

## INFLUENCE OF THE CULTURE AREA ON TWO SEABUCKTHORN (*HIPPOPHAE RHAMNOIDES*) CULTIVARS

### INFLUENȚA AREALULUI DE CULTURĂ ASUPRA A DOUA CULTIVARE DE CATINĂ (*HIPPOPHAE RHAMNOIDES*)

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**Abstract.** Attention to the significance of conventional medicine in the field of health and herbal research are valuable. *Hippophae rhamnoides* has been used in Chinese and Russian medicine for several decades. The research of medicinal plants has grown more and more, *Hippophae rhamnoides* being a very important plant, as it contains a biodiversity of both nutritional and medical constituents. Bioactive fruits are one of the most important sources of bioelements constituents, and are used as a nutritional and medicinal alternative. The chemical components give value to the products obtained from this miraculous plant. Sea buckthorn is a pure store of natural antioxidants, rich in flavonoids, glucosides, phenols, terpenes, vitamins E, A, C, B-carotene, and trace elements, including iron, zinc, manganese, very low molecular weight antioxidants, which neutralizes free radicals. The results regarding the soluble dry matter from fresh fruits are between 7.6-12.64%. Total sugar content between 5.57-10.61 mg/100g fresh substance.

**Key words:** area, seabuckthorn, determinations, fruits

**Rezumat.** Atenția cu privire la semnificația medicinei convenționale în domeniul sănătății și cercetările privind plantele medicinale sunt valoroase. *Hippophae rhamnoides* a fost utilizată în medicina chineză și rusă timp de câteva decenii. Cercetarea plantelor medicinale a crescut din ce în ce mai mult, *Hippophae rhamnoides* fiind plantă deosebit de importantă, deoarece conține o biodiversitate atât nutrițională, cât și medicală de constituenți. Fructul bioactiv reprezintă una dintre cele mai importante surse de bioelemente constitutive, și este folosit ca alternativă nutrițională și medicinală. Componentele chimice dau valoare produselor obținute din această miraculoasă plantă. Catină este un magazin pur de antioxidanți naturali, conținutul său bogat de flavonoizi, glucozide, fenoli, terpeni, vitaminele E, A, C, B-caroten, și oligoelemente, inclusiv fier, zinc, mangan, antioxidanți cu greutate moleculară foarte mică, care neutralizează radicalii liberi. Rezultatele în ceea ce privește substanța uscată solubilă din fructele proaspete se încadrează între 7.6-12.64%. Cantitatea de zahăr total între 5.57-10.61 mg/100g substanță proaspătă.

**Cuvinte cheie:** areal, catină, determinări, fructe

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## INTRODUCTION

Medicinal plant research remains a topical issue. *Hippophae rhamnoides* L. is a valuable plant, because it contains a biodiversity of both nutritional and medical constituents. Seabuckthorn (*Hippophae rhamnoides* L.) from *Elaeagnaceae* family, is a valuable plant, which has recently gained worldwide attention. It is currently domesticated in many parts of the world, due to its nutrients and medicinal properties (Rousi, 1971; Li, 2003). It is a hardy plant, resistant to drought and cold, useful for soil recovery and farm protection through vigorous vegetative and strong reproduction, the root has nitrogen fixing nodules (Rongsen, 1992).

All component parts of this plant are considered to be a good source of bioactive substances such as vitamins (A, C, E, K, riboflavin, folic acid); carotenoids (carotene, lycopene), phytosterols (ergosterol, stigmasterol, lansterol, amirine), organic acids (malic acid, oxalic acid), polyunsaturated fatty acids and certain essential amino acids (Beveridge *et al.*, 1999; Yang and Kallio, 2002; Pintea *et al.*, 2005).

This plant has been used extensively in the traditional eastern system for medicines in the treatment of asthma, skin diseases, gastric ulcers and lung disorders. A wide range of pharmacological effects have been reported in the papers and treated, being an antioxidant, immunomodulatory, anti-atherogenic, anti-stress, hepatoprotective, radioprotective tissue repair. Currently, the seabuckthorn has gained the status of one of the most sought after in the pharmaceutical and cosmetic industry, in the food processing industries of the world. Several countries exploit commercially and ecologically for improving livelihoods and the conservation environment. The amount of experimental data that prove important bioactive properties and substances is vast and continues to grow rapidly. The presence of valuable chemicals and nutritionally important constituents is still a challenge for scientific papers, their knowledge and importance are clear.

