

species of gall midge killing the terminal leaf buds of *S. viminalis* L. became very abundant in southern Sweden, and has been ever since. The attack rate of this midge is also considered when breeding material is selected. To further increase the genetic base in the breeding material interspecific crosses are now being made for example between European *S. viminalis* and *S. schwerinii* E. Wolf from the Soviet Union.

Variability in species of the genus *Salix* with particular reference to cultivated taxa

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The intraspecific variability was studied in the genus *Salix*. In addition to the observations made in the field and the evaluations of herbarium specimens, the willows growing in the Brno Botanical Garden – Arboretum (affiliated to the Brno College of Agriculture, Czechoslovakia) in particular were studied. Among the several hundred specimens it was possible to detect rigid taxa featuring very low variability, e.g. *Salix caesia* L., *S. myrtilloides* L., *S. vestita* Parsh. on the one hand and species that show an extremely wide variability in certain morphological characteristics on the other, e.g. *Salix babylonica* L., *S. alba* L., *S. purpurea* L.

A survey of the willow cultivars has been completed with emphasis on their individual characteristics, e.g. type of growth, difference in foliage, size of catkins, colouring of twigs, and has detected additional attractive cultivars. There is a possibility in the future to introduce into horticulture a group of new willows suitable for cultivation.

Growth of two arctic/alpine willows, *Salix setchelliana* (Alaska, U.S.A.) and *S. polaris* (Kola Peninsula, U.S.S.R.)

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Salix setchelliana Ball, a prostrate willow of Alaskan glacial river gravel bars, grows clonally from a peripherally expanding horizontal root-system. To understand the species' success in its temporary habitat, its architectural system was examined during the period 1987–89, and several architectural parameters quantified. This analysis indicated that clones appear to change in time from a 'guerrilla' strategy of environmental exploration to more of a 'battalion' strategy of increased branching of the underground system (Douglas 1991). A similar study of *S. polaris* Wahl., a widely distributed species of tundra habitats, was initiated in 1991. Plants growing in two locations in the Xibini Mountains, U.S.S.R., and in two size categories were excavated and their architectural form described. Data-analysis is in progress. This examination of *S. polaris* will help determine if the temporal changes in growth strategy seen in *S. setchelliana* are typical of low-growing northern willows.

Reference

- Douglas, D. A. 1991. Clonal architecture of *Salix setchelliana* (gravel bar willow) in Alaska. *Canadian Journal of Botany* **69**, 590–6.

A chemotaxonomic survey of phenolic compounds in Swiss willow species

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A phytochemical atlas of all *Salix* species found in Switzerland has been created (Shao 1991), based on both known (total = 24) and unknown phenolics in the bark and leaves using the HPLC method. The known compounds have been quantitatively analysed while the unknown compounds, so far as possible, have been classified according to the on line UV spectra detected by the diode array system (Meier & Sticher 1986). A chemotaxonomical classification of the willow species into groups with a high yield of salicin-derivatives showed a homogeneous result for the subgenus *Chametia*. All species except *S. herbacea* L. are rich (> 1% in dried material) in salicortin (2'-O-Acetylsalicortin) in their bark and leaves. *S. herbacea* contains phenolic glycosides only in its bark. The species of the subgenus *Amerina* can be divided into two groups; one rich in derivatives of salicin (2'-O-Acetylsalicin) e.g. *S. pentandra* L. and *S. fragilis* L., and the other poor in these compounds e.g. *S. alba* L., *S. triandra* L. Until now, high amounts of acetylates of salicin and salicortin have been detected only in the species of this subgenus. The subgenus *Caprisalix* could also be divided into the same two groups. The main salicin derivatives are tremulacin and salicortin.

The cluster analyses showed only small differences between pairs within the species of the section *Caprea* (*S. caprea* L., *S. cinerea* L., *S. aurita* L., *S. appendiculata* Vill., *S. laggeri* Wimmer) in leaves and their barks. *Capreae* is the most homogeneous section of the subgenus *Caprisalix* and belongs to the group poor in salicin derivatives. The main phenolic glycoside in the bark of all species is triandrin.

Similar to earlier results, the new data shows a fairly constant spectra of phenolic compounds, at least the phenolic glycosides, within a species. This leads to the possibility to confirm hybrid forms with a phytochemical analysis. Hybrids of *S. hastata* × *waldsteiniana* have been detected with this technique (Meier *et al.* 1989). The hypothesis of Lautenschlager to declare *S. hegetschweileri* Heer. as a hybrid of *S. bicolor* Ehrh. and *S. nigricans* ssp. *alpicola* Buser was confirmed by comparing the HPLC-chromatograms of the leaves of all three species. No differences were detected in their barks. Other than for Finnish and Swiss willows there is a general lack of information for world-wide willow species. Will chemotaxonomy be a useful tool for the classification of willows? Only time will tell, but techniques already exist which obtain valid results by GC and HPLC (Meier *et al.* 1988; Julkunen-Tiitto