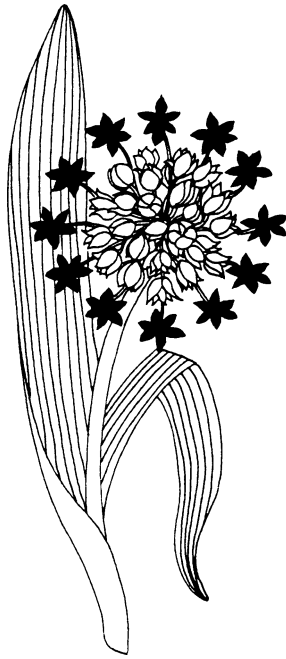


Reports and Short notes

European Vegetation Survey: update on progress

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Abstract. Progress in the European Vegetation Survey is described. 25 countries are now represented in a network committed to common data standards in phytosociological survey, the development of compatible software for data analysis and mapping, the encouragement of national programmes and the development of an overview of European plant communities. Advances in each of these areas of activity is summarised and plans for the future are outlined, most notably the production of a book *'The Vegetation of Europe'*.

Keywords: CORINE; Database; Europe; EU Habitats Directive; National Vegetation survey programmes; Phytosociology; Software.

A new spirit in European phytosociology

The European Vegetation Survey is an alliance of leading phytosociologists committed to developing an overview of plant communities throughout the wider Europe. The enterprise began in March 1992, in the wake of the political changes in the East, with a renewed determination to develop scientific cooperation to understand the vegetation resources of Europe and to inform decision-making in environmental protection across the Continent. Convened by Professor Sandro Pignatti, then President of the International Association for Vegetation Science, representatives of 15 countries attended a first meeting in Rome. Since then, annual workshops have reviewed progress in vegetation survey across Europe and laid the foundation for a programme of action, through an IAVS Working Group chaired by Pignatti and with Dr. Laco Mucina of the University of Vienna as Secretary (Pignatti 1990; Dierschke 1992; Mucina et al. 1993). 25 countries are now represented in the network with a shared commitment to:

- common data standards in the provision of phytosociological information about plant associations;
- the encouragement of national programmes of vegetation survey across Europe;
- the development of software and an electronic network for data exchange;
- the production of an overview of European vegetation.

All this marks a new spirit of collaboration at a time when there is increasing interest in using the phytosociological data and insights first developed by Tüxen (1937) and Braun-Blanquet (1964), not simply for cataloguing plant communities and devising classifications,

but also for predicting and monitoring the impacts of environmental change and developing vegetation management and landscape planning.

Vegetation survey across Europe

One of the basic principles of the European Vegetation Survey is that its area of interest extends beyond the European Union to include the eastern countries, the European parts of Russia, Kazakhstan and Turkey, the Aegean Islands, the Canaries, Svalbard and Iceland; and that, within this network, all participants should enjoy equal treatment. However, the current state of vegetation survey and phytosociological research in these different countries varies widely. An early initiative of the group was therefore to circulate a questionnaire to country representatives to assess the extent and distribution of phytosociological data, the development of databases and software for vegetation data analysis and the state of national survey programmes (Rodwell in press).

18 countries have now completed this questionnaire, including Russia, Latvia, Romania and Albania, with replies currently awaited from a further seven. Responses already reveal that there are in excess of one million relevés recorded in these countries but the number and proportion of these data that are published varied greatly from country to country. Not surprisingly, those countries with a substantial tradition of phytosociology have most relevés, as in Germany (about 200 000), France (400 000), the Netherlands (160 000), Austria (100 000), Spain (150 000), Italy (40 000) and Switzerland (20 000). However, whereas in Germany 70% of these have been published (though mostly as synoptic tables), the figure for the Netherlands is only 3% (though mostly as actual relevés). Many eastern European countries, too, have numerous data, like the Czech Republic, Slovakia, Slovenia, Romania and Russia and, in some cases like the Czech Republic, most of these have been published. Other countries, like Albania, Latvia, Greece or Portugal have many fewer relevés, virtually all unpublished or in relatively inaccessible research reports. In some countries, the oldest relevés date from the 1920s; others, like Eire and the UK, began with a phytosociological approach more recently but have now accumulated substantial amounts of data, much in published sources.

