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DISCUSSIONS ON SOME ALIEN SPECIES FROM THE FLORA OF OLTENIA (ROMANIA)

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Abstract

Alien plants from Romania have drawn the attention of researchers since the beginning of this millennium. A first attempt to create an inventory of alien species in the flora of Romania was made about 20 years ago. In less than 10 years, the number of such plants included on the list has increased by about 35%. Annually, contributions are made to the spread of these taxa or new taxa are mentioned for the adventitious flora of Romania. In this paper, the author discusses certain alien taxa that develop on areas located in southern Romania (especially in Oltenia). The following species are analyzed: Echinocystis lobata, Amaranthus palmeri, Azolla filiculoides, Vallisneria spiralis, Asclepias syriaca, Prunus cerasifera, Oenothera glazioviana, Abutilon theophrasti, Datura wrightii, Symphyotrichum lanceolatum, Eleusine indica. Voucher specimens collected in the field are deposited in the Herbarium of the University of Craiova.

Key words*: alien species, comments, new records, Oltenia, Romania.*

INTRODUCTION

Studies related to alien plants/species have been known for more than half a century at the European level and beyond. In Romania, these studies become more frequent after the year 2000. Until that time, the adventive species were included in various floristic overviews and association tables (Țopa, 1962; 1972; Buia & Păun, 1964; Dihoru et al., 1972; 1973; Dobrescu et al., 1962; Morariu, 1963; 1966; Ștefureac et al., 1971; Roman & Roman, 1961; Roman & Babaca, 1966; Roman, 1974; Popescu, 1974; Matacă, 2003; Răduțoiu, 2004; Costache 2005), without paying special attention to them.

The numerous scientific works that have been elaborated since 2005 until the present contain information about this category of plants at the national level (Anastasiu & Negrean, 2005; 2007; Oprea et al., 2005; Georgescu & Luchian, 2023; Sârbu & Oprea, 2011; Anastasiu et al., 2024), as well as from the Oltenia region (Costache & Răduțoiu, 2005; Oprea et al., 2005; Răduțoiu, 2006; 2009; Răduțoiu & Costache, 2008; Răduțoiu & Stan, 2013; Răduțoiu & Popescu, 2020; Răduțoiu & Ștefănescu, 2016; 2022; Răduțoiu & Niculescu, 2023; Răduțoiu et al., 2010; 2023a; 2023b; Răduțoiu, 2011; 2024; Răduțoiu & Băloniu, 2024).

The first attempt to draw up an outline of the adventive species in Romania was made in 2005 (Anastasiu & Negrean, 2005). The data gathered over time supplemented this inventory, so that in 2011 almost 1/3 of the information existing at that time was added, as 671 adventive taxa were inventoried (Sârbu & Oprea, 2011), while their current number reaches 740 taxa (Kalusová V. et al., 2024; Anastasiu et al., 2024).

Some of these species have become invasive, representing a real danger to natural and anthropogenic habitats (Pimentel et al., 2000; McNeely, 2001; Wittenberg & Cock, 2001).

Year by year, the effects of climate changes worsen and affect plants worldwide, shifting plant communities, resulting in changes in flora biodiversity and disturbing their life cycles and function (Sărățeanu et al., 2023). In this context, there are required certain measures for restoring ecosystems as efficient tools for reducing climate related risks (Acatrinei et al., 2024; Durău et al., 2021; Sălceanu et al., 2023; Velea et al., 2021).

The present paper supplies some information related to certain adventive plant species that develop on areas located in Oltenia. The research provides details regarding their phenology and distribution in this part of the country.

MATERIALS AND METHODS

The species mentioned here were identified during numerous fieldtrips conducted in different areas of the Oltenia region (Romania) (Figure 1). GPS coordinates were recorded and photographs were taken for the identified species, some of these recordings being part of the present work. The analysis of the characters required for correct identifications was conducted in the specialized laboratory of the University of Craiova and it was based on the field literature (Tutin et al., 1964-1980; 1993; Ciocârlan, 2009; Sârbu et al., 2013), as well as on the herborized material. The collected specimens are included in the Herbarium of the University of Craiova (CRA). Since certain invasive species develop on increasingly larger surfaces, for the near future it is recommended to use the arial photography technology enabled by drones, in order to have overview images of the surfaces occupied by these plants (Călina et al., 2020).

