SPECIES OF MEDICINAL PLANTS IN THE BERHECI RIVER BASIN

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Abstract

The Berheci River is an important tributary of the Bârlad River. The Berheci hydrographical basin is part of the Central Moldavian Plateau, the subunit of Tutova Hills. The purpose of this paper is to record the medicinal species, especially the least well-known in the territory of this basin, which can be a potential source for obtaining of pharmaceutical products. The identified species were seen from the point of view of the medical importance based on the bibliography. The studied medicinal species grow in phytocoenoses of the forest and the grass and are often considered unwanted plants in these habitats. 53 species of medicinal importance belonging to 24 botanical families have been identified. The *Asteraceae, Brassicaceae* and *Lamiaceae* families have been noted for the greater number of species. The complex chemical composition of plant organs used for medicinal purposes confers multiple therapeutic actions on them. Among the species with less known medicinal potential include: *Ballota nigra*, *Lamium purpureum*, *Onopordon achanthium*, *Prunella vulgaris*, *Stellaria media*, *Tribulus terestris.*

Key words: weeds, medicinal potential, therapeutic actions

The Berheci River is a right tributary of the Bârlad River. The Berheci hydrographical basin is part of the Central Moldavian Plateau, the Hills of Tutova (Harjoabă I., 1968).

Territory of the Berheci River basin was studied by several botanists over time. Floristic and vegetation studies that partially referred to the Berheci basin were conducted by Răvăruţ M., (1945, 1950), Burduja C. (1956), Mititelu D., Barabaş N., (1970). The most consistent contribution belongs to Bârcă C., (1973) through the doctoral thesis "*Flora and vegetation of Tutova hills (between Tutova and Siret)*" and other studies (1974, 1975, 1984, 1987). Other botanists published synthesis works (Mititelu D., Barabaş N., 1970, 1978; Mititelu D. *et al*, 1993; Chifu T. *et al*, 2006), which also refers to the territory studied in this paper.

In the present paper, frequent medicinal plants have been taken into consideration, more or less known by the inhabitants of this basin; the latter may provide sources for future pharmacological research and potential important sources for new pharmaceuticals. The medicinal plants under consideration are part of forest and grassland phytocenoses and are often considered unwanted plants in these habitats. They cause losses by increasing the costs of removing them from these habitats. The losses caused by these plants can be greatly reduced if their biomass will be used as a new source for the production of pharmaceutical products. In order to do this, it is necessary that the collection area is not polluted and the plants are healthy, not to be contaminated by the animals that visit the respective areas.

The purpose of this paper is to record of medicinal species, especially of the lesser known in the territory, this basin which can be a potential source for the production of produces pharmaceuticals.

MATERIAL AND METHOD

The Berheci River springs from an area located in the village of Izvorul Berheciului (Bacău County), at an altitude of 350m. It flows into the Barlad River in the area of Berheci railway station (Galati County), at an altitude of 43m. It crosses the territories of three counties: Bacău, Vrancea, Galati (Environmental Report - General Urban Planning - Brăhășești village, Galati county). It has a length of 92 km, a water catchment area of 1021 km² (Flood Risk Management Plan 2016 - Prut - Barlad Water Basin Administration).

The study of the flora in the Berheci River basin was carried out in natural habitats, forests and meadows, where the anthropic activities aim to exploit the vegetal resource by mowing or gardening forest and vegetation maintenance activities. The inventory of the species was carried out in the period 2016 - 2017, on the itinerary and their determination was made using the Practical

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Plant identification elaborated by Sârbu I. *et al,* (2013). The material was examined in terms of medical importance on the basis of the specialized bibliography (Crăciun F. *et al,* 1976, 1977; Alexan M. *et al*, 1988; Ciulei I. *et al,* 1993; Tiță I., 2003; Munteanu L. S., *et al*, 2007; Dihoru G., Boruz V., 2014).

RESULTS AND DISCUSSIONS

An important resource of herbs is represented by undesirable plant species in forests and meadows, which is often lost. Some of these species are also present in agricultural crops (*Anagallis arvensis, Capsella bursa-pastoris, Hibiscus trionum, Barbarea vulgaris, Consolida regalis, Polygonum aviculare, Stellaria media*). In the Berheci river basin, the species presented below have medical pottential.

The species are presented in alphabetical order of the botanical family name. For each species, the parts of the plant used for medicinal purposes are marked in brackets: 1 - the underground (root, rhizome); 2 - leaves; 3 - flowers / inflorescences; 4 seeds; 5- fruit, 6 - part air; 7 - whole plant. Some of the medicinal species have other uses; these were noted in letters: A - food, F - fodder; Me - melliferous.

