

SUBBETIC NATURAL PARK (CÓRDOBA, SPAIN): HABITATS AND FLORISTIC DIVERSITY

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Abstract

This paper offers a comprehensive study of the Parque Natural de la Sierra Subbética Cordobesa, where there are about 1.250 taxa, 51 associations, 41 alliances, 29 orders and 17 phytosociological classes. The map of vegetation seres (successions) shows the major units observed in the Park. Both the flora and the communities of this conservation area are compared with those of other Andalusian regions. Some species such as *Lithodora nitida* are recorded for the first time. Finally, a brief description of the sites of botanical interest is also provided.

Introduction

The Parque Natural de la Sierra Subbética Cordobesa, covering 31.568 ha, was established in 1988, prior to the passing of the Bill 2/1989 which listed the Inventory of Conservation Areas in Andalusia. Located in the southeastern part of the province of Córdoba, it is of a mostly calcareous nature with frequent karstic formations in a landscape dominated by valleys and ranges.

There are two bioclimatic belts in the territory between the piedmont at 600 m and the top of the Horconera Mountain (1.570 m). According to the classification of RIVAS MARTÍNEZ (1987) these are the meso- and supramediterranean belts. Rainfall records are, for the most part, those of an upper subhumid climate (RIVAS MARTÍNEZ op. cit.), although a number of enclaves present over 600 mm annual rainfall.

Holm and Lusitanian oaks, lentiscus and kermes oak are, together with a number of bushes, the dominant species at the heart of these ranges, far from cultivated land. Olive groves and livestock raising are the major activities of the population in the area. Surprisingly, reforestation has been extremely rare so far. Steep rocky slopes are frequent and give rise to rock plant communities comprising a valuable endemic flora.

Materials and Methods

A contract signed by the Agencia de Medio Ambiente (Department of the Environment of the Andalusian Regional Government) and the University of Granada made possible the study of the flora and vegetation of the Parque Natural during 1992 and 1993. The major objective of the project (CABELLO & al., 1994) was to provide the Sistema de Información Ambiental de Andalucía (SINAMBA) with a precise mapping (scale 1:10.000) of the area and a valuable data base.

This paper contains part of this information. The data provided by the mapping of the vegetation, together with the phytosociological analysis carried out according to the methods of the Zürich-Montpellier school (BRAUN BLANQUET, 1951), helped to determine which areas in the Park are of special botanical interest.

The data so obtained have been compared with those from other similar areas. In this process the following works have been very useful: APARICIO & SILVESTRE (1987), BLANCA & MORALES (1991), CASTRO & GUIRADO (1995), CUATRECASAS (1929), CUETO (1989), GÓMEZ MERCADO (1989), GÓMEZ MERCADO & VALLE (1988), MOLERO & PÉREZ RAYA (1987), PÉREZ RAYA & al. (1990), RIVAS MARTÍNEZ & al. (1980).

Each site is located on a gridded map (Universal Transverse Mercator, UTM). In each case information about the significant flora, the ecologically valuable communities, and the landscape (geomorphological profile and current use of the territory) is provided.

Results and Discussion

Vegetation

Climate-determined vegetation

There are three climate-determined seres in the Parque Natural de la Sierra Subbética Cordobesa (RIVAS MARTÍNEZ, 1987):

1, Alkali-loving mesomediterranean Betic, Marianense and Araceno-Pacense dry-subhumid holm oak (*Quercus rotundifolia*) sere: *Paeonio coriaceae-Querceto rotundifoliae sigmetum*.

2, Alkali-loving supramediterranean Betic holm oak (*Quercus rotundifolia*) sere: *Berberido hispanicae-Querceto rotundifoliae sigmetum*.

3, Alkali-loving supramediterranean Betic Lusitanian oak (*Quercus faginea*) sere: *Daphno latifoliae-Acereto granatensis sigmetum*.

Quercus woodland associations.- Paeonio coriaceae-Quercetum rotundifoliae Rivas Martínez 1984: Woodland association where the dominant species is the holm oak, though in certain cases a considerable number of Lusitanian oaks is also present. Within the range of profiles of this association, there is a well extended thermophilous facies with a high presence of elements of the order *Pistacio-Rhamnalia*. In the coldest areas of the Park, i.e., those territories above 1.000 or 1.100 m, this facies is replaced by another considerably impoverished one. In this latter mesophilous facies, the elements of *Pistacio-Rhamnalia* are significantly absent and some elements of *Quercus-Fagetum* appear. In the driest inland territories, there can be found highly impoverished holm oak woods which scarcely contain half a dozen elements of the class or order. These formations are the epitome of the driest and coldest facies.

