

# MEETINGS OF THE ROYAL BOTANICAL SOCIETY OF THE NETHERLANDS

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Some aspect of vegetational and environmental research of the dune slacks of Voorne

One of the objects of the Biological Field Station "Weevers' Duin" at Oostvoorne is the investigation of dune slack vegetation. An aspect of this study is a typology of the vegetation types; an important point of this is the relationship between the environment and the vegetation and the similarities, or differences, between the elements of the system.

The island of Voorne, the dunes of which are in the area of calcareous dunes of the Netherlands, is outstandingly rich in slacks, primary as well as secondary ones. Representatives of both kinds, of all ages between young and relatively old, are found. The relation between vegetation and soil development was discussed at one of the previous meetings.

Apart from the differences connected with age there are environmental variations in the slacks affecting vegetation. The differences in vegetation are due to a number of environmental factors or complexes of factors connected with the kind of environment which is rich in gradients. In such an environment syntaxonomic units – after the French-Swiss school of phytosociology – are, at any level, transitory in time as well as in space. Furthermore, our present knowledge of the dune slack vegetation, especially at the association level, is insufficient as a basis for the required typology. There are also objections against applying a system that is based on discontinuities on vegetations with mostly continuous changes.

The method being worked out for the slack vegetations on Voorne is based on the hypothesis that a species occurs in places that fit its requirements. A number of factors assumed to affect the vegetation are being analysed. The amplitude of each species with regard to the factors analysed can be determined. Within the overall range of these factors in the slacks every species has its place. A complete analysis of environmental factors is, of course, a utopia. However, as appeared from previous studies and from experience in the field, a limited number of factors seems to determine the floristic composition of these vegetation types. These are: the altitude of the site in relation to the groundwater table, the structure of the soil, and its content of organic matter and of  $Cl^{-}$  ions. Of some other factors, which are interdependent, the importance is not clear, like the pH and the content of  $CaCO_3$  and of  $P_2O_5$ .

When the vegetation records are arranged in a three-dimensional way it can be tested whether these factors are determining or not. Then the correlation coefficient between the position of the vegetation records on the X, Y, and Z axis and one or a combination of several environmental factors can be computed. As a next step for each species the amplitude of the factor is determined which shows the most evident correlation.

The species can be divided into three groups: 1. species which are mutually exclusive; 2. species identical in amplitude; 3. overlapping species. These groups are not syntaxonomic units but only form a stage in assessing the data. In order to find out to what extent the species in such a specific, so to speak 'theoretical', group are associated, their association is calculated by means of the  $\chi^2$  test as described by Greig-Smith and others. The results of this calculation show to which extent the environmental factor concerned determines the composition of the vegetation. When, for instance, the amplitude of two species with regard to the groundwater régime is identical, but when, on the other hand, they are not associated, it follows that another factor is involved, e.g., the content of organic matter in the soil, which thus separates them.

The eventual system will consist of a number of species tables listing their amplitudes with

regard to various factors analysed, or combinations thereof. If these amplitudinal data are based on a sufficient number of observations, interpolation is acceptable. It becomes then possible to characterize the environment on the basis of its floristic composition, or, conversely, the floristic composition on the basis of the environment. This may be useful for the management of the dune slacks and for the biological supervision of technical works carried out in the dunes.

This, basically continuous, system has the advantage of permitting the assemblage of species into groups at any level, which may be useful in, e.g., vegetation mapping.