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Salix ×browiczii (Salicaceae) – a new nothospecies from northeastern Greece

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Abstract: A hybrid between *Salix triandra* and *S. xanthicola*, occurring in the Rhodope Mountains in northeastern Greece, is described as a new nothospecies. It differs from *S. triandra* by having distinctly hairy young stems and more deeply serrate-dentate leaf margins, and from *S. xanthicola* by a smooth, unstructured (without conicoids) wax layer on the lower side of the leaves and the presence of subsessile glands on the petioles.

Keywords: willows, sympatric hybridization, Balkans

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Introduction

Willows hybridize incredibly readily, which is often considered a distinctive characteristic of this genus (e.g. Argus, 1974; Argus et al., 2010; Belyaeva, 2020; Rechinger, 1964, 1992; Rechinger & Akeroyd, 1993; Skvortsov, 1968, 1999). Hybridization, however, blurs the boundaries between species, which is one of the reasons why taxonomists face difficulties in identifying them. In other words, a comprehensive understanding of potential hybridization events is necessary to delineate *Salix* species accurately. Moreover, this knowledge contributes to our understanding of biodiversity, evolutionary processes, and conservation efforts.

Recently, during the revision of the *Salix* herbarium collection of the Institute of Dendrology of the Polish Academy of Sciences in Kórnik (KOR), we identified a previously unknown hybrid of *Salix triandra* L. × *S. xanthicola* K.I.Chr. The herbarium specimen of this hybrid was collected in 1979 during a field trip to Greece, i.e. 12 years before the name *S. xanthicola* was published. Until now, the hybrid was stored under the name "*Salix triandra* L. forma!".

The first of putative parents, *Salix triandra*, is a deciduous shrub or small tree native to Europe and Western and Central Asia (Skvortsov, 1968, 1999). The second one, *S. xanthicola*, is an erect shrub that has a significantly smaller range, limited mainly to the Rhodope Mountains, on the borderland of southeastern Bulgaria and northeastern Greece (Christensen, 1991, 1997, Christensen et al. 2006). It was described relatively recently (Christensen, 1991), and to date, its two hybrids, with *S. alba* L. and *S. amplexicaulis* Bory & Chaub., were reported from

