HOW MANY ASSOCIATIONS DOES A PHYTOSOCIOLOGIST NEED?

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Abstract - The two concepts "continuum of the vegetation" and "plant communities" are not taken as opposite here, but as related together. Even by accepting the continuum concept, it is possible and useful to define plant communities and to give them names in order to keep a survey of the whole vegetation of a country or a whole continent. But under these circumstances it is possible for the researchers to limit the number of associations to be accepted.
Key words - Phytosociology, continuum, limited number of associations.

Introduction

Phytosociology is a very powerful instrument for a large variety of works in vegetation science. It is frequently used by specialists in basic research as well as for many applied research in agriculture, forestry, nature protection etc. This was demonstrated by many publications since Braun-Blanquet's time.

This paper is provoked mainly by some problems we are embarrassed with at the moment. The books of Oberdorfer (1977-92), Pott (1992) and Grabherr *et al*. (1993) give a very good overview over the vegetation of Germany and Austria, respectively. These books help the user to determine vegetation types in these countries. But the comparison of the three papers shows, that the same name means not always the same and that the same vegetation is not every time called the same way. These differences get more important by comparing the books with older surveys of the vegetation of whole countries, e.g. by Runge (1980), Ellenberg and Klötzli (1972). This may be taken as expression of scientific freedom and development. If the units are used in practice, by specialists or by non phytosociologists, it looks worse and produces troubles. This paper will show, how these can be solved. For this, the two terms of "continuum concept" and "community concept (phytosociology)" are necessary, two things usually seen as incompatible.

WHY "COMMUNITY CONCEPT"?

In every part of a continent we find clear boundaries between single stands. Ruptures in the ecological gradients do exist, for example when the subsoil changes from sediments to igneous rocks, or at a topographic break like the edge of a rock or when the management by e.g. agriculture changes. With such regionally clear borders, it is possible to define plant communities like Braun-Blanquet did at the beginning of his career in the Rhetic Alps (Braun, 1913). He found there a great variety of species combinations, but, due to local ruptures in the ecological gradients, he could describe definite plant associations. Like this he established his very useful concept of phytosociology.

Thanks to this invention, we are able today to characterise the vegetation of any place, to name it, perhaps with the addition of a second, related name, if it is not a pure association, and to include with this name a huge information, mainly of ecology and phytogeography. Thanks to all this wealth of knowledge it is possible today that every user with a certain minimum of understanding of phytosociology and ecology can apply this concept of Braun-Blanquet (1964) with great profit, in phytosociology itself, in agriculture, in forestry, in nature protection and in many other applications. But all this implicit knowledge stays unused, unusable, when we do not use well accepted communities and community names.

WHY "CONTINUUM CONCEPT"?

The concept of continuum means, that over a whole continent does exist an abstract, multidimensional space with one axis for every ecological factor. Most of these factors, taken over a whole continent, show a continuous gradient, without any rupture. Every theoretically possible ecological niche of this space does exist somewhere in reality, although the frequency of the niches is not the same. An ecogram like the one in fig. 1 based on Ellenberg (1963) or like others according to Whittaker (1967) shows continuous gradients for soil reaction and water relations, without ruptures. In a similar way the gradients for nutrients in the soil, the possibility of penetration by roots, for temperature, for light and for many other ecological factors have no empty places, any value between two extremes does usually exist.

In parallel to this ecological, multidimensional space we find an equally multidimensional space for vegetation. To every combination of ecological factors we can find a corresponding vegetation therefore. On a continental scale well defined boundaries between communities do not exist, although the limits between single stands in the field may be very clear. Instead many gradients with transitions in ecology as well as in vegetation do exist. There are parts of this theoretical vegetation-space with more dense or more sparse coverage by stands of real vegetation, but there are no parts of the ecological space without counterpart in the vegetation in the nature.

Here lies a clear contradiction: While we see borders between stands in limited regions, there does exist a continuum in an unlimited space; while we can describe definite associations e.g. in a single valley, we find a continuum on the whole continent.

