Notes on the geographic distribution and ecology of *Salix xanthicola* (*Salicaceae*)

Knud Ib Christensen[1], Jerzy Zieliński[2] & Ana Petrova[3]

[1] University of Copenhagen, Natural History Museum of Denmark, Botanical Garden and Museum, Ø. Farimagsgade 2B, DK-1353 Copenhagen K, Denmark, e-mail: knudib@snm.ku.dk

[2] Polish Academy of Sciences, Institute of Dendrology, 5, Parkowa St., 62-035 Kórnik, Poland, e-mail: jeziel@rose.man.poznan.pl

[3] Bulgarian Academy of Sciences, Institute of Botany, Acad. G. Bonchev St., bl. 23, 1113 Sofia, Bulgaria, e-mail: petrova@bio.bas.bg

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Abstract. New information on this geographic distribution and ecology of *Salix xanthicola*, an endemic Balkan willow, is presented in this article. A dot map showing the total range of *S. xanthicola* is published for the first time and the conservation status and protection of the species is discussed.

Key words: conservation status, ecology, geographic distribution, phytogeography, plant conservation, protection, *Salix xanthicola*

Introduction

Salix xanthicola K.I.Chr. was described only just fifteen years ago, and so far our knowledge about this willow endemic to the Balkan Peninsula has been rather scanty, the primary source of information being the publications of Christensen (1991, 1995, 1997).

Originally, *S. xanthicola* was considered endemic to Northeastern Greece, where it occurred in a few lowland localities in the Xanthis, Rodopis and Evrou districts (Christensen 1991). However, shortly after its description, the species was reported from the region of Kroumovgrad (Kurdzhali district) in Bulgaria (Ganchev s.n., 18.06.1965, SOM) (Zieliński 1992). Velchev (1966) referred the Bulgarian material to *S. cinerea* L. × *triandra* L., but in fact Ganchev's specimen represents the oldest known herbarium material of *S. xanthicola*. In Greece, *S. xanthicola* may have been collected even before 1965. A report of *S. aegyptiaca* L. from Moussafacli near Komotini (Rechinger 1964, 1993) is probably based on misidentified material of *S. xanthicola* (Christensen 1997).

Recently, the authors of this paper had the chance to revise the already known localities of *S. xanthicola,* as well as to visit some previously unknown stands, and new information on the distribution and ecology of the species has accumulated. In Greece, fieldwork was conducted by the first author (KIC) in 1994, 1997 and especially in 2001, and in the Bulgarian territories *S. xanthicola* was studied by the other two authors (JZ and AP) in 2001, 2003 and 2004.

Distribution and ecology

Christensen (1995) treated *S. xanthicola* as a rare plant in Greece, but during recent fieldwork in Northeastern Greece, especially in 2001, several new localities were discovered, mainly in the eastern part of the distribution area of the species, in the valleys of Megalo Rema, Diavolorrema, etc. Unfortunately, in spite of intense searches for populations of *S. xanthicola* (*S. aegyptiaca* according to Rechinger 1964, 1993; see also Christensen 1997) at the Turkish village of Moussafacli situated in the vicinity of Ag. Theodori, Mikro and Megalo Doukato villages, and Lissos River (see Fig. 1), it has not been possible to verify the occurrence of *S. xanthicola* at this site. However, the Moussafacli area constitutes of arable land, where the watercourses are strongly influenced by human activities and, therefore, it is very probable that the locality has been destroyed.

New sites of *S. xanthicola* have been found also in Southeast Bulgaria, primarily in the valleys of rivers Arda and Byala. In the summer of 2001, the vicinity of Kurdzhali was thoroughly searched and the species was found still growing near Nanovitsa village, in the valley of Bouyuk Dere River. Presumably, this is the place, where the first herbarium material of *S. xanthicola* was collected by Ganchev in 1965 (Zieliński 1992).

It is very likely that not all sites suitable for *S. xanthicola* have been found by the authors, especially in Bulgaria, but the information gathered up until now allows us to present a fairly reliable overview of its geographic range. On the basis of the available data the species may be considered endemic to the Balkan Peninsula. Its rather limited distribution area extends from the lower reaches of Nestos (Mesta) River in the west, to the lower course of Evros (Maritsa) River in the east. In the north, *S. xanthicola* does not cross the valley of Arda River, while its southern borderline runs approximately at the latitude of 41° N (Fig. 1). The majority of the known localities of the species are found in the eastern part of the range, Western Thrace, and most likely the species grows even further to the east, in the Eastern Thrace of European Turkey.

In Bulgaria, *S. xanthicola* was generally observed at altitudes between 80 m and 450 m. The most elevated stand was registered at an altitude of 643 m, near Srednogortsi village (Smolyan district). In Greece, the species usually grows at altitudes of 30–300 m (Christensen 1991, 1995, 1997). The most elevated Greek locality, however, was found at 890 m a.s.l., along the road from Leptokarya to Nea Santa (Nom. Rodopis, Ep. Sapon), which is the altitudinal maximum of the species.