In Romania, the seabuckthorn grows spontaneously in the sub-Carpathian area of Moldova and Muntenia, starting from the upper Siret basin to the Olt river. In the sub-Carpathians of Moldova, it is found on the valleys of the rivers Bistrița, Trotuș, Putna and Milcov. In the sub-Carpathian area of Buzău county, seabuckthorn has a higher frequency than in other areas of Romania. It is also found on the valleys of the Teleajen and Dâmbovița rivers, as well as in the Danube delta. New plantations have begun to be established for protection.

Due to its high scavenging capacity, the seabuckthorn is used to consolidate the lands on the slope, but also in the form of a live fence, given the strong thorns that prevent the animals from entering the orchards instead of the fences (Qinxiao and Zhao 2003).

Used in agriculture, it increases the winter resistance of bees. Seabuckthorn biofertilizes the soil with natural nitrogen (300 kg/ha) formed in the root nodules

following the symbiotic activity of the *Actinomyces eleagni* fungus (Bălan *et al.*, 2001). Seabuckthorn has been introduced to culture since 1980, in order to establish and consolidate degraded lands. The seabuckthorn bloom in April-May, when the average daytime temperature is 12-15 °C and takes place over a period of 15 days. The male plants bloom earlier, while the female plants bloom with the bud (Prokkola, 2003).

## MATERIAL AND METHOD

The studied plants were harvested from the following areas:

- ✓ From Orăștie where was established as a protective fence the basic culture being the blueberries.
- ✓ From Banatul Montan, Cornereva commune, Caraș-Severin county.
- ✓ From Cluj were seabuckthorn are cultivated at the Didactic Station for protective fence.

For determinations, branches were collected from five specimens from each location.

Biometric measurements were performed with the ruler and the sander. Weight of fruits and seeds by weighing with analytical balance. Determination of soluble dry matter was determined with refractometer (Bota, 2013). Brix grades (symbol °Bx) are a representative unit for the sugar content of an aqueous solution. A Brix grade corresponds to one gram of sucrose dissolved in 100 grams of solution and represents the concentration of the solution as a percentage by weight (% w / w) (directly, by mass). If the solution contains solids other than pure sucrose, such as other sugars, minerals, etc., then the brix degrees (°Bx) only approximate the content of the dissolved solid.

## RESULTS AND DISCUSSIONS

### *Characteristics of the plants according to the culture area*

In Orăștie, the strong variability of seabuckthorn is characterized by predominantly orange fruits, elongated in shape, medium to large in size.

As for the spines, they had a number between 3-11 spines / 10 cm sprout, and their maximum length is 2-8 cm.

The leaves of the female specimens in this area are relatively small, unfit for harvesting leaves for medicinal purposes, with a length between 2.5 - 5.4 cm.

In Caraș-Severin county, the strong variability of seabuckthorn is characterized by predominantly open orange fruits with specimens showing yellow fruits. We can deduct from this, according to the literature, that the percentage of oil in seabuckthorn is higher, which is indicated by their light color. Fruit shape is predominantly spherical, smaller to medium. As for the spines, they had a number between 3-12 spines / 10 cm shoots, and their maximum length is 2-9 cm. The leaves of the female specimens in this area are relatively small, unfit for medicinal leaves, with a length between 3 - 6.2 cm.

In Cluj, the strong variability of seabuckthorn is characterized by predominantly orange fruits with specimens showing yellow fruits. The fruit shape is predominantly spherical, with medium to medium size. As for the

thorns, they had a number between 3-13 thorns / 10 cm sprout, and their maximum length is 2-8.5 cm. The leaves of the female specimens in this area are relatively small, unfit for harvesting leaves for medicinal purposes, with a length between 3 - 6.1 cm.

As for the male specimens, in Orăștie we found in the field very attractive specimens that can be used as paternal parents in the plantations, considering the amount of pollen they can produce. Thus, the length of the threats varies from a minimum of 5 mm to a maximum of 15 mm. Their predominant form is elongated. The thorns found on 10 cm shoots have a minimum of 3 and a maximum of 13 and their length is between 2 and 9 cm.

However, what differs from the female plants is the length of the leaves which is between 6 and 8.6 cm and the width between 4.3 and 6.5 mm. This represents a great quality in terms of the possibility of harvesting the leaves with a high yield for medicinal purposes.

