

Influence of Swedish bilberry pre-processing technique on juice yield and quality

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Bilberries represent a valuable northern European wild berry crop, well regarded for their high content of bioactive compounds and perceived health benefits. In Sweden, other than consumption of fresh whole berries, processing into juice is the most common route. To optimise the extraction of juice from bilberries and to investigate the impact on juice quality, fresh berries were pre-treated using a range of techniques prior to pressing.

Blanching the berries or treating them with pectinase enzymes gave the highest juice yield with 74 and 83% recovery (% w/w), respectively (approx. 3.4 to 3.8-times the control). Freezing the berries prior to pressing was as effective as grinding + heating and resulted in a 2.8-fold increase in yield. Use of a screw press instead of a hydraulic press increased the yield 3.4-fold with no other pre-treatment. Freezing prior to screw press only resulted in a modest increase in yield from 75 to 78% when using the screw press, but was still an improvement versus freezing prior to hydraulic press.

In terms of the quality of the juices, blanching, grinding and heating, and pectinase treatment had the highest phenolic content, but pectinase treatment resulted in the highest

overall extraction yield from the berries. Again screw press increased the content of phenolic compounds in the juice and had higher extractive yields from the berries. The antioxidant content of juices (measured as ferric-reducing antioxidant potential) followed the same trend as the phenolic content.

Overall, use of a screw press increased the juice yield versus a hydraulic press, but the use of pectinase enzymes still appears to be the most effective treatment for maximising the juice yield when using the hydraulic press. Freezing and blanching berries prior to processing has a positive impact on juice yield, phenolic content, and antioxidant capacity, especially for hydraulic pressing. The use of pectinase enzymes increased the extractive yields of juice and phenolic compounds extracted from the berries, but the composition of the juices themselves were very similar when blanching, freezing, or grinding and heating were used, suggesting the use of expensive enzymes may not be necessary to produce juices rich in antioxidant compounds on a cost benefit level.

Future work should investigate the combination of enzyme treatment followed by screw press as well as the cost and life-cycle implications of the different processing conditions.