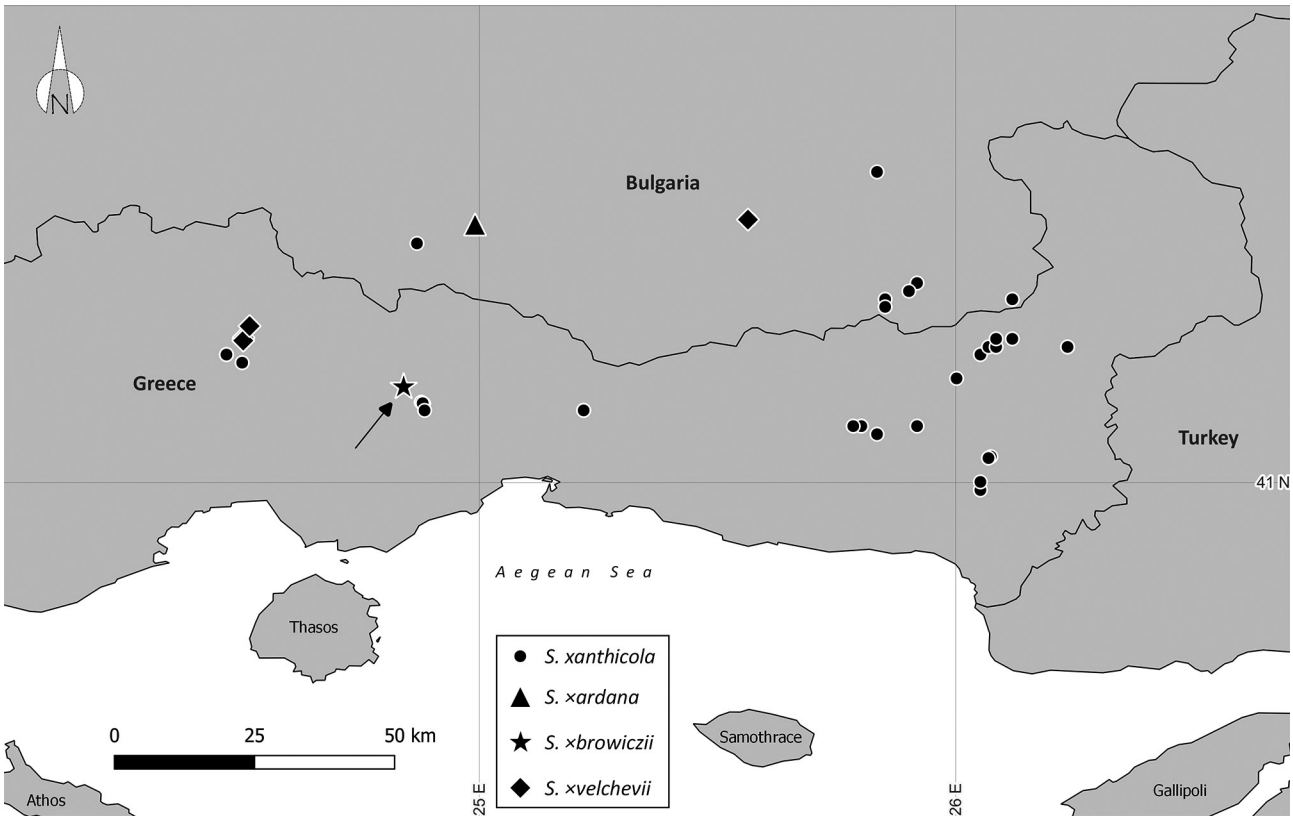

Fig. 1. Distribution of *Salix xanthicola* and its hybrids; based on data from Christensen (1991, 1997), Christensen et al. (2006), Zieliński et al. (2006), Kailis & Eleftheriadou (2011)

Bulgaria by Zieliński et al. (2006). A few years later, more information emerged regarding the occurrence of the latter hybrid, *S.* ×*velchevii* Ziel. & Pancheva, in Greece (Kailis & Eleftheriadou, 2011) (Fig. 1).

The description of this hybrid species is based on a single herbarium specimen, collected in mid-summer, after flowering had already occurred, hence the lack of flowers and fruits on it. Nonetheless, it stands out well among other willows, even in its vegetative form. It is assumed that in the future, a set of diagnostic features for this species will be supplemented by botanists conducting research in the area of its potential occurrence.

Material and methods

To compare the hybrid specimen with the parent species, we used the entire herbarium collection at KOR (herbarium codes following Thiers, 2023+): 95 herbarium sheets of *S. triandra*, 25 of *S. xanthicola*, and one of the hybrid specimen. As we only had a herbarium specimen without flowers and fruits at our disposal, we have expanded our observations to include the micro-morphology of the abaxial surface of the lamina. For the scanning electron microscope (SEM) images, a Hitachi S3000N was used (equipped with a secondary electron detector). Plant fragments from herbarium specimens (*S. triandra*: KOR 27181, 41158, 42253, 42288; *S. xanthicola*: KOR 27173; hybrid: KOR 27179) were mounted on aluminium stubs using double-sided adhesive carbon discs and coated with gold and palladium. The accelerating voltage used was 15 kV.

Results and discussion

Taxonomic treatment

***Salix* ×*browiczii* Ziel., D.Tomasz. & Kosiński, nothosp. nov.**

(*S. triandra* L. × *S. xanthicola* K.I.Chr.)

LSID: urn:lsid:ipni.org:names: 77319699-1

Fig. 2–4, 4B, 4E, S1–S4

Holotype: Greece. Province Xanthi. E of Gerakas, W of the road between Xanthi and Echinos, close to the road to Stavroupoli, 41°11'43"N, 24°50'40"E. Thickets on the slope above the Kosynthos River. 24.06.1979, leg. A. Boratyński, K. Browicz, & J. Zieliński (KOR 27179) (https://rcin.org.pl/dlibra/publication/274369).

