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## VEGETATION ANALYSIS

Contributions for an Integrated  
Approach

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Programme, Abstracts & List of Participants



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CANTABRIAN-BASQUE SUPRATEMPERATE GRASSLANDS OF  
*AGROSTIS CURTISII*: CHARACTERISATION AND PHYTOSOCIOLOGIC  
POSITION

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Acidophilous grasslands are one of the most characteristic elements of the mountain landscape of the Cantabrian regions in those areas traditionally used for extensive pasture. They occupy extensive areas, frequently in mosaic with scrublands, spiny communities and beech forests, being developed as much over oligotrophic substrata as in deep soils built on limestones, that are submitted to strong leaching.

An exhaustive analysis of these grasslands included in the alliance *Violion caninae* has been carried out in the present study, that has permitted us to recognise a new association: *Carici piluliferae-Agrostietum curtisii*.

These are perennial grasslands with grassy physiognomy, generally dominated by *Agrostis curtisii*, where, besides herb species, some woody taxa from nearby heathlands also occur.

The combined use of fire and pasture favours the permanent establishment of this type of grasslands. In the studied territory, they have their optimum development in the upper and medium horizons of the supratemperate bioclimatic belt, where they occupy topographical situations in which the accumulation of snow is fleeting, being displaced in those places where the snow remains longer by the pastures of the *Serratulo-Nardetum strictae*. The presence in some relevés of species as *Nardus stricta*, *Carex panicea*, *Gentiana pneumonanthe* and *Scorzonera humilis* marks the transition toward mat-grasslands.

The frequency of *Agrostis curtisii*, *Carex pilulifera*, *Festuca ovina* subsp. *hirtula* and/or *Carex binervis* confers them sufficient originality as to recognise this new association, *Carici piluliferae-Agrostietum curtisii*. The constant presence of species such as *Danthonia decumbens*, *Galium saxatile*, *Polygala serpyllifolia* and *Jasione laevis* subsp. *laevis* does not leave place to doubts upon its inclusion in the alliance *Violion caninae* (*Nardetalia strictae*, *Nardetea strictae*) that groups the acidophilous meso-hygrophilic supratemperate grasslands of the territory. Next to these species, there are others with broader distribution, characteristic of the class, such as *Potentilla erecta*, *Festuca nigrescens* subsp. *microphylla*, *Veronica officinalis*.

So far, these grasslands are known from the Santanderino-Vizcaíno and Eastern-Euskaldún sub-sectors inside the Cantabrian-Basque sector (Cantabrian-Atlantic Subprovince, Atlantic European Province, Eurosiberian Region), where they are one of the first substitution stages within the mountain acidophilous beech series, *Saxifrago hirsutae-Fago sylvaticae sigmetum*. This community appears restricted, in these temperate oceanic territories, to areas submitted to hiperhumid – ultra-hiperhumid ombrotypes in the supratemperate belt, always developing on well drained siliceous substrata (sandstone, shale).

KEYWORDS: Grasslands, Northern Spain, Syntaxonomy, *Violion caninae*.

LANDSCAPE EVOLUTION IN A MOUNTAIN AGRO-SYSTEM

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The mountain agro-systems that occur in the eastern part of Peneda-Gerês National Park constitute a very particular landscape resulting from a balanced use of the natural resources.

This landscape is made up of irrigated meadows and cultivated land, both managed by Man, interspersed with shrub and tree communities where human intervention is less significant.

This landscape evolution study is aimed at characterising land use in the study area during the years of 1965, 1978, 1986, 1994 and 2000, through the interpretation of aerial photographs provided by IPPC and INGA.

Several landscape and classes indices were applied to the land-use charts obtained for each year in order to understand vegetation dynamics as well as the type of management to which this area was subjected over the last four decades.

KEYWORDS: Agro-systems, Indices, Landscape evolution, PNPG.

**PRESENCE OF A *STIPA TENACISSIMA* COMMUNITY IN TOLEDO TERRITORIES**

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Most of the province of Toledo (Spain) is included in the Toledano-Tagano biogeographic sector (Luso-Extremadurensis subprovince).

The thermotypes are from lower mesomediterranean to supramediterranean with ombrotypes ranging from dry to humid. The dry ombrotype dominates in the Tagus valley, while humid and subhumid ombrotypes dominate in the mountains (Toledo mountains, San Vicente mountains range). In Eastern areas of the Toledano-Tagano sector, the climate is continental.

Most of the geologic materials are siliceous with some amount of calcium carbonate that, together with the high temperatures during Summer, leads to soils with pH of 6.5-7.5. The climax vegetation is the holm-oak forest with wild pear-trees *Pyro bourgaeanae-Quercetum rotundifoliae* in its acid-basic variant.

It is common to find communities of *Stipa tenacissima*, *S. celakowski*, *S. gigantea*, *Lavandula sampaiana*, *Thymus zygis*, *Teucrium pseudochamaepestis*, *Phlomis lychnitis* etc., therefore there are acidophilic and basophilic plants occurring together. This community has associated some plants from the Luso-Extremadurensis subprovince like *Dianthus lusitanus*, *Digitalis thapsi*, *Lavandula sampaiana*, etc. On the other hand, this terrophytic grassland belongs to the alliance *Trachynion distachyae*. With this information, the provisional syntaxon *Stipetum gigantea-tenacissimae* is proposed.

**KEYWORDS:** Biogeography, *Stipa tenacissima*, Syntaxonomy, Toledano-Tagano sector.

**CARTOGRAPHY AND EVALUATION OF THE HABITATS IN THE EAST ALMERIAN MOUNTAINS (SOUTH-EAST SPAIN)**

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The promulgation of the Directive 92/43/EEC (Council of the European Communities) has created a new transborder framework with new operating procedures for the conservation strategies of nature and biodiversity in the European Community. The Directive establishes that each State-member should contribute to the constitution of special conservation zones ("Natura 2000" network).

State-members must discuss their contribution proposals to the Network based on the evaluation criteria of sites that Annex III establishes. These criteria are referred to as the following aspects:

- Degree of representation of each natural habitat in the proposed specific place;
- Surface of the natural habitat in relationship with the one that occupies the national territory;
- Degree of conservation of the habitat and its possibilities of restoration in the proposed area.

The study area mostly includes the mountains of Cabrera and Bédar, as well as other adjacent zones, located in the province of Almería. The limits are: the basin of the river Antas to the north, the Sierra Filabres and Sierra Alhamilla to the west, the basin of Alias river to the south and the Mediterranean sea to the east.

For the study and evaluation of the territory a methodology has been elected based on phytosociological knowledge. The following items are contemplated:

- Phytosociological analysis;
- Cartography of the communities;
- Evaluation of each community (habitat) taking into account the criteria of the Directive 92/43/EEC and its specific properties;
- Global evaluation of each recognized area.

**KEYWORDS:** Almería (Spain) Cartography, Evaluation, Phytosociology.

FLORA AND VEGETATION OF BEIRA-DURIENSE MOUNTAINS – 1<sup>ST</sup>  
APPROACH

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Within a Ph.D. project on Ecology of vascular plants, I have been studying the flora and vegetation of a group of mountains and highlands (above 700 m), situated south of the Douro river and North of the Central System. This area can be divided into four major groups of mountains: 1) Caramulo; 2) Arada/Freita; 3) Montemuro/Nave/Lapa; 4) Penedono/Trancoso; and some other minor sierras. Granites and schists are the dominant rocks.

Oak woods (“carvalhais”, with *Quercus pyrenaica*, *Q. robur*, *Q. rotundifolia* and *Q. suber*) are nowadays rare, but still occur in some places, mainly on rocky slopes of difficult access. *Quercus pyrenaica* is frequently accompanied by *Pteridium aquilinum* and other ferns, *Genista florida*, *Rubus ulmifolius*, *Ajuga pyramidalis*, *Galium* spp., *Hieracium* spp., *Veronica officinalis*, *Viola riviniana*, *Arrhenatherum* spp., *Holcus mollis* and other species.

Scrubs (“matos”) are the dominant vegetation, covering very large areas. The “carqueja” (*Pterospartum tridentatum*) is very frequent, forming scrubs with *Erica arborea*, *E. australis*, *E. cinerea*, *E. umbellata*, *Halimium lasianthum* subsp. *alyssoides* and *Ulex* spp., sometimes with small bulbous plants (*Crocus carpetanus*, *Gagea soleirolii*, *Gladiolus illyricus*, *Merendera montana*, *Narcissus bulbocodium*, *N. triandrus*, *Ornithogalum* spp., *Romulea bulbocodium*, *Simethis mattiazzi* and, very rarely, *Erythronium dens-canis* or *Tulipa sylvestris* subsp. *australis*). *Cytisus striatus* and *C. multiflorus* are very common, forming vast scrub areas, together with *Ulex* spp.

It is possible to find wet heaths with *Erica ciliaris*, *E. tetralix*, *Calluna vulgaris*, *Ulex micranthus*, *U. minor*, *Potentilla erecta*, *Wahlenbergia hederacea* and ferns like *Blechnum spicant* and *Pteridium aquilinum*; *P. aquilinum* is the most common fern, covering large areas or among scrubs and woods (mainly on cultivated pinewoods).

Meadows (“prados” or “lameiros”) dominated by *Holcus lanatus* are very frequent, sometimes with large populations of *Paradisea lusitanica*. There are also *Nardus stricta* grasslands (“cervunais”) with *Danthonia decumbens*, *Narcissus bulbocodium* and conspicuous orchids as *Dactylorhiza caramulensis* and *Serapias cordigera*.

Bogs with *Sphagnum*, *Caltha palustris*, *Viola palustris*, *Pedicularis sylvatica* subsp. *lusitanica*, *Narcissus bulbocodium*, *Anthoxanthum odoratum* and *Carex* spp. are not infrequent, but carnivorous plants like *Drosera rotundifolia* are very rare.

I suppose that the final number of taxa (species and subspecies) of this area will not be far from a thousand. Presently I have identified ca. eight hundred taxa from my field observations, herbarium specimens and bibliography.

There are some Portuguese endemic species as *Anarrhinum longipedicellatum*, *Centaurea herminii* subsp. *lusitana* and *Teucrium salviastrum*. Many more are the Iberian endemisms, as for example *Dactylorhiza caramulensis*, *Linaria triornithophora*, *Ranunculus olissiponensis* subsp. *olissiponensis*, *Silene marizii*, *Ulex micranthus*, etc.

KEYWORDS: Flora, Vegetation, Mountains, Portugal.

CAULIROSETTED COMMUNITIES FROM MADEIRA ISLAND:  
*ISOPLEXIDO SCEPTRI-EUPHORBIEIETUM MELLIFERAE*, ASS. NOVA  
INED.

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The endemic caulirosetted microphanerophytes – e.g. *Euphorbia mellifera*, *Isoplexis sceptrum*, *Melanoselinum decipens*, *Musschia wollastonii* and *Sonchus fruticosus* – are among the most striking plants of Madeira Island. They are easily observed by the visitor in the “levadas” (an artificial system of channels and tunnels constructed to transport water from the humid Northern facing slopes to the drier, more populated, Southern half of the island).

These plants organize themselves in a new association – the *Isoplexido sceptri-Euphorbiei etum melliferae* – that reflects a worldwide recurrent phenomenon in forest ecosystems: the presence of plants adapted to dry ravines, forest clearings produced by tempests, landslides and other natural perturbations. “Levadas” are artificial simulations of these natural habitats.

The caulirosetted microphanerophytes share a common physiognomy and ecology, belong to the same functional group (C-strategist in the primary strategies of GRIME (2001)) and many of them evolved from herbaceous ancestors (e.g. *Melanoselinum* and *Sonchus*) that managed to adapt to an Island without indigenous mammal herbivores, once almost totally covered by dense forest vegetation.

The *Isoplexido-Euphorbiei etum melliferae* phytocoenosis (*Sibthorpio peregrinae-Clethrion arboreae*, *Pruno hixae-Lauretea novocanariensis*, cf. CAPELO *et al.*, 2000) is floristically similar to the *Rhamno glandulosi-Sambucetum lanceolati* but can be easily differentiated from it by the absence of *Rhamnus glandulosa*, *Salix canariensis* and *Sambucus lanceolata*, the scarcity of escio-hygrophilic ferns and the abundance of *Trifolio-Geranietea* character taxa.

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GRIME, P. (2001) – *Plant Strategies, Vegetation Processes and Ecosystem Properties*. 2<sup>o</sup> ed. Wiley.

KEYWORDS: Functional groups, Madeira Island, *Pruno hixae-Lauretea novocanariensis*, Vegetation.



**DIPLAZIO CAUDATI-PEERSEETUM INDICI, ASS. NOVA INED. AND  
RHAMNO GLANDULOSI-SAMBUCETUM LANCEOLATI, ASS. NOVA  
INED.: TWO NEW HYGROPHILIC FOREST ASSOCIATIONS FROM  
MADEIRA ISLAND**

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In a recent phytosociologic study of the vegetation of Madeira Island, CAPELO *et al.* (2000) proposed two types of climatophyllous *laurisilva* vegetation – *Clethro arboreae-Ocoteetum foetentis* and *Semele androgynae-Apollonietum barbujanae*, both within class *Pruno hixae-Lauretea novocanariensis* – with an arboreal stratum respectively dominated by *Ocotea foetens* [til] and *Apollonias barbujana* [barbusano].

Recently, we discovered that the other Madeira's *Lauraceae* tree – *Persea indica* [vinhático] – is the dominant tree in a third type of *laurisilva*: the *Diplazio caudati-Peerseetum indicis*, an edapho-hygrophilic forest, exclusive of permanent watercourses, that ranges from the termomediterranean sub-humid to the mesomediterranean humid stages. Its characteristic combination involves *Persea indica*, *Dryopteris aitoniana*, *Woodwardia radicans*, *Diplazium caudatum*, *Pteris incompleta*, etc. Nowadays, the *Diplazio-Peerseetum indicis* is a rare phytocoenosis because *Persea indica* is a source of noble wood and many of its habitats are suitable for agriculture. The prickly scrub communities of the *Rubio agostinhoi-Rubetum bollei* were identified as the subseral stage. It is possible that at least some *Salix canariensis* communities (*Scrophulario hirtae-Salicetum canariensis*), occupies today former *Persea indica*-forests biotopes.

