

ASPECTS REGARDING RARE PLANT SPECIES IN THE BASIN OF THE OLTET RIVER, ROMANIA

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Abstract

The habitats in the Basin of the Olteț River are characterized by a great plant diversity which is constantly changing due to natural and anthropogenic factors. The present study shows aspects regarding the existence of rare plant species in this river basin. We have focused on finding the presence of these species, with indication of location and date, to monitor the continuity of their existence in the habitats. We have identified 74 rare plant species, vulnerable or critically endangered. For these 16 species we have got the sozology status (protected species) given by the International Union for Nature Conservation (IUCN Red List Category, Europe 2011). Some of the data about the rare plant species are over 50 years old and, consequently, new aspects have been noticed, with the habitat having undergone natural changes or having acquired a different use. It has been observed that some species have a small number of populations in the basin's habitats, and the populations are made up of a small number of individuals. This situation, as well as the indication of the existence of some new rare plant species in the studied area, shows the necessity to establish the conservation status.

Key words: Basin of the Olteț river, spontaneous plants, rare plants, critically endangered plants, vulnerable plants.

INTRODUCTION

The flora of the Olteț river comprises species of rare plants, vulnerable or critically endangered, which we have found in the area of the gorge separating the Parâng Mountains from the Căpățâni Mountains, in the Polovragi Depression, the Getic Plateau and the Romanian Plain, where the Olteț river flows into the Olt river.

The habitats are highly varied, offering natural conditions to these species.

Data about some rare species of plants were collected by Păun (1957, 1966), Păun & Popescu (1971), Popova-Cucu & Muică (1993), Răduțoiu (2006, 2014), Popescu & Ciortan (2009).

Our research work has been correlated with the existing data.

The aspects we had in view were the conservation of these species in their habitats, the reduction of their area or their extinction.

The identified species are found on the red lists or are described sozologically, chorologically, cenologically, biologically (Dihoru & Negrean 2009). The European Red List of Vascular Plants (Bitz M. et al., 2011) comprises some of

these species included in the IUCN categories which no longer use the rare plant term (R).

Our data of this river basin consisted in the identification of the taxa, the indication of the location and the estimation of the influence of the natural and anthropogenic factors.

We consider that a survey of their present situation, especially with regard to the factors which have led to a decrease in the number of these specimens or their extinction, can contribute to establishing such protection measures which would ensure the conservation and restoration of these species' populations.

MATERIALS AND METHODS

The sozological status of these plant species has been identified following the study of the bibliography and the national and European red lists.

For plant observation we have made field trips, from 2007 to 2020, March to November. For location we have used the actual name of the localities, as well as the placename given by the local people.

The identified taxa are presented in a list (Table 1). For each taxon we have indicated their

distribution in the investigated area as well as several ascertained zoological aspects.

For taxa distribution we have introduced two abbreviations, one for the distribution taken from the specialty literature (D1) and another one for our findings (D2). For the data from the specialty literature we have made mention of the bibliographical references, whereas our findings were correlated with the data of their identification and the aspects observed in the field.

For these species of plants we have made up a table (Table 1) of their zoological status in the three National Red Lists (Boşcaiu and collab., 1994; Dihoru Gh. & Dihoru Alexandrina, 1994; Oltean et al., 1994; Negrean, 2001), the Red Book (Dihoru & Negrean, 2009) and the European Red List of the Vascular Plants (Bitz M. et al., 2011).

For the nomenclature we have used the work Vascular Plants of Romania (Sârbu and collab., 2013), Euro+Med. (2007-).

RESULTS AND DISCUSSIONS

The inventory work of the plant species in the river basin gave us the possibility to identify 74 taxa with an important zoological status for protection and conservation activities. The research performed on the field trips points to some zoological aspects in the taxa found in the areas. For the taxa indicated many years before our research, which we did not find out, we have tried to identify the changes in the habitats caused by the natural or anthropogenic factors.

1. *Anacamptis pyramidalis* (L.) Rich.

D2: Polovragi, 12 July 2009, 19 June 2016, 18 July 2018, 14 June 2019, 21 June 2020.

Populations with a small number of specimens exposed to mowing and grazing.

2. *Angelica arhangelica* L.

D2: Polovragi, North of the Olteţ Gorges, 21 July 2014, 5 July 2016, 20 July 2018, 30 July 2019, 2 August 2020. A very small number of specimens, some of them endangered by the forest logging, the mechanical action of animal herds, the upstream floods.

3. *Asplenium cuneifolium* Viv.

D2: The Olteţ Gorges, the rocky areas, 3 June 2007, 10 September 2007, 10 July 2011, 20 July 2018, 30 July 2019, 2 August 2020.

Most often covered with a thick layer of dust raised by vehicles.

4. *Asplenium lepidium* C. Presl

D1: The Olteţ Gorges (Popova-Cucu & Muică 1993);

D2: The Olteţ Gorges and North of the Gorges, 10 September 2007, 14 June 2010, 20 July 2018, 30 July 2019, 2 August 2020.

Most often covered with a thick layer of dust raised by vehicles.

5. *Athamanta turbith* (L.) Brot. subsp. *hungarica* (Borbás) Tutin (*A. hungarica* Borbás)

D2: Polovragi, in the Olteţ Gorges, 27 June 2009, 14 June 2010, 21 June 2018, 30 July 2019.

