ESTABLISHMENT OF MORPHOLOGICAL DESCRIPTORS FOR THE CHARACTERIZATION OF GENETIC RESOURCES OF THE *SAMBUCUS* GENUS

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Abstract

The Sambucus genus contains 20 species. Among them, the most used in the food and pharmaceutical industries is the black elderberry (Sambucus nigra L.). Recent research has led to identification of valuable genotypes that were introduced into germplasm collections from different countries. Some of the genotypes have been promoted as varieties and are used in commercial culture, having various uses. Since there is no uniform assessment regarding elderberry characterization of genetic resources, in this paper we proposed to establish a series of important traits that will help differentiate their subsequent use in breeding programs. The descriptors proposed are: thickness of one-year branches, branch color; internodes length; density, color and form of lenticels; color and shape of buds, etc. With these descriptors a total number of 28 elderberry genotypes from the spontaneous flora of Oltenia region were assessed. There genotypes will be propagated and introduced into the germplasm collection of UCV-SCDP Vâlcea.

Key words: elderberry, germplasm, evaluation, traits.

INTRODUCTION

Black elderberry (*Sambucus nigra* l.) is a deciduous shrub that is found mostly in spontaneous and semi-spontaneous status, and less cultivated in Oltenia region, Romania. In the Oltenia region there are numerous sources of germplasm with great variability, from which valuable biotypes can be selected (Soare et al., 2015). Research on evaluation various shrubs from wild flora has known lately increasingly magnitude in the context of climate change and genetic erosion. Any loss of plant genetic diversity means lower chances for later human survival (Botu and Botu, 2000).
Research directions on fruit trees and small fruits have been geared towards identifying genetic resources that show valuable characteristics concerning the adaptability and quality of fruit for food and pharmaceutical uses. Black elderberry is one of the species with potential in terms of adaptability to various environmental conditions and the food and pharmaceutical properties of the fruits

brought elderberry to the attention of the breeders. The commercial varieties obtained till now in Romania ('Ina', 'Nora' and 'Brădet'), but also new genotypes selected require more clear description, in order to preserve their authenticity and for conservation and evaluation into the germplasm collections in order to provide valuable traits for future breeding programs. For most of the horticultural crops there are lists of descriptors defined by scientific working groups mostly from International Union for the Protection of New Varieties of Plants (UPOV), Biodiversity International (formerly IPGRI) and Food and Agriculture Organization (fFAO) of the United Nations, subject to a continuous updating process corresponding to scientific progress and modernizing of investigative methods. Using suitable descriptors greatly simplifies the recording the data on characterization and in situ and *ex situ* evaluation of genetic resources and cultivars. Establishment and updating the lists of descriptors is a dynamic and open activity and the standardization of the

descriptors is done in such a way as to be universally applicable for characterization of accessions (Pérez and López, 2009). For *Sambucus* genus there is no uniform methodology for characterization of genetic resources (Charlebois et al., 2010). That is the reason why in this study we aimed to identify and propose descriptors for strong characters Who can help for a clear description of elderberry genetic resources and proper identification of cultivars.

MATERIALS AND METHODS

The biological material was made up of 28 elderberry selections, identified in the spontaneous, semi-cultivated and cultivated flora of Oltenia. All the selections are aged between 10 to 20 years old. Observations and measurements were performed during the dormant period and focused on the morphological peculiarities of the one-year shoots and buds. From each selection were harvested a total of 10 annual shoots of 70 cm long, harvested from the third middle part of the crown. We proposed a number of 6 descriptors for the shoots and an evaluation methodology has been applied for each character:

- *One-year old shoot: thickness.* The one-year old shoots were measured at the insertion point region and the mean of the obtained values was calculated.
- *One-year old shoot: color.* Appreciation was carried out taking into account the color of the upper part of the shoots.
- *One-year old shoot: length of internodes.* In order to obtain comparable values, we have opted for measuring the 3rd internode of the one-year shoot.
- *One-year old shoot: density of lenticels.* The lenticels were counted on the lower part of the shoot and the density per cm² was calculated according to the thickness of the shoot.
- *One-year old shoot: color of lenticels* was appreciated following the observations carried on the internodes of the middle third of the one-year old shoot.
- *One-year old shoot: shape of lenticels* was appreciated on the one-year old shoots.

The 4 proposed descriptors for the dormant buds are:

- *Bud: shape*
- *Bud: position to the axis of the shoot*
- *Bud: color*
- *Bud: length/width ratio.*

In case of the buds, measurements regarding the length and width of the buds at the insertion point on the twig were carried out. Ratio between the length and width of the buds was calculated, three size groups were proposed in accordance with data obtained.

Also, the bud position to the shoot axis, color and bud forms were analyzed, establishing the appropriate notation for each situation encountered.

RESULTS AND DISCUSSIONS

Based on the observations and measurements made for the studied characters, the following results were obtained:

- In case of *one-year old shoot: thickness,* the mean values ranged between 4.0 to 8.2 mm. The interval was divided into three size classes, for this descriptor, 3 grades were assigned (Table 1).
- *Color of one-year shoots* varied from light gray, dark grey, light brown and dark brown, 4 classes were proposed for this descriptor.
- *Length of internodes* oscillated from 9 to 15 cm.
- *Density of lenticels* varied in average from 4.5 to 7.6 lenticels per cm^2.
- *Color of lenticels* was observed, three colors being recorded for this trait (white, grey and brown).
- *Shape of lenticels* was either round, oval or elongated.

In case of elderberry buds the results obtained were as following:

- *Bud: shape.* For this trait three situations were encountered: elongated, triangular and round.
- *Bud: position to the axis of the shoot.* Positions of the buds varied from 30° to 70°, three size ranges were established.
- The *color of the bud* differs from one selection to another, ranging from brown, greenish brown, reddish brown and reddish.

