SAMBUCUS EBULUS L. - BIOCHEMICAL COMPOSITION OF LEAVES - POSSIBLE NATURAL TREATMENTS

Pandia Olimpia (1), Ion Sărăcin (2), Ştefania Eliza Tănasie (1) and Iulia Găgeanu (3)
(1) University of Agricultural Sciences and Veterinary Medicine Bucharest, Romania,
e-mail olimpia_pandia@yahoo.com
***(2)** University of Craiova, Faculty of Agriculture, Romania*
***(3)** INMA, Bucharest, Romania*

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ABSTRACT

The purpose of the research was to demonstrate the importance of knowing the biochemical composition of leaves of Sambucus ebulus L., a spontaneous flora plant which, under the direct knowledge of its properties, can be used in natural medicine for the control of abnormal diseases or conditions for the body human. As green plants are of particular importance due to their ability to produce large amounts of organic chemicals rich in Sambucus Ebulus L., it is to confirm the existence of mineral elements, namely N, P and K, which varied according to the harvested plant, and chlorophyll pigments did not show large changes and concentrations from one sample to the next. The same thing happened when determining protein and dry matter. From the leaf harvesting area of Sambucus Ebulus L., laboratory determinations and soil analyzes have been carried out with respect to soil pH, total nitrogen, phosphorus, potassium, sum of bases and humus.

INTRODUCTION

The small elder *Sambucus Ebulus L.,* Fam. *Caprifoliaceae* is known under the name of bozie, small elder. In Romania, the species *Sambucus Ebulus L.* is common; being met in all zones of country, in different places and it is not pretentious at climate and soil. This plant is found in the spontaneous flora of our country in three species (*Grigoresc E., 1962*): *Sambucus Nigra L.* (black elder); *Sambucus Ebulus L.* (small elder); *Sambucus Racemosa L.* (red elder). From the species of *Sambucus* genus are used in medicine, the flowers and sometimes the fruits. The black elder flowers have an ancient usage in scientific and popular medicine. They have an sudorific, diuretic, galactogen, expectorant action, are used against obesity, cold, cough (*Berger FR 1949; Constantinescu C., 1967; Davidek C.,1961; Petkov V., 1982*).

Externally, black elder flowers have emollient, being recommended in baths, poultices, boils, pharyngitis, laryngitis, and the small elder ones have anti-phlogistic effects (*Khare C.P., 2008*). The black elder flowers are parts of anti-rheumatic, depurative and sudorific tea (*Vilar A., 1986*).

The small elder is a perennial plant, known as the step-brother of elder, and it measures up to 1.6 m, the flowers are white and the fruits are black. The ridiculer system is strong and presents a deep rooting; being the most used part in therapeutic interest.

Infusion, decoction (10%), extract - all have diuretic, anti-rheumatic, laxative, antiseptic, purgative, anti-allergic, anti-inflammatory, anti-suction, sudorific properties. The bark is a plant very used for its pharmaceutical qualities (I. Bara, P., 1993). The effect of the bosom is very strong, so the recommended doses should not be exceeded. It is contraindicated for people who are weak, suffer from diarrhea, irritable bowel, hyperacid gastritis; people with a strong feeling of vomiting (*Constantinescu D. Gr. & Bojor O., 1969*).

The chemical composition of medicinal and aromatic plants, the therapeutic action of active principles was studied and presented by (*Leon M., 2007*).

The small elder is usually used in diets, it is a very good diuretic, painkiller, inflammatory, antispasmodic, emetic, expectorant. The small elder also contains: fatty acids,

phytosterols, ursolic acid, glycosides, iridoid compounds. It is distinguished by a repulsive smell of leaves, stems and roots.

MATERIAL AND METHOD

Chemical and biochemical determinations were performed in the Agrochemistry Laboratory, Faculty of Management, Economic Engineering in Agriculture and Rural Development, Slatina Branch. Because the leaves at *Sambucus Ebulus L*. have purgative and emetic proprieties, for establishing their importance for naturist medicine there were made studies in 2015 on 10 lots of small elder plants, harvested from 10 different places from S-V Oltenia area, more precisely from Grecești village, Dolj county, in august, and preponderant soil in this area is argic chernozem.

Experimental soil variants are presented in Table (1), and the methods used for the determinations were: The pH of the soil was measured by the potentiometric method, which is based on the determination of hydrogen ions according to the potential difference between the two electrodes introduced into the soil suspension and the results are read on the scale of the measuring apparatus that is graduated in pH units.