Above this facies, the association *Berberido hispanicae-Quercetum rotundifoliae* occurs. It is confined to those rare peaks over 1.400 m high, where the space limitation accounts for their impoverishment. The original territory of this sere can only be recognised in those cases where the seral scrubs, such as *Erinacea anthyllis*, *Genista longipes*, *Echinopartum boissieri*, etc, are present.

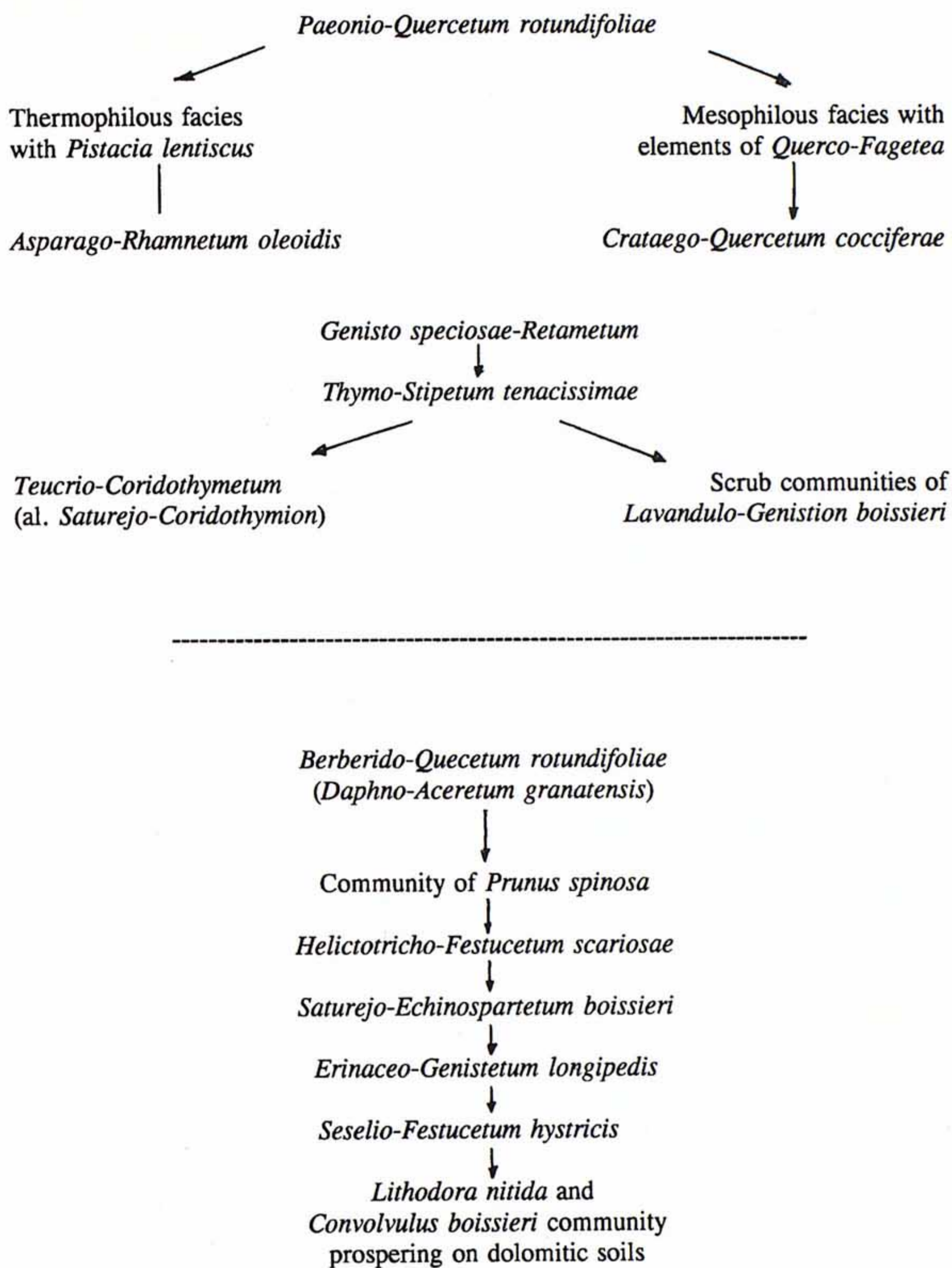


Fig. 1. Diagram of successional stages.