In steep torrential stream riffles with coarse substrates, in the scope of the *Clethro-Ocoteetum foetentis* climatophyllous stage, the *Diplazio caudati-Peerseetum indicis* is substituted by an undescribed nanophanerophytic phytocoenosis – *Rhamno glandulosi-Sambucetum lanceolati* – dominated by *Sambucus lanceolata*, *Euphorbia mellifera* and *Rhamnus glandulosa*. The presence of a wealth of escio-hygrophilic ferns in the shadowy and humid habitats of this community supports its differentiation from the mesophytic *caulirosulati* communities of the *Isoplexido sceptri-Euphorbietum melliferae* (ined.).

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CAPELO *et al.* (2000) – Vegetação da Madeira (Portugal): I – Aproximação à tipologia fitossociológica. *Silva Lusitana* 7: 257-290

KEYWORDS: *Laurisilva*, Madeira Island, *Pruno hixae-Lauretea novocanariensis*, Vegetation

**SILENO DURIENSIS-APIHYLLANTHETUM MONSPELIENSIS:  
A NEW ROSMARINETEA ASSOCIATION FROM NORTHEAST  
PORTUGAL**

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The studies of the flora in the Douro valley made by Mendonça and Vasconcellos between 1944 and 1962 revealed a rich flora with a surprisingly large number of biogeographic disjunctions. A gap in Northern Portugal botanical investigations and the construction of the Douro Hydroelectric System led to a loss of botanical memory. A lot of plants were not collected for a long time and some of them were even thought to be extinct. During the past ten years, together with the botanists of Trás-os-Montes and Alto-Douro University, we resumed systematic floristic studies of the Douro valley along with the application of the Braun-Blanquet sigmatist method to vegetation analysis.

In our investigation, we found in the Douro River rocky flood bed, just after one of the local dams, a very original permanent community dominated by *Aphyllanthes monspeliensis* and *Coronilla minima* that was also the habitat of many of the most rare endemics or biogeographic disjunction known from the Lusitano-Duriense Sector. The characteristic combination of this new association includes the those species and also *Avenula bromoides*, *Globularia vulgaris*, *Silene boryi* subsp. *duriensis*, *Sideritis bubanii*, *Polygala microphylla*, *Scorzonera crispata*, etc. Among these species, it is important to remark the presence of *Silene boryi* subsp. *duriensis*, one of the few lusitano-duriense sector vascular plant endemics.

In our opinion, the *Sileno duriensis-Aphyllanthes monspeliensis* floristic combination and chorology – Lusitano-Duriense Sector (Mediterranean Iberoatlantic Province) – forces its affiliation to the sub-alliance *Xero-Aphyllanthesion (Sideritido-Salvion lavandulifoliae, Rosmarinetalia officinalis, Rosmarinetea)*. Its catenal contacts include: *Salicetum salvifoliae (Salici purpureae-Populetea nigrae)* towards the river; *Paeonio broteroi-Quercenion rotundifoliae (Quercetea ilicis)* communities outside the influence of river floods; *Loeflingio hispanicae-Malcolmietum patulae (Helianthemetea)* in summer-dry sand deposits occasionally submitted to river floods; *Stellarietea mediae* communities in summer-humid sand deposits frequently submerged in winter; and *Lactucho chondrilliflorae-Andryaetum ragusinae (Thlaspietea rotundifoliae)* in rounded-rock flood bed deposits.

The persistence of this community after the construction of the Douro Hydroelectric System is due to the maintenance of natural disturbance regimes and to the small depth of the dam immediately after the dike. The most important menace to the conservation of the *Sileno duriensis-Aphyllanthes monspeliensis* and its flora is the physical destruction of the habitat through the improvement or the construction of new roads near the river.

KEYWORDS: Douro River, Northeast Portugal, *Rosmarinetea*, Vegetation.

**EXPLORING THE ANALYTIC AND DIDACTIC POTENTIAL OF HIGH-MAGNIFICATION IMAGING IN PHYTOSOCIOLOGY: EXAMPLES FROM THE VEGETATION OF TRAMPLED BIOTOPES (CLASS *POLYGONO-POETEA ANNUAE*)**

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The study of vegetation types predominated by small-sized species is sometimes hard and time-consuming, since the small size of plants frequently prevents researchers from recognising adaptive characters and from elaborating correct interpretations of such specific ecologies.

Moreover, small-sized inconspicuous plants are less attractive for young students and the general public, so teaching such “unencouraging” vegetation types is always difficult from a didactic point of view.

In this poster, we propose an alternative didactic approach to the study and teaching of vegetation types predominated by small-sized inconspicuous plants.

We propose to address these specific and “unattractive” biotopes through the use of highly magnified images of plants and adaptive characters, in order to produce correct interpretations of ecologies and to make them attractive to young students and the general public.

We illustrate this preliminary proposal with examples from trampled vegetation (class *Polygono-Poetea annuae*).

**KEYWORDS:** High-magnification imaging, Phytosociology, *Polygono-Poetea annuae*, Teaching.

**BOTANICAL EVALUATION OF THE MAIN WETLAND FROM  
WESTERN ANDALUSIA (SPAIN)**

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A cartography of the wetland vegetation, including a botanical evaluation of current conservation state of the main wetland from Western Andalusia (Spain), will be presented.

The vegetation of 53 wetlands situated in Huelva, Sevilla, Cordoba and Málaga were studied by means of the following methodology:

- \* Recognition of homogeneous vegetation areas. For this purpose, digital aerial photography (scale 1:5000) provided by the Andalusia Government was used.
- \* Localization and limit corrections of these homogeneous areas identified in laboratory.
- \* Identification of the botanical community forming each of the different homogeneous areas. For this purpose, a phytosociological methodology was chosen, according with BRAUN-BLANQUET (1979).
- \* Botanical evaluation. For this task, the following equation was used:

$$Vu_k = \sum_{j=1}^n \left[ P_j * H_j * \left( \sum_{i=1}^k V_{ij} + N_j * A_j \right) \right]$$

where  $Vu_k$  is a value of botanical quality of Unit k (different homogeneous identified areas);  $P_j$  is a value of the area occupied by the community j in the Unit k;  $H_j$  is an index related to the valuation of community j by the European Directive (92/43/CE) for the protection of special habitats;  $V_{ij}$  represents a series of values related to characteristic attributes of the each community (endemic, rarity, fragility, vulnerability and relic indexes);  $N_j$  is a value of phytosociological naturalness and  $A_j$  is an index related to contamination due to human activity, both for community j.

All data were analysed by mean of Geographical Information System (GIS) in order to obtain a global comparison of the current conservation status of the vegetation of the different wetlands.

This study was supported by Andalusia government (Project: Cartografía y evaluación de la vegetación perlagunar de los humedales de Andalucía -807 / 03.1875-).

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KEYWORDS: Andalusia, Evaluation, G.I.S., Wetland

**STUDIES ON BURIED WOOD OF *METASEQUOIA GLYPTOSTROBOIDES*,  
CENTRAL CHINA**

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Dendrochronology is the science that deals with the dating and study of annual growth layers in wood.

Since tree rings provide not only a method of dating, but also widespread, well-replicated and annual-dated proxy data for past environmental changes, dendrochronology has already contributed to many aspects of Past Global Changes research.

Through species identification and determination of physical and chemical properties and ages, as well as the on-the-spot examination, it was found that the so-called "buried wood" (Yian Chang board), a precious wood of *Metasequoia glyptostroboides* was buried under the ground for many years because of local earth crust changes. In the ground, it had undergone changes in its chemical composition and therefore possessed a high resistance to rot.

It is suggested that the Lichuan county area is the ancient natural distribution region of the species.

KEYWORDS: Central China, Dendrochronology, Dendroclimatology, *Metasequoia glyptostroboides*.

**CONTRIBUTION TO THE FLORISTIC CATALOGUE OF THE FERNS OF THE CITIES OF SÃO FRANCISCO DE PAULA, JAQUIRANA, CAMBARÁ DO SUL AND BOM JESUS-RIO GRANDE DO SUL - BRAZIL**

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The state of the Rio Grande do Sul is of great floristic importance because of the contact between tropical and tempered macrobioclimates. For this reason, phytosociologic studies have been performed in the Northeastern region of the state since the year 1999.

The elaboration of a floristic catalogue of the area in question is essential for this research. The object of the present work is the presentation of the actual state of collection.

The material for the elaboration of this catalogue was obtained through field trips in the period from 1999 to 2002. The specimens were included in the Herbarium of the University of Caxias do Sul-HUCS, which, at the same time, was used as a consultation source.

Until now, more than 200 specimens of ferns were collected and determined, resulting in the detection of approximately 80 taxa.

Here, we present data for 20 different families, distinguishing the *Aspleniaceae*, with 14 species, and the genus *Asplenium* L., with 13 species. The *Polypodiaceae* are represented by nine species.

Furthermore, we also found several species of *Blechnaceae*, *Dicksoniaceae*, *Dryopteridaceae*, *Hymenophyllaceae*, *Lycopodiaceae* and *Pteridaceae*, among others, and, within the *Ophyoglossaceae*, the rare *Botrychium virginianum* (L.) Sw. (with only one reference of collection in 1930 for the region) and associations with the "xaxins" (*Dicksonia sellowiana* Hooker), an endangered species due to economic exploitation.

**KEYWORDS:** *Dicksoniaceae*, Ferns, Floristic Catalogue, Phytosociology.

**VEGETATION MAP OF GRAN CANARIA (CANARY ISLANDS). E 1:25,000**

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The island of Gran Canaria, with an area of 1,532 km<sup>2</sup> and a maximum altitude of 1,950 m a.s.l., is both the third largest and third highest island of the Canary Archipelago.

It has a high degree of habitat diversity, widened by the presence of a cloud area on the north slope caused by the influence of NE trade winds. Twenty bioclimatic belts and six climatophilous vegetation series have been recognized (Del Arco et al. 2002).

During the last two years we have developed the field and laboratory work to complete the cartography of Gran Canaria within the framework of a general 1:25,000 map of the Canary Archipelago, following a phytosociological approach to vegetation.

The map units have been delimited by drawing polygons from aerial pictures. The island area covers eight sheets 1:25,000 of the Cartography of GRAFCAN ("Cartográfica de Canarias S.A."), sponsor of our study.

About 12,500 polygons have been identified. For each, a triple approach representing the vegetation has been considered: numbers refer to current vegetation, color to potential vegetation, and signs to physiognomy.

All maps were drawn using an ArcView 3.2 GIS and various software tools.

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**KEYWORDS:** Canary Islands, Cartography, Gran Canaria, Vegetation map.



**BRYO-PTERIDOPHYTIC EPIPHYTIC COMMUNITIES IN THE PENEDA-GERÊS NATIONAL PARK (NORTHWEST PORTUGAL)**

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Epiphytic vegetation is composed mainly by bryophytes, lichens and pteridophytes, capable of establishing and surviving in particular substrata like bark. Organisms such as these, which grow upon other organisms but are not parasitic on them, are called epiphytes. The host-plant is called phorophyte. Temperature gradients, precipitation, altitude and factors of substratum are the most important features limiting the distribution of epiphytic species.

This type of vegetation is included in phytosociologic order *Anomodonto-Polypodietales* (class *Asplenieta trichomanis*). It is characterised by comophytic communities of mixed bryophytes and pteridophytes that colonise acid rock clefts, earthy slopes and tree trunks. Epiphytic communities are typical of temperate areas, occurring in the Northwest of Portugal.

Due to lack of information on bryo-pteridophytic epiphytic communities in Portugal, we performed a thorough study of this kind of vegetation, using the phytosociologic method, in the Peneda-Gerês National Park, a protected mountain area in the Northwest of Portugal. In this area, the presence of oak-woodlands in good state of conservation is of extreme importance to epiphytic vegetation growth.

We noted the following characteristics in each phytosociological relevé: altitude, phorophyte species, slope, area, exposure and cover.

The most frequent phorophyte in the area was *Quercus robur*. However, epiphytic communities were examined also on *Olea europaea* and *Castanea sativa*. Species diversity is usually low, making distinction of vegetation types difficult.

In term of conservation, this vegetation type is not particularly rich in rare species (only *Davallia canariensis* is of some significance). However, well structured epiphytic vegetation is currently becoming rare in the territory due to mass destruction of oak-woods. Therefore, the presence of epiphytic vegetation is a valid indicator of the good state of conservation of the forests where it develops.

**KEYWORDS:** *Anomodonto-Polypodietales*, Epiphytic communities, Northwest of Portugal, Phytosociologic method.

**PLANT COMMUNITIES OF TAIGA-STEPPE CONTACT ON THE WESTERN SHORE OF LAKE BAIKAL**

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Classification of the transient vegetation zones is the modern problem of phytosociology.

It is well known that the forest steppe is a zonal formation that represents a particular set of parameters determining the essence of the phenomenon.

The forest steppe is generally recognized to be a zone of forests dominated by broad-leaved species involving elements of xerophytization of the soil cover in association with steppe communities under plain conditions, or a zone of steppified forests in combination with steppes in highlands. Such a situation occurs in the south of Central Siberia, in the Prebaikalia and Transbaikalia, and certainly in Southern regions of Central Russia and North Kazakhstan. Therefore, the steppe area of the Western shore of Lake Baikal, that occurs in lowlands (dominated by altitudes of up to 800 m above sea level), has an extra-zonal character. Steppes on the Western shore area have a distinctive appearance characteristic for the Baikal hollow only. Communities occur to a greater extent on poorly developed gravel soils of coarse mechanical composition. In this region there is not a transition zone or a zone of different-grass forests with broad-leaved species predominating, as, for example, is the case of a zone of steppified forests in the Altai and in the South of Central Siberia.

