

## THE STUDY OF THE ADAPTABILITY OF TWO CHOKEBERRY VARIETIES IN THE DOBROGEAN AREA – PARTIAL RESULTS

Vlăduț Alexandru Oprîță<sup>1</sup>

<sup>1</sup>Research Station for Fruit Growing Constanta, Pepinierei Street, No. 25, 907300, Valu lui Traian,  
Constanța, România

Corresponding author E-mail: olaviani@yahoo.co.uk

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### ABSTRACT

*The cultivation of fruit bushes in Romania has recently grown exponentially, which has led to the diversification of cultivated shrub species. If in the first part of this interest for shrubs sea buckthorn was by far the winner with the establishment of more than 3,000 ha nationally, followed by the blueberry crop with another 2,000 ha, aronia has become a crop that shows increased interest from farmers. At present, chokeberry cultivation amounts to over 500 ha at the national level. In the official catalog of varieties from Romania, we find a variety registered "Melrom" maintainer being ICDP Pitesti, and in private nurseries we also find the variety "Nero", a variety brought to Romania for testing and acclimatization. In this paper, we observed the two varieties "Melrom" and "Nero", varieties planted in the fall of 2023 in the experimental fields of SCDP Constanța.*

### INTRODUCTION

The *Aronia* genus (Rosaceae family, Maloideae subfamily) includes two species of native North American shrubs: *Aronia melanocarpa* (Michx.) Ell. (black chokeberry) and *Aronia arbutifolia* (L.) Pers. (red chokeberry). The fruits of *A. melanocarpa* have been traditionally used by Potawatomi Native Americans to cure colds. In the first half of the 20th century, cultivars of black chokeberry were introduced to the Soviet Union and other European countries, providing fruits used by food industry. At present, it is used mainly for juice, jam, and wine production, as well as an ornamental plant. Among other substances, the berries of *A. melanocarpa* contain anthocyanins and procyanidins, possessing strong antioxidative potential. Numerous health-promoting activities—namely, antioxidative, antimutagenic, anticancer, cardioprotective, hepatoprotective, gastroprotective, antidiabetic, anti-inflammatory, antibacterial, antiviral, radioprotective, and immunomodulatory—have been demonstrated for black chokeberry extracts by both in vitro and in vivo studies (Adam K. et. all, 2010). The presented review summarizes the information concerning botany and cultivation of aronia plants. The success of a species depends mainly on pedoclimatic conditions and its ability to develop strategies for adapting to a constantly changing environment. Temperature, soil moisture, available nitrogen levels, light, and high levels of carbon dioxide variations affect plant phenology. Among the environmental factors, temperature plays a predominant role in controlling the proper growth and flowering of plants (Marinela Diaconescu et. all, 2022). Given these aspects, in the context of global climate

change, research concerning the suitable adaptation of temperate fruit crops in different crop areas is needed. This paper aimed to study the adaptation of a crop to the specific environmental conditions of Dobrogea, Romania, in terms of the phenology of two chokeberry (*Aronia melanocarpa*) cultivars ('Melrom' and 'Nero'). The plants, obtained through micropropagation, were managed as a bush.

## **MATERIALS AND METHOD**

The study was carried out in aronia demonstrative plots at Research Station for Fruit Growing Constanta, located in south-eastern Romania, near the Black Sea.

The site is located at 44°10' Northern latitude and 28°29' Eastern longitude, and 70 m above sea level. Climate is continental with warm and droughty summers, frequent dry winds all the year round and temperate winter generally without snow. The mean annual temperature is 12.0°C and the total active temperature is 3988°C, out of which 3170°C during the growing season; the annual precipitation amount is 400 mm, out of which during the growing season (April 1 to September 30), 240.7 mm.

The lowest winter temperatures below -20°C are not very often: 1 out of 10-15 years and so are the spring frosts susceptible to cause aronia yield damage.

The climatic water deficit reaches as much as 400 mm/year, so irrigation application is needed for aronia.

The selection are planted in demonstrative plots (3 m x 2 m scheme) in 2023 with north-south row orientation and the crown shape is bush. A number of 416 plants of the aronia cultivars were planted: 208 plants of the "Melrom" cultivar and 208 plants of the "Nero" cultivar.

