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New Alien Species for the Flora of Romania: *Bidens bipinnata* L. (Asteraceae)

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Abstract: This paper presents an alien plant species that has recently migrated into Romania, namely *Bidens bipinnata* L. For this species, the following information is provided: occurrence in Romania, a short botanical description, general distribution, way of migration, and general aspects regarding its biology, ecology, and invasive character.

Key Words: Alien plants, *Bidens*, *Asteraceae*, weeds, Romania

Introduction

The alien flora of Romania currently includes 435 species (13.87% of the Romanian flora), of which 88.27% are neophytes and 11.73% archaeophytes (Ciocârlan, 2000; Anastasiu & Negrean, 2005). New alien species have continuously been reported in recent years (Kovács, 2004; Sîrbu, 2004; Oprea, 2005; Oprea & Sîrbu, 2006 etc.), thus increasing the number of non-native taxa in this country.

Materials and Methods

The presence in Romania and invasive character of the species are documented on the basis of our recent (2005-2006) field studies. Cross-references in the literature are also used. The herbarium specimens have been deposited in the general herbarium of the University of Agricultural Sciences and Veterinary Medicine "I. Ionescu de la Brad" Iași (IASI).

Results and Discussion

The genus *Bidens* L. was previously represented in the Romanian flora by 5 species, of which 2 are indigenous, with a Eurasian distribution (*Bidens cernua* L., *B.*

tripartita L.) (Nyárády, 1964), and 3 are alien, native of North America: *Bidens vulgata* Greene (Morariu, 1966), *B. frondosa* L. (Vicol, 1970), and *B. connata* Muhl. ex. Willd. (Ciocârlan, 1993).

In August 2005, we discovered a new species for the flora of Romania, namely *Bidens bipinnata* L. (Syn.: *Kerneria bipinnata* (L.) Godr. & Gren.) (*Spanish needles*) (Figure 1).

We found this plant at Țândărei railway station (Ialomița county), in south-eastern Romania, on the embankments along the railway, among the concrete slabs of the platform, as well as in open waste places around the railway station.

In that place, *Bidens bipinnata* vegetates in prosperous conditions, abundantly blossoms and fructifies, being accompanied by other ruderal weeds (e.g., *Amaranthus blitoides* S.Watson, *A. retroflexus* L., *Ambrosia artemisiifolia* L., *A. trifida* L., *Arctium lappa* L., *Artemisia vulgaris* L., *Atriplex tatarica* L., *Cannabis sativa* L. var. *spontanea* Vavilov, *Chenopodium album* L., *Conyza canadensis* (L.) Cronq., *Crepis foetida* L. subsp. *rheadifolia* (M.Bieb.) Celak., *Hordeum murinum* L., *Kochia scoparia* (L.) Schrad., *Lathyrus tuberosus* L., *Sorghum halepense* (L.) Pers., and so on).

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Figure 1. *Bidens bipinnata* L.: A - general habitus (herbarium specimen); B - leaf; C -capitulum with achenes; D - achenes. Scale bar = 3 cm (A), 1 cm (B-D).

We found the plant again in the same place in September 2006, when we noted a certain extension of the invaded area (waste places away from the railway station) and an important increase in the plant population (from ca. 50 individuals in August 2005, to ca. 135 individuals in 2006).

Because *Bidens bipinnata* is new taxa for the Romanian flora, we present below its description (based on the herbarium material), in agreement with the existing descriptions in the literature (Coste, 1937; Vasilcenko, 1959; Britton & Brown, 1970; Correll & Johnston, 1970; Tutin, 1976; Pignatti, 1982):

Annual herb, aromatic. Stem 4-angled, 50-120 cm tall, branched, usually glabrous, rarely minutely setose-hispid. Leaves opposite, ± glabrous, rarely pilose along the veins and on the border of the lobes, long petiolate (2-5 cm), lamina ovate, 2-(-3)-pinnate, 7-15 × 5-9 cm; the ultimate segments ovate or rhombic-lanceolate, toward the base cuneate, marginal irregularly dentate. Capitula solitary, sometimes corymbiform, 6-8 × 4-6 mm, narrowed toward the base; peduncles 2-10 cm long; involucre ± erect, pubescent at base, 5-8 mm long; outer phyllaries 7-10, herbaceous, inner phyllaries membranous-margined, all linear-lanceolate; scales of the

receptacle linear-lanceolate, scarios, brown-yellowish, with dark longitudinal lines. Flowers as long as the involucre; ray florets 0-4, inconspicuous, with yellow lamina, 2-3 mm long, lanceolate or obovate-lanceolate, apically 2-(-3)-lobulate; disc florets 20-25, with yellowish corolla, 3-4 mm long. Achenes brown-blackish, tetragonal, distally attenuated, glabrous, 12-18 × 1 mm; pappus bristles usually 3 or 4, yellowish, 2-4 mm long, retrorsely barbed.