Daphno latifoliae-Aceretum granatensis Rivas Martínez 1964: This association is poorly represented in the territory under study; it normally appears in shrub and tree formations where, together with the Lusitanian oak, maple (*Acer monspessulanus*) and hawthorns (*Crataegus monogyna* subsp. *brevispina*), the presence of *Pistacia*

terebinthus is worthy of note. These kinds of communities are also found in other Betic territories, such as Cazorla ranges (GÓMEZ MERCADO & VALLE, 1990), indicating a mesomediterranean variant still characterised by a huge number of taxa of the class *Quercetea ilicis*.

Subseral shrub-like formation.- In the degenerative process, the original woods are replaced by three major formations: lentiscus and kermes oak woods, thorny bushes and leaf-shedder *Genistae*.

The formations of lentiscus and kermes oak woods are associated with the mesomediterranean holm oak woods, the sclerophyllous species of *Pistacio-Rhamnetalia* being dominant here. The thermophilous communities, where the lentiscus is clearly dominant (*Asparago albi-Rhamnetum oleoidis*), can be easily distinguished from the kermes oak and hawthorn communities (*Crataego-Quercetum cocciferae*). It is worthy of note how frequently the *Pistacia terebinthus* occurs in these communities, particularly in the damper and shadier spots. Thorny deciduous taxa, such as *Crataegus monogyna* subsp. *brevispina* and *Prunus spinosa*, may even be dominant and the physiognomical profile resembles the formations of *Prunetalia spinosae*.

Generally speaking, in the humid and temperate territories, the communities of *Pistacia terebinthus* replace not only the mixed sclerophyllous and marcescent woods of holm and Lusitanian oaks but also the maple and Lusitanian oaks woods in the mesomediterranean belt.

Sometimes the shrub-like formations, such as those of kermes oaks and, especially, those of savines (*Rhamno-Juniperetum phoeniceae*) represent the paraclimax communities which are, in the warmer areas, accompanied by carob trees (*Ceratonia siliqua*).

Finally, the formations of *Genista speciosa* and *Retama sphaerocarpa* are associated with all the above mentioned seres.

Espartales, lastonares, cerrillares.- The espartales or atochares (*Thymo-Stipetum tenacissimae*) occur in the mesomediterranean belt and are replaced by the lastonares (*Helictotricho-Festucetum scariosae*) as the altitude increases. Likewise, in the termomediterranean belt, the *Teucro-Brachypodietum* association, which includes the communities of *Brachypodium retusum*, is replaced in the upper belt by the association *Phlomido-Brachypodietum retusi*.

The formation of *Hyparrhenia hirta* (*Micromerio-Hyparrhenietum hirtae*) reach the lower mesomediterranean horizon and, as with other communities, they can be used to draw bioclimatic bands.

Scrub formations.- Since scrub taxa of the class *Rosmarinetea officinalis* are widespread in the Park and cover considerable areas, they are very helpful in interpreting the mapping of the territory. At the foot of the mountain, they are characterised by the presence of thermophilous elements such as *Coridothymus capitatus*, *Micromeria graeca*, *Fumana thymifolia*, *Teucrium lusitanicum*, etc (*Teucro-Coridothymetum capitati*). In the upper mesomediterranean horizon, these scrub formations lose some of their taxa to finally become communities of the *Lavandulo-Echinospartion boissieri* alliance. Here, in the more developed facies, *Phlomis purpurea* and *Rosmarinus officinalis*, are dominant, but these are replaced by *Ulex parviflorus* if forest fires have taken place recently. They lack a flora which could be easily ascribed

to any of the particular associations so far described. A detailed study would perhaps lead to the definition of a new association in these territories.

The *Saturejo-Echinopartium boissieri* association covers the supramediterranean areas. It occurs in close relation with others prospering on dolomitic soils such as *Erinaceo-Genistetum longipedis* or thyme (*Convolvulus boissieri-Lithodora nitida*). These scrub communities comprise a flora of particular interest (MOTA & al., 1993).

In these highlands, the presence of the *Seselio-Festucetum hystricis* association is also worthy of note. These grasslands undergo frost action in the Horconera territory.

Annual herb communities.- These communities occur in the clearings left by the scrub formations. Although they have been included in the *Saxifrago-Hornungietum petraeae* association, their diversity cannot be so narrowly confined. It would probably be wise to distinguish a thermophilous community in the lower mesomediterranean horizon, which is yet to be done.

