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## Beneficial health substances from berries and minor crops –

- How to increase their concentration in cultivated species, eliminate losses in processing and enhance dietary use

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# The effect of processing on chokeberry (Aronia Medik.) polyphenols

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Chokeberry is a violet-black soft fruit of Aronia Medik. native to the northern temperate hemisphere. Aronia is widely cultivated in North America, Russian and Northern Europe and the berries are known to be exceptionally rich in phenolic compounds. The major polyphenols in chokeberry are procyanidins and anthocyanins but it contains also significant amounts of phenolic acids and flavonols. Polyphenols are well-known free-radical scavengers and they have been often associated to potential benefits on human health. Due to the strong astringency and bitterness of chokeberries they have been typically processed into juices and jams before consumption. The aim of this work was to study the effect of some common processing methods on the chokeberry polyphenols.

Chokeberries were processed into jams by mixing them with sucrose, water, pectin and citric acid and then boiled. Two different boiling times (5 min and 15 min) were tested. Chokeberry juices were pressed from crushed berries without enzyme treatment and from berries treated with pectinase or cellulase. The oven-drying of chokeberries were carried out at 45 ºC. For the whole unbroken berries the drying time was 72 hours and for the crushed berries it was 66 hours. Additionally the effect of quick pasteurization before the drying procedure was studied for the crushed berries. The major polyphenols (procyanidins, anthocyanins, chlorogenic acids, flavonols) in chokeberry and chokeberry products were measured by high performance liquid chromatography (HPLC).

The phenolic compounds in chokeberries were quite stable during the jam making and 70-75 % of the total phenols were recovered from the processed jams. However, the boiling time has significant effect on the polyphenol profile. 85 % of anthocyanins were recovered with 5 min boiling but only 60 % when the boiling time was 15 min. On the other hand, the recovery of procyanidis was slightly higher when the longer

boiling time was used. The boiling time has no effect on flavonols and in both cases approx. 65 % of flavonols were recovered. The major phenolic acids, chlorogenic acid and neochlorogenic acid, were very stable during jam making with the recovery of 95 % with either boiling time.

During the juice processing most of the chokeberry polyphenols retained in the pressing cake while 20-25 % were recovered in the chokeberry juices. The recovery of procyanidins (10-15 %) was especially low. Slightly higher polyphenol contents were measured in the juices treated with enzymes.

Drying method had significant influence on the polyphenols in chokeberry. Half of the total phenols, anthocyanins, and procyanidins were lost when the whole unbroken berries were dried for 72 hours. The recovery of anthocyanins was higher and the recovery of procyanidins was lower when crushed berries and shorter drying time (66 h) was used. The pre-pasteurization of the crushed berries improved the stability of the phenolics propably due to inhibition of the oxidative enzymes in the berries. Approx. 65 % of the total polyphenols were recovered in the pre-pasteurized dried berries.

Polyphenol contents and profiles in the processed chokeberry products differ from polyphenols in fresh berries. The lost of polyphenols may be significant during the processing but it can be often reduced by the proper choice of the processing methods.