

***EUPHORBIA DAVIDII* SUBILS (*EUPHORBIACEAE*) – AN ALIEN SPECIES NEW TO THE ROMANIAN FLORA**

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Abstract: An alien species of the genus *Euphorbia* L. – *E. davidii* Subils – within the *E. dentata* agg., native to North America, has been recorded new to the vascular flora of Romania, in the following localities: Socola-Iași (Iași County), Tecuci and Movileni (Galați County), and Buzău (Buzău County). The morphology of the species is described and illustrated on the basis of individuals collected in Romania. *E. davidii* differs from *E. dentata* mainly by: trichomes of the abaxial leaf surface strongly tapered into a broad basal cell (trichomes weak, lacking a broad basal cell in *E. dentata*), involucre lacina of the cyathium glandular (non-glandular in *E. dentata*), bracteoles inside the cyathium with non-glandular lacina (glandular lacina in *E. dentata*), and seeds only a little longer than wide, angular in transverse section and unevenly tuberculate (seeds distinctly longer than wide, rounded in transverse section and evenly tuberculate in *E. dentata*). *Euphorbia davidii* Subils has been previously reported as *E. dentata* Michx. in the vascular flora of Romania and other countries.

Keywords: new alien species, Romanian flora, *Euphorbia davidii*, *Euphorbia dentata* agg., *Euphorbiaceae*

Introduction

The genus *Euphorbia* L. (spurge) includes 40 species and 11 subspecies in the vascular flora of Romania [4, 20]. Of these species, four are questionably present (i.e. *E. oblongata* Griseb., *E. brittingeri* Opiz ex Samp., *E. paralias* L., and *E. petrophila* C. A. Mey.) and seven are aliens, viz.: *E. nutans* Lag., *E. maculata* L. and *E. prostrata* Aiton – all originating in North America, *E. humifusa* Willd. – originating in Asia, *E. falcata* L. subsp. *acuminata* (Lam.) Simonk., *E. chamaesyce* L. (incl. subsp. *chamaesyce* and subsp. *massiliensis* (DC.) Thell.), and *E. segetalis* L. var. *segetalis* – originating in the Mediterranean region of Europe [4, 20, 24]. Three other species have been cited from the Romanian flora, but not confirmed in recent decades: *E. heterophylla* L. – originating in Central America, identified at Cotroceni-București railway station by Zahariadi (incl. var. *graminifolia* (Engl.) Boiss.) [16, 17]; *E. lathyris* L. – originated in the Mediterranean region, reported from Transylvania, Moldavia and Banat (as a cultivated plant) [2]; *E. oblongata* Griseb. – originating in South Europe – has been cultivated in the previous botanic garden near the University „Alexandru Ioan Cuza” of Iași, later becoming naturalized there [21]; *E. marginata* Pursh – originating in North America – is often cultivated as an ornamental plant in Romania, and sometimes escapes from gardens into the wild [24].

Another alien species of *Euphorbia* L. recently identified in the Romanian flora [18, 22-24] belongs to the *Euphorbia dentata* agg., which includes seven species, of which two are of South American and five of North American origin [28].

Material and Methods

Herbarium material collected in Romania between 1997 and 2011, previously determined as *E. dentata* Michx., was revised on the basis of some recent reliable references [1, 6, 12, 25, 28]. The morphology of the species is described and illustrated on the basis of material collected in Romania, in agreement with existing descriptions in the literature [12, 25]. Voucher

specimens are lodged in the following Romanian herbaria (abbreviations according to Thiers, 2011 [26]): IASI, IAGB, and CL. The distribution map of *E. davidii* in Romania was made using the Universal Transverse Mercator (UTM) grid system [3, 10].

Results

As a result of the revision of the herbarium material, previously determined as *E. dentata* Michx., we found that all specimens collected in Romania belong to the species *E. davidii* Subils; consequently *E. dentata* Michx. has been previously published from Romania in error.