Due to man-induced environmental changes, these herbaceous communities become more densely populated and tend to colonize ever larger territories. Two associations characterize these communities: *Filago-Stipetum capensis*, in the mesomediterranean piedmonts and *Medicagini-Aegilopetum geniculatae* in the rest of the area.

Finally, formations of *Poa bulbosa* (*Astragalo-Poetum bulbosae*) may also be found. Although their distribution is not as great as that of the others, they are more densely populated and present a larger number of perennial herbs and species suitable for cattle.

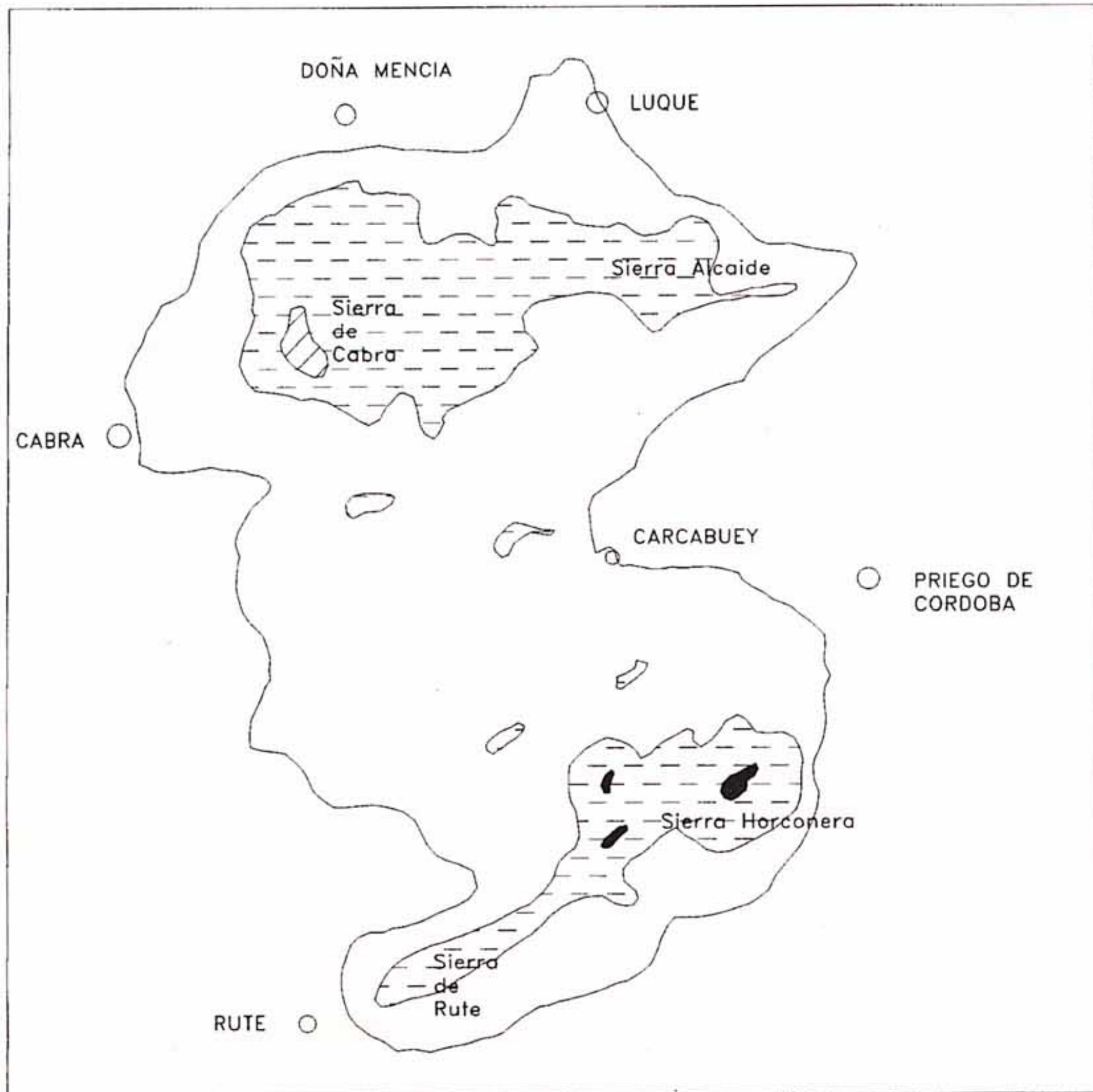
Climate-undetermined vegetation

Riparian communities.- *Fraxinus angustifolia* community: the remnants of riparian woods are so scarce that a more precise description of these communities cannot be given. Together with ash trees, *Populus nigra* and *Salix atrocinerea* can be found here.