Generally, *S. xanthicola* grows along rivers, in alluvial habitats (see Figs 2, 3). It is associated with other woody plants typical for hygrophilous habitats, e.g., *Salix alba* L., *S. amplexicaulis* Bory, *Populus alba* L., *Platanus orientalis* L., and *Alnus glutinosa* (L.) Gaertn. Like to other willows, it is a photophilous plant and grows most abundantly in full sun, where, either alone or together with *Tamarix* spp. or *S. amplexicaulis*, it forms a dense, shrubby vegetation belt at the water's edge. It occurs also in beds of temporary streams running through open oak forests, as well as at the margins of the macchie (in Greece), in roadside ditches,

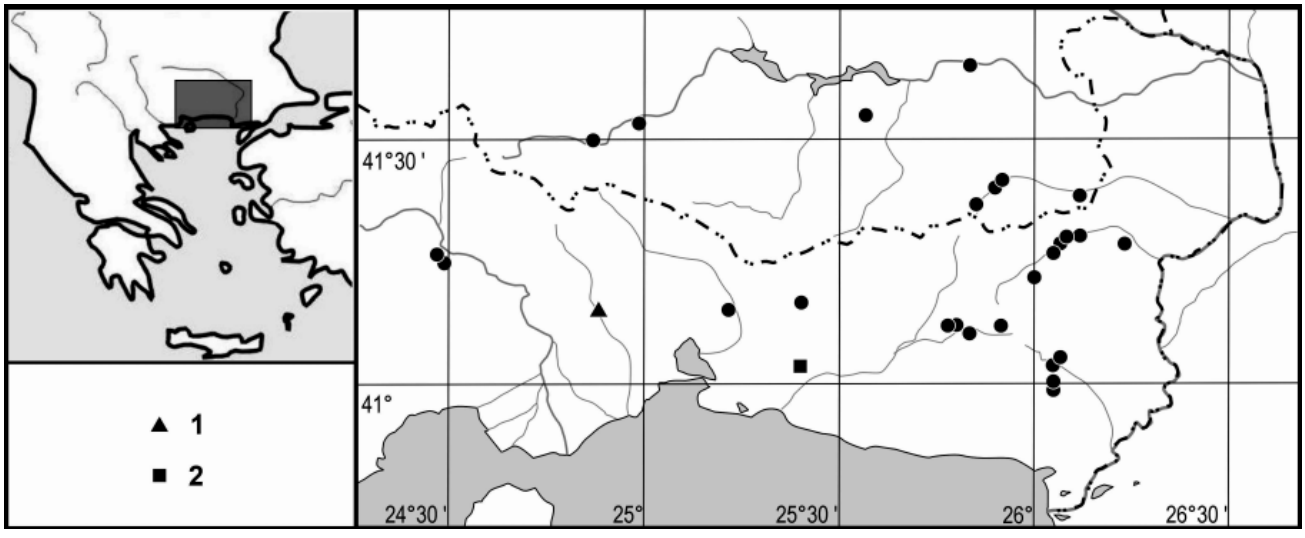

Fig. 1. Geographic distribution of *S. xanthicola*: **1**, type locality; **2**, Rechinger (1964, 1993), not verified.

Fig. 2. *S. xanthicola* in the valley of Arda River, near Srednogortsi village (Smolyan district, Central Rhodopes, SE Bulgaria). Photo: R. Natcheva.

Fig. 3. *S. xanthicola* in the valley of Kompsatos River, ca. 1.5 km NW of the village of Poliandron (Ep. Komotinis, Nom. Evrou, Greece). Photo: K.I. Christensen.

or on rocky slopes, but usually near larger, permanent streams or rivers. At present, *S. xanthicola* is known only from localities where the bedrock is micaceous schist or other types of schist.

Conservation status and protection

Salix xanthicola is one of the most interesting European willows both taxonomically and on account of its geographic distribution (Christensen 1995, in press). Its distribution area is fairly small and restricted to Western Thrace of the Balkan Peninsula. Currently, the species grows in a rather large number of sites, especially in the eastern part of its range, but the number of localities will undoubtedly decrease in the future, and since its formal description, *S. xanthicola* has disappeared from at least one Greek locality (Christensen in press).

The most endangered sites of *S. xanthicola* are the lowland localities situated below ca. 200 m a.s.l. Both in Greece and Bulgaria the lowland zone between the sea level and an altitude of approximately 200 m harbours the primary farmland areas. Here the water-

courses are strongly and negatively influenced by human activities, e.g., felling of the riverine woodlands, changing of the riverbeds into gravel pits, building of dams, and irrigation of nearby fields, which makes the formerly permanent lower reaches of the rivers and larger streams stagnant or temporary. All these changes have a negative impact on the lowland populations of *S. xanthicola*.

On the account of its rarity and great taxonomical interest, *S. xanthicola* was included in the *Red Data Book of Rare and Threatened Plants of Greece* (Christensen 1995), and in the tourist information on the district of Evrou the species is mentioned as one of the attractions of that district (Anonymous 2006).

In Bulgaria the species is protected by the Biodiversity Law (2002) and has been evaluated by the third author according to the IUCN Criteria version 3.1 (IUCN 2001, 2003a, b) as Vulnerable [B2ac(ii,iii)] within the framework of the *Red Lists of Bulgarian Vascular Plants and Fungi* project.

