



## Symposium proceedings

### **Salix diversity in Belgium and the Netherlands: the use of traditional basketry as a key factor**

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#### **Abstract**

In Belgium and the Netherlands more than 60 willow species, hybrids and varieties are found, of which only a limited number are native species. The majority were introduced, mainly in the 19<sup>th</sup> century, as osiers for basketry or hoop-making purposes. Since 1997 the author has tried to identify the willow diversity in Belgium and the Netherlands. In 2019 we have a good idea of the diversity, but a number of names are still uncertain due to taxonomical discussions typical for this difficult genus, with many hybrids, back-crosses and clonal cultivars. Genetic research in the future will probably resolve some of these problems.

**Keywords:** basketry, Belgium, native and escaped willows, Netherlands, *Salix* diversity

#### **Introduction**

In Belgium and the Netherlands more than 60 willow species, hybrids and varieties are found, of which only a limited number are native species. The majority were introduced, mainly in the 19<sup>th</sup> century, as osiers for basketry or hoop-making purposes. This article gives a rough overview of the wild or escaped willow taxa in both countries. The diversity of clonal cultivars is not considered in detail.

The study of willows in Belgium started in the 18<sup>th</sup> century and increased throughout the 19<sup>th</sup> century, mainly by forestry engineers interested in the progress of osier culture. Work by De Poederlé (1779), De St. Moulin (1827), Wesmael (1860, 1865, 1866, 1895), Du Mortier (1862) and Gillekens (1871) drew attention to the diversity in willows and possibilities for new introductions. Most of the willow introductions date from those times and the beginning of the 20<sup>th</sup> century. In the Netherlands, Tuinzing was the authority on osier willows but his work (Tuinzing, 1938) was practically rather than botanically inspired. After World War II, the use of

plastics replaced osier willows and botanical knowledge about willow taxa was forgotten in our floras.

## Materials and methods

In 1997 the author started collecting all wild and escaped willow taxa in Belgium and the Netherlands and has continued this until today. All willow cuttings were grown in a private salicetum and the flowering of the plants was studied. Attempts were made to investigate origins of a number of introductions. Interviews with the last traditional basket makers, often eighty-year-old people, were very helpful in this search. The results were published in different reports and articles (Zwaenepoel, 2000, 2001, 2002, 2003, 2017, 2019; Zwaenepoel and Cosyns, 2007; Zwaenepoel and Maertens, 2019; Zwaenepoel and Uilhoorn, 2017; Zwaenepoel *et al.* 2000).

## Results

### Native taxa

In Belgium and the Netherlands 9 species and subspecies can be considered native or indigenous: *Salix alba* L. (Fig. 1), *S. aurita* L., *S. caprea* L., *S. cinerea* L. subsp. *cinerea*, *S. cinerea* L. subsp. *oleifolia* Macreight, *S. pentandra* L. (Fig. 2), *S. purpurea* L. subsp. *purpurea* (Fig. 3), *S. purpurea* L. subsp. *lambertiana* (Sm.) Neumann ex Rech.f. and *S. repens* L. (Fig. 4). These willows can also hybridize with each other. At least 9 different crosses have already been found in our study area.



Fig. 1. Male catkins of *Salix alba* L.



Fig. 2. Male catkin of *Salix pentandra* L.

### Archeophytes.

At least two and probably three taxa should be considered archeophytes. *Salix viminalis* L. (Figs. 5–7) was already known by the Romans and probably arrived with them. The original

distribution of this species is an open question. In Belgium and the Netherlands tens of local clonal varieties can be found, and they have got local names indicating the colour of the



Fig. 3. Male catkin of *Salix purpurea* L.



Fig. 4. Fruiting catkins of *Salix repens* L.



Fig. 5. 'Yellow Wiedauw' and 'Red Wiedauw', two varieties of *Salix viminalis* L., their coloration indicated by the local names given by osier workers



Fig. 6. Pollarded *Salix viminalis* L. for hoop-making, Biesbosch, Netherlands



Fig. 7. Female catkin of an osier, *Salix viminalis* L.

one-year-old twigs or origin of clones. For basketry use, female clones were most popular.

*Salix triandra* L. (Figs. 8–11) was also possibly introduced by the Romans. However, its original distribution is unknown. Tens of local clonal varieties have been found and named in our study area.



