

Adhesives and insulating foams from softwood bark tannins

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In collaboration with its partners, VTT developed tannin extraction from softwood bark as part of an ERA-NET project. At least 130 kg of crude tannin powder can be produced from one tonne of dry wood bark, still leaving 87% of the original bark mass available for incineration. In Finland, tannin could replace, in particular, fossil-based phenols in adhesives used in the wood products industry.

Hundreds of tonnes of tannin is produced from wood materials and wood bark for the needs of leather, beverage and animal feed industry in South America and South Africa in particular. However, the supply of the main sources of tannin, acacia and quebracho trees, is not sufficient to satisfy the increasing industrial demand for tannin.

In industrial use, tannin could be used to replace fossil chemicals in adhesives and insulating foams. In Finland, softwood bark tannins would be well suited for adhesive production for the manufacturing of wood products at sawmills. It could also enhance the fire resistance of insulating foams.

As part of the international ERA-NET project, VTT Technical Research Centre of Finland Ltd developed, in [collaboration](#) with its partners, a tannin extraction process from bark material generated as a by-product in the paper and wood industry to give added value to the fraction currently used for incineration.

Extraction and drying produce 130 kg of tannin powder from one tonne of wood bark

The extraction process is quite simple: tannin can be extracted from bark using hot water, after which the extract is dried into a powder. Drying the water extract into powder may not be necessary if the tannin is extracted near the site where glued [wood products](#) are manufactured. One tonne of dry [wood](#) bark yields at least 130 kg of tannin powder, leaving 87% of the original bark mass available for incineration.

The tannin extracted from present raw material sources is relatively pure. Extract from spruce [bark](#), however, also contains other compounds, carbohydrates in particular, which limits the use of crude tannin. Yet, it may be possible to develop extraction and extract purification technologies for different end uses. The market price per kilo of tannin extracted from present raw material sources is approximately 1-2 euros. The market price per kilo of phenol is has varied recently from 0.8 to 1.4 euros.

Multi-purpose tannin

One of tannin's special properties is its ability to precipitate proteins and for this reason it has been used for tanning leather for thousands of years. This natural polyphenol is also known as a natural or added ingredient in red wine, where it clarifies the liquid and improves its shelf life and taste. Tannin is also added to certain feed products. For example, it enhances cattle's ability to take advantage of proteins contained in feed in its metabolic processes.

Provided by VTT Technical Research Centre of Finland

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