

## NEW CONTRIBUTION TO THE STUDY OF ALIEN FLORA IN ROMANIA

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**Abstract:** In this paper, a number of seventeen alien plant species are presented, one of them being now for the first time reported in Romania (*Sedum sarmentosum* Bunge). Some species are mentioned for the first time in the flora of Moldavia (*Aster novae-angliae* L., *Cenchrus incertus* M. A. Curtis, *Chenopodium pumilio* R. Br., *Fraxinus americana* L., *Lindernia dubia* (L.) Pennell, *Petunia* × *atkinsiana* D. Don, *Solidago gigantea* Aiton, *Tagetes erecta* L.) or Transylvania (*Kochia sieversiana* (Pallas) C. A. Mey.), and some are reported from new localities (seven species). For each species, there are presented general data on the geographical origin, its distribution in Europe and worldwide, as well as its invasion history and current distribution in Romania. Some of these species manifest a remarkable spreading tendency, expanding their invasion area in Romania. Voucher specimens were deposited in the Herbarium of University of Agricultural Sciences and Veterinary Medicine Iași (IASI).

**Keywords:** alien plants, flora, new records, Romania

### Introduction

According to ANASTASIU & NEGREAN (2005), the alien flora of Romania includes 435 species, of which 88.3% are neophytes and 11.7% are archaeophytes. Therefore, species of alien origin currently represent ca 13% of the total flora of the country, which was estimated by CIOCĂRLAN (2009) to 3335 species. In the last years there is a continuous enrichment of Romania's flora with new alien plant species [ANASTASIU & NEGREAN, 2008; OPREA & SÎRBU, 2010; SÎRBU & OPREA, 2011].

Some of these alien species can become invasive, threatening natural and agricultural ecosystems, causing damages to the economy and human health [PIMENTEL & al. 2000; McNEELY, 2001; WITTENBERG & COCK, 2001]. All signatories to the *Convention on Biological Diversity*, including Romania, are obliged to prevent the introduction of, control, or eradicate those alien species which threaten ecosystems, habitats or species [WITTENBERG, 2005]. Reporting those newly alien species arrived in Romania's flora, and monitoring the spreading of those previously reported, can be useful tools in establishing measures in order to eradicate them before become invasive and harmful.

In the present paper we report a new alien species for the flora of Romania, as well as other new or rare alien species for the flora of Moldavia and Transylvania, some of which have an invasive character.

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**Materials and methods**

All the species in this paper were recorded during our recent field works on alien plants, in the historical provinces Moldavia and Transylvania (Romania). The geographic coordinates were recorded using eTrex Legend HCx GPS system. Voucher specimens were deposited in the Herbarium of University of Agricultural Sciences and Veterinary Medicine Iași (IASI). Morphological characters of species were analyzed on the specimens collected from the field and compared with the data from relevant literature sources [TUTIN & al. 1964-1980, 1993; KUNJUN & OHBA, 2001; CIOCĂRLAN, 2009; OHBA, 2009]. The taxonomy and nomenclature of species follow *Flora Europaea* [TUTIN & al. 1964-1980, 1993], except *Sedum sarmentosum* Bunge [KUNJUN & OHBA, 2001; OHBA, 2009]. Terminology and definitions recommended by RICHARDSON & al. (2000) and PYŠEK & al. (2004) were used for the status of alien plants.

**Results & discussions**

During our recent field investigations, focused on alien plants in Moldavia and Transylvania (2010), we recorded a new alien plant species for the flora of Romania (*Sedum sarmentosum* Bunge), several new alien species for the flora of Moldavia (e. g. *Aster novae-angliae* L., *Cenchrus incertus* M. A. Curtis, *Chenopodium pumilio* R. Br., *Fraxinus americana* L., *Lindernia dubia* (L.) Pennell, *Petunia* × *atkinsiana* D. Don, *Solidago gigantea* Aiton, *Tagetes erecta* L.) or Transylvania (e. g. *Kochia sieversiana* (Pallas) C. A. Mey.), and other species identified in new localities, some of them with an invasive character (e. g. *Brachyactis ciliata* (Ledeb.) Ledeb., *Eleusine indica* (L.) Gaertn., *Euphorbia dentata* Michx., *Grindelia squarrosa* (Pursh) Dunal., *Impatiens parviflora* DC., *Sicyos angulatus* L.).