A small number of specimens exposed to the mechanical destruction caused by the passage of cattle.

6. *Beckmannia eruciformis* (L.) Horst

D1: Petriş (Păun 1963); Between Greci and Osica de Sus (Răvăruţ 1972); the Olteţ meadow, between Vlădueni and Greci, Osica de Sus, 44°15'687-700"N, 24°20'356-347"E, alt. circa 92-99 m, 13 VI 2010 [cra 60.113-136] (Răduţoiu 2013).

D2: Cioroiu, In the Olteţ meadow, 5 July 2019. Several specimens found in an area inaccessible for grazing.

7. *Botrychium matricariifolium* (Retz.) A. Braun ex W.D.J. Koch (*B. ramosum* (Roth) Asch.)

D1: The Olteţ Canyon (Popescu & Ciortan 2009).

8. *Campanula grossekii* Heuff.

D1: The Olteţ Gorges (Păun & Popescu 1971);

D2: The Olteţ Gorges, 25 June 2008, 12 July 2011, 20 July 2018, 30 July 2019, 2 August 2020.

Specimens exposed to picking by tourists and to dust raised by vehicles.

9. *Camphorosma monspeliaca* L. subsp. *monspeliaca*

D1: Osica de Sus (Păun 1965); Osica de Sus NE (Vlădueni) - Greci S, Tabonu Mic, 29 VII 2017, G. Negrean (N: 25.962).

D2: Peretu, Tabonul Mic, drainage channel, 5 July 2018, 18 July 2019, 7 August 2020.

Specimens exposed to mechanical action of domestic animals.

10. *Centaurea affinis* Friv.

D1: Olteț Valley above the Cave (Grecescu 1898); The Olteț Gorges (Păun & Popescu 1971); The Olteț Gorges (Negrean & Dihoru 2009);

D2: The Olteț Gorges, 11 September 2007, 30 June 2017, 18 June 2018, 29 July 2019.

Specimens exposed to dust raised by vehicles.

11. *Centaurea atropurpurea* Waldst. et Kit.

D1: The Olteț Gorges (Păun & Popescu 1971);
D2: The Olteț Gorges, 11 July 2007, 30 June 2017, 18 July 2018, 30 July 2019, 2 August 2020.

Specimens exposed to picking by tourists and to dust raised by vehicles, and the ones in the Grohotiș area are exposed to the mechanical action of the cattle grazing unattended.

12. *Cephalanthera rubra* (L.) Rich.

D1: The Olteț Gorges (Sârbu A. 2007).

D2: The Olteț Gorges, 25 June 2008, 2 June 2016, 2 July 2019.

Specimens exposed to picking by tourists and to dust raised by vehicles.

13. *Cephalaria laevigata* (Waldst. et Kit.) Schrad.

D1: The Olteț Gorges (Păun, & Popescu 1971);
The Olteț Gorges (Păun & Popescu 1975);

D2: The Olteț Gorges, The Olteț Canyon, 30 June 2017, 18 July 2018, 30 July 2019.

Specimens exposed to mechanical action of domestic animals.

14. *Cerastium banaticum* (Rochel) Heuffel

D1: Stony, rocky and grassy areas, the Polovragi Cave (Prodan 1953);

D2: Polovragi in the Olteț Gorges, 16 June 2008, 13 June 2012, 29 June 2013; 21 July 2018, 21 June 2020.

Specimens exposed to picking by tourists and to dust raised by vehicles.

15. *Corydalis solida* (L.) Clairv. subsp. *slivenensis* (Velen.) Hayek

D1: The Olteț Gorges, between Izmona and Mount Negovanu (Păun & Popescu 1971);

D2: Căluș în Pădurea Cerăț - Căluș in the Cerăț Forest, 40°26'06.70"N, 24°04'30.77" E, alt. cca 160 m, 2 April 2009, 19 April 2012, 25 April 2013, 18 April 2016, 21 April 2018, 25 April 2020.

A small number of specimens exposed to destruction during logging activities.

16. *Cyperus serotinus* Rottb. (*Juncellus serotinus* (Rottb.) C. B. Clarke;

D2: Fălcoiu, the dammed area of the river Olteț, 14 August 2014, 18 July 2019, 8 August 2020.

A small number of specimens exposed to destruction from grazing and burning of vegetation.

17. *Delphinium fissum* Waldst. et Kit.

D1: The Olteț Gorges (Păun & Popescu 1971);
D2: The Olteț Gorges, 27 June 2008, 20 July 2009, 25 July 2015, 11 July 2017, 22 June 2018, 14 June 2019, 21 June 2020.

Specimens exposed to picking by tourists and to dust raised by vehicles.

18. *Dianthus spiculifolius* Schur

D1: The Olteț Gorges (Păun & Popescu 1971);
D2: Polovragi in the Olteț Gorges and the Olteț Canyon, 16 June 2008, 29 June 2013, 21 July 2018, 30 July 2019, 21 June 2020.

Specimens exposed to picking by tourists and to dust raised by vehicles.

19. *Dianthus trifasciculatus* subsp. *trifasciculatus* Kit.

D1: Osica de Sus (Păun 1965); Dobrosovleni-Chili (the "Sociologia Militans" Professional Association: 2014).