Fig. 8. *Salix triandra* L.: bark, peeled in patches



Fig. 9. *Salix triandra* L.: pollarded for hoop-making, Biesbosch, Netherlands



Fig. 10. *Salix triandra* L. 'Yellow Reins'



Fig. 11. *Salix triandra* L. 'Black Reins'

*Salix* × *fragilis* L. (= *S. alba* L. × *S. euxina* I.V.Belyaeva) is represented by at least four varieties in our study area. *S.* × *fragilis* L. var. *fragilis* is most probably an archeophyte. The three other varieties are introductions dating back to the 19<sup>th</sup> century.

### **Basketry and hoop-making introductions of the last three centuries.**

At least 18 taxa of willows were introduced in the last three centuries as osier or hoop-making willows. During the late 19<sup>th</sup>/early 20<sup>th</sup> century, there were three major centres of basketry in Belgium: Bornem, Zingem and Dilsen-Stokkem, In the Netherlands the focus was on hoop-making, and the Biesbosch was the main centre.

*Salix acutifolia* Willd. (Fig. 12), *S. daphnoides* Vill. (Fig. 13) and *S. elaeagnos* Scop. were introduced in the 19th century as osiers but were not successful as such. Nowadays they are still in use mainly as ornamental willows.



Fig. 12. *Salix acutifolia* Willd. in the dunes of Wenduine (Belgium)



Fig. 13. Female catkins of *Salix daphnoides* Vill.



Fig. 14. Male catkin of *Salix eriocephala* Michx.



Fig. 15. Typical twig color of *Salix euxina* I.V.Belyaeva

*Salix eriocephala* Michx. (Fig. 14) was introduced into Belgium in the 19<sup>th</sup> century and into the Netherlands at the beginning of the 20<sup>th</sup> century. It was a very important willow for fine basketry and it is still found as an escapee from former plantations.

*Salix euxina* I.V.Belyaeva (Fig. 15) was most probably introduced into Belgium in the 19<sup>th</sup> century. It is very rare in Flanders but more common in Wallonia and the eastern part of the Netherlands. The Belgian, Van Puyvelde, concentrated her PhD research on the *Salix alba* – *Salix euxina* complex (Van Puyvelde, 2013) but mainly on German willows and not those in the Belgian localities that we recently mapped.

*Salix × fragilis* L. var. *furcata* Ser. ex Gaudin (Fig. 16) is also a 19<sup>th</sup> century introduction, most likely from Britain, but this origin is not entirely certain. This variety is a male clone. A small percentage of furcated catkins gave this willow its name.

*Salix × fragilis* L. var. *russelliana* (Sm.) Klett & Richt. (Fig. 17) was also introduced from Britain in the 19<sup>th</sup> century as a female clone. It is still found as an escapee but often crossed back with *S. alba* and thus not always easy to recognize. This willow lost its importance following the introduction of *S. eriocephala*.



Fig. 16. Bifurcate male catkin of *Salix × fragilis* var. *furcata*. Ser. ex Gaudin



Fig. 17. Typical pale green colour of *Salix × fragilis* var. *russelliana* (Sm.) Klett & Richt., Biesbosch, Netherlands



Fig. 18. Osier field of *Salix × fragilis* var. *vitellina* f. *sanguinea* (Meikle) Zwaenep., Scheldt River, Flanders, Belgium

*Salix* × *fragilis* L. var. *vitellina* (L.) Zwaenep. f. *basfordiana* (Scaling ex Salter) P.D.Sell was introduced into Belgium most likely in the 18<sup>th</sup> century and into the Netherlands in the 19<sup>th</sup> century. The introduction of *S.* × *fragilis* L. var. *vitellina* f. *sanguinea* (Meikle) Zwaenep., nom. inval. (Fig. 18) occurred later, in the 19<sup>th</sup> century in Belgium and the 20<sup>th</sup> century in the Netherlands. The latter willow remained the most important binding and osier willow until the disappearance of osier willows. The name *Salix* ‘Belgisch Rood’ (Belgian Red) testifies to the importance of this willow in Belgium, and its correct scientific name, according to the latest taxonomic treatment (Belyaeva *et al.*, 2018), is *S.* × *fragilis* L. f. *vitellina* (L.) I.V.Belyaeva.

