MAKING RUBBER FROM DANDELIONS

With support from

Federal Ministry of Food and Agriculture

by decision of the German Bundestag
DEAR READER,

The global demand for natural rubber is rising. This is mainly used in tyre production, as well as other rubber products. Up until now, it has not been possible to fully replace its excellent technical properties with synthetic rubber.

Previously, the only way to produce natural rubber was by using latex from the tropical rubber tree *Hevea brasiliensis*, but now, alternative sources of natural rubber are needed so that medium-term demand can be met, while also protecting the rainforest.

The Russian dandelion *Taraxacum kokssaghyz* produces natural rubber of a similar quality. It grows in temperate climates, making it possible to expand natural rubber production into our regions. Cultivating dandelions will also make it possible to increase domestic crop diversity.

The Federal Ministry of Food and Agriculture and the Federal Ministry of Education and Research, as well as other donors are supporting the development of the full process chain, from growing and cultivation of dandelions to creating the first tyres and other products. In this brochure, we will present the individual steps and the participating research partners.

Kind regards,

Dr Andreas Schütte
BREEDING

The Russian dandelion is a close relative of the dandelions that grow here, in Germany. It produces a whitish, sticky latex containing natural rubber within its roots. However, as a wild plant, it is not entirely suitable for agricultural production. To begin with, plant breeders are therefore working out the physiology behind natural rubber synthesis and developing varieties that will allow for successful industrialisation. The plants should have a high root yield and latex content as well as a high level of resistance to disease, pests and drought. In addition to this, the roots must be easy to grub up as cleanly as possible, as well as being simple to store and process.

GOALS FOR BREEDING

- Stabilising yields and increasing them to approximately one tonne of natural rubber per hectare
- Optimising the geometry of the roots to minimise soil adhesion, contamination and losses when harvesting
- Improving drought tolerance
- Increasing disease resistance
CULTIVATION AND HARVESTING

Up until now there has been relatively little experience in cultivating and harvesting the Russian dandelion. This is considered to be a major challenge. There are still a few areas in need of improvement, from inexpensive seeding methods and plant protection management to harvesting technology. Similar research is also conducted in order to figure out whether the plants will spread and cross-breed with other varieties, and how to control or prevent this if necessary.

GOALS FOR CULTIVATION/HARVESTING

- Development of direct seeding methods
- Minimal use of fertilisers and plant protection products
- Optimisation of weed control
- Prevention of uncontrolled seed distribution
- Development of harvesting processes

PROJECT PARTNERS
LATEX AND NATURAL RUBBER PRODUCTION

Latex can be obtained relatively easily by slicing open the bark of the rubber tree. However, with the Russian dandelion, the natural rubber is extracted directly from washed roots. The Taraxagum Lab Anklam is carrying out research into the extraction of solid natural rubber from dandelion roots in and with the support of the State of Mecklenburg-Vorpommern.

DEVELOPMENT GOALS FOR LATEX AND NATURAL RUBBER PRODUCTION

- Optimisation of extraction procedures
- Development of purification processes

PROJECT PARTNERS
TYRE PRODUCTION

Previous studies have shown that natural rubber made from dandelions is very similar to the rubber produced using rubber trees. To meet the high and very specific standards of the tyre industry, research is being carried out into whether dandelion rubber can be processed using existing processes. This includes research into whether the operating, braking, abrasion and ageing behaviour of the tyres manufactured using these processes can meet the relevant quality standards in a range of road and weather conditions. There is considerable demand: in fact, one HGV tyre contains up to 25 kg of natural rubber, a car tyre 1–3 kg.

DEVELOPMENT GOALS FOR TYRES:

- Low rolling resistance
- Good braking behaviour under a range of conditions
- Lower levels of wear
- Durability

PROJECT PARTNER

[Continental Logo]
Although most of the natural rubber produced worldwide is used for tyre production, this natural raw material is also used to manufacture many other products. These include, for example, erasers and seals, as well as foam and mattresses. One of the participating projects is testing the processing of latex from the Russian dandelion into foam, e.g., for mattresses.

**DEVELOPMENT GOALS FOR FOAM**

- Mechanical stability
- Durability
With support from decision of the German Bundestag

PROJECT PARTNERS

A wide range of partners have contributed expertise to the process chain for obtaining and processing natural rubber from the Russian dandelion:

- Bavarian State Research Center for Agriculture
- Continental Reifen Deutschland GmbH
- ecSeq Bioinformatics GmbH
- ESKUSA GmbH
- Fraunhofer Institute for Interfacial Engineering and Biotechnology
- Fraunhofer Institute for Molecular Biology and Applied Ecology
- Gaubodenkrauter GmbH & Co. KG
- HOLMER Maschinenbau GmbH
- hortilab - Laboratory for Plant Tissue Culture
- Julius Kühn Institute, Federal Research Centre for Cultivated Plants (JKI)
- Max Planck Society for the Advancement of Science (MPG)
- lifespin GmbH, preliminary work carried out by numares AG
- Synthomer Deutschland GmbH
- University of Regensburg
- University of Stuttgart
- University of Münster (WWU)

DEVELOPMENT GOALS FOR LATEX GLOVES

- Ensuring mechanical stability and ensuring tear strength
- Barrier behaviour: impermeable to air and liquids

LATEX GLOVES

Can balloons, gloves, condoms and other thin-walled products also be made from dandelion rubber while maintaining similar properties? Researchers are currently using latex gloves as an example to test this.

THE CORRESPONDING RESEARCH PROJECTS WERE AND ARE CURRENTLY BEING SUPPORTED BY
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