20. *Dictamnus albus* L.

D1: The Olteț Gorges (Păun & Popescu 1971);
D2: The Olteț Gorges, 16 May 2008, 14 May 2018, 14 June 2019.

Specimens exposed to dust raised by vehicles.

21. *Elatine alsinastrum* L.

D1: In the forest pool between Greci and Cioroiu (Păun 1963);

D2: Balș, the Saru Forest, North of the national highway, East of the forest road, 30 June 2017, 22 July 2018, 5 June 2020.

A small number of specimens exposed to destruction during logging activities.

22. *Elodea canadensis* Michx.

D2: Cioroiu, Fălcoiu in the dammed area of the river Olteț, 3 July 2011, 29 July 20015, 1 July 2017, 19 July 2019, 8 August 2020.

Specimens exposed to drainage, pollution with household organic waste and plastic bottles.

23. *Erythronium dens-canis* L. subsp. *niveum* Baumg.

D1: The Curtișoara Forest, Vulpeni (r. Balș) (Zahariadi 1966); Sârbești, Polovragi (Păun & Popescu 1971);

D2: Tetoiu, at Piscul lui Țâpan (Țâpan Peak), at Cetate, in Chirca, in Vâlceaua Șetrarului, 10 March 2007, 27 February 2014, 15 March 2018, 20 April 2020; Zătreni, in Făget, 5 April 2009; Săscioara, in Crin, Piscul Ioanei (Ioana's Peak), 18 April 2011; Bălcești, in the forest of Aninoasa, 30 March 2014; Călui, in the forest of Cerăt and Petriș Forest, 5 April 2016, 3 April 2017, 21 April 2018, 25 April 2020.

The specimen is picked as an ornamental plant and for superstitions – to bring good luck, more chicks from the brooding hen.

24. *Fimbristylis bisumbellata* (Forssk.) Bubani
D1: the Olteț meadow, North of Balș (Păun 1966).

25. *Fritillaria montana* Hoppe

D1: Romula in the Prapor Forest (r. Balș) (Zahariadi 1966);

D2: The Olteț Gorges, 14 April 2010, 21 April 2017, 8 April 2018, 21 April 2019.

A very small number of specimens, exposed to picking by tourists.

26. *Gnista tinctoria* L. subsp. *oligosperma* (Andrae) Borza (*G. oligosperma* Andrae).

D1: Curmătura Oltețului – the Olteț Pass; Mount Negovanu (Păun & Popescu 1971);

D2: The Olteț Gorges, 21 June 2006, 17 July 2017, 28 July 2019.

Small number of specimens exposed to mechanical action of domestic animals and dust raised by vehicles.

27. *Gladiolus imbricatus* L.

D2: Ciuperceni de Olteț, 29 V 2013; Polovragi in the fenced grasslands, 20 June 2009, 28 June 2019;

The grasslands are exploited by mowing/scything.

28. *Jovibarba heuffelii* (Schott) Á. Löve et D. Löve (*Sempervivum heuffelii* Schott)

D1: At Peștera-Polovraci Cave (Grecescu 1898); The Olteț Gorges (Păun & Popescu 1971); The Olteț Gorges (Păun & Popescu 1975);

D2: Polovragi in The Olteț Gorges and the Olteț Canyon, 25 June 2008, 12 June 2009, 16 July 2012, 20 July 2103, 12 July 2017, 14 June 2019, 21 June 2020.

Specimens exposed to dust raised by vehicles, and the ones in the Grohotiș area are exposed to the mechanical action of the cattle.

29. *Lactuca viminea* (L.) J. Presl et C. Presl.

D2: Tetoiu, in the grassland Dealul Viilor (Vineyard Hill), 4 July 2008; the Olteț Canyon, 29 July 2019; Ciuperceni de Olteț, 31 July 2019.

Specimens exposed to scything and the mechanical action of domestic animals.

30. *Lamium garganicum* L. subsp. *laevigatum* Arcang. (*L. bithynicum* Benth.)

D1: La Peștera Polovraci (Polovraci Cave) on the banks of the Olteț river (Grecescu 1898); Peștera Polovragi (Polovraci Cave) on the banks of the Olteț river (Grințescu 1961); the Olteț Gorges (Păun & Popescu 1971);

D2: Polovragi in the Olteț Gorges, 16 May 2008, 3 June 2016, 2 June 2018, 27 July 2019.

Specimens exposed to the dust raised by vehicles.

31. *Lathyrus sphaericus* Retz.

D2: Irimești in the meadow, 21 June 2015, 18 May 2018, 16 May 2019.

A small number of specimens on the reduced areas of grassland unexploited by scything, but used for grazing. Risk for these areas to be turned into farmland.

32. *Leontopodium alpinum* Cass.

D2: Polovragi in the Olteț Gorges, at Grotă (the Grotto), 24 July 2011, 7 July 2017, 27 June 2019. A very small number of specimens on the rocky areas near the Grohotiș-Grotă.

33. *Leucojum vernum* L.

D1: Between Izmona and Mount Negovanu (Păun & Popescu 1971);

D2: The Olteț Gorges, 14 April 2010, 20 April 2017, 21 April 2019, 7 April 2020.

Specimens exposed to picking by tourists and local people for sale and to the mechanical action of domestic animals and logging equipment.