The distribution of such data within the various countries is sometimes very uneven. In Portugal, for example, many relevés originate from relatively small areas in the uplands and, in Greece, coverage is also irregular. The sampling of different kinds of vegetation is also very variable within and between different countries. In the questionnaire, each respondent was asked to score the quality of coverage for the phytosociological

classes like the bog vegetation of the *Oxycocco-Sphagnetea* or the calcicolous pine-forests of the *Erico-Pinetea*. Such responses have now been mapped across Europe for over 60 classes.

Although there have been important publications on the plant communities of various European countries (Oberdorfer 1957 *et seq.*; Westhoff & den Held 1969; Pott 1992), when the European Vegetation Survey began its work, only four countries had a national programme of survey - Austria, Germany, the Netherlands, and the UK (Mucina *et al.* 1993). The UK National Vegetation Classification was the first of all such surveys to begin publication, with the first volume of *British Plant Communities* appearing in 1991 (Rodwell 1991 *et seq.*). The three volumes of *Pflanzengesellschaften Österreichs* have now appeared (Mucina *et al.* 1994), with the first two volumes of *De Vegetatie van Nederland* (Schaminée *et al.* 1995, in press) due imminently.

Meanwhile, the support of the European Vegetation Survey has been of critical importance in securing government funding for the Czech and Slovak vegetation surveys. Italy and Spain have surveys in progress and Slovenia is also starting a national programme, with Switzerland, Latvia and Romania undertaking studies of particular regions or major vegetation types. However, not all of these programmes yet have proposals for publication of their results.

Databases and software

Parallel with such programmes, many countries now make extensive use of software for the analysis and display of relevé data, particularly with the increasing availability of PCs (van der Maarel *et al.* 1980; Mucina & van der Maarel 1989). A wide variety of existing programs is used, notably TWINSPAN (Hill 1979) and CANOCO (ter Braak 1990) but new software has also been specially developed by some groups (e.g. Malloch 1988), with FORTRAN and PASCAL the commonest programming languages.

10 countries have more formal programmes for developing databases of relevés with central locations for such information, minimum data-standards and single national lists of vascular species and cryptogams for coding. To assist compatibility between such systems and the exchange of phytosociological data, the members of the European Vegetation Survey have committed themselves to adopting or interfacing with a new database-management package TURBO(VEG) developed in the Netherlands (Hennekens 1994) and already installed in 10 centres in the network. TURBO(VEG) is a user-friendly, menu-driven package with fast and flex-

ible options for editing and tabulating data and for exporting to a variety of other software for multivariate analysis. It can also generate maps on a 50 km × 50 km grid over a Universal Transverse Mercator map of Europe similar to that used in the Atlas of *Flora Europaea*. TURBO(VEG) is not yet widely available but the Dutch documentation will shortly be translated into English. The Central Office for Statistics in the Netherlands is also preparing a computerised list of vascular species based on *Flora Europaea* which will greatly ease data transfer across Europe.

For the European Vegetation Survey, development of TURBO(VEG) is centred on the Institute for Forest and Nature Research at Wageningen in the Netherlands under the direction of Dr. Joop Schaminée, with the Unit of Vegetation Science at Lancaster pursuing a parallel database-development programme using an ARC/Info Geographical Information System (Rodwell et al. in press). This will open up the possibility of more sophisticated use of phytosociological data for understanding vegetational trends across Europe and for predicting and monitoring the impacts of environmental change. GIS will also enable the work of the European Vegetation Survey to be interfaced with the Potential Vegetation Map of Europe project, which has an overlapping network of participants across the Continent (Bohn 1992). Meanwhile, the conceptual basis of phytosociology is being developed by members of the European Vegetation Survey team in textbooks (Dierschke 1994; Schaminée et al. 1995) and papers (van der Maarel 1993; Mucina 1993; Pignatti et al. 1994).

