

## The Habitats Directive in the UK: some wider questions raised by the definition, notification and monitoring of grassland habitats

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### Abstract

In the UK there are 76 Annex I habitats, including 23 priority types, and a total of 613 SACs have been designated covering over 25,000 km<sup>2</sup> or 6.5% of the land surface. There is an interpretation manual which provides a modular description of the habitat, a summary of the vegetation types included using a standard phytosociological scheme for the country, information about environmental relationships, extent and the rationale for selecting sites. Using examples from a variety of UK grassland types of wider relevance across Europe, this paper examines the quality of definition of the habitats and the extent of their designation within Natura 2000. Details are also given of the UK monitoring programme and some difficulties of defining 'favourable condition' are reviewed.

Key words: Annex I, European Vegetation Survey, Favourable Condition, Habitats Directive, lowland grasslands, monitoring, phytosociology.

### Résumé

La directive «Habitats» au Royaume-Uni: quelques questions générales soulevées par la définition, la notification et le monitoring des habitats des prairies. Au Royaume-Uni, il y a 76 habitats de la liste Annexe I, y compris 23 types prioritaires, et 613 SIC ont été désignés au total, recouvrant plus de 25.000 km<sup>2</sup> ou 6.5% de la superficie du pays. Il existe un manuel interprétatif qui fournit : une description modulaire de chaque habitat ; un résumé des types de végétation inclus là-dedans, désignés par le moyen d'un outil de référence phytosociologique pour le pays ; des renseignements sur les relations environnementales ; ainsi que l'étendue de chacun et le motif de sélection des sites. À l'aide d'exemples tirés d'une variété de types de prairie trouvés au Royaume-Uni qui ont une importance à l'échelle européenne, cet article examine la qualité de la définition des habitats et l'état de leur désignation dans le cadre du réseau Natura 2000. Il donne également les détails du programme de suivi au Royaume-Uni et examine quelques difficultés de définition de 'condition favorable'.

Mots clés: Annexe I, Condition Favorable, directive Habitats, monitoring, phytosociologie, prairies de plaine, végétation européenne Survey.

### The Habitats Directive in the UK

The UK lies entirely within the Atlantic biogeographic zone of the EU and has 76 of the Annex I habitats including 23 priority types. 51 Annex II species also occur there. Starting from December 2004, a total of 613 SACs has been designated across the UK, covering 25,109 km<sup>2</sup> or 6.5% of the terrestrial area of the nation. Most of the terrestrial or freshwater SACs are based on sites previously notified for their scientific interest and nature conservation value. Each of the UK countries (England, Scotland, Wales & Northern Ireland) now has a separate nature conservation agency and team of Habitats Directive advisors but, together with the coordinating Joint Nature Conservation Committee, these all report to central government on the implementation of the Habitats Directive.

There is a web-based interpretation manual for the Annex I habitats represented in the UK ([www.jncc.gov.uk/page-1523](http://www.jncc.gov.uk/page-1523)). This provides a modular

description of each of the Annex I habitats: a summary of the vegetation types which are included, the ecological characteristics such as relationships to climate, soil and biotic factors, the overall distribution, the rationale for selection of sites and brief accounts of the SACs designated. The UK has a comprehensive and standardised phytosociological classification of vegetation (Rodwell 1991 *et seq.*) which recognises 292 communities equivalent to Braun-Blanquet associations and a remedial survey of gaps in coverage has scoped a further 60 provisional plant communities (Rodwell *et al.*, 2000). This scheme provides a basis for the interpretation and mapping of the Annex I habitats (Jackson & McLeod, 2002) but, in practice, the scientific precision of habitat definition varies considerably. This paper, based on research for Natural England (Rodwell *et al.*, 2007), uses a variety of grassland types to highlight some difficulties in interpretation and understanding the Annex I habitats that are of wide relevance across Europe. For the first time, this project

also gives an overview of the representation of these different grasslands within the whole Natura 2000 network

### The varied definition of Annex I habitats across the EU

The Species and Habitats Interpretation Manual (CEC 2003) provides definitions of the Annex I habitats and many EU member states have interpretation manuals of their own, often with the kind of modular format used in the UK. Some manuals are published books, others are agency reports, others are web-based and a fuller review of these can be found in Rodwell *et al.* 2007. Where an authoritative phytosociological framework is used as the basis for definition comparisons of interpretation from country to country are more easily achieved. Of course, the character of particular habitats varies across Europe according to the local interactions of climate, soil and human impacts but, beyond this, there have often been arguments as to quite how the vegetation types they include are to be defined and classified.

In some cases, as with the 6520 Mountain hay meadows, the definition in the EU Interpretation Manual (CEC 2003) is clear and the interpretation across Europe has been more or less the same, so a good range of Trisetum-Polygonum grasslands is now protected within the Natura 2000 network. By contrast, the habitat 6510 Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*) is defined as comprising 'species-rich meadows on lightly to moderately fertilised soils of the plain to sub-montane levels, belonging to the *Arrhenatherion* and the *Brachypodio-Centaureion nemoralis* alliances', this latter apparently a defunct name for vegetation now subsumed into the *Arrhenatherion*. Many of the species listed as characteristic of the habitat are, in fact, broadly associated with the *Arrhenatheretalia* while the two highlighted taxa, *Alopecurus pratensis* and *Sanguisorba officinalis* are plants of the Molinietales.

Among the EU member states, the UK has taken a narrow literal view of the name of the habitat and designated only the *Alopecurus-Sanguisorba* grassland (MG4 in Rodwell 1991 *et seq.*) for inclusion. This is the main surviving type of lowland flood-meadow in the UK, characteristic of winter-flooded mature river-valleys with rich free-draining alluvial soils, cut for hay and grazed after mowing. Its known national distribution at the present time is shown (solid circles) in Fig. 1, using the 10x10km national grid as a mapping frame.

