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Aronia Berry Based New Food Products and Shelf Life Stability Studies

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Abstract

In this research data review, Turkish aronia melanocarpa fruit based products and these shelf life examining have been reported. Aronia berry based new nutritive food products could be utilized in functional food industry as valuable antioxidant sources and could be evaluated as innovative foods.

Key words: Aronia berry, black chokeberry, *Aronia melanocarpa* (Michx.), aronia tea, aronia powder, ice-cream.

Introduction

Aronia (Aronia melanocarpa) is a member of the Rosaceae , native to North America and also cultivated in Europe. In the food sector, aronia is extensively utilized for the jam, juice and wine production, and for many other food product ingredient. Aronia contains remarkable quantities of health-promoting compounds, such as anthocyanins and other polyphenols and is, thus, prescribed for various adult diseases such as hypertension, hyperglycemia, and diabetes (Kim et al., 2016, Tokusoglu 2017ab).

The consumption of low levels of antioxidants in the form of fruit and vegetables has been shown to more than double the incidence of certain cancers. Tea is popular beverage and currently, herbal infusions based on dried fruit products have gained in popularity because of their fragrance, fruity flavor, lower amounts of caffeine, and low astringent and bitter taste. Chemical composition and biological activity of berries and their products have been widely reported but there are limited works dealing with berry fruit teas. Powder forms of berries and industrial ice-cream form of berries are also utilized as functional food products for nutrition (Tokusoglu,2017ab).

The genus Aronia (Rosaceae family) includes two species of shrubs, native to eastern North America and Eastern Canada: *Aronia melanocarpa* (Michx.) Ell., known as black chokeberry and *Aronia arbutifolia* (L.) Pers. (red chokeberry). The aronia berries contain high levels of flavonoids, mostly proanthocyanidins and anthocyanins, and in vitro and in vivo studies indicate that the berries may have potential health benefits, e.g. hepatoprotective effects,

cardioprotective effects, antidiabetes effect and anticancer effects on selected CA cells (Yamane et al., 2017).

The aim of this research paper is to determine the polyphenolic compound extraction from Aronia based products, to determine the preliminary compositional structure and phenolics of aronia tea, aronia powder and aronia ice-cream.

Material and Methods

Research Material

Aronia berry [*Aronia melanocarpa* (Michx.)] (black chokeberry) was harvested at Yalova Research Institute, Yalova, Turkey. In our current research, aronia based new products including aronia berry teas (as decoction and infusion types), aronia powder and aronia ice-cream were developed by Dokuz Eylul University Technology Development Zone Depark Technopark Spil Innova LLC, Izmir Project.

In manufacturing, decoction method was applied by boiling of aronia berry material in a non-aluminum pot during 8 min until up to two-thirds of the water was evaporated and was strained by home-made tea strain apparatus.

Total phenolic content

The total phenolic content of the aronia tea, powder and ice-cream were determined according to the Folin-Ciocalteu colorimetric method (Anagnostopoulou et al.,2006). The total phenolic content was expressed as mg gallic acid equivalent/100 g dried weight (DW).

Results and Discussion

Aronia berry (black chokeberry) fruit teas was found as valuable source of flavonoids and anthocyanins compared to the most of commonly consumed berry teas. After harvesting, the content of total polyphenols of fresh aronia berry was 1012.67 ± 34.62 mg GAE/100 ml (*n*=3) and the monomeric anthocyanin level was 425.65 ±3.65 mg/100 ml (*n*=3).

Total concentration of phenolics for decoction was evaluated by Folin-Ciocalteu method at 765 nm of absorbance and total phenolics was found as 87.72 ± 0.83 mg GAE/100 ml (*n*=3) whereas total anthocyanin content was measured according to European Pharmacopoeia 6.0 method with slight modifications. The percentage content of anthocyanins, expressed as cyanidin-3-glucoside chloride was calculated from the expression: A × 5000/718 × m (A=absorbance at 528 m; 718=spesific absorbance of cyanidin-3-glucoside chloride at 528 nm; m=mass of the tea to be examined in grams) and was found as 8.87 0.03 mg/100 ml (*n*=3). In the study, aronia tea infusion was also carried out. Infusion means achieving a desired taste and aroma results of aronia

berry by dissolving a certain proportion of the tea materials into water. This application was performed by using a certain combination of teaware, steeping process, water temperature, water to aronia berry tea ratio. The total phenolics and the anthocyanin level of infusion was determined as 101.02 ± 0.55 mg GAE/100 ml (*n*=3) and 9.05 0.05 mg/100 ml (*n*=3), respectively.

For aronia (chokeberry) powder production, aronia berries were subjected to freze drying (FD) and spray drying process (B-290, Buchi Labour Technik,AG,Flawil, Switzerland) based on our determined conditions; the content of total polyphenols in aronia powder product was 444.72 ± 4.33 mg GAE/100 ml (*n*=3) whereas the anthocyanin level of powder was 151.30 1.53 mg/100 ml (*n*=3).

In the study content, ice-cream with aronia berry (aronia ice-cream) was also manufactured by industrial ice-cream procedure with pasteurization and by using emulgators and stabilizers at Piramit Ice-Cream Company. The content of total polyphenols in pasteurized aronia berry pulp, in aronia ice-cream, and in control ice-cream were found as 676.48 16.86 mg GAE/100 ml (*n*=3), 69.06 7.75 mg GAE/100 ml (*n*=3) and 0.79 0.17 mg GAE/100 ml (*n*=3), respectively. The level of the anthocyanin in pasteurized aronia berry pulp, in aronia ice-cream, and control ice-cream were detected as 312.24 ±5.82 mg/100 ml (*n*=3), 44.59 1.83 mg/100 ml (*n*=3) and 0.00 0.00 mg/100 ml (*n*=3), respectively.

Aronia berry based new nutritive food products could be utilized in functional food industry as valuable antioxidant sources and could be evaluated as innovative foods.

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