

Examination of valuable ingredients of some wild fruits

Sipos, B.Z.¹, Szabó, N.¹, Stéger-Máté, M.² and Schmidt, G.³

¹Szent István University, Faculty of Horticulture Science, Department of Pomology,
H-1118 Budapest, Villányi u. 29-31.

²Szent István University, Faculty of Food Science, Department of Preservation,
H-1118 Budapest, Ménesi u. 45.

³Szent István University, Faculty of Horticulture, Department of Floriculture and Dendrology,
Budapest, Villányi u. 29-31. Hungary
Correspond author: Béla Zoltán Sipos

Szent István University, Faculty of Horticulture Science, Department of Pomology,
H-1118 Budapest, Villányi u. 29-31., Tel: 36-1-3726200/6500, email: sipos@omega.kee.hu

Summary: A possible way of the development of Hungarian agriculture is the selection and growing of new fruit species and varieties featuring special qualities, with high biological nutritive and health protecting properties due to their natural composition. A reserve for such new fruits is the native dendroflora, e.g. those wild-growing trees and shrubs of Hungary, which bear edible fruits. The publication is giving a summary of chemical analyses done on the fruits of the plants listed below. The research team on the project started the work in 2001 with woody species (genera) as follows:

- common elder (*Sambucus nigra*) clone named Szcs-1, Szcs-2, Szcs-3, Szcs-4, Szcs-5, SzcsK-1, SzcsK-2
- dog rose (*Rosa canina*) types: clones named Sz-1, Sz-2, Sz-3, Sz-4 and Sz-5.
- native rowans: *Sorbus dacica*, *S. rotundifolia*, *S. degenii*, *S. bakonyensis* cv. Fánivölgy
- hawthorns: *Crataegus monogyna*, *C. orientalis*, *C. x lavallei*.
- cornel cherry: *Cornus mas* cv. Császló.

The present paper is reporting on the content of the following compounds in the fruits: dry matter (refractometric values), total acid content, ascorbic acid, β -carotene, pectin, minerals and carbohydrates. The results have shown that these wild fruits have excellent composition. Besides their curative effects, their content of minerals, ascorbic acid and β -carotene has surpassed that of the traditional fruits. These fruits are rich in ascorbic acid, β -carotene and pectin. The high content of the above-listed, biologically active compounds makes the new wild fruits studied suitable for the preparation (and later: mass-production) of special curative and exclusive products.

Key words: wild fruits, vitamin C, element

Introduction

In the recent years customers show an increasing interest towards the quality of food products. In the case of processed fruits and the products made from them vitamins, mineral elements, coloring compounds and compounds with antioxidative or other characteristics receive a special emphasis. These compounds are commonly called biologically active compounds in food industry.

An important task of fruit processing branch within the food industry is to seek and find those kind of fruits that are rich in the compounds mentioned formerly and also to elaborate processing methods for obtaining products with the possible highest level of active ingredients. Presently there is an increasing interest and demand toward wild fruits both from the side of growers and from the processing industry. The most interesting species and genera are the common elder (*Sambucus nigra*), dog-roses (*Rosa ssp.*), hawthorns (*Crataegus ssp.*), rowans white beans and mountain-ashes (*Sorbus ssp.*), and the cornel cherry (*Cornus mas*). These wild fruits are extremely rich in biologically active

ingredients were acknowledged for their medicinal affect only. All of them are native to Hungary and their commercial growing is initiated as well.

Common elder (*Sambucus nigra*) is well-known as a medical plant since ancient times, and presently it is also used for such purposes. Pratically, all parts of the plant are suitable to cure some disease (Grieve, 1982., Winter, 1998., Hemgesberg, 1998.). The fruits are rich in vitamins, proteins, mineral elements including microelements, sugars, organic acids, tannins and pectin. The high content of antocyanins make it a widely used material to stain leather, wood, moreover, to improve the colour of foods (Porpáczy, 1987, 1997; J. Schmidt, 1987, Sipos, 1996). Elderberries alone or mixed with other fruits, make also excellent jams, fruit juices, concentrates, candies, wine, shnaps or liqueurs. (Keipert, 1981; Schmidt, 1987, Stoll & Gremminger, 1986).

Because of its excellent chemical properties, the fruit of common elder took an important position in the modern cookery and in diabetics. As 50-60% of its proteins belong to „essential” proteins, it has high biological value (J. Schmidt, 1987)

Table 1 Chemical components of *Sambucus nigra* fruit (in one litre juice) (J. Schmidt 1987.)

