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Letter to the Editor

Antioxidants Content in *Empetrum nigrum* Fresh and Dried Fruits

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Dear Editor in Chief

Empetrum nigrum L. (crowberry or black crowberry) belongs to *Ericaceae* (*Empetraceae*) family and is a circumboreal species, including both arctic and alpine environments as well as temperate and sub-arctic climates. The species is divided into two subspecies, whether is a plant produces hermaphroditic flowers (*E. nigrum* ssp. *hermaphroditum*) or is dioecious (*E. nigrum ssp. nigrum*).

There is currently a great interest around the world for forest fruit and their potential beneficial health effects. Fruits contain and synthesize many compounds which are helpful against many chronic diseases because of their good antioxidant properties, as in the case of the *Empetrum* (1). Some of maladies can appear in our body because of the imbalance between antioxidants and free radicals.

Generally, through significant contents and the phytochemicals number from *Empetrum* sp. such as ascorbic acid, carotenoids, flavonoids, phenolic acids and tocopherols these berries may contribute at the maintaining of health. Unlike the cultivated berries which exerted lower antioxidant activity several wild berries like crowberry (*E. nigrum*), cloudberry (*Rubus chamaemorus*), aronia (*Aronia melanocarpa*) have very high antioxidant activities. The bland or slightly acidic *Empetrum* sp. fruit are very juicy and have high level of anthocyanin pigments in the skin; they may be eaten raw or processed.

Because of natural purple colorant, the *Empetrum* fruit is used for food products and antioxidant capacity benefits. Leaves, stems and roots were used by native cultures in various extract mixture as a cathartic, diuretic, antidiarrheal treatment as well as to treat eyes and liver or kidney disease (2), because of their antibacterial and antifungal compounds as well as anti-inflammatory effect (3).

Some researcher evidenced the decrease of the total cholesterol, triglyceride and low density lipoprotein (LDL), by intake of 2 grams of powdered crowberries daily for four weeks, this study being effected at 55 healthy volunteered subjects (4). From the reason of *E. nigrum* multiple beneficial effects the aim of this study was to compare the content of some non-enzymatic antioxidants (polyphenols, flavonoids and total anthocyanins) from fresh and dried fruits; the sample of *E. nigrum* were collected from spontaneous flora of Harghita district from 1050m altitudes.

Total polyphenol content (as galic acid equivalent/g DW) of *Empetrum* samples was higher in the methanolic extract of dried sample than fresh fruits, increase beeing by 1.60-fold (Table 1).

There are contradicting data in several studies regarding the effects of heat treatment on the total phenolic content in fruits or vegetables. Thus, several researchers showed in some vegetables and fruits an decrease of total phenolic content or a dramatic loss. On the other hand, others authors

reported an increase of total phenolic level with heating temperature in *Citrus unshiu* peel (5) or in goji fruits (6).

Flavonoid content (as cathechin equivalent/g DW) of fresh and dried *Empetrum* fruits were 2.46 ± 0.01 and 3.94 ± 0.106 mg CE/g DW, respectively. Thereby, like total polyphenol content of *Empetrum*, the drying process lead also to increase of flavonoid level. Similar results were obtained by Das et al. (7) which indicates, too, that total flavonoid content of wheatgrass were higher after freeze-drying process. The flavonoid compounds are better stabilises at high drying temperature 120-150 ºC than a temperature of 40-60 ºC in the opinion of Elbanowska and Suszenie (8).

In the dried *Empetrum* fruits extract the level of anthocyanin (as cyanidin-3-glucoside equivalent) increase with 11.21% than those of fresh extract. In contrast with our research, results from a study regarding the anthocyanin content in dried blueberries was significantly reduced in comparison with that in fresh blueberries (9).

From point of view of anthocyanins profile among some several berries the crowberry fruits have the highest contents (10). More than, the assessment of antioxidant activity, by three methods, evidence that crowberry extract exert the strongest antioxidant activity. Crowberry fruits have high levels of anthocyanin pigments in the skin, which have potential as nutritive extracts and natural food colorants.

Therefore, when fresh fruits are not available, the powdered dried *E. nigrum* could be successfully used as a better substitute or a nutritional additive in functional foods.

Table 1: Non enzymatic antioxidant content in fresh and dried *Empetrum nigrum* fruits reported at dry weight

	Fresh *Empetrum* fruits	Dried *Empetrum* fruits	Increase
Total polyphenol (mg GAE/g DW)	4.30 ± 0.09	7.51 ± 0.17	1.74
Flavonoids (mg CE/g DW)	2.46 ± 0.01	3.94 ± 0.106	1.60
Total anthocyanins (mg C3G E/ g DW)	2629.54 ± 54.71	29246.52 ± 22.10	11.12
Dry content (g/100)	14.18 ± 0.14		

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