This is an intrinsically somewhat different formation, exemplifying the specific character of the origin of the Baikal hollow. More likely such communities should be termed the xerophyte-petrophyte plant clusters and defined as "communities of taiga-steppe contact". These communities occur within the Western shore of Lake Baikal.

Communities in the taiga-steppes contact area produce cenoses consisting of *Larix sibirica* and *Pinus sylvestris*; in undergrowth – *Rhododendron dauricum* and *Duschekia fruticosa*; and in the soil cover – *Rhodococcum vitis-idaea* and *Bergenia crassifolia* with patches of moss in association with xerophytes characteristic of dry petrophyte steppes such as *Festuca lenensis*, *Stipa krylovii*, *Caragana pygmaea*, *Ephedra monosperma*, *Thalictrum foetidum*, *Carex pediformis*, *Artemisia frigida*, *Chamaerodos altaica*, *Iris humilis*, *Bupleurum scorzonifolium*, etc.

From the above discussion, it appears that the communities of taiga-steppes contact constitute an inherent structural feature of the vegetation in the area of the Baikal hollow. This is supported by the character of genesis and by current trends of the regional vegetation. The extra-zonal character of the regional steppe communities testifies that we observe the formation of specific taiga-steppe cenoses. The structural complexity of the terrain in this area is responsible for the various forms of their contact.

**KEYWORDS:** Communities of taiga-steppe contact, Transient vegetation zones, Xerophyte-petrophyte plant clusters.

**OPTIMISING CROPS THROUGH BIOCLIMATIC STUDIES**

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In this work, a bioclimatic study for the South of the Iberian Peninsula (Spain and Portugal) was conducted. Our aim was to identify territories/areas in order to optimise crops with minimum environmental cost.

This model was applied to olive cultivation/plantation with the use of data from 200 meteorological stations, and subsequently the bioclimatic indices were obtained: Io, Ic, It/Ic, etc. (Rivas Martínez, 1996). Different varieties of olive were studied: Picual, Cornicabra, Hojiblanca, Lechin, Morisca, Manzanilla, Gordial and Verdial, (Barranco *et al.* 1998).

This way, a correlation could be established between olive varieties and bioclimatic indices. For example: the Picual variety is cultivated in areas with the following indices: Io= 3.5-4.5; Ic= 18-20; It/Ic= 280-400. In such areas, the edaphic-indifferent thermo-mesomediterranean holm-oak and the mesomediterranean basophilic gall-oak could be found. This information highlights the importance of Bioclimatology in the territorial planning of agriculture.

**KEYWORDS:** Bioclimatology, Crops, Olive, South Iberian Peninsula

**CONTRIBUTION TO THE KNOWLEDGE OF THE FLORA AND  
VEGETATION OF THE LOWER COURSE OF SABOR RIVER**

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As a result of field research carried out between May and July 2002, at various locations alongside the lower course of Sabor river, namely in the sector between Felgar (council of Torre de Moncorvo) and Porrais (council of Mogadouro), preliminary results of vegetation surveys will be presented, especially concerning the identified species and attributed families.

An overview of river Sabor vegetation stages and catena will also be discussed.

This investigation is part of a research that aims to analyse the development of landscape and the impacts of distinct forms of land use in this part of Trás-os-Montes, at the vegetation level.

**KEYWORDS:** Sabor River, Portugal, Trás-os-Montes, Vegetation.

## COASTAL VEGETATION OF PORTO SANTO ISLAND (ARCHIPELAGO OF MADEIRA)

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The littoral geomorphology of the Porto Santo Island is of paramount importance in the coastal phytocoenosis assemblage: the Southern part of the island has an 8 km long sand beach with littoral arenitic platforms in its Eastern extreme; arenitic or volcanic (mostly trachits) sea cliffs predominate in the rest of the island; in the Northern part of the island, near the airport, there is an elevated dune (more than 150 m above sea level), related to an ancient island tilt.

In the Porto Santo beaches, we found three new associations:

- *Senecio incrassati-Mesembryanthemum cristalini* – it is a halonitrophylous succulent annual prostrate plant community, very similar to the canarian *Mesembryanthemum cristalini*, characterized by the two nominal plants together with *M. nodiflorum* and *Beta procumbens*. This community is not exclusive of mobile substrata and was also observed in Ponta de S. Lourenço (Madeira) in a compact-soil variant with *Aizoon canariensis*.
- *Euphorbia paraliae-Lotetum glauci* – this secondary dune community is dominated by the Madeira and Canaries Islands endemic *Lotus glaucus*. This association was also identified in Ponta de S. Lourenço in the elevated dunes of northern Porto Santo (subas. *phylletosum nobli*).
- *Lotetum loweani* – is a phytocoenosis only known from the Porto Santo beaches nearby the sea arenitic platforms. It is characterized by the Porto Santo endemic *Lotus loweanus*.

The northern arenitic cliffs are the habitat of the *Limonietum pyramidati*, a species-poor coastal halophylous chasmophytic association, identifiable by the Porto Santo endemic *Limonium ovalifolium* subsp. *pyramidatum*.

Despite the scarcity of characteristic species of higher syntaxa, the location of *Euphorbia paraliae-Lotetum glauci* in the alliance *Polycarpaeo niveae-Euphorbion paraliae* and the location of both *Lotetum loweani* and *Limonietum pyramidati* in the Madeiran sea-cliff alliance *Helichryson obconico-devium* are the most parsimonious syntaxonomical solutions: it avoids the proliferation of higher syntaxa and it is biogeographically more coherent. In our opinion, this is an unavoidable approach in general when approaching island syntaxonomy. All of them are finicolous associations in the context of their alliances, with low floristic diversity and presided by small area endemics.

**KEYWORDS:** *Crithmo-Sticetea*, *Polycarpaeo niveae-Traganetea moquini*, Porto Santo Island, *Stellarietea mediae*.

## AN INTEGRATED METHODOLOGY FOR THE MANAGEMENT AND CONSERVATION OF DUNE SYSTEMS IN THE “ARCO TRÓIA-SINES”

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As a contribute for the better understanding of the level of conservation of flora and vegetation and for the delimitation of coastal areas of intervention, integrated in the “Projecto de Recuperação dos Sistemas Dunares do Arco Tróia-Sines” (sponsored by D.R.A.O.T.-Alentejo and developed by the Department of Ecology Évora University and by the Department of Earth Sciences of Universidade Independente), we intend to expose the methodology developed so far in this area.

In terms of vegetation cartography, the maximum efficiency and technical rigour demanded in the gathering of data requires, in this methodology, previous elaboration of cartographic support material for fieldwork.

As far as flora and vegetation is concerned, herborizations were all along the coast, as well as cartography of all the psammophilic communities in the unstable dunes, dunes in a stabilization process and stabilized dunes and even of some interior dune systems. Each were assigned a conservation index which was based on the ground cover rate, abundance of typical species, position in the micro series or series and level of intrusion of exotic species.

After finishing all the fieldwork, all the information will be compiled and organized with Arc View GIS 3.2 © software. On top of these procedures, the “Carta da Vegetação Dunar do Arco Tróia-Sines” will be built in an analogical format on a scale of 1: 10 000, which will include cartography concerning association, series and micro-series from the digital cartography edition.

In order to characterize and modeling the aeolian sand transport 4 permanent weather stations (PWS) were installed, with high frequency (1 Hz) data record of several meteorological variables that could affect beginning and maintenance of sediment particles transport in saltation.

The final aeolian sand transport model, calibrated to micro-scale with ET, meso-scale with CT and macro-scale by consecutive micro-topographic surveys comparison, will allow the verification of system responses to the several environmental conditions at least in a one-year time period.

Due to the integration of floristic and vegetation data with data concerning sediments, we will build the “Carta de Risco do Arco Tróia-Sines”, where the level of change in the ecosystems will be represented, as well as the coastal areas where, by natural circumstances, we can intervene.

**KEYWORDS:** Aeolian Sand Transport, Coastal dunes, Flora, Vegetation.

VEGETATION ANALYSIS OF THE SAN JUAN LAKE AND ITS  
SURROUNDINGS

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The San Juan Lake is a refuge for fauna and as such, a Natural Protected Area of the Community of Madrid by ordinance 5/1991 of February 14<sup>th</sup> (BOCM of February 18<sup>th</sup> 1991), and it is considered one of the most important wetlands in the South of the Community. Its protection is not only fundamentally due to its richness of fauna, but also due to its remarkable vegetation.

The San Juan Lake is located in the province of Madrid, near the limits of Guadalajara and Cuenca provinces. It is located in a depression of the alluvial valley of the Tajuña river where the aquifer is near the surface and forms a wide wetland surrounded by agricultural fields.

The hills surrounding the lake to the SE are covered by a gypsophyllous scrub, rich in endemic species belonging to order *Gypsophiletalia* (class *Rosmarinetea*).

The hygrophytic vegetation of the margins of the lake preserves fragments of its potential vegetation of poplars, willows and tamarisks (classes *Salici-Populetea* and *Nerio-Tamaricetea*), and most of the wetland is occupied by a dense formation of the helophytes with reed-maces (*Typha latifolia*) common reed (*Phragmites australis*), yellow irises (*Iris pseudacorus*) etc.

The analysis of the past and present of this vegetation is accompanied by graphics and maps.

KEYWORDS: Hidrophylous and helophytic vegetation, Madrid (central Spain), Natural Protected Areas, Wetlands.

LINO STRICTI-STIPETUM CAPENSIS, ASS. NOVA INED. AND VICIO  
COSTEI-ECHIETUM PLATAGINI, ASS. NOVA INED., TWO NEW SEMI-  
NITROPHILIC ASSOCIATIONS FROM PORTO SANTO ISLAND  
(ARCHIPELAGO OF MADEIRA)

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Porto Santo is a deeply eroded oceanic island. The human uses of the territory led to a massive destruction of its primitive vegetation cover and its substitution by new types of vegetation with plants adapted to the novel perturbation regimes. A vegetation cover once dominated by trees or shrubs that evolved isolated from herbivory during millions of years was replaced since the XV century by herbaceous anthropogenic vegetation, dominated by neophytes, adapted to perturbation events imposed by mammal herbivores (goats and rabbits) and by dry-farming agriculture (mostly barley). Agriculture and grazing together with low climatic precipitation levels promoted sub-nitrophilic types of herbaceous vegetation. So, present Porto Santo vegetation is largely dominated by two, yet undescribed, herbaceous subnitrophylous phytocoenosis: *Lino stricti-Stipetum capensis* and *Vicio costei-Echietum platagini* (*Thero-Brometalia*, *Stellarietea mediae*).

*Lino-Stipetum capensis* is the most conspicuous vascular plant community in Porto Santo [it is also present in Ponta de São Lourenço (NE of Madeira Island)], ranging from a basal infra-mediterranean semi-arid stage to the thermomediterranean lower-dry stage. It is easily identified by its dominant – *Stipa capensis* – which has its phenological optimum in March and attributes a greenish-brown colour to the landscape. *Lino-Stipetum* can be distinguished from peninsular and canarian *Stipeta capensis* by the simultaneous presence, among other species, of *Euphorbia terracina*, *Linum strictum* and *Beta maritima*. Its inclusion in the thermomediterranean xeric-desertic alliance *Resedo lanceolatae-Moricandion* seems more accurate than in the more continental and higrophilic *Taeniathero-Aegilopion geniculatae*.

In turn, *Vicio-Echietum platagini*, in “climatophylous habitats”, is restricted to the highest peaks of the island (e.g. Pico do Facho-517m and Pico Branco-450m), mostly in the upper dry to sub-humid thermomediterranean stage. In dryer ombrotypes, the presence of this community is only possible in water compensated biotopes. As the *Lino-Stipetum capensis*, it is dominated by neophytes but its characteristic combination includes two important Porto Santo endemics: *Vicia costae* and *V. ferreirensis*. We suspect that these species primarily occupied forest clearings [*Trifolio-Geranietea*?] but, later, were able to survive in the anthropogenic habitats. The autonomy and the collocation of *Vicio-Echietum platagini* in the alliance *Echio plantaginei-Galactition tomentosae* are evident.

KEYWORDS: Nitrophylous vegetation, Porto Santo Island, *Stellarietea mediae*.



**CONTRIBUTION TO THE FLORISTIC CATALOGUE OF SUCCESSION STAGES OF THE DECIDUOUS SEASONAL FOREST AND OF THE MIXED OMBROPHYLOUS FOREST IN THE CITY OF CAXIAS DO SUL, RIO GRANDE DO SUL (BRAZIL)**

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The primitive vegetation of the study area is basically formed by the forest types "Mixed Ombrophyllous Forest", basically constituted by *Araucaria angustifolia* bushes, in the areas with higher altitudes, and "Deciduous Seasonal Forest", in the lower altitudes.

The anthropic actions developed since the beginning of the settling in this area, with constant and continuous deforestation for the opening of new farming, changed the original limits of vegetation types. Currently, plant formations in different succession stages are observed.

The knowledge of the natural vegetation and the study of the structure and floristic composition in the several succession stages of a forest type are basic to establish the succession dynamics of the plant communities. With this purpose, we have been developing the floristic study of the plant formations in the several succession stages, as the formations of *Baccharis* spp. ("capoeiras"), the secondary woodlands ("capoeirões"), the formations of *Mimosa scabrella* and the primary woodlands.

Until the moment, we collected and determined 1400 plants belonging to ca. 800 taxa. The collected material is deposited in the herbaria of the University of Caxias do Sul (HUCS) and of the University of León (LEB).

In this study, we present 173 taxa, that are part of the most numerous families: *Asteraceae* and *Myrtaceae*, which belong to the Floristic Catalogue of the city of Caxias do Sul. The area where these taxa were found presents a humid meso-tropical climate, with altitudes varying between a maximum of about 950 meters and a minimum of around 100 meters.

The final objective of this study is the phytosociological characterisation of the Mixed Ombrophyllous Forest and of the Deciduous Seasonal Forest, as well as their shrubby stages of degradation.