Water	865 g
Carbohydrates	75 g
Proteins	20 g
Minerals	8 g
Potash (K)	30 mg
Phosphorus (P)	0.5 mg
Calcium (Ca)	50 mg
Sodium (Na)	5 mg
Iron	14 mg
Nikotinamide	40 mg
Dry materials	135 g
Panhotenic acid	2 mg
vitamin C	260 mg
vitamin B ₆	1 mg
vitamin B ₂	0.6 mg
vitamin B ₁	0.3 mg
Folic acid	0.06 mg
Biotine	0.007 mg
Acids, total	10 g
Surcose	0.6 g

Fruits of dog-roses (*Rosa ssp.*) contain, depending on the site and species, 0.3–1.0% of vitamin C and also vitamins B₁, B₂, P and considerable amounts of carotinoids (Hornok, 1990). They are rich in pectins (10%), acids (about 3%, mainly apple- and citric acids) and contain some vitamin K as well (Stoll & Gremminger, 1986).

Fruits of hawthorn (*Crataegus ssp.*) containing mainly vitamins B, ascorbic acid and other important compounds, flavonoids using for therapy.

Fruits of different rowans, white beans and mountain-ashes (*Sorbus ssp.*) are of variable composition depending on the type. Generally, they are rich in phenolic acids and some of them in antocyanins. Little is known about their diabetically active ingredients.

Fruits of cornel-cherry (*Cornus mas*) are rich in vitamin C (200 mg/ 100g) and in carotene (Papp & Porpáczy, 1999). According to Benk (1986), the content of dry materials in cornel- cherry is varying between 9–14% that of sugars

Table 2 Analyzed ingredients and the methods of analysis

Ingredient analyzed	Methods
water-soluble dry matter (%)	MÉ 3-1558/93
total dry matter (%)	MSZ 2429-1980
total acid content (%)	MSZ 3619-1983
vitamin C (mg/100g)	HPLC
mineral elements (mg/100g)	ICP
β-carotene	HPLC

between 5.1–8.0% and acids are high (1,8–2,5%). The same author estimates the content of vitamin C at 25–50 mg/100g only.

Material and method

Investigations of active ingredients were carried out analyzing the content in the fruits of following plants:

- Dog-rose (*Rosa canina*) clones: Sz-1, Sz-2, Sz-3, Sz-4 and Sz-5.
- Sorbuses: *Sorbus dacica*, *rotundifolia*, *degenii*, *cv. bakonyensis* 'Fánivölgy'
- Hawthorns: *Crataegus monogyna*, *orientalis*, *lavalley*
- Cornel-cherry: *Cornus mas cv. Császló*
- Common elder (*Sambucus nigra*) selected clores: Szcs-1, Szcs-2, Szcs-3, Szcs-4, Szcs-5, SzcsK-1, SzcsK-2.

The methods of analysis along with the ingredients analyzed are given in Table 2.

Results and discussion

The evaluation of investigated wild fruits based on their chemical analyses in as follows.

Common elder (*Sambucus nigra*) (Table 5, Figure 3)

Clone Szcs-1 has outstandingly high content of water-soluble dry materials (16.5 ref %). C-vitamin content is also

Table 3 Valuable ingredients of wild fruits

Fruits	Water-soluble dry material (ref%)	Total dry material (%)	Total acid (%)	β-carotene (mg/100g)
Sz-1 (<i>Rosa canina</i>)	27.0	38.0	0.36	0.74
Sz-2 (<i>Rosa canina</i>)	25.0	39.2	0.40	1.07
Sz-3 (<i>Rosa canina</i>)	24.0	33.3	0.34	1.03
Sz-4 (<i>Rosa canina</i>)	25.0	44.5	0.40	0.92
Sz-5 (<i>Rosa canina</i>)	15.0	36.9	0.29	0.71
<i>Sorbus vertesensis</i>	27.6	34.7	0.6	0.72
<i>Sorbus rotundifolia</i>	24.4	42.3	0.6	<0.1
<i>Sorbus degenii</i>	25.2	30.1	1.9	<0.1
<i>Sorbus bakonyensis cv. Fánivölgy</i>	19.4	30.8	0.4	3.6
<i>Crataegus monogyna</i>	22.7	33.2	0.6	<0.1
<i>Crataegus orientalis</i>	14.3	20.7	0.5	0.8
<i>Crataegus lavalley</i>	9.8	27.3	1.0	0.7
<i>Cornus mas cv. Császló</i>	17.3	20.4	2.4	<0.1

considerable, (45.6 mg/100g) minerals are average, just magnesium and iron are higher than the average.