It should be remembered that maps of this type can give a false impression of the extent of any habitat: in fact, within many squares, the stands of this vegetation type are small, fragmented and under continuing threat, and the total extent is less than 1500 ha (Jefferson, 1997).

Most other member states have a more generous approach to defining this habitat, where it is not always clear that *Alopecurus* and *Sanguisorba* need be constant or especially characteristic of the meadows included but where the reference to the *Arrhenatherion* in the habitat definition is taken as the cue for designation. The EU distribution of the SACs for this habitat is shown in Fig. 2. On its narrower definition, the UK has much less than 1% of the total number of sites across the EU, although other kinds of lowland hay meadows included in the designation elsewhere in Europe are, in fact, widespread in the UK (shown as hollow circles in Fig. 1).

### The static understanding of Annex I habitats

Some Annex I habitat definitions exclude dynamic phases of plant communities that are an integral part of their relations to the environment and which ought to be sustained for the full integrity of the habitat to be assured. For example, the 6130 Calaminarian grasslands of the *Violetalia calaminariae* are defined in the Interpretation Manual (CEC 2003) as generally open, natural and semi-natural swards on rock outcrops, river gravels and spoil heaps rich in heavy metals like zinc and lead. This habitat has been designated from only a few countries (for Germany, for example, see Szymank *et al.* 1998, for Austria see Ellmauer & Traxler 2000, for France see Bensettiti *et al.* 2005) but the UK is rather well-endowed. It has 29% of the SACs (Fig. 3), though these include localities on serpentine rocks where the vegetation is obviously of broader floristic affinities and sometimes dominated by cryptogams: in other words, in this case, the British interpretation has been rather generous. In particular, pioneer stages which are not considered a priority in the Habitats Directive have attracted particular attention in the UK (Simkin, 2003). They are especially rich in lichens and bryophytes, many of which are scarce or rare in the country, some endemic to the habitat. Such pioneer stages depend on the creation and maintenance of fresh substrate and the interruption of succession by, for example, river flooding. Taking the Habitats Directive definition literally neglects this important and interesting aspect of the habitat.

In other cases, it is differences of interpretation that

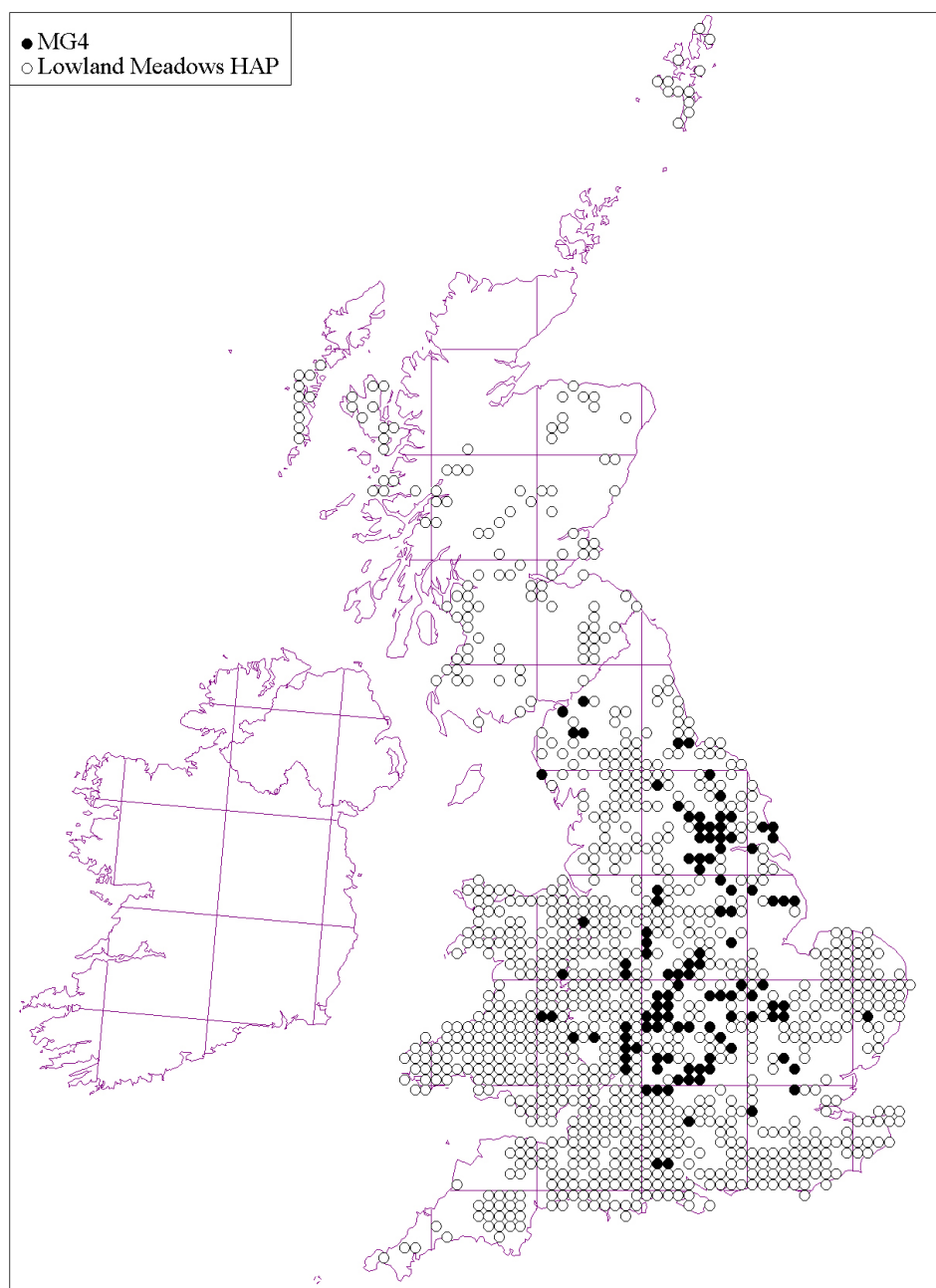


Fig. 1 - Distribution of MG4 *Alopecurus-Sanguisorba* grassland, the 6510 Lowland hay meadow in the UK (solid circles within a 10x10km national grid) and the total range of other lowland hay meadows of the Arrhenetheretalia included in the Habitat Action Plan (HAP: open circles)

threaten sustaining the full dynamism of a habitat. The 6210 Semi-natural dry grasslands on calcareous substrates are referred in the Habitats Directive Interpretation Manual (CEC 2003) to the *Festuco-Brometalia* and the associated species list focuses on plants of the Bromion (= Mesobromion) and Xerobromion, though the fuller definition clearly includes two orders of the *Festuco-Brometea*, the *Brometalia* and the *Festucetalia vallesiacaе*. In the UK, where there are up to 38,000ha of this habitat, a total of

