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VEGETATIONAL OUTLINES OF NORTH ADRIATIC COASTS

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A synthetic view of coastal vegetation between the Po river delta and Monte Conero (Italy) is given. *Quercus ilex* woods, hygrophilous wood communities, halophilous and psammophilous vegetation types are analysed by means of cluster analysis methods performed on about 750 phytosociological relevés. Phytosociological attributions of vegetation types recognized are proposed.

Introduction

The coastal vegetation between the Po delta and the Monte Conero promontory (Ancona), has already been investigated by many authors (Fig. 1). In spite of the alterations due to anthropogenic influence, several vegetation types are still recognizable, influenced by some environmental factors, such as: distance from the shoreline, soil type and ground-water level.

In this work we have attempted to synthesize a great amount of phytosociological relevés, in part already issued and in part still unpublished, on halophilous and sand dunes vegtation, on *Quercus ilex* wood communities and on hygrophilous wood communities. All the vegetation types recognized are synthesized in synoptical tables, by means of constancy columns. In each table, the columns refer to the groups obtained by average linkage cluster analysis; similarity ratio within groups are $\geq 30\%$. Cover/abundance values were employed to cluster the herbaceous communities (Whishart 1969), while presence/absence values were considered for wood vegetation (Jaccard 1901).

For species names in synoptical tables see Zangheri (1976).

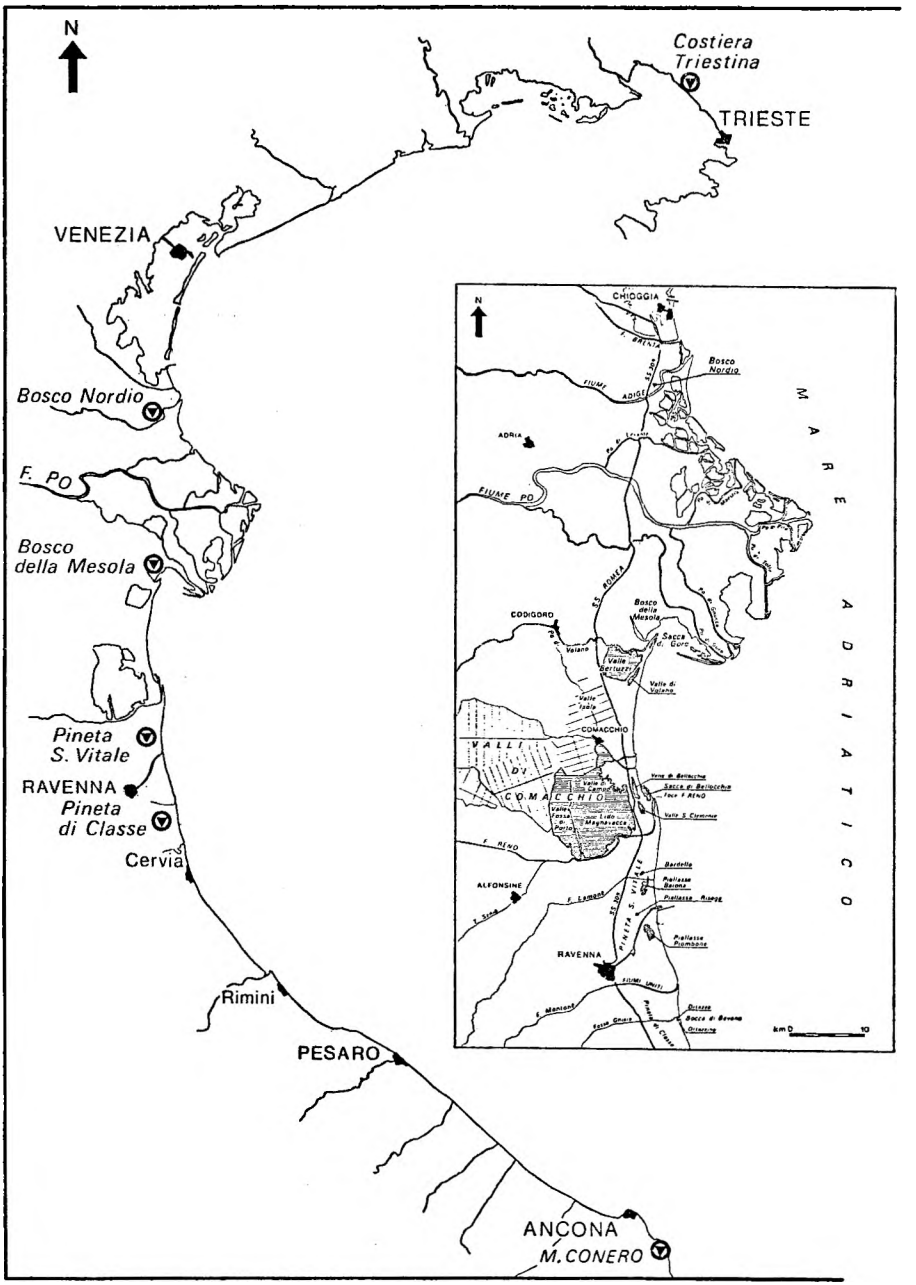

Fig. 1. Geographic map of the investigated area

The halophilous and halophilous-hygrophilous communities

The data (338 relevés) come from the lagoons in the Ferrara and Ravenna territory and from the Po delta (Corbetta 1968, 1974, 1976, unpublished data, Turroni & Merloni 1982) and concern the whole set of saltish habitats which occur along the Emilia-Romagna coast.

By means of cluster analysis we can recognize ten vegetation types (Tab. 1). The phytosociological attribution of these communities is based on the syntaxonomic schemes proposed by Pignatti (1966) and by Beeftink & Géhu (1973) for the *Spartina* communities.

The main factors affecting the vegetation diversity in these saltish habitats, are: the period of flooding, the level and the salinity of the water. In temporarily or never flooded stands, the plant communities of the *Spartinetea maritimae* or of the *Puccinellio-Salicornietea* occur. In permanently flooded stands occur the plant communities of the *Phragmitetea.*

Concerning the *Spartinetea maritimae,* in our territory we can recognize the association *Limonio-Spartinetum maritimae* (col. A), at nearly monophytic community, growing on temporarily flooded stands (valle Ancona, Bevano mouth), and very important for the consolidation of moving muds.

Concerning *Puccinellio-Salicornietea,* seven vegetation types were identified. *Salicornietum fruticosae* (col. B) and *Salicornietum radicantis,* including *Halocnemum strobilaceum* communities (col. C), belong to *Limonio-Salicornietalia* and *Puccinellio-Salicornion.* In these communities, growing on salty and clay soils, dry in summer but flooded in winter, chamaephytes are dominant.

