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Article

The application of scientific names to plants in cultivation: *Salix* ×*cottetii* Lagger ex A.Kern. (Salicaceae)

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Abstract

Salix ×*cottetii* Lagger ex A.Kern. is a frequently cultivated willow worldwide. It represents a prostrate plant suitable for rock, alpine, or small urban gardens. Our comparison of original material of *S.* ×*cottetii*, which was used by Kerner for the description of this willow, with cultivated plants showed that the name *Salix* ×*cottetii* was misapplied to a prostrate clone from Europe, as well as to an upright plant called *S.* ×*cottetii* 'Bankers', which was promoted in the US for erosion control. A specimen of *Salix* ×*cottettii* stored in WU is designated as the lectotype to ensure the correct application of the name *S.* ×*cottetii* to the cultivated, prostrate plants. It is proposed that the clone cultivated in the US as *S.* ×*cottetii* 'Bankers' be referred to as *S.* 'Bankers' until its parentage is determined.

Key words: cultivation, historical collections, nomenclature, *Salix* ×*cottetii*, Salicaceae, taxonomy, typification.

Introduction

The application of scientific names is determined by the use of nomenclatural types, as stated in Art. 7.1 of the ICN (McNeill *et al.*, 2012). However, scientific names of plants are frequently misapplied for a large number of cultivated plants. Many names published before 1st of January 1958 have not been typified, thereby creating confusion for horticulturists as to which specimen should be used for verification of the identification. Furthermore, old herbarium collections and type specimens are not always available for use via loan or via JSTOR, resulting in misunderstanding and misapplication of names during identification. In this connection, typification of plant names, as well as digitalization of images of type specimens to make them available for users are important steps in the process of taxonomic research (Kovtonyuk & Belyaeva, 2015).

A problem with the name *Salix* ×*cottettii* Lagger ex A.Kern., the name of a frequently cultivated willow worldwide, has repeatedly arisen during our work on three independent projects: a compilation of the 'World Checklist of Salicaceae *s. str.*'(I.Belyaeva), a compilation for the 'World Checklist for Cultivars of *Salix* L.' (Y.Kuzovkina) and research on introduction of arcto-alpine willows in the Middle Urals (O.Epantchintseva and I.Belyaeva).

Salix ×*cottetii* is a low-growing prostrate shrub that was discovered in the European Alps. It is often cultivated as an ornamental willow that forms an effective groundcover in rock, alpine, or small urban gardens.

The revision of willows in various collections in Europe revealed that two different prostrate plants of different sexes and morphological characters are cultivated in the Old World under the name *S.* ×*cottetii*. Moreover, verification of stocks of willows in the North American nursery trade revealed that a morphologically dissimilar plant with upright habit is frequently cultivated under the name *S.* ×*cottetii* in the New World.

The goal of this study was to verify the identity of these cultivated plants, to determine the correct application of the scientific name, *Salix* ×*cottetii*, by studying the original material and then choosing the lectotype.

Materials and methods

The species protologue, authentic herbarium specimens held mainly in K, MHA, NHM and WU, and information stored in the international database 'Virtual Herbaria' (http://herbarium.univie.ac.at/) was used for this study. Herbarium acronyms are cited as in Thiers (2013). Accepted names are given in bold. Typification was made according to the ICN (McNeill *et al*., 2012) and following recommendations given by McNeill (2014, 2015). Cultivated plants were received from the National Plant Germplasm System of the United States Department of Agriculture (USDA/ARS). Plants were obtained in the private collections of J.Batke (Braunschweig, Germany) and D.Geissler (Gorsmitz, Germany) and were grown and observed at the Botanic Garden of the Ural Branch of the Russian Academy of Sciences, Yekaterinburg. The DNA content of the accession from the USDA/ARS was analysed at the Plant Science Unit at the Institute for Agricultural and Fisheries Research, Belgium.

Nomenclatural and taxonomic notes

Salix* ×*cottetii Lagger ex A.Kern., Oesterr. Bot. Z. 14: 368. 1864 (as 'cotteti')
(*S. myrsinifolia* Salisb. × *S. retusa* L.)

