

## *Herniaria caucasica* (Caryophyllaceae), *Rumex cyprius* (Polygonaceae), and *Potentilla multifida* (Rosaceae); 3 new records for Turkey

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**Abstract:** *Herniaria caucasica* Rupr., *Rumex cyprius* Murb., and *Potentilla multifida* L. are given as new records for Turkey. The specimens were collected from Van, Mersin, and Kayseri provinces. These new records were compared with similar species in Turkey. Descriptions, distributions, and figures of these new records are given.

**Key words:** *Herniaria*, *Rumex*, *Potentilla*, new record, taxonomy, Turkey

### 1. Introduction

The family Caryophyllaceae consists of 80 genera and 2100 species mainly distributed in the Irano-Turanian and Mediterranean phytogeographical regions. It has 3 subfamilies, namely *Alsinoideae* Burnett, *Caryophylloideae* Arn., and *Paronychioideae* A.St. The genus *Herniaria* L. belongs to the subfamily *Paronychioideae* and has 45 species distributed in Africa, Europe, and Asia (Lawrence, 1951; Bittrich, 1993). Nine species of this genus are found in Turkey and 5 of them are endemic to this country (Brummit, 1967; Ekim, 2000).

The family Polygonaceae includes 32 genera and more than 400 species distributed from the arctic zones to the tropical regions all over the world. Among these genera, *Rumex* L. is particular dominant in the tropical regions and has 200 species (Lawrence, 1951; Bittrich, 1993). The genus is represented by 25 species, 6 subspecies, and 2 hybrids, and 8 of them are endemic to Turkey (Cullen, 1967; Davis et al., 1988; Özhatay, 2000).

Rosaceae is a very large family as regards number of taxa and has a very wide distribution worldwide. The family is composed of approximately 150 genera and 3200 species. Among these genera, *Potentilla* L. consists of 300 species growing particularly in warmer regions of the northern hemisphere (Lawrence, 1951). This genus is represented by 59 species, 3 subspecies, and 2 varieties in Turkey. Twenty-one of these species are endemic to Turkey (Peşmen, 1972; Davis et al., 1988; Erik and Güner, 2000; Özhatay and Kültür, 2006).

The authors collected some very interesting specimens belonging to the genera *Herniaria* (Van), *Rumex* (Mersin), and *Potentilla* (Kayseri). These provinces are very rich as regards biological diversity and there have been very important records in recent years in those regions (Dinç and Doğan, 2006; Güneş and Çırpıcı, 2012; Dinç et al., 2013; İlçim et al., 2013; Koç and Aksoy, 2013). The specimens collected were compared with the related taxa in the herbaria of P, K, E, ANK, GAZI, and Bozok University and the relevant data in the literature (Zohary, 1966; Brummitt, 1967; Cullen, 1967; Ball et al., 1968; Rechinger and Schiman-Czeika, 1968; Schiman-Czeika, 1969; Shishkin and Yuzepchuk, 1971; Peşmen, 1972; Brummitt and Heywood 1976; Webb, 1976; Chaudhri, 1980; Shishkin, 1995; MNHN; RBG Kew; RBG Edinburgh). As a result of all these comparisons, the specimens collected were found to be new records for the Turkish flora.

### 2. Materials and methods

The specimens upon which this study is based were collected from Kayseri, Mersin, and Van provinces in Turkey. The collected specimens were first compared with similar species from *Flora of Turkey* and then *Flora of the U.S.S.R.*, *Flora Europaea*, and *Flora Iranica* in order to identify them. The morphological characteristics of the species were determined by the use of an Olympus SZ61 microscope, and a ruler with an accuracy of 0.5 mm and an ocular micrometer. The collected specimens are deposited in the herbaria of Gazi (GAZI) and Bozok universities.