Salicornietum herbaceae (col. D), *Suaedo-Kochietum hirsutae* (col. E) and *Salsoletum sodae* (col. F) belong to *Thero-Salicornietalia* and *Thero--Salicornion.* In these communities, occurring on soils very rich in organic matter, either animal or vegetal, therophytes are dominant. *Salicornietum herbaceae* and *Suaedo-Kochietum hirsutae* prefer moist soils, whereas *Salsoletum sodae* grows on dry sand soils.

Juncetum maritimi (col. G) belongs to *Juncetalia maritimi* and *Juncion maritimi.* In this community, geophytes and hemicriptophytes are dominant. In our territory, *Juncetum maritimi* was found on the channel edges or on flat zones. On less damp soils, species such as *Sonchus maritimus, Agrostis maritima, Carex extensa* occur in *Juncetum.* This variant of the association is present especially in the »valli Bertuzzi«.

We think that *Holoschoenetum romani* (col. H) could be ascribed to *Juncetalia maritimi* too. This association has been included in *Plantaginion crassifoliae* Br.-Bl. 1931, but only the character species *Linum maritimum* is present there.

Concerning the *Phragmitetea,* two vegetation types were recognized: *Scirpetum maritimi* (col. I) and *Phragmitetum communis* (col. L). The major part of these communities belongs to the subassociation *halophylum* Pign. 53 of the two respective associations. In fact, many character species of *Puccinellio-Salicornietea* and of the orders of this class occur in them.

The vegetation on sand dunes

The data (about 80 relevés) concern the coast of Ravenna (Pirola 1974) and the Po delta (Corbetta, unpublished data). Tab. 2 shows the synthetical columns relating to the vegetation types which were distinguished by cluster analysis.

We can recognize a progresive dynamic succession from the aphytoic zone, to *Cakilo-Xanthietum* (col. A), *Agropyretum mediterraneum* (col. B), *Medicago-Ammophiletum* (col. C), and *Tortulo-Scabiosetum* (col. D). This dynamic succession is quite similar to that described by Pignatti (1959) for the Venetian coast. A similar succession was also recognized by Giacomini (1974) for the Emilia-Romagna coast.

Owing to the erosion phenomena which are present on the Emilian coast, and to human activities too, we can find some character species of *Agropyretum mediterraneum (Cyperus kalli, Agropyron junceum* subsp. *mediterraneum)* in *Medicago-Ammophiletum* or in *Tortulo-Scabiosetum,* and some character species of *Medicago-Ammophiletum (Ammophila littoralis, Medicago marina)* in *Agropyretum mediterraneum* or in *Tortulo-Scabiosetum.*

In the depressions behind the dunes, temporarily flooded, psammophilous and weakly halophilous communities grow. These communities belong to *Schoeno-Erianthetum (Schoenion litoralis* (Rivas Goday 1945) Pign. 1953. *Schoeno-Erianthetum* occurs in progressive as well in regressive dynamic situations caused by subsidence phenomena.

The successive evolution of *Schoeno-Erianthetum* leads to wood communities of *Orno-Quercetum ilicis* s. l. (Piccoli & Gerdol 1980). In fact in *Schoeno-Erianthetum* some character species of *Quercetalia ilicis,* such as *Phillyrea angustifolia, Asparagus acutifolius, Rubia peregrina* and other thermophilous species such as *Pyracantha coccinea, Juniperus communis* are present. We do not think however that *Schoeno-Erianthetum* could evolve towards *Carici-Fraxinetum angustifoliae* (Piccoli & Gerdol 1980). The presence of this association cannot yet be demonstrated in this part of the Adriatic coast.

The forest communities

The investigations of forest communities was performed on data from Bosco Nordio (Pignatti 1959), Bosco of the Mesola (unpublished data; Piccoli & Gerdol 1980), Pine woods of S. Vitale and Classe (unpublished data), Monte Conero (Biondi 1982. and unpublished data). The Bosco of the Mesola and the Pine woods of S. Vitale, Classe and Bosco Nordio, are coastal plain forest, mostly with a high tree layer of *Quercus ilex* and *Quercus robur,* growing on ancient coastal dunes, and therefore on deep and sandy soils. On the rocky calcareous soils of Monte Conero, mostly communities of Mediterranean scrubs with *Quercus ilex* are present.

Quercus ilex wood communities

Cluster analysis performed on 250 relevés. makes it possible to distinguish at least six plant communities* (Tab. 3), which were mostly attri-

* Four relevés from Bosco Mesola (Piccoli & Gerdol 1980) have been neglected owing to their low similarity indices with the other groups.

buted by Authors (Biondi 1982, Corbetta & Bachiocco 1972, Corbetta & Pettener 1976, Piccoli & Gerdol 1980, Pignatti 1959) to the association *Orno-Quercetum ilicis* described by Horvatić. Using cluster analysis we therefore compared our relevés with Horvatić's data (1963), and also with relevés performed by Lausi & Poldini (1962) on the coast of Trieste (*Orno-Quercetum ilicis* subass. *cotinetosum).*

It can be seen that the similarity index values (Fig. 2) between the set of coastal rocky communities (A, B, C, D) and the plain communities (F, G, H) are very low (from 6 to 15%), while the Bosco Nordio community (E) seems to be an intermediate type between these two sets of communities.

The phytosociological analysis of the synoptical table (Tab. 3) shows a greater number of *Quercetea ilicis* species in the rocky set, while the differential species of the plain communities seem to be *Juniperus communis, Carex liparocarpos, Quercus robur, Pyracantha coccinea, Berberis vulgaris, Frangula alnus.* At least for the xerophilous community of Mont Conero (groupe C) we agree with the attribution to *Orno-Quercetum ilicis,* nevertheless a new subassociation should be defined, because of the low similarity level with Horvatić's relevés. As differential species of subassociation, we suggest: *Pulicaria odora, Hieracium pilosella, Stahelina dubia.*

On the other hand, the community D, from the northen slopes of Monte Conero, seems quite similar to that found by Biondi (1982) and ascribed by him to the subassociation *aceretosum obtusati* of the *Ostryo-Quercetum ilicis* Trinajstić 1975. For the plain communities, the phytosociological attribution to *Orno-Quercetum ilicis* is questionable, because of their low similarity values and their floristic and structural diversity. Moreover, among the character species of the association, only *Rosa sempervirens* is present, besides *Quercus ilex.*

In the Pine woods of S. Vitale and Classe we can notice a lot of *Festuco-Brometea* species, owing to the tree layer deterioration state due to man's activities, i.e. to a lack of or unsuitable cultural treatments, stamping, grazing, etc. . . . Moreover, S. Vitale Pine wood is richer than Classe Pine wood in *Querco-Fagetea* species. The difference between rocky and plain communities is mainly due to the microclimatic conditions, which are dependent on the soil type. With regard to water balance, the difference between the loose, deep, sandy soils of the plain communities, with a high groundwater level, and the thin stony soils of the plain communities, with a high groundwater level, and the thin stony soils of the rocky communities is evident.

