

A New Alien Species for The Flora of Türkiye: *Spiraea japonica* (Rosaceae)

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Abstract

Aim of study: This study aimed to contribute the alien flora of Türkiye.

Area of study: Broadleaf forest along streamside and roadside of Kayaköy (Kemalpaşa/Artvin) in NE Anatolia.

Materials and methods: Samples collected from four adjacent areas during the excursion on an ongoing project in the years 2020 and 2021 were used in the present study. Voucher were identified using relevant literatures and stored in the herbarium of KATO and KTUB at Karadeniz Technical University.

Main results: *Spiraea japonica* L. f. (Rosaceae) is reported from natural habitat as a new alien species for the flora of Türkiye.

Research highlights: This study reveals the introduction of Japanese spirea, widely used as ornamental plants in European countries including Türkiye, into the natural habitat in NE Anatolia.

Key words: Alien Species, Anatolia, *Spiraea*, Rosaceae.

Türkiye Florası İçin Yeni Yabancı Bir Kayıt: *Spiraea japonica* (Rosaceae)

Öz

Çalışmanın amacı: Bu çalışma Türkiye'nin yabancı bitkilerine katkı sağlamayı amaçlamaktadır.

Çalışma alanı: Kuzeydoğu Anadolu (Kemalpaşa/Artvin)'nde yapraklı ormanlarda dere boyları ve yol kenarları.

Materyal ve yöntem: Bu çalışmada kullanılan materyaller, 2020 ve 2021 yıllarında devam eden bir proje çalışması sürecinde toplanmıştır. İlgili literatür kullanılarak teşhis edilen örnekler Karadeniz Teknik Üniversitesi KATO ve KTUB Herbaryumlarına konulmuştur.

Temel Sonuçlar: *Spiraea japonica* L. f. (Rosaceae), doğal habitatlardan Türkiye florası için yeni bir yabancı tür olarak rapor edilmektedir.

Araştırma vurguları: Bu tür, yaygın şekilde Avrupa ve Türkiye'de süs bitkisi kullanılmakta olan Japon Keçisakalı'nın KD Anadolu'nun doğal habitatlarına yerleştiğini ortaya koymaktadır.

Anahtar kelimeler: Yabancı Tür, Anadolu, *Spiraea*, Rosaceae.

Introduction

The genus *Spiraea* L. (Rosaceae) was treated under the 3 sections: sect. *Chamaedryon* Ser. with simple corymbiform or umbellate, sect. *Calospira* K. Koch. with compound corymbs and sect. *Spiraria* Ser. with panicles inflorescences (Pojarkova, 1939; Businský & Businská, 2002; Potter et al., 2007; Businský, 2020) with about 90 species grown mostly in forest-steppe, steppe, semi desert zones, and in subalpine belt of the mountains of the northern Hemisphere (Polyakova & Gataulina,

2008). All taxa of the genus are native to N. temperate zone, extending S. to mountainous subtropical areas (Wu et al., 2003).

Spiraea japonica L. f. belongs to sect. *Calospira* K. Koch (Tae Jin & Sun, 1996; Wu et al., 2003; Businský, 2020). It is a deciduous, perennial shrub native to Asia that has been introduced to the United States and Europe as an ornamental (URL-1, 2022). It is adapted to disturbed areas, tolerates a wide range of soil conditions and grows in full sun to partial shade. It is commonly found growing along streams and rivers, forest



edges, roadsides, and in successional fields and power line right-of-ways.

The genus *Spiraea* were represented by three native (*S. crenata* L., *S. hypericifolia* L. and *S. cudidaghense* Fırat & N. Aksoy) (Browicz, 1972; Fırat & Aksoy, 2017) and two ornamental garden taxa (*S. vanhoutteii* (Briot) Carrière and *Spiraea* × *bumalda* Burv.) in Türkiye (Güner et al., 2012; Bal & Abay, 2019). However, *S. japonica* are also reported from parks (Yener & Ayaşlıgil, 2016) and arboretum (Yücel, 2020) in Anatolia.

Recently, several naturalized Asian alien species have been reported from NE Anatolia such as *Lysimachia japonica* Thunb. (Terzioğlu & Karaer, 2009), *Rhus chinensis* Mill. (Terzioğlu & Coşkunçelebi, 2017), *Reynoutria japonica* Houtt. (Karaer et al., 2020), *Leptatherum boreale* (Ohwi) C.-H. Chen, C.-S. Kuoh & Veldk. (Terzioğlu & Özkan, 2020) and *Impatiens glandulifera* Royle (Coşkunçelebi and Terzioğlu, 2022). Like in Japan and China, heavy rainfall and frequent mist throughout the year give chance to the Asian plants easily colonizing in the blacksea region of Türkiye (Terzioğlu & Özkan, 2020). From chorological point of view, introduction of alien species into the new areas have been mainly resulted by both climate change and human activities. Wind and animals are also very important vectors of invasive alien species. These taxa have negative effects on natural ecosystems in a variety of ways. Reduction of diversity through the displacement of native species, reducing soil stability and water quality, and altering fire regimes and nutrient cycling are the main ones (Raizada et al., 2008; Wilson & Hoch, 2009).