Type: Switzerland: Fribourg, VI. 1864, *F.J.Lagger 2*, ♀ (lectotype, WU, WU0033728, **designated here**).

Information from the protologue: when describing this nothotaxon, Kerner cited in the protologue: "in Crau dessus in pago Frieburgensis Helvetiae" and mentioned that it was collected by Dr. F.J.Lagger and named in honour of a friend, M.Cottet. Furthermore, he wrote that it was growing with *Salix nigricans* Sm., *S. retusa* L. and *S. hastata* L.

Comments: herbarium specimens corresponding to the protologue were found at BM (BM001041991), K (K 000906956) and WU (WU0033728). However, only one herbarium sheet, WU0033728, belongs to the original material. Herbarium specimens at BM and K contain fragments of *S. cottetii* with staminate and pistillate flowers mounted on the same sheet and labels with the identical text written by the same person: "*Salix Cotteti* Lagger et Kerner, retusa × nigricans, Helv. Friburg: "Crau desses", l. Cottet, c. Huter. Österr. B. Zeitschr. 1864, pag. 368", which is evidence that these specimens were collected after the species was described.

The herbarium sheet WU0033728 contains two fragments with catkins (with pistillate flowers only) and leaves that are similar to those fragments with pistillate flowers and leaves on the sheets at BM and K, and they were probably collected from the same locality. There are four labels attached to the sheet at WU: an original label by A.J.Kerner with the name '*Salix Cotteti*', a second original label by F.J.Lagger with the text: "No 2. An forma *Salicis nigricantis*? var. nana for. repens de Crau dessus in pago Friburgensi, Juni 1864, Dr Lagger. In Gesellschaft von *Salix hastata*, *nigricans* u. *retusa*, an feuchten Stellen". The other two labels are by E.Hörandl which read: "Holotypus *Salix cotteti* Lagger ex A.Kern., typificavit E.Hörandl, WU 1990, Lagger, F.J. 2" and "*Salix myrsinifolia* Salisb. × *S. retusa* L. 1990 det./rev. Hörandl".

The protologue does not cite a specimen, as is required in Art. 9.1 of the ICN (McNeill *et al*., 2012). Mention of locality and collector is not sufficient to indicate that Kerner used only this particular specimen when he described *Salix cottetii*; there could be other specimens from the same locality collected by Lagger that were destroyed during the second world war and, because of this, the specimen WU0033728 cannot be the holotype but rather one of the syntypes, which we designate here as the lectotype (Art. 9.2 and 9.11, ICN).

Kerner (1864: 368) described *Salix ×cottetii* as a hybrid between *S. myrsinifolia* and *S. retusa*.

Horticultural References

References to *Salix* ×*cottetii* are in a few horticultural publications (Rehder, 1927, 1940, 1949), Bean (1981) and Krussman (1984). The first mention of this nothospecies in cultivation is in Rehder (1927), where he lists *S. cottetii* twice: first under '*Salix retusa* L.' on page 108 as a hybrid of *S. retusa* × *S. myrsinifolia* followed by a description. The second listing is under "*Salix myrsinifolia* Salisb." on page 114 as a hybrid *S. myrsinifolia* × *S. retusa.*

Krussman (1984) listed it as *S.* ×*cottetii* Kern. (*S. myrsinifolia* × *S. retusa)* and Bean (1981) — as *S.* ×*cottetii* Lagger ex Kern. (*S. retusa* × *S. nigricans*). Bean (1981) mentioned that a commercial clone with staminate flowers distributed as *"S.* ×*gillotii",* has been identified as S. ×*cottetii*. This followed by Hillier and Lancaster (2014) where *S.* ×*gillotii* Hort. is listed as a name that was misapplied to *S.* ×*cottetii*. There is a description in Krussmann (1984).

Below is a combined description of *S.* ×*cottetii* based on Kerner (1864: 368), Rehder (1927), Bean (1980), Krussman (1984) Newsholme (1992) and Hillier (2014).