Hygrophilous wood communities

In the dune slacks, at time inundated, of Bosco Mesola and of S. Vitale and Classe Pine woods, some hygrophilous wood communities are settled, characterised by a significant abundance of *Ulmus minor, Quercus robur, Populus alba, Fraxinus angustifolia, Frangula alnus.* Pirola (1974), analysing S. Vitale Pine wood, was able to recognize two hygrophilous communities (*Ulmus minor* variant and *Populus alba* and *Fraxinus angustifolia* variant) and attributed them to the order *Populetalia albae.* Corbetta & Pettener (1976) also assigned the hygrophilous communities observed in Bosco Mesola to the same order. More recently, Piccoli & Gerdol (1980) suggested the attribution of the same Mesola plant communities to *Carici-Fraxinetum angustifoliae* described

by Pedrotti (1970) with regard to Sinello woods. We analysed 85 relevés performed in Mesola, S. Vitale, Classe and Sinello woods, and then reported the six groups obtained in a synoptical table (Tab. 4). Group A and B, relating to the relevés from Bosco Mesola, show a relatively low similarity (21%). Interestingly, *Quercetea ilicis* species, almost lacking in the first group, are well represented in group B.

Quite low, too (18% or even less), is the similarity between Pine woods groups (C, D, E). In particular, group C seems to correspond to the *Ulmus* variant described by Pirola, and is characterised by abundance of *Ulmus minor* and marsh species, while group D could be joined to the *Populus* and *Fraxinus* variant and is marked by a great number of *Querco-Fagetea* and *Quercetea ilicis* species. In group E, consisting of relevés from S. Vitale, a high abundance of *Populus alba* is found, together with an appreciable number of *Populetalia albae* species. It is noteworthy that marsh species are lacking in group E.

The vegetational diversity observed in the Pine woods is probably due to both anthropogenic and microenvironmental causes. Moreover, these plant communities should be regarded as unstable owing to the remarkable subsidence phenomena which have occurred in the Ravenna area over the last twenty years, and which have caused the relative rising of groundwater level.

Finally, the constancy column F of tab. 4 represents *Carici-Fraxinetum angustifoliae* Pedrotti 1970 (from Sinello river) and is reported for the sake of comparison.

The phytosociological attribution of the vegetation types recognized appears problematical. In fact, all the groups are quite different from Sinello relevés (Jaccard similarity 10—12%) and the lack of character species of *Carici-Fraxinetum angustifoliae* (except *Fraxinus angustifolia* and *Ulmus minor*) is noteworthy. All these communities should belong to the order *Populetalia albae* Br.-Bl. 1931. However the attribution to associations already described and even to alliances is uncertain because of the scarcity of character species.

	A	B	C	D	E	F	G	H
A	—	18	17	16	17	11	7	13
B	18	—	21	18	21	13	9	15
C	17	21	—	18	18	13	6	10
D	16	18	18	—	21	13	8	13
E	17	21	18	21	—	27	16	18
F	11	13	13	13	27	—	17	15
G	7	9	6	8	16	17	—	13
H	13	15	10	13	18	15	13	—

Fig. 2. Similarity index values among the xerophytic wood communities. A: Horvatić's relevés on the dalmatic coast (1962); B: Lausi and Poldini's relevés on the coast of Trieste (1962); C: Monte Conero (Biondi 1982 and unpublished data); D: Monte Conero, mesophytic aspects (unpublished data); E: Bosco Nordio (Pignatti 1959), F: Classe Pine wood (unpublished data); G: S. Vitale Pine wood (unpublished data); H: Bosco Mesola (Piccoli & Gerdol 1980 and unpublished data).

Table 1. *SYNOPTICAL TABLE OF HALOPHILOUS AND HALOPHILOUS-HYGROPHILOUS COMMUNITIES*

Plant communities Number of relevés	A 12	B 60	C 35	D 50	E 15	F 15	G 49	H 8	I 50	L 44
Character species of *Spartinetea maritimae*										
Spartina stricta	V^{5}	.	.	.	.	.	.	.	.	.
Character species of *Puccinellio-Salicornietea*										
Aster tripolium	V^{+}	II^{1}	II^{+}	IV^{2}	V^{1}	.	II^{+}	.	IV^{+}	III^{2}
Halimione portulacoides	.	I^{+}	V^{2}	I^{+}	.	.	I^{+}	.	.	I^{+}
Salicornia europaea	I^{+}	I^{+}	.	V^{3}	.	.	.	.	.	.
Bassia hirsuta	.	I^{+}	.	.	.	II^{+}	.	.	.	.
Character species of *Limonio-Salicornietalia* and *Puccinellio-Salicornion*										
Puccinellia palustris	IV^{+}	V^{2}	III^{1}	III^{+}	.	II^{+}	I^{+}	.	I^{+}	I^{1}
Limonium vulgare	I^{+}	IV^{2}	III^{1}	II^{+}	.	II^{+}	II^{+}	.	I^{+}	I^{+}
Inula crithmoides	.	.	II^{1}	.	.	I^{+}	I^{+}	.	I^{+}	I^{+}
Arthrocnemum fruticosum	.	V^{4}	I^{1}	II^{+}	.	.	.	.	.	.
Arthrocnemum glaucum	.	I^{1}	II^{+}	.	.	.	.	.	.	.
Arthrocnemum perenne	.	.	V^{3}	.	.	.	.	.	.	.
Agropyron elongatum	.	.	I^{1}	.	.	.	II^{1}	.	.	.
Artemisia caerulescens	.	.	.	.	.	.	I^{+}	.	.	.
Character species of *Therosalicornietalia* and *Therosalicornion*										
Suaeda maritima	.	II^{+}	I^{+}	IV^{1}	V^{2}	I^{+}	.	.	I^{+}	.
Salsola soda	.	I^{+}	.	I^{+}	IV^{2}	V^{2}	.	.	.	.
Character species of *Juncetalia maritimi* and *Juncion maritimi*										
Juncus maritimus	.	II^{1}	I^{1}	.	.	.	V^{4}	IV^{+}	III^{+}	II^{1}
Aeluropus litoralis	.	I^{+}	III^{1}	.	.	IV^{4}	I^{1}	.	II^{2}	I^{+}
Sonchus maritimus	.	.	.	.	.	.	III^{2}	IV^{+}	II^{1}	II^{1}
Carex extensa	.	.	.	.	.	.	I^{1}	IV^{+}	.	.
Plantago coronopus	.	.	.	.	.	.	I^{+}	III^{+}	.	.
Linum maritimum	.	.	.	.	.	.	I^{+}	III^{+}	.	.
Holoschoenus romanus	.	.	.	.	.	.	I^{+}	V^{1}	.	.
Character species of *Phragmitetea* and *Phragmitetali*										
Bolboschoenus maritimus	.	.	.	.	.	.	I^{1}	.	V^{4}	III^{1}
Phragmites australis	.	I^{+}	.	II^{1}	.	.	I^{1}	.	II^{+}	V^{4}
Schoenoplectus litoralis	.	.	.	.	.	.	.	.	II^{+}	.
Other species										
Agropyron pungens	.	.	I^{+}	I^{+}	II^{+}	.	I^{+}	I^{1}	I^{2}	II^{2}
Juncus acutus	.	I^{+}	.	.	.	.	I^{1}	I^{+}	I^{1}	I^{1}
Atriplex hastata	.	.	.	I^{1}	II^{+}	.	.	.	I^{1}	I^{2}
Agrostis stolonifera subsp. *maritima*	.	.	.	.	.	.	II^{2}	V^{+}	I^{1}	II^{2}
Samolus valerandi	.	.	.	.	.	.	I^{+}	II^{+}	II^{1}	I^{1}
Artemisia maritima	.	.	I^{+}	.	.	.	.	.	.	.
Limonium bellidifolium	.	.	I^{+}	.	.	.	.	.	.	.
Spergularia media	.	.	I^{+}	.	.	.	.	.	.	.
Cakile maritima	.	.	.	.	.	III^{1}	.	.	.	.
Ruppia maritima	.	.	.	.	.	.	I^{2}	.	.	.
Carex distans	.	.	.	.	.	.	I^{+}	.	.	.
Calystegia sepium	.	.	.	.	.	.	.	.	I^{1}	I^{1}
Cupularia viscosa	.	.	.	.	.	.	.	.	I^{1}	I^{1}
Lythrum salicaria	.	.	.	.	.	.	.	.	I^{+}	I^{+}
Oenanthe fistulosa	.	.	.	.	.	.	.	.	I^{+}	I^{+}
Mentha aguatica	.	.	.	.	.	.	.	.	I^{+}	I^{+}
Typha angustifolia	.	.	.	.	.	.	.	.	I^{+}	I^{+}
Juncus articulatus	.	.	.	.	.	.	.	.	I^{+}	.
Schoenoplectus lacustris	.	.	.	.	.	.	.	.	I^{+}	.
Sschoenus nigricans	.	.	.	.	.	.	.	.	I^{+}	.
Althaea officinalis	.	.	.	.	.	.	.	.	.	I^{+}
Galium palustre	.	.	.	.	.	.	.	.	.	I^{+}
Sparganium erectum	.	.	.	.	.	.	.	.	.	I^{+}
Stachys palustris	.	.	.	.	.	.	.	.	.	I^{+}

