

*LUDWIGIA PEPLOIDES* (KUNTH.) P.H.  
RAVEN – FLOATING WATER PRIMROSE,  
A NEW SPECIES IN CROATIAN FLORA  
FROM THE LIST OF INVASIVE ALIEN  
SPECIES OF UNION CONCERN

SUZANA BUZJAK & ZORANA SEDLAR

Department of Botany, Croatian Natural History Museum, Demetrova 1, HR-10 000 Zagreb, Croatia

**Buzjak, S. & Sedlar, Z.: *Ludwigia peploides* (Kunth.) P.H. Raven – Floating Water Primrose, a new species in Croatian flora from the list of invasive allochthonous species of Union concern. Nat. Croat. Vol. 27, No. 2, 351-356, 2018, Zagreb.**

The species *Ludwigia peploides* – the floating water primrose, one of the species listed as IAS of EU concern (Regulation EU No 1143/2014) has been recorded for the first time in Croatian flora. It was recorded at the end of August 2018 on the Ilova River near the village of Kaniška Iva (Moslavina, Croatia) where it forms dense floating mats. Its presence was observed along a length of the river of about 2 km. With this finding there are now six plant species listed as invasive alien species of Union concern present in Croatia.

**Key words:** river, Ilova, macrophytes, allochthonous species, distribution

**Buzjak, S. & Sedlar, Z.: *Ludwigia peploides* (Kunth.) P.H. Raven – plutajuća mekčina, nova vrsta za floru Hrvatske s popisa invazivnih stranih svojti koje izazivaju zabrinutost u Uniji. Nat. Croat. Vol. 27, No. 2, 351-356, 2018, Zagreb.**

Vrsta *Ludwigia peploides* – plutajuća mekčina, nalazi se na popisu invazivnih stranih vrsta koje izazivaju zabrinutost u Uniji i nova je vrsta za floru Hrvatske. Zabilježena je krajem kolovoza 2018. godine na rijeci Ilovi u blizini mjesta Kaniška Iva (Moslavina) gdje raste u nakupinama. Njezina prisutnost zabilježena je na riječnom toku u dužini od oko 2 km. S ovim nalazom sada je u Hrvatskoj prisutno šest biljnih vrsta koje su na popisu invazivnih stranih vrsta koje izazivaju zabrinutost u Uniji.

**Ključne riječi:** rijeka, Ilova, makrofiti, alohtone vrste, rasprostranjenost

*Ludwigia peploides* (Kunth.) P.H. Raven (Onagraceae) is an emergent and floating herbaceous perennial aquatic plant (Fig. 1). The native distribution of *L. peploides* is in South and Central America, and Southern part of the USA. There is contradictory information about its distribution in Australia and New Zealand, stating it could be native or introduced (CABI, 2018; EPPO, 2011a; EPPO, 2011b; USDA-ARS, 1997). It was introduced to Montpellier (France) in the 1830s, presumably as ornamental and during the 20<sup>th</sup> century became one of the most widespread and detrimental aquatic invasive plants in the country (DANDELLOT *et al.*, 2005). During the same period it has been recorded in many European countries: Belgium, France (including Corsica), Germany, Greece, Italy, the Netherlands, Portugal, Spain, Switzerland, Turkey and the UK (Fig. 2); and in the rest of the world: Africa and Asia; Turkey, Southeast Asia, Taiwan, Japan (CABI, 2018; EPPO 2011a; EPPO, 2011b).



Fig. 1. Habitus of *Ludwigia peploides*.

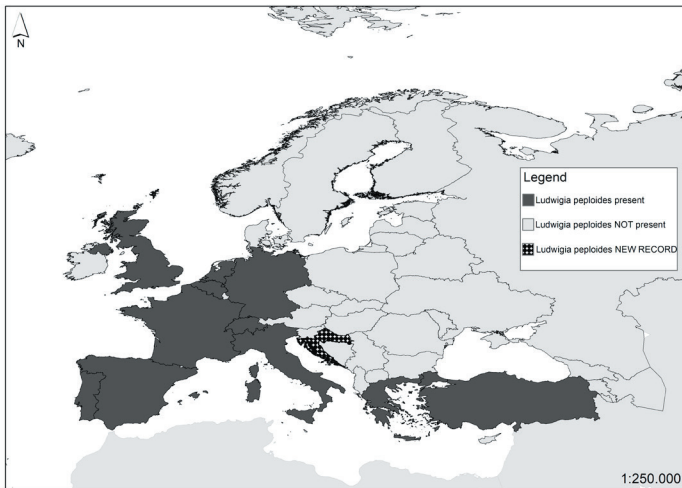


Fig. 2. Distribution of *Ludwigia peploides* in Europe, including the new finding in Croatia.