Habit: low, usually prostrate or procumbent shrub, with long trailing and somewhat ascending branches. Young branches white pubescent, later becoming yellow-brown and glabrous. Winter buds obtuse, pubescent. Leaves: elliptic to oblong and obovate, 2-4 cm long and about half as wide, obtuse or slightly acute, finely serrulate (toothed), green, pubescent on both surfaces when young, upper surface later glabrous, veins on lower surface pubescent, venation reticulate. Catkins: cylindrical, 1.5–2.2 cm long on leafy pubescent peduncles. Scales oblong-obovate, pubescent, darkened at the truncate or retuse apex. Ovary ovoid, usually glabrous. Stamens 2, filaments glabrous and free; anthers yellow.

Introduction into cultivation. The year of introduction is given as 1905 by Rehder (1927). According to Krussmann (1984), only plants with staminate flowers are found in cultivation.

Ornamental value: *Salix cottetii* is a very effective groundcover with dark, shining, fresh-green leaves. Catkins appear before the leaves in early spring and are very attractive during anthesis (Fig. 1).

***Salix* ×*cottetii* in European collections**

Two different prostrate plants of different sexes and morphological characters, cultivated as *S.* ×*cottetii* in the Old World, were observed at the collection of the Botanic Garden of the Ural Branch of the Russian Academy of Sciences, Yekaterinburg.

The first clone, which completely matches the description of the type, is a plant with pistilate flowers and was positively identified as *S.* ×*cottetii* (Fig. 1).

Figure1. *Salix* ×*cottetii* Lagger ex A.Kern. cultivated in the Botanical Garden Yekaterinburg. Originally from private collection of J.Battke. Photo by O.Epantschintseva.

The second plant, which is also a prostrate shrub, but represented by a clone with staminate flowers, (Fig. 2.) was received from Europe. Based on the morphohological characters it is a hybrid of *S. myrsinites* L. × *S. repens* L. It is more vigorous than *S.* ×*cottetii* and forms carpets several metres across. The upper surfaces of the leaves are dark and shining while the lower surfaces are paler.

Figure 2. A hybrid clone of *S. myrsinites* L. × *S. repens* L. often cultivated as *S.* ×*cottetii* A.Kern. in Europe**.** Origin from an uknown nursery in Poland**.** Photo by A.Marchenko.

Salix **×*cottetii* in USA**

Verification of stocks of willows in the North American nursery trade showed that a dissimilar plant is frequently cultivated as *S.* ×*cottetii* 'Bankers'.

The U.S. Department of Agriculture, Agricultural Research Service (USDA/ARS) (USDA, ARS, National Genetic Resources Program, 2015) lists it as "*Salix* ×*cottetii* Jos.Kern. 'Bankers' (PI 434285, Fig. 3 and 4). Currently maintained by the North Central Regional PI Station, this plant was received in March of 1979 from the U.S. Department of Agriculture Soil Conservation Service, Plant Materials Center at Coffeeville, Mississippi (http://www.ars-grin.gov/cgi-bin/npgs/acc/display.pl?1329221).

Figure 3. Clone listed as *Salix* ×*cottetii* Jos. Kern.'Bankers' (PI 434285; National Plant Germplasm System (USDA/ARS). Photo by J.Carstens (USDA GRIN) (http://www.ars-grin.gov/cgi-bin/npgs/html/dispimage.pl?327905; accessed 15 September 2015).

The USDA cited two records describing this introduction. The first was titled " 'Bankers' dwarf willow" (Soil Conservation Service; Program Aid Number 1362) published in 1984, where it was stated that in April 1983 the Soil Conservation Service and the University of Kentucky Agricultural Experiment Station jointly released 'Bankers' for commercial production. The information listed in that brochure was repeated under "Dwarf willow *Salix* ×*cottetii* Kerner" in the U.S. Department of Agriculture Natural Resources Conservation Service Plant Fact Sheet (USDA NRCS, 2002). The later publication stated that it was released by Quicksand, Kentucky Plant Material Center in 1983. It was specified that this cultivar was introduced from the alpine region of West Germany in the mid1960s as a selection of a natural hybrid between *S. retusa* and *S. myrsinifolia.* It was described as a small to medium sized shrub to 6-8 feet tall with "smooth, slender, tough, resilient branches that are lime green at first but later change to a darker green".

