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Sorbaria species cultivated in Poland

Abstract: Specimens of the genus *Sorbaria* cultivated in Polish dendrological collections have been examined. It appears that in Poland only 3 species are cultivated: *S. sorbifolia*, *S. kirilowii* and *S. tomentosa*. Some supposed hybrids of *S. sorbifolia* and *S. kirilowii* or *S. tomentosa* have been found in the Arboretum in Kórnik and Botanical Gardens in Poznań and Warsaw. A new, supplemented distribution map, a key to identification, and descriptions of the species occurring in Poland are given.

Additional key words: *Spiraeoideae*, dendrological collections in Poland

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Introduction

Sorbaria is a genus known for a long time; it is composed of only a few species, sometimes cultivated in gardens and often found in specialized collections, arboreta and botanical gardens. However, it presents difficulties to botanists and gardeners. Some taxa were described many times under different names, which was the reason of nomenclatural confusion. The basic taxonomic problems were resolved by a Dutch investigator, Knud Rahn (1989). In collections specimens of different *Sorbaria* species are usually planted one next to another, which is conducive to hybridization.

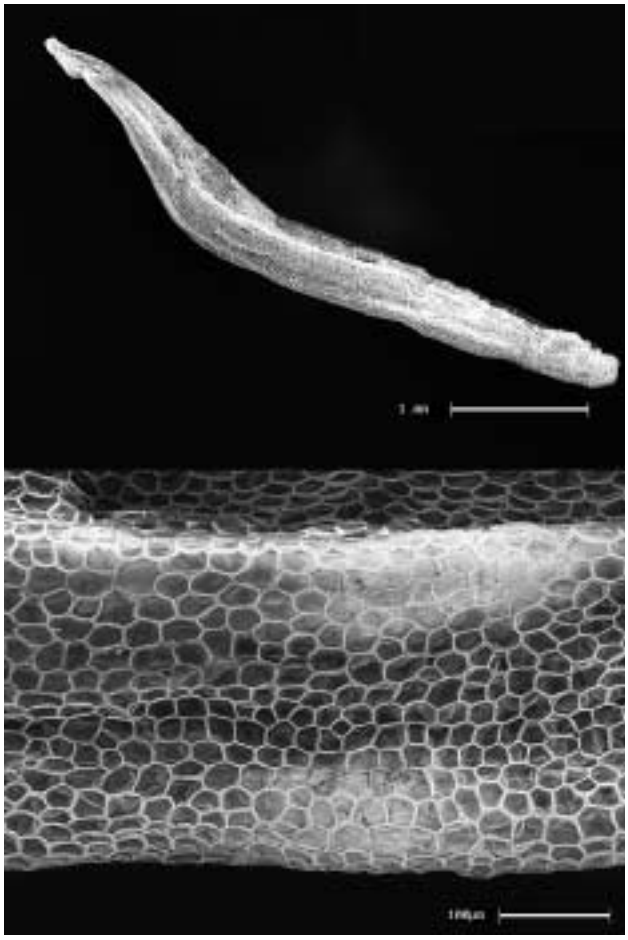
The aim of this study was to verify the identification of *Sorbaria* specimens in Polish dendrological collections. This work is based on my own observations carried out in the Arboretum of the Institute of Dendrology (Polish Academy of Sciences) in Kórnik, in the Botanical Garden of the Adam Mickiewicz University in Poznań, and on herbarium studies in Poland and abroad.

Genus description

Sorbaria (Ser. ex DC.) A.Braun in Ascherson *Fl. Brandenb.* 1: 177, 1860

Deciduous shrubs forming colonies by suckers. Stems 0.2–7 m high. Leaves alternate, pinnate, up to 40 cm long. Leaflets 7–33 (usually about 17), 1.5–13 cm long, 0.2–4 cm wide, glabrous or hairy (with simple or stellate hairs). Leaflets margin doubly or simply serrate; one main tooth consists of up to 6 little ones. Stipules persistent, ovate to lanceolate. Inflorescence: a panicle, usually large, up to 35 cm long, composed of many bisexual flowers. Flowers small, up to 11 mm in diameter. Petals 5, white, rounded and shedding very early. Sepals 5. Stamens 20–50. Carpels 5 (rarely 4), connate up to the middle of their height. Receptacle disk-shaped. Fruit composed of 5 partly connate follicles dehiscing dorsally lengthwise when ripe. Seed light-brown, elongated, with fragile seed coat (Phot. 1).

