

Compatibility and hybridization in wetland *Salix* species

Kompatibilita a hybridizace mokřadních druhů vrb

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Wide spectrum of hybrids has been gained by crossing different species of willows. From 16 types of crossing 400 individuals have been used as a material for studying the heredity of important diacritical features.

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Species of the variable genus *Salix* L. are dominant components and represent a characteristic feature of Central European wetlands. Great variability of willows has been attributed to the assumed spontaneous interspecific hybridization within this genus. To prove this assumption, intensive studies have been done in several *Salix* species growing in Mokré Louky, a wetland area near the town Třeboň, South Bohemia. The plants were studied in natural conditions of the locality. Mainly *Salix cinerea* L., *S. pentandra* L. and *S. fragilis* L. were examined. Other less frequent species of the study area were used in hybridization experiments, too, viz. *Salix aurita* L., *S. caprea* L., *S. viminalis* L., *S. triandra* L.. All plants used for experiments were collected as items for authors herbarium. Problems of both intra- and interspecific compatibility as well as other questions of reproductive biology of willows, such as the phenology of flowering and dissemination, quality of the pollen, quality and germination of seeds and seedling establishment, have been studied in connection with observation of environmental factors (KONČALOVÁ et JIČÍNSKÁ, 1979, 1982 a,b).

The pollen quality proved to be a good parameter for estimating the influence of both ecological factors during the pollen development and contingent hybrid origin of the individuals under studies. Therefore the pollen quality, together with morphological diacritical characters, was used as a criterion for excluding contingent hybrids as parental plants. The methods of pollen analysis have been described (KONČALOVÁ et JIČÍNSKÁ, 1982a).

In most of the willow species, allogamy is determined by dioecy and thus inbreeding depression occurred only in the case of typical monoecious individuals of *S. cinerea*. Selfing resulted in the lower viability of seeds and lower rate of germination and seedling establishment (KONČALOVÁ et JIČÍNSKÁ 1983). Dioecious individuals of *S. cinerea* and other dioecious species were pollinated by pollen of the same species, but from different individuals (xenogamy). In comparison with the free pollination, lower fertility in our experiments did not occur.

After overcoming ecological barriers (pollen storage, artificial transfer of pollen) the wide intercompatibility of willow species has been proved (Table

Tab. 1. Types of crossings and their results

Type of Crossing (F × M)	Number of Pollinated Catkins	% Successful
A × A	144	90
A × CAP	136	70
A × CIN	229	63
A × F	153	48
CAP × CAP	100	100
CAP × CIN	107	64
CAP × P	39	0
CAP × V	61	32
CIN × CIN	733	64
CIN × A	250	48
CIN × CAP	389	29
CIN × F	234	10
CIN × P	11	100
CIN × V	58	97
F × F	50	42
F × A	39	46
F × CAP	89	73
F × CIN	115	51
F × P	39	46
F × V	8	100
P × P	107	75
P × A	48	56
P × CAP	32	94
P × CIN	127	58
P × F	64	86
P × T	23	87
T × T	19	66
T × A	13	0
T × CAP	33	0
T × CIN	29	0
T × F	8	0
V × V	32	97
V × CAP	47	89
V × CIN	51	94

Notes: A = *S. aurita*, CAP = *S. caprea*, CIN = *S. cinerea*, F = *S. fragilis*, P = *S. pentandra*,
T = *S. triandra*, V = *S. viminalis*

1.). In most cases whole twigs with 10 to 30 female flowers were isolated in nylon bags. The bags were of rather large size in order to protect the flowers against lack light, overheating and/or mechanical damage. Bags were kept on twigs until all capsules achieved full ripeness. The catkins were pollinated when they were ready to accept the pollen. Comparable numbers of capsules, seeds and — most of all — grown seedlings served as criteria of successful crossing. Hybrids of *S. aurita*, *S. caprea*, *S. cinerea*, *S. fragilis*, *S. pentandra*

and *S. viminalis* were obtained. For the time being, no seedlings germinated from crossings of *S. triandra*. Similar result has been presented by CHMELAŘ (1983). The rate of successful crossings did not exceed 50 % when compared with free pollination. Evaluation of all types of pollination was based on the ratio of ripened catkins to pollinated one. Reciprocal crossings have not always been equal. From 16 types of crossings a wide spectrum of hybrids has been gained. Presently, more than 400 individuals are grown in the experimental plot. Several individuals of F₁-generation have already started flowering during the second year after dissemination. However, most of the willows in our experiments started flowering while three or four years old. Using back-cross analysis, we have started a study of the heredity of main diacritic taxonomic characters.

SOUHRN

Velká variabilita vrb bývá považována za důsledek časté spontánní mezidruhové hybridizace. Při překonání ekologických bariér byla prokázána široká interkompatibilita druhů, z nichž některé jsou vývojově velice vzdálené: *S. aurita*, *S. caprea*, *S. cinerea*, *S. fragilis*, *S. pentandra*, *S. viminalis*. V porovnání s volným sprášením dosahovala úspěšnost křížení maximálně 50 %, přičemž reciproké hybridizace nebyly vždy rovnocenné. Ze 16 typů křížení bylo získáno široké spektrum hybridního potomstva, na kterém je dále sledována dědičnost důležitých diakritických znaků.

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