**a) New records in the alien flora of Romania*****Sedum sarmentosum* Bunge**

A species native to Eastern Asia (China) [KUNJUN & OHBA, 2001], cultivated for ornamental purposes and naturalized in Japan [MÜLLER & OKUDA, 1998], North America [OHBA, 2009], as well as in numerous European countries, such as: Spain [CASTROVIEJO, 1995], Montenegro [STEŠEVIĆ & al. 2008], Slovenia [JOGAN & al. 1995], Czech Republic [PYŠEK & al. 2002], Switzerland [WITTEMBERG, 2005], Belgium [VERLOOVE, 2006], Hungary (casual) [BALOGH & al. 2004], Croatia [ŠEGULJA & REGULA BEVILACQUA, 1994], Austria [FISCHER & al. 2008], Germany, Italy and Slovakia [MARHOLD, 2011].

In Romania, this species was recently found in Mediaș town (Sibiu county), on a platform of a concrete channel, along the Henri Coandă street (46°09'59.32"N; 24°21'37.50"E; leg. Eliáš P. jun., Oprea A., Sîrbu C., Ferus P., 2011 August 18) (Fig. 1). On that place, this species grow abundantly, forming mono-specific and compact clumps, presumably by vegetative reproduction.

We do not know the introduction date of this species into Romania. None of the floristic papers in Romania, either older [BAUMGARTEN, 1816; SCHUR, 1866; FUSS, 1866; SIMONKAI, 1886; KANITZ, 1879-1881; BRÂNDZĂ, 1879-1883; GRECESCU,

1898; PRODAN, 1939; BORZA, 1947], or more recent [RĂVĂRUȚ, in SĂVULESCU, 1956; BELDIE, 1977; OPREA, 2005; CIOCĂRLAN, 2009] does not mention it. Its morphological characters, based on the study of herbarium specimens, in agreement with the data from relevant literature sources [KUNJUN & OHBA, 2001; OHBA, 2009], are presented below.

*S. sarmentosum* is a perennial herb, glabrous, with stems creeping and ascending, branched, rooting at nodes, 10-25 cm; leaves 3-verticillate, sessile; blade pale yellowish-green, 10-25 × 4-6 mm, base abruptly narrowed, spurred, apex subacute; cyme corymbiform, bracts similar to leaves, smaller; flowers ± sessile, 5-merous; sepals lanceolate to oblong, 3.5-5 mm, green, apex acute to obtuse; petals yellow, lanceolate to oblong, 5-8 mm, apex long-mucronate; stamens 10, shorter than petals; carpels 5, distinct, oblong, 5-6 mm. Fruit polyfollicle.

*S. sarmentosum* is a polyploid species ( $2n = ca\ 72$ ) [OHBA, 2009], blooming in May-June and fruiting in August [KUNJUN & OHBA, 2001; FISCHER & al. 2008]. The actively clonal reproduction allows it to maintain populations even when no seeds are formed (Croatia) [ŠEGULJA & REGULA BEVILACQUA, 1994]. Into the natural range, this species prefers rocky and shaded fields, up to the altitude of 1600 m [KUNJUN & OHBA, 2001]. In North America it is reported on dry rocks, between 0 and 500 m altitudes [OHBA, 2009]. In Croatia, it grows on sandy or rocky anthropogenic grounds and on old walls, where it can form almost pure stands [ŠEGULJA & REGULA BEVILACQUA, 1994]. In addition to its use as an ornamental plant, *S. sarmentosum* is indicated in folk medicine, e.g. in chronic viral hepatitis [HE & al. 1998], or as a vegetable [KUNJUN & OHBA, 2001].

#### b) New records in the alien flora of Moldavia

##### *Aster novae-angliae* L. (*Symphyotrichum novae-angliae* (L.) G. L. Nesom)

It is a species native to North America [FEHÉR, 2008], introduced in Europe as an ornamental plant, and naturalized in many regions [TAMAMSCHJAN, 1999/1959; YEO, in TUTIN & al. 1976]. In Romania, it is also cultivated in gardens [MORARIU & NYÁRÁDY, in SĂVULESCU, 1964], from where it sometimes escapes and spreads freely: Banat [ARVAT, 1977] and Muntenia [NEGREAN, 1972]. It was also found in Moldavia, in Iași city, on a vacant land, near the railway, ca 500 m, westward of the railway station (47°10'13.16"N; 27°33'36.60"E; leg. Sirbu C., 2010 October 12), where it grows into a phytocoenosis dominated by *Elymus repens*.