The Ah was determined by treating the soil with the solution of an alkaline hydrolysis salt with 0.1 N sodium hydroxide in the presence of phenolphthalein.

Sb. The method of determination is to treat the soil with an excess of 0,05 HCl 0,005 n and the sum of the bases being equivalent to the amount of HCl consumed in the reaction is determined by titration with NaOH in the presence of the methyl red used as an indicator.

Phosphorus was determined by the Engner-Riehm-Domingo method and was carried out by removing the mobile phosphorus with a solution of ammonium lactate acetate. The concentration in the phosphorus thus obtained is determined by colorimetry.

Potassium was determined by the same method as phosphorus, and its dosing was carried out on a flame photometer.

For the determination of Humus, the Walkle and Black method was used and was made by oxidizing the organic substance in the soil with potassium dichromate in the presence of sulfuric acid and titrating excess potassium dichromate with a Mohr's salt solution.

Nt was obtained by applying the Kjeldahl method, which was done by soil mineralization with concentrated sulfuric acid, and by measuring excess sulfuric acid with 0.1N NaOH, the nitrogen content of the sample to be analyzed can be calculated.

The preparation of plants samples for analysis

The harvested samples (leaves) do not present visual symptoms of nutrition disorders and they are prepared for the established analyses program. Some leaves which have presented slight traces of dust have been wiped with a gauze or cotton pad softened in distilled water.

The mineralization of vegetal material for determining nitrogen

For determining nitrogen was been used Kjendal method, by mineralization with sulfuric acid.

Procedure

From the sample of dried vegetal material and finely chopped it is weighed at analytical balance 1 g of material and it is introduced in a 250 ml Kjendal disintegration balloon. 5 g of catalyst mixture and 12.5 ml of concentrated sulfuric acid are added. The balloon is covered with a pear or glass funnel and the violent boil is avoided. The mineralization is considered done when the balloon content fades from brownish-yellow to colorless or slight green hue.

The determination of gross protein. **Total nitrogen**

Total nitrogen content from the vegetal material is determined by wet mineralization, the sulfuric acid being widely used, in different variants of classical Kjendal method.

The calculation and results expression

For the calculation of N content in % the next formula is used:

$$N_t \% \text{ from DS} = (V1 - V2) \cdot f \cdot 1000 \cdot 100 / m \cdot 1\,000\,000 \quad (1)$$

where:

DS is dried substance;

V1 - ml of sulfuric acid used at titration of the analyzed sample;

V2 - ml of sulfuric acid n/14 used at titration of the blind sample;

f - the factor of n/14 sulfuric acid solution;

m - the quantity of vegetal material taken for analysis in [g];

100 - the factor of percent reporting;

1000- the factor for transformation of micrograms of N in g of N;

In these conditions, the formula has the simplified form:

$$N_t \% \text{ from DS} = (V1 - V2) \cdot f \cdot 0,1 \quad (2)$$

The determination of phosphorus

The prepared materials are determined and read at the spectrophotometer when they are yellow, using the formula:

$$P\% = C \cdot Vt \cdot 100 / \cdot Va \cdot m \cdot 1\,000\,000 \quad (3)$$

where:

C – the content of P in micrograms of the aliquot part used at color metering;

m – the quantity of vegetal material used at mineralization in [g]

Vt – the total volume of extract obtained at mineralization in [ml]

Va – the volume of aliquot part used in color metering;

100 – the factor of percent reporting;

1 000 000 – the factor of transformation of micrograms in [g].

The determination of K is made by calcinations, and the dosage of K is made by photometry of flame emission or potentiometry with selective electrode ion.

The results obtained at the total K dosage from the vegetal material are expressed in percent from the dried substance.

$$K\% \text{ from DS} = C \cdot V \cdot r \cdot 100 / m \cdot 1000\,000 \quad (4)$$

$$K\% \text{ from DS} = C \cdot V \cdot r / m \cdot 10\,000 \quad (5)$$

where:

C – the concentration in micrograms K per ml, found on the calibration curve;

V – the volume of diluted solution used at the dosage in [ml];

r – the dilution report used;

m – the quantity of vegetal material used at mineralization in [g].

The determination of carotene and chlorophyll pigments

5 g from the fresh substance from the analyzed plant sample is weighted and milled very well, then 25-30 ml of ethyl alcohol are added, in small glasses of 50 ml. The next day this is filtered and brought at the sign (50 ml) with alcohol. The readings are made at the photo-colorimeter and the results are introduced in the calculation formula.