34. *Limodorum abortivum* (L.) Sw.

D1: between Horezu and Iancu Jianu (Dobricior Forest), between Morunglav and Morunești (Paucă 1972).

D2: Iancu Jianu, 12 June 2018, 9 May 2019, 4 June 2020.

A small number of specimens exposed to logging activities.

35. *Limonium tomentellum* (Boiss.) Kuntze (*Statice tomentella* Boiss.)

D1: The meadow of the Olteț river, between Vlădueni and Greci, Osica de Sus, 44°15'687-700"N, 24°20'356-347"E, alt. cca 92-99 m, 13

June 2010, 15 August 2011, leg. et det. I. Costache et D. Răduțoiu [CRA60.113, 60.133-136], (Răduțoiu 2014);

D2: Between Vlăduțeni and Greci, 5 July 2016, 11 July 2019, 7 August 2020, 44°15'37,09"N, 24°20'42,68"E.

A small number of specimens exposed to intensive grazing.

36. *Linum uninerve* (Rochel) Jav.

D1: The Olteț Gorges (Păun & Popescu 1971);

D2: The Olteț Gorges, 16 May 2008, 2 June 2016, 14 May 2018, 21 June 2020.

Specimens exposed to picking by tourists, to crushing and to dust raised by vehicles.

37. *Marsilea quadrifolia* L.

D1: South-East of the ROSCI0266 area the Olteț Valley at the confluence with the river Olt ("Sociologia Militans" Professional Association: 2014);

D2: Fălcoiu, 12 August 2019.

A very small number of specimens exposed to the competition with other aquatic species and to the pollution of the water with wastes.

38. *Medicago polymorpha* L. (*M hispida* Gaertn.)

D1: Greci in the Olteț meadow, Găvănești in the Geamartalău meadow, Vărtina (Păun 1963); Găvăneasa to Groșșani, Groșșani to Mardare in the Horezu meadow, Horezu, the Horezu meadow, Greci to Osica Mare, Tomeni, the Geamartalău meadow between Băleasa and Găvănești, Găvănești at Balta Borească (Borească Pond), between Greci and Osica de Sus, Greci at Balta Stejarului (Stejarul Pond), between Greci and Tomeni, Horezu (Păun 1966);

D2: North of the Olteț Gorges, 25 June 2010, 2 June 2018; Groșșani, 10 June 2019.

A small number of specimens exposed to intensive grazing.

39. *Mercurialis annua* L.

D2: The Olteț Gorges, 14 May 2018, 28 July 2019.

A small number of specimens exposed to the mechanical action of domestic animals.

40. *Nasturtium officinale* (L.) R. Br.

D1: North Polovragi, The Olteț Gorges, in aqua, 45°12'39,08"N, 23°46'34,79"E, alt. cca 670 m, 2 June 2013, G. Negrean (GN 20.662);

D2: The Olteț Gorges, 22 May 2006; 14 June 2010; North of the Olteț Gorges, 16 July 2016, 12 July 2017, 29 July 2019.

Specimens exposed to the dust raised by vehicles, to draught and the mechanical action of animal herds.

41. *Neottia nidus-avis* (L.) Rich.

D1: Between The Olteț Gorges and Strîmtori (Păun & Popescu 1971);

D2: Tetoiu in the forest of Chirca and the forest at Piscul lui Țâpan (Țâpan Peak) 3 May 2009, 10 May 2011, 18 June 2014, 5 June 2017, 26 May 2019.

Specimens exposed to the mechanical action of animal herds.

42. *Oenanthe aquatica* (L.) Poir

D1: Balș, Greci the pond area (Păun 1966);

D2: Irimești, Tetoiu, Stanomiru, 12 June 2007, 20 July 2017; Tabonu Mic, Osica de Sus, 30 June 2017, 5 June 2020.

Specimens exposed to the mechanical action of animal herds and to the dumping of household waste.

43. *Orchis elegans* Heuff. (*Anacamptis palustris* subsp. *elegans* (Heuff.) R. M. Bateman, Pridgeon & M. W. Chase).

D1: Baldovinești, Buzduc (Păun 1966);

D2: Tetoiu, in the wet grasslands of Dealul Viilor (Vineyard Hill), to Piscul lui Țâpan (Țâpan's Peak), 12 May 2008, 19 June 2013; 26 May 2019.

Specimens exposed to the mechanical action of animal herds.

44. *Orchis ustulata* L.

D1: The Olteț Gorges (Sârbu A. 2007).

D2 Polovragi in the grasslands, the chestnut tree area, 25 June 2008. 14 May 2018, 14 June 2019.

Specimens exposed to picking by tourists and the mechanical action of domestic animals.

45. *Peltaria alliacea* Jacq. (*P. perennis* (Ard.) Markgraf).

D1: The Polovragi Gorges (Nyárády 1953); The Olteț Gorges (Păun & Popescu 1971);

D2: The Olteț Gorges, 25 June 2008, 11 July 2010, 21 July 2014, 5 July 2016, 20 July 2018, 30 July 2019, 21 June 2020.

Specimens exposed to destruction by tourists and to dust raised by vehicles.

46. *Peucedanum rochelianum* Heuff.