8 plant communities and parts of 2 others have been included (Fig. 4) and across Europe there has generally been a similar generous approach to including equivalent associations within the definition. Over 2800 SACs have been designated (Fig. 5).

However, more problematic has been the interpretation of the part of the habitat definition which includes 'scrubland facies'. It is the Dutch who have been most explicit in including within the definition transitions to woody vegetation that develop with the

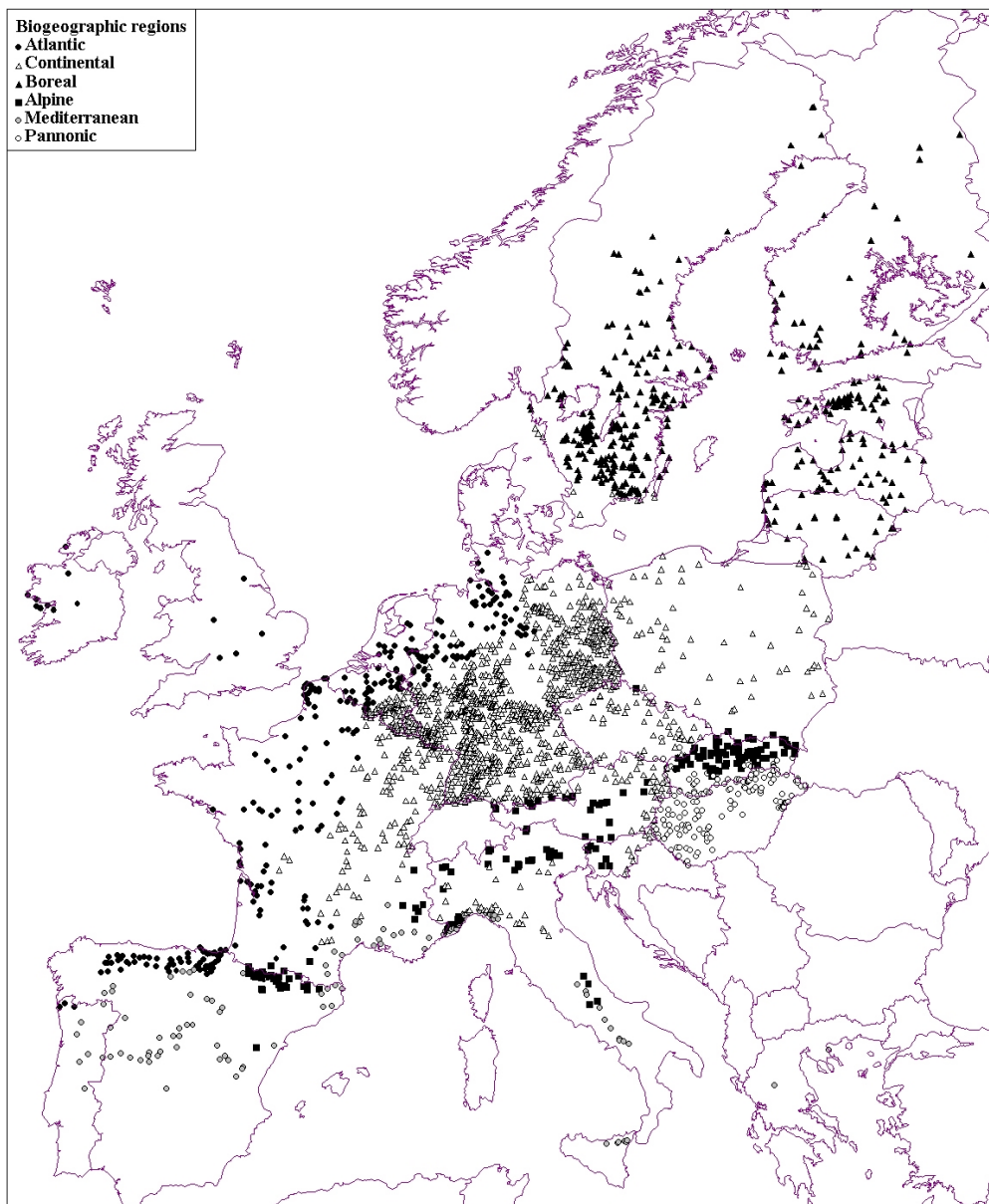


Fig. 2 - Distribution of SACs for 6510 Lowland hay meadows (NATURA 2000 data notified to the European Commission by EU Member States and supplied by the European Topic Centre on Biological Diversity, Paris)

relaxation of the grazing essential for sustaining the grasslands themselves. In The Netherlands, this habitat therefore includes associations of calcicolous fringe vegetation of the *Trifolion medii* and *Berberidion* scrubs (Jansen & Schaminée, 2003). Transitions to scrub are also included as part of the habitat in Denmark (Pihl *et al.*, 2001) and Lithuania (Rašomavičius *et al.*, 2001) or they find mention in the literature as part of the mosaics and dynamic transitions as in France (Bensettiti *et al.*, 2003) and Germany (Ssymank *et al.*, 1998). In the UK, grassland-scrub transitions are of particular interest for certain rare and local plants and some SACs are especially significant in this respect but British examples

of the Geranion (see Rodwell *et al.*, 2000) could be more explicitly included within the definition. Of course, as throughout the range of this habitat, the inclusion of both grassland and scrub poses particular difficulties because of the need to carefully modulate the grazing so as to sustain dynamic mosaics.

