HYGROPHILOUS HERBACEOUS VEGETATION OF CATALONIA. RETRIEVAL FROM THE DATA BANK FLORACAT

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Abstract - From the data gathered in FloraCat, a synthesis of the herbaceous hygrophilous communities of Catalonia is presented, under the form of a phytocoenological sheme. 100 associations have been considered, as clearly documented through relevés from the area. For each one, the biogeographic character, the frequency or rarity in the area and the level of knowledge is expressed in the same scheme. Most of the associations are rare or very rare in general, and mainly those of Mediterranean character, which represent in most cases tiny spots of particular vegetation within xerophilous landscapes. As for phytocoenological knowledge, Boreo-Alpine communities are more or less well known, whereas data on Mediterranean associations are much more sparse, a half of them being poorly to very poorly known.

Key words - Phytocoenology, association, data bank, hygrophilous vegetation

Introduction

In recent years the need for vegetation surveys has become increasingly apparent at all scales, for a number of reasons. Following several decades of geographical research, syntaxonomic surveys are now seen as representing an improvement in our understanding of vegetation, and also a good tool in land management.

In Catalonia, phytocoenological sampling has resulted in more than 14,000 relevés corresponding to 611 estimated associations (Font *et al*., 1998). As all this data are computerized and available for retrievals, it seems adequate to undertake a comprehensive vegetation conspectus of the area, which is at present being produced (Ninot *et al*., in press). Such a conspectus is based on a rough analysis of the published or available relevés, and implies both taxonomical and nomenclatural definition of associations and subassociations. As a result, these vegetation units become described in terms of their structure, species definition, ecology, distribution and variability; and also classified in the appropriate syntaxonomical scheme.

In this paper, we summarize a first part of the Conspectus, which corresponds to

the hygrophilous herbaceous vegetation, from the free-floating carpets of *Lemnetea* to the Mediterranean rush communities of *Molinio-Holoschoenion* and including hay meadows and related communities (*Arrhenatheretalia*).

Material and Method

The data bank FloraCat, created and managed by X. Font at the University of Barcelona, contains all the known relevés of vegetation of Catalonia, plus few thousands more from neighbouring regions (Valencian countries, northern Spain, southern France, Balearic islands; Font & Ninot, 1995). In the area of Catalonia, the distribution of the relevés reveal some irregularities, both at the syntaxonomical and at the geographical aspects (fig. 1; Font *et al*., 1998). More than 150 associations have been reported by means of 3 or fewer relevés, i.e. a high percentage of syntaxa are very poorly known; and several blank areas, or *terrae ignotae*, have been uncovered. The most sampled areas lie in the northern part of Catalonia, which corresponds to Pyrenean ranges, and also in some mountain areas nearby to Barcelona, connected to the fact that these areas are more diverse and better conserved than lowlands. On the contrary, recent phytocoenological studies referred to Mediterranean lowlands are scarce.

We have focused this survey on the association level. Bibliographic retrieval allowed us to list the associations cited, from which finally only those clearly documented (i.e., as a rule with relevés from the area) have been considered; and also to synthesize into indexes three general aspects for each one: biogeographical character, rarity/abundance and knowledge level.

Three main biogeographic regions have been considered: Mediterranean (M; most of lowlands and some dry, southern mountains), Medio-European (E; humid sub-Montane and Montane belts of the mountains) and Boreo-Alpine (A; high mountain in the Pyrenees).

Rarity/abundance, expressed from RR to CC, is referred both to the frequency of a given association in the whole area and to its dominance in the landscape when present. It cannot take its maximum (CC) for none of the communities here considered.

As for the phytocoenological knowledge, the associations have been classified into four levels, according to the number of relevés of each one and their geographic distribution in relation to its abundance index. Among the four levels considered, I means a very poor knowledge (one or very few relevés available); II, insufficient knowledge (few relevés, often territorially biased; comprehensive syntheses not possible); IV, sufficient, fair knowledge (a few tens of relevés); and IV, good to very good knowledge (some tens of relevés, referred to the whole range of the association in Catalonia; sometimes a thorough revision).