A European overview of vegetation

Developing an overview of European vegetation cannot wait for the completion of the various national survey programmes. For one thing, a robust framework of vegetation classification with supporting data and descriptions is urgently needed to inform the implementation of environmental legislation like the European Union Habitats Directive. While the EU's own CORINE Biotope Classification (Anon. 1991) offers a framework of sorts, it is not sufficiently informative or sturdy to serve as a basis for predicting and monitoring environmental impacts and managing vegetation in protected sites, nor even for providing a reliable guarantee that a representative selection of European plant communities will be protected by the legislation (Waterton et al. 1995; Pearce 1995). For example, an overview of pastures and meadows undertaken for the European Vegetation Survey, based on relevé data from Ireland, the UK, the Netherlands and Germany, across to Slovakia and Romania and down through France to Spain and

Portugal, reveals many grassland types that are simply unrecorded in the CORINE classification, some of great scientific, landscape and nature conservation value (Zuidhoff et al. in press).

As an initial step towards such an overview, a first approximation of European vegetation types pitched at the level of alliances will be prepared and published early in 1996. Meanwhile, a more ambitious publication, *The Vegetation of Europe*, is also underway with an editorial team under the coordination of Mucina. Here, the emphasis is very much on the ecology, not the classification and syntaxonomy, of the vegetation types, with sections of text on floristic composition, eco-physiology, community structure and population ecology, climatic, soil and biotic relationships of the vegetation, florogenetic processes and palaeoecology, distribution, vicarism and regional differentiation across the range. For this volume, to be outlined in draft by 1996, the vegetation types of Europe have been amalgamated into major groups of classes such as bogs, mires and fens, mediterranean matorral, temperate and boreal coniferous forests, krummholz and so on.

The way forward

At the 4th Workshop of the European Vegetation Survey held in Rome last March, over 50 delegates from 18 European countries met for 3 days of presentations and discussions, with formal participation for the first time by Greece, Sweden and Denmark and, from further afield, the United States and Japan. Professor Elgene Box, the present President of the IAVS, Professor Eddy van der Maarel, Editor of the *Journal of Vegetation Science* and Dr. Udo Bohn, coordinator of the Vegetation Map of Europe project, also attended.

Definitive progress was made in a number of important areas: new contacts were established in countries so far unrepresented in the network, arrangements were made for extending the TURBO(VEG) network and agreement reached on the preparation of the overview and the *Vegetation of Europe*. The 5th Workshop, which will receive the completed overview and draft of this book will meet in Rome in March 1996 and a special session will be devoted to the European Vegetation Survey at the IAVS International Symposium at Lancaster in September 1996.

Meanwhile, as a token of its unity and hope, the European Vegetation Survey has adopted the logo shown at the head of this article. The ring of open flowers echoes the symbol of Europe, young flowers continuing to join the circle. The illustration is based on *Allium neapolitanum* - its specific epithet an appropriate summary of this new and lively collaboration.