The floating water primrose has glabrous or pubescent stems of 10-300 cm that creep horizontally or grow vertically (but never strongly erect). In early spring rosette-like clusters of rounded floating leaves appear. Leaves are alternate, with highly variable shape, petiolate, less than 10 cm long and oblong to round (1-6 x 0.4-3 cm). During flowering period, leaves on floating shoots are as described, while on vertical shoots are more lanceolate. It has roots, used for absorption of nutrients and attachment of the plant to the soil, and adventitious roots, from submerged nodes, ensuring oxygen uptake and favoring rooting of plant fragments (cuttings). Flowers developing individually in leaf

axils are pentamerous, with bright yellow petals, 9 to 16 (22) mm long, and green sepals, 6-14 mm long. Bracteoles, placed at ovarium base, are deltate or ovate. The fruit is a cylindrical, five-angled capsule of 13–32 mm long and 3-4 mm wide with 40-50 seeds of 1.0-1.5 mm in length (EPPO, 2011b; JEPSON FLORA PROJECT, 2018; RAVEN, 1986).

Similar species, *Ludwigia grandiflora* (Michx.) Greuter & Burdet, a large-flowered water primrose and *Ludwigia hexapetala* (Hook. & Arn.) Zardini, H.Y. Gu & P.H. Raven a Uruguayan waterprimrose are very difficult to differentiate and they are often confused with *L. peploides* especially with *L. peploides* subsp. *montevidensis* (Spreng.) P.H. Raven. The *L. grandiflora* and *L. hexapetala* have stems that also creep horizontally on the surface of the water but the flower shoots are strongly erect and up to one meter high, bracteoles are lanceolate to lance-ovate and petals are generally larger, 15 – 29 mm long (EPPO, 2011b; ROBERT *et al.* 2013; JEPSON FLORA PROJECT, 2018).

*L. peploides* is mainly aquatic but can also colonize damp terrestrial habitats such as riverbanks or wet meadows. In its native range, it occurs in wetlands (ROLON *et al.*, 2008) and in the transition zone between aquatic and terrestrial environments (HERNANDEZ & RANGEL, 2009). Elsewhere, establishment habitats of *L. peploides* often include wet margins of ponds and lakes, stagnant or slow-flowing waters, rivers, shallow ponds and lakes, canals, wetlands, ditch networks, sediment bars on river borders, in wet meadows and in brackish waters (EPPO, 2011a; ZOTOS *et al.*, 2006).

Survival strategies include perennial vegetative organs (cuttings of roots and stems) and prolific seed production. Fragmentation of stems and dispersion through water flow is the main mode of dispersal of *Ludwigia* spp. The sexual reproduction and seed dispersal could become an additional mechanism for winter survival and spread of *Ludwigia*, especially over long distances (RUAUX *et al.*, 2009).

During field work at the end of August (30 August 2018) *Ludwigia peploides* was found on the Ilova River (Fig. 3), near the village of Kaniška Iva, in the vicinity of town of Garešnica (HTRS96: X 534021; Y 5042382). The river is rather canalized (Fig. 4) and is surrounded by ponds. It is about 7 meters wide and 0.5 – 1 m deep with a bottom

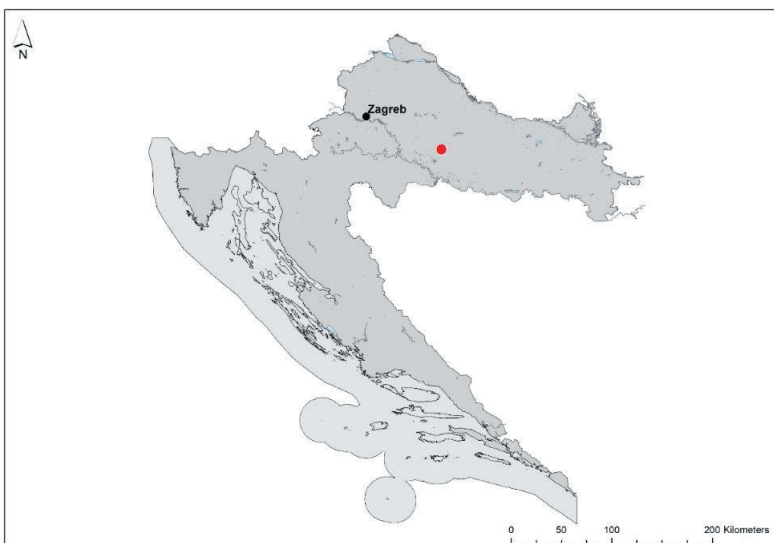


Fig. 3. The location of the Ilova River in which *Ludwigia peploides* was recorded.