#### Using phytosociology to help define 'Favourable condition'

Such questions highlight the difficulty of understanding what is the 'favourable condition' of a

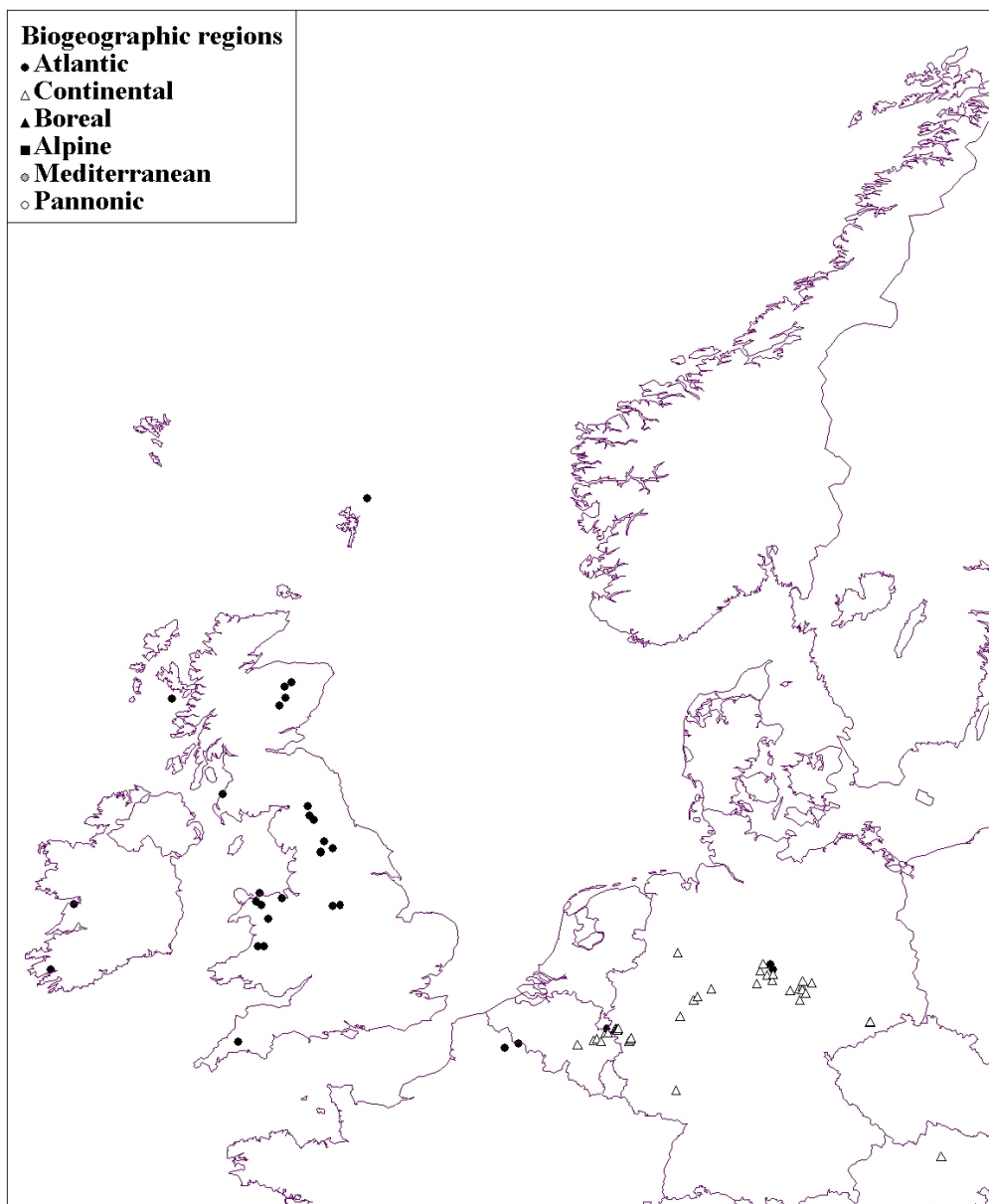


Fig. 3 - Distribution of SACs for 6130 Calaminarian grasslands (NATURA 2000 data notified to the European Commission by EU Member States and supplied by the European Topic Centre on Biological Diversity, Paris)

particular habitat and what management might ensure this is delivered within the frame of the Habitats Directive. The 6520 Mountain hay meadows, for example, depend, in the UK as elsewhere in Europe, on traditional hay-making on moderately fertile soils in a harsh sub-montane climate (Fig. 6, Rodwell, 1992; Jefferson, 2005). With the unpredictable climate characteristic of the upland fringes, the actual dates of hay-making are very variable, the farmer being dependent upon four or five days of good sunny weather to cut and dry the crop. Agri-environment schemes in the UK, intended to help sustain this national resource within the frame of the habitats Directive and UK

conservation designations, have often imposed fixed dates for starting the mowing, and have banned the application of lime and mild forms of phosphate which are known to have been essential in the past for maintaining both floristic richness and the productivity essential to sustain the farm animals. This formality of management is itself damaging to the sustainability and diversity of the resource and it undervalues the importance of seasonal impacts of climate and the ways in which farming culture accommodates to them from year to year.