*Salix gmelinii* Pall. (Fig. 19) was imported into Belgium from Germany in the 19<sup>th</sup> century and from Belgium to the Netherlands at the beginning of the 20<sup>th</sup> century. At least three (female) clones were introduced, and all three still can be found as escapees from former osier plantations.

In Hingene, by the Scheldt River (the centre of the former basketry region), there is a small plantation of a willow with uncertain origin. Until now it was indicated as *Salix* × *forbyana* Sm. but in POWO (<https://beta.ipni.org/?q=Salix%20%C3%97%20leiophylla>) the correct name is given as *S.* × *leiophylla* A.Camus & E.G. Camus (= *S. purpurea* × *S. triandra*).

The hybrid of *Salix cinerea* and *S. viminalis* occurs as a spontaneous hybrid and as a cultivated osier in our study area.



Fig. 19. Female catkins of *Salix gmelinii* Pall.



Fig. 20. Female catkins of *Salix* × *mollissima* var. *undulata* (Ehrh.) Wimm.

*Salix* × *mollissima* Hoffm. ex Elwert (= *S. triandra* × *S. viminalis*) occurs with three different clonal varieties (Meikle, 1984). The two female varieties: *S.* × *mollissima* var. *mollissima* and *S.* × *mollissima* var. *undulata* (Ehrh.) Wimm. (Fig. 20) are widespread. The male variety, *S.* ×

*mollissima* var. *hippophaeifolia* (Thuill.) Wimm. is mentioned in every willow survey of the 19<sup>th</sup> century but is now very rare.

***Salix miyabeana*** Seemen. This willow (Fig. 21) was one of the latest introductions of osier willows. It was the Dutch state osier consultant, Tuinzing, who introduced it into the Netherlands in about 1953 after a series of experiments that started in 1930. The willow was known under its osier name ‘Schmidtstam 65’. It was only in 2017 that we discovered the botanical identity of this willow (Zwaenepoel and Uilhoorn, 2017).



Fig. 21. Male catkins of *Salix miyabeana* Seemen

***Salix × rubra*** Huds. (*S. purpurea* L. × *S. viminalis* L.) was very commonly mentioned in the 19<sup>th</sup> century osier literature but is nowadays a rather rare escapee because of its lime requirement.

A hybrid between *Salix caprea* L. and *S. viminalis* occurs as a spontaneous hybrid and as a cultivated osier in our study area.

### **Ornamental introductions**

A number of weeping willows, originally *Salix babylonica* L., but later mainly hybrids with *S. alba*, *S. euxina* and *S. × fragilis* were introduced as ornamentals. They are rather rare as escapees, but from time to time one can find seedlings. Sometimes these seedlings come from

bisexual catkins, but more often the seedlings are hybrids between *Salix* × *sepulcralis* Simonk. var. *chrysocoma* (Dode) Meikle and *S. alba*.

*Salix irrorata* Andersson, *S.* × *meyeriana* Rostk. ex Willd. were also introduced as ornamental willows. They have been found a few times as escapees.

### Introductions by beekeepers

*Salix udensis* Trautv. & C.A.Mey ‘Sekka’ (Fig. 22) was introduced mainly as a beekeepers’ willow but also as an ornamental shrub. Recently it became clear that this willow hybridises in Belgium with at least *S. caprea*, *S. cinerea*, *S. viminalis* and *S. triandra*. We are preparing a paper about these recent hybrids.



Fig. 22. Male catkins on a fasciated twig of *Salix udensis* Trautv. & C.A.Mey ‘Sekka’

*Salix aegyptiaca* L. and *S. myrsinifolia* Salisb. were also introduced as beekeepers' willows. They are rarely encountered as escapees.

### **Hybrids between the different groups of willows mentioned above.**

The different willows of the groups mentioned above (native willows, osiers, ornamental willows, beekeepers' willows) often also grow close to each other and form hybrids. At least ten different hybrids can be encountered in our study area.

## **Discussion**

### **Native species and subspecies.**

There are discussions about the division of *Salix alba* into the varieties *S. alba* var. *alba* and *S. alba* var. *caerulea* (Sm.) Sm. Is the division a rather artificial limit or is the variety, *S. alba* var. *caerulea*, the result of backcrossing with *S. × fragilis*? Genetic analyses suggest both possibilities (De Cock *et al.*, 2003).