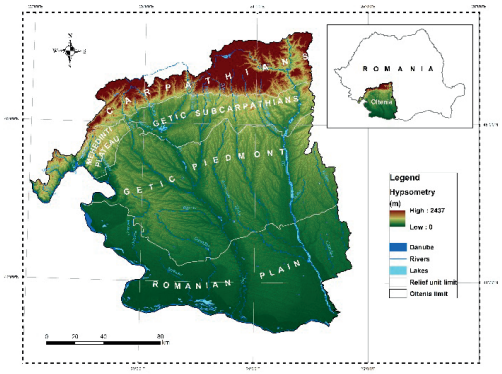

Figure 1. Map of Oltenia and location of the region at the national level (Source: GIS processing after Topographical Map, 1:25,000)

The terminology used in the present paper is consistent with that in the specialized literature that addresses the status of this category of plants (Pyšek et al., 2004).

RESULTS AND DISCUSSIONS

The research conducted during recent years in the Oltenia region (Romania) has also focused on adventive plants, among others, because the field observations made over time revealed that many of them settle in new natural or anthropized territories, where they induce significant changes in the floristic composition of those areas. Certain species for which obvious changes in phenology and distribution have been observed are presented below.

Abutilon theophrasti (*Malvaceae*)

Opinions are divided with respect to the origin of this species (Sîrbu & Oprea, 2011), but whatever that may be, one thing is certain: the species is currently found all over the world, except for Central and South America (Stegink & Spencer, 1988; Warwick & Black, 1988; Pheloung et al., 1999; Ali & Qaiser, 2001; Ciocârlan et al., 2004, etc.). In Romania, it is mentioned as a weed in agricultural crops from almost all regions of the country. In Oltenia, it prefers corn crops, but it has also been observed in sorghum crops, on the territory of Olt County. In the specialized literature, it is mentioned in the plain areas and piedmont hills, which can be explained by the fact that it is a heliophilous and thermophile species; however, the climate changes during recent years have enabled this taxon to advance at the level of the Subcarpathian depression in Oltenia as well (e.g., Pauşeşti-Otăsău settlement in Vâlcea County). Within the settlements situated along the Danube River (e.g., Orlea - Olt County, Bechet and Rastu Vechi - Dolj County) this plant forms abundant populations, while in the Subcarpathian depression its presence takes the form of solitary individuals, in corn crops and vegetable gardens. If the climatic conditions continue the same trend, it is possible that the future representation of the species will be much higher in this area as well. At the level of the Subcarpathian depression, many of the identified specimens do not form flowers and they only develop a weak vegetative apparatus.

New locations: Negoiești, Melinești, Rastu Vechi, Vela, Desnățui, Podari, Palilula, Cetate, Radovan, Coșoveni, Sadova, Valea Stanciului, Gângiova settlements (Dolj County), Mateești and Crețeni settlements (Vâlcea County), Urdari settlement (Gorj County).

Amaranthus palmeri (*Amaranthaceae*)

The species is native to Mexico and to the United States (Brenan, 1961). In Europe, it has been known since the beginning of the 20th century, from the Czech Republic (around 1908) (Pyšek et al., 2004). Subsequent research highlighted not only the presence of this plant in

other European states (Aellen, 1959; Brenan, 1961; Sauer, 1967; Frey, 1974; Carretero, 1990; Mosyakin, 1995; Raus & Raabe, 2006; in Greuter & Raus, 2006; Dimopoulos et al., 2013), but also its success in the competition with other weeds that coexist with it (Sîrbu & Oprea, 2011).

In Romania, it is mentioned for the first time by Costea (1996; 1997) from Constanța and Bucharest railway station. The first herbarium material with this taxon dates from 1981 and was collected by G. Negrean (Sîrbu & Oprea, 2011). Subsequently, it was found in other places in the country (Oprea et al., 2021).

Although this taxon grows in both ruderal and segetal anthropogenic habitats, in Oltenia it is present only near the railways, in sandy, well-aired places, within the plain region. If the evolution of the climatic conditions in southern Romania is taken into account, we can state that the area of this species will increase considerably in the near future.

It is the first mention of this taxon in Olt County - at the railway stations of Drăgănești-Olt (44.153835 °N; 24.546436°E) and Caracal (44.120792°N; 24.364594°E) towns, among the railway tracks (Figure 2) and the second mention in Dolj County - from ruderal places located on the outskirts of Voita settlement (Brabova commune) (44.364750°N; 23.386570°E).

Figure 2. *Amaranthus palmeri* from the Drăgănești-Olt railway station

Asclepias syriaca (*Asclepiadaceae*)

It is a taxon of interest for the EU and its development area within the Oltenia region has recently expanded. The species originates in eastern Canada and in the area extending from the eastern to the central United States of America (Frankton & Mulligan, 1974), from where it also reached Europe (Bagi, 2008; in Botta-Dukát & Balogh, 2008).

