EUPHORBIA PROSTRATA (EUPHORBIACEAE),
A NEW ALIEN IN THE CARPATHIAN BASIN

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During the study of the urban flora of the city of Szeged (southern Hungary) in 2011, about 100 specimens of Euphorbia prostrata Aiton, a new alien for the Hungarian flora, were found in a city park. Characterisation of the locality is provided. This record, being the one and only in the Carpathian Basin so far, confirms former observations that this meridional-subtropical species is in expansion in many parts of the world, including proper habitats of the temperate regions. A key for all species of the genus Euphorbia subgenus Chamaesyce for the region is given.

Key words: alien, Carpathian Basin, Euphorbia prostrata, Hungary, range expansion, urban flora

INTRODUCTION

The genus Euphorbia subgenus Chamaesyce contains about 10 native or naturalised species in Europe. Most of them are of American origin, while E. humifusa is native in Asia, E. chamaesyce and E. peplis are native in Africa and Eurasia (Smith and Tutin 1968, Húgín 1998). Up to now, 5 representatives of this subgenus (E. chamaesyce, E. glyptosperma, E. humifusa, E. maculata, E. nutans) have been registered in the Carpathian Basin (Jávorka 1924–1925, Prodan 1953, Oprea 2005, Somlyay 2009). Except E. chamaesyce, they all occur in Hungary (Somlyay 2009, Király et al. 2010), but only E. maculata is known in Slovakia (Elíáš 2009). According to Balogh et al. (2004) and Somlyay (2009), these species are casual or naturalised, but not invasive aliens in this region.

Although Euphorbia prostrata (syn.: Chamaesyce prostrata (Aiton) Small, Tithymalus prostratus (Aiton) Samp.) occurs in some countries of SE Europe, it...
has only been recorded outside the Carpathian Basin. The species is expanding its distribution along the Adriatic coast (Smith and Tutin 1968, Pulević 1984, Trpin 1997, Milović and Randić 2001) and different parts of Austria (Fischer 2005). *E. prostrata* has recently been discovered in Bucharest, Romania (Anastasiu and Negrean 2008).

**MATERIALS AND METHODS**

During field studies of city parks and riversides of Szeged in September 2011, an *Euphorbia* species unknown for the authors was found between the former floodplains of the Maros and Tisza rivers (Fig. 1). The taxon was identified as *E. prostrata* by the third author, using the key given by Hügin (1998). Vouchers were deposited in the Hungarian Natural History Museum, Budapest (BP).

To characterise the habitat of the species, a $2 \times 2$ m plot was taken according to the Braun-Blanquet methodology (Mueller-Dombois and Ellenberg 1974). Latitude and longitude of the site were determined by GPS.

![Fig. 1. Location of *Euphorbia prostrata* in the city of Szeged (southern Hungary)](image)
Since *E. prostrata* is usually lacking in regional keys (e.g. Ciocârlan 2000, Domac 2002, Király 2009), a new user-friendly key for all species of the *Euphorbia* subgenus *Chamaesyce* for the Carpathian Basin and Croatia is provided. Finally, an overview of the occurrence of *E. prostrata* in different parts of the world is given.

**RESULTS AND DISCUSSION**

*Euphorbia prostrata* is an annual vascular plant with the height of 1–10 cm. The procumbent stems are usually glabrous below, pubescent above. The (2–)8–10(–15) × (1–)4–6(–8) mm leaves are ovate, obtuse, asymmetrical at the base, serrulate to subentire, sparsely pubescent to glabrescent on both surfaces, with *ca* 1 mm long petioles. Stipules are triangular, the uppers are free, and the lowers are often connate. Cyathium glands are transversely ovate, with small appendages. Capsules are hairy only on the keels and at base. The 1 mm long seeds are ovoid-quadrangular, sharply angled, with 5–8 transverse grooves (Fig. 2).


