

Rubber from dandelions and shrubs

Wageningen researchers are getting the Russian dandelion and an American shrub ready to take over the role of the rubber tree. 'The financial picture looks good.' TEXT NIENKE BEINTEMA

Endless rows of dandelions or guayule, an American shrub, stretching out to the horizon: this could be a reality in Europe in ten years' time. Biofuel? No - rubber. The cells of the Guayule bush contain rubber particles while the sap of the Russian dandelion plant (a cousin of the dandelion that is a familiar sight in the Netherlands) contains high-quality latex, the raw material for rubber. And thanks to guayule and the Russian dandelion, Europe will be able to make its own rubber gloves and car tyres in the not too distant future. That is the idea behind a European research project, EU-PEARLS, in which Wageningen UR is playing a key role. The consortium includes KeyGene and car tyre manufacturer Apollo Vredestein, along with research groups from various countries. 'Rubber traditionally comes from the rubber tree', explains Robert van Loo of Plant Research International, part of Wageningen UR (PRI). He is one of the researchers. 'Originally, rubber trees come from South America, but large-scale production has never been possible there because of a fungal disease. That is why large rubber planta-

tions are only to be found in Southeast Asia. But disease could break out there too. It's a very vulnerable crop.'

ALTERNATIVE SOURCE

Rubber is an important raw material, explains Van Loo, not just for industry but also for healthcare, the transport sector and even for defence. That is why the Americans were already looking for an alternative source back during the Second World War, when trade with Southeast Asia had ceased. And they found it. Guayule, a shrub from the same family as the dandelion, has rubber particles in its cells, which on extraction form latex with its characteristic milky colour. This shrub grows in the desert in Mexico and the southern USA. 'They never went on to cultivate it on a large scale there', says Van Loo. 'But there is now renewed interest in alternative rubber. Rubber prices have risen more than fivefold over the last ten years.' He explains that this is largely due to the rapid increase in demand from countries such as India and China. There is a threat of global shortages, especially in view of the vulnerability of the plantations. 'All the more rea-

son for Europe to secure its rubber supplies.' This could be done in Northern Europe by growing the Russian dandelion, while further south guayule has stronger potential. The aim of the EU project is to set up and optimize the entire production chain in Europe, from plant to final product, using not just the Russian dandelion but also the guayule as a source of latex. Wageningen researchers have taken on a number of chal-



Guayule



Russian dandelion



‘Rubber prices have gone up more than fivefold in the past ten years’

lenges. For example, they are trying to improve the genetic makeup of the two plant species in order to increase their production and their resistance to disease. ‘We are using marker-assisted breeding to achieve this’, says Hans Mooibroek of Wageningen UR Food & Biobased Research, the EU-PEARLS coordinator. ‘This is a method for crossing certain genes in plants in a very targeted way.’

PRI is also carrying out ‘classic’ agronomic research into the guayule, with field trials in Spain to investigate the influence of soil, climate, water and fertilizers on the plants’ growth. Mooibroek emphasizes that the businesses in the consortium also have a crucial role. For example, KeyGene has undertaken to do some of the breeding research and Vredestein is working on testing the rubber in car tyres.

MOLECULES IN LONG CHAINS

The molecule that serves as the foundation for the production of rubber is isoprene, a relatively simple organic molecule. In latex and rubber these molecules are linked together in long chains, or polymers – something plants are much better at doing than

chemists. ‘There are other plants that make polyisoprenes,’ says Van Loo, ‘such as our own dandelion. But its chains are not nearly as long and so it can’t be used as the basis for rubber.’

The project’s initial results are extremely positive, according to Mooibroek. ‘We can expect to achieve annual yields of 1,000 to 1,500 kilos of rubber per hectare. We can get that from guayule now and from the Russian dandelion in a few years’ time’, he says.

‘That would mean these two crops can compete with rubber trees.’ In fact, these crops can be grown more efficiently because you can harvest the plants mechanically.

Investigations are still going on to discover the best method for extracting the latex from the plants.

The process does not just produce rubber, emphasizes the project coordinator. For example, a by-product of the cultivation of the Russian dandelion is inulin, a compound that can be used as the basis for all kinds of chemicals. Mooibroek: ‘The financial picture looks promising.’ Now it is just a question of time, think the two Wageningen scientists. The first natural rubber from Europe should be on the market in about ten years. ■