A : *Limonio Spartinetum maritimae* (Pignatti 1966) nom. nov. (= *Spartinetum strictae* Pignatti 1966)
B : *Salicornietum fruticosae* (Br.—Bl. 1931) Piqn. 1953
C : *Salicornietum radicantis* Br.—Br. (1930) 1933
D : *Salicornietum herbaceae* Van Langendonck 1933 (s. l).
E : *Suaedo-Kochietum hirsutae* Br.—Bl. 1928
F : *Salsoletum sodae* Pign. 1953
G : *Juncetum maritimi* (Rübel) 1930) Pign. 1953
H : *Holschoenetum romani* (Br.—Bl. 1931) 1951
I : *Scirpetum maritimi* Br.—Bl. 1931
L : *Phragmitetum communis* (Allorge 1921) Pign. 1953

Table 2. *SYNOPTICAL TABLE OF THE COMMUNITIES ON SAND DUNES*

Plant comunities	A	B	C	D	E
Number of relevés	10	14	30	8	12
Character species of *Cakilo-Xauthietum italici*					
Cakile maritima	V^{3}	V^{+}	IV^{+}	·	·
Salsola kali	II^{+}	II^{+}	II^{+}	·	·
Character species of *Agropyretum mediterraneum*					
Agropyron junceum subsp. *mediterraneum*	II^{+}	V^{3}	II^{1}	V^{+}	·
Cyperus kalli	·	I^{+}	II^{1}	V^{1}	·
Euphorbia peplis	·	I^{+}	·	·	·
Character species of *Medicago-Ammophiletum*					
Ammophila littoralis	·	III^{1}	V^{3}	III^{+}	·
Medicago marina	·	II^{+}	I^{+}	IV^{+}	·
Ambrosia maritima	·	·	·	III^{2}	·
Character species of *Tortulo-Scabiosetum*					
Scabiosa argentea	·	·	I^{+}	V^{1}	·
Tortula ruralis	·	·	·	V^{1}	·
Fumana procumbens	·	·	·	V^{1}	·
Character species of *Ammophiletalia*					
Calystegia soldanella	I^{+}	III^{1}	IV^{2}	·	·
Echinophora spinosa	·	IV^{+}	III^{1}	III^{+}	·
Euphorbia paralias	·	I^{+}	III^{+}	·	·
Phleum arenarium	·	·	II^{+}	IV^{+}	·
Eryngium maritimum	·	·	II^{+}	·	·
Character species of *Schoeno-Erianthetum* and *Schoenion litorale*					
Schoenus nigricans	·	·	·	·	V^{3}
Juncus acutus	·	·	I^{1}	·	IV^{1}
Erianthus ravennae	·	·	·	·	III^{+}
Character species of *Holoschoenetalia*					
Eupatorium cannabinum	·	·	·	·	II^{1}
Character species of *Quercetalia ilicis*					
Phillyrea angustifolia	·	·	·	·	V^{2}
Asparagus acutifolius	·	·	·	·	V^{1}
Rubia peregrina	·	·	·	·	III^{1}
Character species of *Querco-Fagetea*					
Ligustrum vulgare	·	·	·	·	IV^{1}
Brachypodium sylvaticum	·	·	·	·	III^{+}
Crataegus monogyna	·	·	·	·	I^{+}
Other species					
Xanthium italicum	IV^{+}	V^{1}	IV^{1}	·	·
Spartina juncea	III^{1}	·	I^{+}	·	·
Halimione portulacoides	I^{+}	I^{+}	·	·	·
Phragmites australis	II^{+}	I^{+}	·	·	V^{1}
Arundo donax	I^{+}	·	I^{+}	·	·