D1: Dumbrava Forest between Sîrbești and Poenari (Păun & Popescu 1971);

D2: Sîrbești Forest 6 May 2018, 7 June 2019.

Specimens exposed to the mechanical action of animal herds.

47. *Platanthera bifolia* (L.) Rich.

D1: Lunca Oltețului (Olteț Meadow), in Călui Forest (Păun 1966);

D2: Tetoiu at the edge of Traian Doctorul Forest, 10 June 2006, 5 June 2017, 18 June 2019; Călui Forest, 30 June 2017, 5 June 2020.

Specimens exposed to the mechanical action of animal herds.

48. *Ranunculus constantinopolitanus* (DC)

D'Urv.

D1: Roșieni Forest, Dobrun Forest, the forest between Greci and Cioroi (Păun 1963);

D2: Călui in Cerăt Forest, 16 April 2009, 20 April 2011, 25 April 2020; Fălcoiu, 2 April 2016, 20 April 2017, 5 May 2018; East of Pietriș, 9 May 2019.

Specimens exposed to the mechanical action of domestic animals and the forest logging activities.

49. *Sedum cepaea* L.

D2: Tetoiu, at Pricu lângă Groapă (Pricu by the Pit), 6 July 2008, 10 July 2010, 5 June 2017, 18 June 2019.

Specimens exposed to the mechanical action of domestic animals.

50. *Sedum rubens* L.

D2: Polovragi, in the vicinity of the power dam on the Olteț river, 2 June 2019.

Specimens exposed to the mechanical action of domestic animals and the vehicles carrying gravel.

51. *Seseli rigidum* Waldst. & Kit.

D1: Steep limestone cliffs, rock crevices on the precipices, Polovraci (Grecescu 1898); Polovraci (Todor 1958); the Olteț Gorges (Păun & Popescu 1971);

D2: Polovragi in the Olteț Gorges 9 July 2007, 20 July 2016, 14 August 2018, 30 July 2019.

Specimens exposed to the dust raised by vehicles and those at Grohotiș are exposed to the mechanical action of cattle.

52. *Silene flavescens* Waldst. et Kit.

D1: Polovragi Monastery on the Olteț Valley (Gușuleac 1953); the Olteț Gorges (Păun & Popescu 1971);

D2: Polovragi in the Olteț Gorges, 10 July 2007, 26 June 2008, 13 June 2012, 29 June 2013, 21 July 2018.

Specimens exposed to the dust raised by vehicles.

53. *Silene gallinyi* Rechb. (*Silene trinervia* Sebast. et Mauri).

D1: Balș, on road sides, by the fences, on sandy soil (Gușuleac 1953).

54. *Sorbus graeca* (Spach) Schauer (*S. cretica* Frisch et Rech.).

D1: The Olteț Gorges (Păun & Popescu 1971);

D2: The Olteț Gorges to the East, 25 May 2007, 11 July 2009, 16 June 2016, 30 July 2019.

Few specimens, at high altitudes.

55. *Spiranthes spiralis* (L.) Cheval

D1: The Olteț Gorges (Păun & Popescu 1971);

D2: Polovragi, South-West of the Olteț Gorges, to Baia de Fier (the Iron Mine) 10 September 2007, 18 July 2018.

Populations with a small number of specimens exposed to scything and grazing.

56. *Stipa eriocaulis* Borbás.

D1: The Olteț Gorges, 45°11'44,49"N, 23°46'1159,17"E, alt. cca 676 m, 2 July 2004, (G. Negrean) [bucm 69.625*];

D2: The Olteț Gorges, on chalk rocks, at the Grotă (Grotto) 25 June 2008, 14 July 2010, 3 June 2016, 21 June 2018, 14 June 2019, 21 June 2020.

Specimens exposed to the mechanical action of cattle.

57. *Symphandra wanneri* (Rochel) Heuff.

D1: Polovragi (Ghișă, Gușuleac, Morariu 1964); The Olteț Gorges (Păun & Popescu 1971);

D2: The Olteț Gorges, to the North, 17 July 2007; The Olteț Canyon 20 July 2018, 27 July 2019.

Specimens exposed to the picking by tourists and the dust raised by vehicles.

58. *Taeniantherum caput-medusae* (L.) Nevski.

D2: Tetoiu in the grasslands at Pricu, 27 June 2008, 11 June 2018; Dobriceni, 29 June 2009; Balș, Saru Forest, North of the national highway, edge of wheat field, 44°22'50,92"N, 24°11'43,57"E, alt. cca 191 m, 1 July 2017, 22 July 2018, 11 July 2019.

Specimens exposed to destruction by farming equipment.

59. *Tanacetum macrophyllum* (Waldst. & Kit.) Sch. Bip. (*Crysanthemum macrophyllum* Waldst. & Kit.)

D2: The Olteț Gorges, 25 June 2008, 18 July 2019.

Specimens exposed to the mechanical action of domestic animals.

60. *Teucrium montanum* L.

D1: The Olteț Gorges (Păun & Popescu 1971); the upstream Olteț river (Păun & Popescu 1975);

D2: Polovragi la Grotă (at the Grotto), 2 June 2010, 6 July 2016, 12 July 2017, 18 June 2018, 21 June 2020.

Specimens exposed to the mechanical action of cattle.

61. *Thlaspi alliaceum* L.