Relevé was made by Z. Bátori and L. Erdős, date: 29.09.2011, location: Hungary/Szeged, position (Gauss–Krüger coordinates): 4435913, 5123878, altitude: 80 m a.s.l., total plant cover: 90%, plot size: 2 m × 2 m. Vegetation height: 5 cm, cover abundance scale: »Braun-Blanquet«.

In October 2011, *E. prostrata* was found in another grass lawn occurring near the former habitat. In this place, the species is spreading rapidly not only in the lawn but also along the kerbs (Fig. 3). Geographically, the nearest occurrence of *E. prostrata* has been reported from the city of Vienna (ca 350 km from Szeged).

To reveal the main differences among the *Euphorbia* subgenus *Chamaesyce* species of the region, the authors suggest the following key.

1a Plant glabrous 2

1b Plant hairy (sometimes only sparsely or inconspicuously; loupe!). Except 7a, leaves may be dark spotted 5
2a Capsule at least 3 mm long. Seed smooth, at least 2 mm long, rounded at base, apiculate at top. Leaves at most 3 as long as wide, very asymmetric, without spots [Chamaesyce peplis (L.) Prokh.] E. peplis L.

2b Capsule at most 2 mm long. Seed at most 1.5 mm long

3a Seed evidently rugose (with 4–7 transverse grooves), cut grounded, apiculate at top. Leaves 2–4 times as long as wide, often slightly curved, without spots. Plants ± ascending (at least when young) [Chamaesyce glyptosperma (Engelm.) Small] E. glyptosperma Engelm.

3b Seed-coat different, seed ± rounded at base. Plants usually prostrate

4a Seed ruminate or irregularly reticulate-foveate, rounded at top. Leaves 1–1.5(–2) times as long as wide, often dark spotted [Chamaesyce canescens (L.) Prokh., see 7b] E. chamaesyce L.

4b Seed smooth (or at most frosted), apiculate at top. Leaves 1.5–2.5 times as long as wide, without spots [Chamaesyce humifusa (Willd.) Prokh.] E. humifusa Willd.

5a Capsule glabrous. Cyathia mostly grouped at the end of stems. Leaves 2–3(–3.5) times as long as wide, bigger ones often more than 15 mm long. Ripe seed of blackish colour, seed-coat wrinkled or coarse. Plant usually ascending (up to 60 cm!) [Chamaesyce nutans (Lag.) Small] E. nutans Lag.

5b Capsule hairy. Cyathia not grouped at the end of stems. Leaves usually shorter. Seed not blackish, at most dark grey or dark brown. Plants usually prostrate

6a Capsule with ± appressed hairs, uniformly hairy. Seed evidently rugose (with 3–5 transverse grooves). Leaves (1.5–)2–3(–4) times as long as wide [Chamaesyce maculata (L.) Small] E. maculata L.

6b Capsule with patent hairs. Leaves 1–2 times as long as wide

7a Capsule with hairs only on the keels and at base. Seed distinctly angled, cut grounded, rugose (with 5–8 transverse grooves). Stem usually glabrous below, pubescent above [Chamaesyce prostrata (Aiton) Small] E. prostrata Aiton

7b Capsule uniformly hairy. Seed hardly angled, ± rounded at base, ruminate or irregularly reticulate-foveate. Stem ± hairy on both sides [Chamaesyce canescens (L.) Prokh., see 4a] E. chamaesyce L.
The appearance of *E. prostrata* in Hungary, possibly as a result of human activity, confirms former observations that *E. prostrata* is in expansion in many parts of the world (cf. Dafni and Heller 1982, Topp 1988, Ma and Wu 1992, Čarni 1997, Mashaly and Awad 2003, Reis et al. 2006, Henderson 2007, Negi and Hajra 2007, Tahira et al. 2010, Pahlevani and Riina 2011). In the tropical and subtropical regions, it often appears in agricultural fields (e.g. cotton, mustard and turmeric fields, wheat cultures, and orchards), in parks (ornamental gardens, lawns, trampled places), and on man-made objects (e.g. roads, pavement fissures, walls).