▶

Plant comunities	A	B	C	D	E
Number of relevés	10	14	30	8	12
Hordeum marinum	·	II^{+}	II^{1}	·	·
Inula crithmoides	·	II^{1}	II^{+}	·	·
Oenothera biennis	·	I^{+}	III^{1}	V^{+}	·
Cynodon dactylon	·	II^{+}	II^{+}	III^{+}	·
Conyza canadensis	·	·	I^{+}	III^{+}	·
Silene conica	·	·	II^{+}	II^{+}	·
Agropyron repens	·	·	I^{+}	·	I^{+}
Reichardia picroides	·	·	·	IV^{+}	·
Bromus sterilis	·	·	·	II^{+}	·
Setaria viridis	·	·	·	II^{+}	·
Dorycnium hirsutum	·	·	·	·	V^{+}
Galium palustre	·	·	·	·	III^{+}
Pyracantha coccinea	·	·	·	·	II^{+}
Dorycnium pentaphyllum	·	·	·	·	II^{+}
Juniperus communis	·	·	·	·	I^{1}
Hippophae rhamnoides	·	·	·	·	I^{+}
Hippophae rhamnoides	·	·	·	·	I^{+}
Arundo pliniana	·	·	·	·	I^{+}

A : *Cakilo-Xanthietum italici* (Bég. 1941) Pign. 1953
B : *Agropyretum mediterraneum* (Kuhnh.) Br.-Bl. 1933
C : *Medicago-Ammophiletum* Br.-Bl. (1921) 1923
D : *Tortulo-Scabiosetum* Pign. 1953
E : *Schoeno-Erianthetum* Pign. 1953

Table 3. *SYNOPTICAL TABLE OF XEROPHYTIC WOOD COMMUNITIES*

Plant communities	A	B	C	D	E	F	G	H
Number of relevés	38	29	65	43	8	18	21	95
Character species of *Orno-Quercetum ilicis** and *Quercetea ilicis*								
**Quercus ilex*	V^{3}	V^{3}	V^{4}	IV^{2}	V^{3}	III^{1}	I^{1}	V^{3}
Asparagus acutifolius	V^{1}	IV^{+}	V^{+}	V^{+}	V^{+}	V^{1}	V^{2}	IV^{+}
Rubia peregrina	V^{1}	IV^{+}	V^{1}	IV^{+}	V^{+}	IV^{1}	IV^{1}	III^{+}
Ruscus aculeatus	V^{2}	II^{+}	III^{+}	IV^{1}	V^{1}	IV^{1}	V^{2}	V^{1}
Osyris alba	I^{+}	V^{1}	IV^{1}	II^{+}	IV^{1}	II^{+}	II^{1}	·
Clematis flammula	II^{+}	V^{+}	II^{+}	·	II^{1}	III^{1}	II^{1}	II^{+}
Lonicera etrusca	I^{+}	IV^{+}	II^{+}	·	·	IV^{1}	I^{1}	I^{+}
**Rosa sempervirens*	II^{+}	·	IV^{+}	III^{+}	·	I^{+}	·	I^{+}
Phillyrea angustifolia	·	·	I^{+}	·	·	V^{2}	II^{+}	III^{1}
Smilax aspera	V^{3}	III^{+}	V^{2}	IV^{1}	·	·	·	·
Phillyrea latifolia	V^{1}	II^{1}	I^{+}	I^{+}	·	·	·	·
Laurus nobilis	II^{2}	I^{+}	I^{+}	I^{+}	·	·	·	·
Pistacia terebinthus	I^{+}	V^{1}	II^{+}	I^{+}	·	·	·	·
Arbutus unedo	IV^{1}	·	V^{2}	III^{1}	·	·	·	·
**Cyclamen repandum*	II^{+}	II^{+}	I^{+}	·	·	·	·	·
**Lonicera implexa*	III^{1}	·	IV^{+}	I^{+}	·	·	·	·
**Viburnum tinus*	III^{1}	·	III^{1}	III^{1}	·	·	·	·

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Plant communities Number of relevés	A 38	B 29	C 65	D 43	E 8	F 18	G 21	H 95
Juniperus oxycedrus	II^{+}	·	IV^{1}	I^{+}	·	·	·	·
**Rhamnus alaternus*	II^{1}	·	III^{+}	I^{+}	·	·	·	·
Pistacia lentiscus	IV^{1}	·	III^{1}	·	·	·	·	·
Erica arborea	III^{1}	·	I^{+}	·	·	·	·	·
Pinus halepensis	II^{3}	·	I^{+}	·	·	·	·	·
**Carex distachya*	I^{1}	·	II^{+}	·	·	·	·	·
Cistus incanus	I^{1}	·	II^{+}	·	·	·	·	·
**Asplenium onopteris*	II^{+}	·	·	II^{+}	·	·	·	·
Olea europaea	I^{+}	I^{+}	·	·	·	·	·	·
Paliurus spina-christi	I^{+}	I^{+}	·	·	·	·	·	·
Myrtus communis	II^{1}	·	·	·	·	·	·	·
Quercus coccifera	I^{4}	·	·	·	·	·	·	·
Erica manipuliflora	I^{1}	·	·	·	·	·	·	·
**Oryzopsis virescens*	I^{1}	·	·	·	·	·	·	·
Helictotrichon convolutum	I^{1}	·	·	·	·	·	·	·
Cistus salvifolius	I^{+}	·	·	·	·	·	·	·
Juniperus phoenicea	I^{+}	·	·	·	·	·	·	·
**Arbutus andrachne*	I^{+}	·	·	·	·	·	·	·
Teline monspessulana	I^{+}	·	·	·	·	·	·	·
Viola alba subsp. *scotophylla*	·	I^{+}	·	·	·	·	·	·
Pulicaria odora	·	·	III^{+}	·	·	·	·	·
Species of *Querco-Fagetea*								
Fraxinus ornus	III^{1}	V^{1}	V^{1}	V^{1}	V^{1}	·	II^{1}	III^{+}
Coronilla emerus	III^{+}	V^{+}	IV^{+}	IV^{+}	II^{1}	IV^{2}	II^{1}	I^{+}
Quercus pubescens	I^{1}	II^{+}	III^{1}	V^{1}	IV^{1}	II^{1}	II^{1}	·
Crataegus monogyna	I^{+}	III^{+}	·	I^{+}	V^{+}	IV^{1}	V^{2}	V^{+}
Ligustrum vulgare	I^{+}	I^{+}	·	·	IV^{+}	IV^{1}	III^{1}	IV^{+}
Brachypodium sylvaticum	II^{+}	I^{+}	I^{+}	I^{1}	·	·	·	IV^{+}
Tamus communis	II^{1}	I^{+}	I^{+}	·	·	·	·	I^{+}
Ostrya carpinifolia	I^{+}	V^{1}	I^{+}	V^{2}	·	·	·	·
Cotinus coggygria	·	IV^{1}	I^{1}	I^{1}	·	I^{1}	·	·
Cornus sanguinea	·	I^{+}	I^{+}	II^{+}	·	I^{1}	·	I^{+}
Cornus mas	·	II^{+}	·	I^{+}	·	I^{+}	I^{+}	II^{+}
Vincetoxicum hirundinaria	·	I^{+}	·	·	·	·	II^{+}	V^{1}
Euonymus europaea	·	I^{+}	·	I^{+}	·	I^{+}	II^{1}	I^{+}
Viola hirta	·	·	III^{+}	IV^{+}	I^{+}	III^{+}	·	II^{+}
Buglossoides purpurocaerulea	·	·	I^{+}	II^{1}	·	II^{+}	III^{1}	I^{+}
Cephalanthera longifolia	·	·	I^{+}	I^{+}	·	·	I^{+}	I^{+}
Clematis vitalba	·	·	·	III^{+}	IV^{+}	·	·	I^{+}
Carpinus orientalis	·	II^{1}	·	·	·	I^{1}	·	V^{3}
Viola reichenbachiana	I^{+}	·	·	·	·	·	·	·
Prunus mahaleb	·	IV^{+}	·	·	·	·	·	·
Melittis melissophyllum	·	I^{+}	I^{+}	II^{+}	·	·	·	·
Sorbus torminalis	·	I^{+}	·	I^{+}	·	·	·	·
Mercurialis perennis	·	I^{+}	·	I^{1}	·	·	·	·
Polygonatum officinale	·	I^{+}	·	·	·	·	·	·
Geranium sanguineum	·	I^{+}	·	·	·	·	·	·
Viburnum lantana	·	I^{+}	·	·	·	·	·	·
Daphne laureola	·	·	III^{+}	V^{+}	·	·	·	·
Inula conyza	·	·	I^{+}	·	·	·	·	·
Hepatica nobilis	·	·	·	II^{1}	·	·	·	·
Acer obtusatum	·	·	·	II^{1}	·	·	·	·
Primula vulgaris	·	·	·	II^{1}	·	·	·	·
Sanicula europaea	·	·	·	I^{1}	·	·	·	·
Melica uniflora	·	·	·	I^{+}	·	·	·	·
Colutea arborescens	·	·	·	I^{+}	·	·	·	·