Rushes (*Cirsio-Holoschoenetum vulgare*, *Junco-Sparganietum erecti*), brambles (*Rubus-Corietum myrtifolii*), or marshland vegetation (communities of *Gaudinia fragilis*, *Lolio-Plantaginetum majoris*), etc, accompany the remnants of the riparian woods in these territories where the water table is close to the surface.

Rock plant communities.- Certain communities dominated by savines, carob trees and terebinths tend to colonize gentle rocky slopes. In this group, special attention must be paid to those belonging to the class *Asplenietea trichomanis*. The flora of these communities comprises important endemic taxa (MOTA & al. 1991). Associations of particular interest are: *Jasione-Teucrietum rotundifolii*, *Sarcocapno-Centaureetum clementei*, *Stachydetum circinnatae*, and the communities of *Saxifragion caposii* on the peaks of Horconera.

Ruderal and man-induced communities.- A great variety of formations may be found here: from woody, highly colonising thyme communities (*Artemisio-Santolinetum barrelieri*), thistles, to others, dominated by cruciferae (*Sisymbrietalia officinalis*), which prosper in both irrigated and dry farming land.




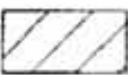



-  Alkali-loving supramediterranean Betic holm oak (*Quercus rotundifolia*) sere: *Berberido hispanicae-Querceto rotundifoliae sisetum*.
-  Alkali-loving supramediterranean Betic Lusitanian oak (*Quercus faginea*) sere: *Daphno latifoliae-Acereto granatensis sisetum*.
-  Alkali-loving mesomediterranean Betic, Marianense and Araceno-Pacense dry-subhumid holm oak (*Quercus rotundifolia*) sere: *Paeonio coriacea-Querceto rotundifoliae sisetum*. Mesophilous facies.
-  Alkali-loving mesomediterranean Betic, Marianense and Araceno-Pacense dry-subhumid holm oak (*Quercus rotundifolia*) sere: *Paeonio coriacea-Querceto rotundifoliae sisetum*. Thermophilous facies with *Pistacia lentiscus*.
-  Park border

Fig. 2. Subbetic natural park (Córdoba, Spain). Map of vegetation seres (Scale 1:200.000).

Comparative study within other Andalusian regions

The comparison of the data from the S^a Subbética with those from other Andalusian protection areas are shown in the following table:

Sites	Land area (ha)	Highest point	Nº taxa	Nº associations
S ^a Cazorla	214.000	2.107	1.511	84
S ^a Nevada	170.000	3.481	1.935	149
S ^a María	18.962	2.045	1.200	50
S ^a Baza	52.337	2.271	975	43
S ^a Grazalema	51.695	1.650	1.353	67
S ^a Mágina	19.900	2.100	995	?
Doñana	50.720	100	875	78
Cabo de Gata	26.000	480	900	?
S ^a Subbética	31.568	1.570	1.250	51

Table 1. Comparative data of S^a Subbética with other Andalusian areas.

Sites of botanical interest

Peaks of Horconera (La Tiñosa and Bermejo) (UTM: 30SUG9038 and 30SUG8638)

Flora: Great number of endemic taxa, which include the unique *Thymelaea granatensis* subsp. *glauca* and *Lithodora nitida* (Bermejo), others of larger distribution such as *Convolvulus boissieri*, *Globularia spinosa*, *Echinopartum boissieri*, *Teucrium webbianum*, *Thymus granatensis*, *Genista lobelii* subsp. *longipes*, *Globularia spinosa*, etc and rock plants such as *Potentilla caulescens*, *Asplenium hispanicum*, etc.

Communities: Although the dominant species are piornales such as *Echinopartum boissieri* and *Erinacea anthyllis*, and lastonares (*Festuca scariosa* and *Helictotrichon filifolium* formations), the most valuable communities are made up of the thymes on dolomitic soils and rock plants. This is one of the rare sites in the Park where frost action is apparent. Scree deposits and solifluction processes have encouraged the occurrence of herbs belonging to the *Seselio-Festucetum hystricis* association. Along the dry and sunny rocky ridge of the mountains, in the upper mesomediterranean level, permanent formations of *Juniperus phoenicea* may be also observed.