**KEYWORDS:** *Araucaria* Forests, Fitosociology, Floristic Catalogue, Succession Stages.

**THE USE OF GEOGRAPHICAL INFORMATION SYSTEMS IN VEGETATION AND PHYSICAL ENVIRONMENT ANALYSIS IN THE MUNICIPALITY OF VILLA DE MAZO (LA PALMA – ISLAS CANARIAS)**

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The present work uses a phytosociological approach together with a GIS for analysing the vegetation and the physical environment, with an emphasis on the comparative analysis of the factors that most influence the current distribution of plant communities in Villa de Mazo. This tool allows the evaluation of the selected data set.

The initial data considered of interest were:

- a) Subject maps: geology, soils, bioclimatology and vegetation (E 1:15,000);
- b) Analytical maps: drawn by means of GIS analysis tools. The slope, orientation, trade wind influence and digital elevation model were mapped.

A database was generated from these results. The comparative analysis between vegetation and each of the remaining attribute layers was performed by dividing the area into 50 m<sup>2</sup> grid cells, to provide indicators of which environmental parameters could be affecting the current distribution of plant communities.

**KEYWORDS:** Canary Islands, Environment analysis, La Palma, Vegetation map.



**BIRCH WOODLANDS IN THE UPPER SLOPES OF THE CANENCIA  
RIVER BASSIN, MADRID (SPAIN)**

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The present study analyses the present vegetation of some enclaves with birches (*Betula* sp.) in the upper slopes of several streams of the basin of the Canencia river, Madrid (Spain).

These upper basins are located in the number 484 of the National Topographical Map 1:50.000 (Buitrago de Lozoya). More specifically in the numbers 484-I [Lozoya] and 484-III [Bustarviejo] of the 1:25.000 Map and they are the following ones:

- North slope of the "Puerto de Canencia".
- Stream of "Sestil de Maillo".
- Stream of "El Toril".
- Stream of "Las Chorreras".

The method followed included several campaigns of fieldwork carried out during the Spring and Summer of 2001 and 2002, with special attention to the analysis of the actual situation of the birch masses and to its vegetative regeneration and reproduction by seeds. In these last cases, a search for seedlings has been performed and will continue in each site.

The results of this fieldwork are presented in the form of records that contain: the location, a list of accompanying species, an evaluation of their actual state and future perspectives and the graphic complement which is considered the most convenient for each case.

Among the first contributions, the following facts should be pointed out:

- In the shade slope of the Puerto de Canencia: it is the most extensive mass and it can be defined as a birch-woodland of young trees and of thin shafts, with pluristem prevalence for stump re-sprout, with scarce thick and old individuals;
- In the stream of "Sestil de Maillo": small woodlands of young birches in riparian position;
- In the stream of "El Toril": the birches are also young and seem not to develop from stumps. The older individuals appear to be associated to hawthorns (*Crataegus monogyna*), and *Sorbus* sp.
- In the stream of "Las Chorreras": the young birches form small groups. Some birches near the stream are accompanied with hazel-tree (*Corylus avellana*) and other groups along the riverside are associated to *Salix* sp.

**KEYWORDS:** Birch woodlands, Madrid (Spain), Present vegetation, Regeneration of relict species.

**STUDY, IDENTIFICATION AND CARTOGRAPHY OF DOMINANT  
HELOPHYTIC COMMUNITIES IN SALREU AND CANELAS COASTAL  
WETLANDS**

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The amphibian communities of *Pragmito-Magnocaricetea* are dominated by helophytes typical of fresh and brackish waters.

This class is characteristic of moist areas of mid- and western Iberian Peninsula and includes five orders (*Phragmitetalia*, *Nasturtio-Glycerietalia*, *Magnocaricetalia*, *Scirpetalia compacti* and *Filipenduletalia ulmariae*).

The communities that dominate the study area (Salreu and Canelas coastal wetlands) belong to two of these orders (*Phragmitetalia* and *Scirpetalia compacti*) and involve, respectively, communities dominated by tall helophytes typical of fresh waters, with cosmopolitan distribution, and communities dominated by a small number of helophytic ciperaceous species (mainly of genus *Scirpus*) associated to brackish soils.

The study area is part of the terminal lagoon system of Vouga river and of its complex estuarine system, and it is mainly composed by interior sub-halophilic vegetation areas and fresh-water swampy areas. Included in Beira Litoral (West-Central Portugal) and in the Miniense Litoral biogeographic district, this area is characterised by a lower-mesomediterranean higher-subhumid bioclimate.

This study is part of an integrated conservation plan for these coastal wetlands. Our goal is to identify the different plant communities in this area (according to the phytosociologic approach) and to inquire and quantify the non-biotic factors that determine their dynamics and the way they are connected with each other.

A small number of species dominate the main associations (*Typha latifolia*, *Phragmites australis*, *Scirpus compactus*, *S. maritimus*, *Juncus effusus*, *J. maritimus* and several others, belonging to families *Typhaceae*, *Gramineae*, *Cyperaceae* and *Juncaceae*). Their distribution, which is determined by salinity, flooding and mineral nutrient concentration, is responsible for the organisation of microgeosigmeta.

The study of this area and its plant communities turns to be of great interest regarding their importance as habitats for many species, namely for birds, due to their high productivity in the base of the trophic chains and to their important purifying capacity typical of sedimentation areas.

**KEYWORDS:** Conservation, Habitats, Miniense Litoral district, *Pragmito-Magnocaricetea*.

INTEGRATED PHYTOSOCIOLOGICAL STUDY OF THE BASQUE  
COASTAL CLIFFS (PYRÉNÉES-ATLANTIQUES, FRANCE)

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An integrated phytosociological study of the area of the coastal cliffs between Saint-Jean-de-Luz and Hendaye (7 km long) was carried out.

The maps have been produced with the aim of contributing to the sustainable development and conservation of this rich natural heritage. The associations (phytosociology), the serial level (symphytosociology) and the catenal level (geosymphytosociology) were approached.

The characteristics of the studied area are :

- Biogeography: Cantabrian-Atlantic Province, Basque-Cantabrian Sector, Eastern Basque Subsector;

- Bioclimatology: thermo-atlantic hyper-humid type.

The main vegetation series are: *Polysticho setiferi-Fraxino excelsioris sigmetum*, *Hyperico pulchri-Quercu roboris sigmetum*, *Hyperico androsaemi-Alno glutinosae sigmetum* and rocky coastal *microsigmeta*.

Several *microsigmeta* and the resulting landscapes (*microsigmeta* complexes) are recognized as endemic of this coastal area of great biological value.

KEYWORDS: Basque coastal cliffs, France, Phytosociology, Pyrénées-Atlantiques.

VEGETATION LANDSCAPE OF THE PAYUNIA PHYTOGEOGRAPHIC  
PROVINCE, ARGENTINA

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In the Payunia phytogeographic province, that comprises the Center-South of Mendoza and the Center-North of Neuquén (Argentina), landscape was analysed based on an integral study of the syntaxonomical vegetation units, geomorphological units and soil types.

The Payunia occupies a surface of 60,000 km<sup>2</sup> within an area that underwent intense volcanic activity during the Pleistocene-Holocene period. It is located between 1,400 and 1,950 m a.s.l., and has a semiarid Mediterranean climate. Payunia supports approximately 140 endemic plant species, and is divided into three areas: litosols, psammophilous grasslands, and halophilous vegetation.

At the scale used in this work (1:1,000,000), and for the entire area, five subordinate landscape units (local landscapes or geofacies) are indicated, and they correspond to the physiognomies of shrubland, grassland, and psammophilous or saline vegetation, all included, on a larger scale, in two landscape units: A - volcanic-psammophilous area, and B - halophilous plain.

In the volcanic-psammophilous environment:

- Landscape I includes hills dominated by shrubs. Subunits identified were: thickets on rocky slopes of hills with *Adesmio-Prosopidastretum globosi*; thickets on shady, windy slopes with *Mulinetum spinosi*; alluvial cones and lower parts of slopes with *Adesmietum pinifoliae*; basaltic scoria with *Chuirago-Stipetum hypsophylae*, and fissures of rocks and rocky slopes with elements of the *Pellaeetea* class.
- Landscape II refers to the foothills of the Frontal Cordillera and of volcanoes, dominated by thickets. Some of these thickets are associated with the upper part of foothills such as *Fabiano-Stipetum speciosae atuelensis*; with the alluvial cones such as *Neospartetum aphylli*, and with low undulating rocky hills such as *Retanillo-Colliguajetum integerrimae*.
- Landscape III corresponds to semiarid tablelands with grasslands. Above 2,000 m a.s.l., in mesetas and hilltops, there are *Poetum durifoliae* grasslands, and in the upper part of undulating rocky hills, *Stipetum spectosae crispulae* occurs.
- Landscape IV refers to sandy areas. *Stipetum speciosae mediae* is normally associated with sandy nebkas; in semifixed dunes, *Calycero-Sporobolium rigentis*, and in active dunes, *Hyaletum argenteae latisquamae*.

In the halophilous plain:

- Landscape V corresponds to endorreic basins. Saline soils affected by gleization processes are associated with *Distichlietum spicatae*, and saline, clay-sandy, soils with *Lycio-Sporobolium mendocinae*.

KEYWORDS: Geomorphology, Landscape, Payunia, Syntaxonomy.

ABOUT A QUANTITATIVE SYSTEM OF SOIL TYPE AND VEGETATION  
RECOGNITION OF THE CRYOARIDIC HOLLOWES IN TRANSBAIKALYE

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Based on the middle- and large-scale soil and geobotany mapping of cryoaridic hollows (Vitim platen) and informative-mapmetrical estimation in the "soil-environment", entropic measures (Shanon) of connection with environmental factors were revealed in "vegetation-environment" systems, and ecological niches of soil types and vegetation were established. The duration of the period with temperatures higher than 0°C is the most informative in the multidimensional and hydrothermal space of the system "soil (vegetation) – climate" on a regional-ecological level. It is possible to connect the duration of that period with the duration of soil formation and speciation of the vegetation. The average annual sum of precipitation and the sum of active air temperatures serve as good indicators of the soil type and vegetation.

On the topoecological level, in the "soil-environment" system the maximal informative parameters were revealed with maternal rocks (0,75), type of vegetation (0,70), altitude of place (0,60), class of geochemical landscapes (0,50) and granulometry of maternal rocks (0,45). The analysis of double factor connection canals showed the following combinations: 1) "soil-(granulometry of maternal rocks -altitude of place)"; 2) "soils-(maternal rocks (genesis)- altitude of place)"; 3) "soils-(vegetation-altitude of place)"; 4) "soils-(exposition of slope-altitude of place)". For "vegetation-environment" system the maximum coefficient of informativity is connected with moistening, heat accumulation and frozen properties of soils.

For every type of soil and vegetation the most characteristic condition of environmental factor was determined. It allows to distinguish and to predict, considering the objective quantitative criterions, the parameters of ecological niches, ecological range of functioning. Reliable prognoses allow us to create "Soil-vegetative periodic system", which makes it possible to solve problems of diagnostics, classification, protection and rational using of soils and vegetation.

KEYWORDS: Cryoaridic hollows, Soils, Transbaikalye, Vegetation.

THE ROLE OF PLANTS IN THE CONSERVATION OF OLIGOPHAGOUS  
RHOPALOCERA (LEPIDOPTERA: HESPERIOIDEA & PAPILIONOIDEA)

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The larval stages of Lepidoptera are primary consumers on a great variety of plant species. Depending on the trophic regimes of larvae, *Lepidoptera* species can be considered polyphagous (wide trophic regimes) or oligophagous (those that feed on a small number of plant species). Monophagy (strict dependence of larvae upon one single plant species) is an extreme case of oligophagy.

In this poster we analyse the trophic regimes of larvae of the Portuguese *Papilionoidea* and *Hesperioidea*. We usually considered plants at the generic level because this taxonomic category is sufficient in an exploratory approach and because many of the quoted plant species have a similar morphology and are thought to be phylogenetically close. The inventory was organized after bibliographical data; all the plants absent in Portugal were excluded. The ecology of the plants used by oligophagous *Lepidoptera* species, obtained from phytosociological studies, allowed us to make some inference about their conservation.

The experience of two of the authors in the rearing of some lepidopteran species, revealed the existence of 38 oligophagous *Papilionoidea* and *Hesperioidea* butterflies in continental Portugal (23 being monophagous). This result shows a high oligophagy index: 30% of the fauna depends on specific plant *taxa* (24 genera).

Usually important *Lepidoptera* habitats are restricted to small areas in a fragmented landscape creating serious conservation problems, both for butterfly and plant communities. The risks of extinction resulting from habitat extirpation and fragmentation increase from polyphagous to oligophagous species. Host plants ecology and abundance are also important factors in the conservation of oligophagous butterfly species. As we show in this paper, 69% of threatened studied butterflies are monophagous (*sensu stricto*), the other 31% being oligophagous.

*Maculinea alcon* (Dennis & Schiffermüller, 1775) is a flagship oligophagous species: it inhabits scrubby turf habitats which are now very rare in Northern Portugal (where the last *alcon* populations stand). Some of the populations of its plant host - *Gentiana pneumonanthe* - are so small, that in remnant populations only a dozen of plants survive, leading to high extinction risks of butterfly populations. But this species is only one of a larger group of Portuguese threatened butterflies because of habitat loss, mainly in the last decades. We strongly believe that Nature conservancy should focus much more in ecosystem maintenance, instead of isolated protection gave by policies specifically voted to species, butterflies or plants.

KEYWORDS: Conservation, *Lepidoptera*, *Maculinea alcon*, Oligophagous butterflies.

**LANDSCAPE DYNAMICS ANALYSIS AT SERRA DA MALCATA NATURE  
RESERVE**

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The vegetation cover of Serra da Malcata Nature Reserve has changed considerably over the last decades: from substituting shrublands with cornfields during the wheat campaign launched by the Portuguese government during the nineteen-forties, to the gradual abandonment of traditional agriculture in the sixties and seventies and the transformation of large areas of uncultivated land into forest stands in recent years.