##### *Cenchrus incertus* M. A. Curtis

Species native to North and Central America [HITCHCOCK, 1950; SZIGETVÁRI, 2008], and naturalized in Southern, Central and Eastern Europe [CLAYTON, in TUTIN & al. 1980; SZIGETVÁRI, 2008; DAISIE, 2011]. In Romania it was relatively recent reported [CIOCĂRLAN & al. 1991], along the Black Sea littoral, in Vama Veche and subsequently in other localities from Dobrudja [CIOCĂRLAN, 2000; CIOCĂRLAN & al. 2004; OPREA, 2005]. In Moldavia, a small population of *C. incertus* has been identified at Galați railway station (45°26'38.09"N; 28°03'41.94"E; leg. Sirbu C., Oprea A., Eliáš P. jun., Ferus P., 2011 August 20). It seems to be now a species on the way of spreading in Romania.

*Chenopodium pumilio* R. Br.

This is a species originating in tropical regions, unintentionally introduced in Europe by importing wool from Australia [AELLEN, 1979, cited by CHYTRY, 1993]. In Romania, it was first mentioned by CHYTRY (1993) (leg. 1989) and COSTEA (1994), from the Danube Delta, on sandy river banks influenced by the human activities. In other areas it also grows on ruderal grounds, railway stations, and river banks [CHYTRY, 1993]. According to CHYTRY (1993), due to high capacity for dissemination and long viability of seeds, the species is expected to further spread in South-Eastern Europe. Indeed, we recently found it in other localities from the Danube Delta (e. g. Crişan, Sulina, Maliuc and Caraorman), but also in Southern part of Moldavia, on the left bank of the Danube river, in Galaţi town (between 45°25'06.11"N; 28°02'07.82"E and 45°26'11.75"N; 28°04'43.43"E; leg. Sîrbu C., Oprea A.; 2011 August 02), and at Cotul Pisicii (45°25'10.27"N; 28°11'17.09"E; leg. Sîrbu C., Oprea A., Eliáš P. jun., Ferus P.; 2011 August 20).

*Fraxinus americana* L.

This is one of the most common ash species in North America [GRIFFITH, 1991], introduced in Europe at 1724 [CSISZÁR & BARTHA, 2008], and now occasionally reported as sub-spontaneous tree in France, Bulgaria, Hungary and Lithuania [DAISIE, 2011]. In Romania it is cultivated as isolated trees in parks, along the streets and in forest plantations [DUMITRIU-TĂTĂRANU, 1960; MORARIU, in SĂVULESCU, 1961]. As a sub-spontaneous plant, this ash species was previously reported in Dobrudja, at Mamaia (on the Tăbăcărie lakesides) [FĂGĂRAŞ & al. 2008]. We also have identified this species, as sub-spontaneous, in Galaţi county, at Tirighina-Barboşi railway yard (45°24'07.13"N; 27°58'14.96"E; leg. Sîrbu C., Oprea A., 2011 August 02), Şendreni (near the road; 45°25'12.26"N; 27°53'48.45"E; leg. Sîrbu C., Oprea A., 2011 August 02) and Galaţi (near the railway station; 45°26'26.68"N; 28°04'00.85"E; leg. Sîrbu C., Oprea A., Eliáš P. jun., Ferus P., 2011 August 20).

*Lindernia dubia* (L.) Pennell

Species originating in North and South America, naturalized in a large part of South-Western Europe [WEBB & PHILCOX, IN TUTIN & al. 1972]. In Romania it was previously reported by CIOCĂRLAN & COSTEA (1994), on wet alluvia from the Danube Delta – Sacalin Island, towards the Sfântul Gheorghe distributary channel, and, subsequently, it was also mentioned from Chilia Veche and Periprava [CIOCĂRLAN, 1994, 2009]. We found this species along the Sulina distributary channel, at Mila 28 (West of Maliuc) (45°10'19.63"N; 29°02'56.96"E; leg. Sîrbu C., Oprea A., 2011 August 03), at Crişan (45°10'32.71"N; 29°23'06.52"E; leg. Oprea A., 2011 September 15), as well as in the city of Galaţi, on the left bank of Danube river (45°25'33.22"N; 28°02'55.32"E; leg. Sîrbu C., Oprea A., 2011 August 02).

