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## Research article

# A new species as a member of the Flora of Turkey: *Persicaria hydropiperoides* (Polygonaceae)

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## Abstract

*Persicaria* genus in Turkish Madımakgiller or Buckwheat family (Polygonaceae) is included in the genus *Polygonum* now. Today, the genus *Persicaria* is separated from the genus *Polygonum*. In this study, *Pe. hydropiperoides* belonging to the genus *Persicaria* is given as a new species for the flora of Turkey. Specimens of *Pe. hydropiperoides* were collected from Sancaktepe/ Paşaköy (Istanbul). Adding this new species, the number of *Persicaria* genus in Turkish Flora reached 12 species (13 taxa). Additionally, a Turkish name, detailed description, locality data, photographs, and geographical distribution information of the species were given in this research.

**Keywords:** A new record; Istanbul; *Pe. hydropiperoides*; *Persicaria*; Turkey

## 1. Introduction

Polygonaceae Juss (Buckwheat in English or Madımakgiller in Turkish), which contains around 50 genera and 1200 species worldwide, is usually found in temperate zones of the Northern Hemisphere and is only rarely found in tropical climates (Heywood, 1978; Freeman and Reveal, 2005).

Except for the subfamily Erigonuinae Meisner, the most common trait of this family is the presence of the ocrea (a stipule modification that wraps around the stem).

According to recent investigations, the number of taxa grew by 11 in Polygonaceae, the Flora of Turkey, and the Eastern Aegean Islands (Davis et al., 1967; Coode and Cullen, 1967). (Keskin, 2012; Karaer et al., 2020). *Persicaria* (L.) Miller, on the other hand, was originally assessed in *Polygonum* L. in 1754, however, Miller (1754) split it as a new genus. With the splitting of *Persicaria* from *Polygonum* in recent years, Turkey now possesses 12 genera (Brandbyge, 1993; Keskin and Severoglu, 2020).

In *Polygonum*, the ocrea is normally membranous, silvery,

and glabrous, with a two-lobed apex that is typically fibrous and glabrous. The ocrea tube of *Persicaria* is not membranous, but rather fleshy, brown or reddish, rarely silvery, hairy, or glabrous, seldom 2-lobed at the tip, and frequently ripped apart by aging (Webb and Chater, 1964; Davis et al., 1967; Hinds and Freeman, 2020).

## 2. Materials and methods

*Persicaria* samples were gathered from the Anatolian side of Istanbul in November 2019 during field investigations conducted by the first author as a part of his doctoral dissertation research.

Examples, the former name *Polygonum hydropiper* at first appearance, the current name *Pe. hydropiper* although it resembles 'hydropiper', as a result of detailed examination, it is an unknown species from Turkey belonging to the genus *Persicaria*; as a result of the literature study (Webb and Chater, 1964; Small, 1895) and herbarium (E, EGE, ISTE, ISTF, ISTO, ANK, MUFE and NGBB).

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The gathered samples are stored at MUFE (Marmara University Faculty of Arts and Sciences Herbarium).

### 3. Results

Linne named *Persicaria* as a member of the *Polygonum* genus because it looks to have peach (*Persica*) leaves (Linne, 1753). Miller later classified it as a distinct genus (Miller, 1754). With this record, *Persicaria* has 150 species worldwide (Hinds and Freeman, 2020) and 12 species in Turkey.