Natural range: Siberia, Kamchatka, Japan, China, Himalayas, Central Asia (Fig. 1). Widely distributed in cultivation as ornamental plants. In nature *Sorbaria* species occur mainly at banks of streams and rivers and their light seeds can float on water surface and sprout immediately.



Phot. 1. Seed of *Sorbaria sorbifolia* and surface of its seed coat (SEM)

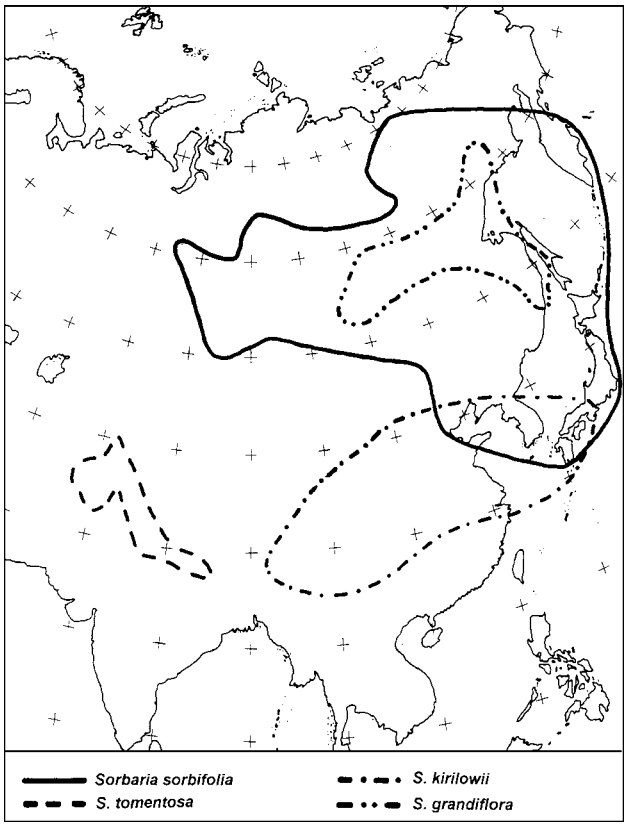


Fig. 1. Distribution of *Sorbaria* species (according to Rahn 1989, supplemented by: Shipchinskii 1954, Osmaston 1978, Hara and Williams 1979, Malyshev and Peshkova 1979, Sokolov et al. 1980)

Among species of this genus, *Sorbaria sorbifolia* was the earliest introduced to Europe, and is now widespread in cultivation. It was first described by Linné as *Spiraea sorbifolia* (Sp. Pl. (1753) 490). *Sorbaria* was treated as a separate genus by Alexander Braun in *Flora der Provinz Brandenburg* in 1860, and this name is used until now. Before that, *Sorbaria* species were included not only in the genus *Spiraea*, but also *Schizonotus* or *Basilima*. Takhtadzhyan (1987) assigned this genus (together with *Chamaebatiaria* from North America) to the family Rosaceae, subfamily Spiraeoideae and tribe Sorbarieae.

The Latin name *Sorbaria* refers to the shape of its leaves, resembling those of *Sorbus aucuparia*. In English it is sometimes called 'false spirea' and in Polish its common name is 'tawlina', which indicates the similarity to spirea. Nevertheless, *Sorbaria* and *Spiraea* are easily distinguishable genera. *Spiraea* has simple leaves, free pistils and carpels alternating with sepals, while the leaves of *Sorbaria* are pinnate, pistils connate at the lower half and carpels opposite to sepals.

Key to identification of *Sorbaria* species cultivated in Poland.

1. Fruits always hairy. Stamens usually 30 or more. Lower surface of leaflets without simple hairs. Shrub up to 3 m high ..... 1. *S. sorbifolia*
1. Fruits glabrous or hardly ever puberulent. Stamens usually about 20. Lower surface of leaflets usually at least partly covered with simple hairs (sometimes hidden under stellate hairs). Shrub up to 7 m high, usually more than 3 m ..... 2.
2. Style fixed well below follicle apex. Lower surface of leaflets ± hairy; stellate hairs usually present, simple hairs in vein axils. Branches ± patent, so inflorescence very loose ..... 2. *S. kirilowii*
2. Style recurved, fixed at or near follicle apex. Lower surface of leaflets with simple hairs arranged along main nerve or glabrous, stellate hairs normally lacking. Inflorescence denser ..... 3. *S. tomentosa*

