other brands was really cool, we all agreed that the real win here is to have less scrap that won't biodegrade thrown into landfills."

The next step is a 100% guayule wetsuit, currently in development, which will reportedly have extra performance advantages which will be revealed at its launch.

"I think the sky is the limit," says Mr McCaffrey of the possibilities. "The natural rubber supply chain is an incredibly complex one and the more attention given to it, and the further development of non-food crops that thrive in arid regions using little to no water and no pesticides makes it a no-brainer."



Rubber from guayule does not cause allergic reactions like traditional rubber can.
Yulex

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