Clone Szcs-2 had very high content of C-vitamin (109 mg/100g), and considerable amounts of Ca and Zn.

Clone Szcs-3 had the highest content of total dry-materials, but was poor in vitamin C, whereas minerals, phosphorus-content was very high.

Clone Szcs-4 was low in acids, but rich in Zn.

Fruits of clone Szcs-5 had high amounts of acids, and average amounts of both vitamin C and that of minerals.

Clone Szcs-K1 had low amounts of acids and soluble dry materials. From minerals, Ca and P are to mention

In the fruits of Szcs-K2, vitamin C and water-soluble dry materials are very low but P and Fe are present in considerable amounts.

Rosa canina selected clones (Table 3, 4, Figure 1)

Clone "SZ-1" had outstandingly high amounts of soluble dry-materials (27.0 ref %), but was not too valuable in the respect of other parameters. Mineral elements were medium-high, vitamin C 180.0 mg/100g.

Clone "SZ-2" had the highest β -carotene content among the investigated rose-fruits (1,07 mg/100mg). This clone contained considerable amounts of calcium and iron as well.

Clone "SZ-3" had the highest vitamin C level (348.0 mg/100g) and was also fairly rich in iron and magnesium.

Clone "SZ-4" had also very high vitamin C level (332.0 mg/100g), and considerable amounts of magnesium and zinc. β -carotene content was 0.92 mg/100g.

Clone "SZ-4" had the lowest level of vitamin C (150.0 mg/100g). Water-soluble dry matter and acids are also low, mineral elements medium high.

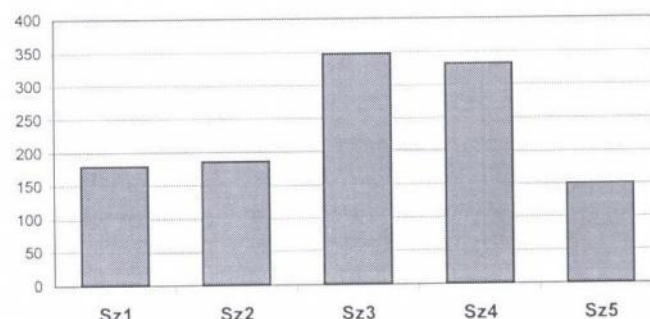


Figure 1 C vitamin content of different rose types (mg/100g)

Sorbuses (Table 3, 4, Figure 2)

Among the investigated Sorbuses *Sorbus vértensis* had the highest amount of dry-matter (27.6 ref %) and the total amount of dry-matter is also quite high (34.7%). Vitamin C level is high (193.0 mg/100g). Acids are low but in this case. It is an advantage because most of the Sorbuses have a harsh taste caused by tannic acid.

Table 4 Mineral components of wild fruits (mg/100g)

Fruits	Ca	Mg	P	Fe	Zn
Sz-1 (<i>Rosa canina</i>)	237.6	74.6	46.5	0.58	0.78
Sz-2 (<i>Rosa canina</i>)	364.5	97.3	50.7	0.76	0.75
Sz-3 (<i>Rosa canina</i>)	322.1	89.0	68.7	0.78	0.67
Sz-4 (<i>Rosa canina</i>)	319.2	101.2	59.7	0.50	0.81
Sz-5 (<i>Rosa canina</i>)	241.0	64.0	69.3	0.37	0.70
<i>Sorbus vertesensis</i>	75.2	32.2	56.0	0.96	0.76
<i>Sorbus rotundifolia</i>	94.5	42.1	44.7	1.10	0.98
<i>Sorbus degenii</i>	107.3	52.7	65.0	0.60	0.58
<i>Sorbus bakonyensis</i> cv. Fánivölgy	66.6	44.9	55.0	0.80	0.64
<i>Crataegus monogyna</i>	233.4	59.5	58.0	1.01	0.90
<i>Crataegus orientalis</i>	64.4	20.3	35.1	0.63	0.56
<i>Crataegus lavalley</i>	155.8	33.0	46.5	0.61	0.60
<i>Cornus mas</i> cv. Császló	41.8	11.6	21.5	0.33	0.32