Result and Discussion

The result of this survey is summarized in table 1, in which the associations are arranged in a syntaxonomical scheme. A first noticeable aspect is the fair diversity of the herbaceous hygrophilous vegetation in Catalonia. 100 associa-

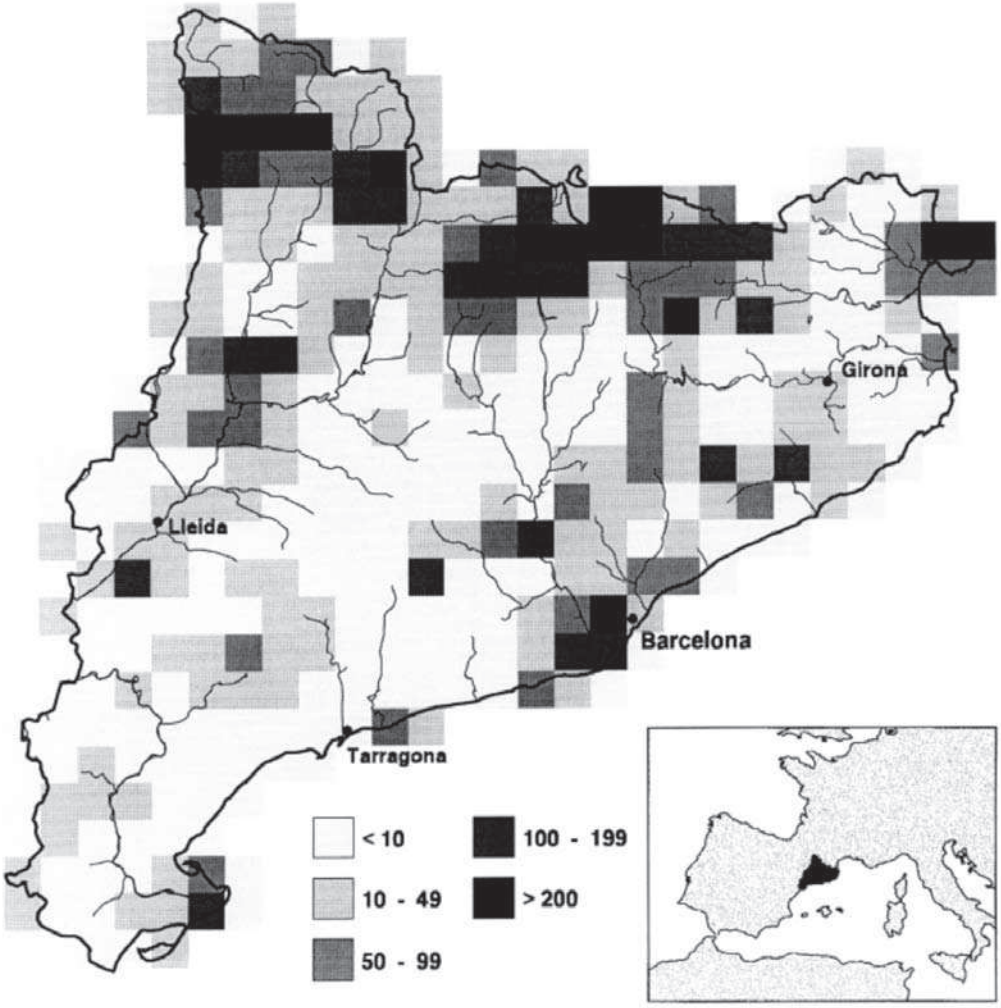

Fig. 1 - Intensity of phytocoenological sampling in Catalonia, expressed from the number of relevés per 10 x 10 UTM square gathered in FloraCat.

tions (most of them diversified into subassociations) have been documented in the area, which means more than 16% of the whole vegetation diversity of Catalonia.

Whithin the vegetation here considered, a high proportion of communities are rare; half of them have been labeled as RR in the table. As most of the species included in these communities occur only under more or less specific ecological conditions, and given that water resources hold a rising human pressure, these

turns them into threatened or endangered. Mediterranean hygrophilous vegetation is clearly more sparse and rare in lowlands than Alpine and Medio-European analogous communities are in the mountains. Moreover, although no precise data are available, Mediterranean vegetation holds worse conservation degree and stronger threats.

In general, the phytocoenological knowledge of the herbaceous hygrophilous vegetation is low (fig. 2). Especially for the Mediterranean communities, data are scarce or rare, and very often geographically biased. Only one Mediterranean association may be considered well known, and almost the half are documented only through one or very few relevés. This will clearly provide preferent objectives in our research planning. Medio-European vegetation seems better known, as one third of the communities are sufficiently known, and Boreo-Alpine communities are the best studied.