D1: Oteteliș (Răduțoiu 2006);

D2: Tetoiu, 15 May 2008, 5 June 2017, 17 May 2019; Polovragi in the Olteț Gorges, 2 May 2010.

Specimens exposed to scything and the mechanical action of domestic animals.

62. *Thlaspi dacicum* subsp. *banaticum* (R. Uechtr.) Jáv (*Th. banaticum* R. Uechtr.).

D2: The Olteț Gorges to the ruins of Cetatea (the Citadel), 20 July 2010, 12 July 2017, 29 July 2019.

Specimens exposed to the picking by tourists and the dust raised by vehicles.

63. *Thymus comosus* Heuff. ex Grisb. et Schenk.

D1: The Olteț Gorges (Păun & Popescu 1971);

D2: The Olteț Gorges and the Olteț Canyon, 14 July 2008, 19 June 2009, 26 June 2012, 11 July 2016, 30 July 2019, 2 August 2020.

Specimens exposed to the mechanical action of domestic animals and the dust raised by vehicles.

64. *Trapa natans* L.

D2: Cioroiu, at the confluence of the rivers Olteț and the Olt, 16 July 2010, 29 June 2017; 8 August 2020.

Specimens exposed to competition with other aquatic species and to pollution of the waters of river Olteț.

65. *Trifolium michelianum* Savi

D1: In the meadow of the river Geamărtăului, at Balgovinești, Petriș, Găvănești, Groșșani (Păun 1963); Petriș, Spineni, Balș (Păun 1957).

66. *Trifolium scabrum* L.

D1: Vlădueni, on the slope between the road going to Piatra Olt and the meadow of the Olt river, as well as at the entrance to Vlădueni from Piatra Olt, on the slopes along the road; Baldovinești, on the slope in the communal pasture land, at the exit to Găvănești (Păun 1957); Vlădueni, Baldovinești to Găvănești, Gubandru, (Păun 1963); the outskirts of Balșului (Păun 1969);

D2: Balș, Saru Forest, North of the national highway, a degraded grassland, 44°22'50,52"N, 24°11'40,90"E, alt. cca 188 m, 1 July 2017, 18 July 2019, 5 June 2020.

Specimens exposed to excessive grazing.

67. *Trifolium squamosum* L.

D2: Saru Forest, the meadow of Pârâul Bârlui (the Bârlui Brook), 44°21'36,30"N, 24°11'20,40"E, alt. cca 140 m, 29 June 2017, 18 July 2019, 5 June 2020.

Specimens exposed to excessive grazing.

68. *Typha minima* Funk

D1: The Olteț Meadow at Mîinești, Osica de Jos (Păun 1963); Oteteliș (Răduțoiu 2006);

D2: Ghioroiu, 26 July 2015; Cioroiu, the drainage channel outside the Olteț river dam, 22 July 2018, 18 July 2019; Dobrețu at the bridge over Bulzești river, 20 July 2019.

Specimens exposed to pollution of the waters of the Olteț river.

69. *Typha shuttleworthii* Koch & Sonder.

D1: Polovragi (Păun & Popescu 1971);

D2: Polovragi, 18 June 2018, 14 June 2019.

Specimens exposed to the mechanical action of domestic animals.

70. *Vallisneria spiralis* L.

D2: Fălcoiu in the dammed area of the Olteț river, 3 July 2011, 29 July 2015, 1 July 2017, 19 July 2019.

Specimens exposed to pollution of the waters of Olteț river.

71. *Veronica bachofenii* Heuff.

D1: Between Izmona and Mount Negovanu (Păun & Popescu 1971); the Olteț Gorges (Păun & Popescu 1975);

D2: The Olteț Gorges, 23 July 2008, 17 July 2017, 30 July 2019.

Specimens exposed to the mechanical action of domestic animals and the dust raised by vehicles

72. *Vicia sparsiflora* Ten.

D1: Vulpeni, to Horezu through the forests (Păun 1963); the forests at Văleni and Horezu (Păun 1964); Vulpeni, in the Pescărești Forest, Cârțișoara Forest, Horezu, in Tăstine Forest, Făgețel Forest at Horezu (Păun 1965); east of Balș, Saru Forest (Negrean:1973).

73. *Vicia tenuissima* (M. Bieb.) Schinz & Thell.

D2: Tetoiu, 16 May 2008, 5 June 2017, 17 May 2019; Osica de Sus NE (Vlădueni) - Greci S, Tabonu Mic, 44°16'07,83"N, 24°20'15,88"E, alt. cca 88 m, 13 July 2016, 9 May 2019, 5 June 2020.

Specimens exposed to excessive grazing.

74. *Zingeria pisidica* (Boiss.) Tutin

D1: Surrounding area of Balș (Păun 1969); Olari, Găvănești, Baldovinești, Pârșcoveni, Pietrișu (Beldie 1972);

D2: Balș, Saru Forest, North of the national highway, East of the forest road, 19 July 2016, 22 July 2018, 17 July 2019.

Specimens exposed to excessive grazing.

A number of 55 taxa were quoted by researchers, in some cases the data being older than 50 years. Out of these we have found a number of 49 taxa in other habitats in the river basin or the places they were mentioned at.

For the 6 taxa which we have not found we searched to identify the causes that generated this situation.