The *length/width ratio of the bud* ranged from 0.95 up to 1.50, 3 classes being defined for this descriptor.

Table 1. Proposed descriptors for one-year shoots and dormant buds for *Sambucus nigra* L.

Descriptor	Note	Expression level
One year-old shoot: thickness (mm)	3	Thin (<4.0)
	5	Medium (4.1-8.0)
	7	Thick (> 8.1)
One year-old shoot: color	3	Light grey
	5	Dark grey
	7	Light brown
	9	Dark brown
One year-old shoot: length of internodes (cm)	3	Small (<10)
	5	Medium (10.1-15.0)
	7	High (>15.1)
One year-old shoot: density of lenticels (no./cm²)	3	Weak (<5.0)
	5	Medium (5.1-6.0)
	7	Strong (> 6.1)
One year-old shoot: color of lenticels	3	White
	5	Grey
	7	Brown
One year-old shoot: shape of lenticels	3	Round
	5	Oval
	7	Elongated
Bud: shape	3	Elongate
	5	Triangular
	7	Round
Bud: position to the axis of the shoot (degrees)	3	Low (<40°)
	5	Medium (41-60°)
	7	High (>61°)
Bud: color	3	Brown
	5	Brown greenish
	7	Brown reddish
	9	Reddish
Bud: length/width ratio	3	Small (< 1)
	5	Medium (1.1-1.5)
	7	High (>1.5)

Following the establishment of distinctive traits and their graduation, the most relevant elderberry selections were noted according to the proposed methodology (Tables 2 and 3).

Table 2. Proposed evaluation of black elderberry (*Sambucus nigra* L.) selections based on one year-old shoot descriptors.

No.	Selection	*Thickness (mm)*	*Color*	*Length of internodes (cm)*	*Density of lenticels (no./cm²)*	*Color of lenticels*	*Shape of lenticels*
1	Căzănești 21	3	3	5	3	3	1
2	Bălcești 71	3	5	3	5	3	3
3	Bălcești 215	7	7	7	5	7	5
4	Bălcești 100	5	5	5	3	5	3
5	Oteteliș 78	7	3	5	5	7	5
6	Oteteliș 100	5	3	5	3	5	7
7	Gorunești 80	3	9	5	3	5	7
8	Drănic 97	5	3	3	3	3	3
9	Comoșteni 63	7	7	7	5	7	5
10	Dăești 205	7	3	5	7	7	7
11	Dăești 111	5	5	5	3	5	3
12	Dăești 66	5	3	5	7	3	3
13	Ciocâltei 28	5	5	7	3	7	5
14	Ciocâltei 81	3	5	5	7	5	3
15	Roești 9	5	5	3	7	7	7
16	Găgeni 166	5	9	3	5	5	5
17	Giulești 53	5	7	3	7	5	3
18	Benești 18	3	7	5	3	3	3
19	Benești 83	5	3	3	7	7	3
20	Benești 103	5	5	5	3	3	7
21	Craiova 63	3	3	3	7	5	3
22	Gorunești 30	7	3	5	3	7	5
23	Motoci 11	5	5	7	3	5	3
24	Picăturile 41	7	3	7	5	5	3
25	Craiova 29	5	7	3	7	7	3
26	Craiova 79	7	9	3	5	5	3
27	Bechet 61	3	7	5	3	3	7
28	Valea Stanciului 24	3	5	3	7	5	3

Table 3. Proposed evaluation of black elderberry (*Sambucus nigra* L.) selections based on bud descriptors.

No.	Selection	*Bud: Shape*	*Position to the axis of the shoot*	*Color*	*Length/ width ratio*
1	Căzănești 21	3	5	7	3
2	Bălcești 71	7	3	5	5
3	Bălcești 215	5	5	3	5
4	Bălcești 100	3	7	9	7
5	Oteteliș 78	7	3	3	3
6	Oteteliș 100	7	5	3	5
7	Gorunești 80	5	7	7	3
8	Drănic 97	5	3	5	7
9	Comoșteni 63	5	5	5	5
10	Dăești 205	5	3	9	3
11	Dăești 111	5	5	7	3
12	Dăești 66	5	3	7	5
13	Ciocâltei 28	3	7	3	7
14	Ciocâltei 81	7	3	3	5
15	Roești 9	5	3	3	3
16	Găgeni 166	7	5	9	5
17	Giulești 53	5	7	3	3
18	Benești 18	5	3	7	5
19	Benești 83	3	3	9	5
20	Benești 103	5	5	3	5
21	Craiova 63	7	7	3	5
22	Gorunești 30	5	7	7	3
23	Motoci 11	5	7	9	5
24	Picăturile 41	5	5	5	3
25	Craiova 29	5	5	3	5
26	Craiova 79	5	7	3	3
27	Bechet 61	7	5	5	5
28	Valea Stanciului 24	5	3	3	3

Figure 1. One year-old shoot and bud selection Dăești 205

Figure 2. One year-old shoot
and bud selection Giuleşti 53

Figure 3. One year-old shoot
and bud selection Oteteliş 78

Figure 4. One year-old shoot
and bud selection Picăturile 41

CONCLUSIONS

As result of analyzing the traits of the black elderberry (*Sambucus nigra* L.) selections a total number of 10 descriptors were proposed: 6 for the one year-old shoots and 4 for the buds. The proposed working methodology and the identified morphological peculiarities may be of use for establishing a complete list of descriptors for *Sambucus* genus.

The results obtained may be useful for characterization of the elderberry germplasm existing in the Oltenia region.

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