References

- Anon. 1991. *CORINE Biotopes Manual*.: Office for Official Publications of the European Communities, Luxembourg.
- Bohn, U. 1992. Zum internationalen Projekt einer Karte der natürlichen Vegetation Europas im Maßstab 1:2,5 Mio. *Nat. Landsch.* 67: 476-480.
- Braun-Blanquet, J. 1964. *Pflanzensoziologie, 3rd ed.* Springer-Verlag, Wien.
- Dierschke, H. 1992. European Vegetation Survey - ein neuer Anlauf für eine Übersicht der Pflanzengesellschaften Europas. *Tuexenia* 12: 3-11.
- Dierschke, H. 1994. *Pflanzensoziologie*. Verlag Eugen Ulmer, Stuttgart.
- Hennekens, S.M. 1994. *TURBO(VEG). Handleiding voor invoer, verwerking en presentatie van vegetatiekundige gegevens (concept)*. Instituut voor Bos- en Natuuronderzoek, Wageningen.
- Hill, M.O. 1979. *TWINSPAN - A FORTRAN program for arranging multivariate data in an ordered two-way table by classification of the individuals and attributes*. Cornell University, Ithaca, NY.
- Malloch, A.J.C. 1988. *VESPAN II*. University of Lancaster, Lancaster.
- Mucina, L. 1993. Nomenklatorische und Syntaxonomische Definitionen, Konzepte und Methoden. In: Mucina, L., Grabherr, G. & Ellmauer, T. (eds.) *Die Pflanzengesellschaften Österreichs*, pp. 19-28. Gustav Fischer, Jena.
- Mucina, L. & van der Maarel, E. 1989. Twenty years of numerical syntaxonomy. *Vegetatio* 81: 1-15.
- Mucina, L., Grabherr, G. & Ellmauer, T. (eds.) 1993. *Die Pflanzengesellschaften Österreichs*, Teil I-III. Gustav Fischer, Jena.
- Mucina, L., Rodwell, J.S., Schaminée, J.H.J. & Dierschke, H. 1994. European Vegetation Survey: Current state of some national programmes. *J. Veg. Sci.* 4: 429-439.
- Oberdorfer, E. 1957 *et seq.* *Süddeutscher Pflanzengesellschaften*. Gustav Fischer Verlag, Stuttgart.
- Pearce, F. 1995. Vulnerable habitats 'vanish' from Europe's agenda. *New Sci.* 1968: 8.
- Pignatti, S. 1990. Towards a prodrome of plant communities. *J. Veg. Sci.* 1: 425-426.
- Pignatti, S., Oberdorfer, E., Schaminée, J.H.J. & Westhoff, V. 1994. On the concept of vegetation class in phytosociology. *J. Veg. Sci.* 6: 143-152.
- Pott, R. 1992. *Die Pflanzengesellschaften Deutschlands*. Verlag Eugen Ulmer, Stuttgart.
- Rodwell, J.S. In press. Phytosociological data, survey programmes and databases in Europe: the results of a questionnaire. *Annali di Botanica (Roma)*.
- Rodwell, J.S. 1991 *et seq.* *British Plant Communities, Vols. 1-4*. Cambridge University Press, Cambridge.
- Rodwell, J.S., Cooper, E.A. & Winstanley, D. In press. Using computerised maps of actual and potential vegetation for nature conservation. *Coll. Phytosociol.*
- Schaminée, J.H.J., Stortelder, A.H.F. & Westhoff, V. 1995. *De Vegetatie van Nederland I*. Opulus Press, Uppsala, Leiden.
- Schaminée, J.H.J., Weeda, E.J. & Westhoff, V. In press. *De Vegetatie van Nederland II*. Opulus Press, Uppsala, Leiden.
- ter Braak, C.J.F. 1990. *CANOCO - A FORTRAN program for canonical community ordination by (partial) (detrended) (canonical) correspondence analysis, practical components analysis and redundancy analysis*, version 3.10. Microcomputer Power, Ithaca, NY.
- Tüxen, R. 1937. Die Pflanzengesellschaften Nordwestdeutschlands. *Mitteilungen der Floristischsoziologischen Arbeitsgemeinschaft*, 3: 1-170.
- van der Maarel, E., Orlóci, L. & Pignatti, S. 1980. *Data Processing in Phytosociology*. Junk, The Hague.
- van der Maarel, E. 1993. Relations between sociological-ecological species groups and Ellenberg indicator values. *Phytocoenologia* 23: 343-362.
- Waterton, C., Grove-White, R., Rodwell, J.S. & Wynne, B. 1995. *CORINE: Databases and Nature Conservation*. Report to World Wide Fund for Nature, Lancaster University, Lancaster.
- Westhoff, V. & den Held, A.J. 1969. *Plantengemeenschappen in Nederland*. Thieme, Zutphen.
- Zuidhoff, A., Rodwell, J.S. & Schaminée, J.H.J. In press. The *Cynosurion cristati* Tx. 1947 of central, southern and western Europe: a tentative overview, based on an analysis of individual relevés. *Annali di Botanica (Roma)*.