EVALUAREA AGROBIOLOGICĂ A UNOR GENOTIPURI ROMÂNEȘTI DE CĂTINĂ
AGROBIOLOGICAL ASSESSMENT OF SOME ROMANIAN SEA BUCKTHORN GENOTYPES

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Abstract

Recently the sea buckthorn is come a cultivated species. The research on this species should be focused on more efficient harvesting method, new cultivars suitable to European climate; bigger yields by right cultivation methods, pest and diseases control. In Romania, the sea buckthorn is found in at different altitudes ranging from 0 to 1200 m in wild flora. In this paper were studied 8 genotypes from the wild flora. To these genotypes we evaluated 6 quality features. The study revealed the Pitesti 5 genotype.

Cuvinte cheie: fructe, brix %, pH, determinari biometrice.
Keywords: fruits, brix%, pH, biometrical measurements.

1. Introduction

Sea buckthorn *(Hippophae rhamnoides* L.*)* grows over a broad area, from East and Western Asia, from the Caucasus to the Carpatian Mountains, from the Alps to the Pyrenees, in the Black Sea Basin and in Central and Northern Europe (Wang, 2011; Nowakowska, 2017). Due to this extensive and varied area, there are 12 species identified to date and a very large variety of populations, so most varieties come from selection of wild flora.

The interest for sea buckthorn fruits are increase because his biochemical compounds and nutraceutical effects. Since the 1950s and 1960s, literature has provided the results of studies on the influence of extracts of fruit sea buckthorn on some diseases as cancer (Pukhalsskaia 1958, Sokoloff, 1961, Zhang, 1989).

Studies in the 2000s have shown that alcoholic extracts of sea buckthorn have positive effects for the faster recovery of bone marrow cells (Agrawala, 2002). In China, a study was conducted to demonstrate a faster recovery of the hemolytic system after high dose chemotherapy in mice fed with sea buckthorn oil (Chen 2003). The seed oil was enhancing for non-specific immunity and provides anti-tumor effects in preliminary laboratory studies (Yu 1993).

In China, the sea buckthorn breeding research has markedly progressed since 1985, guided by the principles of multi-purpose hybridization, multi-level selection, advances in introduction, hybridization and plant multiplication by both sexual and asexual means, and implementation through multi-region tests and multi-unit cooperation (Huang 2005).

The varieties from China (*H. rhamnoides* ssp. *sinensis*) have good adaptability to harsh environments (e.g., drop doughty, salinity) and are fast-growing. Five new elite cultivars, such as 'Hongxia' and 'Wucixiong' were created through multi - level selection from Chinese local sea buckthorns (Zhao 1996), but this varieties have small fruit, more thorns, and a short fruit stalk. For that reason in 1991 many varieties from Russia and Mongolia were used for China breeding program (Ruan, 2007).

In Europe the sea buckthorn is still young fruit species, about the sea buckthorn cultivation in Europe, are only a few information. The sea buckthorn is growing now in the Baltic States, but the populations are small, also are plantations in Italy, France, Poland, Belarus and Romania (Horne, 2015).

The oldest breeding program for sea buckthorn was initiated in 1933 by Lisavenko Research Institute of Horticulture for Siberia (Zubarev Y.A., 2015). From this program until now have been obtained 40 varieties, but the most known and widespread are the following varieties: 'Botanitscheskaya', 'Botanitscheskaya Liubitelskaya', 'Gibrid Pertsika', 'Otradnaya', 'Podarok Sadu', 'Trofimovskaya'.

The number of sea buckthorn varieties for European climate is too low; in Germany are now cultivated only four varieties ('Hergo', 'Askola', 'Habego', 'Leikora').

