Making juice healthier with skin and seeds

Many of the beneficial substances in berries are found in the skin and the seeds – which are usually discarded when the berries are pressed to give juice.

Ph.D student Linda Holtung at the food research institute Nofima has studied how the press residue can be better utilized. She has also studied the health effects of drinking healthier juice.

She shows that only one half of the polyphenols, also known as antioxidants, that were originally present in blackcurrants and bilberries end up in the juice. The rest are left in the press residue.

Blackcurrants selected

In collaboration with the industry she has created what they have called an Optijuice. Optijuice consists of a commercially available juice, MANA, fortified with natural antioxidants from the blackcurrant press residue. 85% MANA and 15% blackcurrant extract from the press residue.

“This means that the consumer receives a healthier juice, while the industry can use a more efficient and environmentally sensitive process in which the raw materials are exploited more fully,” says Holtung.

The idea of studying the effects of using the skin and seeds arose from knowledge obtained in previous research projects at Nofima. The results of the studies showed that a very large fraction of the polyphenols is present in the skin and seeds of fruits and berries. In the current project, bilberries, raspberries and apples in addition to blackcurrants, were studied. Among these commodities, blackcurrant was the most promising.

Laboratory experiments followed by clinical trials

Before the scientists gave Optijuice to people in an intervention study, they wanted to develope the best possible extract. They discovered that the highest concentration of polyphenols and the best health effect was obtained by extracting at high temperature for a relatively short time period. The best conditions were extraction at 80-100 °C for 4-15 minutes.

“We started by carrying out experiments in cell cultures, and saw that the extracts had an inhibitory effect on cancer cells, among others. Markers for both blood pressure and inflammation reactions also reacted in the way we wanted. We then went on to clinical trials and saw that the effects we had seen in the cell studies were confirmed in the intervention study,” says Linda’s Ph.D. supervisor, Kjersti Aaby at Nofima.

130 people in the intervention study

The participants, who all had mildly elevated blood pressure, were assigned to one of three groups.

One group received a placebo drink, one group received pure MANA juice, and one group received Optijuice.
“The study lasted for 12 weeks and we obtained useful information about how polyphenols work in the body. This is a win-win situation. The producers can better utilize the berries, while the consumers receive a healthier juice,” says Linda Holtung.

The blood pressure of participants in the group that drank MANA and the group that drank Optijuice decreased. Further, a marker for oxidative stress was reduced in the group that drank Optijuice. Oxidative stress is associated with a number of conditions, including cancer and cardiovascular diseases.

“It’s worth noting that the positive effect that arose from the blackcurrant extract cannot be attributed to the effects of vitamin C,” says Kjersti Aaby, “because while half of the polyphenols remain in the press residue, all of the vitamin C is present in the juice.”

“We have collaborated in this project with TINE SA, Findus and Fellesjuice to create what we have called an “Optijuice”.

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Only one half of the polyphenols, also known as antioxidants, that were originally present in blackcurrants and bilberries end up in the juice. (Photo: Colourbox) [6]

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Side story

Linda Holtung’s doctorate

Linda Holtung has previously a Master degree in molecular medicine. She defended her doctoral thesis on August 28th at the Institute of Basic Medical Sciences, University of Oslo. The thesis is entitled: “Berry press-residue – a valuable source of polyphenols with potential health effects”, and Linda’s supervisors were Professor Rune Blomhoff, Institute of Basic Medical Sciences, University of Oslo, and scientists Kjerst Aaby and Stine Grimmer, both from Nofima.

The doctorate, which has been associated with the Optijuice project, has been financed by the Research Council of Norway, through its “Bionær programme” and by TINE SA, which is also the project owner of Optijuice. Other collaborators have been Findus and Fellesjuice.

Wenche Aale Hægermark [14]

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