Sometimes, too, in the UK, the phytosociological definition of a plant community in the literature is

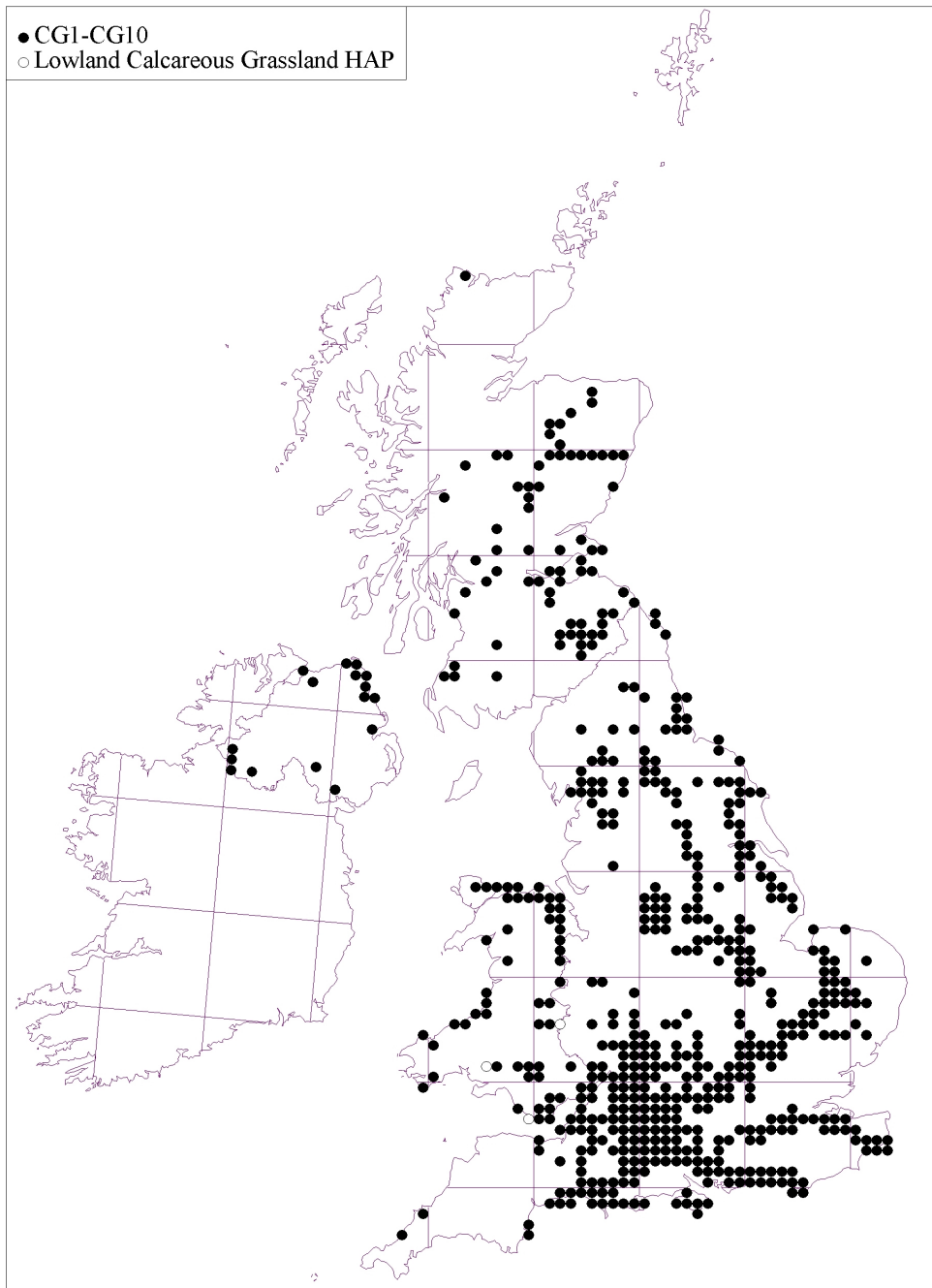


Fig. 4 - Total distribution on a 10x10km grid of UK communities included in 6210 Semi-natural dry grassland and scrubland facies on calcareous substrates

wrongly used to rigidly define what should be the floristic profile and appearance of a particular habitat wherever it occurs. The constancy table of the *Anthoxanthum-Geranium* hay meadow (MG3 in Rodwell, 1992), the British representative of habitat 6520, has sometimes been used as a proscriptive test of the condition of sites, whether they are worth designating and whether they are as they should be. In fact, of course, a phytosociological table is a generalised

summary of a great deal of diversity and the aim of the Habitats Directive should be to sustain such locally distinctive site variation within the overall envelope of definition.

#### Monitoring for the Habitats Directive in the UK

SACs and other designated sites in the UK are all assessed using Common Standards Monitoring