In Romania, the sea buckthorn is found in at different altitudes ranging from 0 to 1200 m. In the plate area, the sea buckthorn is found in riverbeds (Bistrita Valley, Siret Valley, Buzau Basin, Danube Delta), also in the hilly and submontane area it explore the sunny slopes. Sea buckthorn, being so widespread in wild flora, all cultivated Romanian varieties has the origin from wild flora. At present, this

species is cultivated ≈ 220 hectares area with predominant varieties as: 'Serpeni', 'Pitesti 1', 'Andros', 'Clara', 'Cora', 'Auras'.

Sea buckthorn is a relatively new crop in Romania and in Europe also. So the cultivation technology is under investigation. The research on this species should be focused on more efficient harvesting method, new cultivars suitable to European climate; bigger yields by right cultivation methods, pest and diseases control (Horne, 2015). The aim of this paperwork is to agro biological assessment of some Romanian genotypes *ex situ* from wild flora.

2. Material and methods

The study was conducted at RIFG Pitesti, Romania, during 2014-2015. During the study, the experimental field was no irrigated and no chemical fertilization were used; the plants was spaced 2 m apart in the row and 2.8 m between rows. The plants are selected from wild flora of Romania and were planted in 2008. The experimental plot was emplaced in an alluvial soil which on 0-20 cm depth showing the following properties: clay content, Ø < de 0.005 mm (C) =16.88%; organic matter (H) = 1.91%; pH_{H2O} =6.0. On the 20-40 cm depth, these properties had the following values: C= 21.2%, H=1.73%, pH_{H2O}=5.8 For quantifying the fruit quality characteristics, some biometric fruit quality indicators were made: average fruit flesh weight (g) was determined by weighing after stone extraction at 100 randomly selected berries from each replication. Soluble solids content was determined in berry juice obtained from 30 fruits from every replication; by means of digital refract meter (PR Series) and fruits pH with digital pH meter type IQ 150. The index size was calculated by formula: (height +large diameter +small diameter)/3, the shape index shape was calculated by formula: (height +large diameter)/2. The detachment force of fruits was determined with penetrometer FT 011 (kg / cm^2) from every 7 day in October, and in first decade of November after first cold (-2 Celsius degree). The results obtained were statistically analyzed using the analysis of variance (ANOVA). Means were compared using LSD multiple range test at 0.05 probability levels. The different letters from figures are significantly different according to LSD test ($P \leq 0.05$).

3. Results and discussions

The fruits weight of sea buckthorn genotypes, shows that the data recorded during the study period recorded the highest value to the 'Pitesti 5' genotype, and the lowest value was recorded to the 'Mărăcineni 2' genotype. From a statistical point of view, the genotypes studied were classified into five statistical classes with differences between the ranges of 8.0-5.0% (Fig. 1).

The size index is a very important feature for the sea buckthorn, especially for some harvesting machines that operate by aspersion mechanisms. For the consumers are not so important this feature, because sea buckthorn fruits are less for fresh consumption, but in specially as processed foods (Fig. 2). Analyzing data of the two years of study, we find that the eight genotypes studied were divided into six statistical classes, the differences varying between 7.07-9.69%. The highest value of the size index (9.80) was recorded at the 'Pitesti 5' genotype (Fig. 2).

The pedicel length (mm) of fruits sea buckthorn genotypes is a very important feature in the harvesting process. If the pedicel is longer, the harvesting process both mechanically and manually, is easier to perform. That being said, the values of this index varied to the eight genotypes studied between 1.59 mm ('P1R2') and 3.20 mm for the genotype of 'Moldova G' (Fig. 3). The statistical calculation of the mean values recorded in the study period, divided the eight genotypes into 4 statistics classes, with differences between 4.96 and respectively 9.25%.

The fruits content in soluble solids (% Brix). The highest value of this quality index (12.66% Brix) was recorded at the 'Maracineni 2' genotype. The differences between the genotypes were between 5.28 and 9.76%. Mean values above 11.50 were recorded to 5 genotypes, of the 8 studied (Fig. 4).

The pH is next to % Brix a major feature in the processing process of fruits. The highest value (2.99) on this quality indicator was recorded to the genotype 'P1R1', and the lowest value (2.33) was recorded in the 'Mărăcineni 2' genotype (Fig. 5).