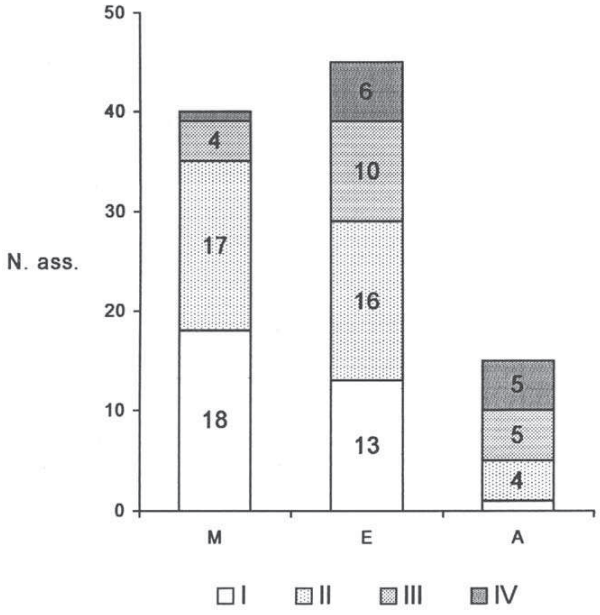

Fig. 2 - Number of associations per biogeographic type (M, Mediterranean; E, Medio-European; A, Boreo-Alpine) and per knowledge level (I, very poor; II, insufficient; III, sufficient; IV, good).

TABLE 1 - PHYTOCOENOLOGICAL SCHEME OF THE HYGROPHILOUS HERBACEOUS VEGETATION IN CATALONIA. FOR EACH ASSOCIATION THE INDEXES MEAN: BIOGEOGRAPHICAL CHARACTER (M, MEDITERRANEAN; E, MEDIO-EUROPEAN; A, BOREO-ALPINE), RARITY (FROM RR TO CC) AND KNOWLEDGE LEVEL (I, VERY POOR; II, INSUFFICIENT; III, SUFFICIENT; IV, GOOD).

	Bgr.	Rar.	Knl.
LEMNETEA MINORIS (Koch & Tx.) Schw. & Tx. 1981			
Lemnetalia minoris (Tx.) Schw. & Tx. 1981			
Lemnion gibbae Tx. & Schw. 1974			
Lemnetum gibbae (Koch) Miyawaki & J. Tx. 1960	M	R	II
Lemnion minoris Koch & Tx. 1954			
Lemnetum minoris (Oberd.) Th. Müller & Görs 1960	E	C	I
Riccio-Lemnion trisulcae (Tx. & Schw.) Schw. & Tx. 1981			
Riccietum fluitantis Slavnic 1956	M	RR	I
Lemno-Salvinion natantis Schw. & Tx. 1981			
Lemno-Azolletum filiculoidis Br.-Bl. 1952	M	R	I
ZOSTERETEA MARINAE Pign. 1953			
Zosteretalia marinae Bég. 1941			
Zosterion W. Christ. 1934			
Giraudio-Zostheretum noltii Boudouresque et al. 1977	M	RR	I
Cymodoceetum nodosae J. Feldmann 1937	M	R	I
Posidonion oceanicae Br.-Bl. 1952			
Posidonietum oceanicae Funk 1927	M	C	I
POTAMETEA Tx. & Prsg. 1942			
Ruppietalia Tx. 1960			
Ruppion maritimae Br.-Bl. 1931			
Ruppietum maritimae Hocquette 1927	M	RR	I
Chaetomorpho-Ruppietum Br.-Bl. 1952	M	RR	II
Potametalia Koch 1926			
Potamion pectinati (Koch) Görs 1977			
Potamo-Vallisnerietum Br.-Bl. 1931	M	RR	I
Potamo-Utricularietum Br.-Bl. 1952	M	R	II
Potametum pectinati Carstensen 1955	M	RR	II
Potametum denso-nodosi Bolòs 1957	M	C	III
Zannichellio-Potametum colorati Bolòs & R. Mol 1997	M	R	II
Potamo-Najadetum marinae Horvatic & Micev. 1963	M	RR	II
Potamo-Myriophylletum spicati Rivas-G. 1964	M	RR	I
Ranunculetum baudotii Br.-Bl. 1952	M	RR	I
Ranunculo-Myriophylletum alterniflori Franquesa 1995	M	RR	II
Ranunculo-Potametum alpini Ballesteros & Gacia 1991	A	R	II
LITTORELLETEA Br.-Bl. & Tx. 1943			
Littorelletalia Koch 1926			
Littorellion Koch 1926			
Isoeto-Sparganietum borderei Br.-Bl. 1948	A	R	II
Eleocharition acicularis Pietsch 1967			
Ranunculo-Juncetum bulbosi Oberd. 1957	A	RR	I