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Plant communities	A	B	C	D	E	F	G	H
Number of relevés	38	29	65	43	8	18	21	95
Euphorbia amygdaloides	·	·	·	I+	·	·	·	·
Circaea lutetiana	·	·	·	·	I+	·	·	·
Prunus spinosa	·	·	·	·	·	I+	II¹	I+
Rhamnus catharticus	·	·	·	·	·	I¹	II¹	·
Vitis vinifera subsp. *sylvestris*	·	I+	·	·	·	I+	·	I+
Ulmus minor	·	·	·	·	·	·	II+	II+
Calamintha nepeta	·	·	·	·	·	·	II¹	I+
Clinopodium vulgare	·	·	·	·	·	·	II+	I+
Populus alba	·	·	·	·	·	·	I+	I+
Fraxinus angustifolia	·	·	·	·	·	·	I+	I+
Rosa canina	·	·	·	·	·	·	I+	·
Carpinus betulus	·	·	·	·	·	·	·	II¹
Malus sylvestris	·	·	·	·	·	·	·	I+
Rubus caesius	·	·	·	·	·	·	·	I+
Other species								
Hedera helix	III¹	III¹	I¹	IV¹	III¹	V¹	IV¹	V¹
Rubus ulmifolius	III¹	I+	I¹	I+	IV¹	IV¹	IV²	III+
Brachypodium pinnatum	I+	·	II+	II¹	·	II²	I+	·
Viola alba subsp. *dehnhardtii*	I+	·	I+	I+	·	·	II¹	I+
Galium mollugo	I+	·	·	·	·	·	IV¹	·
Stellaria media	·	·	·	·	·	·	I+	·
Carex flacca	·	II+	I+	II¹	·	I+	·	·
Dactylis glomerata	·	II+	I+	·	IV+	II¹	I¹	·
Lonicera caprifolium	·	·	II+	II+	·	IV¹	IV+	I+
Viola canina	·	·	I+	II+	·	II+	II¹	I+
Teucrium chamaedrys	·	·	I+	·	V+	III¹	III+	I+
Bromus erectus	·	·	II+	·	·	II²	III¹	·
Scabiosa columbaria	·	·	I+	·	·	II+	I+	·
Teucrium polium	·	·	I+	·	·	I¹	I+	·
Pteridium aquilinum	·	·	·	I+	·	I+	I+	I²
Carex halleriana	III¹	I+	·	·	·	·	·	·
Sesleria autumnalis	II¹	II¹	·	·	·	·	·	·
Frangula rupestris	I¹	III+	·	·	·	·	·	·
Teucrium flavum	I+	·	II+	I+	·	·	·	·
Oryzopsis miliacea	I+	·	·	I+	·	·	·	·
Prunella vulgaris	I+	·	·	I+	·	·	·	·
Stachys officinalis	·	·	III+	III¹	·	·	·	·
Cytisus sessilifolius	·	·	III+	II¹	·	·	·	·
Sorbus domestica	·	·	I+	II+	·	·	·	·
Cephalanthera damasonium	·	·	I+	I+	·	·	·	·
Brachypodium retusum	II¹	·	·	·	·	·	·	·
Acer monspessulanum	·	IV¹	·	·	·	·	·	·
Hieracium pilosella	·	·	II+	·	·	·	·	·
Staehelina dubia	·	·	II+	·	·	·	·	·
Dorycnium hirsutum	·	·	II+	·	·	·	·	·
Dorycnium pentaphyllum	·	·	II+	·	·	·	·	·
Cyclamen hederifolium	·	·	·	IV+	·	·	·	·
Quercus cerris	·	·	·	II+	·	·	·	·
Solidago virgaurea	·	·	·	II+	·	·	·	·
Juniperus communis	·	·	·	·	IV¹	III¹	IV²	II+
Silene vulgaris	·	·	·	·	IV+	II+	III¹	·
Pinus pinea	·	·	·	·	II¹	V²	V²	·
Carex liparocarpos	·	·	·	·	II+	II+	·	I+
Quercus robur	·	·	·	·	·	IV²	V²	III¹
Pyracantha coccinea	·	·	·	·	·	IV+	II+	I+
Euphorbia cyparissias	·	·	·	·	·	III¹	V¹	I+