La Nava (UTM: 30SUG7850)

Flora: In addition to the endemic species *Narcissus bugei* and *Biarum carratracense*, in this site the major trees (*Acer monspesulanum*, *Quercus rotundifolia*, *Q. faginea*, etc) and shrubs of the Park (*Pistacia terebinthus*, *Crataegus monogyna*, etc) are well represented.

Communities: This is undoubtedly one of the most remarkable sites in the Park. All over this polje and its surroundings, there are magnificent examples of deciduous maple and Lusitanian oak woods, some scattered elm trees and large holm oak forest. These latter reveal the traditional use of the land. Nowadays they have, for the most part, been transformed into dehesas (pastures with scattered trees). Finally, a number of riparian communities (*Phragmitetea*, *Isoeto-Nanojuncetea*, *Molinio-Arrhenatheretea*, etc) are also of interest.

NW steep slopes of the Sierra Horconera (UTM: 30SUG8537)

Flora: Rock vegetation is here remarkable, with valuable elements such as *Stachys circinata*, *Campanula velutina*, *Silene adryalifolia*, *Biscutella frutescens* or the endemic taxon *Centaurea clementei*.

Communities: In addition to the communities already mentioned, most of the chasms are colonized by interesting remnants of rock holm oak together with terebinth and savine in the drier exposures.

Surroundings of La Camorra quarry (UTM: 30SUG7745)

Flora: In this site, some rare elements of the Park, such as *Viburnum tinus* and *Teucrium fruticans* may be found.

Communities: This site stands as a prominent example of the kermes oak woods with terebinths and lentiscus which replace, in the first degenerative stage, the original holm and Lusitanian oak forest of the Park. In this temperate and humid enclave the former taxa are abundant. The current exploitation of the quarry constitutes a serious risk for the conservation of the environment.

Southern exposure of Sierra de Cabra (UTM: 30SUG7849)

Flora: The only remarkable feature of this site is the abundance of *Quercus coccifera*.

Communities: The kermes oak woods covering large areas of a lapiés surface in the southern exposure of Sierra de Cabra, opposite the Ermita de Nuestra Señora de la Sierra, are a prominent example of the mesomediterranean association *Crataego-Quercetum cocciferae*, the paraclimax community. Altitude and lack of soil impose serious restrictions on the development of lentiscus and terebinth which are usually frequent in other kermes oak woods. The conservation of this unique enclave is also at risk due the exploitation of the quarry.

Morrón Grande (UTM: 30SUG8237)

Communities: This site is a lapiés surface located in the lower mesomediterranean horizon which has been colonized by a superb lentiscus forest (*Asparago albi-Rhamnetum oloidis*), the paraclimax community. In shaded places where there is more soil, terebinths can also be found among the extensive holm and Lusitanian oak woods, this being the first stage in the degenerative process.

Appendix.

Syntaxonomic summary for the study area

ASPLENIETEA TRICHOMANIS (Br.-Bl. in Meier & Br.-Bl. 1934) Oberdorfer 1977

- + *Asplenietalia petrarchae* Br.-Bl. in Meier & Br.-Bl. 1934
- * *Asplenion petrarchae* Br.-Bl. in Meier & Br.-Bl. 1934
 - Jasione glutinosae-Teucrietum rotundifolii* Pérez Raya 1987
- * *Saxifragion boissiero-reuterani* Díez Garretas, Asensi & Martín Osorio 1989
 - Linario anticari-Saxifragetum biternatae* Esteve & López Guadalupe 1973
- + *Potentilletalia caulescentis* Br.-Bl. in Br.-Bl. & Jenny 1926
- * *Saxifragion camposii* Cuatrecasas ex Quézel 1953
 - Community of *Silene andryalifolia*

PARIETARIETEA JUDAICAE Rivas Martínez in Rivas Goday (1955) 1964 *em. nom.* Oberdorfer 1977

- + *Parietarietalia judaicae* Rivas Martínez (1955) 1960 *em. nom.* Oberdorfer 1977
- * *Centrantho-Parietarion judaicae* Rivas Martínez (1960) 1969 *nom. inv.*
 - Sarcocapno baeticae-Centaureetum clementei* Asensi & Esteve Chueca 1977
 - Stachydetum circinatae* Fernández Casas 1972

ANOMODONTO-POLYPODIETEA Rivas Martínez 1975

- + *Anomodonto-Polypodiotalia* O.Bolòs & Vives in O.Bolòs 1957
- * *Bartramio-Polypodion serrati* O.Bolòs & Vives in O.Bolòs 1957
 - Asplenietum hispanici* Pérez Raya 1987

