Stabilizing properties of spruce gum can be adjusted using extraction techniques

November 24 2020

From the right: unpurified spruce gum obtained from hot water extraction, spruce gum obtained from industrial streams, and purified spruce gum. Credit: University of Helsinki

Biomass obtained from wood and the fractions extracted from it can serve as precursors for future sustainable and cost-efficient raw materials in various industrial sectors. A good example is spruce gum, a common, renewable and sustainable raw material found in nature.

"These hemicelluloses in wood have promising properties as stabilizers of emulsions, such as salad dressings and yogurts. Stabilizers help

achieve the desired texture and mouthfeel in food products. So far, oil-in-water emulsions have been primarily stabilized using more expensive polysaccharides, which are imports. Furthermore, the whole processes of from their extraction to global supply makes it less sustainable," says Mamata Bhattarai, who is defending her doctoral thesis in a public examination at the Faculty of Agriculture and Forestry, University of Helsinki.

In her doctoral thesis, Bhattarai investigated spruce gum extracted through three different approaches, observing that individual processes had markedly different effects on the solubility of spruce gum and its functioning in emulsions.

"Particles of varying sizes and structures, brought about by partial solubility, affected the functioning of spruce gum as an emulsion stabilizer. For example, spruce gum recovered through a modified hot water extraction had the best solubility, but its ability to stabilize emulsions was poorer than that of the spruce gum samples obtained by the two other processes. Recovery processes are also expected to modify the chemical composition of spruce gum which also affect their functioning."

Spruce gum offers a plant-based alternative for the food, cosmetics and pharmaceutical industries, which manufacture a broad range of emulsion-based products. The new information gained on spruce gum also promotes their use in biobased films, fillers and biofuels.

More information: Associative behavior of spruce galactoglucomannans in aqueous solutions and emulsions: helda.helsinki.fi/bitstream/ha … quence=1&isAllowed=y