Club-rushes (*Schoenoplectus* (Reichenb.) Palla) in the Schelde-estuary : morphology and ecology of planted-alien versus spontaneous-native populations

Maurice HOFFMANN [1,2], Leo VANHECKE [3], Wouter DEKONINCK [2] & Patrick MEIRE [1]

[1] *Institute of Nature Conservation, Kliniekstraat 25, B-1070 Brussel, Belgium*
[2] *Universiteit Gent, Dept Botany, Lab Botany, K L Ledeganckstraat 35 B-9000 Gent, Belgium*
[3] *National Botanic Garden, Domein van Bouchout, B-1860 Meise, Belgium*

Although several club-rush species are known from the Schelde-estuary, colonisation of free mud flats by these characteristic estuarine perennials was not observed for a long time. Six taxa have been observed until now, i.e. *Schoenoplectus triqueter, S pungens, S. lacustris, S tabernaemontani, S x scheuchzeri* and *S x carinatus*

Spontaneous native populations are restricted to artificial boulder slopes in a narrow zone between 0.6 m and 1 6 m beneath MHW. These robust, rhizomatous species are nonetheless known as good mud flat fixators, which might help stabilise river banks with large mud flats. Therefore Grey club-rushes (*S tabernaemontani*) were planted on an experimental scale in 1993 at two sites in the fresh water tidal zone. At several other sites in the brackish tidal part commercial plantations (chair-bottoming) of the same species were realised in the eighties. In both cases rhizome material was introduced from Dutch plantations (IJsselmeer, Oude Maas). To test whether these planted-alien "populations" differ morphologically and/or ecologically from native-spontaneous populations we compared *S triqueter, S x scheuchzeri/S. x carinatus* and native *S. tabernaemontani* with planted-alien *S. tabernaemontani.*

Significant differences ($p < 0,05$) were found for almost all morphological characters (convexity (triangularity) of the stem, mid-stem section area, mid stem perimeter, fertile stem length, # spikelets/inflorescence, # seeds/spikelet, # fertile stems/m^2, total # stems/m^2) between *S. triqueter* and hybrids (*S x scheuchzeri*), *S. triqueter* and *S tabernaemontani* and between hybrids and *S. tabernaemontani*. Therefore *S triqueter* is readily distinguishable from hybrids (*S x scheuchzeri*) and from *S tabernaemontani*. Hybrids (*S x scheuchzeri*) are also rather easily distinguished from *S. tabernaemontani*

Planted versus spontaneous *S tabernaemontani* show no marked morphological differences, i e when both are considered as homogeneous groups (as if belonging to one population). When we compare spontaneous *S tabernaemontani* with one particular Grey club-rush plantation, planted at Appels in May 1993, some differences occur (planted material is generally larger and has thicker stems then spontaneous populations).

The stem base of all three tested native spontaneous club-rush taxa is inundated with almost every high tide (> 98 %) The stem base of planted *S tabernaemontani* on the other hand is far less frequently inundated. This is not due to selective planting at higher altitudes, since all plantations were initially along a wide altitudinal gradient. All plantations withdrew during their development to higher altitudes, not surviving at lower altitudes, at which native club-rushes normally appear. This is a remarkable feature indicating that the alien plant material is less capable to withstand frequent and high inundation then native club-rushes.

Inflorescences of spontaneous *S tabernaemontani* populations are only inundated by ca. 15 % of the high tides, inflorescences of planted Grey club-rush on the other hand are never inundated, while inflorescences of *S triqueter* and *S x scheuchzeri* are very frequently inundated, what might (partially) explain the lower number of seeds/spikelet compared to *S tabernaemontani* . This might have important dispersal consequences, favouring generative dispersal by fruits of planted *S. tabernaemontani* above native *S tabernaemontani*, and certainly above *S triqueter* and *S x scheuchzeri*

Field observations proof nevertheless that hybrids are far more successful then *S. tabernaemontani* Until now we assume that vegetative dispersal is far more important then dispersal by fruits. Club-rushes almost exclusively grow between boulders on artificial dike slopes , space limitations for rhizomes to attach between these boulders might be more limiting for *S. tabernaemontani* then for hybrids, which form thinner rhizomes then *S tabernaemontani* The rareness of *S triqueter* (only 21 individual populations counted in 1995) on the other hand can not be explained in this way.

Although morphological differences are relatively small, important ecological differences between planted and spontaneous club-rushes were detected. This indicates that introduction of alien plant material should only be done with greatest care Use of native plant material has strong preference over introduction Until now there are no reasons to believe though that the introduction of alien material of *S tabernaemon-*

tani threatens native populations of *S tabernaemontani*, *S x scheuchzeri* or *S triqueter.*

There are no field indications that competition for potentially suitable habitats threatens the dispersal possibilities of native club-rush populations. Hybridisation between alien Grey club-rush and native club-rushes can not be excluded though and might cause genetic pollution.

Initiation and development of cichlid and zebrafish first-generation teeth: an in vitro study

HUYSSEUNE, A., J.-Y. SIRE (°) & C. VAN DER HEYDEN

University of Ghent, Belgium , (°) Université Paris 7, France

We have used a recently developed organ culture method based on a serum-free culture medium, appropriate for teleost skeletal and dental tissues (KOUMANS & SIRE, 1996), to study the initiation and development of first-generation teeth in early post-embryonic stages of two teleostean fishes, the cichlid *Hemichromis bimaculatus* (Cichlidae) and the zebrafish *Danio rerio* (Cyprinidae). Entire heads, explanted for 3 to 7 days reveal (1) the *in vitro* formation of tooth germs from a microscopically undifferentiated epithelium in the cichlid, but not in the zebrafish, (2) ongoing morphogenesis and cytodifferentiation of initiated tooth germs including the deposition of dentine, and (3) attachment of the tooth through attachment bone deposited *in vitro*. The pattern observed in early postembryonic stages of the cichlid can be mimicked in organ cultures of the head, but not of isolated jaws. The results point to the possibility of the involvement of neurotrophic factors in tooth initiation in these teleost models.

Reference

KOUMANS, J.T.M & J.-Y SIRE (1996) In Vitro Cell Dev Biol. **32** 612-626.