It was initially introduced only as cultivated plant, but subsequently become subspontaneous in different regions of Europe (Bagi, 2008; in Botta-Dukát & Balogh, 2008), including Romania, thus being naturalized in numerous European states. The first chorological data concerning the presence of this species in Oltenia are from the Danube Floodplain (Răduțoiu & Stan, 2013). Subsequently, it was found that this taxon began to expand its growing area within the Oltenia Plain, the Getic Piedmont, as well as in the Subcarpathian Depression (Răduțoiu & Băloniu, 2021).

In recent years, it has also been identified in other counties of Oltenia: Vâlcea (Frâncești settlement), Gorj (Cojani - roadside, corn crop and *Agrostis capillaris* meadows (44.992908°N; 23.531448°E), Jupânești), and Dolj (Braloștița, Preajba, Maglavit, Murgași, Teasc, Poiana Mare, and Zăval settlements). Almost all identified specimens abundantly bloom and fructify over a long period of time (from May until October).

Azolla filiculoides (*Azollaceae*)

With respect to the origin of this taxon, the specialized literature mentions it as native to the North, Central and South America, from where it was also introduced to Europe (West, 1953 in Hussner, 2006). Its first mention is from France. Subsequently, it is found in the flora of numerous European states. In Romania, it has been known since the beginning of the 20th century (Prodan, 1939), from the Danube Delta and from the marshes around Bucharest (the Cernica Monastery). To date, it is mentioned from ten counties (Sîrbu & Oprea, 2011; Popescu et al., 2001; Răduțoiu & Boruz, 2001), two of them being located in Oltenia (Dolj and Mehedinți Counties).

Although this plant is included in the Red Book of vascular plants in Romania as a vulnerable species (Dihoru & Negrean, 2009), at the European level, its status is that of an invasive species. The increasing number of places where it has been identified within the counties already mentioned in the field literature and the significant expansion in other Romanian counties (those located in Oltenia implicitly) represent evidences that enable us to state that

this taxon will continue to expand its development area in the near future.

New locations: in the vicinity of the Danube bend, next to Ciupercenii Noi settlement; in a canal within the Danube Floodplain, next to the village of Desa (Dolj County); in the Olt River floodplain, next to Gostavățu settlement (Olt County).

Datura wrightii Regel (*Solanaceae*)

This taxon is native to the southwestern United States of America and Mexico (Verloove, 2008). At the European level, this species is known as an ornamental plant, but in recent years it has been mentioned as having fallen out of cultivation in a growing number of countries, such as Spain (Verloove, 2008), Austria (Essl & Rabitsch, 2002), France, including the island of Corsica (Lambinon, 2006, quoted by Verloove, 2008), Hungary (Király et al., 2009), and Romania (Sîrbu & Oprea, 2011; Oprea et al., 2015; Camen-Comănescu & Mihai, 2022; Niculescu, 2022; Şuşnia, 2022; Camen-Comănescu et al., 2023; Nagodă et al., 2023). It is also mentioned from Tunisia and Australia (https://powo.science.kew.org).

In Oltenia, it is mentioned from the counties of Vâlcea (Râmnicu Vâlcea, Băile Govora, Bălcești, and Nicolae Bălcescu) and Dolj (between Segarcea and Giurgita, Craiova, Cârna and in Măceșu de Sus) (Niculescu, 2022).

It was also identified in Poiana Mare, Sârsca, Sopot, and Potmelțu settlements within Dolj County, as well as in Spineni and Drăgăneşti settlements within Olt County.

Echinocystis lobata (Michx.) Torr. & A. Gray (*Sicyos lobatus* Michx.) (*Cucurbitaceae*)

It is an adventive plant that originates in North America and prefers river floodplain habitats (Foster & Duke, 1990). In Oltenia it is found in the Danube Floodplain (where it forms impenetrable thickets, such as those located near the Port of Rast), as well as in the inland river floodplains (e.g., those of the Jiu and the Olt).

At the beginning of this century, the species in question was mentioned in the Romanian specialized field guides as a rare plant. In recent years, this taxon has undergone a luxuriant development, especially in the lower part of the river floodplains and in the Danube Floodplain. The spread over larger areas is due to the climatic conditions in this part of the country, characterized by higher temperatures over a longer period and by stronger and more frequent winds. These changes allow the plant to form more flowers, fruits and seeds that are easily dispersed by wind. Unless urgent measures are taken, in the near future, this taxon will fully contribute to the deterioration of the Natura 2000 habitat: 92A0 *Salix alba* and *Populus alba* galleries.