Botrychium matricarii folium has not been found, the possible cause being the modification of the area due to traffic, the falling rocks or the mechanical action of the domestic animals. Species such as *Dianthus*

trifasciculatus subsp. *trifasciculatus*, *Trifolium michelianum*, *Vicia sparsiflora* are affected by the excessive grazing which begins as early as March.

The Olteț Meadow North of Balș is occupied by a ballast machine and large landfills of household waste.

The search for the species *Fimbristylis bisumbellata* in this area did not have positive results. The species *Silene gallinyi* may not have been found in the mentioned type of areadue to the changes caused by farming, grazing or road maintainance.

The 19 taxa with special zoological status which we are further mentioning, are proof of the value of the floristic heritage of the river basin: *Angelica arhangelica*, *Asplenium cuneifolium*, *Athamanta turbith* subsp. *hungarica*, *Cyperus serotinus*, *Elodea canadensis*, *Gladiolus imbricatus*, *Lactuca viminea*, *Lathyrus sphaericus*, *Leontopodium alpinum*, *Mercurialis annua*, *Sedum cepaea*, *Sedum rubens*, *Taeniantherum caput-medusae*, *Tanacetum macrophyllum*, *Thlaspi dacicum* subsp. *banaticum*, *Trapa natans*, *Trifolium squamosum*, *Vallisneria spiralis*, *Vicia tenuissima*.

We have analysed the zoological status in the three National Red Lists (Dihoru Gh. & Dihoru Alexandrina 1994; Oltean & al. 1994; Negrean 2001), The Red Book (Dihoru & Negrean 2009) and the European Red List of Vascular Plants (Bitz M. & al. 2011). We have made a comparative table which shows the status of these rare, endangered and vulnerable taxa in the Basin of the Olteț river.

Table 1. Species from the National Red Lists and the IUCN List

Nr. crt.	Taxoni	Statut LR (Boşcaiu et al., 1994)	Statut LR (Oltean et al., 1994)	Statut LR (Dihoru et al., 1994)	Statut LR (Negrean, 2001)	IUCN Red List Category (Europe) 2011
1.	<i>Anacamptis pyramidalis</i> (L.) Rich.		V/R		V/R	LC
2.	<i>Angelica arhangelică</i> L.	V	V	V	V	
3.	<i>Asplenium cuneifolium</i> Viv.	R		R		
4.	<i>Asplenium lepidum</i> C. Presl subsp. <i>lepidum</i>	R	R	R		DD
5.	<i>Athamanta turbith</i> (L.) Brot. subsp. <i>hungarica</i> (Borbás) Tutin			R	R	
6.	<i>Beckmannia eruciformis</i> (L.) Horst				R	
7.	<i>Botrychium matricariifolium</i> (Retz.) A. Braun ex Koch	I	R	E	E	NT
8.	<i>Campanula grosseckii</i> Heuffel		R	R	R	
9.	<i>Camphorosma monspeliaca</i> L. subsp. <i>monspeliaca</i>	I	V/R	E	V/R	
10.	<i>Centaurea affinis</i> Friv. subsp. <i>affinis</i>		R	R	R	
11.	<i>Centaurea atropurpurea</i> Waldst. & Kit.		R	R	R	
12.	<i>Cephalanthera rubra</i> (L.) L. C. M. Richard		R			
13.	<i>Cephalaria laevigata</i> (Waldst. et Kit.) Schrad.		R	R	R	
14.	<i>Cerastium banaticum</i> (Rochel) Heuffel		R	R	R	LC
15.	<i>Coydalis solida</i> (L.) Clairv. subsp. <i>slivenensis</i> (Velen.) Hayek		R			
16.	<i>Cyperus serotinus</i> Rottb.		R		R	
17.	<i>Delphinium fissum</i> Waldst. & Kit.		R		R	
18.	<i>Dianthus spiculifolius</i> Schur		R	V	R	
19.	<i>Dianthus trifasciculatus</i> subsp. <i>trifasciculatus</i> Kit.		R		R/CR	
20.	<i>Dictamnus albus</i> L.		V/R			
21.	<i>Elatine alsinastrum</i> L.	I	E/R	R (V)		
22.	<i>Elodea canadensis</i> Michx.	R				
23.	<i>Erythronium dens-canis</i> (incl. subsp. <i>niveum</i>)			R		
24.	<i>Fimbristylis bisumbellata</i> (Forssk.) Bubani	I	R	V	V	
25.	<i>Fritillaria montana</i> Hoppe		V/R	V	V	LC
26.	<i>Genista tinctoria</i> L. subsp. <i>oligosperma</i> (Andrae) Borza			nt		
27.	<i>Gladiolus imbricatus</i> L.			R		
28.	<i>Jovibarba heuffelii</i> (Schott) A. & D. Löve		R			DD
29.	<i>Lactuca viminea</i> (L.) J. & C. Presl s		V/R		R	
30.	<i>Lamium garganicum</i> L. subsp. <i>laevigatum</i> Arcang.		R	R	R	LC
31.	<i>Lathyrus sphaericus</i> Retz.	R		R	R	
32.	<i>Leontopodium alpinum</i> Cass.	E	V/R	V	V	
33.	<i>Leucojum vernum</i> L.			R	R	
34.	<i>Limodorum abortivum</i> (L.) Swartz	R	R	V		LC
35.	<i>Limonium tomentellum</i> (Boiss) O. Kuntze		V/R	R	V	LC
36.	<i>Linum uninerve</i> (Rochel) Jav. R		R	V	R	
37.	<i>Marsilea quadrifolia</i> L.	E	V	V	R	
38.	<i>Medicago polymorpha</i> L. (<i>M. hispida</i> Gaertn.)		R	V	R	NT
39.	<i>Mercurialis annua</i> L.			R		