This study aims to analyse and quantify land-use changes that occurred in this Protected Area between 1954 and 2000 in five vegetation classes – native woodlands, forest stands (essentially dominated by fir trees), shrublands, agricultural and agroforestry systems and artificial zones (where the reservoirs were included) – having for this purpose used the aerial photograph interpretation of 1954 and 1982 and the digitised vegetation map (Caldeira, 2000).

The landscape dynamics study at Malcata was based on various landscape and class indices – such as Shannon's diversity and dispersion indices – that helped to characterise landscape structure and configuration. Transition matrices were also used to assess landscape evolution, as well as to predict vegetation cover until the year 2005.

**KEYWORDS:** Malcata, Dynamics, Landscape, Indices, Transition Matrix.

prairie/grassland schemes, the wildflower meadow, the spontaneous association, the wildlife edge, the butterfly border, the historic plants schemes, the roof garden association, the sculptural plants association, the woodland garden association, the drought resistant association, the wetland garden, the habitat/wildlife garden, are a few examples of contemporary man made plant associations.

In Portugal research is needed to evaluate the potential of native perennials and small shrubs to integrate designed planting schemes, particularly focusing on aspects of their response to urban ecosystems and maintenance strategies.

VEGETATION CARTOGRAPHY OF DUNE SYSTEMS BETWEEN TRÓIA  
AND SINES

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The results of the studies of the vegetation and flora under the project "Recovering the Sand Dunes of Troia-Sines Arche", which has been supported by "DRAOT-Alentejo" and developed by the "Universidade de Évora" and by the "Universidade Independente", are presented.

Based on cartographic studies, both the vegetation communities and the studies of the actual state of preservation are focused. The natural diversity of the coast is shown through some of the different features, either geomorphologic or of disturbance.

Globally speaking, the conservation of these coastal areas is not uniform. There are areas that are well preserved, while others are quite degraded.

The main factors of degradation are based not only on natural causes (wind strength and direction, sediment feed rate of the dune system and of the beach, among others) but also, and mainly, on anthropic causes explained by the increase of tourism throughout the year, building constructions, forest development and the consequences of previous attempts to stabilise the dunes with non-indigenous species.

KEYWORDS: Cartography, Dune systems, Flora, Vegetation.



## BIOCLIMATIC CHARACTERISATION OF A TERRITORY FOR THE CARTOGRAPHY OF VEGETATION SERIES

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The cartography of vegetation series is firstly based on the characterization of geologic, edaphic and, specially, bioclimatic factors.

The most used bioclimatic proposal around the world is the one of Rivas-Martínez (1994). In this proposal, different macrobioclimates and bioclimates are recognised, defined by bioclimatic indexes such as ombrothermic, thermic and continental indexes.

Frequently, when deciding to carry out a detailed bioclimatic study of a specific area, the number of meteorological stations is not enough. In order to avoid random extrapolations, a correlation study is performed with the main climatic and geographic (altitude, longitude and latitude) parameters. Sequentially, the necessary predictive equations are calculated. In this way, it is possible to obtain the climatic parameters and calculate the bioclimatic indexes.

With the bioclimatic indexes values, the ombrotype and thermotype maps are drawn. Based on these maps, a map of the vegetation series, that must be checked *in situ*, can be outlined.

As an example, this methodology was applied to the South-eastern Iberian Peninsula range, Sierra de Gádor.

The results obtained show the reliability of this method in the study area. Nevertheless, it seems necessary to make a correction when we deal with extreme values due to the influence of other factors, such as wind or edaphic dryness, not included in the correlation study.

**KEYWORDS:** Bioclimatology, Iberian Peninsula, Sierra de Gádor, Vegetation series.

## VEGETATION "ANALYSIS" IN LANDSCAPE DESIGN

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Planning and designing space is the goal of landscape architects and vegetation is their main material. Such space is designed as a programmed living system that needs to be constantly managed in order to accommodate human activities.

Landscape architects and garden designers have been using plants mainly for their aesthetic value, the ability to define space and integrate buildings, and for environmental reasons. So they combine species with landscape interest creating man made plant associations in order to meet their goals.

There are many ways of associating plants in landscape design. One can associate plants as elements of design or as functional and environmental realities. As objects or systems of design plants can be combined and composed by size/scale/volume, by layer, by form, by colour, by texture, by flowering period, by fragrance, by succession of aesthetic display throughout the year, by uniqueness, by fruit interest, by deciduous/non deciduous character, etc. As environmental realities plants can be associated as native communities, by microclimate value, by windbreak value, by pollution filter value, by growing rate, by lifecycle, by resilience, by ecological compatibility/adaptability, by hardiness, by wildlife value, by availability, by price, by meaning/reference value, etc. Usually one learns to use as many criteria as possible to get the right plant in the right place.

The Portuguese School of Landscape Architecture was grounded in the use of native vegetation communities (climax *Quercus* sp. associations), together with cultivated species relevant in the Portuguese context. It also followed a spatial model based on the establishment of contrasting vegetation zones where central glades of activity are surrounded by woodland edges for enclosure and protection (wood - edge - glade matrix).

In each zone plants are grouped according to their approximate size and ecological compatibility, establishing three major layers of vegetation: herbaceous layer, shrub layer and tree layer.

Herbaceous communities currently define the glade zone with the ability to withstand trampling and frequent cuts; here natural succession is constantly being interrupted in order to ease human use (grasslands, meadows, lawns).

The edge zone establishes the transition between the glade and the woodland defines space and promotes ecological and aesthetic diversity (ecotone). It is planted with several contrasting layers, starting with perennials and small shrubs in the foreground; medium sized shrubs in the middle ground and small trees, large shrubs and big trees in the background. The ecological succession is occasionally interrupted in each layer so that the formal composition may last. Native and exotic species are commonly associated, as this is the most visually exciting zone.

Finally, the woodland zone may occur as a major volume element where the climax stage is promoted. This is a protection zone planted with a mixture of pioneer and climax tree species with particular emphasis on riparian species. At ground level, shade tolerant herbaceous species are introduced. Here the association normally dominated by native species.

Today, landscape architects design plant associations mostly with ecological or cultural interest, using native exotic species. However, there is a growing tendency to use as much natives as possible, especially in the urban context. The

### THE GEOGRAPHER'S CONCEPT OF VEGETATION

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Geography as a scientific field of knowledge arised partly from the integrative vision of the world, presented by Humboldt in *Essay on the Geography of Plants* (1805).

Afterwards, the vegetation analysis into the geographical science was underdeveloped. The academic geographical approach of nature, also the regional studies, were essentially based on some branches of physical geography, mainly geomorphology and climatology. This evolution justified the well-known sentence of Joy Tivy, "Biogeography is the 'Cinderella' of Geography" (1971).

The presentation will not aim to explain the history of the lost opportunities of the Geography, in the natural vegetal domain, but rather to recognize what are nowadays the phytogeographical developments for a geographer, emphasizing two major tendencies.

The first involves methodological contributions within natural sciences or environmental disciplines, eg phytosociology and landscape ecology.

The second includes a specific geographical purpose, throughout vegetation analysis of territories, at different geographical and prehistorical/historical scales.

Some case studies of both tendencies will be presented.

### GALL-OAK GROVE CARTHOGRAPHIC STUDY IN THE SUBBETIC SIERRAS CORDOBESAS (ANDALUCIA, SPAIN)

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As a result of investigations that we have been developing concerning gall-oak groves in the South of the Iberian Peninsula, we have started the cartography of these formations in the Natural Park of the Subbetic Sierras Cordobesas (Province of Cordoba).

The studied territory is situated in the Subbetic-Maginsense biogeographic sector (Bética province). It is dominated by basic materials, limestone and limestone-dolomites and it presents as predominant thermotypes the meso- and supramediterranean, with ombrotypes ranging from dry to humid.

The vegetation is included in the new gall-oak vegetation series on deep soils and sub-humid ombrotype, as previously described by CANO & al (2000) from different territories of the Betic province; the climax formation is a gall-oak grove of *Viburno tini- Quercetum fagineae* Torre & Cano inéd., which presents two variants in the study area, the southernmost with *Quercus alpestris* and another, more mesophytic, with *Quercus broteroi*.

KEYWORDS: Cartography, Gall-oak, Subbetic-Manginsense sector, Vegetation.

CONTRIBUTION TO THE KNOWLEDGE OF AROMATIC AND/OR  
MEDICINAL PLANTS AT ARRÁBIDA NATURAL PARK

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The present work was made in order to survey the aromatic and/or medicinal plants, as well as those used in culinary, recognized at Arrábida Natural Park.

In the first stage of the work, an ethnobotanical survey was made. This survey was carried out through ethnobotanical interviews to resident populations near or inside the area of Arrábida Natural Park. The fieldwork was done from February to July 2001.

During the interviews, the informants were asked about the plants used for aromatic and/or medicinal purposes, their uses, vernacular names, the parts of the plant used, the condition (dried or fresh), the way the plant is used and prepared, the place where it is collected, the time of the year and the abundance in the area. After the identification of the plants with these properties, the phytosociological units and the *habitats* included in the 92/43/CEE Directive to which they belong were also recognized.

A total of 176 *taxa* with aromatic and/or medicinal properties, or used in culinary, were identified.

These *taxa* belong to 57 botanical families, being *Lamiaceae*, *Asteraceae*, *Rosaceae* and *Fabaceae* the most represented. Most of the identified *taxa* are spontaneous (68%), only a few are cultivated (26%) and a small number was introduced (6%).

The spontaneous *taxa* identified in the area belong mainly to the following phytosociological classes: *Stellarietea mediae* (22 *taxa*), *Quercetea ilicis* (16 *taxa*), *Artemisietea vulgaris* (15 *taxa*) and *Molinio-Arrhenatheretea* (14 *taxa*).

KEYWORDS: Aromatic and/or medicinal plants, Arrábida Natural Park, Ethnobotanical interviews, Phytosociological classes.

CLASSIFICATION AND DESCRIPTION OF BRITISH PLANT  
COMMUNITIES

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The UK National Vegetation Classification provides the first ever systematic and comprehensive classification of plant communities from all natural, semi-natural and major artificial habitats in the country. Funded by the state nature conservation agencies, it used a phytosociological approach to classify 33,000 newly-collected relevés, providing standardised accounts of the floristics and ecology of 293 associations.

The scheme, now published in five volumes, has been accepted as a standard by all wildlife, farming and forestry agencies, non-governmental organisations, corporate industries and environmental consultancies and provides a common language for the description and assessment of vegetation resources, habitat protection, vegetation management and monitoring, landscape restoration and design.

This paper will outline the concepts and methods of the NVC, provide examples of the results of the work and illustrate a range of applications that are of wider European significance.

**A CASE-STUDY OF MULTIVARIATE ANALYSIS IN APPLIED  
VEGETATION SCIENCE:  
MODELLING MANAGED MARITIME-PINE STANDS UNDERGROWTH  
VEGETATION COMPOSITION AND DIVERSITY IN RELATION TO  
ENVIRONMENTAL AND STRUCTURAL VARIABLES.**

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A case-study attempting to approach the patterns of species' composition and diversity of the undergrowth vegetation of maritime-pine (*Pinus pinaster* Ait.) stands, in relation to environmental factors and forestry practices, is presented. Due to its large area in the rural landscape, forestry-intensive stands still have to be approached as ecologically meaningful. The vegetation patterns in these forests arise mostly from human disturbance related to management along with interactions with natural succession processes. Furthermore, tradeoffs of stand vegetation with the overall landscape-mosaic [neighbouring mass effects] adds further degrees-of-freedom to the problem. Describing and modelling such vegetation patterns asks for powerful multivariate statistical tools, since the main environment-vegetation interactions are expected to be complex and intricate. Therefore, this case-study can be used as an illustration of contemporary classification, ordination and generalized linear models, as tools for describing vegetation patterns. Namely, the main flow of data treatment illustrate *minimum variance agglomerative clustering* [Ward's method], *iterative dichotomised hierarchical ordination* [TWINSPAN], *detrended correspondence analysis* [DCA], *partial canonical correspondence analysis* [PCCA] and *multiple linear discriminant analysis* [or *canonical variate analysis* - CVA]. Auxiliary techniques such as generalized linear models and exact Mann-Withney U-tests are also described.

Results suggest that stages in succession and their relation to management can be efficiently modelled. Furthermore, effects of management practices in seral stage establishment, transition and composition can be effectively isolated from those arising from endogenous natural factors. Thus, biodiversity-oriented management regimes can be set from the results. At the landscape level, results also show that certain mosaic patterns favour phenomena such as mass-effect [sink-source] in the pinewood seed-rain and therefore a great influence in undergrowth composition. Issues in landscape planning for forestry can also be drawn from the later.

**INVESTIGATION ON THE RELATIONSHIP BETWEEN DIVERSITY  
INDICES OF WOODY SPECIES AND GROWING STOCK IN NATURAL  
BEECH (*FAGUS ORIENTALIS*) SITES IN GUILAN (IRAN)**

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In order to determine the relationship between the biodiversity indices of woody species and the growing stock per hectare in natural beech (*Fagus orientalis*) forests in Asalem, twenty sites were studied.

Three plots were investigated in each site. The dimension of each plot was 50x100 meters, and the method of surveying was the one of selective sampling.

The obtained results have indicated that between the biodiversity indices and the growing stock per hectare there is a Linear relationship. The best equation was obtained from the relationship between the Shannon-Wiener function and the growing stock per hectare ( $r=0.90$ ).

**KEYWORDS:** Beech, Biodiversity indices of woody species, Growing stock, Natural forest stand.

THE PYRENEAN OAK (*QUERCUS PYRENAICA* WILLD.) IN THE ÉVORA  
REGION - ALTO ALENTEJO

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In this paper, we present the phytosociological behaviour of *Quercus pyrenaica* Willd. in the Serra de Monfurado.