Species description

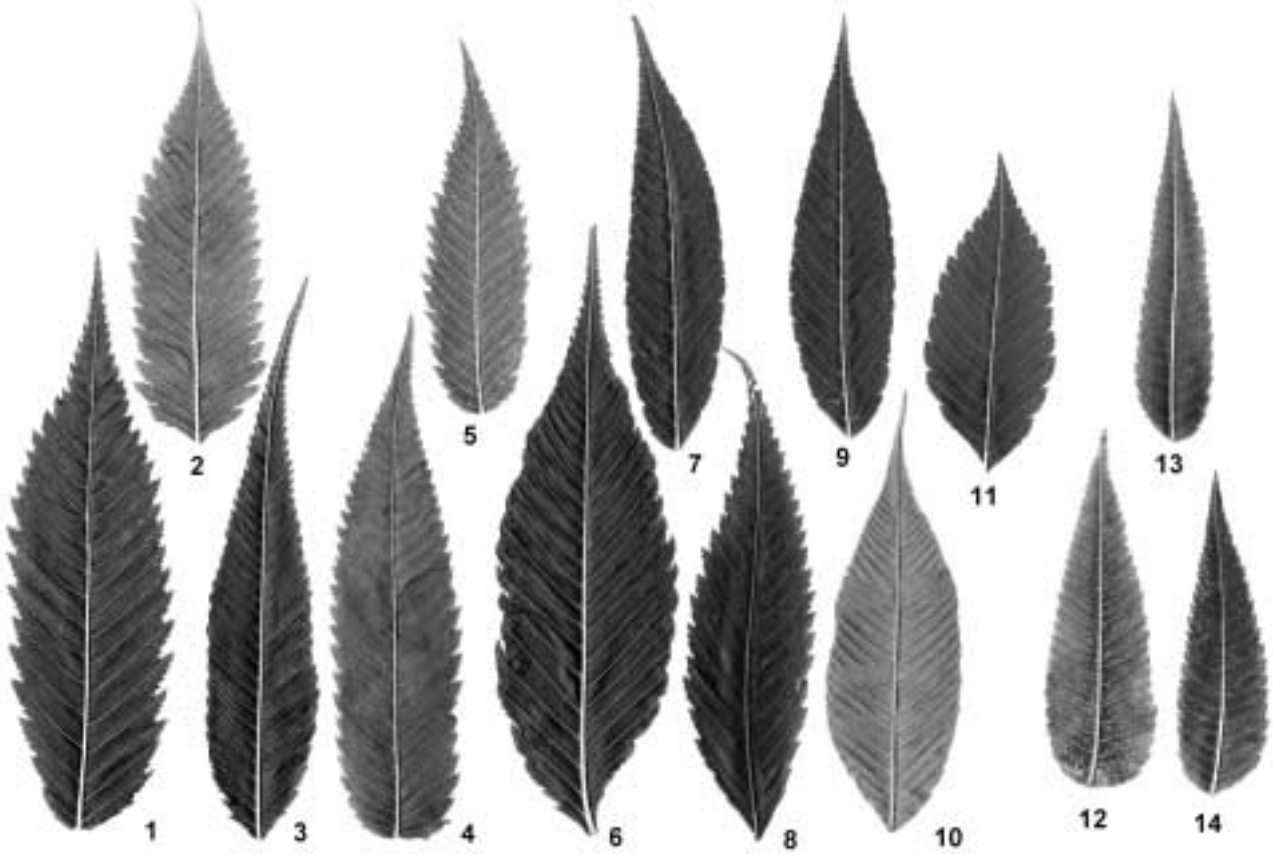
1. *Sorbaria sorbifolia* (L.) A.Braun in Ascherson *Fl. Brandenb*. 1: 177, 1860
   Synonym: *Sorbaria stellipila* (Maxim.) C.K.Schneid.
   English name: Sorbaria
   Polish name: *tawlina jarzębolistna*

Shrub up to 3 m high. Leaf-buds opening very early in spring. Leaves up to 30 cm long. Leaflets 9–21(–25), 2–10 cm long and 1–3 cm wide (Phot. 2), their lower surface glabrous or with stellate hairs, simple hairs lacking. Inflorescence 10–35 cm long, 5–14 cm wide. Flowers 7–11 mm in diameter. Sepal margin usually with glands, sometimes with stellate hairs. Stamens numerous (up to 45), but normally about 30, of variable length, considerably longer than petals irrespective of their position in the whorl; with the long filaments they make the inflorescence look flossy (Phot. 3). Fruits up to 5.5 mm long, pubescent (Fig. 2). Flowering from June to August.