Figure 4. One year old plant received as *S.* ×*cottetii* 'Bankers' from the USDA, ARS, National Genetic Resources Program accession (PI 434285) in spring 2013 demonstrating upright habit. Photo by Y.Kuzovkina.

It was also noted that it was a sterile hybrid producing no seeds. This willow was recommended for erosion control along small stream channels as a semi-prostrate shrub that sends up many branches from the roots to form a dense surface cover, and rarely spreads by layering of branches.

In the Herbarium of Moscow Botanical Garden (MHA) among specimens of cultivated plants there is a specimen from the Herbarium of the US National Arboretum (Washington, DC) BN 14871 (Fig. 5). It was collected at the Plant Material Center, Soil Conservation Service, Beltsville, Prince George's County (flowers on 23 April 1967; leaves on 7 June 1967) by F.G. Meyer and P. Mazzeo. The source is listed as German Academy of Land Science or Berlin, Institute for Forest Plant Breeding, Graupa, East Berlin. The specimen is similar to a clone currently cultivated in the US as *S.* ×*cottetii* 'Bankers'.

Figure 5. *Salix ×cottetii* from the Herbarium of the US National Arboretum (Washington, DC) BN 14871. Reproduced by kind permission of the Herbarium of Moscow Botanical Garden (MHA), Russia. Photo by N.Reshetnikova.

Table 1. Comparisons of the morphological characters of *S.* ×*cottetii* Lagger ex A.Kern., *S. myrsinites* × *S. repens* and *S.* 'Bankers'.

Characters	***S.* ×*cottetii***	***S. myrsinites* × *S. repens***	***S.* 'Bankers'**
Habit	low-growing prostrate	low-growing prostrate, but more vigorous than *S.* ×*cottetii* forming carpets several metres across	upright
Height	10–15 cm	10–15 cm	2–3 m
Branches	white pubescent, later becoming glabrous yellow-brown; non-fragile	green later becoming brown; non-fragile	lime green, later becoming darker green; glabrous, fragile
Winter buds	pubescent, obtuse	glabrous, obtuse 5 mm long	glabrous, acute
Leaves	2–4 cm long, pubescent on both surfaces when young; eaqually green on both sides	4–5 cm long, glabrous; upper surface of the leaves is dark and shining, lower surface is light green	6–8 cm long; glabrous; upper surface of the leaves is light green and not shining, lower surface is pale green
Stipules	without stipules	with small stipules 2–3 mm long	with prominent stipules 5 mm long
Catkins	with pistillate and staminate flowers in different clones	with staminate flowers	with pistillate flowers

Identification

The hardwood cuttings of *S.* ×*cottetii* 'Bankers'were received from the USDA, ARS, National Genetic Resources Program accession (PI 434285) in spring 2013 and were grown at the University of Connecticut for two years. The clone differed from the European *S.* ×*cottetii* as it had an upright habit and much larger leaves (Table 1). There was no morphological evidence to suggest that it was the same taxon. The plant produced catkins with pistillate flowers but no seeds. The catkins were green and inconspicuous, offering limited ornamental value. Some morphological characters were similar to *S. eriocephala* Michx., including the presence of stipules, fragile branchlets and bud scale morphology. It is possible that *S. eriocephala* was involved as a parent. It also had some similarity to *S. hastata*. The apparent infertility of this clone may be a sign of hybridity, but requires further investigation using

molecular markers. The DNA content of this cultivar (1.5 pg) suggested that it is a tetraploid, while *S. eriocephala* (0.72 pg) is a diploid species (the DNA content of diploid species of willows native to Europe was estimated to be 0.76 to 0.98 pg per diploid nucleus based on flow cytometry (Thibault, 1998)). We propose that the clone cultivated in the US as *S.* ×*cottetii* 'Bankers' be named as *S.* 'Bankers'.

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