Description

Shrub ca 2 m tall. Stems erect. Decorticated wood is smooth (with some indistinct ridges and wood imperfections) (Fig. S1). Annual stems ±

Fig. 2. Holotype of *Salix* ×*browiczii* (KOR 27179)

densely grey-tomentose (Fig. S3). Buds tomentose, slightly flattened, adpressed to the shoot in their lower part and declined from it in their upper par

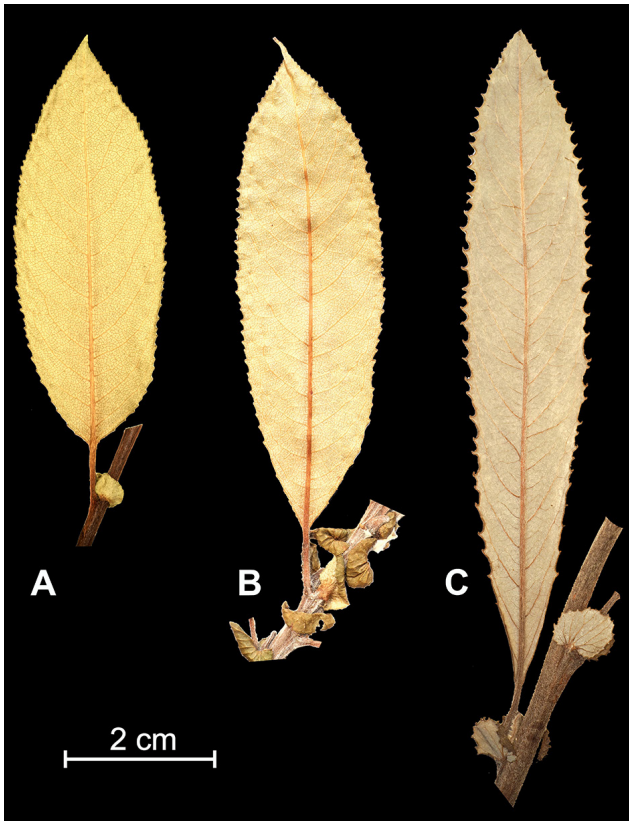

Fig. 3. Leaves (with stem fragments) of *Salix triandra* subsp. *triandra* (A) (KOR 44294), *S.* ×*browiczii* (B) (KOR 27179), and *S. xanthicola* (C) (KOR 27170) (photo by P. Kosiński)

(Fig. 3B). Older stems glabrous. Leaves up to 10 cm long and 2.5 cm wide, narrowly oblong to narrowly oblanceolate, acute to shortly acuminate, densely serrate-dentate, with slightly irregularly curved teeth (Fig. 3B, S2). Petioles 5–10 mm long, with several sessile to short-stipitate glands just below the leaf blade. Stipules large, broad, coarsely dentate, with scattered glands above, persistent (Fig. S4). Young leaves shortly puberulent on both sides, adult ones subglabrous, dark green above, and grey-green, covered with ± smooth wax layer beneath (Fig. 4B, 4E). Flowers and fruits unknown.

Diagnosis

Generally, *Salix* ×*browiczii*, by having a smooth wax layer (i.e. without conicoids or other structures) on the abaxial side of leaves (Fig. 4B, 4E), resembles *S. triandra* subsp. *triandra,* which also grows in this region (Fig. 4A, 4D). The question arises as to why these structures do not exhibit an intermediate character between the parental species. A study by Szafranek et al. (2008) on *Salix* demonstrates that the hybrid taxa within this group do not consistently occupy an intermediate position in terms of chemistry or micromorphology but tend to resemble one of their parents. The absence of wax structures can be explained by assuming that it is a dominantly inherited trait.