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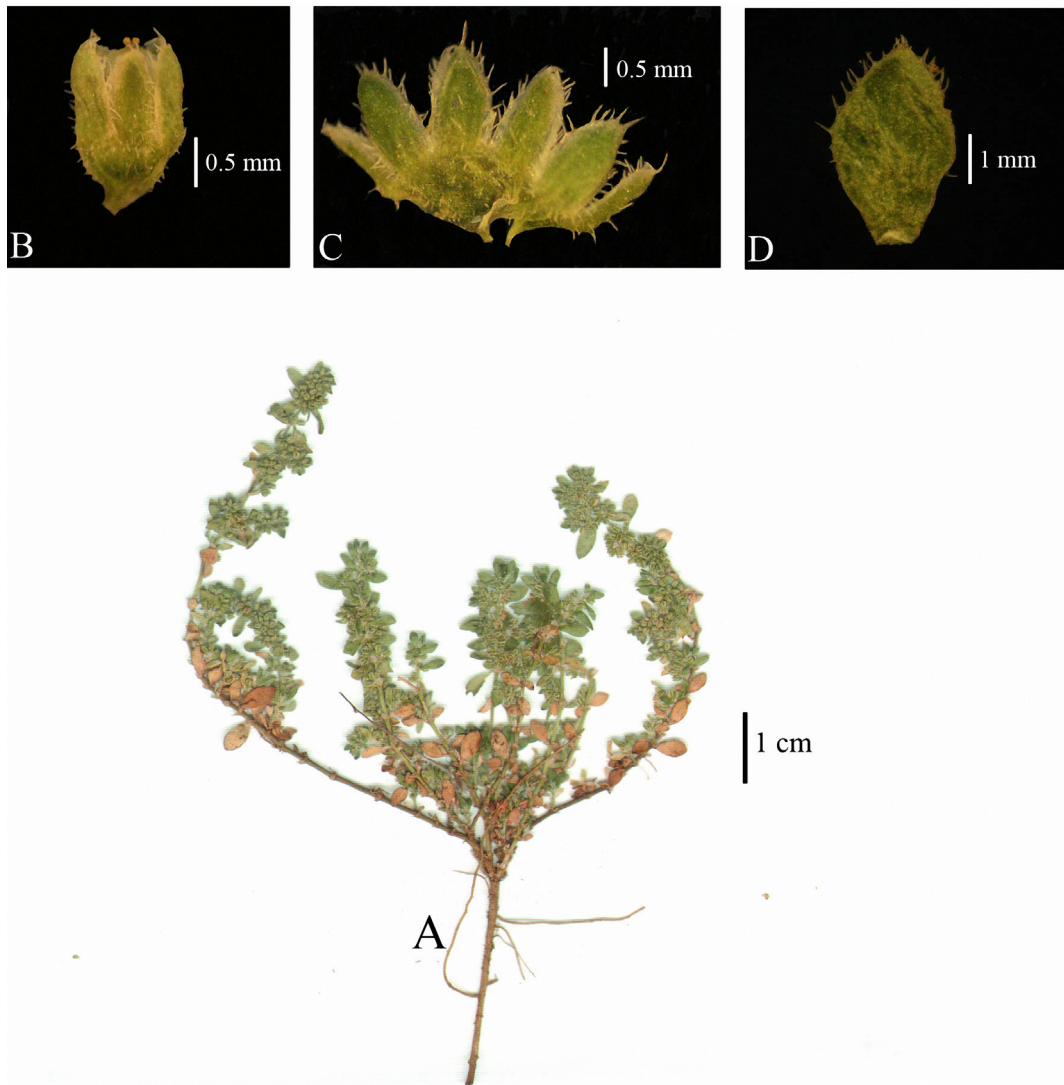
### 3. Results

*Herniaria caucasica* Rupr., Fl. Caucasi, 241 (1869) (Figure 1). Type: Caucasus oriental, in Mount Borbalo, 1500 m, 9.1860, *Ruprecht s.n.* (LE).

Perennial herbs with woody rootstock, sometimes matted, bright green. Stems woody, prostrate-decumbent but not rooting; young herbaceous stems puberulent, 5-15 cm long. Leaves yellowish-green, almost completely glabrous, only sometimes ciliate towards apex, ovate or obovate, 4-8 × 2-3 mm, cuneately attenuate toward base; stipules ovate, with fringed-ciliate margins. Flowers in 3-7-flowered axillary clusters, short-pedicellate. Calyx short-tubed, 1.2 - 1.5 mm long, with 5 ciliate-margined sepals, puberulent at base. Sepals 1-1.3 × 0.5-0.7 mm. Stamens 5 alternate with staminoid petals; anthers purple, 0.2-0.3 mm long. Styles very short but apparent, c. 0.1 mm, deeply lobed. Fruits ovate-elliptic, including calyx, papillose above.

Seeds suborbicular, 0.5-0.7 × 0.5-0.6 mm, brown. Fl. July–August, alpine meadows, 2400–2650 m.

