Salix × meyeriana (= Salix pentandra × S. euxina)—a forgotten willow in Eastern North America

ALEXEY G. ZINOVJEV
9 Madison Ave., Randolph, MA 02368, USA; E-mail: webmaster@salicicola.com

Salix pentandra L. is a boreal species native to Europe and western Siberia. In North America it is considered to have been introduced to about half of the US states (Argus 2007, 2010). In Massachusetts it is reported from nine of the fourteen counties (Sorrie & Somers 1999). Even though this plant may have been introduced to the US and Canada, its naturalization in North America appears to be quite improbable. Unlike willows from the related section Salix, in S. pentandra twigs are not easily broken off and their ability to root is very low, 0–15% (Belyaeva et al. 2006). It is possible to propagate S. pentandra from softwood cuttings (Belyaeva et al. 2006) and it can be cultivated in botanical gardens, however, vegetative reproduction of this species by natural means seems less likely. In North America this willow is known only by female (pistillate) plants (Argus 2010), so for this species, although setting fruit, sexual reproduction should be excluded. It is difficult to imagine that, under these circumstances, it could escape from cultivation. Therefore, most of the records for this willow in North America should be considered as collections from cultivated plants or misidentifications (Zinovjev 2008–2010).

Salix pentandra is known to hybridize with willows of the related section Salix. The differences between them were shown, e.g., by Bean (1980), Berg and Christensen (2000). In Europe, this section includes native S. alba L., another species introduced from Asia Minor and its hybrids (Skvortsov 1968, 1973). For a long time, the name S. fragilis has been applied either to some of these hybrids or to a species from Asia Minor. According to recent decision of the Nomenclature Committee for Vascular Plants, these hybrids should be named S. × fragilis L., while plants native to Turkey and the Caucasus region have been described as S. euxina I.V. Belyaeva (Brummit 2009: 280, Belyaeva 2009, Argus 2010).

Examination of herbarium samples from the herbaria A, GH, NEBC, MASS, US, College of the Holy Cross (Worcester, Massachusetts), led to the conclusion that the main cause for misinterpretation of this willow in North America was the presence of cultivated hybrids of S. pentandra with S. euxina, known as S. × meyeriana Rostk. ex Willd. (Willdenow 1811). Such a hybrid would have been favored for cultivation as it is easily propagated vegetatively. It is particularly noteworthy that some old herbarium samples of Nearctic S. pentandra were initially treated as hybrids (labeled S. pentandra × S. fragilis), e.g., Washington, D.C., Corcoran St., between 18th & 19th St., June 21, 1905, G.B. Sudworth (US 1584807 and US 1584808). However, such hybrids are not mentioned in recent American literature, with the exception of a horticultural manual (Rehder 1954). These hybrids have only been seen by the author in the European section of Harvard University Herbaria. Perhaps some of them are real hybrids, and one of these samples is of special interest, proving that this hybrid was cultivated in the US: it bears the label "S. fragilis × pentandra ... Received from Kew. Grown at Fountaindale, Illinois: 1880. leg. M.S. Bebb" (GH).