Spiraea japonica L. f. (Japanese spirea) belongs to sect. *Calospira* K. Koch (Tae & Sun, 1996; Wu et al., 2003; Businský, 2020). It is a deciduous, perennial shrub native to Asia that has been introduced to the United States and Europe as an ornamental plant (URL-1, 2022). It is adapted to disturbed areas, tolerates a wide range of soil conditions and grows in full sun to partial shade. It is commonly found growing along streams and rivers, forest edges, roadsides, and in successional fields and power line right-of-ways. Japanese spirea has been reported as

introduced species from Europe, Australia and north America (URL-2, 2022). But, unfortunately, it has also shown the potential to become an invasive weed, naturalizing in much of the eastern United States (Wilson & Hoch, 2009).

In the present paper we aim to contribute to the alien flora of Anatolia, which is a natural bridge between Asia and Europe, by adding Japanese spirea from the natural habitat from Turkey.

Materials and Method

Plant material of this newly recorded species was firstly collected in the last stage of vegetation without flower by the authors in 2020 during the field studies of an ongoing project and coordinated by GPS (UTM 50 Datum). Materials were collected from A8 Artvin (Kemalpaşa District, Kaya Village) both at flowering and fruiting stage near the border of Republic of Georgia in the year of 2021 (Figure 2). The specimens were stored at both KATO and KTUB Herbariums at Karadeniz Technical University (Trabzon). The identification and authentication has been done using different relevant literature (Dostál, 1968; Wu et al., 2003).

Results and Discussion

Spiraea japonica L. f., Suppl. Pl. 262. 1782., (Figure 1).

Turkish Name: Japon Keçisakalı.

Syn.: *Spiraea angulata* Fritsch ex C.K. Schneid., *S. belloides* hort., *S. bullata* Maxim., *S. callosa* Thunb., *S. callosa* var. *glabra* Regel, *S. callosa* var. *pubescens* Regel, *S. fortunei* Planch., *S. fritschiana* C.K.Schneid., *S. fritschiana* var. *angulata* (Fritsch ex C.K.Schneid.) Rehder, *S. japonica* var. *acuminat* Franch., *S. japonica* var. *angulata* (Fritsch ex C.K.Schneid.) Kitam., *S. japonica* var. *bullata* (Maxim.) Makino, *S. japonica* f. *fortunei* (Planch.) Kitam., *S. japonica* var. *fortunei* Koidz., *S. japonica* var. *fortunei* (Planch.) Rehder, *S. japonica* subsp. *glabra* (Regel) Koidz., *S. japonica* var. *glabra* (Regel) Koidz., *S. japonica* var. *japonica*, *S. japonica* var. *mayebarai* Kitam., *S. japonica* var. *ovatifolia* Koidz., *S. japonica* var. *parvifolia* (Koidz.) Kitam., *S. japonica* f.

pubescens (Regel) Kitam., *S. japonica* var. *pubescens* (Regel) Koidz., *S. japonica* var. *tomentosa* Koidz., *S. japonica* var. *typica* C.K.Schneid., *S. koreana* Nakai, *S. koreana* var. *macrogyne* Nakai, *S. koreana* var. *rosea* Nakai, *S. microgyne* Nakai, *S. microgyne* var. *velutina* Nakai (URL-3, 2022).

The description of the species was prepared based on our new collections, Dostál (1968) and Wu et al. (2003).

Deciduous shrub, up to 1.5 m tall, multiple upright, brown to reddish-brown stemmed. Simple leaves alternate, petiole to 3 mm, pubescent, leaves ovate, lanceolate or

oblanceolate, green above, paler and glabrous or puberulous on veins below, base cuneate, margin crenate to doubly serrate, apex obtuse or acute to acuminate. Corymbs terminal leafy shoots of current year, compound, up to 12 cm wide, many flowered; rachis and pedicels densely pubescent; Flowers to 7 mm. Sepals triangular, apex acute. Petals 5, pink (rarely white), ovate to orbicular, apex obtuse. Stamens 25-30, much longer than petals. Carpels free, follicles divergent, glabrous; styles ascending. Seeds linear to oblong, about 0.1 mm in length. Fl. 6-7, Fr. 8-9. Broadleaved forest clearings, roadside, 174-195 m.