**Specimens examined:** *Herniaria caucasica* - Turkey. B9 Van: Bahçesaray, Karapet Pass, 38°08'N 42°56'E, 2650 m, alpine meadows, 24.7.2013, *Hamzaoğlu* 6929 & *M.Koç* (GAZI, Bozok Univ. Herb.); Kirghizstan. Declivitas australis jugi Kirghizici, in fauce f. Kiczi-Korumdy, 2400 m, *G.Lazkov* 7615 (P, barcode: P05133620, photo); *Herniaria argaea* Boiss. - Turkey. B5 Kayseri: Hisarcık, Erciyes Ski Center, Hisarcık Gate, S of Hitit Tepe station, 3040 m, 38°32'N 35°27'E, alpine steppe, 20.7.2013, *Hamzaoğlu* 6878 & *M.Koç* (GAZI, Bozok Univ. Herb.); [Kayseri] Cappadocia: At 2500–2700 m, 16.6.1890, *Bornmüller* 1982 (P, barcode: P05053582, photo); *ibid.*, 2600–2800 m, 18.6.1890, *Bornmüller* 3110 (P, barcode: P05380865, photo); Kayseri: Tekir Yayla to Develi, c. 1820 m, 15.7.1973, *T.Ekim* 4004 (ANK).



**Figure 1.** *Herniaria caucasica*: A- habit, B- flower, C- calyx, D- leaf.

*Rumex cyprius* Murb., Acta Univ. Lund. n. s., 2(14): 20 (1907) (Figure 2).

Subgen. *Acetosa* (Campd.) Rech.

Type: Cyprus, *collector s.n.* (Hb?).

Annual, glabrescent herbs. Stems 10-40 cm tall, ascending to erect, branching from base, rather thick below. Leaves 6.5-8.5 × 1.5-2.5(-3) cm, petiolate, somewhat fleshy, ovate-triangular or oblong-deltoid, the upper lanceolate, cuneate-subhastate at base, acute-acuminate at apex, entire; ochreae membranous-hyaline. Inflorescences sparingly branched, elongate. Pedicels 1-3 mm in each axil, longer than perianth, filiform, jointed below middle, elongated and reflexed in fruit. Flowers 2-3 mm, 1-2 on each pedicel. Valves distinctly unequal, membranous but leathery at center, flat, 10-16(-18) × 12-17(-20) mm, suborbicular, deeply cordate at base, all denticulate-

spinescent at margins or obsoletely so, netted-veined with a vein around margin. Achene 2-3 mm, trigonous, lanceolate-ovoid, acuminate, brownish-white, smooth. Fl. January–May, rocks, limestone hills and stony places near the sea, nr s.l.–30 m.

**Specimens examined:** *Rumex cyprius* - Turkey. C4 Mersin: Gülnar, Büyükeceli village, Beşparmak island, 36°07'N 33°31'E, 30 m, 28.5.2011, *Hamzaoğlu* 6089 (GAZI, Bozok Univ. Herb.); Algeria. Biskra: Environs de Biskra, *C.Schmitt* 93 (K, barcode: K000831325, photo); Jordan. Holy Land: N.E. Shores of Dead Sea, ?.3.1872, *W.A.Hayne* s.n. (K, barcode: K000831327, photo); Israel. Dead Sea area, Ein Ghedi [En Gedi], stony desert near the road Jerusalem–Eilat, 28.1.2011, *A.Sukhorukov* & *M.Kushunina* 330 (E, barcode: E00667502, photo); Cyprus. Ougosos to Agios Elias, 3.3.1941, *P.H.Davis*