covered with mud. The banks are covered with regularly mown grasslands. The right bank is at about 45°, while the left is at an angle of 25°. The research of this particular area comprised 2 km of the course of the Ilova River, on which *L. peploides* was found at many scattered localities forming dense floating mats, about 1 square meter surface (Fig. 5). Some other plants found on the river together with *L. peploides* were *Ceratophyllum demersum* L., *Typha latifolia* L., *Polygonum mite* Schrank, *Sparganium erectum* L., *Bidens frondosa* L., *Najas marina* L., *Leersia oryzoides* (L.) Sw. The Ilova River was also checked for the presence of *L. peploides* upstream and downstream for distances of approximately 5 km and *L. peploides* was not found. Specimens of *L. peploides* were collected and vouchers are stored in the Herbarium collection of the Croatian Natural History Museum (CNHM) under inventory number 600:ZAG; 8305:BOB.



**Fig. 4.** *Ludwigia peploides* habitat in Croatia on the Ilova river.



**Fig. 5.** Formation of dense floating mats of *Ludwigia peploides*.

*L. peploides* is considered to have been introduced into Europe as an ornamental aquatic plant. There are no known pathways of its introduction into Croatian territory. However, a possible pathway may include the availability of internet purchase of creeping water primrose for aquarium or a garden pond purposes from which it could have spread into natural habitats. According to Regulation EU 1143/2014 on the prevention and management of the introduction and spread of invasive alien species (EU, 2014), creeping water primrose is on the list of invasive alien species of Union concern (EC, 2016; EC, 2017). The Republic of Croatia has, as a member of the European Union, an obligation to implement rapid eradication of this species and prevent further spread. Its distribution is still limited in the European countries in which it is recorded or its invasions are at an early stage, except in France (CABI, 2018; EPPO, 2011b, ROBERT *et al.* 2013) and we can hope that this same limitation will be effectuated in Croatia. Mechanical control is possible but should be carried out with precaution so not to produce more fragments which may disperse the plants further. Herbicides are available for chemical management but their use in the natural environment is not recommended (EPPO, 2011b).

Including data presented in this paper there are now six plant species present in Croatia on the list of invasive alien species of Union concern (EC, 2016; EC, 2017; INVASIVE ALIEN SPECIES IN CROATIA, 2018; NIKOLIĆ, 2018).

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## SAŽETAK

### *Ludwigia peploides* (Kunth.) P.H. Raven – plutajuća mekčina, nova vrsta za floru Hrvatske s popisa invazivnih stranih svojti koje izazivaju zabrinutost u Uniji

S. Buzjak & Z. Sedlar

Vrsta *Ludwigia peploides* – plutajuća mekčina, višegodišnji je makrofit koji je prirodno rasprostranjen na području Južne i Centralne Amerike te u južnom dijelu SAD-a, a po nekima i u Australiji i Novom Zelandu. U Europu je unesena 1830-tih u Montpellier (Francuska) i to vjerojatno kao ukrasna biljka te se proširila i postala vrlo invazivna. Od tada je u Europi pronađena u Belgiji, na Korzici, Grčkoj, Italiji, Nizozemskoj, Španjolskoj, Švicarskoj, Turskoj i u Velikoj Britaniji gdje je ograničene rasprostranjenosti ili je njena invazivnost tek u početnom stadiju. Vrsta se nalazi na popisu invazivnih stranih vrsta koje izazivaju zabrinutost u Uniji te je nova vrsta za floru Hrvatske. Zabilježena je krajem kolovoza 2018. godine na rijeci Ilovi u blizini mjesta Kaniška Iva (Moslavina) gdje raste u nakupinama na dužini toka od oko 2 km. Način na koji je došla u Hrvatsku nije poznat. Međutim, mogući put ulaska na teritorij Hrvatske uključuje dostupnost ove vrste za nabavu te korištenje u akvaristici odakle je možda dospjela u prirodu. Hrvatska kao članica Europske Unije dužna je nakon ranog otkrivanja invazivnih stranih vrsta s Unijinog popisa primijeniti mjere iskorjenjivanja u ranoj fazi invazije, vodeći računa o zdravlju ljudi i okolišu. S ovim nalazom sada je u Hrvatskoj prisutno šest biljnih vrsta koje su na popisu invazivnih stranih vrsta koje izazivaju zabrinutost u Uniji.