Furthermore, *Salix* ×*browiczii* differs from *S. triandra* by distinctly grey tomentose young twigs and buds, ± pubescent young leaves and a more deeply serrate leaf margin (Fig. 3, S3). The above features

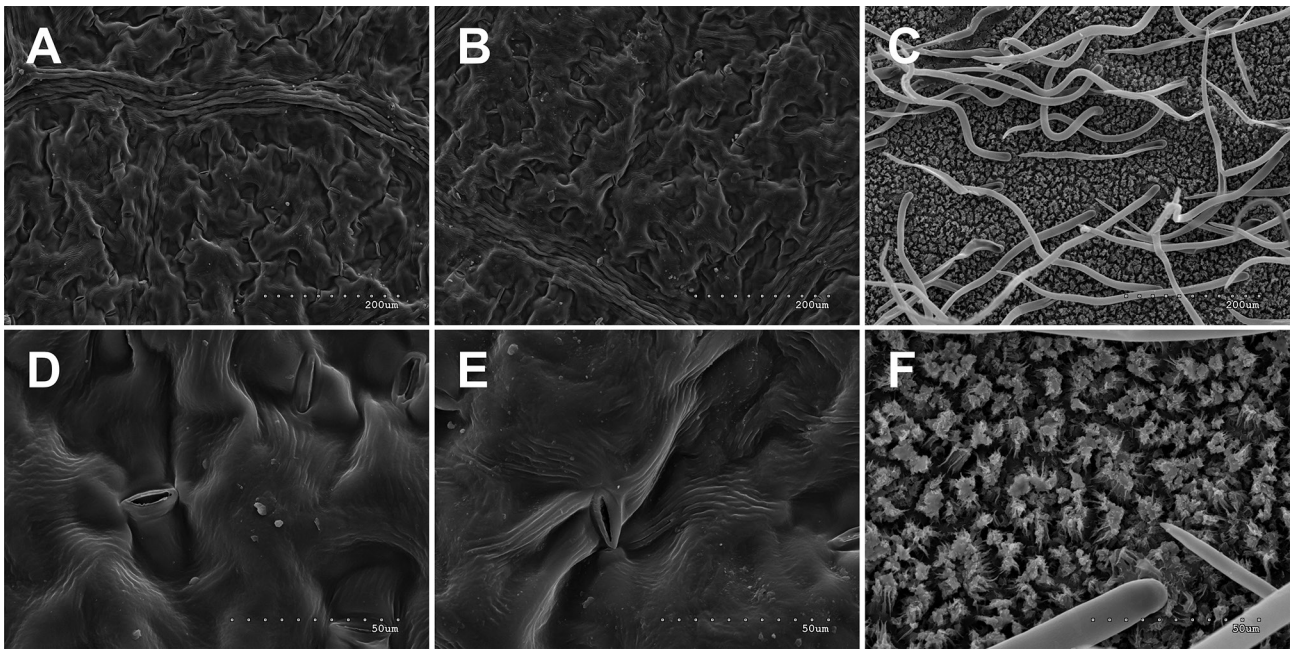

Fig. 4. Surface of the abaxial side of the leaf blade of *Salix triandra* subsp. *triandra* (A, D) (KOR 27181), *S.* ×*browiczii* (B, E) (KOR 27179), and *S. xanthicola* (C, F) (KOR 27173); surface distortions result from material drying (photos by D. Tomaszewski)

clearly indicate that the second parent species is *S. xanthicola* which grows nearby. However, in the latter species, the leaves are permanently hairy on both sides and, contrary to the wax structure of *S. triandra* occurring in this region, the lower surface of its leaves is always covered with wax, which forms conicoids (Fig. 4C, 4F).

From *S. xanthicola,* the hybrid is distinguished by the weaker indumentum of all organs, green abaxial leaf surface, type of wax layer and the presence of glands in the upper part of the petioles (Fig. 3).

Eponymy

The epithet "browiczii" commemorates Kazimierz Browicz (1925–2009), a Polish botanist and biogeographer, an outstanding expert in the woody flora of SW Asia and the Eastern Mediterranean, who organized and participated in the expedition to Greece mentioned above.

Acknowledgements

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