Species list. Apiaceae: *Eryngium planum* L. (7); Asteraceae: *Arctium lappa* L. (1) A, Me; *Arctium minus (*Hill.) Bernh (1, 2, 5); *Artemisia absinthium* L. (2, 3,7)*; Artemisia vulgaris* L. (2, 3, 7); *Bidens tripartita* L. (7); *Centaurea cyanus* L. (3) Me; *Tanacetum vulgare* L. (3, 6); *Cichorium intybus* L. (1, 7) Me, F; *Onopordon achanthium* L. (3, 7); *Xanthium spinosum* L. (7); Boraginaceae: *Cynoglossum officinale* L. (1) Me; *Lithospermum officinale* L. (7); Brassicaceae: *Barbarea vulgaris* R. Br.(7) A, Me; *Capsella bursa-pastoris* (L.) Medik (2, 3, 7) Me; *Erisymum diffusum* Ehrh.(7); *Lepidium draba* L. (2); *Thlaspi arvense* L. (2); Caryophyllaceae: *Stellaria media* (L.) Vill.(1,7) F; Caprifoliaceae: *Sambucus ebulus* L. (1, 3, 5); Chenopodiaceae: *Chenopodium bonus-henricus* L. (1, 2, 7) A*; Salsola kali* L *ssp. ruthenica* (6) F*;* Euphorbiaceaea: *Euphorbia cyparissias* L. (1, 2, 3); Fabaceae: *Ononis spinosa* L. (1); *Melilothus officinalis* (L.) Medik. (6) F, Me; Geraniaceae: *Erodium cicutarium* (L) L´Hérit (6, 7); Lamiaceae: *Ballota nigra* L.(2, 7) Me; *Lamium purpureum* L. (7) Me; *Leonurus quinquelobatus* Gilib (6) Me*; Prunela vulgaris* L. (6); *Stachis recta* L. (7) Me; Malvaceae: *Hibiscus trionum* L. (3, 7); *Malva neglecta* Wallr. (2, 3, 7) A, F, Me; *Malva pusilla* Sm. (2, 7) A, F; *Malva sylvestris* L. (2, 3) A, Me; Papaveraceae: *Chelidonium majus* L. (1, 3, 7); *Papaver rhoeas* L. (3); Plantaginaceae: *Plantago indica* L. (4) F*; Plantago lanceolata* L. (2, 4) F; *Plantago major* L. (2) F; *Plantago media* L. (2) F; Poaceae: *Cynodon dactylon* (L) Pers. (1, 7) F; Polygonaceae: *Polygonum aviculare* L. (7) F, Me; *Polygonum hydropiper* L.(7) Me; *Polygonum persicaria* L. (2, 7); Portulacaceae: *Portulaca oleracea* L. (2, 4) A; Primulaceae: *Anagallis arvensis* L. (7); Ranunculaceae: *Delphynium consolida* L. (3); Rosaceae: *Rubus caesius* L. (2, 5) A, Me; Scrophulariaceae: *Verbascum thapsiforme* L. (3); Urticaceae: *Urtica dioica* L. (1, 2, 4) A, F; Verbenaceae: *Verbena officinalis* L. (7); Zigophylaceae: *Tribulus terestris* L.(2, 7).

53 species with medicinal potential belonging to 24 botanical families have been identified. The *Asteraceae* family comprises 10 species, followed in decreasing order by the families of *Brassicaceae* (5 species); *Lamiaceae* (5 species), *Malvaceae* and *Plantaginaceae* with 4 species each; *Polygonaceae* (3 species). The other botanical families are poorly represented numerically (with one or two species).

For medicinal purposes, only the underground part is used in some species, all or certain aerial organs, or the entire plant to other species.

Some species on the list (*Arctium lappa; Artemisia absinthium; Capsella bursa-pastoris, Cichorium intybus; Chelidonium majus, Melilothus officinalis, Plantago lanceolata*; *Plantago major*; *Plantago media; Polygonum aviculare; Rubus caesius; Urtica dioica* etc) are well known and used as medicinal plants. Some of the biologically active substances identified in organs of these plants are: phenolic compounds (flavonoids, tannins, etc.), saponins, terpenic compounds, volatile oils, glycosides, alkaloids, sterols, fatty acids, organic acids; polysaccharides (inulin, mucilages), proteins, vitamins, mineral salts. These substances confer different therapeutic properties: antioxidant, anti-inflammatory, diuretic, vasoprotectant (phenolic compounds); antiseptic, antidiabetic, astringent (tannins); emollients (lipids, mucilages), expectorants (mucilages); revolutions, antibiotics (sulfur glycosides) (Alexan M. *et al*, 1988, Palade M., 1997; Muntean L. S. *et al,* 2007). Details of chemical composition, therapeutic actions and uses of these species are presented in specialized papers (Alexan M. *et al*, 1988; Grigorescu E. *et al,* 1986; Ciulei I. *et al*, 1993; Muntean *et al*, 2007; Bojor O., 2009; Burzo I., 2015).