At the sea buckthorn the optimum time for picking of the fruit is sometimes difficult to establish because the fruits begins to coloring yellow-orange since mid-August, but the fruit until the end of September doubles its size, also the value of pH and % Brix are grow. So, for the majority of Romanian genotypes in the end of September and the first ten days of October is considered to be the optimal time for harvesting the sea buckthorn. For that reason we considered that the measurement of the force detachment of the fruit off the branches provides valuable information both for the accurate setting of the harvest time and also, precious information for establishing the parameters of the harvesting machines.

The force of detachment of the fruit off the branches registered on October 5 exceeded the values of 250 kgf/cm^2 for all 8 genotypes studied. Values below 250-100 kgf/cm^2 were recorded at the end of October (October 26) before the hoar-frost. After first hoar frost, the value of force of detachment

of the fruit off the branches is increased by 4% to 19% compared to the values recorded before hoar frost for all genotypes (Table 1).

4. Conclusions

Over the studied period the 'Pitesti 5' genotype had recorded the highest fruit weight (0.65 g) and size index (9.8) also the length of pedicel was long versus the other studied genotypes, for that we recommend this genotype for spread in culture.

At the end of this study we found that the best harvesting period for sea buckthorn is 20 September-20 October for climate conditions in Romania.

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Tables and Figures

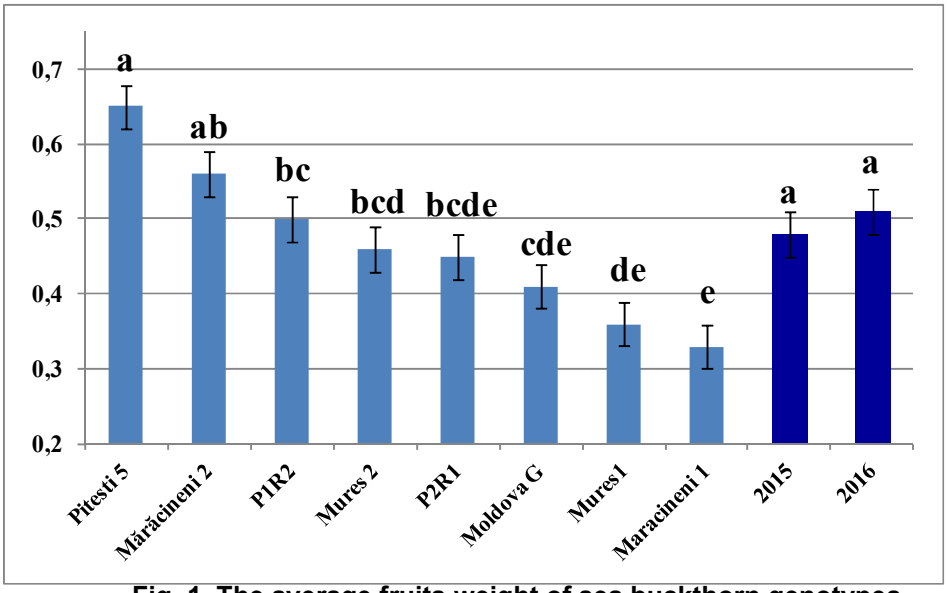

Fig. 1. The average fruits weight of sea buckthorn genotypes

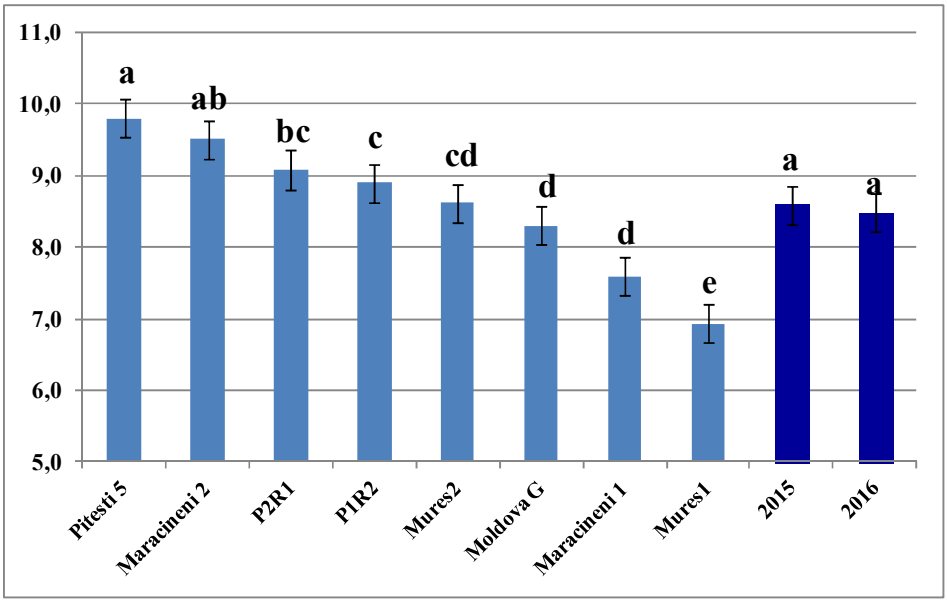

Fig. 2. The fruit index size of fruit sea buckthorn genotypes

