

Contribution to the description and distribution of *Salix* × *velchevii* (*Salicaceae*)

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Abstract. In the current study the authors report for the first time the occurrence of *Salix* × *velchevii*, a recently described willow hybrid, in Greece. The specimens were collected from three localities in the northeastern part of the Drama Prefecture, at low altitudes, where both parent species were present. Detailed information concerning the taxon's ecology is provided too. Finally, a contribution to its description is made with the measurement and description of the leaf morphological characters and with the first- time description of the female catkins and fruits.

Key words: Greece, *Salicaceae*, *Salix* hybrid, *Salix* × *velchevii*, the Rhodopes

Introduction

Salix × *velchevii* Ziel. & Pancheva (*Salix xanthicola* K.I. Chr. × *S. amplexicaulis* Bory) has been recently described from two localities in Southeast Bulgaria by Zieliński & al. (2006). *S. xanthicola* is a Balkan endemic species occurring in Northeast Greece and Bulgaria (Christensen & al. 2006), while *S. amplexicaulis* is a sub-Mediterranean species occurring on the Balkan Peninsula, in Northern and Central Anatolia and locally in S Italy (Christensen 1997). Zieliński & al. (2006) have based their description of *S. velchevii* on sterile samples. Therefore, no description exists of the taxon's flowers and fruits. Moreover, they did not provide a detailed description of the taxon's ecology.

In the summer of 2009, during a study of genus *Salix* in the Drama Prefecture in Northeast Greece, the authors collected three samples that were later identified as *S. velchevii*.

Material and methods

The samples were collected on the banks of the Arkoudorema stream in the northeastern part of the Dra-

ma Prefecture (Fig. 1), at the end of July 2009. The plots were revisited in April 2010, in order to collect flowering specimens. In the wider area only female individuals were found. The following parameters were recorded for each sample in a plot of 100 m²: geographical coordinates (WGS 84 international coordinate system), locality – name of the closest stream, altitude, exposition and slope incline, total number of plants in each plot and their percentage coverage, maximum height and ecological form, soil skeletal material (%), soil texture, soil pH, surface stoniness (%) of



Fig. 1. Geographic distribution of *S. velchevii*; 1: Zieliński & al. (2006); 2: Localities of specimens from the current study.

the soil, drainage conditions, dominant woody vegetation in the surrounding area, and other woody vegetation in the sample plot.

The soil samples collected from each plot were subjected to laboratory analysis for pH, soil texture and drainage conditions. The surface stoniness and soil skeletal material were estimated in the field.

For identification of the collected samples and for descriptive purposes, the morphological characters of each sample were measured from five leaves growing between the third and fifth node of the shoots (Kehl & al. 2008). Several characters with high diagnostic value were selected to determine if differences in leaf morphology occur between the Greek and the Bulgarian population. These characters were lamina width, lamina length, lamina length/width and petiole length. Furthermore, another set of characters was measured and described for descriptive purposes. For more details, see Table 1. Localities of the collected specimens of *S. ×velchevii*, as well as of the specimens described by Zielinski & al. (2006) were mapped (Fig. 1).

Table 1. Character measurements and descriptions of *S. ×velchevii*, as compared to Zielinski & al. (2006) description.

Character	Measured samples	Zielinski & al.
Buds position on shoot	convergent	–
Buds hairiness	glabrous or with a few hairs	glabrous or with few hairs
Shoots	pubescent (sparsely pubescent)	glabrous (sparsely pubescent)
Stems	glabrous	glabrous
Wood striation	almost slender, slightly ridged	–
Leaf arrangement	alternate (some subopposite)	alternate (some subopposite)
Leaf shape	oblong to oblanceolate	oblong to oblanceolate
Leaf length/width (mm)	3.40	–
Leaf length (mm)	33.5–57	up to 80
Leaf width (mm)	9.5–16	up to 22
Upper surface of young leaves	sericeous (pubescent along the main vein)	–
Lower surface of young leaves	sericeous (sparsely sericeous)	–
Upper surface of leaves	usually glabrous with prominent veins	usually glabrous
Lower surface of leaves	usually glabrous (sparsely pubescent, mainly along the main vein)	usually glabrous (with some subappressed hairs)
Leaf base	±rounded (obtuse)	narrowly rounded

Table 1. Continuation.