![Fig. 2. Euphorbia prostrata (A = habit, B = leaf, C = stipule, D = cyathium and fruit, E = seed; drawn by Attila Bodor)](image-url)
Table 1


<table>
<thead>
<tr>
<th>Country/Province</th>
<th>Year</th>
<th>Region/Settlement</th>
<th>Expansion</th>
</tr>
</thead>
<tbody>
<tr>
<td>France</td>
<td>1806</td>
<td>Lyon</td>
<td>mainly the southern part of France</td>
</tr>
<tr>
<td>Italy</td>
<td>1868</td>
<td>Campobasso</td>
<td>mainly in northern and middle Italy</td>
</tr>
<tr>
<td>Portugal</td>
<td>1884</td>
<td>Lisbon</td>
<td>around Lisbon</td>
</tr>
<tr>
<td>Catalonia (Spain)</td>
<td>1912</td>
<td>Catalonia</td>
<td>all over Spain and the Balearic Isl</td>
</tr>
<tr>
<td>Switzerland</td>
<td>1945</td>
<td>Melide</td>
<td>southern and northern Switzerland</td>
</tr>
<tr>
<td>Croatia</td>
<td>1981</td>
<td>Rijeka</td>
<td>along the Adriatic coast</td>
</tr>
<tr>
<td>Montenegro</td>
<td>1984</td>
<td>Pržno, Bigovo</td>
<td>along the Adriatic coast</td>
</tr>
<tr>
<td>Slovenia</td>
<td>1992</td>
<td>Rožna dolina</td>
<td>along the Adriatic coast</td>
</tr>
<tr>
<td>Crete (Greece)</td>
<td>1999</td>
<td>Chania</td>
<td>Nomos of Chania</td>
</tr>
<tr>
<td>Austria</td>
<td>2003</td>
<td>Kärnten</td>
<td>southern Austria, Upper Austria</td>
</tr>
<tr>
<td>Romania</td>
<td>2008</td>
<td>Bucharest</td>
<td>?</td>
</tr>
<tr>
<td>Hungary</td>
<td>2011</td>
<td>Szeged</td>
<td>?</td>
</tr>
</tbody>
</table>

Fig. 3. The spreading of *Euphorbia prostrata* along the kerbs in a city park of Szeged (photo: Zoltán Bátori)
The first occurrences of *E. prostrata* in Europe (France, Italy and Portugal) were observed as early as the 19th century (Thellung 1907). Since then the species has been naturalised in the Mediterranean area of Europe from Portugal to Greece (Smith and Tutin 1968, Benedí and Orell 1992, Arianoutsou *et al.* 2010) (Table 1). In Croatia (Čarni and Jogan 1998, Milović and Randić 2001, Pandža *et al.* 2001, Pandža and Tafra 2008, Boršić *et al.* 2008), Montenegro (Pulević 1984, Stešević and Petrović 2010), and Slovenia (Trpin 1997, Frajman and Jogan 2007), it is gradually spreading mainly along the main roads and railways of the Adriatic coast. However, the species has not been recorded yet in Serbia (Nestorović and Konstantinović 2011). At the same time, *E. prostrata* appeared in ruderal places and railway stations in some parts of temperate Europe, namely in Germany (Hügin and Hügin 1997), Austria (Melzer 2003, Hohla *et al.* 2005, Fischer 2005), and in Switzerland (Röthlisberger 2007). It has recently been discovered in Bucharest, Romania (Anastasiu and Negrean 2008). In the temperate zone, this meridional–subtropical species often occurs in cities, where the disturbed areas (Chytrý *et al.* 2008, Ruščić and Nikolić 2011) and the urban heat island effect (Unger 1996, 1999) may contribute to its colonization.

Further investigations are necessary to clarify whether *E. prostrata* will expand its range in different parts of Hungary.

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