*Petunia* × *atkinsiana* D. Don (= *P. axillaris* (Lam.) Britton, Sterns et Pogg. × *P. integrifolia* (Hook.) Schinz & Thell.; *P. hybrida* Vilm.)

Ornamental plant of hybrid origin, which was obtained from crosses between *P. axillaris* and *P. integrifolia*, in the second half of the nineteenth century [GUYOT, 1961]. Occasionally, it was reported as a refugee from the gardens in some countries from Central, Western and Southern Europe [DAISIE, 2011]. In Romania, it was introduced, probably,

towards the end of the nineteenth century, now being widely cultivated as an ornamental plant. It was occasionally reported as a plant escaped from gardens, in several localities from Transylvania [BORZA, 1959] and Dobruđja [HOREANU, 1975; FĂGĂRAȘ & al. 2008]. We also found it on vacant lands or roadsides, in many localities in Southern Moldavia (Galați county): Fârțânești (45°47'06.06"N; 27°58'54.76"E; leg. Sîrbu C., Oprea A., 2011 July 31), Tg. Bujor (45°52'27.05"N; 27°55'33.23"E; leg. Sîrbu C., Oprea A., 2011 July 31), Galați (45°24'46.41"N; 28°01'46.88"E; leg. Sîrbu C., Oprea A., 2011 August 02), Hanu Conachi (45°34'54.15"N; 28°35'42.14"E; leg. Sîrbu C., Oprea A., 2011 August 02), Costache Negri (45°42'02.03"N; 27°43'00.15"E; leg. Sîrbu C., Oprea A., 2011 August 02), Cudalbi (45°46'16.16"N; 27°41'11.46"E; leg. Sîrbu C., Oprea A., 2011 August 02), Pechea (45°37'20.24"N; 27°48'00.82"E; leg. Sîrbu C., Oprea A., 2011 August 02).

***Solidago gigantea*** Aiton (*S. serotina* Aiton; *S. gigantea* subsp. *serotina* (Kuntze) McNeill)

Species native to North America (United States and Canada) [BRITTON & BROWN, 1970], from where it was introduced in Europe, as an ornamental plant, in 1758 (London) [JAKOBS & al. 2004; WITTENBERG, 2005; WEBER & JAKOBS, 2005]. Although the first naturalized populations in Europe were recorded shortly after its introduction, the plant has been spread throughout the continent mainly after the year of 1850 [WEBER & JAKOBS, 2005]. Nowadays, it is widespread in almost all European countries, between 42°N and 63°N [MCNEILL, in TUTIN & al. 1976; WEBER & JAKOBS, 2005]. In Romania, according to MORARIU & NYÁRÁDY, in SĂVULESCU (1964), *S. gigantea* was firstly published by SCHUR (1866), on the river meadows between Avrig and Bradu (Transylvania). This is, however, an erroneous information, because the species indicated by SCHUR (1866) is *S. canadensis*, and not *S. gigantea*. Therefore, probably, the first indication of this species in Romania remains that made by BORBAS (1886), cited by MORARIU & NYÁRÁDY, in SĂVULESCU (1964), which mentioned *S. gigantea* from Lipova (Arad county). In the last century the species has also been mentioned on the Danube river meadows and Danube Delta [PRODAN, 1935-1939, 1939], as well as from Transylvania, Maramureș, Banat and Oltenia [BORZA, 1947; MORARIU & NYÁRÁDY, in SĂVULESCU, 1964; ȘTEFUREAC & al. 1971; ROMAN, 1974; DIHORU & al. 1968-1970]. In Moldavia, it has been previously known only from gardens. As a sub-spontaneous plant, it was recently found in the following localities: Fundu Moldovei (on the left bank of the Moldova river; leg. Sîrbu C., 2006 July 25), between Pojorâta and Sadova (the left bank of the Moldavia river; 47°32'01.79"N; 25°29'32.36"E; leg. Sîrbu C., 2011 September 01) (Suceava county), as well as in Răducăneni (the left bank of the Bohotin river; 46°57'37.32"N; 27°56'34.69"E; leg. Sîrbu C., Oprea A., 2011 September 11) (Iași county). Currently, we can state that in Romania, this species is quite common (invasive) on the river meadows in Transylvania, Crișana, Maramureș, and Banat, but it is still rather rare in the other provinces of the country.