Thus, *Bidens bipinnata* is easily distinguished from the other species of *Bidens*, which are found nowadays in the Romanian flora (Ciocârlan, 2000; Oprea, 2005), as follows:

- 1a. Leaves simple, with serrate border.....2
- 1b. Leaves compound or simple but deeply incised.....3
- 2a. Leaves sessile; capitula nutant; achenes non-verrucose.....*B. cernua* L.
- 2b. Leaves short petiolate; capitula erect; achenes verrucose.....*B. connata* Muhl. ex. Willd.
- 3a. Leaves simple, pinnatisect.....*B. tripartita* L.
- 3b. Leaves pinnate-compound.....4

- 4a. Leaves 2-(-3)-pinnate; achenes linear, tetragonal, 12-18 × 1 mm, with (2-) 3-4 bristles.....*B. bipinnata* L.
- 4b. Leaves 1-pinnate; achenes cuneate-obovate, flattened, 6-12 × 2-4 mm, with 2 bristles.....5
- 5a. Leaflets 3-(-5), ovate-oblong; outer phyllaries 5-8.....*B. frondosa* L.
- 5b. Leaflets 5, lanceolate; outer phyllaries 10-16..... *B. vulgata* Greene

Historical considerations and general distribution.

This species, native of South America (Hegi, 1954; Tutin, 1976), was known in Europe at the middle of the 18th century, being described by Linné (Sp. Pl. 832, 1753) on the basis of material originating from Virginia (North America). One year later (1754), the species was mentioned in the north of Italy (Hegi, 1954).

Nowadays, *Bidens bipinnata* is naturalised in Italy, France, Switzerland, Croatia, and Georgia, and casual in many other countries from South, West, and Central Europe; in addition, it occurs in South America, North America, Asia, Africa, and Australia (Hegi, 1954; Vasilîcenko, 1959; Britton & Brown, 1970; Correll & Johnston, 1970; Tutin, 1976; Xie et al., 2000).

The way of migration. Taking into consideration the fact that the Țândărei railway station, where the plant was identified by us, is at an important railway junction in south-eastern Romania, as well as the seed dispersal by adhesion of the plant, it seems that this species has accidentally arrived in Romania with goods, cattle, or passenger trains, from South or Central Europe.

Biology and ecology. *Bidens bipinnata* is a hexaploid (2n = 72) therophyte (Soó, 1970), flowering from July to September, with insect pollinisation; ripeness from August to October; epizoochorous seeds dispersal. The outer achenes germinate later than the inner ones (Venable & Lawlor, 1980).

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It prefers sunny and warm places, with light (often sandy or stony), moist, and moderate-fertile soils. It especially grows in disturbed habitats: waste places, cultivated fields, areas along railroads and roadsides, riverbanks, and so on (Hegi, 1954; Correll & Johnston, 1970; Tutin, 1976; Huxley, 1992).

The invasive character. Although it is not known yet from other localities in Romania, its wide spread throughout the world leads to us considering it a species with a fairly high invasive potential into disturbed habitats, especially in southern Romania.

Utilisations. In some regions, *Bidens bipinnata* is used as a vegetable (leaves and young shoots) or flavouring (Fern, 1997). In China, where this plant is widely distributed, it has been used as a folk medicine against various diseases such as inflammations, rheumatism, hypertension, and diabetes (Li et al., 2004); in North America, it is recommended in the treatment of laryngeal and bronchial diseases (Fern, 1997).

Conclusions

A rich population of *Bidens bipinnata*, native to South America, was found in 2005-2006 at the railway station of Țândărei town, Ialomița county, south-eastern Romania. The species was probably introduced via the railway. This is the first record of this species in Romania. Although it is not known yet from other places in Romania, we consider it a species having a fairly high invasive potential.

Taking into consideration the intensification of the anthropic influences in various habitats and the wide geographical spread of this species, its further distribution in Romania is predicted to extend in the near future, and some management strategies for its control must be implemented as soon as possible.

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