PHRAGMITO-MAGNOCARICETEA Klica in Klika & Novak 1941

- + *Phragmitetalia* W.Koch 1926
- * *Glycerio-Sparganion* Br.-Bl. & Sissingh in Boer 1942
 - Junco subnodulosi-Sparganietum erecti* Peinado & Martínez Parras 1983

MOLINIO-ARRHENATHERETEA Tüxen 1937

- + *Holoschoenetalia* Br.-Bl. (1931) 1947
 - Cirsio-Holoschoenetum vulgaris* Br. Bl. 1931
- + *Plantaginetalia majoris* R.Tx. & Preising 1950
- * *Lolio-Plantaginion majoris* Sissingh 1969
 - Lolio perennis-Plantaginetum majoris* (Link 1921) Berger 1930
- * *Trifolio-Cynodontion dactylionis* Br.-Bl. & O.Bolòs 1957
 - Trifolio fragiferi-Cynodontetum dactylionis* Br. Bl. & O. Bolòs 1957
- * *Agropyro-Rumicion crispi* Nordhagen 1940
- ** *Mentho longifoliae-Juncenion inflexi* Rivas Martínez, Fernández González & Sánchez Mata 1986
 - Cirsio-Juncetum inflexi* Vigo 1986
- + *Agrostietalia castellanae* (Rivas Goday 1957) Rivas Martínez in Rivas Martínez & col. 1980
- * *Agrostion castellanae* Rivas Goday 1957 corr. Rivas Goday & Rivas Martínez 1963
 - Community of *Gaudinia fragilis* y *Agrostis castellana*

RUDERALI-SECALIETEA CEREALIS Br.-Bl. 1936

- ° **SECALIENEA CEREALIS** Rivas Martínez 1987
- + *Secalietalia cerealis* Br.-Bl. 1931

- * *Secalio cerealis* Br.-Bl. 1931
 Roemerio hybridae-Hypecoetum penduli Br. Bl. & O. Bolòs (1954) 1957
- + *Solano nigri-Polygonetalia convolvuli* (Sissing ex Westhoff, Dijk & Passier 1946) O.Bolòs 1962.
- * *Panico-Setarion* Sissingh 1946
 Setario glaucae-Echinochloetum colonae (A. & O. Bolòs 1959) O. Bolòs 1956
- ° *CHENOPODIENEA MURALIS* Rivas Martínez 1987
- + *Sisymbrietalia officinalis* J.Tx. in Lohmeyer & al. em. Rivas Martínez 1987
- ++ *Sisymbrienalia officinalis* Rivas Martínez & Izco 1977
- * *Hordeion leporini* Br.-Bl. (1931) 1947
 Bromo scoparii-Hordeetum leporini Rivas Martínez 1978
 Comunidad de *Hordeum geniculatum*
- ++ *Bromenalia rubenti-tectori* Rivas Martínez & Izco 1977
- * *Taenianthero-Aegilopion geniculatae* Rivas Martínez & Izco 1977
 Medicagini rigidulae-Aegilopetum geniculatae Rivas Martínez & Izco 1977
- * *Cerintho-Fedion* Rivas Martínez & Izco 1977
 Fedio cornucopiae-Sinapetum albae Peinado, Martínez Parras & Bartolomé 1986

- ARTEMISIETEA VULGARIS** Lohmeyer, Preising & Tüxen in Tüxen 1950
- ° *ONOPORDENEA ACANTHI* Rivas Martínez 1987
- + *Cartametalia lanati* Brullo in Brullo & Marceno 1985
- * *Onopordion nervosi* Br. Bl. & O. Bolòs 1958 corr. Rivas Martínez 1975
 Comunidades de la alianza *Onopordion nervosi* Br. Bl. & O. Bolòs 1958 corr. Rivas Martínez 1975

- PEGANO HARMALAE-SALSOLETEA VERMICULATAE** Br.-Bl. & O.Bolòs 1954
- + *Helichryso-Santolinetalia* Peinado & Martínez Parras 1984
- * *Santolinion pectinato-canescens* Peinado & Martínez Parras 1984
 Artemisio glutinosae-Santolinetum canescens Peinado & Martínez Parras 1984