***Tagetes erecta*** L.

Species native to Central America (Mexico), from where it was introduced into Central Europe, in the 1573 [NYÁRÁDY, in SĂVULESCU, 1964; GUYOT, 1961], for ornamental use. Today, it is reported as a casual alien plant from many European countries [GUYOT, 1961; ESSL & RABITSCH, 2002; MOSYAKIN & YAVORSKA, 2002;

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PYŠEK & al. 2002; BALOGH & al. 2004; VERLOOVE, 2006; DAISIE, 2011]. In Romania, it was listed as a garden plant, starting from the 19<sup>th</sup> century [SZABO, 1841; PORCIUS, 1885; BRÂNDZĂ, 1879-1883; SIMONKAI, 1886; GRECESCU, 1898]. According to DIACONESCU (1961) and ANASTASIU (1994), it is naturalized in Bucharest (in the Botanical Garden). We have found it as a sub-spontaneous plant (escaped from gardens) in Horlești-Rediu, on a ruderal place (leg. Sîrbu C., 2006 September 03) (Iași county), Fundu Moldovei (on the left bank of the Moldova river; leg. Sîrbu C., 2006 July 25) (Suceava county), as well as at Crișan (Danube Delta) (45°10'25.41"N; 29°23'33.67"E; leg. Oprea A., 2011 September 15).

### c) New record in the alien flora of Transylvania

*Kochia sieversiana* (Pallas) C. A. Mey. (*Bassia sieversiana* (Pallas) W. A. Weber; *K. scoparia* var. *sieversiana* Graebn.; *K. densiflora* Turcz. in DC.; *K. scoparia* var. *densiflora* Moq. in DC.).

A species originating in Central Asia and Siberia [ILJIN, 1970/1936], first time reported in Romania, from Muntenia, by CIOCÂRLAN (1991). Subsequently, it was identified in Dobruđja [MITITELU & al. 1992; CIOCÂRLAN, 1994], and Moldavia [OPREA, 1997a, 1998; OPREA & al. 1997; SÎRBU & OPREA, 1998; COROI & COROI A.M., 1999; COROI, 2001; COROI A.M., 2001; OPREA, 2005], but its area of invasion in Romania is certainly wider and in a continuous expansion. It is quite similar to *K. scoparia* (of which it is distinguished by the numerous whitish hairs, located under flowers), reason why, in many cases, it may have been erroneously identified, as *K. scoparia*. Recently it was also found in Transylvania, in Sibiu city, on a ruderal ground, near the railway station (45°47'32.25"N; 24°10'18.90"E; leg. Eliáš P. jun., Ferus P., Oprea A., Sîrbu C., 2011 August 19).

### d) Alien species found in new localities

*Brachyactis ciliata* (Ledeb.) Ledeb. (*Erigeron ciliatus* Ledeb.; *Symphotrichum ciliatum* (Ledeb.) G. L. Nesom)

It is an Asian species [BOTSCHANTZEV, 1999/1959], known as alien plant in Poland [BRÓŚ & PODGÓRSKA, 2005], R. of Moldova [DAISIE, 2011] and Romania. It was found in Eastern Romania (Moldavia), in the year 1967 [VIȚĂLARIU, 1971; POP & VIȚĂLARIU, 1971]. Subsequently, it has spread fairly quickly in this province, as well as in Muntenia and Dobruđja (including the Danube Delta) [OPREA, 2005]. In Transylvania, this plant was previously reported only from Cluj-Napoca [FILIPAȘ & CRISTEA, 2006]. We also found it at Gheorgheni (Harghita county) (on a ruderal ground, near the railway station; 46°43'10.68"N; 25°34'21.71"E; leg. Sîrbu C., Eliáš P. jun., Ferus P., Oprea A., 2011 August 18), as well as in Sibiu (Sibiu county), near the railway station (45°47'14.51"N; 24°10'46.95"E; leg. Sîrbu C., Oprea A., Eliáš P. jun., Ferus P., 2011 August 19).

*Eleusine indica* (L.) Gaertn.