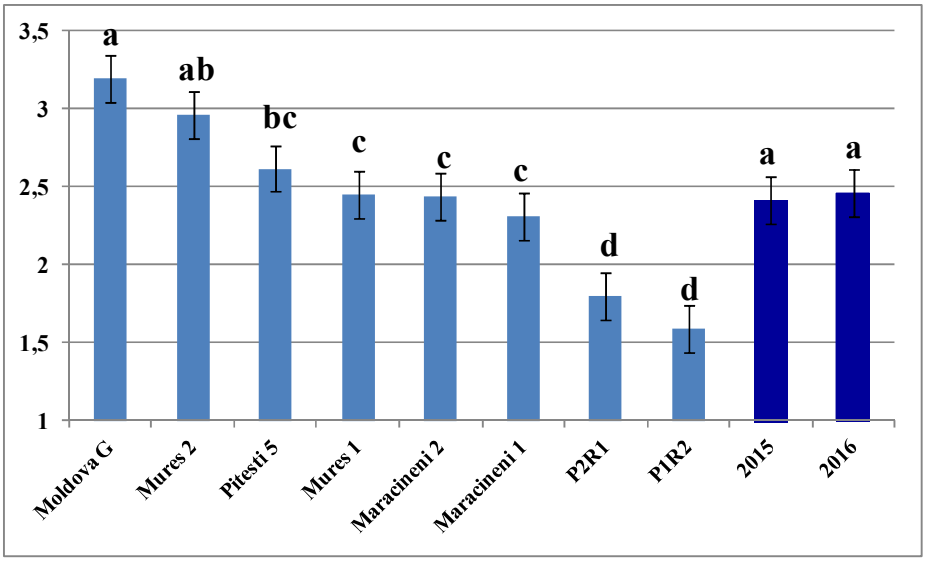

Fig. 3. The pedicel length (mm) of fruits sea buckthorn genotypes

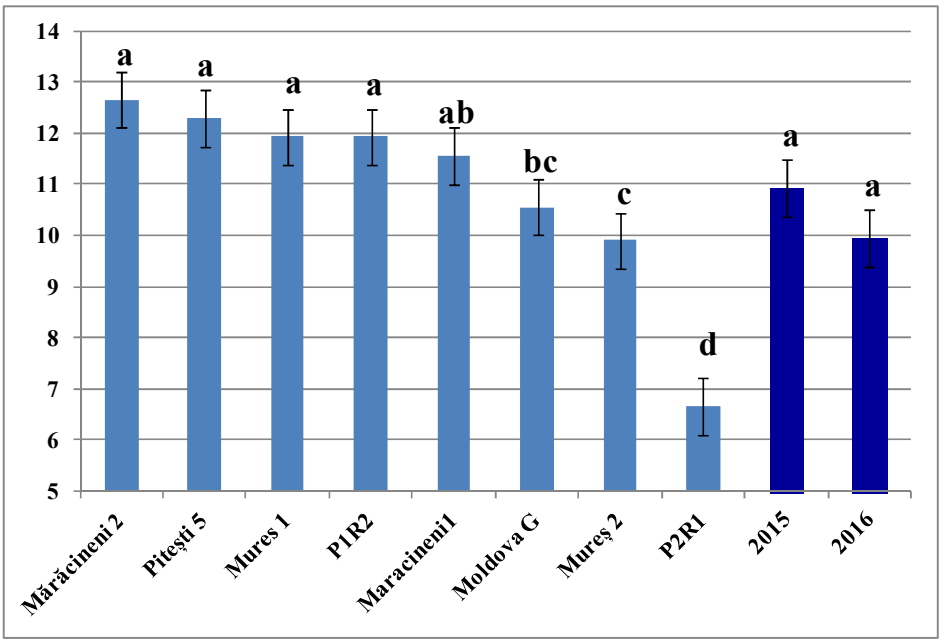

Fig. 4. The average content in soluble solids (% Brix), sea buckthorn genotypes fruits

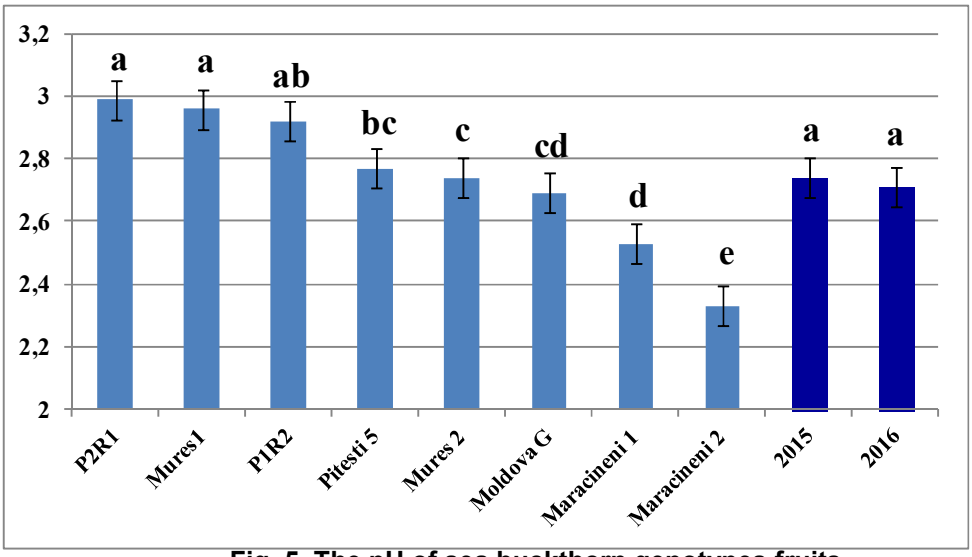

Fig. 5. The pH of sea buckthorn genotypes fruits

Table 1. The force of detachment of the fruit off the branches

Genotype	The force of detachment of the fruit off the branches (kgf/cm^2)				
	Date of determination				
	05. October	12. October	19. October	26. October	2. November
Maracineni 2	264.61	153.84	129.61	69.61	139.23
Mărăcineni 1	237.24	151.37	123.79	84.82	114.13
Mures 1	254.88	138,22	125.11	100.57	110.22
Moldova G	252.36	246.52	242.27	207.27	124.54
P2R1	278.33	270.33	235.33	207.33	121.21
Mures 2	283.21	278.57	247.51	236.07	131.07
P1R2	295.02	275.01	259.51	232.11	116.51
Pitești 5	272.50	199.06	208.75	90.31	157.81