MONTIO-CARDAMINETEA Klika & Hadac 1944			
Montio-Cardaminetalia Pawl. 1928			
Cardamino-Montion Br.-Bl. 1925			
Montietum fontanae Br.-Bl. 1915	E	R	II
Montio-Bryetum schleicheri Br.-Bl. 1925	A	RR	III
Saxifragetum aquaticae Br.-Bl. 1948	A	RR	III
Cardaminetum latifoliae Br.-Bl. 1952	A	R	III
Cardamino-Chrysosplenietum oppositifoliae Bolòs 1979	E	RR	I
Cratoneurion commutati Koch 1928			
Cratoneuretum falcati Gams 1927	A	RR	II
PHRAGMITI-MAGNOCARICETEA Klika 1941			
Phragmitetalia Koch 1926			
Glycerio-Sparganion Br.-Bl. & Sissingh 1942			
Helosciadietum nodiflori Maire 1924	M	C	III
Catabrosetum aquaticae Rübel 1912	E	RR	I
Glycerietum plicatae Kulcz. 1928	E	R	II
Glycerietum fluitantis Eggler 1933	E	RR	I
Acrocladio-Eleocharitetum palustris Bolòs & Vigo 1967	E	C	II
Phragmition communis Koch 1926			
Typhetum latifoliae Lang 1973	E	R	I
Typho-Phragmitetum australis (Tx. & Prsg.) Rivas-M. & al. 1991	M	RR	I
Typho-Schoenoplectetum tabernaemontani Br.-Bl. & Bolòs 1958	M	C	III
Scirpetum maritimi-litoralis Bolòs 1962	M	C	II
Magnocaricion elatae W. Koch 1926			
Cypero-Caricetum otrubae Tx. & Oberd. 1958	M	R	II
Soncho-Cladietum marisci (Br.-Bl. & Bolòs) Cirujano 1980	M	R	II
Irido-Polygonetum serrulati Bolòs 1957	M	R	II
Cladio-Caricetum hispidae Bolòs 1967	M	R	II
Caricetum rostratae Osvald 1923	A	R	II
SCHEUCHZERIO-CARICETEA FUSCAE Tx. 1937			
Caricetalia davallianae Br.-Bl. 1949			
Caricion davallianae Klika 1934			
Caricetum davallianae Dutoit 1924	A	R	IV
Carici-Pinguiculetum grandiflorae Br.-Bl. 1948	A	RR	IV
Carici-Eriophoretum latifolii Bolòs & Vives 1956	A	RR	IV
Swertio-Caricetum nigrae Vigo 1984	A	RR	III
Caricetalia fuscae Koch 1926			
Caricion fuscae Koch 1926			
Caricetum fuscae Br.-Bl. 1915	A	R	IV
Narthecio-Trichophoretum Br.-Bl. 1948	A	R	IV
Sphagno-Ericetum tetralicis Ballesteros & al. ex Ninot *et al.* in press	E	RR	IV
Calluno-Sphagnetum subnitentis Casanovas 1992	A	RR	III
ISOETO-NANOJUNCETEA Westhoff & al. 1946			
Isoetetalia Br.-Bl. 1931			
Isoetion Br.-Bl. 1931			
Isoetetum delilei Br.-Bl. (1931) 1935	M	RR	I
Isoetetum duriei Br.-Bl. (1931) 1935	M	RR	I
Nanocyperion Libbert 1932			
Stellario-Scirpetum setacei (Koch) Libbert 1932	E	R	III
Cyperetum flavescentis Aichinger 1933	E	R	II
Gnaphalio-Peplidetum portulae Bolòs 1979	E	RR	I
Hyperico-Cyperetum flavidi Molero 1984	E	RR	II
Ranunculo-Lythretum portulae Molero & Pujadas 1984	M	RR	II
Lythrion tribracteati Rivas-G. & Rivas-M. 1963			
Isolepido-Lythretum castellani Rivas-G. 1970	M	RR	II