Species originating in tropical and subtropical Asia [CIOCÂRLAN, 2009] or Africa [HILDEBRAND, 2008], now widespread throughout the world, mainly in regions with warmer climates [HITCHCOCK, 1950; BRITTON & BROWN, 1970; JÜRGENS,

1977; SALIMATH & al. 1995; CLAYTON & al. 2006]. It is reported as a naturalized alien plant in Southern Europe [HANSEN, in TUTIN & al. 1980] and as casual in the central and western regions [LE CLERCH, 1973; HANSEN, in TUTIN & al. 1980]. The first report of this species in Romania (as a sub-spontaneous plant) was from Iași, where it seems to have arrived accidentally (in 1957) with seeds of *Lolium perenne* bought from the market, and used for lawns in the surroundings of the Agronomical Institute [RĂVĂRUȚ & MITITELU, 1960]. Subsequently, *E. indica* has not been confirmed as a sub-spontaneous species in Iași. Instead, it was reported from Crișana (North-Western Romania) [NEGREAN & KARÁCSONYI, 1984], Dobrudja [COSTEA, 1996], as well as from Muntenia [NEGREAN & CONSTANTIN, 1999; OPREA & al. 2004]. Recently it has been found in Galați railway station (45°26'41.69"N; 28°03'40.48"E; leg. Sîrbu C., 2011 July 20), in the second locality in Moldavia. *E. indica* is seen in general as a common and harmful weed of crops in warmer regions of the world [HITCHCOCK, 1950; JÜRGENS, 1977]. In Romania, although it was mentioned only in a few localities so far, the fact that his presence was noted in so distant regions (Maramureș, Moldavia, Dobrudja, Muntenia) may be an alarm signal on its invasive capacity, particularly in that regions with high temperature and light resources.

***Euphorbia dentata* Michx.**

Species of North American origin, naturalized in Ukraine [MOSYAKIN & YAVORSKA, 2002], R. of Moldova [MÎRZA & ȘABANOVA, 1992], Belgium, Italy [DAISIE, 2011], as well as in Eastern Asia [MA & LIU, 2003; LEE & al. 2009]. In Romania, it was previously known from Socola-Iași (including var. *cuphosperma* Engelm.) [OPREA, 1997b] and from Buzău railway stations [SÎRBU, 2005]. To these, we add now two other localities in Southern Moldavia: Tecuci – Southern railway station (45°25'04.23"N; 27°25'23.42"E; leg. Sîrbu & Oprea 2011, 2011 August 01) and Movileni - railway yard (45°24'17.50"N; 27°57'26.80"E; leg. Sîrbu & Oprea, 2011 August 02).

***Grindelia squarrosa* (Pursh) Dunal. (*Donia squarrosa* Pursh)**

Species native to North America [BRITTON & BROWN, 1970], accidentally introduced to Europe in the first half of last century (Ukraine) [TAMAMSCHJAN, 1999/1959; PROTOPOPOVA & al. 2006]. It is now known as an invasive plant in Ukraine and R. of Moldova [MÎRZA & al. 1987; MOSYAKIN & YAVORSKA, 2002; PROTOPOPOVA & al. 2006], naturalized in Central and Eastern Russia [TAMAMSCHJAN, 1999/1959; HANSEN, in TUTIN & al. 1976], with a casual status in other european countries [GUDZINSKAS, 1997; KUKK, 1999; PYŠEK & al. 2002; REYNOLDS, 2002; GREUTER, 2006-2009]. In Romania, it was previously mentioned from Iași at Socola railway station [SÎRBU & OPREA, 1998] and Galați [SÎRBU & OPREA, 2008]. Recently, it was also found at Movileni railway yard (between 45°24'19.33"N; 27°57'13.27"E and 45°24'26.89"N; 27°56'36.58; leg. Sîrbu & Oprea, 2011 August 02), as well as at Tirighina-Barboși railway yard (45°24'20.50"N; 27°59'31.95; leg. Sîrbu & Oprea, 2011 August 02) (Galați county).

***Impatiens parviflora* DC.**

Species originating in the mountainous regions of central Asia [POBEDIMOVA, 1974/1949], invasive in Europe, except the Mediterranean region [MOORE, in TUTIN & al.