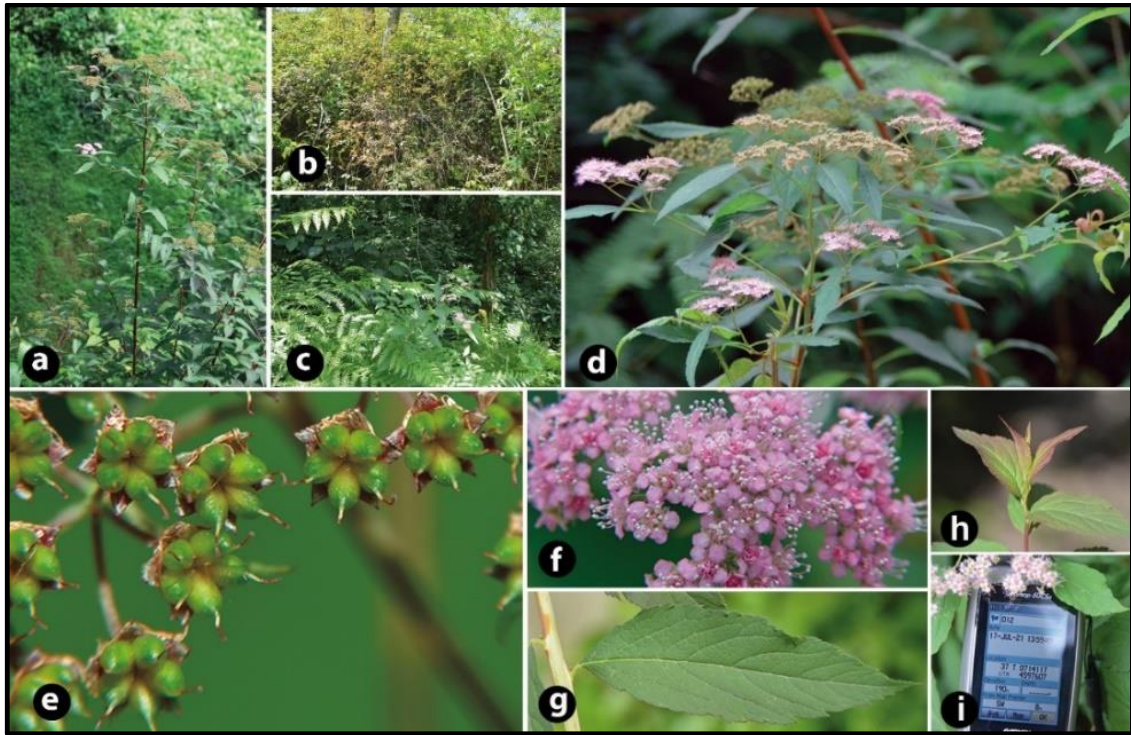


Figure 1. *S. japonica* L. f. : **a**-Habit of the species, **b**, **c**- Habitat in forest edge, along the road, **d**- Terminal corymbs on erect, long, leafy shoots of current year, **e**- Divergent follicles, **f**- Pink flowers, **g**- Leaf, **h**- Leafy shoot of current year, **i**- UTM coordinate

Examined specimens: A8 Artvin: Kemalpaşa, Kaya Village, broad leaved forest and roadsides, 174 m, 04.08.2020, Coşkunçelebi 1409! (KTUB), 22450! (KATO); ibid., 189 m, 28.4.2021, UTM: 0714056 – 4597507 Coşkunçelebi 1418!

(KTUB), 22451! (KATO); ibid., 195, 9.6.2021, UTM: 0714127 – 4597602, Coşkunçelebi 1419! (KTUB), 22452! (KATO); ibid., 195, 17.07.2021, UTM: 0714117 – 4597607 Coşkunçelebi 1420! (KTUB), 22453! (KATO) (Figure 2).