Salix pentandra belongs to section Salicaster Dumort. All species of this section differ from those in section Salix (as defined by Skvortsov 1968) by having multistaminate male flowers. All of its species have strongly lustrous leaves, producing odorous resin, as some poplars do, when young. As has been shown by Skvortsov (1960) this section is further separated into two distinct groups: the Holarctic pentandra-group (with five species) and the Nearctic lucida-group (with two or three species).
All species of the S. pentandra-group are separated from other willows by their phenology. Their seeds ripen much later than those of any other willows, in late summer (see links to photographs in Zinovjev 2008–2010); they are dispersed during the winter and germinate in the following spring; catkins remain hanging on the tree during the entire winter and often remain during the next year. In American literature this feature is known for S. serissima Fernald that is called ‘autumn willow’ but which is seldom associated with New World ‘S. pentandra’. This fact alone suggests that the name ‘S. pentandra’ is misinterpreted in North America. Morphologically, late seed formation is correlated with thick stout catkins, with mature capsules that are unusually large and thick-walled (Skvortsov 1960, 1968). However, in the keys for Nearctic willows (e.g., Fernald 1950, Seymour 1969, Magee & Ahles 1999) large capsules are only mentioned for S. serissima (7–10 mm long) but not for ‘S. pentandra’ (5–6 mm long). Herbarium samples identified as ‘S. pentandra’ in North America frequently have long, loose and narrow catkins with smaller capsules. Ecologically, species of the S. pentandra-group also differ from related willows: they are nearly obligatory wetland species. Salix pentandra itself usually grows in graminoid forest fens dominated by Carex L. and Calamagrostis Adans. The ease of rooting of the brittle twigs of S. euxina and its hybrids seems to be correlated with the alluvial habit of these taxa, which is not the case for S. pentandra and its relatives of the S. pentandra-group.

Sometimes Salix pentandra could be confused with native S. lucida Muhl. However, as was shown by Skvortsov (1960), the latter belongs to the S. lucida-group of section Salicaster, which is characterized by a different bud structure and elongated cataphylls that correspond to first primordial leaves in the mature buds. In S. lucida bud scales do not die off during the winter, their inner membranous layer (second prophyll) is free, its connection to the base of developing shoots is retained by a small ring; it partially embraces and covers developing cataphylls together with tufts of long silvery hairs originating from the base of branchlets and medial parts of cataphylls (see photographs in Zinovjev 2010). However, in all species of the S. pentandra-group of section Salicaster and willows of section Salix, at least the first cataphylls are broad, their length is equal to or smaller than their width; in mature floriferous buds the first primordia are longer than the catkin, the outermost primordial leaf fully embraces the bud contents, so that its margins meet; bud scales die during the winter (at least partially) and are not persistent (hence, are rarely found in herbarium samples); cataphylls are glabrous on both sides but ciliate, with fugacious trichomes at the margin (may not be retained in herbarium material). Furthermore, the young leaves of S. lucida are more or less hairy, with some hairs reddish, the stipules are usually well developed. In S. pentandra (and native S. serissima) even the youngest leaves are totally glabrous; in herbarium samples stipules are absent or rudimentary although they are known to occur in S. pentandra but perhaps only on the most vigorous shoots; if present, according to Skvortsov (1960), with glands on the upper surface.

In some vegetative characters, Salix pentandra can be similar to S. euxina, particularly by having glabrous, lustrous leaves that are sometimes of a similar shape. This makes distinguishing their hybrids particularly difficult when dealing with herbarium samples. In nature, S. pentandra looks very distinctive. It usually grows as a small tree with branches flexible at the base, rarely, according to some authors, slightly brittle. Branchlets and young branches are glabrous and shiny, as if varnished, their color ranging from yellowish and yellow-brown to dark red-brown. Buds in winter are positioned at acute angles to branchlets; they die off but never become black. Pistillate catkins are stout with large thick-walled mature capsules (7–11 mm long). The leaves are deep green and lustrous above, pale below but not with glaucous bloom. In S. euxina young branches are very brittle at the base, light grayish-yellow (like light-colored wax) and the buds have the same color as the branches but usually become black apically in winter. The first outermost primordium in the bud is sericeous at the margin and the outside is frequently pubescent. Sometimes the young leaves have a few hairs.