RESULTS

The results on the chemical content of soil from which the 10 soil samples were collected are shown in Table (1) and the results on the biochemical content of the analyzed leaves are presented in Table (2).

Table 1

Determination of chemical proprieties of argic chernozem harvested from the study area

Sample number	pH	N total	P_2O_5	K_2O	Ah	S.B.	Humus
	H_2O	%	%	%	me/100 g sol		%
1	6,15	0,191	4,3	11,5	2,71	16,8	2,16
2	6,37	0,224	4,8	15,4	2,53	16,7	2,18
3	6,21	0,211	5,2	12,8	2,64	17,9	2,16
4	6,36	0,215	4,4	11,9	1,95	16,6	2,17
5	6,34	0,199	4,5	14,4	2,56	18,4	2,22
6	6,28	0,204	5,6	16,8	2.69	17,5	2,17
7	6,19	0,221	5,4	18,1	2,12	16,3	2,17
8	6,19	0,217	5,1	16,6	2,01	19,1	2.18
9	6,25	0,216	4,9	17,8	1,93	18,7	2,17
10	6,15	0,222	4,0	18,9	1,878	19,3	2,21

Source: Author

Soil pH was noted due to the small differences between the samples collected from 6.15% to 6.37%, the total nitrogen is present in the soil at significant doses with small differences from 0.191 to 2.224%, being a good way for development of the plant.

Phosphorus is found in the proportion of 4.0 to 5.6%, but sufficient for the growth of the plant. Potassium which reaches a minimum of 11.5% has a maximum of 18.9%, and the sum of the bases and humus in the soil are found in sufficient quantities in the soil for these plants to develop properly. In the five images, there are presented aspects of the preparation of samples for laboratory analysis and obtaining extracts for reading the results, as well as the laboratory equipment used. As a result, the results on the biochemical content of the leaves of *Sambucus Ebulus* L. are shown in Table (2).

Because plant physiological activity is closely related to the water content of the cells, the essential role of water is determined by its physical properties, so the determinations that have been made on the bosom leaves, which is a plant of the spontaneous flora and which depends only from the water from the fall of rainfall, it can be seen that most of the results are differentiated between them with small values.

Table 2

The biochemical determinations obtained from *Sambucus Ebulus L* plant

Sample number	Nitrogen %	Protein %	P_2O_5 %	K_2O %	Chlorophyll pigments mg/dm^2 %			Dried substance
					Ca	Cb	K	g %
1	3,11	19,4	1,96	1,66	10,615	4,709	3,964	28,52
2	3,10	19,3	1,91	1,63	10,606	4,713	3,959	28,54
3	3,10	19,6	1,92	1,65	10,413	4,718	3,951	28,52
4	3,14	19,4	1,95	1,66	10,543	4,722	3,944	28,52
5	3,09	19,02	1,95	1,64	10,614	4,711	3,952	28,53
6	3,09	19,6	1,96	1,64	10,579	4,722	3,953	28,51
7	3,08	19,3	1,97	1,63	10,604	4,717	3,951	28,51
8	3,13	19,02	1,93	1,66	10,477	4,724	3,958	28,53
9	3,11	19,4	1,92	1,67	10,496	4,723	3,963	28,54
10	3,08	19,5	1,96	1,65	10,611	4,724	3,9434	28,54

Source: Author

Thus, nitrogen has values ranging from 3.8% to 3.14, while the phosphorus and potassium yields are very close to each other. The protein has a minimum of 19.02% and a maximum of 19.6%, the values being less significant.

Chlorophyll pigments have good values for the three forms of determination, which leads to the conclusion that the plants have been harmoniously developed. The dry matter has normal values ranging from 28.51 to 28.54.

CONCLUSIONS

The biochemical substance from the leaves of indigenous species of Sambucus genus were studied qualitative and quantitative.

From leaves a 5% infusion can be made, being used as diuretic, sudorific, for cough and for cleaning heavy throat.

A certain limit must not be overcome because it becomes emetic.

For laxative purposes a cup of infusion per day can be served.

The small elder effect is very strong, because of that must not overcome the recommended dosage.

The small elder, as plant used like naturist remedy, is contraindicated for weak persons, suffering of diarrhea, IBS, hyperacid gastritis, persons with stressed emetic sensation.

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