The trees and fruit characteristics were evaluated according to the Methodology for trying new varieties of fruit trees, shrubs and rootstock in order to approve the homologation and International Union for the Protection of New Varieties of Plants (UPOV) guidelines.

During 2023-2024 the fruit yield was recorded, phenological observations were performed weekly or every 2-3 days.

## **RESULTS AND DISCUSSIONS**

In 2023/2024 the winter temperatures varied a lot in very short periods of time, so if in January we recorded temperatures of - 11°C, in February we recorded days with temperatures above + 20,09°C, followed by temperatures of - 2°C in March. For this reason, the "Melrom" and "Nero" suffered, so the catch percentage in the first year, as shown in table no. 1, was 75.47% for the "Melrom" chokeberry cultivar. From table no. 2 shows that the catch percentage for the chokeberry cultivar "Nero" was 55.76% viable plants.

We observe from table no. 3 that in terms of plant development during the first year (2024) the "Melrom" chokeberry cultivar had an average growth of 43 cm, and the "Nero" chokeberry cultivar a growth of 29.5 cm, it follows that under the same pedoclimatic conditions and the same technology of growth, the "Melrom" cultivar had a growth increase compared to the "Nero" cultivar of 13.5 cm.

In table no. 4, the data on the number of shoots grown on a plant are recorded, so we notice that the average number of shoots in the "Melrom" cultivar is 2.3 shoots and in the "Nero" cultivar we have an average number of shoots of 3.07. Regarding their thickness measured 10 cm above the ground, also from table no. 4 we observe that the "Melrom" cultivar has an average thickness of 9.04 mm while the "Nero" cultivar has an average shoot thickness of 7.72 mm.

Table 1.

## "Melrom" hrub root establishment – first year after planting

Cultivar	Number of plants planted	number of plants caught	% viable plants	% affected plants
"Melrom"	R1 - 52	43	82,69	17,31
	R2 - 52	49	94,23	5,77
	R3 - 52	27	51,92	48,08
	R4 - 52	38	73,07	26,93
Average	208	157	75,47	24,53

Table 2.

## "Nero" shrub root establishment – first year after planting

Cultivar	Number of plants planted	Number of plants caught	% viable plants	% affected plants
"Nero"	R1 - 52	32	61,53	38,47
	R1 - 52	37	71,15	28,85
	R1 - 52	26	50,00	50,00
	R1 - 52	21	40,38	59,62
Average	208	116	55,76	44,24

Table 3.

## Average plant height growth cm – first year

Cultivar	Row	No. of plants analyzed	Average height cm	Average over all cultivar cm
"Melrom"	R1	43	47	43
	R2	49	41	
	R3	27	44	
	R4	38	40	
"Nero"	R1	32	25	29,5
	R2	37	33	
	R3	26	29	
	R4	21	31	

Table 4.

## Average thickness at 10 cm above the soil

Cultivar	Row	Average number of shoots per plant	Average thickness	Average thickness per cultivar
"Melrom"	R1	2,4	9,34	9,04
	R2	2,1	9,01	
	R3	2,5	9,57	
	R4	2,2	10,04	
"Nero"	R1	2,7	8,16	7,72
	R2	3,2	7,86	
	R3	3,1	7,55	
	R4	3,3	7,34	



Photo 1. "Melrom" measuring



Photo 2. "Melrom" shoots



Photo 3 "Nero" measuring



Photo 4 "Nero" shoots

### CONCLUSIONS

Although from an agrotechnical point of view both chokeberry varieties benefit from the same conditions, we can see from the seeds collected from the field and presented in the tables above, that in terms of the percentage of planting, the "Melrom" cultivar (75.47%) had a better grip compared to the "Nero" cultivar (55.76%). Regarding the height of the plants in the first year after planting, we find a greater increase in the "Melrom" cultivar (43 cm, photo1) compared to the "Nero" cultivar (29.5 cm, photo 3). The number of shoots recorded higher values in the "Nero" cultivar (3.07 shoots, photo 4) than in the "Melrom" cultivar (2.3 shoots, photo 2). The thickness of the shoots recorded a greater increase in the "Melrom" cultivar

(9.04 mm) than in the "Nero" cultivar (7.72 mm). We can conclude that chokeberry cultivar "Melrom" had better grip, growth and thickness than chokeberry "Nero" cultivar. The chokeberry cultivar "Nero" had a greater increase in the number of shoots compared to the "Melrom" cultivar.

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