▶

Plant communities Number of relevés	A 38	B 29	C 65	D 43	E 8	F 18	G 21	H 95
Berberis vulgaris	·	·	·	·	·	III^{+}	III^{1}	I^{+}
Frangula alnus	·	·	·	·	·	II^{1}	III^{1}	I^{+}
Sanguisorba minor	·	·	·	·	·	II^{+}	III^{+}	·
Helianthemum nummularium	·	·	·	·	·	II^{+}	I^{+}	·
Orchis tridentata	·	·	·	·	·	II^{+}	I^{+}	·
Festuca rubra	·	·	·	·	·	I^{2}	I^{1}	·
Poa pratensis	·	·	·	·	·	I^{+}	I^{1}	·
Scabiosa atropurpurea subsp. *maritima*	·	·	·	·	·	I^{+}	I^{+}	·
Ornithogalum umbellatum	·	·	·	·	·	I^{+}	I^{+}	·
Clematis vitalba	·	·	·	·	·	I^{1}	·	I^{+}
Carex distans	·	·	·	·	·	·	I^{+}	III^{+}
Equisetum palustre	·	·	·	·	·	·	I^{+}	II^{+}
Asparagus officinalis	·	·	·	·	V^{+}	·	·	·
Robinia paseudacacia	·	·	·	·	II^{+}	·	·	·
Peucedanum oreoselinum	·	·	·	·	II^{+}	·	·	·
Thymus pulegioides	·	·	·	·	·	II^{1}	·	·
Ranunculus nemorosus	·	·	·	·	·	II^{+}	·	·
Anthoxanthum odoratum	·	·	·	·	·	·	III^{+}	·
Daucus carota	·	·	·	·	·	·	III^{+}	·
Tuberaria guttata	·	·	·	·	·	·	II^{1}	·
Poa bulbosa f. *vivipara*	·	·	·	·	·	·	II^{1}	·
Luzula multiflora	·	·	·	·	·	·	II^{1}	·
Ranunculus bulbosus	·	·	·	·	·	·	II^{+}	·
Cerastium glomeratum	·	·	·	·	·	·	II^{+}	·
Bromus rigidus	·	·	·	·	·	·	II^{+}	·
Calystegia sepium	·	·	·	·	·	·	II^{+}	·
Hippophaë rhamnoides	·	·	·	·	·	·	II^{+}	·
Lotus corniculatus	·	·	·	·	·	·	II^{+}	·

Species with low frequency:

column A : *Prunella laciniata, Carex serrulata, Galium spurium, Garanium purpureum, Oenanthe pimpinelloides*

column B : *Carex alba, Celtis australis*

column C : *Ampelodesmos mauritanicus, Coronilla valentina, Eryngium campestre, Silene italica, Cephalaria leucantha, Fumana procumbens, Psoralea bituminosa, Spartium junceum, Ajuga reptans*

column D : *Fragaria vesca, Ilex aquifolium, Hieracium lachenalii, Silene nutans, Ruscus hypoglossum*

column E : *Hornungia petraea, Festuca glauca*

column F : *Pinus pinaster*

column G : *Vicia sativa, Genista tinctoria, Poa trivialis, Plantago lanceolata, Plantago major, Polygala comosa, Salvia verbenaca, Silene alba, Solanum dulcamara, Vicia villosa*

column H : *Molinia coerulea, Pyrus piraster, Molinia altissima, Luzula campestris.*

Table 4. *SYNOPTICAL TABLE OF HYGROPHYTIC WOOD COMMUNITIES*

Plant communities Number of relevés	A 7	B 14	C 9	D 32	E 18	F 5
Dominant wood species						
Quercus robur	V^{2}	III^{1}	II^{1}	V^{3}	IV^{1}	IV^{+}
**Fraxinus angustifolia*	V^{3}	V^{2}	I^{1}	II^{1}	II^{1}	V^{1}
**Ulmus minor*	IV^{1}	V^{2}	V^{3}	III^{1}	V^{2}	V^{4}
Species of *Populetalia albae*						
Populus alba	II^{+}	IV^{1}	III^{1}	III^{3}	V^{3}	V^{1}
Brachypodium sylvaticum	·	IV^{+}	I^{+}	IV^{1}	·	III^{+}
Vitis vinifera subsp. *sylvestris*	·	I^{+}	·	I^{+}	I^{+}	·
Rubus caesius	IV^{1}	·	·	·	I^{1}	·
Salix alba	·	·	I^{+}	·	I^{+}	·
Salix cinerea	·	·	I^{+}	·	I^{+}	·
Solanum dulcamara	·	·	·	I^{+}	II^{+}	·
Bryonia cretica	·	·	·	·	I^{+}	I^{+}
Alnus glutinosa	·	I^{1}	·	·	·	·
Sison amomum	·	·	·	·	·	I^{+}
Character species of *Carici-Fraxinetum angustifoliae** and *Alno-Ulmion*						
**Carex divulsa*	·	·	·	I^{+}	·	II^{+}
**Ranunculus lanuginosus*	·	·	·	·	·	V^{2}
**Carex remota*	·	·	·	·	·	V^{1}
**Rumex sanguineus*	·	·	·	·	·	V^{1}
**Carex pendula*	·	·	·	·	·	IV^{+}
Stachys sylvatica	·	·	·	·	·	II^{+}
Equisetum telmateja	·	·	·	·	·	I^{+}
Species of *Carpinion* and *Fagetalia sylvaticae*						
Carpinus betulus	II^{+}	I^{1}	·	I^{+}	·	·
Arum maculatum	·	·	·	I^{+}	·	·
Viola reichenbachiana	·	·	·	·	·	I^{+}
Carex sylvatica	·	·	·	·	·	I^{+}
Symphytum tuberosum	·	·	·	·	·	I^{+}
Species of *Querco-Fagetea*						
Prunus spinosa	V^{2}	IV^{1}	V^{1}	III^{1}	I^{1}	III^{+}
Crataegus monogyna	II^{+}	II^{+}	III^{1}	V^{1}	V^{1}	IV^{+}
Cornus sanguinea	III^{+}	II^{+}	·	III^{1}	·	III^{+}
Ligustrum vulgare	III^{+}	IV^{1}	I^{+}	V^{1}	V^{2}	·
Cornus mas	I^{1}	·	IV^{1}	II^{+}	II^{1}	·
Rhamnus cathartica	I^{+}	·	·	I^{+}	·	·
Carpinus orientalis	·	II^{1}	·	II^{1}	·	I^{+}
Euonymus europaea	·	I^{+}	I^{1}	III^{1}	IV^{1}	·
Calamintha nepeta	·	I^{+}	·	·	III^{+}	·
Clematis vitalba	·	·	III^{+}	I^{+}	·	I^{+}
Populus tremula	·	·	I^{+}	I^{+}	·	·
Buglossoides purpureo-coerulea	·	·	·	V^{2}	II^{1}	·
Coronilla emerus	·	·	·	I^{+}	I^{+}	·
Quercus pubescens	·	·	·	I^{1}	I^{+}	·
Acer campestre	·	·	·	I^{+}	·	I^{+}
Geum urbanum	·	·	·	·	II^{+}	I^{+}
Viola hirta	·	·	·	III^{1}	·	·