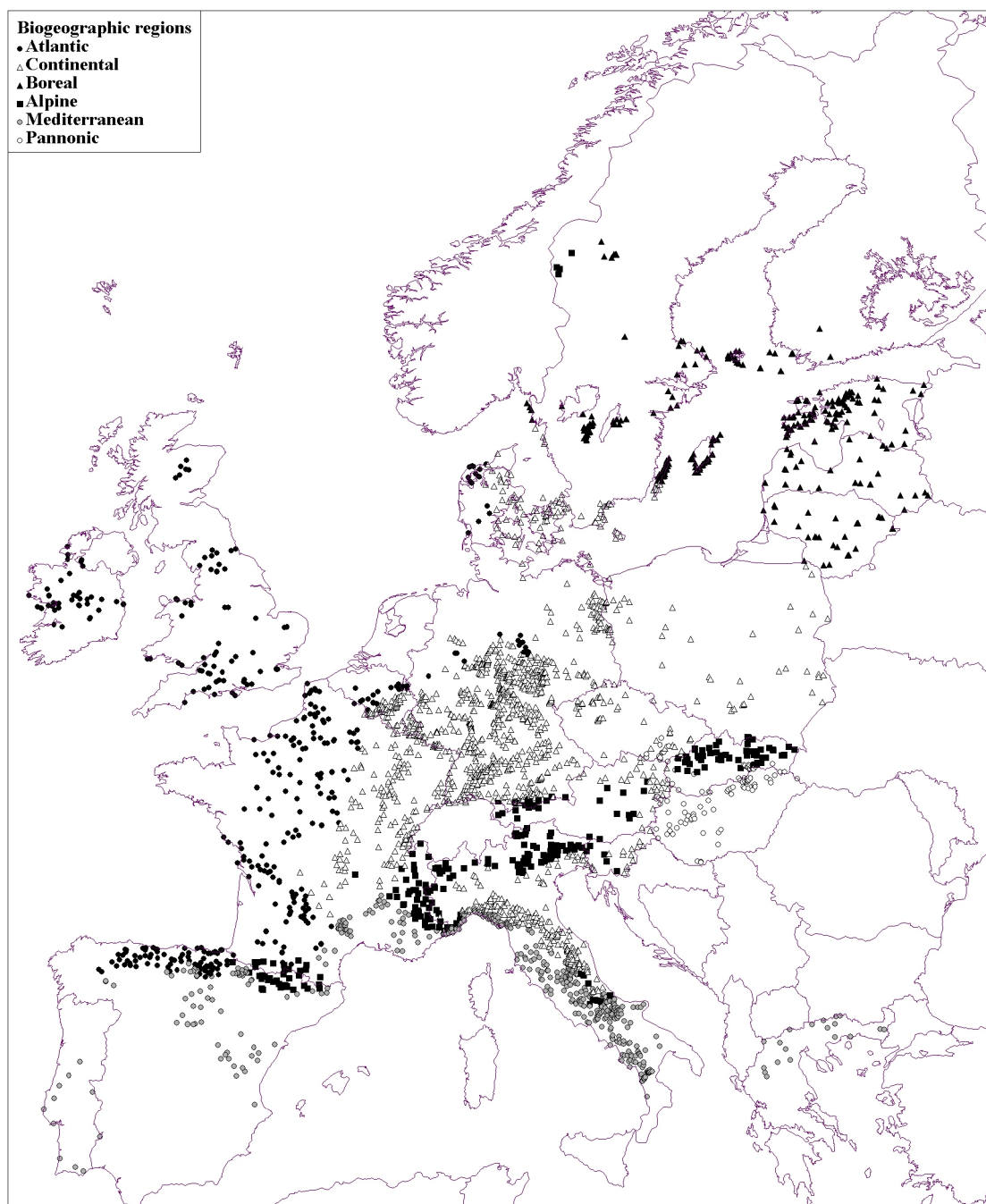


Fig. 5 - Distribution of SACs for 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (NATURA 2000 data notified to the European Commission by EU Member States and supplied by the European Topic Centre on Biological Diversity, Paris)

([www.jncc.gov.uk/page-2198](http://www.jncc.gov.uk/page-2198)) which became operational in 1999 and the first results of which have recently been published (Williams, 2006). The basis for such monitoring is not the site itself but the particular features(s) - the species or habitat from the Habitats Directive Annexes - for which it was designated. Every SAC has a management plan or statement with conservation objectives for each feature. These identify attributes of the features and

set targets against which measurements are made.

At the level of individual SACs, Common Standards Monitoring shows the degree to which the conservation measures are effective in achieving the objectives of the site designation. At national level, the programme enables the government to demonstrate its commitment to the Habitats Directive and identifies any shortfalls in implementation.

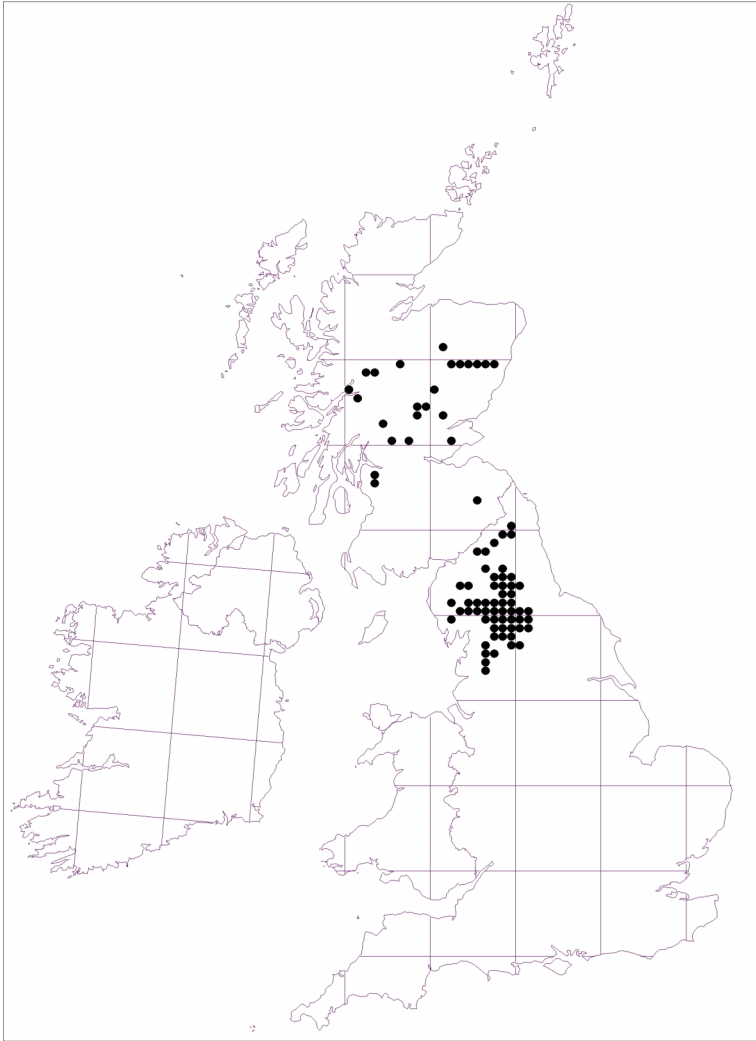


Fig. 6 - Total distribution on a 10x10km grid of the UK representative of 6520 Mountain hay meadows, the MG3 *Anthoxanthum-Geranium* grassland

If all the targets for a particular species or habitat are met, the feature is judged to be in 'favourable' condition. If the state of the feature is unsatisfactory, it is recorded as in 'unfavourable' condition and a further assessment is then made to determine whether it is 'recovering' or moving towards the desired condition, 'declining' or moving further away from the desired condition. If there is no discernible shift in condition, a 'no-change' state is recorded. Subsequent monitoring will then show whether 'favourable' features are 'maintained' or 'recovered' from a previously unacceptable condition. When a feature is no longer present and there is no prospect of restoration, a record of 'Destroyed (partly or completely)' is made.