In the wild it grows in thickets at stony or sandy banks of rivers and streams, in spruce forests, wet birch, aspen or mixed woods, on borders of bogs and forests, also in meadows and in ravines (Popov 1957, Polozhii et al. 1975, Malyshev and Peshkova 1979, Grubov 1982).

It was introduced into Europe in the mid-18th century (Shipchinskii 1954, Bulygin and Firsov 1998). About the same time it started to be planted in gardens of Central Europe – since 1759 according to Hegi (1922). It is the most popular *Sorbaria* species in cultivation. It is very hardy in our country and suitable for large gardens and parks, as it grows quickly, forming extensive thickets. Sometimes it is used to

Phot. 3. Inflorescence of *S. sorbifolia* (fot. Elżbieta Szubert)



Phot. 2. Leaflets of *Sorbaria* (1–5 *S. sorbifolia*, 6–11 *S. kirilowii*, 12–14 *S. tomentosa* var. *tomentosa*)

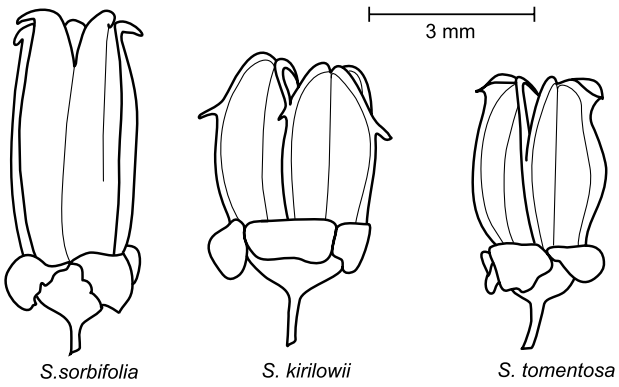


Fig. 2. Fruits of *Sorbaria*

strengthen slopes. Occasionally it escapes from cultivation and grows in the wild.

In Poland it occurs in the majority of dendrological collections (Arboretum in Kórnik, Arboretum of Warsaw Agriculture University in Rogów, Dendrological Garden of Poznań Agriculture University, Botanical Gardens in Lublin, Warsaw and Poznań).

2. *Sorbaria kirilowii* (Regel) Maxim. *Acta Hort. Petrop.* 6: 225, 1879

Synonyms: *Sorbaria assurgens* Vilm. & Bois, *Sorbaria arborea* C.K.Schneid.

English name: Chinese Sorbaria

Polish name: *tawlina Kiryłowa*

Shrub up to 7 m high. Leaflets 7–31, 3–13 cm long and 1–4 cm wide (Phot. 2). Density of hairiness on lower surface of leaves highly variable; simple hairs present in vein axils (sometimes very scarce); stellate hairs usually present, often overtopping less numerous simple hairs, but absent in plants from northern part of natural range. Inflorescence very often pendant and loose, because its branches make an angle of ± 90° to main axis (Phot. 4). Stamens 20–25 and, like in *S. tomentosa*, epipetal ones are shorter than others. Fruits always glabrous. Style fixed distinctly below follicle apex. Dorsal ridge of follicles provided with a rib formed by a lighter swelling (Fig. 2).

S. kirilowii occurs in mountain thickets and woodlands at altitudes of 950–3600 m (Rahn 1989). In cultivation since 1896 (Krüssman 1978). In Polish collections quite frequent (Arboretum in Kórnik, Botanical Garden of the Adam Mickiewicz University in Poznań, Botanical Garden of Wrocław University, Botanical Garden Jagiellonian University in Kraków, Dendrological Garden in Przelewice).

In the Kórnik Arboretum I found a specimen of *S. kirilowii* with very peculiar leaves. Their leaflets are deeply serrate to almost pinnate, sometimes with a whole range of transitions within the same leaf, and

Phot. 4. Inflorescence *S. kirilowii* (fot. Elżbieta Szubert)

Phot. 5. Leaf of *S. kirilowii* from Arboretum in Kórnik

even within the same leaflet (Phot. 5). However, only some of the first leaves and on several shoots show this interesting irregularity.