#### 3.1. *Persicaria hydropiperoides* (Michaux) Small, Fl. S.E. U.S. 378, 1330 (1903). (Fig. 1 and 2).

**Basionym:** *Polygonum hydropiperoides* Michaux, Fl. Bor.-Amer. 1: 239 (1803).

**Synonyms (according to Hinds and Freeman, 2005):** *Persicaria opelousana* (Riddell) Small, Fl. S.E. U.S. 378, 1330 (1903). *P. hydropiperoides* subsp. *opelousanum* (Riddell) W.Stone, Pl. S. New Jersey 422 (1912). *P. hydropiperoides* var. *psilostachyum* H.St.John, Proc. Boston Soc. Nat. Hist. 36: 71 (1921). *P. hydropiperoides* var. *digitatum* Fernald, Rhodora 23: 260 (1922). *P. hydropiperoides* var. *asperifolium* Stanford, Rhodora 28: 27 (1926). *P. hydropiperoides* var. *bushmanum* Stanford, Rhodora 28: 27 (1926). *P. opelousanum* var. *adenocalyx* Stanford, Rhodora 28: 28 (1926). *Pe. paludicola* Small, Man. S.E. Fl. 457 (1933). *P. hydropiperoides* var. *breviciliatum* Fernald, Rhodora 42: 448 (1940). *P. hydropiperoides* var. *adenocalyx* (Stanford) Gleason, Phytologia 4: 23 (1952). *Pe. hydropiperoides* var. *euronotum* (Fernald) C.F.Reed, Phytologia 50(7): 461 (1982). *Pe. hydropiperoides* var. *breviciliata* (Fernald) C. F. Reed, Phytologia 50: 461 (1982). *Pe. hydropiperoides* var. *bushiana* Mohlenbr., Vasc. Fl. Illinois 501 (2014), nom. inval. *Pe. hydropiperoides* var. *bushiana* (Stanford) Mohlenbr, Phytoneuron 2015-67: 3 (2015). *Pe. hydropiperoides* var. *strigosa* (Small) G.Wilh. & Rericha, Michigan Bot. 55(3-4): 95 (2016).

**Type locality:** in Pennsylvania, Virginia, Carolina.

**Life span:** Perennials with rhizomes.

**Stems:** (15-)35-45(-100) cm long; decumbent to ascending, usually branched, without ribs, glabrous; usually branched or single; brownish or colorless, sparsely glandular; the glands are prominent after the central part of the body, reddish-brown in the lower part; the internodium is variable but body-like in structure.

**Leaves:** Ocrea in the middle of the stem, swollen base, (5-)15-20(-23) mm, brown, at the tip, truncate, ciliated with bristles (2-)4-5(-10) mm, white; ocrea tube 10-nerved, end of each vein with reddish brownish cilia, fragile. Petioles (2-)5-8(-20) mm, glabrous or strigose; blade 40-80(-250) x (4-)10-18(-35) mm, no bloeth, linear to lanceolate, acuminate to caudate and obtuse at apex; the main vein evident on the upper face, both the main vein and the lateral veins are prominent on the lower face with strigose on edge.

**Inflorescences:** (30-)50-100 × 2-5 mm, terminal, sometimes also axillary, erect, or curved. Bracts 8-15 x 1-3 mm, lanceolate, like a leaf. Peduncles 7-40 cm, usually as long as inflorescences; glabrous or strigose; ocreol usually overlapping distally, margins ciliate with bristles to 2-3 mm.

**Flowers:** Pedicels 1-3.5 mm, shorter than ocrea, and wrapped by ocreol; bisexual or unisexual and staminate, (2-)4-5(-6) per ocreate fascicle. Tepals 5; bisexual flowers 2,1-3,2(4)

mm, and staminate flowers 1.5-2.5 mm greenish with pinkish tips or whitish (sometimes rose clour); at maturity the lobes overlap; surface brownish or colorless glandular, usually rather dense, narrow margins, membranous, blunt tip; the veinless surface is adjacent at the base at approximately 1/3-1/2 of the length of the tepals. Stamen 8, anthers pink or red, elliptic to ovate. Styles 3.

**Achenes:** Included or apex subexserted, brown to brownish-black or black, 3-gonous, (1.5-) 2.8-3 × 1-2 (-2.5) mm, shiny, smooth.