Fig. 1: *Euphorbia davidii*: inflorescence (photo: C. Sîrbu, 2011)



Fig. 2: *Euphorbia davidii*: a, b – glandular lacinia of cyathium; c – non-glandular bracteoles inside cyathium; d – seeds (photo: C. Sîrbu, 2012)

Euphorbia davidii Subils, *Kurtziana*, 17: 125 (1984). Syn.: *E. dentata* Michx. var. *gracillima* Millsp., *Pittonia*, 2: 90 (1890); *E. dentata* Michx. var. *lancifolia* Farwell, *Amer. Midl. Nat.*, 8: 273 (1923) (Figures 1–2).

An annual plant, with a taproot; stem 20–50 cm tall, more or less branched, pubescent, with hairs of two types: i) sparse, ± patent, multi-cellular, longer hairs, and ii) minute, denser, down-curved hairs; leaves petiolate, opposite, the lamina up to 60 (–80) mm long, lanceolate to elliptical or ovate, sometimes red-spotted, the base attenuate, the margin crenate-serrate, the apex acute to acuminate, hairy on both surfaces (more abundantly beneath), the hairs with a larger basal cell and verrucose walls (microscope!); pleiochasium terminal, usually with 3 short primary axes; cyathia c. 2.5 mm long, with one marginal gland, the rim irregularly lobed and fringed, and lacinia glandular; bracteoles inside cyathium with non-glandular lacinia; staminate flowers up to 15 per cyathium; pistillate flower exceeding cyathia, the ovary usually glabrous, the stigma 2-lobed; capsule 3–5 × 4.5–5 mm, glabrous; seeds 2.5–2.8 × 2.1–2.5 mm (only a little longer than wide), angular in cross-section, unevenly tuberculate, with a large yellow reniform caruncle. 2n=56.

Discussion

Euphorbia davidii belongs to the American subgenus *Poinsettia* (Graham) House, and according to Subils (1984) [25] and Marchessi *et al.* (2011) [12], it differs from the closely related species *E. dentata* by the following characters (Table 1):

Table 1: Morphological differences between *Euphorbia davidii* and *E. dentata*

<i>Euphorbia davidii</i>	<i>Euphorbia dentata</i>
Trichomes on the abaxial side of the leaves strongly tapered into a large basal cell, with verrucose walls	Trichomes on the abaxial side of the leaves cylindrical, weak at the base, without a large basal cell, with smooth walls
Lacinia of the cyathium glandular	Lacinia of the cyathium non-glandular
Bracteoles inside cyathium with non-glandular lacinia	Bracteoles inside cyathium with glandular lacinia
Seeds 2.5-2.8 mm × 2.1-2.5 mm, angular in cross-section, unevenly tuberculate, only a little longer than wide, with a large yellow reniform caruncle	Seeds rounded in cross-section, evenly tuberculate, distinctly longer than wide, with a small caruncle

Origins: *Euphorbia davidii* is scattered mostly in western and northern parts of the USA (Arizona to Texas and north to Wyoming, Wisconsin and Ohio [31]).

World distribution: introduced as an adventive elsewhere in the USA, in Mexico and Canada [31], South America (Argentina) [12, 25] and Australia [28]. It is possible that plants reported in China [11] and Korea [9] can be ascribed, also, to *E. davidii*.

In Europe, *E. davidii* was first reported from Italy in 1995, being collected and named as *E. dentata* by Poldini *et al.*, and later, on reconsideration, as *E. davidii* by Galasso *et al.* (2011) [5]; subsequently *E. davidii* has been reported from Bulgaria, in 2009 [28], France, in 2010 (Chanu, 2010 [cited in 6,7]), Crimea, in 2010 (leg. Yevseyenkov, 2010) [30], Switzerland, in 2011 [7], and Hungary, in 2012 [1].