In the 1960s, a synthetic hybrid between S. pentandra and S. euxina (then called ‘S. fragilis’) was produced by V. I. Shaburov in Yekaterinburg Botanical Garden. The described cultivar, Salix ‘Sverdlovskaja blestjaszczaja’ (Belyaeva et al. 2000), is a male tree of about 16 m height . Morphologically, it occupies an intermediate position between both parents. Like in S. euxina, twigs in this hybrid are brittle and easily rooted (100%). The dark green, broad and highly lustrous leaves resemble those of S. pentandra, but the stipules can
persist even on some shorter twigs. The cultivated tree, examined by the author in 2010, looks very similar to
the great majority of the herbarium specimens treated here as putative hybrids of S. pentandra with S. euxina.
These specimens frequently have better developed stipules than typical for S. pentandra and, if catkins are
present, they are usually loose and narrow, sometimes with traces of some abnormalities like incidental male
flowers. In rare cases (Massachusetts: Barnstable and Suffolk counties) they bear sawfly galls of the European
Pontania proxima (Serville). This sawfly is characteristic for S. euxina, S. alba, and their hybrids (i.e.,
willows of section Salix). Producing such galls on true S. pentandra is highly improbable which is additional
evidence of the hybrid origin of the so-called American S. pentandra.

Therefore, the great majority of herbarium samples from eastern North America previously identified as
'S. pentandra' are putative hybrids of S. pentandra and S. euxina or possibly of S. pentandra with the fertile
hybrid S. × fragilis, that approaches S. euxina phenetically. Samples most definitely identified as these
hybrids were seen from the following states of eastern USA: Illinois, Maine, Massachusetts, New Hampshire,
New York, Pennsylvania, Rhode Island, and as undoubtedly cultivated plants from Wisconsin and the vicinity
of the District of Columbia. In Massachusetts, they were seen from Berkshire, Hampshire (cultivated),
Worcester, Middlesex, Essex, Suffolk (perhaps cultivated), Norfolk, Plymouth (explicitly marked as a
cultivated plant), Barnstable, Dukes, and also from Hampden and Nantucket counties (identification less
definite). A few of the examined specimens from New England formerly named S. pentandra belong to S. ×
fragilis, or maybe even to some kind of hybrids of S. lucida. So far I have seen only one living plant from the
US. It is cultivated in the Arnold Arboretum of Harvard University under the name S. pentandra: accession
number 95-1990, an asexual propagation of an older accession 503-33 received as cuttings from the Botanic
Garden Berlin-Dahlem. In spite of superficial resemblance to S. pentandra, this cultivated plant cannot be
pure S. pentandra because of its brittle branchlets and easily rooting young branches, hairy second and
subsequent primordial leaves of the winter buds, as well as some other differences. A detailed list of examined
samples is available at http://www.salicicola.com/.

Plants named Salix pentandra from the US will still need further investigation, particularly because their
fertility remains an unanswered question. I hereby propose to apply the name S. × meyeriana, a name
traditionally applied to hybrids of S. pentandra with S. euxina (formerly confused with S. fragilis); however,
they actually may include hybrids of triple parentage (e.g. S. pentandra × S. euxina × S. alba), and the actual
situation may prove to be even more complicated, e.g., we cannot exclude the possibility of back-crossing
with parent willows or subsequent hybridization with North American species. Also the possibility that pure
S. pentandra occurs in North America cannot be excluded completely, however, since even the plants
cultivated in arboreta under the name S. pentandra appear to be hybrids, for the time being I suggest to place
S. pentandra in the list of dubious species for North America and remove it from the standard list of New
England willows until proven otherwise.

Acknowledgements

I am grateful to E. Wood (Harvard Herbaria), R. Russell (US), K. Searcy (MASS), R. Bertin (College of the
Holy Cross) for the opportunity to study herbarium collections. I am indebted to O. V. Epanchintseva for
showing me the living willow collection in Yekaterinburg Botanic Garden. Irina Belyaeva (K) provided
helpful comments on the draft of this article. Keith Chamberlain has kindly checked the English. I am very
grateful to George Argus (CAN) for his continuous support in studying Nearctic willows and for reviewing
the manuscript. I also thank an anonymous reviewer for many helpful comments. This work would not have
been possible to complete, if the morphology and systematics of all these willows had not been so thoroughly
studied by the late Prof. A.K. Skvortsov in his numerous publications.
References