New locations: The settlements of Secui (Figure 3), Bădoși, and Bratovoiești (Dolj County).

Figure 3. Fruit-bearing specimen from the Jiu floodplain, near Secui settlement

Eleusine indica (*Poaceae*)

It represents a grass and the data regarding its origin are different. Some authors specify that this plant originates in the tropical and subtropical part of Asia (Ciocârlan, 2009; Oprea, 2005), while others place its origin in Africa (Hildebrand, 2008). It is currently found on all continents, especially in tropical and subtropical areas (Hitchcock, 1950; Britton & Brown, 1970; Jürgens, 1977; Salimath et al., 1995; Clayton et al., 2006).

In Romania, it was reported as a subspontaneous plant from Iași County (Răvăruț & Mititelu, 1960). Subsequently, new information appeared from the north-western Romania (Negrean & Karácsonyi, 1984), Dobrogea region (Costea, 1996), and Muntenia region (Negrean & Constantin, 1999; Oprea et al., 2004).

The first mention of this taxon in the flora of Oltenia is from Dolj County (Răduțoiu & Stan, 2013).

In recent years, an increasing spread has been noticed in this part of Romania. It is important to mention that the identified populations are sparse and cover small surfaces, located near more humid areas.

It was identified in settlements situated in Vâlcea County (Păușești-Otăsău, Pietrari, and

Buneşti), as well as in Olt County (Gostavăţu settlement).

Oenothera glazioviana (*Onagraceae*)

The taxon is currently characterised by a wide global distribution, except for Antarctica, being found either as a cultivated plant for ornamental purposes, or as a subspontaneous plant (Ali & Qaiser, 2001; Weakley, 2007). It is native to North America, from where it has spread almost all over the Earth. In Romania, it is reported from several counties (Morariu in Săvulescu, 1957; Oprea & Sîrbu, 2006; Sîrbu & Oprea, 2008; 2010). In the places mentioned within the specialized literature, the species is present under the form of isolated specimens, this aspect being also observed by the author in the locations where it was found for the present study. In Oltenia, the plant in question prefers sandy, open, and well-aired places, roadsides, ruderal areas, especially on the banks of rivers where the local inhabitants throw vegetable remains from the specimens grown in their own households. The species does not tolerate competition, thus preferring pioneer places where it can develop its entire biological cycle. In phytocoenosis with uniform physiognomy and large coverage, this plant develops only the vegetative apparatus.

In Oltenia, it is the most widespread species of the genus Oenothera. Basically, this taxon can be identified in all settlements.

Examples: the cemetery on the outskirts of Covei settlement; ruderal places, sidewalk, near Calafat municipality Police; in an abandoned vineyard on the outskirts of Poiana Mare settlement; on the side of a road in Ciutura settlement; in xeric meadows with abundant *Cynodon dactylon*, which are located in Salcia, Maglavit, and Georocul Mare settlements (Dolj County), in ruderal places from Păuşeşti-Otăsău settlement (Vâlcea County).

Prunus cerasifera (*Rosaceae*)

This plant has taken full advantage of all the opportunities it has been given in terms of spreading and occupying new territories. According to some authors, this taxon is considered to be indigenous only in South-Eastern Europe (Sîrbu & Oprea, 2011), while on the rest of the continent it is cultivated and locally naturalized (Austria, Great Britain, Denmark, France, Germany, Hungary, Italy, and Romania). About a quarter of a century ago, this plant was subspontaneous in Oltenia, being found under the form of isolated specimens, while its current populations are abundant, especially in the plain region of Oltenia. This can be explained either by the frequent reproduction by generative means, which is rather often noticed in the field, and by the appearance of root suckers, or by the resistance of this plant to frost and drought (Sonea, 1957), which are quite common phenomena in the southern part of Oltenia.

In order to understand the representation of this taxon in a certain region of Oltenia, it is enough to notice the vernal aspect, when this plant is in bloom.

The current climatic conditions in this part of Romania, associated with the abandonment of certain ruderal and segetal lands, will enable this plant to increasingly invade the anthropized and semi-natural habitats in the near future. The fruit-growers represent the only researchers who can benefit from the presence of large populations of *Prunus cerasifera*, as they use cherry plum specimens as rootstocks for plum, peach and apricot trees (Buia in Săvulescu, 1956; Sonea, 1957).

The fight against this species is difficult in Oltenia, because of the multiple agents that led to its spread: humans, but also animals, either domestic (especially sheep and goats) or wild (deer, wild boar, and various bird species).