Table 5 Organic compounds in the fruits of common elder (*Sambucus nigra* L)

Species and clone	Souble dry materials (ref%)	Total dry materials (%)	Total acids (%)	C- vitamine (mg/100g)
Szcs-1 (<i>Sambucus nigra</i>)	16.5	17.69	0.58	45.6
Szcs-2 (<i>Sambucus nigra</i>)	12.1	18.85	0.63	109.0
Szcs-3 (<i>Sambucus nigra</i>)	12.1	20.78	0.78	31.2
Szcs-4 (<i>Sambucus nigra</i>)	14.1	15.93	0.53	43.2
Szcs-5 (<i>Sambucus nigra</i>)	14.6	19.09	1.16	41.4
SzcsK-1 (<i>Sambucus nigra</i>)	13.7	20.24	0.55	38.3
SzcsK-2 (<i>Sambucus nigra</i>)	11.2	17.12	0.84	10.0

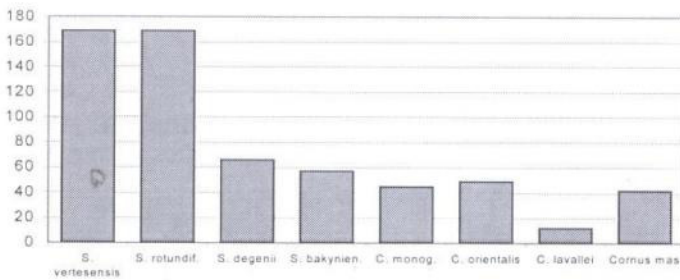


Figure 2 C vitamin content of wild fruits (mg/100g)

Sorbus bakonyensis 'Fánivölgy' had outstandingly high amounts of β -carotene (3.6 mg/100g) and a low acid content (0.4%). From the mineral elements, iron is to be noted (0.80mg/10g).

Sorbus rotundifolia had the highest level of total dry-matter (42.3%) and a high level of soluble dry-matter (42.3%). Content of β -carotene was low and vitamin C very high (169.0 mg/100g). The level of mineral elements was middle high, but that of iron and zinc were outstanding (1.10 mg/100g, 0.98 mg/100g respectively).

Sorbus degenii had the highest acidity (1.9%) among the investigated Sorbuses. β -carotene is low. Contents of mineral elements were high with considerable amounts of calcium, magnesium and phosphorus but low level of iron and zinc.

Hawthorns (*Crataegus* ssp.) (Table 3, 4, Figure 2)

Crataegus orientalis proved to be the richest in vitamins: Vitamin C content 49.0 mg/100g, β -carotene 0.8 mg/100 g. The content of mineral elements, however, were very low: calcium, magnesium and phosphorus were the lowest of all hawthorns.

In *Crataegus monogyna* samples, water-soluble and total dry-matter were very high (22.7 ref % and 33.2 ref %, respectively, β -carotene low). Mineral elements were relatively high, the content of phosphorus, iron and zinc were the highest among the *Crataegus* species investigated.

Crataegus x lavallei gave the poorest chemical parameters among the investigated *Crataegus*es. Content of soluble and total dry-matter and also that of vitamin C and β -carotene were low, the acidity, however, was high (1.0%).

Cornel-cherry (*Cornus mas*) (Table 3, 4, Figure 2)

Cornus mas cv. Császló had a vitamin C content not too high if compared with the other investigated wild-fruits, but quite good if compared to cultivated fruits. β -carotene and mineral elements were low.

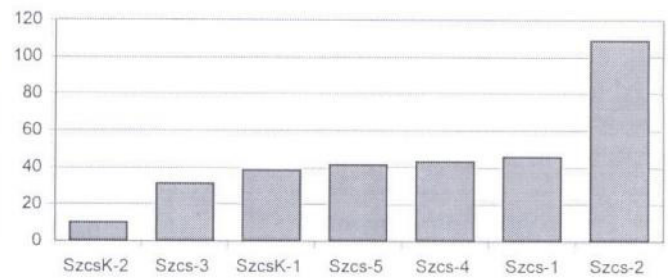


Figure 3 C vitamin content of elderberry selections (mg/100g)

Summarized our result, wild fruits play an important role in human health because of their nutritionally very important ingredients.

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