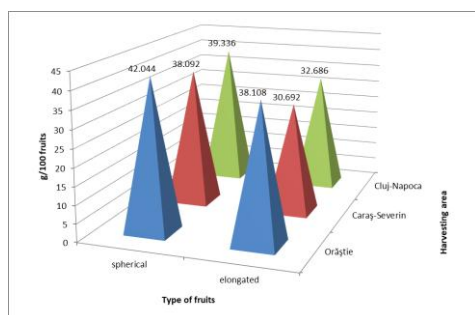
In Caraș-Severin county, in the studied genotypes, the male flowering buds have a variation between 4- 4 cm. The predominant shape is spherical. The number of spines on a portion of 10 cm is between 3-13 and their length between 2 and 8 cm. We observe here a reduction in the size of spines in relation to the populations from Orăștie.

The length of the leaves is between 4.5 - 8.5 cm, therefore larger than the populations from Orăștie. The width of the leaves is between 4-7,6 mm. The length of the threats to the genotypes in the Cluj area is between 5-16 mm. The thorns are present in a number of 3-14 on a length of 10 cm. The leaf length has a minimum of 4.2 cm and a maximum of 7.1 cm, and the width is between 4 and 7 mm.

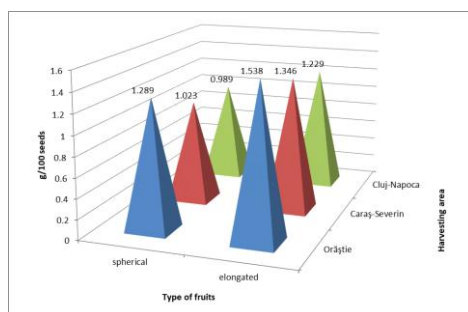
#### *Characteristics of the fruits obtained according to the culture area*

The size of the fruits was weighed 100 fruits for each variant according to the area of cultivation and according to the shape of the beans (fig. 1). Regardless of the culture locality, fruits with spherical grains have higher values than elongated ones. Analyzing the average of the weight of the fruits in all the origins of the three studied areas, it was found that the average value of the character for the spherical fruits of 100 / fruits registered the value of 38.15g, and for the elongated fruits of 33.82g. These values were in line with the values described by Felicia Elena Andronic, 2017.

The weight of the seeds was measured from 100 fruits from each variant according to the crop area and according to the shape of the grains (fig. 2). Analysing the average seed weight for all the origins of the three studied areas, it was found that the average value of the character for the spherical fruits of 100/fruits registered the value of 1.37g, and for the elongated fruits of 1.43g.



**Fig. 1** The influence of the harvesting area on the cultivars, the type of fruits and the weight of the fruits



**Fig. 2** The influence of the harvesting area on the cultivars, the type of fruits and the weight of the seeds

The results obtained regarding the soluble dry matter are presented in table 1. The highest values were registered in Caraș-Severin county (12.64% soluble dry matter) the data obtained were higher than those obtained by Antoneli *et al.* (2005), for the Carpathian subspecies. The analysis of the variance shows that the Caraș-Severin area fruits have distinctly positive values regarding the dry substance content, while the Cluj area presents significantly negative values compared to the control value considered the average of the experience. The Orăștie area has no statistically assured differences.

Table 1

**Soluble solids content in the seabuckthorn from the studied areas**

No.	Studied areas	Number of plants	(° Brix) Soluble solids			
			(° Brix) Mean ± sx	"t"	Significance	CV%
1	Orăștie	18	11.73±0,31	1.34	-	14.48
2	Caraș-Severin	20	12.63±0,33	3.51	**	14.51
3	Cluj	19	9.28±0,23	-6.06	ooo	13.6
	<b>Mean</b>		<b>11.21±0,23</b>			

\*, \*\*, \*\*\*/ o, oo, ooo Significant at  $P < 0.05$ ; 0.01 and 0.001 (\*, \*\*, \*\*\* positive, o, oo, ooo negative)

## CONCLUSIONS

1. Unlike the Caraș-Severin area, where the plants grow spontaneously, the Orăștie area and the Cluj area present compact bushes, very difficult to penetrate, with strong draft, which have a radius of spreading sometimes to 10 m.

2. The fruiting of these plants is present mostly on the main axis and less on the branches of the second order. It produces fruit that is found in the middle of the bushes, which makes harvesting fruit more difficult.

3. The highest percentage of soluble dry matter is presented by cultivars from Caras-Severin area 12.64%.

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