40.	<i>Nasturtium officinale</i> (L.) R. Br.	R				
41.	<i>Neottia nidus-avis</i> (L.) L. C. M. Richard		R			LC
42.	<i>Oenanthe aquatica</i> (L.) Poir	R				
43.	<i>Orchis elegans</i> Heuff.		R		R	
44.	<i>Orchis ustulata</i> L.		R		R	LC
45.	<i>Peltaria alliacea</i> Jacq.		R	R		
46.	<i>Peucedanum rochelianum</i> Heuff.	R	R	R(V)	R	
47.	<i>Platanthera bifolia</i> (L.) Rich.		R			
48.	<i>Ranunculus constantinopolitanus</i> (DC.) D'Urv.		R	V		
49.	<i>Sedum cepaea</i> L.		R	R	R	
50.	<i>Sedum rubens</i> L.			V	R	
51.	<i>Seseli rigidum</i> Waldst. & Kit. s. l.		R			
52.	<i>Silene flavescens</i> Waldst. et Kit.		R	R	R	
53.	<i>Silene gallinyi</i> Rchb.	R				
54.	<i>Sorbus graeca</i> (Spach) Schauer		R			
55.	<i>Spiranthes spiralis</i> (L.) Chevall.		R		E	LC
56.	<i>Stipa eriocalis</i> Borb.		K	R	R	
57.	<i>Symphyandra wanneri</i> (Rochel) Heuffel		R	R		
58.	<i>Taiantherum caput-medusae</i> (L.) Nevski			R		
59.	<i>Tanacetum macrophyllum</i> (Waldst. & Kit.) Schultz Bip.		R		R	
60.	<i>Teucrium montanum</i> L.			R		
61.	<i>Thlaspi alliaceum</i> L.			R		
62.	<i>Thlaspi dacicum</i> Heuff. subsp. <i>banaticum</i> (Uechtr.) Jáv.		R	R		
63.	<i>Thymus comosus</i> Heuff. ex Grisb. et Schenk		A nt	nt	R	
64.	<i>Trapa natans</i> L.		V		R	NT
65.	<i>Trifolium michelianum</i> Savi	R	R	V	R	
66.	<i>Trifolium scabrum</i> L.	R	R	R	R	
67.	<i>Trifolium squamosum</i> L.	R	R	E	R	
68.	<i>Typha minima</i> Funck	R	R	R(V)	R	DD
69.	<i>Typha shuttleworthii</i> Koch & Sonder		V/R	R	R	DD
70.	<i>Vallisneria spiralis</i> L.	V	V/R			
71.	<i>Veronica bachofenii</i> Heuff.		R	R	R	
72.	<i>Vicia sparsiflora</i> Ten.	R	V/R	E		
73.	<i>Vicia tenuissima</i> (M. Bieb.) Schinz & Thell.		K	R	R	
74.	<i>Zingiber pispidica</i> (Boiss.) Tutin		R	V	R	

CONCLUSIONS

The results of our study consist in the identification of 74 rare, endangered and vulnerable taxa from the Basin of the Olteţ river. We are signalling the existence in the area of a number of 68 taxa which prove a great adaptation and resistance to limiting factors.

The status of some species quoted in the bibliographic sources has changed over the years, consequently this presentation is made comparatively, using information from the specialized works and our field data.

The 6 taxa (*Botrychium matricariifolium*, *Dianthus trifasciculatus* subsp. *trifasciculatus*, *Trifolium michelianum*, *Vicia sparsiflora*,

Fimbristylis bisumbellata, *Silene gallinyi*) on which we do not have field data have determined us to consider necessary to reduce limiting factors, a condition that could favour the recovery of their populations.

The floristic inventory of the river basin increases by the 19 taxa (*Angelica arhangelica*, *Asplenium cuneifolium*, *Athamanta turbith* subsp. *hungarica*, *Cyperus serotinus*, *Eloдея canadensis*, *Gladiolus imbricatus*, *Lactuca viminea*, *Lathyrus sphaericus*, *Leontopodium alpinum*, *Mercurialis annua*, *Sedum cepaea*, *Sedum rubens*, *Taeniantherum caput-medusae*, *Tanacetum macrophyllum*, *Thlaspi dacicum* subsp. *banaticum*, *Trapa natans*, *Trifolium squamosum*, *Vallisneria spiralis*, *Vicia tenuissima*) which we have added.

Our study brings about contributions to the knowledge of the present-day situation of the species with special status in the basin area and of the variation of the factors directly or indirectly influencing these species.

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Abbreviations

Distributions:

D1 - data from specialized literature

D2 - personal data

Sozological categories:

V - vulnerable, R - rare, E - endangered, K - insufficiently known, CR - critically endangered with extinction, NT - nearly threatened, LC - least concern, DD - insufficient data.

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