Specifically, we present data on woodlands predominated by *Quercus pyrenaica* Willd. (associations *Arbuto unedonis-Quercetum pyrenaicae* and *Fraxino angustifoliae-Quercetum pyrenaicae*) and on the spiny mantle formations associated with those woodlands (associations *Lonicero hispanicae-Rubetum ulmifoliae* and *Clematido campaniflorae-Rubetum ulmifoliae*).

KEYWORDS: Alto Alentejo, Phytosociology, *Quercus pyrenaica*, Serra de Monfurado.

CATENAL PHYTOSOCIOLOGY

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Microgeosigmatum - Vegetation transects or microcatenas constituted by microsigmassociations, usually with reduced surface. They are delimited by exceptional microtopographic and edaphic features which, in a small piece of ground, cause numerous ecological niches and teselas, covered by non-stratified permanent plant communities whose dynamic balance seems to have been reached. Under these conditions, the reference to a mature plant community of the theoretic regional sigmeta is not possible or should be ambiguous.

In general, the microgeosigmatums are monostratum vegetation-types ordered in microcatenas according to their determinant mesologic features. The most auspicious biotopes for the microsigmetum development are the cliffs and rock crevices, bogs, snowdrifts, mobile dunes, shores of lakes and ponds, springs, etc.

The study of these neighbouring plant community complexes must be made within their geomorphologic and ecological limits, following the increasing degree of their causing ecological factor. For their hierarchic ordination (-etum, -ion, -etalia, -etea) it must be noted their biogeographic location, their bioclimatic peculiarities, as well as their statistical fidelity to the rest of communities also present in the microcatena, not to mention the possible vicariances with similar microcatenas in other territories.



syntaxonomic definition of habitats as the base for the protection of species within associations or as an expression of biodiversity through the evaluation of the associations for their own conservation as individual entities. The study of systematic entities, of their ecology and of their successional role is another practical use with an outstanding interest for the restoration of vegetation, involving such areas as forestry, agriculture, gardening, conservation, etc.

**CONTRIBUTION TO THE STUDY OF ORCHIDS IN THE "ALTO E BAIXO ALENTEJO" - II.**

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This presentation synthesises the observations made "in loco", between 1999 and 2002, in the Alto and Baixo Alentejo (Amieira, Portel, Viana do Alentejo e Vila Nova da Baronia), concerning the systematics, morphology and distribution of some orchid species.

The vegetation where the orchids were observed to occur belong to the phytosociologic classes *Quercetea ilicis*, *Calluno-Ulicetea*, *Molinio-Arrhenatheretea*, *Trifolio-Geranietea*, *Stipo giganteae-Agrostietea castellanae*, *Stellarietea mediae* and *Isoeto-Nanojuncetea*.

**KEYWORDS:** Alentejo, Conservation, Habitats, Orchids.

**LAURO AZORICAE-JUNIPERETEA BREVIFOLIAE CLASSIS NOVA INED.,  
A NEW VEGETATION CLASS FROM AZORES ISLAND**

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A new vegetation class endemic of Azores Islands, geovicariant of the canarian and maderean *Pruno hixae-Lauretea novocanariensis*, is proposed.

It includes evergreen mesoforests, dominated by plane and coriaceous persistent leaf trees, of relict paleotropical character, and permanent or subserial acicular nano(micro)forests or phanerophytic shrub communities.

It is present from a supralittoral infratempere submediterranean hiperoceanic (punctually thermomediterranean) humid to subhumid stage, to the supratempere hiperoceanic ultra-hiperhumid stage (in Pico Island).

**Proposed syntaxonomy**

LAURO AZORICAE-JUNIPERETEA BREVIFOLIAE classis nova ined.

+ *Ericetalia azoricae* Lüpnitz 1975

\* *Culcito macrocarpae-Juniperion brevifoliae* Sjögren ex Lüpnitz 1975

\*\* *Culcito macrocarpae-Juniperion brevifoliae* suball. nova ined.

*Cerastio vulgare-Juniperetum brevifoliae* Lüpnitz 1975 corr.

*Daphno-Ericetum azoricae* Lüpnitz 1975

\*\* *Pteridio aquilini-Ericenion azoricae* suball. nova ined.

*Festuco petraeae-Coremetum azoricae* ass. nova ined.

*Pteridio aquilini-Ericetum azoricae* ass. nova ined.

\* *Myrico fayae-Pittosporion undulati* Lüpnitz 1976

*Carici hochstetterianae-Picconietum azoricae* ass. nova ined.

*Hedychio gardnerani-Pittosporium undulati* Lüpnitz 1976

\* *Dryopterido azoricae-Laurion azoricae* all. nova ined.

*Dryopterido azoricae-Lauretum azoricae* ass. nova ined.

*Woodwardio radicans-Prunetum azoricae* ass. nova ined.

**KEYWORDS:** Azores Islands, *Laurisilva*, Syntaxonomy, Vegetation.

**APPROACHES TO VEGETATION ANALYSIS: AN OVERVIEW**

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The first attempts to describe vegetation units from a repeating floristic composition, including a quantitative indication for its components and referring to a specific, uniform, ecologic environment, are dated from the XIX century and the beginning of the XX century.

Phytosociology, as the science of vegetation, is almost one hundred years old. Its starting point was the definition of association approved in the International Botanical Congress of Brussels in 1910 and the nomenclatural standards included in the current International Code of Phytosociologic Nomenclature. During these one hundred years, significant advances have been produced in the knowledge of vegetation, including epistemologic developments, with several new approaches and applications in Phytosociology.

Science is currently experiencing an intense moment, as part of a general evolution process that is affecting numerous aspects of present societies. Phytosociology is aware of this evolution and faces a multitude of perspectives. Many of the new approaches have already known some development, with visible results; other approaches are still at their first steps, but will soon produce some data. The objective of this presentation is precisely to revise the tendencies and the new approaches within Phytosociology.

Europe is clearly the most studied territory in terms of phytosociologic assessment. The estimated total number of relevés performed in this continent is of 1-2 millions, though not all of these are published. With this analytic intensity, the systematic study of vegetation based on vascular plants is getting closer to be complete. New systematic perspectives turn to new territories and to vegetation types predominated by bryophytes, lichens and algae. On the other hand, most of the available information is not gathered or evaluated by means of general revisions, so it becomes necessary to work more deeply on the elaboration of global syntaxonomic schemes, either for territories, or for specific systematic groups. These synthetic tasks must involve the correct use of the International Code of Phytosociologic Nomenclature, and so syntaxonomic work to be developed in new areas should also be aware of nomenclatural rules.

The study of vegetation from a successional perspective started 25 years ago. Since then, this approach has been largely developed as a synthetic way of expressing vegetation, based on climatic communities. On the one hand, this form of analysis has been complemented by the catenal concepts and a synthetic catenal dynamic approach has been developed for landscape definition and classification. This landscape analysis approach proved to be more powerful than many other landscape interpretation methods, which were more subjective and inaccurate. On the other hand, the consideration of vegetation series individually or integrated in catenas correlated to environmental gradients has simplified cartographic procedures, allowing researchers to work at smaller scales within larger territories.

Application is the ultimate goal of Phytosociology. The advances in the concepts, methods and results of Phytosociology allow its use in very diverse areas, something that has been demonstrated in these last few years. Phytosociology is a precise instrument for Nature Conservation due to its diagnostic capacity and to the possibility of performing territorial evaluation. The study and conservation of biodiversity is currently one of the most important and urgent tasks in biology, and, in this regard, Phytosociology will play a valuable role, either through the

**MESOTROPHIC MIXED WOODLANDS OF NORTHWEST PORTUGAL :  
A CONTRIBUTION TO THE STUDY OF THE PULMONARIO  
LONGIFOLIAE-QUERCION ROBORIS ALLIANCE**

Isabel da ROCHA<sup>1</sup>, João TORRES<sup>1</sup>, Paulo ALVES<sup>1</sup>, João HONRADO<sup>1,2</sup>, S.  
ORTIZ<sup>3</sup> & F. BARRETO CALDAS<sup>1,2</sup>

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Deciduous, generally climatophilous woods, typical of temperate areas, belong to class *Quercio-Fagetea*. Within this class, meso-eutrophic woods were classically enclosed in the alliance *Carpinion*, within the order *Fagetalia*.

Presently, Iberian meso-eutrophic mixed woodlands are included in the recently described alliance *Pulmonario longifoliae-Quercion roboris*. This alliance comprises thermo-mesotemperate deciduous mesophytic oak- or mixed forests with mostly cantabro-atlantic and pyrenean distribution.

Meso-eutrophic mixed woods are established in the bottom of steep slopes. These biotopes are characterised by moist, nutrient-rich, well developed soils. One of the main features of these woodlands is the unusual diversity of tree species, which strikingly contrasts with the usually small number of canopy species of the remnant types of deciduous woods of Northern Iberian Peninsula. Another remarkable feature is the peculiar group of paleoclimatic relicts from the Tertiary, absent in other European mixed forests.

We performed a study of mixed woodlands in the low to mid altitude territories in the Northwest of Portugal. Our main goal was to assess the syntaxonomic position of these woodlands. The study was performed according to the Phytosociological approach.

Studied woodlands are dominated by *Quercus robur* and several other tree species, like *Corylus avellana* and *Fraxinus angustifolia*. In the herb layer, meso-eutrophic species like *Helleborus foetidus*, *Phyllitis scolopendrium* and *Veronica montana* can be found.

Deciduous woodlands are nowadays very rare because many areas are used for agricultural and grazing purposes. Mixed woodlands in the narrow valleys are therefore more naturally protected. These woodlands should be protected for they present high species diversity and possess species that are nowadays rare in Portugal.

**KEYWORDS:** Mixed woodlands, Northwest Portugal, Phytosociology, *Pulmonario-Quercion roboris*.

Abstracts of Main Papers

**RELICT VEGETATION OF MOUNTAIN SUMMITS OF NORTHWEST  
IBERIAN PENINSULA: GRASSLANDS OF *FESTUCA SUMMILUSITANA*  
FRANCO & ROCHA AFONSO**

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The object of this study is the plant communities that thrive in large crevices with shallow soil in rocky environments (granite and schists), at the summits of the interior mountains of Galicia and its surroundings. Despite the little distance and interconnection among these territories, they are included in different biogeographic units: in the Eurosiberian region they belong to the Juresiano-Queixensian subsector (Galaico-Portuguese Sector of the Cantabro-Atlantic Province) and to the Ancarensian subsector (Laciano-Ancarensian Sector of the Orocantabric Province); in the Mediterranean region, they are included in the Orensano-Sanabrenian sector (in the Carpetano-Leonese province).

These mountain communities develop under especially hostile environments for plants (extreme temperatures, xeric soils, solar irradiation, winds, etc.). That is why the taxa belonging to these environments are truly survival specialists in the peaks. There is a great uniformity in the flora of the relevés made in these mountains for this study.

The communities we here introduce includes numerous northwest-iberian endemics of siliceous soils (*Festuca summilusitana*, *Dianthus langeanus*, *Ornithogalum concinnum*, *Phalacrocarpum oppositifolium*, *Armeria* sp., etc.). The presence of *Festuca summilusitana* and the ecology of the community suggests that it is a relict from pliocenic cold ages that found shelter in the open and windy outcrops of these peaks or of lower summits. This origin must be shared by similar communities with species of *Festuca*, which are present in the high peaks of the carpetano-leonesian mountains or their surrounding areas that were submitted to cold continental climates. With this in mind, it is possible to think in a parallel residual condition (likely to disappear) in mountains with Atlantic and Mediterranean climates. Possible disappearance would be due, on the one hand, to the increase of the oceanic character; on the other hand, to an increase of the Mediterranean character.

The new association proposed is *Diantho langeani-Festucetum summilusitanae*, subordinated to the class *Festucetea indigestae* Goday & Rivas-Martínez 1971, that gathers the mountain siliceous vegetation from the western Mediterranean, and, inside it, in the alliance *Hieracio castellani-Plantaginion radicatae* Rivas-Martínez & Cantó 1987. We recognise two sub-associations depending on substrate type. On granites, sub-association *ranunculetosum nigrescentis*, with different variants that respond to oceanicity-continentality (var. *Thymus caespitius*, var. *Cytisus oromediterraneus*); on schists, sub-association *armerietosum*, with two variants according to its degree of evolution.

**KEYWORDS:** *Festucetea indigestae*, Mountain vegetation, Northwest Iberian Peninsula, Relict vegetation.

33.  
A. RODRÍGUEZ TORRES (Consejería de Agricultura y Medio Ambiente), C. PINTO-GOMES (Univ. Évora), L. RUIZ, M. MELENDO (Univ. Jaén), S. MENDES (Univ. Évora), A. CANO ORTIZ, R. J. MONTILLA & E. CANO (Univ. Jaén):  
**PERENNIAL GRASSLANDS WITH *CORYNEPHORUS CANESCENS*  
FROM THE SANDY AREAS OF THE TOLEDANO-TAGANO  
SECTOR**

34.  
Ronaldo Adelfo WASUM, Luciana SCUR, Adelaide KEGLER, Alindo BUTZKE (Universidade de Caxias do Sul - RS), Angel PENAS MERINO (Univ. León) & Juçara BORDIN (Univ. Caxias do Sul):  
**CONTRIBUTION TO THE FLORISTIC CATALOGUE OF THE  
FERNS OF THE CITIES OF SÃO FRANCISCO DE PAULA,  
JAQUIRANA, CAMBARÁ DO SUL AND BOM JESUS - RIO  
GRANDE DO SUL -BRAZIL**

24.  
M. H. NOVAIS, R. PAIVA-FERREIRA (Univ. Évora), I. SANTOS (Parque Natural da Arrábida) & S. MENDES (Univ. Évora):

CONTRIBUTION TO THE KNOWLEDGE OF AROMATIC AND/OR MEDICINAL PLANTS AT ARRÁBIDA NATURAL PARK)

25.  
Iraj Hassanzad NAVROODI (Univ. Iran) & Pirooz AZIZI (Tehran Univ.):

INVESTIGATION ON THE RELATIONSHIP BETWEEN DIVERSITY INDICES OF WOODY SPECIES AND GROWING STOCK IN NATURAL BEECH (*FAGUS ORIENTALIS*) SITES IN GUILAN (IRAN)

26.  
Marízia Menezes Dias PEREIRA (Univ. de Évora), José Carlos COSTA (Instituto Superior de Agronomia):  
THE PYRENEAN OAK (*QUERCUS PYRENAICA* WILLD.) IN THE ÉVORA REGION - ALTO ALENTEJO

27.  
Marízia Menezes Dias PEREIRA, Rute F. Moleiro CARAÇA & Cristina I. C. CARRIÇO (Univ. de Évora):  
CONTRIBUTION TO THE STUDY OF ORCHIDS IN THE "ALTO E BAIXO ALENTEJO" - II.