Character	Measured samples	Zielinski & al.
Leaf apice	acute usually convex	acute or shortly acuminate
Leaf margin	glandular serrulate, almost entire towards the base, prominent, green	serrulate and flat
Petiole length (mm)	1.6–2.5	up to 5
Petiole hairiness	sericeous on the adaxial surface, ±glabrous on the abaxial surface	–
Stipule length (mm)	0.86–7.21	3–10(13)
Stipule	usually narrowed to short petioles	usually narrowed to short petioles
Stipule persistency	persistent (seldom caducous)	persistent
Stipule shape	asymmetric ovate	ovate to broadly ovate
Stipule margin	glandular serrate	–
Catkin length (mm)	15.05–17.65	–
Floral bract length (mm)	0.79–1.15	–
Nectary length (mm)	~0.5	–
Ovary length (mm)	1.31–1.79	–
Ovary width (mm)	0.86–1.37	–
Bract length in fruit (mm)	0.75–1.37	–
Capsule length (mm)	3.02–4.32	–
Capsule width (mm)	1.14–2.23	–

Results

Investigated material: Nomos Dramas, Arkoudorema stream, 41°18'08,4" N, 024°30'10,6" E, alt. 163 m, NE exposure, slope <5%, 21/07/2009, Kailis 08 (TAUF); *ibid.* 25/04/2010, (flowering), Kailis 118 (TAUF); *ditto*, 41°17'46.8" N, 024°30'08.3" E, alt. 155 m, N exposure, slope ±6%, 21/07/2009, Kailis 13 (TAUF); *ibid.* 25/04/2010, (flowering), Kailis 119 (TAUF); *ditto*, 41°19'36.3" N, 024°30'56.3" E, alt. 239 m, S exposure, slope 5%, 24/07/2009, Kailis 32 (TAUF); *ibid.* 25/04/2010, (flowering), Kailis 120 (TAUF).

In most plots *S. ×velchevii* was represented by one individual and only once the species was represented by two individuals. All individuals of *S. ×velchevii* were shrubs, the highest of which (Kailis 08) reached a height of 3 m. These shrubs covered only a small area in each plot, ranging between 3–7%, depending on the number of individuals present and their height. In all plots *S. ×velchevii* grew along with *S. amplexicaulis*, while *S. xanthicola* was also present in the area though not always in the plots. Besides with

its parent species, *S. ×velchevii* grew also with other *Salix* species, namely: *S. alba* L., *S. elaeagnos* Scop. and *S. ×seringeana* Gaud. The dominant willow species of the surrounding area, *S. amplexicaulis*, *S. xanthicola* and *S. elaeagnos*, formed a dense vegetation belt along the stream banks, together with *Rubus ulmifolius* Schott and *Clematis vitalba* L., dominated by *Alnus glutinosa* (L.) Gaertn. The wider area was covered by deciduous oak forests (*Quercus* spp.).

The site slopes ranged between 5–6%. The exposure of the plots was northwestern in two cases and southern in one case.

All samples grew on well drained, sandy, slightly alkaline (mean pH = 7.47) soils, with low content of organic matter. The skeletal material of the soil ranged between 50–90% in all sites, while the surface stoniness of the soil ranged between 10–50% in two sites and between 50–90% in another one.

The lamina length varied between 33.5–57 mm (mean length 44.25 mm), lamina width was between 9.5–16 mm (mean width 13.12 mm) and lamina length/width ratio was about 2–4:1 (mean value 3.40) for all measured leaves. The petiole length ranged between 1–3 mm, with mean petiole length 2.11 mm (Table 1, Fig. 2a). The female catkins were ~16 mm long at pollination, lengthening in the fruit (up to 4.5 cm), ± densely flowered, upright, slightly curved (Fig. 2b). The leafy bracts were ciliate and sericeous on the lower surface. The bracts were ~1 mm long, dark-brown towards the apex, sericeous, with long marginal hairs. The nectary was ~0.5 mm long. The ovary (~1.5 × 1 mm) was ovate,