In addition, according to Barina *et al.*, 2012 [1], the revision of plants published up until 2011 as *E. dentata* from other European countries, such as Russia (first record in 1968 in the area of Pyatigorsk town, northern Caucasus) [13], Republic of Moldova (first record in 1970s) [15], Belgium (first record in 1986) [27], Ukraine in 1993 [8, 14], and Romania in 1997, 2005 and

2011 [18, 22–24], has indicated that only *E. davidii* occurs in all these countries, and *E. dentata* has been reported erroneously.

Distribution in Romania (Figure 3): *E. davidii* Subils was observed in Romania early in 1997, being published as *E. dentata* Michx. (incl. var. *cuphosperma* Engelm.) in the railway station of Socola – Iași [18]. Later on, the same taxa was identified in the railway station of Buzău town [22]. Recently, this species has been observed in the South railway stations of Tecuci town, and the village of Movileni (Galați county) [23, 24].

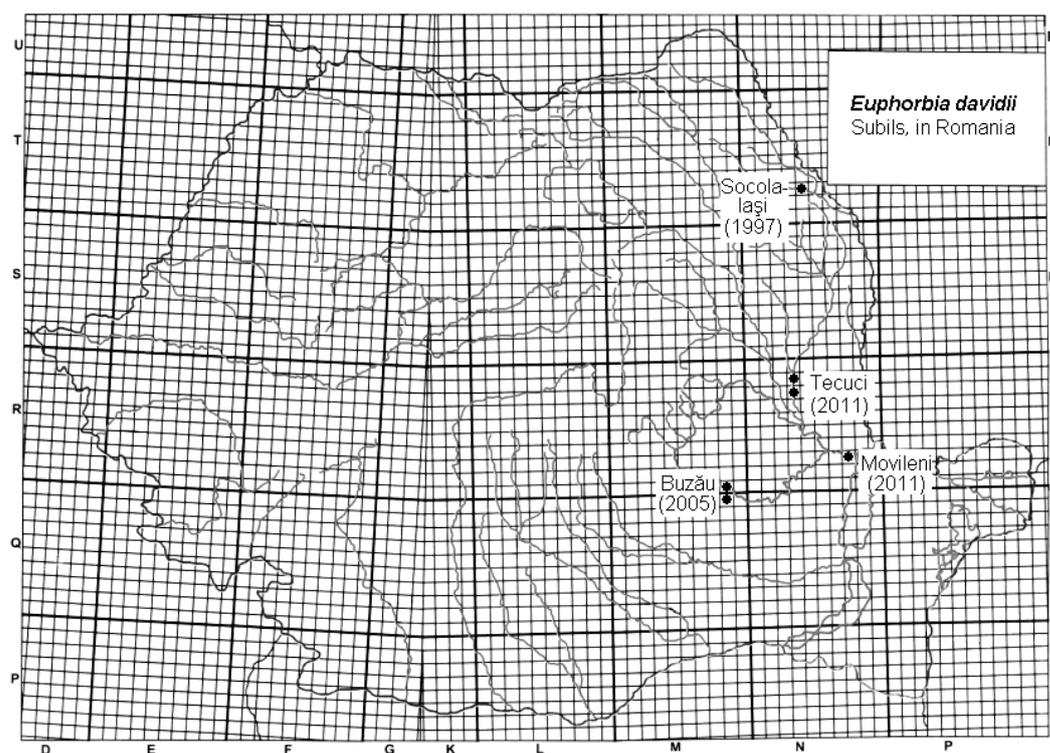


Fig. 3: Distribution of *Euphorbia davidii* Subils in Romania

Means of introduction in Romania: most probably, by the railway transport of goods.

Phenology: in Romania, as in other countries, e.g. Bulgaria [28], France [6], *E. davidii* flowers August–September and ripens its seeds August–October.