**Figure 2.** *Rumex cyprius*: A- habit, B- inner perianth segment.

2472K (E, barcode: E00473276, photo); **Iraq**. [Maysan] Higher foothills near Wadi Tib Police Station, Amarah Livva, 28.3.1957, *K.H.Rechinger* 8952 (E, barcode: E00473271, photo); **Iran**. W. Lorestan: Ilam, 33°17'N 46°15'E, *M.Jacobs* 6259 (E, barcode: E00473272). *Rumex tuberosus* L. subsp. *tuberosus* - **Turkey**. A3 Bolu: Bolu to Aladağ, meadows, c. 1600 m, 14.8.1983, *M.Vural* 2702 (GAZI); A5 Kastamonu: Devrekani, Yaralıgöz Mountain, 1900 m, subalpine, 9.7.1991, *E.Yurdakulol* 3493 (ANK); B1 Manisa: Manisa Mountain, around Atalanı, 1270 m, 24.5.1983, *H.Duman* 1103 (GAZI); C3 Antalya: Akseki to Geyran Yayla, around Taşlıca Yayla, 1350–1500 m, 9.6.1995, *A.Duran* 2955 (GAZI); **Isparta**: Eğirdir, Kopuz Mountain, S. Yaka village, c. 1800 m, forest, 20.5.1973, *H.Peşmen* & *A.Güner* 3506 (ANK); C4 Konya: Ereğli, Bolkar Mountain, 25.5.1953, *H.Birand* 2766 & *M.Zohary* (ANK); C6 Kahramanmaraş: Engizek Mountain, around Aksu district, 1100 m, 12.6.1987, *H.Duman* 3173 (GAZI); *Rumex tuberosus* L. subsp. *creticus* (Boiss.) Rech. - **Turkey**. B1 [İzmir] Smyrne, dans les lieux rupestres et incultes, *Balansa* 353 (E, barcode: E00473240, photo); C1 Muğla: Bodrum, Muşgebi to Karatoprak, 5–100 m, igneous sandy slopes in maquis, 12.4.1965, *P.H.Davis* 41006 (E, barcode: E004732434, photo); C2 Muğla: Marmaris, Turgut to Bayır, 50 m, rocky limestone slopes, 15.4.1965, *P.H.Davis* 41119 (E, barcode: E00473241, photo); **Greece**. Rodhos: Lindos, 50 m, rocky limestone slopes, 22.4.1965, *P.H.Davis* 40303 (E, barcode: E00473244), photo); *Rumex tuberosus* L. subsp. *horizontalis* (K.Koch) Rech. - **Turkey**. A4 Ankara: Beypazarı, İkizdere, c. 1650 m, meadows, 23.7.1972, *Y.Akman* 8941 (ANK); A9 Kars: Kars to Susuz, 8 km, 1800 m, 5.7.1957, *P.H.Davis* 30606 (ANK); B6 Kayseri: Pınarbaşı, above Kavak village, Hınzır Mountain, 1800 m, 16.7.1981, *N.Çelik* 1961 (ANK); B7 Tunceli: S. Ovacık, 1750 m, 22.7.1957, *P.H.Davis* 31559 (ANK); B8 Erzurum: İlica to Tercan, c. 1900 m, 10.7.1957, *P.H.Davis* 30910 (ANK).

*Potentilla multifida* L., Sp. Pl. 1: 496 (1753) (Figure 3).

Subgen. *Potentilla*

Lectotype (Soják, 1988): In Siberia, collector s.n. (LINN-655.6!).

Perennial herbs. Roots terete, slightly woody. Flowering stems ascending, sometimes prostrate or rarely erect, 10–40 cm, sparsely to densely tomentose. Basal leaves 2–9 cm including petiole; stipules brown, membranous, abaxially pilose or glabrescent; petioles appressed or spreading pubescent; lamina pinnate with 3–5 pairs of leaflets; leaflets opposite, oblong-elliptic, 5–40 × 3–20 mm, sometimes very crowded and so almost digitate, revolute at margin, with up to 5 linear lobes, appressed pubescent to densely villous, or rarely glabrescent, greenish above, white tomentose, appressed sericeous-villous on veins, grayish-white beneath, apex acute. Cauline leaves 2 or 3;

stipules green, ovate or ovate-lanceolate, herbaceous, apex acute to acuminate. Flowers 7–13 mm in diam.; pedicel 12–22 mm, pubescent. Sepals ovate-lanceolate, 4.5–8 × 2.5–4 mm, apex acute or acuminate; epicalyx segments oblong-linear, as long as or slightly shorter than sepals, appressed villous, apex acute. Petals yellow, obovate, 5–8 × 3–6 mm, equaling or slightly exceeding sepals, apex emarginate. Style conical-filiform, much shorter than achene. Achene smooth. Fl. June–August, sandy places among igneous rocks, 3000–3170 m.