Localities

Bulgaria:

Rhodopi Mts (*Eastern*): around Madzharovo village, Haskovo district, MG-00, 41°39′ N, 25°50′ E, 140 m, along Arda River (SOM 162693, 162694); near Mandritsa village, Kurdzhali district, MF-28, 41°23′ N, 26°07′ E, 88 m, along Byala Reka River (SOM 162695); near Gougoutka village, Kurdzhali district, MF-08, 41°25′ N, 25°55′ E, 155 m, along Byala Reka River (SOM 162696); near Byalgradets village, Hambar Dere loc., Kurdzhali district, MF-08, 41°24′ N, 25°54′ E, 180 m (SOM 162697, 162698); between the villages Kazak and Gorni Yuroutsi, Ivailovgrad district, MF-08, 41°23′ N, 25°51′ E, 446 m (SOM 162699); near Choukourite village, Kurdzhali district, MF-08, 41°22′ N, 25°51′ E, 441 m, along the feeder of Byala Reka River; near Nanovitsa village, Kurdzhali district, LG-80, 41°33′ N, 25°34′ E, 430 m, the valley of Bouyuk Dere River (162700);

Rhodopi Mts (*Central*): near Boukovo village, Smolyan distrct, LF-39, 41°32′ N, 24°59′ E, 615 m, along Arda River, in stony, sandy places (SOM 162701); near Srednogortsi village, Smolyan district, LG-20, 41°30′ N, 24°52′ E, 643 m, along Arda River, in stony, sandy places (SOM 162702), (Fig. 2).

Greece:

Prov. & District Dramas: 0.5–1 km along Nestos River, NW of the Drama to Xanthi road, 41°16′ N, 24°28′ E, 160 m, in mixed deciduous forest along the eastern bank of the river; about 1 km S of Paranestion, southern bank of Nestos River, 41°15′ N, 24°30′ E;

Prov. Evrou. District Alexandroupoleos: ca. 16 km along the Loutros to Pessani road, 40°59′ N, 26°03′ E, 370–400 m, in macchie and forest with *Quercus*; along the road from Loutros to Pessani and Dadia, beyond the military post, 41°00′ N, 26°03′ E, 400 m, in mixed forest;

District Didimothichou: along the road from Nea Santa to Mega Derio, 41°13′ N, 26°00′ E, 450 m, in the roadside ditch in open forest with *Quercus*; ibid., 41°16′ N, 26°03′ E, 210 m, on steep rocky slope, schist; between Mega Derio and Mikro Derio, at the riverbed, 41°17′ N, 26°04′ E; ibid., 41°17′ N, 26°05′ E; ibid., 41°18′ N, 26°05′ E; along the road from Mikro Derio to Protoklisi and Mandra, 41°18′ N, 26°07′ E, 190 m, at the roadside; near the village of Protoklisi, at the riverbed, 41°17′ N, 26°14′ E, 60 m; along the road from Mandra to Mikro Derio, beyond the village of Protoklisi, at the riverbed, 41°17′ N, 26°14′ E, 100 m;

District Komotinis: along the Komotini to Jasmos road, Kompsatos River, ca. 1.5 km NW of the village of Poliandron below a bridge, 41°09′ N, 25°13′ E, 30 m, in the forest with *Platanus orientalis*, *Salix alba*, *Populus alba*, *Alnus glutinosa*, on riverbanks, 1–2.5 m tall *Salix* shrubs at the riverbed (Fig. 3);

District Soufliou: 26–28 km along the Loutros to Pessani road, 41°03′ N, 26°04′ E, in a 280 m roadside ditch; along the road from Loutros to Pessani and Dadia, at the Pessani bridge, 41°03′ N, 26°04′ E, 150 m, at the riverbed with *Salix alba*, *S. xanthicola*, *Tamarix* sp., etc.;

Prov. Rodopis. District Sapon: along the road from Nea Santa to Mega and Mikron Derion, 41°07′ N, 25°48′ E, 220 m, at a dry streambed in macchie, micaceous schist; ca. 4 km E of the village of Nea Santa, along the Nea Santa to Deri road, 41°07′ N, 25°47′ E, 200–230 m, at the riverbed with *Salix alba*, *S. xanthicola*, *Alnus glutinosa*, etc., micaceous schist; along the road from Leptokaria to Nea Santa, beyond the turn-off to Mega and Mikro Derio, 41°07′ N, 25°55′E, 890 m, on the roadside bank in mixed deciduous forest, schist; along the road from Leptokaria and Mega Derio to Nea Santa, 41°06′ N, 25°50′ E, 280 m, in a dry streambed;

Prov. & District Xanthis: ca. 2 km N of the town of Xanthi, just before the road to Echinos crosses Xanthis River, 41°09′ N, 24°53′ E, 180 m, in a plantation with *Pinus pinaster* and undergrowth of *Carpinus*, *Acer*, *Ulmus*, etc., on a steep mountain slope, or at sandy riverbed.

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