**Flowering time:** 7-9 months.

**Fruiting time:** 9-11 months. Moist roadsides, wet habitats.

#### Plant Sample Collected:

**Turkey:** Istanbul, Sancaktepe, Paşaköy, center, in valley, fountain area, wet place, N 41° 03' 49.7" and E 28° 44' 57.4", 23.ix.2019, M. Keskin 7899!.

**Turkish name:** Koca evelek (proposal)

*Pe. hydropiperoides* were discovered at Sancaktepe/ Paşaköy (Istanbul). It is spread throughout semi-natural landscapes, residential areas, valleys, and marshes. This species associated with a wide range of plants in its environment: *Colchicum chalcedonicum* subsp. *chalcedonicum*, *Galatella linoisyris*, *Erica manipuliflora*, *E. arborea*, *Cistus creticus*, *C. salviifolius*, *Prunella vulgaris*, *Salvia forskahlei*, *Paspulum paspoloides*.

#### 3.2. Identification key for perennial *Persicaria* in Turkey

1. Aquatic, rarely terrestrial; stamens longer than tepal  
*amphibia*
1. Terrestrials; stamens shorter than tepal
  2. Stems loosely prickled; loosely rooting at nodes (perennant)  
*thunbergii*
  2. Stems smooth; strongly rooting at nodes (net perennials)
  3. Tepal glabrous  
*decipiens*
  3. Tepal glandular  
*hydropiperoides*

A visual comparison of mentioned perennial *Persicaria* species is given in Fig. 3.

### 4. Discussion

Although it is expected that *Pe. hydropiperoides* extend across a larger region than the 2-3 km<sup>2</sup> region where the samples were gathered. It has a wider spread than this single record since it may have been misidentified among similar herbarium specimens. *Pe. hydropiperoides* is one of the species with a great number of (16) synonyms, and it is frequently misnamed due to its high variety and worldwide distribution. The inaccuracy rate increases, especially when identifying without seeing all of the plant's organs (Table).

When a diagnosis is established without removing the subterranean parts, the genus *Persicaria* is frequently referred to as *Pe. maculosa*. *Pe. hydropiperoides* achenes are all triangular prismatic, *Pe. maculosa* achenes are triangular and two-faced, and ocreae have somewhat longer hairs on the borders (Hinds