3. *Sorbaria tomentosa* (Lindl.) Rehder *Journ. Arn. Arb.* 19: 74, 1938

Synonyms: *Sorbaria lindleyana* (Lindl.) Maxim., *Sorbaria olgae* Zinserl.

English name: Himalayan Sorbaria

Polish name: *tawlina kutnerowata*

Shrub up to 6 m high. Leaflets 12–23. Lower surface of leaflets usually with hairs along veins, seldom glabrous, 23–100 × 8–35 mm, doubly serrate (Phot. 2). Stellate hairs absent or scarce. Inflorescence (12-)20–30(–41) cm long and 10–20 cm wide. Flowers white, 8–10 mm in diameter. Stamens 17–30, but usually about 20, epipetal ones (centrally overlying petals) distinctly shorter than others. Follicles about 2.5 mm (up to 4.5 mm) in length, glabrous or (very seldom) pubescent (Fig. 2).

Natural range: Himalayas, eastern Afghanistan and Central Asia; mountains (1400–3800 m), on rocky soils, at the banks of streams, riversides, screes and near cultivated areas (Parker 1973, Osmaston 1978, Polunin and Stainton 1984, Rahn 1989). In cultivation since 1840 (Krüssman 1978). In Poland rare, its presence confirmed only in Botanical Gardens in Lublin and Poznań.

Apart from the above taxon, *S. tomentosa* var. *tomentosa*, there is also *Sorbaria tomentosa* (Lindl.) Rehder var. *angustifolia* (Wenzig) Rahn (synonyms: *Sorbaria angustifolia* (Wenzig) Zabel and *Sorbaria aitchisonii* (Hemsl.) Rehder). I have not found it in our collections. This variety is easy distinguishable, as its leaflets are glabrous, 40–80 × 5–12 mm, simply or almost simply serrate. In the wild it occurs in water-channels, at 2100–2750 m, in the Kuram Valley at the frontier between Afghanistan and Pakistan (Aitchison 1979). In cultivation since 1815 (Krüssman 1978).

Apart from the above species, *Sorbaria grandiflora* (Sweet) Maxim. was registered in Poland by Nowak et al. (1999). This plant is also known under three synonymic names: *S. alpina* (Pall.) Dippel, *S. pallasii* (G.Don) A.Pojark. and *S. rhoifolia* Komarov. I did not confirm its presence in Polish gardens. The plants occurring in our collections under the name *S. grandiflora* belong to *S. tomentosa* and *S. sorbifolia*. *S. grandiflora* is easy to distinguish, due to its small size (up to 0.5 m high in nature), small leaflets (usually up to 4 cm long), relatively large flowers (12–18 mm in diameter) and small inflorescence 2–8(–13) cm long and 2–6(–11) cm wide. In the wild (E Siberia, see Fig. 1) it grows in the alpine zone (1300–1700 m) on ledges, rocky slopes and gravel (Poyarkova 1939, Popov 1957, Shlotgauehr 1978, Malyshev and Peshkova 1979). It has been cultivated since 1852 (Krüssman 1978). *S. grandiflora* differs very distinctively from the other species of the genus and is hardy (Krüssman 1978), so certainly would be a valuable plant in every collection.

Hybrids

In gardens and arboreta *Sorbaria* species are often planted side by side, which is conducive to their hybridization. Among the examined specimens I found some plants difficult to classify unequivocally. In the case of supposed hybrids I conducted a whole year's observation and collection of herbarium material in different seasons to collect the most complete set of characters. I also assessed the proportion of normally formed pollen grains in total mass of pollen (Müntzing's staining method, using a mixture of equal amounts of 1% aceto-carmine and neutral glycerine).

I found some hybrids among the plants cultivated in the Kórnik Arboretum, and in Botanical Gardens in Poznań and Warsaw. They were often characterized by the presence of simple hairs on the lower surface of leaves (like in *S. kirilowii* and *S. tomentosa*) and pubescent follicles (like in *S. sorbifolia* and *S. grandiflora*). Furthermore, the percentage of healthy pollen grains was in such cases usually lower (24–87%, compared to 72–100% in plants determined as pure species). One can expect that they are hybrids between *S. sorbifolia* and *S. kirilowii* or *S. tomentosa*, because these three species occur in our collections. Identification of the parental species based exclusively on morphological traits is not reliable, so biochemical and genetic characters should be included in a further analysis.

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