During the 1998 pilot year, it was clear that detailed guidance was needed in formulating conservation objectives and this was developed and progressively adopted over the next few years ([www.jncc.gov.uk/page-2199](http://www.jncc.gov.uk/page-2199) & 2201). It is intended that every SAC feature should be monitored over six years in a rolling programme. During the first six years, 1570 assessment reports were made for SACs which covers 71% of the total number of sites. Overall, 37% were found to be favourable, 24% unfavourable recovering, 38% unfavourable declining or no-change, and 1% destroyed in part or wholly. The comparable figures for the national Sites of Special Scientific Interest, where 57% of sites were monitored were 57%, 16%, 26% and 1%.

In addition, Common Standards Monitoring requires the identification of 'Adverse Activities'- those human activities damaging the feature - and 'Management Measures' which are beneficial in achieving favourable condition. These will help prioritise conservation effort and the use of resources in the future. Recording of adverse activities shows that the lack of appropriate remedial management is extremely common and the level of grazing on SACs is a very widespread cause for concern - very often it is too heavy, in many other situations too light.

Invasive species, thoughtless forest or farming operations, poor water management, poor water quality and recreation impacts are the next most frequent adverse influences. Management agreements with site owners or occupiers are the most common method of trying to bring SACs into favourable condition. Agri-environment schemes may have a larger role to play in future though these have not been very successful so far.

### **The capture of the European resource within Natura 2000**

Different habitats are very unevenly represented within the Natura 2000 network from country to



country (Tab. 1). This is partly because they are not uniformly distributed across Europe, of course, their range being naturally determined by climate and soil and, with grasslands, strongly influenced by patterns of human settlement and intervention. But the differing interpretation of the habitat definitions also accounts for some of these disparities, sometimes because of scientific arguments about just what the vegetation types are, or should be called, or how classified; sometimes because of political concerns about how much responsibility a particular country wishes to accept for the costly sustainability of the habitats.

How representative of the total European habitat resource the Natura 2000 network will be, is an

interesting and difficult question. Recently the European Vegetation Survey has produced an overview of the vegetation of Europe at alliance level (Rodwell *et al.*, 2002), probably the most feasible level at which to make such a summary. But we still do not have an accurate indication of the distribution and total extent of the vast majority of vegetation types and habitats across Europe even at this level: a study like that on the Cynosurion by Zuidhoff *et al.* (1997) shows how difficult a 'bottom-up' approach to defining and mapping just a single alliance can be. Preliminary responses to a questionnaire within the European Vegetation Survey can show crudely what is the extent of particular phytosociological alliances within different countries,

Tab. 1 - Percentage of SACs for each of selected Lowland Grassland habitats in each EU member state (AT Austria, BE Belgium, CY Cyprus, CZ Czech Republic, DE Germany, DK Denmark, EE Estonia, ES Spain, FI Finland, FR France, GR Greece, HU Hungary, IE Ireland, IT Italy, LT Lithuania, LU Luxembourg, LV Latvia, MT Malta, NL Netherlands, PL Poland, PT Portugal, SE Sweden, SI Slovenia, SK Slovakia, UK United Kingdom)

	AT	BE	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HU	IE
2330		7		2	56	3	<1			11			
6130	5	8			45			3		4			
6210	2	3		2	26	3	3	6	1	14	1	2	1
6410	3	3		2	27	3	3	3	<<1	11		5	1
6510	2	5		2	43		2	6	1	8	<<1	4	<1
6520	3	8	1	44				1	5	15		3	
Tot	3	4		2	34	2	2	5	1	11	<1	3	1

	IT	LT	LU	LV	MT	NL	PL	PT	SE	SI	SK	UK
2330	<1	1		1		4	5	2	7			<1
6130	8					1				1		29
6210	21	1	1	1		1	1	1	6	1	3	2
6410	5	1	1	1		1	3	1	23	1	1	2
6510	4	1	1	2		1	3	1	10	1	4	<<1
6520	12						1		3	1	2	<<1
Tot	10	1	1	1		1	2	1	11	1	3	2

as with the Alopecurion and Calthion shown in Fig. 7 and 8, but more detailed data in distribution are needed.

One further use of a phytosociological overview is that it is possible to identify vegetation types which are at present poorly covered within the Habitats Directive. Good examples of such neglected habitats are the weed

communities of traditional arable land, with low inputs and traditional patterns of cropping. In the UK a number of such vegetation types have been characterised (Rodwell, 1991 *et seq.*, Rodwell *et al.*, 2000) but they are under continuing threat and traditional arable landscapes are very rare.