Among the less known herbs and whose therapeutic action has been scientifically confirmed or researches have revealed other therapeutic actions, we mention:

1. *Artemisia vulgaris L.*: in the aerial parts were identified carbohydrates, lipids, proteins,

tannins, organic acids, inulin, vitamins, terpene, sterols, flavones, volatile oil. As biological properties are cited: antispasmodic, antiseptic, stomachic, sedative, carminative, diuretic, expectorant, tonic, hemostatic (Burzo I., 2015).

2. Balota nigra L.: the extract from the aerial parts has antioxidant action (Matkowski A., *et al*, 2008). Tiță I., (2003) cites other therapeutic actions (cicatrizant, sedative, antispasmodic).

3. Chenopodium bonus-henricus L.: flavonoids have been identified in the aerial parts. Extracts from the aerial part of the plant have shown antioxidant activity (Kokanova-Nedialkova Z., Nedialkov P., 2017).

4. Hibiscus trionum: the aerial parts contain flavonoids, mucilages; shows diuretic and saluretic action (Crăciun, 1976, Muntean L. S. *et al*, 2007).

5. Lamium purpureum L.: Crăciun F. *et al*, (1976) cites hemostatic and emollient properties. The aerial part contains phenolic compounds and have antioxidant activity (Grujik S. M. *et al*, 2017).

6. Lepidium draba L.: leaf extract has shown significant, analgesic, anti-inflammatory and anticancer effect (Chyad A.H., 2017).

7.Ononis spinosa L.: contains carbohydrates, saponosides, volatile oil, fatty acids, citric acid, sterols, phenolic compounds; exhibits diuretic action (Crăciun *et al*, 1976; Muntean L. S. *et al*, 2007) and antioxidant action (Valyova M. *et al*, 2009).

8. Onopordon achanthium L: carbohydrates, amino acids, phenolic acids, sterols, sesquiterpene, flavonoid pigments were identified in aerial organs. Presents anti-bacterial action, hypotensive (Ciulei I. *et al*, 1993), cardiotonic (flowers) (Burzo I., 2015).

9. *Portulaca oleracea L.:* identified compounds are polysaccharides, flavonoids, alkaloids, fatty acids, sterols, vitamins, minerals. Extracts obtained from the aerial organs have antioxidant, anti-inflammatory, anticancer, neuroprotective, antitumoral activity (Uddin K., *et al*, 2012; Rafieian- Kopaei M., Alesaedi S., 2016).

10. *Prunella vulgaris*: contains glucose, galactose, tannins, mineral salts, organic acids, volatile oils, pigments, tannins (Burzo I., 2015).

11. *Stellaria media:* carbohydrates, lipids, proteins, mucilages, minerals, saponins, vitamins, fatty acids, phenolic acids, triterpenoids, pigments have been identified. Anti-inflammatory, analgesic effects are cited (Oyebanji B. O., *et al*, 2012); diuretic, expectorant, tonic (Burzo I., 2015).

12. *Tribulus terestris:* lipids, proteins, ascorbic acid, sterol glycosides, saponins, tannins, flavonoids, sterols have been identified in the aerial parts. It has many therapeutic actions: diuretic, immunomodulatory, antidiabetic, cardiotonic, hepatoprotective, anti-inflammatory, analgesic, antispasmodic, anticancer, antibacterial, anthelmintic, etc. (Chhatre S. *et al*, 2014; Burzo I., 2015).

Some of the medicinal species studied also have other uses: food plants, fodder plants, melliferous plants (Pop I., 1982; Drăgulescu C., 1992; Moga I. *et al*, 1996; Pârvu C., 2006; Ion N. *et al*, 2008).

CONCLUSIONS

The investigations have shown that in the studied area there are undesirable plant species present in different phytocoenoses, with medicinal potential, some of them may become material for future pharmacological research. These species of the investigated phytocoenoses play an important role in supporting the ecosystem services in the studied area.

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