Habitats: In its native US range, it grows on the banks of streams and rivers, in lowland forests, lowland and upland prairies, and sand prairies; also along ditches, railroads, roadsides, and in open, disturbed areas [31]. In Romania it invades railway embankments, growing on skeletal substrates, on loamy soils or even chernozems, together with: *Amaranthus albus* L., *Ambrosia artemisiifolia* L., *Chondrilla juncea* L., *Crepis foetida* L. subsp. *rhoeadifolia* (M. Bieb.) Čelak, *Digitaria sanguinalis* (L.) Scop., *Erigeron canadensis* L., *Grindelia squarrosa* (Pursh) Dunal, *Gypsophila perfoliata* L., etc. In other European countries, it was also reported along railways (especially railway yards and railway stations), but also along roadsides and other related ruderal habitats, even on agricultural lands [1, 6, 28].

In the Republic of Moldova, it seems that this species (reported as *E. dentata*) has a remarkable tendency to spread (it is a quarantine plant over there) [15]. In France, *E. davidii* was assessed as having an intermediate risk score [29], similar to other weed species, such as: *Erigeron canadensis* L., *Xanthium italicum* Moretti, *Euphorbia prostrata* Aiton, *Eleusine indica* (L.) Gaertn., *Galinsoga* spp., *Veronica persica* Poir., etc. [6]. Similarly, in Australia, Pheloung *et al.* (1999) [19] assessed *E. davidii* to have a medium impact on the environment, but a significant impact on agricultural land [6].

According to Vladimirov & Petrova (2009) [28] (and references therein), *E. davidii* is the most widespread and weediest of the species in the *E. dentata* agg.

Conclusions

Based on material collected in various localities in Eastern Romania, the authors have followed up all the literature published until now on this species in Europe and elsewhere, and conclude that only *Euphorbia davidii* Subils is present in Romania's vascular flora, and not *E. dentata* Michx. All the previously collected plants in Romania named as *E. dentata* Michx. should be referred to *E. davidii* Subils.

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***EUPHORBIA DAVIDII* SUBILS (*EUPHORBIACEAE*) – O NOUĂ SPECIE
ADVENTIVĂ ÎN FLORA ROMÂNIEI**

(Rezumat)

O nouă specie a genului *Euphorbia* L. – *E. davidii* Subils – aparținând grupului *E. dentata* a fost identificată în flora României, și anume în estul țării, în următoarele localități: Socola-Iași (județul Iași), Tecuci, Movileni (județul Galați), and Buzău (județul Buzău). Descrierea speciei și ilustrațiile sunt efectuate pe baza materialului colectat în România. *E. davidii* Subils este o specie originară din America de Nord și diferă de *E. dentata* Michx., cu care a fost confundată anterior în literatură, prin următoarele caracteristici esențiale: perii de pe fața inferioară a frunzelor au o celulă bazală largă, iar pereții sunt verucoși (peri cilindrici, fără o celulă bazală largă și cu pereți netezi la *E. dentata*), laciniile ciatului glandulare (laciniile ciatului neglandulare la *E. dentata*), scvamele din cupa ciatului cu lacinii neglandulare (scvamele cu lacinii glandulare la *E. dentata*), semințe costate în secțiune transversală, neuniform tuberculată, doar cu puțin mai lungi decât late (semințele sunt rotunjite în secțiune transversală, uniform tuberculată și evident mai lungi decât late la *E. dentata*). În România, *E. davidii* invadează terenurile cu substrat scheletic de pe terasamentele de cale ferată și terenurile ruderales asociate acestora. În alte țări europene (Bulgaria, Elveția, Franța, Ungaria, Belgia, Rusia, Republica Moldova, Ucraina, incl. Crimeea) a fost de asemenea identificată crescând în lungul căilor ferate (în principal prin zonele de triaj, dar și prin gările propriuzise), dar și de-a lungul altor căi de comunicație ori în alte locuri ruderales, și chiar ca buruiiană în culturile agricole.

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