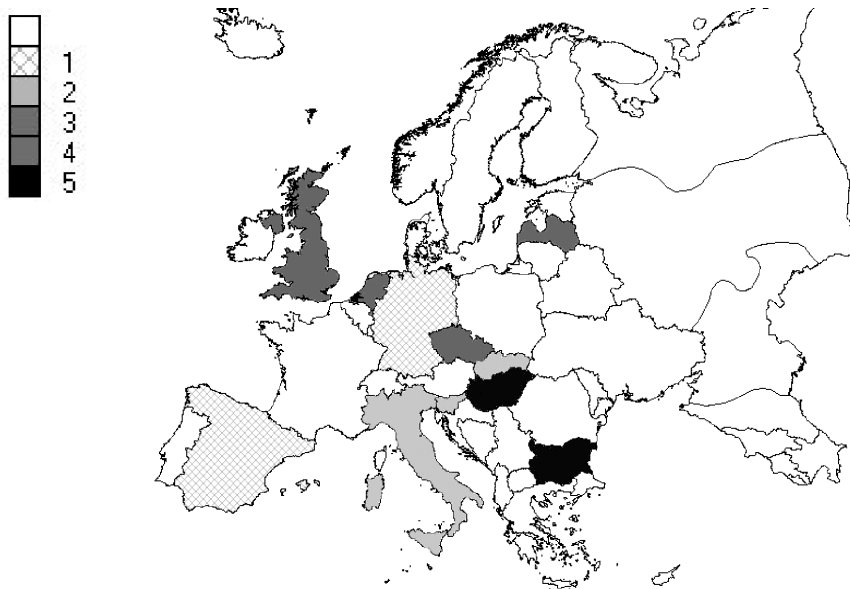


Fig. 7 - Extent of Alopecurion grasslands in selected European countries (blank=no data, 1=never recorded, 2=rare, 3=local, 4=widespread but uncommon, 5=widespread and common)

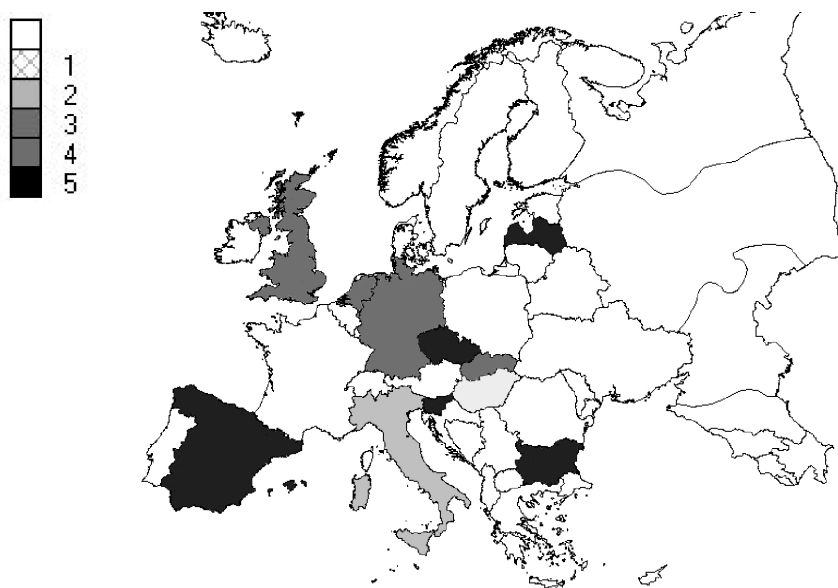


Fig. 8 - Extent of Calthion grasslands in selected European countries (blank=no data, 1=never recorded, 2=rare, 3=local, 4=widespread but uncommon, 5=widespread and common)

## References

- Bensettiti F., Boulet V., Chavaudret-Laborie C. & Deniaud J., 2005. Cahiers d'habitats Natura 2000. Connaissance et gestion des habitats et des espèces d'intérêt communautaire. Habitats agropastoraux. Paris: La Documentation française.
- CEC., 1992. Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. Commission of the European Communities.
- Ellmauer T. & Traxler A., 2000. Handbuch der FFH-lebensraumtypen Österreichs. Vienna: Umweltsbundesamt Österreichs.
- Jackson D.L. & Mcleod C.R., 2002. Handbook on the UK status of EC Habitats Directive interest features: provisional data on the UK distribution and extent of Annex I habitats and the UK distribution and population size of Annex II species. JNCC Report 312. Peterborough: Joint Nature Conservation Committee.
- Janssen J. & Schaminée J.H.J., 2003. Habitattypen. Utrecht: KNNV Uitgeverij.
- Jefferson R.G., 1997. Distribution, status and conservation of *Alopecurus pratensis*-*Sanguisorba officinalis* flood-plain meadows in England. Research Report 249. Peterborough: English Nature.
- Jefferson R.G., 2005. The conservation management of upland hay meadows in Britain: a review. Grass & Forage Science 60: 322-331.
- Pihl S. *et al.*, 2001. Habitat and Species covered by the EEC habitats Directive: A Preliminary Assessment of Distribution and Conservation status in Denmark. Copenhagen: NERI Technical Report 365.
- Rasomavičius, V. (editor), 2001. Europines Svarbos Buveines Lietuvoje. Vilnius: Botanikos institutes.
- Rodwell J.S. (editor.), 1991 (et seq). British Plant Communities. Volume 1-5. Cambridge: Cambridge University Press.
- Rodwell J.S., Dring J.C., Averis A.B.V., Proctor M.C.F., Malloch A.J.C., Schaminée J.H.J & Dargie T.C.D., 2000. Review of Coverage of the National Vegetation Classification. JNCC Report No 302. Peterborough: Joint Nature Conservation Committee.
- Rodwell J.S., Schaminée J.H.J., Mucina L., Pignatti S., Dring J. & Moss D., 2002. The Diversity of European Vegetation. Wageningen: National reference centre for Agriculture, Nature & Fisheries.
- Rodwell J.S., Morgan V., Jefferson R.G. & Moss D., 2007. The European Context of British Lowland Grasslands. JNCC Report No 394. Peterborough: Joint Nature Conservation Committee.
- Simkin J.M., 2003. Lichen survey of North Pennines Lead Mines. Report to English Nature.
- Szymank A. *et al.*, 1998. Das europäische Schutzgebietsystem NATURA2000. Bonn: Bundesamt für Naturschutz.
- Williams J.M. (ed.), 2006. Common Standards Monitoring for Designated Sites: First Six Year report. Peterborough: Joint Nature Conservation Committee.
- Zuidhoff A.C., Rodwell J.S. & Schaminée J.H.J., 1995. The Cynosurion cristati Tx. 1947 of central, southern and western Europe: a tentative overview, based on the analysis of individual relevés. Annali di Botanica LIII: 25-47.