MOLINIO-ARRHENATHERETEA Tx. 1937			
Arrhenatheretalia elatioris Pawl. 1928			
Cynosurion cristati Tx. 1947			
Cynosuro-Trifolietum repentis Bolòs (1967) 1983	E	C	IV
Caric i-Agrostidetum capillaris Villegas 1997	E	R	II
Arrhenatherion elatioris Br.-Bl. 1952			
Gaudinio-Arrhenatheretum Br.-Bl. 1931	M	R	II
Tragopogono-Lolietum multiflori P. Monts. 1957	E	R	IV
Ophioglosso-Arrhenatheretum P. Monts. 1957	E	C	III
Malvo-Arrhenatheretum Tx. & Oberd. 1958	E	RR	I
Galio-Arrhenatheretum Rivas-G. & Borja 1961	E	RR	I
Odontido-Trifolietum pratensis Bolòs & Masalles 1983	E	RR	I
Rhinantho-Trisetetum flavescentis Vigo 1984	E	C	IV
Gentiano-Trisetetum flavescentis Vigo 1984	E	RR	II
Triseto-Polygonion bistortae Marschall 1947			
Triseto-Heracleetum pyrenaici Bolòs 1957	E	C	IV
Alchemillo xanthochlorae-Trollietum Vigo, in pres	E	R	III
Molinietalia Koch 1926			
Calthion palustris Tx. 1937			
Cirsietum rivularis Now. 1928	E	R	III
Juncetum sylvatici Br.-Bl. 1915	E	R	II
Chaerophyllo-Ranunculetum aconitifolii Oberd. 1952	E	RR	I
Epilobio-Juncetum effusi Oberd. 1957	E	R	II
Junco-Caricetum punctatae Bolòs 1959	E	RR	II
Dactylorhizo-Caricetum paniculatae Carreras & Vigo 1984	E	R	III
Ranunculo-Filipenduletum ulmariae Vigo 1975	E	R	III
Chaeropyllo-Valerianrtum pyrenaicae Vigo & Carreras 1984	E	R	II
Molinion coeruleae Koch 1926			
Molinietum coeruleae Koch 1926	E	RR	II
Molinio-Caricetum lepidocarpae Baulies & Romo 1983	E	RR	I
Caric i-Molinietum Carreras & Vigo 1987	E	R	II
Epipactidi-Molinietum Montserrat, Soriano & Vigo 1987	E	R	III
Violion cornutae Romo 1986			
Viola-Euphorbietum hybernae Romo 1986	E	RR	I
Agrostietalia stoloniferae Oberd., Th. Müller & Görs 1967			
Deschampsion mediae Br.-Bl. (1947) 1952			
Deschampsietum mediae Br.-Bl. 1931	M	RR	II
Agrostio-Achilleetum agerati Br.-Bl. 1952	M	R	I
Plantagini-Jasonietum tuberosae (Bolòs) Bolòs & Masalles 1983	M	R	II
Centaurio-Jasonietum tuberosae Bolòs 1996	M	RR	I
Agrostion stoloniferae Görs 1966			
Jasonio-Tussilaginetum farfarae Vives 1964	E	C	III
Prunello-Agrostietum stoloniferae Bolòs & Masalles 1983	E	C	II
Potentillion anserinae Tx. 1947			
Dactylido-Festucetum arundinaceae Lohm. 1953	E	RR	I
Junco-Menthetum longifoliae Lohm. 1953	E	R	III
Rumici-Agrostietum stoloniferae Moor 1958	E	RR	II
Festuco-Caricetum hirtae Bolòs 1962	E	R	II
Holoschoenetalia Br.-Bl. (1931) 1947			
Molinio-Holoschoenion Br.-Bl. (1931) 1947			
Inulo-Schoenetum nigricantis Br.-Bl. 1924	M	R	III
Galio-Juncetum subnodulosi Br.-Bl. 1931	M	RR	I
Holoschoenetum Br.-Bl. 1952	M	C	IV
Centaureo-Succisetum pratensis Bolòs 1954	E	R	III
Cirsio-Menthetum longifoliae Bolòs & Vives 1956	E	C	IV
Lysimachio-Holoschoenetum Rivas-G. & Borja 1961	M	RR	I
Mentho-Caricetum loscosii Bolòs (1957) 1967	M	RR	I
Peucedano-Sonchetum aquatilis Bolòs 1957	M	RR	I

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