The author considers *Salix cinerea* subsp. *cinerea* and *S. cinerea* subsp. *oleifolia* as subspecies, while many authors consider them as separate species: *Salix cinerea* L. and *Salix atrocinerea* Brot. At least in Belgium and the Netherlands crosses between these two taxa, *S. × guinieri* Chass. & Goerz, are more frequent than the pure species *S. cinerea* and *S. atrocinerea*. Wild *Salix pentandra* is very rare in our study area, but archaeological macro-remains at the edges of the River Scheldt probably prove its indigenous character (Maes *et al.*, 2006). Belgium is situated at the southern limit of this species. Jan Bastiaens, the palaeobotanist who did research on the remains, indicated that the seed material on which the determination was based, was found in Lommel, Province of Limburg. It was determined to be the seed of *S. pentandra* by comparison with the *Digital Seed Atlas of The Netherlands* (Cappers *et al.*, 2006), but reviewing the material seems useful (pers. comm. with Jan Bastiaens).

*Salix purpurea* L. is a very old osier species and it is for that reason that it is extremely difficult to differentiate between truly wild forms and former cultivars. Multiple transition sequences have been found.

*Salix repens* L. is, in our floras, divided into 4 or 5 subspecies, but transplantation experiments with *S. repens* subsp. *repens* and *S. repens* subsp. *dunensis* Rouy (Lambinon *et al.*, 1998) make clear that the differences are rather unstable and disappear after transplantation (personal experiment with *S. repens* subsp. *argentea* in my garden). Probably they are rather ecotypes

than subspecies. There is a strong suspicion that the same is true for other subspecies but further research is needed.

### Osier willows

The botanical interpretation of many of the introduced osier willows is still under study. *Salix eriocephala* is known by at least five different names in the literature and discussion about the correct name is still going on.

*Salix euxina*, following Belyaeva (2009), only occurs as a male clone in our study area, so any female plants resembling *S.euxina* must be considered hybrids. However, we strongly suspect that both sexes occur. Further (genetical) research is desirable for Belgian plants. In the localities with *S. euxina* in Belgium and the Netherlands there is always only one gender - male. Mixed populations do not occur as far as is known but several localities have still to be checked on this point.

*Salix gmelinii* is a very confusing willow in our study area. Until recently we believed, in Belgium and the Netherlands, that it was a triple cross between *S. caprea*, *S. cinerea* and *S. viminalis*, indicated by the name *S. × dasyclados* Wimm. We have still a lot of problems with recognizing very similar willows found here and there. Probably some of them are indeed triple crosses, others could be backcrosses of *S. gmelinii* with *S. viminalis* or other willows. Genetic research on existing clones is desirable.



Fig. 23. Male catkin of *Salix × mollissima* var. *hippophaeifolia* (Thuill.) Wimm.

*Salix cinerea* × *S. viminalis*. There is much discussion about the correct name for this willow. In our studies we indicate it by the name *S. × holosericea* Willd.

*Salix × mollissima* var. *hippophaeifolia* (Fig. 23). In the 19<sup>th</sup> century this name was widespread in the literature of the time, at least in Belgium. Probably the name was often used incorrectly because this willow is nowadays very rare. Some herbarium specimens, however, indicate that it was present, at least at some locations.

*Salix caprea* × *S. viminalis*. Again, there is much discussion about the correct name for this willow. In our studies we indicate it by the name *S. × smithiana* Willd.

## Conclusions

At least 60 species and hybrids of willows can be encountered in Belgium and the Netherlands as wild or escaped willows. The number of clonal forms (and local names) is even higher. The list of willow taxa in our study area is still expanding by a constant supply of new ornamental and beekeepers' willows that escape and hybridize. That is why willows are a fascinating but difficult group to study in our area. In addition, the biodiversity associated with all these willows is fascinating. Willows are the host plants for hundreds of other organisms. At least 184 mushroom species, 120 beetle species, 113 moths, 37 bee species, 57 mosses, 56 lichen species, and 28 higher plants as epiphytes on willows have already been counted in Belgium. This makes a total of 598 associated species, which exceeds the number of organisms associated with oaks or poplars.

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All photographs presented in this publication are the property of the author.

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