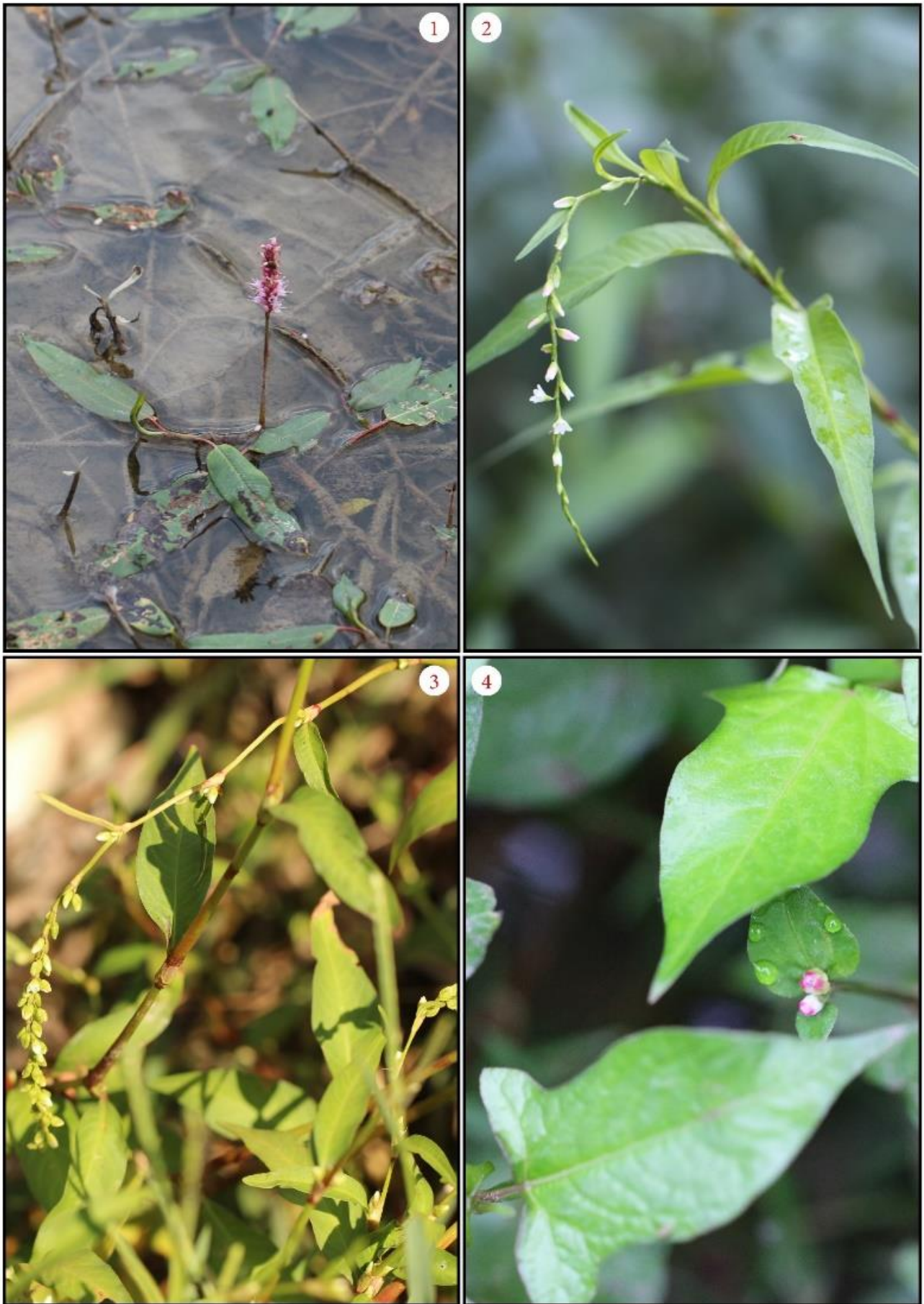
**Fig. 1.** *Persicaria hydropiperoides*, (1) Habitus, (2) Internodium, ocrea and base of leaf, (3) Inflorescence and (4) Infructescence.





**Fig. 2.** *Persicaria hydropiperoides*, (1) General view, (2) Rhizome, (3) Ocrea, (4) Leaf, (5) Inflorescence with staminate flowers, (6) Inflorescence with bracts and upper leaves and (7) Fruiting perianth.





**Fig. 3.** Perennial *Persicaria* species, (1) *Pe. amphibia*, (2) *Pe. decipiens*, (3) *Pe. hydropiperoides*, (4) *Pe. thunbergii*.