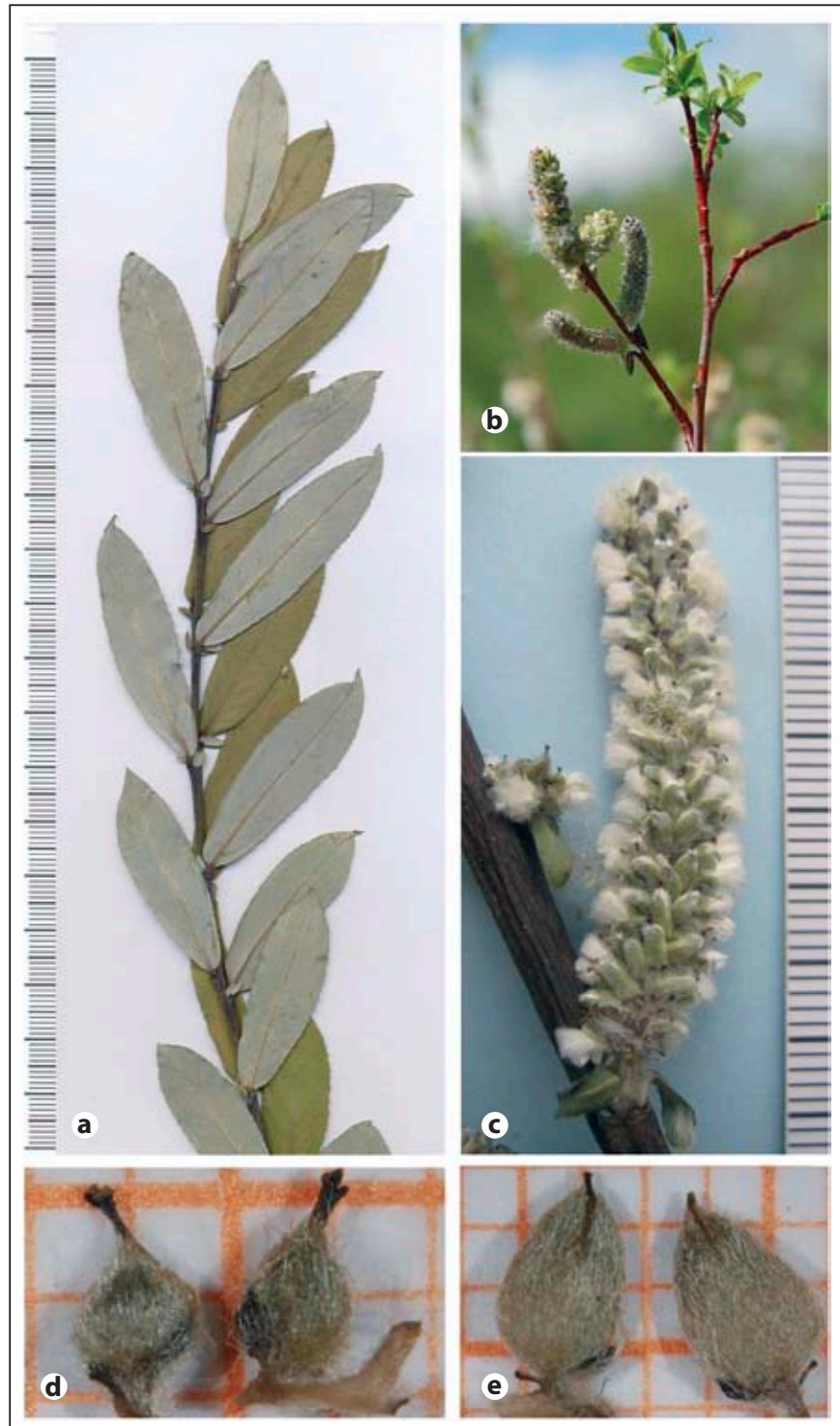


Fig. 2. *Salix ×velchevii*; a: leafy branch; b: flowering branch; c: fruiting catkin; d: female flowers; e: fruits.

sericeous, subsessile. The style was short, with two stigmas, bifid, dark-colored (Fig. 2d). The capsule (~3.5 × 1.7 mm) was ovate-oblong, sericeous, appendunculate (Fig. 2c, 2e).

More detailed measurements are given in Table 1.

Discussion

At present, *Salix* \times *velchevii* is known in Greece only from the three localities reported in this study, in the northeastern part of the Drama Prefecture. The specimens were collected at low altitudes, where both of parent species were present. At a first glance, the taxon's morphology is very similar to that of *S. amplexicaulis* or *S. purpurea* L. In fact, the three specimens that were later identified as *S.* \times *velchevii* were at first recorded in the field as *S. purpurea*. Flowering plants can be easily distinguished from parent species, thanks to the short style, since the stigma is sessile in *S. purpurea*, whereas it is on a long style in *S. xanthicola*.

In Greece, *S. xvelchevii* was observed at altitudes between 152 m and 239 m, at the water edge of permanent streams, a habitat suitable for both its parent species according to literature (Christensen 1997; Christensen 2006; Christensen & al. 2006). Although both parent species may occur at altitudes higher than the ones at which the authors have found *S. xvelchevii*, namely, 1700 m a.s.l. for *S. amplexicaulis* (Christensen 1997) and 890 m a.s.l. for *S. xanthicola* (Christensen 2006; Christensen & al. 2006), and even though the *Salix* specimens were collected at higher altitudes, the authors were unable to confirm the taxon's occurrence at higher altitudes.

Zieliński & al. (2006) provided some information on the ecology of this taxon. The site slope never exceeded 6%, while the exposure did not seem to affect

the occurrence of *Salix xvelchevii*. The studied specimens were collected from well-drained, sandy, slightly alkaline alluvial soils, very poor in humus. The skeletal material of the soil ranged between 50–90% and the surface stoniness ranged between 10–90%.

The leaf measurements showed no significant difference between the authors' specimens and the ones described by Zieliński & al. (2006), other than the relatively small stipules in the authors' specimens which, however, were not always persistent (Table 1).

Zieliński & al. (2006) collected sterile specimens and provided no description of flowers and fruits. All specimens collected by the authors were female and despite the thorough searching of the wider area of the plots, no male individuals were found.

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