- FESTUCO HYSTRICIS-ONONIDETEA STRIATAE** Rivas Martínez, T.E. Díaz, Fernández Prieto, Loidi & Penas 1991
- + *Festuco hystricis-Poetalia ligulatae* Rivas Goday & Rivas Martínez 1963
- * *Minuartio-Poion ligulatae* O.Bolòs 1962
 Seselio granatensis-Festucetum hystricis Martínez Parras, Peinado & Alcaraz 1987

- HELIANTHEMETEA GUTTATI** (Br.-Bl. ex Rivas Goday 1958) Rivas Goday & Rivas Martínez 1963
- + *Trachynietalia distachyae* Rivas Martínez 1978
- * *Trachynion distachyae* Rivas Martínez 1978
 Saxifrago tridactylitidis-Hornungietum petraeae Izco 1974
- * *Stipion capensis* Br.-Bl. in Br.-Bl. & O.Bolòs 1954 em. Izco 1975
 Filago ramosissimae-Stipetum capensis Pérez Raya 1987

- LYGEO-STIPETEA TENACISSIMAE** Rivas Martínez 1978
- + *Lygeo-Stipetalia tenacissimae* Br.-Bl. & O.Bolòs 1958 em. Rivas Martínez 1978
- * *Stipion tenacissimae* Rivas Martínez 1978
 Thymo gracile-Stipetum tenacissimae Pérez Raya 1987
- * *Thero-Brachypodion retusi* Br.-Bl. 1925

Phlomido lychnitis-Brachypodietum retusi Br. Bl. 1924

Teucro pseudochamaepitys-Brachypodietum retusi O. Bolòs 1957 nom. mut.

* *Festucion scariosae* Martínez Parras, Peinado & Alcaraz 1984

Helictotricho filifolii-Festucetum scariosae Martínez Parras, Peinado & Alcaraz 1983

+ *Hyparrhenietalia hirtae* Rivas Martínez 1978

* *Micromerio graecae-Hyparrhenion hirtae* O. Bolòs 1962

Micromerio graecae-Hyparrhenietum hirtae

* *Inulo viscosae-Oryzopsis miliaceae* O. Bolòs 1970

Inulo viscosae-Oryzopsietum miliaceae (A. & O. Bolòs 1950) Bolòs 1957

POETEA BULBOSAE Rivas Goday & Rivas Martínez in Rivas Martínez 1978

+ *Poetalia bulbosae* Rivas Goday & Rivas Martínez in Rivas Goday & Ladero 1970

* *Poo bulbosae-Astragalion* Rivas Goday & Ladero 1970

Poo bulbosae-Astragaletum sesamei Rivas Goday & Ladero 1970

CISTO-LAVANDULETEA Br.-Bl. (1940) 1952

+ *Lavanduletalia stoechidis* Br.-Bl. 1940 em. Rivas Martínez 1968

* *Calicotomo-Cistion ladaniferi* Br.-Bl. (1931) 1940

Community of *Cistus monspeliensis* Rivas Goday & Rivas Martínez 1968

ROSMARINETEA OFFICINALIS Br.-Bl. 1947 em. Rivas Martínez, T.E. Díaz, Fernández Prieto, Loidi & Penas 1991

+ *Convolvuletalia boissieri* Rivas Martínez, Pérez Raya & Molero Mesa in Pérez Raya 1987

* *Andryalion agardhii* Rivas Martínez ex Rivas Goday & Mayor 1966

Comunidad de *Lithodora nitida* y *Convolvulus boissieri*

+ *Erinacetalia anthyllidis* Quézel 1953

* *Xeroacantho-Erinaceion* (Quézel 1953) O. Bolòs 1967

Erinaceo anthyllidis-Genistetum longipedis O. Bolòs & Rigual in O. Bolòs 1967

+ **Rosmarinetalia** Br.-Bl. 1931

* *Lavandulo lanatae-Echinopartion boissieri* Rivas Goday & Rivas Martínez 1969

Comunidad de *Rosmarinus officinalis* y *Ulex parviflorus*

Saturejo intricatae-Echinopartietum boissieri Rivas Goday & Rivas Martínez 1968

* *Micromerio micranthae-Corydothymion capitati* Rivas Goday & Rivas Martínez in Rivas Goday 1964

Teucro lusitanici-Coridothymetum capitatae Rivas Goday & Rivas Martínez 1969

CYTISETEA SCOPARIO-STRIATI Rivas Martínez 1974

+ *Retametalia sphaerocarpace* Rivas Goday 1980

* *Retamion sphaerocarpace* Rivas Martínez 1981

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