

SUMMARIES OF DOCTOR'S THESES and of other Dutch papers which might escape attention because of their mode of publication

J. VAN DER TOORN 1973: *Variability of Phragmites australis (Cav.) Trin. ex Steudel in relation to the environment*. Thesis, Groningen, 122 pages. Also: Van Zee tot Land 48.

SUMMARY

A study was performed on the variability of the Common Reed, *Phragmites australis* (Cav.) Trin. ex Steudel, in The Netherlands and on the relationship of this variability with the habitat.

This reed, a perennial plant belonging to the family of the Gramineae, is reported in the literature to have a cosmopolitan distribution and a high degree of morphological variability. The species is found in widely divergent habitats.

The results of transplantation experiments show that in The Netherlands at least two ecotypes can be distinguished:

1. a peat ecotype consisting of reed with short shoots and a high shoot density, occurring in peat marshes, and
2. a riverine ecotype consisting of reed with long shoots and limited shoot density, occurring mainly in fresh-water tidal areas.

These two ecotypes are related to each other by transitional forms.

The peat and riverine ecotypes correspond with the varieties *typica* Beck and *latifolia* Horw., respectively. In brackish tidal regions and in the IJsselmeer area, long- and short-shooted forms are found. All of the forms mentioned have the same chromosome number, i.e. $2n = 48$.

The habitat of these forms was investigated, the peat ecotype in an area near Kalenberg and the riverine ecotype in The Biesbosch region; the reed occurring in brackish areas was studied in the vicinity of Zuidland.

Around Kalenberg the reed grows in lakes formed from 200 to 50 years ago, when peat was cut for fuel in this region, and must originally have become established from seed, after which a floating vegetation developed by vegetative extension. The growth of the reed is probably determined mainly by the amount of phosphorus in the upper layer of the soil. Indications were obtained that under poor nutritional conditions high shoot density is a favourable characteristic.

Both in The Biesbosch and near Zuidland the reed occurs on nutrient-rich soils which developed as the result of silting under the influence of tidal action (fluctuation about 2 m). In Zuidland the salinity varies from 3 to 10 ‰ Cl^- . In both regions reed growth is highly dependent on the aeration of the soil.

The reed develops from rhizome segments, in The Biesbosch at a mean high water level of about 100 cm and less above soil level, in Zuidland at about 0 cm. Formerly, when the reed was still a commercial crop, it was often planted by man, which must have led to a certain selection.

Ground frost in the spring can cause serious damage to reed. Temperature measurements showed that such frosts occur more frequently and reach lower values in the vicinity of Kalenberg than in The Biesbosch, and that these differences are appreciably greater in places where reed can become established.

Due to differences in nutritional conditions, the production level is on the average higher

in The Biesbosch than in Kalenberg, Zuidland being intermediate, probably due to the rather high salinity there.

The habitat differences between the three studied areas are clearly expressed in the composition of the local vegetation and the spectra of the life forms.

Since it was assumed that competition phenomena could have selective importance, experiments were performed in the various habitats to investigate competition between the peat and riverine ecotypes. The results show that initially the riverine ecotype was the stronger competitor, after which there was a reversal favouring the peat ecotype. The degree of this reversal was distinctly greater in Kalenberg than in The Biesbosch. There are indications that in the Biesbosch experiment this reversal was promoted by an experimental effect in contrast to the Kalenberg experiment. It was therefore concluded that the peat ecotype shows a better adaptation to the peat habitat than does the riverine ecotype. Experiments set out in a natural vegetation showed, however, that the riverine ecotype is relatively better adapted to the tidal habitat.

The results of the field experiments show that as compared with the peat ecotype, the riverine ecotype is distinguished by:

1. a higher above-ground production;
2. greater tolerance for tidal submergence;
3. less tolerance for ground frosts in the spring;
4. greater sensitivity to infestation by the moth *Archanara geminipuncta*.

Laboratory experiments were performed to investigate differences in the reaction of the two ecotypes to the following substrate factors: soil type, pH, phosphate and nitrogen levels (the latter in the form of ammonium), and salinity. Differences were found only with respect to salinity, the riverine ecotype showing a relatively greater salt tolerance as compared with the peat ecotype and even as compared with a (short-shooted) form deriving from a brackish tidal area.

The present distribution of the various forms of reed may be seen as the result of selection processes. In the fresh-water tidal areas (riverine habitat) the riverine ecotype is favoured by the good nutritional conditions, tidal submergence, and planting of stands. In the peat habitat the peat ecotype is relatively less depressed by the poor nutritional conditions and frequent occurrence of ground frosts. In the brackish tidal areas (estuarine habitat) the riverine ecotype is favoured by the relatively good nutritional conditions and relatively high salinity, but the forms with short shoots are favoured by artificial plantation.

The thesis is available on request at the author's address: Dr. J. van der Toorn, Institute for Ecological Research, Kemperbergerweg 11, Arnhem.