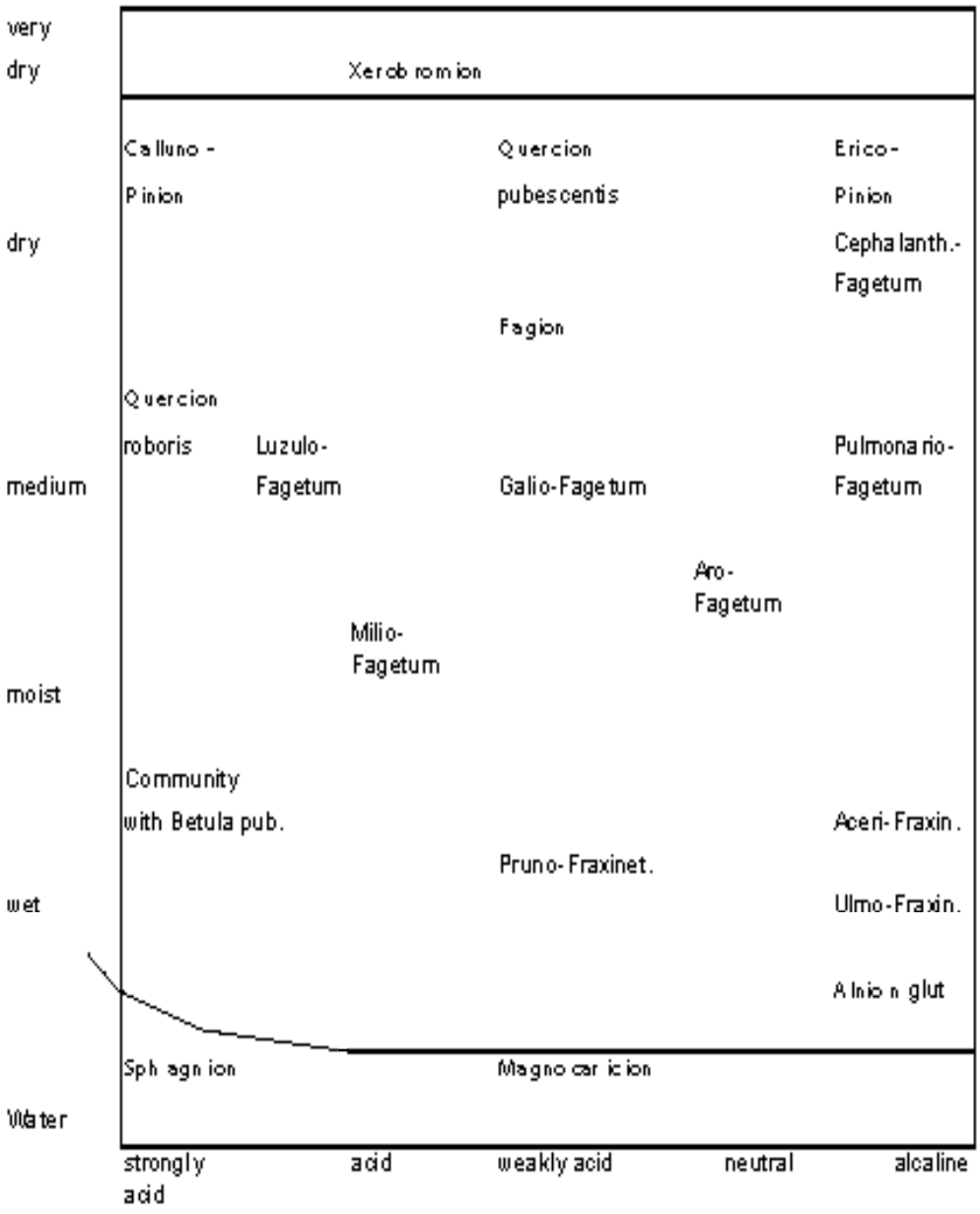

Fig. 1 - Forest - Association of central Europe according to Ellenberg (1963) and Ellenberg & Klötzli

SYNTHESES OF THE CONCEPTS OF PHYTOSOCIOLOGY AND CONTINUUM

Today's phytosociologists tend to do, what their predecessors did: to describe more and more new associations. If we continue to do so, every spot of vegetation may finally be included into a unit. Braun-Blanquet never thought to go so far. He knew that there do exist stands in succession or on a boundary zone between two phytosociologically and ecologically clearly differentiated stands, and for these transitions he did never give a name, he did not even make a relevé there. It was not a "good" place for him. If we try to include the whole of our vegetation into associations, one of the very important goals of phytosociology goes lost: the broad survey of the vegetation as a whole, the possibility to give an idea of the vegetation with its ecological relations to many people, including non-specialists. For this purpose of survey it would be very useful to restrict the number of associations.

When we accept the concept of continuum, when we accept therefore the fact that we can define an association somewhere in the space of vegetation according to our decision, we are able to restrict the number of associations for a continent, so that an overview stays possible. It seems, that the moment for such a decision has come, at least for Europe. We in Europe, we could give a list of the associations we need for our practical and scientific work. This list will be proposed later on. Then, the very important applications of phytosociology in nature protection, in landscape planning, in agriculture and forestry will continue, our associations will be the basis for many works of high importance for future.

If we do not so, we will be overrun by scientists who until now have applied phytosociology as a well defined basis of their work, but who now define lists of biotopes (ironically based on our associations) with much less clear definitions, and our knowledge will no more be used for the protection of nature, and many other practical applications will no more be done. We will have a "good" science, well founded, with a very good theory, but nobody except phytosociologists will use it; and nobody will anymore finance our work, what will hurt us very strongly!

LIMITATION OF THE NUMBER OF ASSOCIATIONS

A central goal of phytosociology should be an overview of the vegetation, an overview which can be used in practice. This does not include a direct description with a name for the vegetation of every place on the earth. There do exist places with vegetation, which cannot be inserted into an association. This is true for example for the ecological zones transitional between two associations (Gradus according to Brun-Hool, 1974) and for communities of succession or for heterogeneous relevés from an ecological mosaic.

The association is an abstraction of the vegetation. It is constructed on the basis of the relevés from several really existing stands.

To find the "gravitation centre" for an association and to define boundaries between associations needs an intellectual work: the above mentioned abstraction.

Therefore, the number of associations to be described on a continent is not given in the nature itself, it is the result of the decision of the phytosociologists. This number

should neither be too large – the clearness of the overview would be lost – nor too small – the description of details would no more be possible.

GENERAL PRINCIPLES FOR A LIMITATION OF THE NUMBER OF ASSOCIATIONS

The definition of an association is, as we have seen, an intellectual work, it is not directly given in the nature. Therefor we need some rules:

- The associations have to be defined in such a way, that they are valuable for a large part of a continent.
- The distances between the centres of these units, measured in a multidimensional ecological space, should be of comparable size.
- The boundaries between the associations must be laid in a way that they are correct for a large part of a continent. They must coincide with the frequent conditions.
- All associations must be characterised with the methods of phytosociology, as described by Mucina (1997), especially with character species. Only for **central associations** according to Dierschke (1981) character species do not exist just because of their central position, but nevertheless they must be described. Just because of their central position they have a great importance in the whole landscape: intermediate conditions are found on a large part of a continent.
- The number of associations on a continent should be limited.
- Specialities of small parts of the continent can be treated as subassociations, regional associations, varieties or facies for detailed and more local studies. This gives the opportunity to describe the vegetation of small parts of the continent as well as of the continent as a whole.

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