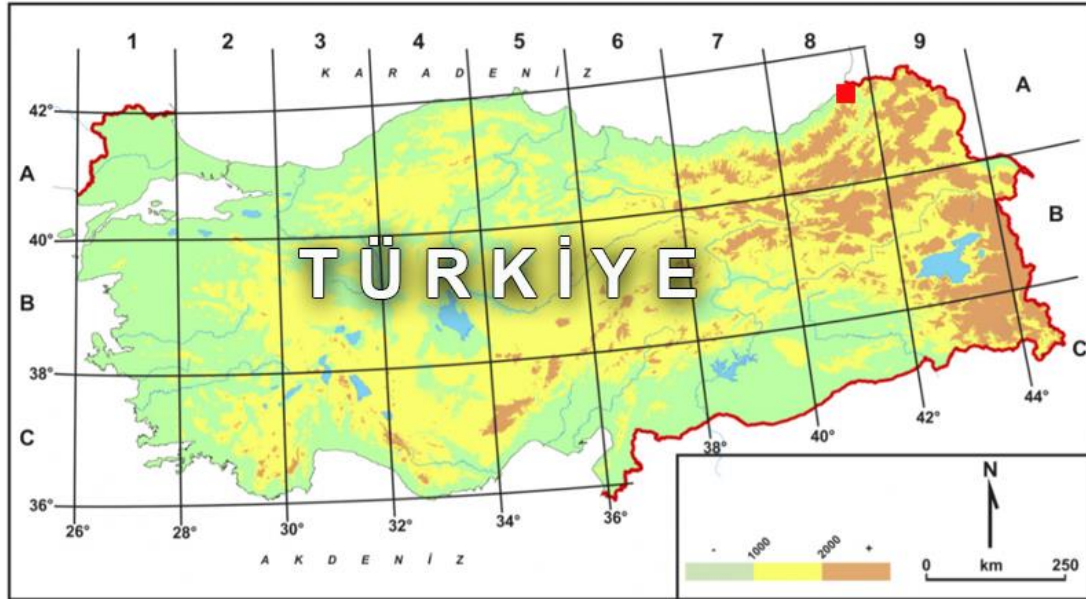


Figure 2. Naturalized distribution of *S. japonica* (■) in Türkiye (Adapted from Güner & Ekim, 2014)

On 4 August 2020, during the field study, focused on Bur Cucumber (*Sicyos angulatus* L., Cucurbitaceae) in NE Anatolia, we found unexpected *Spiraea* individuals, with, under broadleaved forest and edge of roads. Similar habitats of described population in 2020 were re-visited three more times in 2021, and fruiting and flowered materials were collected in order to certain identification. Because of the pink color of flowers, it is very easy to distinguish this taxon from the native and exotic *Spiraea* taxa (with white or creamy-white flowers) distributed in Türkiye.

Japanese spirea was known an exotic ornamental species in parks of the NE Anatolian, but not observed in natural habitats in Türkiye, before (Yener & Ayaşlıgil, 2016; Yücel, 2020). Early detection of this alien species from Anatolian natural habitats may play an important role in the conservation of plant biodiversity in Colchis sector of Euxine province. *S. japonica* is reported as invasive in different states of USA (Feldhaus et al., 2013) and Europe (Essl, 2005; Veenvliet et al., 2019) means its non-native range extends far from its native range in eastern Asia.

With its pinkish deep rose flowered form and variegated leaves, *Spiraea × bumalda* Burv. is reported as ornamental plant from Turkey and Europe (Dostál, 1968; Bal & Abay, 2019; Businský, 2020). This taxon has been commonly produced in the horticulture

and considered to be an accepted interspecific hybrid between *S. albiflora* (Miq.) Zabeland *S. japonica* of unknown garden origin (Businský, 2020; URL-3, 2022).

High annual seed production of *S. japonica* increases local propagule pressure, and dispersal via water or wind are common and it is an opportunistic shrub that grows well in disturbed areas and a wide variety of habitats (Feldhaus et al., 2013). A common habitat for the genus *Spiraea* in general seems to be in fields, forest, riparian areas, bogs, or other wetland habitats (Klinka et al. 1985; Ogle 1991) which are largely distributed in NE Anatolia. It has hitherto become naturalized in Türkiye and may occupy many similar habitats situated in this region. It is estimated that *S. japonica* is in the initial establishment and/or lag phases of invasion in Türkiye. So, the possible new dispersion range and invasiveness of this species should be monitored in the region, including NE Anatolia and Republic of Georgia. More than 80-90 individuals counted in the area, however about a couple of hundreds is estimated to distribute in the area. Because both of cliff and dense population of thorny plants, we could not count the total number of species in the studied area. The main vector of the species is estimated as human activities together with wind and birds. This species is known as an extremely popular landscape

plant and used in landscape design in Turkey (Güner et al., 2012; Yener & Ayaşlıgil, 2016; Bal & Abay, 2019; Yücel, 2020). It is underlined that 85% of invasive woody plants, such as Japanese spirea, were originally introduced for landscape purposes (Reichard, 1997). In Türkiye, it is in the initial establishment and/or lag phases of invasion with, estimated, more than 150 individuals.

The genus *Spiraea* is represented with three native (Browicz, 1972; Fırat & Aksoy, 2017), two ornamental (Güner et al., 2012; Bal & Abay, 2019) and one alien (present study) taxa in the flora of Türkiye.

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Ethics Committee Approval

N/A

Peer-review

Externally peer-reviewed.

Author Contributions

Conceptualization: S.T., K.C.; Investigation: S.T., K.C.; Material and Methodology: S.T., K.C.; Supervision: S.T., K.C.; Visualization: S.T.; Writing-Original Draft: S.T., K.C.; Writing-review & Editing: S.T., K.C.; Other: All authors have read and agreed to the published version of manuscript.

Conflict of Interest

The authors have no conflicts of interest to declare.

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