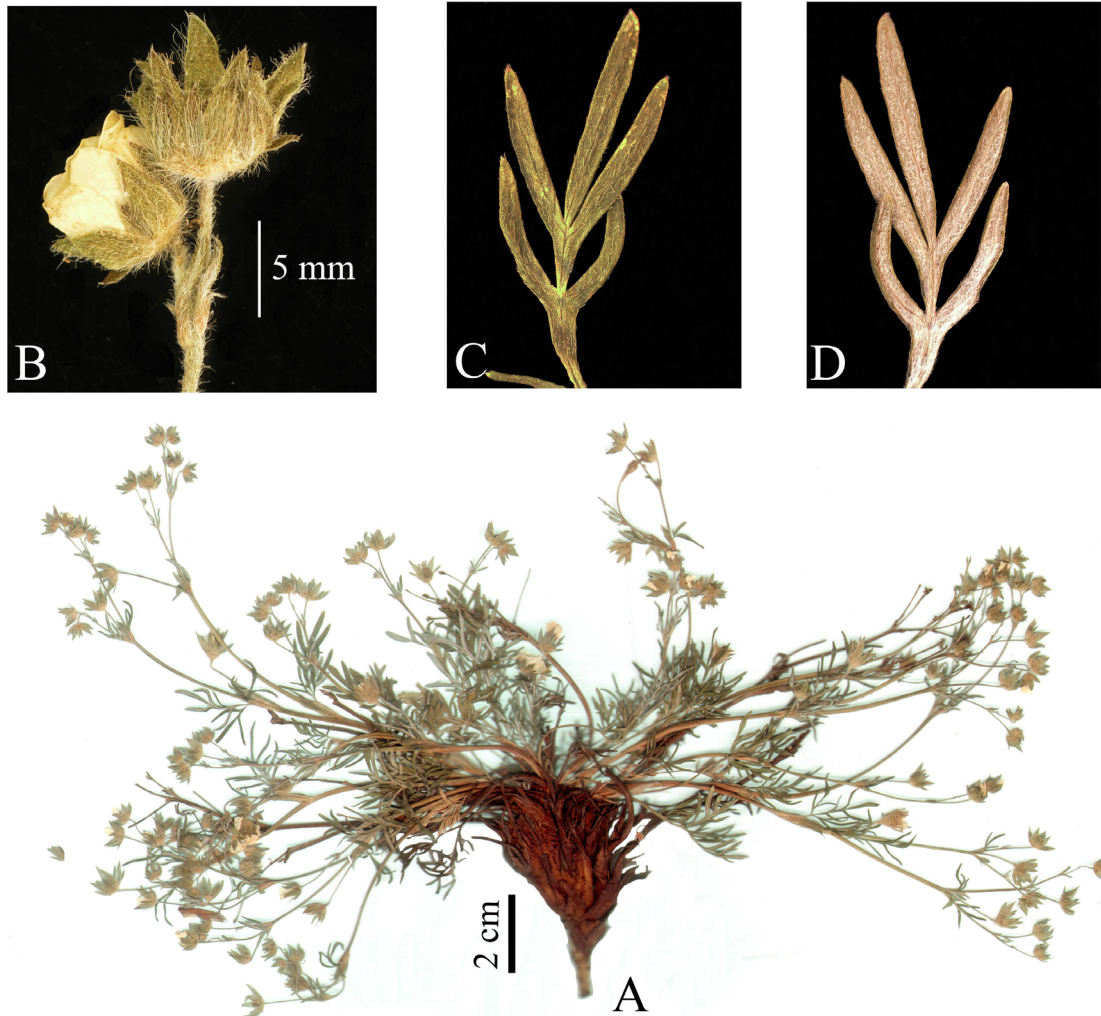
**Specimens examined:** *Potentilla multifida* - **Turkey**. B5 Kayseri: Mount Erciyes, 38°31'N 35°29'E, 3170 m, 20.8.2013, *Hamzaoglu* 6873 & *M.Koç* (GAZI, Bozok Univ. Herb.); [**Russia**]. Dagestan: Semur, Caucasus, Schalbus dagh, *A.K.Becker* s.n. (P, barcode: P03358700, photo); [**Switzerland**]. Alpes de Suisse, Zermatten im Wallis, *E.M.Thomas* 776 (P, barcode: P02521585, photo); **Afghanistan**. Kabul: Unai, near village, c. 3000 m, 25.6.1962, *Hedge* & *Wendelbo* 4544 (E, barcode: E00409424, photo); *Potentilla polyschista* Boiss. & Hohen. - **Iran**. In alpebus Hasartschal in partibus occidentalibus m. Elbrus, 12.7.1843, *Kotschy* 489 (K, barcode: K000762309, type specimen, photo); Elburs occid. in regione alpina montis Tacht Soleiman, ad nives prope Hasartschal, 4100 m, 29.6.1902, *Bornmüller* 6969 (E, barcode: E00409410, photo).

#### 4. Discussion

The *Herniaria* specimens collected from Karapet Pass (Bahçesaray, Van) were first compared with the related species in *Flora of Turkey* (Figure 4). According to this comparison, the specimens looking like *Herniaria argaea* Boiss. were different from these species as regards to their more apparent stylus, puberulent calyx base, longer sepals, and short fruit from the calyx (Brummitt, 1967; Davis et al., 1988; Ekim, 2000). That was why the specimens collected from the various regions of Turkey were compared with the flora of the neighboring countries, which showed that the morphological characteristics of the species were identical to those of *Herniaria caucasica*. This reveals that *Herniaria caucasica*, which is known to be distributed in Iran, Transcaucasia, and Asia, is also present in Turkey (Chaudhri, 1980; Shishkin, 1995).

