

Natural rubber from dandelions

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Left to right: Dr. Christian Schulze Gronover, Dr. Carla Recker (Continental Reifen Deutschland GmbH) and Prof. Dirk Prüfer make use of the Russian dandelion to obtain natural rubber for subsequent use in the manufacture of car tires. Credit: Dirk Mahler/Fraunhofer

Dandelions are modest plants that are an excellent alternative source for a raw material of high demand: natural rubber, the fundamental

ingredient in rubber products. Fraunhofer researchers have established the basis for the large-scale production of high quality rubber with Russian dandelion.

Approximately 40,000 products of everyday life contain [natural rubber](#). It's the material that provides extreme elasticity, tensile strength and low-temperature flexibility in products from mattresses and gloves to adhesive tape and tires. As yet, it has no artificial replacement. However, researchers from the Fraunhofer Institute for Molecular Biology and Applied Ecology IME were able to identify a cost-effective and eco-friendly alternative to the natural rubber tree: the [dandelion](#).

Currently, all our natural rubber comes from *Hevea brasiliensis*, a tree that grows under subtropical climate. Increasing demands and potential problems with a devastating fungus have made natural rubber into a valuable resource. Southeast Asia accounts for 95% of global production. In order to meet growing demands, producers turn rainforest into agricultural land. Now Professor Dirk Prüfer and his colleague Dr. Christian Schulze Gronover from Fraunhofer IME in Münster are developing *Taraxacum kok-saghyz*, also known as Russian dandelion, as an efficient replacement for the natural rubber tree. "The plant is extremely resilient, able to grow in moderate climates and even in soil that is not or just barely suited for the cultivation of food and feed crops," explains Christian Schulze Gronover. "Dandelions also have the advantage of growing annually. The natural rubber tree takes between seven and ten years to deliver the first harvest."

Dirk Prüfer decided to investigate the dandelion after a sudden insight on a day out. "I was sitting in a meadow in the Sauerland region in Germany, and it was absolutely covered with dandelions. Having plucked the flower off one of them, I was wondering if the expelling white latex contains rubber." However, Germany's native dandelions don't produce sufficient quantities of rubber for being industrially viable. That's why

the researchers subsequently turned their attention to the Russian dandelion, which produces large amounts of natural rubber.

No genetic modification

With the help of precision breeding, the researchers were quickly able to double the amount of natural rubber in the Russian dandelion. This was achieved without genetic modification; instead, Dirk Prüfer and Christian Schulze Gronover analyzed the dandelion's genome and identified suitable DNA markers. These genetic tools could tell already in a very early stage of plant development if a given plant will possess an efficient rubber production.

Extraction of natural rubber from the plant was another challenge. To this end, the scientists developed an eco-friendly technique whereby only the roots are pulverized because the leaves contain very little rubber. At the end of the process, water is used to separate the resource from the other substances.

New natural rubber successfully undergoes practical testing

The performance of tires made of dandelion natural rubber has already proven in action, and manufacturer Continental has tested a first version. "The dandelion natural rubber has ideal material properties. The tires are equivalent to those made from Hevea natural rubber," says Dr. Carla Recker of Continental.

Since natural rubber is critical to the quality of many rubber products, industrialized nations in particular regard it as a strategically important resource. Natural rubber obtained from dandelions could reduce the dependence on imports from Asia. However, if the entire world

production will be based on dandelion rubber, one would need the size of Austria for its cultivation. Thus, Dirk Prüfer points out that rubber from dandelion will not replace the actual source, but will compensate the additional demand in the future.

Provided by Fraunhofer-Gesellschaft

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