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1968; WITTENBERG, 2005]. In Romania, it was mentioned initially by PRODAN (1939), as an ornamental plant, sometimes escaped from gardens (without location). It is now quite widespread in Transylvania [DRĂGULESCU, 2003; CIOCĂRLAN, 2006], Crișana [POP & al. 1968; RESMERIȚĂ, 1970], Maramureș [RESMERIȚĂ & al. 1975-1987, cited by OPREA, 2005; OPREA & SÎRBU, 2006], Banat [GOGA, 1980; PĂTROESCU & al. 2007], and Moldavia [OPREA & al. 1997; SÎRBU & OPREA, 1998; DARABAN, 2007]. In this paper, we mention it from the following new localities: Borșa (Maramureș county) (leg. Sîrbu, 2006 August 23), the chalet Bâlea-Râu (leg. Sîrbu C., Oprea A., 2009 August 17), Cârțișoara at Glăjărie (leg. Sîrbu C., Oprea A., 2009 August 19) (Sibiu county), Brașov (45°40'27.10"N; 25°38'33.82"E; leg. Sîrbu C., Oprea A., Eliáš P. jun., Ferus P., 2011 August 19), Sibiu - railway station (Sibiu county) (45°47'41.41"N; 24°10'09.82"E; leg. Sîrbu C. Oprea A., Eliáš P. jun., Ferus P., 2011 August 18), Bogății Forest (Brașov county) (leg. Sîrbu C., Oprea A., 2009 August 19), Gheorgheni (46°42'59.89"N; 25°34'29.15"E; leg. Sîrbu C. Oprea A., Eliáš P. jun., Ferus P., 2011 August 18) (Harghita county), Burdujeni-Suceava (railway station) (47°40'12.79"N; 26°15'50.45"E; leg. Sîrbu C., 2011 June 15), between Câmpulung Moldovenesc and Pojorâta (47°32'04.64"N; 27°29'45.86"E; leg. Sîrbu C., 2011 September 01) (Suceava county).

***Juncus dudleyi*** Wiegand (*J. tenuis* Willdenow var. *dudleyi* (Wiegand) F. J. Hermann; *J. tenuis* var. *uniflorus* Farwell)

Species native to North America [BRITTON & BROWN, 1970], reported as an alien plant in some countries of Western and Central Europe [SNOGERUP, in TUTIN & al. 1980; DAISIE, 2011], previously mentioned in Romania from the Făgăraș Mountains, in Brezicioara valley (Brașov county) [NEGREAN, 1987; CIOCĂRLAN, 2009]. It was also found at Borzont (46°40'52.26"N; 25°23'35.69"E; leg. Sîrbu C., Oprea A., Eliáš P. jun., Ferus P., 2011 August 18) (Harghita county).

### ***Sicyos angulatus* L.**

Species native to North America [BRITTON & BROWN, 1970], and naturalized in a large part of Europe [VASILCHENKO, 1972/1957; TUTIN, in TUTIN & al. 1968; PYŠEK & al. 2002; ESSL & RABITSCH, 2002; STEŠEVIĆ & al. 2008; VIVANT, 1983; SANZ ELORZA & al. 2001]. In Romania, it is known as an alien plant (sporadically) in all provinces of the country [BAUMGARTEN, 1816; HEUFFEL, 1858; COMAN, 1946; BORZA, 1947; PRODAN & NYÁRÁDY, in SĂVULESCU, 1964; CIOCĂRLAN, 2009; ANASTASIU, 2010]. In Moldavia (Eastern Romania) it was previously reported from Suceava county only (Northern Moldavia) [MITITELU & al. 1989]. We have also found it in Galați city (Southern Moldavia), on the banks of a stream that flows into the Danube river (45°24'55.86"N; 28°01'53.35"E; leg. Sîrbu C., Oprea A., Eliáš P. jun., Ferus P., 2011 August 20).

## Conclusions

In this paper, a number of seventeen alien plant species are presented, one of them being mentioned for the first time in Romania's flora, eight species are new in Moldavia and one species is new in Transylvania. Other seven species are reported now from new localities.



Some of these species (e.g. *Brachyactis ciliata*, *Chenopodium pumilio*, *Eleusine indica*, *Euphorbia dentata*, *Grindelia squarrosa*, *Impatiens parviflora*, *Kochia sieversiana*, *Solidago gigantea*, *Sicyos angulatus*) have a remarkable spreading tendency, expanding their area of invasion in Romania. Others are still quite rare, but the capacity of all these alien species to reproduce without human help must be taken into account in order to prevent their further invasion.

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**Fig. 1.** *Sedum sarmentosum* Bunge, at Mediaș, Sibiu county