Key to closely related *Herniaria* species according to *Flora of Turkey*

1. Sepals glabrous or ciliate or rarely puberulous; leaves glabrous or inconspicuously ciliate
2. Calyx glabrous at base; sepals up to 0.7 mm long; fruit exceeding calyx
3. Leaves and sepals ± completely glabrous .... **H. glabra**
3. Leaves glabrous or ciliate; sepals ciliate or rarely puberulous ..... **H. argaea**
2. Calyx puberulent at base, sepals 1–1.3 mm long; fruit including calyx ..... **H. caucasica**



**Figure 3.** *Potentilla multifida*: A- habit, B- inflorescence, C- upper surface of leaf, D- lower surface of leaf.

1. Sepals ± densely covered with long or short, stiff, grey hairs; leaves hirsute or ciliate, or sometimes subglabrous

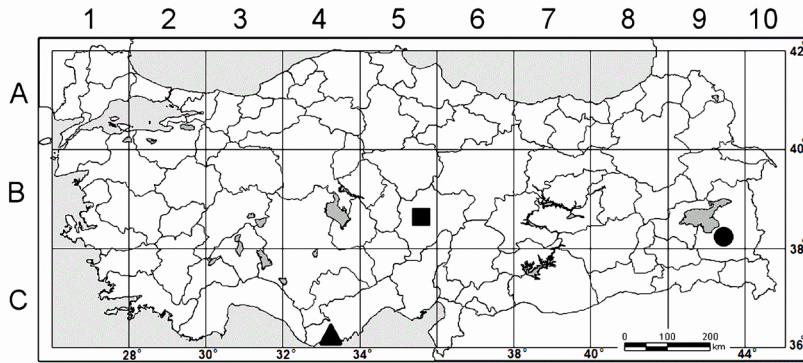
The *Rumex* specimens collected from Beşparmak Island (Büyükeceli village, Gülnar, Mersin) were first compared with the related species in *Flora of Turkey* (Figure 4). It was seen that the specimens were markedly different from the related *Rumex tuberosus* L. due to the fact that the specimens collected from Mersin were annual, non-tuber, and the margins of the valves (inner perianth segments) were denticulate-spinescent (Cullen, 1967; Davis et al., 1988; Özhatay, 2000). That was why the specimens were identified by comparison of the floras of the neighboring countries and it was found that the morphological characteristics of the collected species were identical to those of *Rumex cyprius*, which is distributed in Palestine, Egypt, Syria, Cyprus, Iraq, and Iran, and is also present in Turkey (Zohary, 1966; Rechinger & Schiman-Czeika, 1968; Webb, 1976).

Key to closely related *Rumex* species according to *Flora of Turkey*

1. Valves with entire margin, 2.5-4.5 mm wide ..... *R. arifolius*

1. Valves with denticulate-spinescent margin, 12-20 mm wide ..... *R. cyprius*

The *Potentilla* specimens collected from Erciyes Mountain (Kayseri) were first compared with the related species in *Flora of Turkey* (Figure 4). However, the collected specimens were observed to be significantly different from the related species *Potentilla polyschista* Boiss. as regards the presence of irregular pinnatifid, revolute margins and the greenish upper and grey-greenish lower surfaces of their leaves and the conical-filiform stylus (Peşmen, 1972; Davis et al., 1988; Erik & Güner, 2000). That was why the specimens were compared with the floras of the neighboring countries and it was found the morphological features of the collected specimens were identical to those



**Figure 4.** Distribution of *Herniaria caucasica* (●), *Rumex cyprus* (▲), and *Potentilla multifida* (■) in Turkey.

of *Potentilla multifida*. This proves the presence of this species, which is known to grow in Europe, Russia, Iran, Afghanistan, Japan, and China, in Turkey (Ball et al., 1968; Schiman-Czeika, 1969; Shishkin and Yuzepchuk, 1971).

Key to closely related *Potentilla* species according to *Flora of Turkey*

1. Leaflets pubescent to ± villous, glandular and green beneath ..... **P. argaea**

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1. Leaflets white tomentose, appressed sericeous-villous on veins and grayish-white beneath ..... **P. multifida**

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