28.  
S. RIVAS-MARTÍNEZ (Phytosociological Research Center), M. LOUSÃ (Instituto Superior de Agronomia), F. PRIETO (Univ. Oviedo), J. C. COSTA (Instituto Superior de Agronomia), E. DIAS (Univ. Açores) & C. AGUIAR (Escola Superior Agrária de Bragança):  
*LAURO AZORICAE-JUNIPERETEA BREVIFOLIAE CLASSIS NOVA INED.*, A NEW VEGETATION CLASS FROM AZORES ISLAND

29.  
Isabel da ROCHA, João TORRES, Paulo ALVES, João HONRADO (Univ. Porto), S. Ortiz (Univ. Santiago de Compostela) & F. BARRETO CALDAS (Univ. Porto):  
MESOTROPHIC MIXED WOODLANDS OF NORTHWEST PORTUGAL: A CONTRIBUTION TO THE STUDY OF THE *PULMONARIO LONGIFOLIAE-QUERCION ROBORIS* ALLIANCE

30.  
Íñigo PULGAR SAÑUDO & Jesús IZCO SEVILLANO (Univ. de Santiago de Compostela):  
RELICT VEGETATION OF MOUNTAIN SUMMITS OF NORTHWEST IBERIAN PENINSULA: GRASSLANDS OF *FESTUCA SUMMILUSITANA* FRANCO & ROCHA AFONSO

31.  
Luciana SCUR, Ronaldo Adelfo WASUM, Adelaide KEGLER, Alindo BUTZKE (Univ. Caxias do Sul - RS), Angel PENAS MERINO (Univ. León), Elton BOLDO (Univ. Caxias do Sul):  
CONTRIBUTION TO THE FLORISTIC CATALOGUE OF THE VEGETATION OF THE FIELDS OF THE CITY OF CAXIAS DO SUL (RIO GRANDE DO SUL - BRAZIL)

32.  
Ana SÉNECA & Cristiana VIEIRA (Univ. Porto):  
PRELIMINARY APPROACH TO THE BRYOFLORE OF THE VALLEY OF RIVER FERREIRA

CONTRIBUTION TO CATALOGUE FLORISTIC OF THE VEGETATION OF THE FIELDS OF THE CITY OF CAXIAS DO SUL. (RIO GRANDE DO SUL-BRAZIL)

Luciana SCUR<sup>1</sup>; Ronaldo Adelfo WASUM<sup>1</sup>; Adelaide KEGLER<sup>1</sup>; Alindo BUTZKE<sup>1</sup>; Angel PENAS MERINO<sup>2</sup>; Elton BOLDO<sup>3</sup>

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With the objective of studying the grassland formations, a group of researchers has been working, since 1999, on phytosociologic studies of the herbaceous formations associated to cattle raising around the City of Caxias do Sul, Rio Grande do Sul. The elaboration of a floristic catalogue of the studied area is essential for this research. The object of this work is the presentation of the current state of the collection. The material for the elaboration of this catalogue was obtained through field trips in the period from 1999 to 2002. The specimens were included in the Herbarium of the University of Caxias do Sul - HUCS, which, at the same time, was used as a consultation source.

Until the present moment, we have collected and determined more than 1200 specimens, resulting in the determination of approximately 700 taxa. The following families are presented: *Acanthaceae*, *Amaranthaceae*, *Caryophyllaceae*, *Cyperaceae*, *Fabaceae*, *Iridaceae*, *Labiatae*, *Malvaceae*, *Melastomataceae*, *Onagraceae*, *Polygalaceae*, *Scrophulariaceae*, *Umbelliferae* and *Verbenaceae*, among others. A great number of species of families *Asteraceae* and *Gramineae* were also determined.

The state of Rio Grande do Sul is of great floristic importance because of the contact between tropical and temperate macro-bioclimate. The City of Caxias do Sul is located in the North-eastern region of the state of Rio Grande do Sul, approximately between the meridians 55°30' and 51°00' East and the parallels 28°15' and 29°30' South, with predominance of Semi-humid Tropical climate, with altitudes between 100 and 900 meters a.s.l.

The final objective of this study is the phytosociologic characterisation of the grassland formations of this area, with an original vegetation characterised by the presence of *Araucaria angustifolia*, intercalated by fields, receiving the denominations of "Mixed Ombrophylous Forest" ("Floresta Ombrófila Mista") and of "Grasslands of the Mountain Top" ("Campos de Cima da Serra"), respectively.

KEYWORDS: Fields, Floristic Catalogue, Grassland formations, Phytosociology.



**PRELIMINARY APPROACH TO THE BRYOFLORA OF THE VALLEY OF FERREIRA RIVER**

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The study of the bryoflora of the valley of Ferreira river represents an important contribution to the knowledge on the floristic composition of the Douro Litoral (Northwest Portugal), given the lack of information for this area and the important roles of bryophytes in ecological processes.

Listed bryophytes thrive in all types of vegetation communities and play an essential role in soil fixation, humus accumulation and water retention in the valley ecosystems, especially in pioneer succession stages.

This valley is located in the Miniense Litoral biogeographic district (Galaico-Português sector) and represents a considerable part of the *Natura 2000* Site "Valongo".

With some peculiar geologic characteristics, such as the narrow shape of the valley and the presence of ancient gold mines, this valley includes a set of particular habitats that enable the establishment of a very diversified bryoflora.

With the purpose of continuing and updating the work initiated in the XIX century by Isaac Newton, new collections of bryophytes were made in the area and bibliographical references about the bryoflora of the valley were revised.

This work led to the identification of 126 species, of which 57 are new to the area and 16 are new to Douro Litoral. We also identified 8 species rare in Portugal and 4 taxa considered vulnerable.

In this poster, we report data from this study, as well as the correlations between bryophyte composition, valley characteristics and the conservation state of the vegetation.

**KEYWORDS:** Bryoecology, Bryoflora, Conservation, Valongo.

16. Adelaide KEGLER, Ronaldo Adelfo WASUM, Luciana SCUR (Univ. Caxias do Sul – RS), Angel PENAS MERINO (Univ. León), Alindo BUZTKE & Rosângela MOLON (Univ. Caxias do Sul – RS):

**CONTRIBUTION TO THE FLORISTIC CATALOGUE OF SUCCESSION STAGES OF THE DECIDUOUS SEASONAL FOREST AND OF THE MIXED OMBROPHYLOUS FOREST IN THE CITY OF CAXIAS DO SUL, RIO GRANDE DO SUL (BRAZIL)**

17. Susana LAMAS (Univ. do Porto) Paulo ALVES<sup>2</sup>, João HONRADO (Unidade de Genética e Ecologia Vegetal- CIBIO/ICETA – Univ. do Porto) & Helena SILVA (Departamento de Biologia da Univ. de Aveiro. / Centro de Biologia Celular, Univ. de Aveiro):

**STUDY, IDENTIFICATION AND CARTOGRAPHY OF DOMINANT HELOPHYTIC COMMUNITIES IN SALREU AND CANELAS COASTAL WETLANDS**

18. Jean-Jacques LAZARE & Karine LANNIEL (Centre d'Etude et Conservation des Ressources Végétales – CECRV):

**INTEGRATED PHYTOSOCIOLOGICAL STUDY OF THE BASQUE COASTAL CLIFFS (PYRÉNÉES-ATLANTIQUES, FRANCE)**

19. E. MARAVALHAS, P. GARCIA-PEREIRA (Univ. Autónoma de Madrid), J. HONRADO (Univ. do Porto) & C.F. AGUIAR (Escola Superior Agrária de Bragança):

**THE ROLE OF PLANTS IN THE CONSERVATION OF OLIGOPHAGOUS *RHOPALOCERA* (LEPIDOPTERA: HESPERIOIDEA & PAPILIONOIDEA)**

20. Rosalinda Martins MARRÃO (Quinta do Couto), Paula Cristina Cardoso GONÇALVES (Reserva Natural da Serra da Malcata), Maria Raquel Bento Rainho CALDEIRA (Escola Superior Agrária de Castelo Branco) & Francisco Castro REGO (Instituto Superior de Agronomia):

**LANDSCAPE DYNAMICS ANALYSIS AT SERRA DA MALCATA NATURE RESERVE**

21. S. MENDES, R. PAIVA-FERREIRA, A. GIL, A. PAIVA, C. RIBEIRO, R. TELES & R. DOMÍNGUEZ (Univ. Évora):

**VEGETATION CARTOGRAPHY OF DUNE SYSTEMS BETWEEN TRÓIA AND SINES**

22. Francisco GÓMEZ MERCADO, Javier NAVARRO PASTOR & Esther GIMÉNEZ LUQUE (Univ. Almería):

**BIOCLIMATIC CHARACTERISATION OF A TERRITORY FOR THE CARTOGRAPHY OF VEGETATION SERIES**

23. R. J. MONTILLA (Univ. Jaén), R. PAIVA-FERREIRA (Univ. Évora), M. MELENDO, L. RUIZ, A. CANO ORTIZ, F. M. MARCHAL, J. A. TORRES & E. CANO (Univ. Jaén):

**GALL-OAK GROVE CARTOGRAPHIC STUDY IN THE SUBBETIC SIERRAS CORDOBESAS (ANDALUCIA, SPAIN)**

9.  
Sara CLETO, Nilsa SILVA (Faculdade de Ciências da Univ. do Porto), Ana SÉNECA & João HONRADO (Unidade de Genética e Ecologia Vegetal - CIBIO/ICETA / Univ. do Porto):  
**EXPLORING THE ANALYTIC AND DIDACTIC POTENTIAL OF HIGH-MAGNIFICATION IMAGING IN PHYTOSOCIOLOGY: EXAMPLES FROM THE VEGETATION OF TRAMPLED BIOTOPES (CLASS *POLYGONO-POETEA ANNUAE*)**
10.  
Rafael CONDE-ÁLVAREZ, Olga COMINO, Juan L. DÍAZ & José M<sup>a</sup> NIETO (Univ. Málaga):  
**BOTANICAL EVALUATION OF THE MAIN WETLAND FROM WESTERN ANDALUSIA (SPAIN)**
11.  
Marcelino DEL ARCO, Wolfredo WILDPRET, Pedro-Luis PÉREZ, Octavio RODRÍGUEZ, Juan-Ramón ACEBES, Antonio GARCÍA, Victoria-Eugenia MARTÍN, Jorge-Alfredo REYES, Marcos SALAS, Juan-Antonio BERMEJO, María-Victoria CABRERA, Sara GARCÍA, Ricardo GONZÁLEZ & Agustín DÍAZ (Univ. La Laguna):  
**VEGETATION MAP OF GRAN CANARIA (CANARY ISLANDS). E 1:25,000**
12.  
Helena HESPAHOL, Cristiana VIEIRA, Ana SÉNECA, João HONRADO & F. BARRETO CALDAS (Univ. Porto):  
**BRYO-PTERIDOPHYTIC EPIPHYTIC COMMUNITIES IN THE PENEDA-GERÊS NATIONAL PARK (NORTHWEST PORTUGAL)**
13.  
André HOELZER (Univ. Bremen) & Carlos AGUIAR (Escola Superior Agrária de Bragança):  
**CONTRIBUTION TO THE KNOWLEDGE OF THE FLORA AND VEGETATION OF THE LOWER COURSE OF SABOR RIVER**
14.  
Roberto JARDIM (Jardim Botânico da Madeira), Miguel SEQUEIRA (Univ. Madeira), Jorge CAPELO (Estação Florestal Nacional - INIA), C. AGUIAR (Escola Superior Agrária de Bragança), José C. COSTA, Dalila ESPÍRITO-SANTO & Mário LOUSÁ (Instituto Superior de Agronomia):  
**COASTAL VEGETATION OF PORTO SANTO ISLAND (ARCHIPELAGO OF MADEIRA).**
15.  
Roberto JARDIM (Jardim Botânico da Madeira), Miguel SEQUEIRA (Univ. Madeira), Dalila ESPÍRITO-SANTO (Instituto Superior de Agronomia), Jorge CAPELO (Estação Florestal Nacional - INIA), Carlos AGUIAR (Escola Superior Agrária de Bragança), Mário LOUSÁ & José C. COSTA (Instituto Superior de Agronomia):  
**LINO STRICTI-STIPETUM CAPENSIS, ASS. NOVA INED. AND VICIO COSTEI-ECHIETUM PLATAGINI, ASS. NOVA INED., TWO NEW SEMI-NITROPHILIC ASSOCIATIONS FROM PORTO SANTO ISLAND (ARCHIPELAGO OF MADEIRA)**

**PERENNIAL GRASSLANDS WITH *CORYNEPHORUS CANESCENS* FROM THE SANDY AREAS OF THE TOLEDANO-TAGANO SECTOR**

A. RODRÍGUEZ TORRES<sup>1</sup>, C. PINTO-GOMES<sup>2</sup>, L. RUIZ<sup>3</sup>, M. MELENDO<sup>3</sup>, S. MENDES<sup>2</sup>, A. CANO ORTIZ<sup>3</sup>, R.J. MONTILLA<sup>3</sup> & E. CANO<sup>3</sup>

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The Toledano-Tagano biogeographic sector is a wide territory that comprises the valleys of the rivers Tagus, Tietar, Guayerbas, etc..