**Table**A taxonomic comparison of *Pe. hydropiperoides* and its allies.

	<i>hydropiperoides</i> (This Article)	<i>hydropiperoides</i> (Hinds & Freeman 2020).	<i>hydropiper</i> (Hinds & Freeman 2020).	<i>maculosa</i> (Hinds & Freeman 2020).
<b>Life Span</b>	Perennial with rhizomes	Perennial with rhizomes	Annual, rhizomes absent	Annual, rhizomes absent
<b>Stem Length</b>	35-45 cm	15-100 cm	20-100 cm	5-130 cm
<b>Stems</b>	Decumbent to ascending, without ribs, glabrous	Decumbent to ascending, without ribs, glabrous/obscurely strigose distally	Decumbent to ascending/erect, branched, without ribs, glabrous, glandular-punctate	Procumbent, decumbent, ascending, without ribs, glabrous/appressed-pubescent
<b>Ocrea</b>	Brown, base inflated, 10-nerved, 15-20 mm; surface strigose; with bristles 2-4 mm	Brown, base inflated, 5-23 mm; surface glabrous/strigose, with bristles (2-) 4-10 mm	Brown, base somewhat inflated surface glabrous/strigose, usually glandular-punctate.	Light brown, base inflated, 4-10 (-15) mm; surface glabrous/strigose.
<b>Petiole</b>	5-8 mm, glabrous/strigose	2-20 mm, glabrous/strigose	1-8 mm, glandular-punctate	Sessile or 0.1-0.8 cm, glabrous/strigose
<b>Leaves</b>	Blotch absent; lanceolate/linear to lanceolate, 4-8 x 1-2 cm, faces glabrous; margins appressed- hirsute; apex acuminate to caudate	Blotch absent; broadly lanceolate to linear-lanceolate, 5-25 x 0.4-3.7 cm, margins antrorsely appressed-pubescent, apex acuminate	Blotch absent; lanceolate to narrowly rhombic, (1.5-)4-10(-15) x 0.4-2.5 cm, margins antrorsely strigose, apex acute to acuminate	Blotch present; adaxially, lanceolate to narrowly ovate, (1-) 5-10(-18) x (0.2-)1-2.5(-4) cm, margins antrorsely strigose, apex acute to acuminate
<b>Inflorescences</b>	Terminal, sometimes axillary, 50-100 x 2-5 mm	Terminal, sometimes also axillary, 30-80 x 2-5 mm	Terminal and axillary, 30-180 x 5-9 mm	Terminal and axillary, 10-45(-60) x 7-12 mm
<b>Peduncle</b>	7-40 cm	10-30 mm	(0-)10-50 mm	10-50 mm
<b>Pedicels</b>	1-3.5 mm	1-1.5 mm	1-3 mm	1-2.5 mm
<b>Flowers</b>	Bisexual, 3-5 per ocreate fascicle, homostylous	Bisexual/unisexual and staminate, homostylous, 2-6 per ocreate fascicle	1-3(-5) per ocreate fascicle, homostylous	4-14 per ocreate fascicle, homostylous
<b>Perianth</b>	Greenish/white with glandular-punctate on tubes and inner tepals; tepals 5, 2.1-4 mm; staminate flowers 1.5-2.5 mm, veins not visible; margin entire, apex obtuse	Roseate proximally, roseate, White/greenish white distally; tepals 5, 2.5-4 mm in bisexual flowers, 1.5-2.5 mm in staminate flowers; veins prominent/not, margins entire, apex obtuse to rounded.	Greenish proximally, White/pink distally, glandular-punctate; tepals 4-5, obovate, 2-3.5 mm, veins prominent/not, apex obtuse	Greenish white proximally and roseate distally/entirely roseate, not glandular-punctate, scarcely accrescent; tepals 4-5, obovate, 2-3.5 mm, veins prominent, apex obtuse
<b>Stamens</b>	8; anthers pink to reddish, ovate- spheroidal	8; anthers pink/red, elliptic to ovate	6-8; anthers pink/red, elliptic to ovate	4-8; anthers yellow/pink, ovate
<b>Styles</b>	3, connate at base area	3, connate near middle.	2-3, connate proximally.	2-3, connate proximally
<b>Achenes</b>	Brownish to blackish/black, 3-gonous; 2.8-3 mm, shiny, smooth	Brown to brownish black/black, 3-gonous, 1.5-3 mm, shiny, smooth	Brownish black, biconvex/3-gonous, 1.9-3 mm, dull, minutely roughened	Brownish black to black, discoid/biconvex to 3-gonous, (1.9-)2-2.7 mm, shiny, smooth

and Freeman, 2021). However, the inflorescence of *Pe. hydropiperoides* and *Pe. hydropiper* are identical. Mosafari and Keshavarzi (2010) described *Pe. hydropiperoides* as a new record for Iranian flora and conducted a comparative anatomical investigation with species similar to the species. With the registration in Turkey, the distribution of this species from Asia to Europe has been completed. This species is certain to be an invasive species.

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