Fraunhofer, Continental come together when the dandelion rubber meets the road

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Scientists from Fraunhofer have transformed the ordinary dandelion from a weed into an agricultural crop that produces an abundance of natural rubber. Credit: © Fraunhofer IME

(Fraunhofer-Gesellschaft) Rubber can be extracted from the juice of the dandelion. Working jointly with industry and science, the Fraunhofer Institute for Molecular Biology and Applied Ecology IME has optimized the cultivation and production engineering over the past few years. Now the researchers—in collaboration with Continental—are building the first ever pilot system to extract vast quantities of dandelion rubber for making tires: An important milestone on the path to rubber procurement

in Europe.

The joint project officially started at the beginning of October. The goal is to develop the production process over the next five years so that Continental can manufacture tires made from dandelion rubber. This is why molecular biologists at IME and the research department of the automotive supplier built a pilot facility in Münster that is capable of producing natural rubber by the ton. At the same time, they cultivate several hectares of a dandelion variety which is particularly rich in rubber. To optimize the raw material content and the properties of the blossom, the researchers concurrently grew new varieties with a higher proportion of rubber and biomass yield. The first prototype test tires made with blends from dandelion-rubber are scheduled to be tested on public roads over the next few years. The natural product obtained in this manner exhibited the same quality as the conventional rubber from rubber trees that has been imported from subtropical countries and used in tire production. However unlike the conventional rubber, it could be harvested more cost-effectively, better cultivated and grown in Germany as a sustainable raw material - even on land areas not previously suited for agricultural crops.

"Through the most modern cultivation methods and optimization of systems technology, we have succeeded in manufacturing high-grade natural rubber from dandelions – in the laboratory. The time is now right to move this technology from the pilot project-scale to the industrial scale. We have found an expert partner in Continental, with whom we now want to create tires that are ready for production," explains Prof. Dr. Rainer Fischer, head of institute at IME in Aachen.

"We are investing in this highly promising materials development and production project because we are certain that in this way we can further improve our tire production over the long term," says Nikolai Setzer, the Continental managing director who is responsible for the tires division.

"It's because the rubber extraction from the dandelion root is markedly less affected by weather than the rubber obtained from the rubber tree. Based on its agricultural modesty, it holds entirely new potential – especially for cropland that is lying fallow today. Since we can grow it in much closer proximity to our production sites, we can further reduce both the environmental impact as well as our logistics costs by a substantial margin. This development project impressively demonstrates that, with regard to material development, we have not reached the end of our potential."

"We have amassed tremendous expertise in dandelion harvesting over the last few years. With the aid of DNA markers, we now know which gene is responsible for which molecular feature. This makes it possible to cultivate especially high-yield plants much more efficiently," as Prof. Dr. Dirk Prüfer describes the research efforts at the Münster-based IME site.

Scientists there have intensively engaged with this topic there. They succeeded in proving that the rubber extracted from dandelion is of the same quality as its cousin from the rubber tree. The team under Prof. Prüfer is gathering comprehensive raw data for the first time on the individual varieties, on their rubber content and on the biological mechanisms of production. With the aid of this knowledge, they succeeded in cultivating varieties that are especially high in yield, robust, and easy to grow. "The greatest challenge was to transform the weed into a useful crop and to cultivate suitable varieties. In the meantime, a few of our plants proved to contain a markedly elevated rubber content. We will now stabilize these even further by breeding them," explains Prof. Prüfer.

For production, only the Russian variety of our domestic plants can be used. This is the only type that features large quantities of rubber within its white latex sap. It is immense potential hidden inside the dandelion.

Compared to the rubber tree, it has three decisive advantages: Its vegetation period only lasts one year, not several years. Afterwards, the plants can be harvested immediately, and be further optimized by breeding. At the same time, it is less vulnerable to pests. And finally, it does not require a subtropical climate and can be planted on domestic croplands.

"With this new technology, we can achieve a sustainable edge for the German automotive market. On the one hand, it makes the domestic economy less dependent on the importing of raw materials. On the other hand, it reduces the transportation routes, and thus improves the CO2 balance," as Dr.-Ing. Reimund Neugebauer, President of the Fraunhofer-Gesellschaft, describes the purpose and the essential advantages of the collaboration.

Provided by Fraunhofer-Gesellschaft

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