These territories present siliceous-sandy soils from the erosion of granite of the nearby mountains. The territory presents a predominant mesomediterranean thermotype and a dry to sub-humid ombrotype.

The climax vegetation is the psammophilic variant of the *Sanguisorbo-Quercetum suberis*, which is very degraded in the form of "montados"; subseral scrubs with *Adenocarpus aureus* are frequent, and also the rockrose scrub of *Halimio ocymoidis-Halimietum commutati*.

In open areas among the scrubs, annual grasslands of *Malcomietalia* are frequent as well as perennial grasslands with *Corynephorus canescens*, *Sesamoides purpurascens*, *Corrigiola telephiipholia*, etc., that we are studying at the moment and are probably distinct as a new association within the class *Koelerio-Corynephoretea*.

KEYWORDS: Biogeography, Grassland, Sand, Toledano-Tagano sector.

**CONTRIBUTION TO THE FLORISTIC CATALOGUE OF THE FERNS OF THE CITIES OF SÃO FRANCISCO DE PAULA, JAQUIRANA, CAMBARÁ DO SUL AND BOM JESUS-RIO GRANDE DO SUL - BRAZIL**

Ronaldo Adelfo WASUM<sup>1</sup>, Luciana SCUR<sup>1</sup>, Adelaide KEGLER<sup>1</sup>, Alindo BUTZKE<sup>1</sup>, Angel PENAS MERINO<sup>2</sup> & Juçara BORDIN<sup>3</sup>

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The state of the Rio Grande do Sul is of great floristic importance because of the contact between tropical and tempered macrobioclimates.

For this reason, phytosociologic studies have been performed in the North-eastern region of the state since the year 1999.

The elaboration of a floristic catalogue of the area in question is essential for that research. The object of the present work is the presentation of the actual state of collection.

The material for the elaboration of this catalogue was obtained through field trips in the period from 1999 to 2002. The specimens were included in the Herbarium of the University of Caxias do Sul-HUCS, which, at the same time, was used as a consultation source.

Until now, more than 200 specimens of ferns were collected and determined, resulting in the detection of approximately 80 taxa.

Here, we present data for 20 different families, distinguishing the *Aspleniaceae*, with 14 species, and the genus *Asplenium* L., with 13 species. The *Polypodiaceae* are represented by nine species.

Furthermore, we also found several species of *Blechnaceae*, *Dicksoniaceae*, *Dryopteridaceae*, *Hymenophyllaceae*, *Lycopodiaceae* and *Pteridaceae*, among others, and, within the *Ophioglossaceae*, the rare *Botrychium virginianum* (L.) Sw. (with only one reference of collection in 1930 for the region) and associations with the "xaxins" (*Dicksonia sellowiana* Hooker), an endangered species because of economic exploitation.

**KEYWORDS:** *Dicksoniaceae*, Ferns, Floristic Catalogue, Phytosociology.

**LIST OF POSTERS**

1. Anabela AMADO (Parque Natural do Douro Internacional). & Carlos AGUIAR (Escola Superior Agrária de Bragança) :  
*SILENO DURIENSIS-APHYLLANTHETUM MONSPELIENSIS: A NEW ROSMARINETEA ASSOCIATION FROM NORTHEAST PORTUGAL*

2. João Domingues de ALMEIDA (Univ. de Coimbra):  
*FLORA AND VEGETATION OF BEIRA-DURIENSE MOUNTAINS - 1<sup>ST</sup> APPROACH*

3. Alfredo ASENSI, Blanca DíEZ-GARRETAS, Olga COMINO & Juan Luis DíAZ ARAGÓN (Univ. de Málaga):  
*CARTOGRAPHY AND EVALUATION OF THE HABITATS IN THE EAST ALMERIAN MOUNTAINS (SOUTH-EAST SPAIN)*

4. Asun BERASTEGI (Gestión Ambiental. Viveros y Repoblaciones de Navarra, S.A.), Ainhoa DARQUISTADE & Juan Antonio Campos (UPV/EHU):  
*CANTABRIAN-BASQUE SUPRATEMPERATE GRASSLANDS OF AGROSTIS CURTISII: CHARACTERISATION AND PHYTOSOCIOLOGIC POSITION*

5. Raquel CALDEIRA (Escola Superior Agrária de Castelo Branco) & Helena FREITAS (F.C.T.U.C.):  
*LANDSCAPE EVOLUTION IN A MOUNTAIN AGRO-SYSTEM*

6. E. CANO(Univ. Jaén), A. RODRÍGUEZ-TORRES (Cosejería de Agricultura y Medio Ambiente), L. RUIZ, M. MELENDO, A. GARCIA-FUENTES, J. A. TORRES, C. SALAZAR (Univ. Jaén) & C. PINTO-GOMES (Univ. de Évora):  
*PRESENCE OF A STIPA TENACISSIMA COMMUNITY IN TOLEDO TERRITORIES*

7. Jorge CAPELO (Estação Florestal Nacional - INIA), Roberto JARDIM (Jardim Botânico da Madeira), Miguel SEQUEIRA (Univ. Madeira), José C. COSTA, Dalila ESPÍRITO-SANTO, Mário LOUSÁ (Instituto Superior de Agronomia) & Carlos AGUIAR (Escola Superior Agrária de Bragança):  
*CAULIROSETTED COMMUNITIES FROM MADEIRA ISLAND: ISOPLEXIDO SCEPTRI-EUPHORBIAETUM MELLIFERAE, ASS. NOVA INED.*

8. Jorge CAPELO (Estação Florestal Nacional - INIA), Roberto JARDIM (Jardim Botânico da Madeira), Miguel SEQUEIRA (Univ. Madeira), José C. COSTA, D. ESPÍRITO-SANTO, Mário LOUSÁ (Instituto Superior de Agronomia) & Carlos AGUIAR (Escola Superior Agrária de Bragança):  
*DIPLAZIO CAUDATI-PEERSEETUM INDICI, ASS. NOVA INED. AND RHAMNO GLANDULOSI-SAMBUCETUM LANCEOLATI, ASS. NOVA INED.: TWO NEW HYGROPHILIC FORES ASSOCIATIONS FROM MADEIRA ISLAND.*

List of Posters

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12:30 Jianming YANG & Xingyu YANG (Hubei University, Wuhan,  
China)  
*Studies on Buried Wood of Metasequoia Glyptostrobooides, Central  
China*

12:45 Discussion

13:00 Lunch break

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*Session 4: Portuguese Natural Vegetation*

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15:00 João HONRADO (Universidade do Porto, Portugal)  
*Northwest Portugal*

15:15 Carlos AGUIAR (Escola Superior Agrária de Bragança, Portugal)  
*Northeast Portugal*

15:35 Carmo LOPES (Escola Superior Agrária de Coimbra, Portugal)  
*Western limestone mountains*

15:50 José Carlos COSTA (Instituto Superior de Agronomia, Lisboa,  
Portugal)  
*Central Portugal and Alentejo*

16:15 Carlos PINTO-GOMES (Universidade de Évora, Portugal)  
*Barrocal and Algarve*

16:35 Discussion

16:45 Coffee break

17:00 Eduardo DIAS (Universidade dos Açores, Portugal)  
*Azores Islands*

17:25 Miguel MENEZES DE SEQUEIRA (Universidade da Madeira,  
Portugal)  
*Madeira Islands*

17:50 Discussion

18:00 Closing session

ALFA and AEFA general meetings

Day 5 (Sunday, 15th September 2002)

8:30 Extra-programme: Touristic boat excursion in Douro River.



**Day 3 (Friday, 13<sup>th</sup> September 2002)**

8:00 Geobotanical excursion to the "Alto Minho" (North-west Portugal)

**Day 4 (Saturday, 14<sup>th</sup> September 2002)**

**Session 3: Case-studies in Vegetation Science (Oral presentations)**

- 9:00 N. BADMAEV, M. KULIKOV & N. BADMAEVA (The Buryat State Agricultural Academy, Russia)  
*About a Quantitative System of Soil Type and Vegetation Recognition of the Cryoaridic Hollows in Transbaikalye*
- 9:15 Eduardo MARTÍNEZ CARRETERO & Fidel A. ROIG (IADIZA, Argentina)  
*Vegetation Landscape of the Payunia Phytogeographic Province, Argentina*
- 9:30 Casildo FERRERAS CHASCO & María Manuela REDONDO GARCIA (Universidad Complutense de Madrid, Spain)  
*Birch Woodlands in the Upper Slopes of the Canencia River Bassin, Madrid (Spain)*
- 9:45 Juan Antonio BERMEJO DOMÍNGUEZ, Pedro Luis PÉREZ DE PAZ, Marcelino José DEL ARCO AGUILAR & Jorge Alfredo REYES BETANCORT (Universidad de La Laguna, Tenerife, Spain)  
*The Use of Geographical Information Systems in Vegetation and Physical Environment Analysis in the Municipality of Villa de Mazo (La Palma – Islas Canarias)*
- 10:00 María Manuela REDONDO GARCIA & Casildo FERRERAS CHASCO (Universidad Complutense de Madrid, Spain)  
*Vegetation Analysis of the San Juan Lake and its Surroundings*
- 10:15 Discussion
- 10:30 3<sup>rd</sup> poster session
- 11:00 Coffee break

**Session 3 (cont.)**

- 11:30 R. PAIVA-FERREIRA (Univ. Évora, Portugal), N. GOMES (Univ. Independente, Lisboa, Portugal), C. PINTO-GOMES (Univ. Évora, Portugal) & N. MIRA (Univ. Independente, Lisboa, Portugal)  
*An Integrated Methodology for the Management and Conservation of Dune Systems in the "Arco Tróia-Sines"*
- 11:45 L. RUIZ, M. MELENDO, A. CANO-ORTIZ, R.J. MONTILLA, C. SALAZAR & E. CANO (Universidad de Jaén, Spain)  
*Optimising Crops through Bioclimatic Studies*
- 12:00 Alexander SIZYKH (Institute of Geography SB RAS, Irkutsk, Russia)  
*Plant Communities of Taiga-Steppe Contact on the Western Shore of Lake Baikal*
- 12:15 Ronaldo Adelfo WASUM (Univ. Caxias do Sul - RS, Brazil), Luciana SCUR (Univ. Caxias do Sul - RS, Brazil), Adelaide KEGLER (Univ. Caxias do Sul - RS, Brazil); Alindo BUTZKE (Univ. Caxias do Sul - RS, Brazil); Angel PENAS MERINO (Univ. León, Spain) & Juçara BORDIN (Univ. Caxias do Sul - RS, Brazil)  
*Contribution to the Floristic Catalogue of the Ferns of the Cities of São Francisco de Paula, Jaquirana, Cambará do Sul and Bom Jesus-Rio Grande do Sul - Brazil*

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**Day 1 (Wednesday, 11<sup>th</sup> September 2002)**

15:00 Reception at the Meeting place

**Day 2 (Thursday, 12<sup>th</sup> September 2002)**

9:30 Opening session

10:00 Conference by Prof. Jesús IZCO SEVILLANO  
(Universidad de Santiago de Compostela, Spain)  
*Approaches to Vegetation Analysis: an Overview*

10:45 1<sup>st</sup> poster session

11:15 Coffee break

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**Session 1: Approaches to Vegetation Analysis (I)**

11:30 Conference by Prof. Salvador RIVAS-MARTÍNEZ  
(Universidad Complutense de Madrid, Spain)  
*Recent Advances in Phytosociology: Catenal Phytosociology*

12:15 Conference by Eng<sup>o</sup> Jorge Henrique CAPELO  
(Estação Florestal Nacional - I.N.I.A. – Lisboa, Portugal)  
*A Case-study of Multivariate Analysis in Applied Vegetation  
Science*

13:00 Lunch break

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**Session 2: Approaches to Vegetation Analysis (II)**

15:00 Conference by Prof. John RODWELL  
(Lancaster University, England)  
*Classification and Description of British Plant Communities*

16:00 2<sup>nd</sup> poster session

16:30 Coffee break

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**Session 2 (cont.)**

17:00 Conference by Prof. Nicole DEVY-VARETA  
(Universidade do Porto, Portugal)  
*The Geographer's Concept of Vegetation*

17:45 Conference by Arch. Paulo FARINHA MARQUES  
(Universidade de Trás-os-Montes e Alto Douro, Portugal)  
*Vegetation "Analysis" in Landscape Design*

18:30 Final discussion

20:30 Meeting dinner

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## SCOPE

Landscape analysis based on classifying and mapping natural vegetation is nowadays an essential subject regarding nature conservation within a model of sustainable development.

Different approaches to vegetation analysis, many of which based on long-established traditions in several countries, usually provide different classification systems, making integration of data a difficult or even impossible task. Therefore, efforts should be made in order to promote the establishment of standard classification systems to be used in vegetation mapping at different geographic scales.

The 2002 International Scientific Meeting of the Portuguese Phytosociology Association (ALFA) aims to promote the sharing of experiences in vegetation science among scientists, technicians and other professionals dealing with vegetation analysis. Attention will be focused on conceptual and methodological similarities and/or differences between distinct approaches. Case studies will also be presented and discussed.

The three-day scientific programme will include presentations by invited experts on vegetation analysis, open sessions for both oral and poster presentations, a field visit to Northwest Portugal and a final session on Portuguese natural vegetation (including Azores and Madeira Islands). The scientific sessions will be followed by an optional one-day touristic excursion to Douro River.

**C O N T E N T S**

SCOPE	5
PROGRAMME	6
LIST OF POSTERS	10
ABSTRACTS OF MAIN PAPERS	16
ABSTRACTS OF ORAL PRESENTATIONS	25
ABSTRACTS OF POSTER PRESENTATIONS	36
LIST OF PARTICIPANTS	71

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VEGETATION ANALYSIS  
Contributions for an Integrated Approach

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