

## **VTT develops use of berry seeds in cosmetics**

The husks of berry seeds have properties worth using in cosmetics to prevent the growth of harmful microbes. VTT Technical Research Centre of Finland has developed a method of recovering active substances from seed husks.

When manufacturing juice, the food industry produces large amounts of press cakes containing a range of useful compounds for the skin, such as polyphenols known for their antimicrobial and antioxidant properties. Until now, the industry has largely confined itself to extracting seed oil from press cake. Despite the potential for new product concepts, no other high-value-added products are currently made from press cake.

“Cosmetics trends include the maintenance of healthy skin and replacement of preservatives with natural compounds. Berry seed husks contain large amounts of antimicrobial compounds which can help to maintain a natural microbial balance in the skin, by suppressing the growth of harmful microbes while beneficial ones flourish. This is based on nature’s way of protecting seeds from threats such as fungi,” says Riitta Puupponen-Pimiä , Principal Scientist at VTT.

### **Compounds enriched by sanding**

VTT has developed a seed sanding method for enriching compounds which suppress the growth of harmful bacteria. For example, 20% of a cloudberry seed’s weight can be sanded using this method.

So-called hydrothermal extraction technology is used to extract active substances from seed husk fractions, as suitable ingredients for the cosmetics industry. This method involves no toxic reagents or solvents. The final product tends to be light-coloured, powdery, water-soluble, food-grade fractions. VTT has optimised the process for a variety of berry seeds. After sanding, seed oil can be extracted from the remaining seeds.

The sanding method is suitable for berries with large seeds and various fruits. Useful compounds from small-seed berries, such as blueberries, can be extracted using a wet milling method developed by VTT.

VTT patented the sanding method and filed two other processing patents, as well as exploring the commercialisation opportunities associated with natural antimicrobial compounds in berries during a recently concluded Research Commercialisation Project (TUTL) of Tekes - the Finnish Funding Agency for Innovation.

“We have investigated how the microbes typically found in human skin and those that hide in cosmetics products react to polyphenols contained in berries. At a general level, you could say that seed husk fractions and the resulting extracts prevent harmful microbial growth in the skin, but do not suppress the growth of good microbes,” says Puupponen-Pimiä.

Cloudberry and Arctic brambles are most effective

Among Finnish berries, cloudbberries and Arctic brambles produce the seed fraction extracts that are best at inhibiting harmful microbial growth. These berries, which belong to the *Rubus* genus, contain high levels of polyphenols called ellagitannins, which are known for their anti-microbial effects.

Extract from sea buckthorn seed fractions has also proven effective. Sea buckthorn seed husks are also rich in polyphenols known as procyanidins, a kind of tannin.

The varied and abundant microflora of the skin

Each square centimetre of skin contains around one billion microbes. *Staphylococcus* and *Pseudomonas* bacteria are examples of microbes that are hazardous to the skin's health. On the other hand, lactic acid bacteria are useful. Bacteria belonging to the *Propionibacterium* genus can be either harmful or beneficial, depending on factors such as their numbers. Seed extract's effectiveness in preventing harmful microbial growth depends on the berry in question.

VTT's research has shown that, in addition to polyphenols, seed press cake contains other health-promoting compounds and thus it could be used in food and cosmetics in a number of ways. Most of the thousands of kilogrammes of seed cake produced could be used for purposes other than feed.

VTT has been studying antimicrobial compounds in Finnish berries for almost 20 years.

Puupponen-Pimiä, R., Nohynek, L., Juvonen, R., Kössö, T., Truchado, P., Westerlund-Wikström, B., Leppänen, T., Moilanen, E., & Oksman-Caldentey, K.-M. 2016. Fermentation and dry fractionation increase bioactivity of cloudberry (*Rubus chamaemorus*). *Food Chemistry* 197, 950-958.

Nohynek, L.J., Alakomi, H.-L., Kähkönen, M.P., Heinonen, M., Helander, I.M., Oksman-Caldentey, K.-M. & Puupponen-Pimiä, R.H. 2006. Berry phenolics: antimicrobial properties and mechanisms of action against severe human pathogens. *Nutr. Cancer* 54, 18-32.