New locations: Calafat Customs, Breasta, the outskirts of Leu settlement, Castranova, Bordei train stop located near Craiova, Filiaşi and Segarcea railway stations, the settlements of Prunet, Tatomireşti, Obedin, Scăeşti, Sfârcea, Mischi, Goieşti, Negoieşti, Melineşti, Drănic, Ghidici, Băileşti, Vela, Pietroaia, the edge of Urdinița cemetery, between Malu Mare and Ghindeni, between Bucovăț and Lazu, Terpezița, Brabova, Răchita de Sus, Carpen, Lăcrița, Vârvor, Zănoaga, Bulzeşti, Coşoveni, Verbicioara, Verbița, Podari, Leamna de Jos, Leamna de Sus, Motoci, Murgaşi, Picăturile, Dobreşti, Drănic, Maglavit, Pieleşti, Bratovoieşti, Criva, Dobromira, Ciutura, Țuglui, Crovna, Fratoștița, Râșnic, Cârcea, Almăj, Rovine, Teslui, Cornița, Ștefănel, Gogoşu, Robăneşti, Drgăgoteşti, Lipovu, Roşieni, Țiu, Întorsura, Goicea, Drăgoaia, Lişteava, Gângiova, Ostroveni, Piscu Vechi, Poiana Mare, Plenița, Moțăței, Seaca de Câmp, Valea

Stanciului, Târburești, Comoșteni, between Daneți and Dobrotești (Dolj County), the Port of Corabia, Orlea, Caracal, Slatina railway station, the outskirts of Balș town and those of Brănet, Brâncoveni, Bobicești, Piatra Olt, Oltișoru, and Bârza settlements (Olt County), Bumbești-Pițic, on the banks of the Galbenu river, Novaci, (Gorj County), Burila Mare settlement (Mehedinți County), Drăgășani, Păușești-Otăsău, Pesceana, Tomșani, Slătioara, Gorunești, Stroești, Păsculești, Fârtățești, Giulești, Crețeni, Gușoeni, Glăvile, Amărăști, and Călimănești-Căciulata (Vâlcea County).

Symphyotrichum lanceolatum (*Asteraceae*)
It is known as a native species from North America (Britton & Brown, 1970) and it was subsequently introduced into Europe as a plant cultivated for ornamental purposes and then naturalized (Hoffmann 1996, Wittenberg, 2005, Fehér, 2008).
The first report of this taxon in Oltenia is from Mehedinți County, namely from the town of Orșova (Morariu et al., 1969). More recently, it has been also indicated in the Habitat 3130 - Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoëto-Nanojuncetea (CLAS. PAL.: 22.12 x (22.31 and 22.32), from the island of Copanița (Dolj County) (Niculescu et al., 2023), from phytocoenosis belonging to *Cyperetum flavescenti* Koch ex. Aichinger 1933, *Juncetum bufonii* Felfoldi 1942 associations.
New locations: The Danube Floodplain, near the Ports of Rast and Bechet, in places with sparse vegetation, on the edges of wet scrub areas and in ditches located near roads in poplar forests.

Vallisneria spiralis (*Hydrocharitaceae*)
This species holds a controversial status in the flora of Romania. The *Flora Europaea* (Dandy, in Tutin et al., 1980) specifies that this taxon is native to Romania, whereas most of the Romanian specialized literature mentions it as an adventive plant (Beldie, 1979; Ciocârlan, 2000; 2009; Oprea, 2005; Chifu et al., 2006; Sârbu et al., 2013).
From Oltenia, it is known from a small number of settlements; thus, it is mentioned from Rast and Bistreț, without field identification or herbarium material (Popescu et al., 2001), Strâmba Brook (Ro: *Gârla Strâmbă*) from Bistrețu village - Mehedinți County (Țopa in Săvulescu, 1966, Oprea, 2005), the Iron Gates I and II (Liţescu et al., 2003), the Preajba-Făcăi Lacustrine Complex (Răduțoiu & Răduțoiu, 2024, Răduțoiu, 2024).
The development of almost monodominant populations of this species in an increasing number of areas located in Oltenia can also be triggered by the augmented temperatures in this part of Romania, as it is known that this taxon optimally develops at temperatures higher than 20°C (Hutorowicz, 2006).
New locations: in a canal located within the Danube Floodplain, in the area of Desa settlement.

CONCLUSIONS

The analysis of the species tackled in this paper reveals that most of them prefer regions with higher temperatures, these climatic conditions being found in the southern part of Romania. The combination of climate changes in recent years with the zoo-anthropogenic activities conducted in the habitats where these plants grow has led to obvious changes both in terms of anthesis and of covered area, some of them becoming invasive. Information regarding the species in the latter category is particularly important, as it may contribute to their future management.

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