▶

Plant communities	A	B	C	D	E	F
Number of relevés	7	14	9	32	18	5
Berberis vulgaris	·	·	·	III^{+}	·	·
Mespilus germanica	·	·	·	I^{+}	·	·
Viburnum lantana	·	·	·	I^{+}	·	·
Cotinus coggygria	·	·	·	I^{1}	·	·
Rosa canina	·	·	·	·	I^{+}	·
Ranunculus ficaria	·	·	·	·	·	V^{+}
Quercus cerris	·	·	·	·	·	II^{+}
Species of *Quercetea ilicis*						
Ruscus aculeatus	I^{+}	III^{+}	I^{+}	V^{2}	III^{+}	IV^{+}
Rubia peregrina	·	II^{+}	·	IV^{1}	II^{+}	·
Asparagus acutifolius	·	II^{+}	·	IV^{+}	IV^{+}	·
Phillyrea angustifolia	·	I^{+}	·	I^{+}	·	·
Quercus ilex	·	IV^{1}	·	·	·	·
Lonicera etrusca	·	·	I^{+}	II^{1}	·	·
Clematis flammula	·	·	·	II^{+}	·	·
Rosa sempervirens	·	·	·	II^{+}	·	·
Smilax aspera	·	·	·	·	·	II^{+}
Species of wet soils						
Schoenus nigricans	II^{1}	·	I^{+}	·	·	·
Lythrum salicaria	II^{1}	·	I^{+}	·	·	·
Lycopus europaeus	I^{+}	·	IV^{+}	·	·	·
Euphorbia palustris	I^{1}	I^{+}	I^{+}	I^{1}	·	·
Galium palustre	III^{+}	III^{+}	·	I^{+}	·	·
Cladium mariscus	III^{2}	III^{1}	I^{1}	I^{1}	·	·
Samolus valerandi	·	II^{+}	I^{+}	I^{+}	·	·
Carex acutiformis	·	II^{+}	·	·	·	·
Mentha aquatica	·	II^{+}	·	·	·	·
Thelypteris palustris	·	I^{2}	·	·	·	·
Hydrocotyle vulgaris	·	I^{+}	·	·	·	·
Alisma plantago-aquatica	·	·	III^{1}	·	·	I^{+}
Lysimachia vulgaris	·	·	III^{+}	·	·	·
Gratiola officinalis	·	·	I^{+}	I^{+}	·	·
Other species						
Hedera helix	I^{2}	V^{+}	I^{+}	V^{2}	IV^{2}	IV^{+}
Rubus ulmifolius	I^{+}	IV^{+}	I^{+}	III^{1}	III^{+}	IV^{+}
Equisetum sp.	IV^{1}	·	·	·	I^{+}	·
Carex distans	III^{1}	IV^{+}	·	·	I^{1}	·
Pyracantha coccinea	II^{+}	·	I^{+}	IV^{1}	·	·
Frangula alnus	V^{1}	III^{1}	I^{+}	IV^{2}	I^{+}	·
Molinia arundinacea	V^{3}	II^{1}	III^{1}	III^{1}	·	·
Pyrus pyraster	III^{+}	I^{+}	V^{+}	II^{+}	·	·
Pteridium aquilinum	·	II^{+}	·	IV^{1}	I^{+}	·
Lonicera caprifolium	·	I^{+}	·	III^{1}	V^{1}	I^{+}
Calystegia sepium	·	I^{+}	III^{+}	I^{+}	III^{1}	·
Vincetoxicum hirundinaria	·	IV^{+}	I^{+}	I^{+}	III^{1}	·
Valeriana officinalis	·	·	I^{+}	·	I^{+}	·
Juniperus communis	·	·	I^{+}	III^{1}	I^{1}	·
Viola canina	·	·	I	III^{1}	I^{1}	·
Pinus pinea	·	·	·	II^{1}	V^{1}	·
Euphorbia cyparissias	·	·	·	II^{+}	IV^{+}	·
Brachypodium pinnatum	·	·	·	II^{1}	III^{1}	·
Scabiosa columbaria	·	·	·	I^{1}	II^{+}	·
Teucrium chamaedrys	·	·	·	I^{+}	I^{+}	·
Festuca rubra	·	·	·	I^{+}	I^{+}	·

Plant communities	A	B	C	D	E	F
Number of relevés	7	14	9	32	18	5
Eupatorium cannabinum	·	·	·	I+	I+	·
Ornithogalum ssp.	·	·	·	I+	I+	·
Galium mollugo	·	·	·	I+	III1	II+
Poa trivialis	·	·	·	·	II1	V1
Arum italicum	·	·	·	·	II+	V+
Potentilla reptans	·	II+	·	·	·	I+
Agrostis stolonifera	·	II+	·	·	·	·
Stachys officinalis	·	·	·	II+	·	·
Carex caespitosa	·	·	·	II+	·	·
Listera ovata	·	·	·	II+	·	·
Viola alba	·	·	·	·	IV1	·
Stellaria media	·	·	·	·	III+	·
Silena alba	·	·	·	·	III+	·
Geranium robertianum	·	·	·	·	III1	·
Colchicum autumnale	·	·	·	·	III1	·
Cerastium glomeratum	·	·	·	·	III1	·
Anthoxanthum odoratum	·	·	·	·	II1	·
Ranunculus bulbosus	·	·	·	·	II+	·
Oenanthe pimpinelloides	·	·	·	·	·	V+
Prunella vulgaris	I+	·	·	·	·	IV+

Species with low frequency:

column D : *Carex flacca, Ajuga reptans, Orobanche hederae, Pinus pinaster, Ranunculus nemorosus, Silene vulgaris, Clematis viticella, Centaurea paniculata, Lithospermum officinale*

column E : *Vicia villosa, Vicia sativa, Veronica arvensis, Taraxacum officinale, Silene italica, Robinia pseudacacia, Poa pratensis, Plantago major, Plantago lanceolata, Luzula multiflora, Helianthemum nummularium, Daucus, carota, Cardamine hirsuta, Artemisia vulgaris, Arabidopsis thaliana, Arabis hirsuta, Bromus rigidus*

column F : *Carex vulpina, Veronica serpyllifolia.*

References

Beeftink, W. G., J. M. Gehu, 1973: *Spartinetea maritimae.* Prodrome des groupements végétaux d'Europe. 1 vol., 1—43 pp., Lehre.

Biondi, E., 1982: La vegétation du Monte Conero. In: *Pedrotti, F.,* ed. Guide--Itineraire. Excursion International de Phytosociologie en Italie centrale. Camerino.

Corbetta, F., 1968: La vegetazione delle valli del litorale ferrarese e ravennate. Not. Fitosoc. *5,* 67—98.

Corbetta, F., 1974: La vegetazione delle pialasse. In: *Scossiroli, R.* (ed.) Influenza di insediamenti industriali sul circostante ambiente naturale. Compositori, Bologna.

Corbetta, F., 1976: Lineamenti vegetazionali della sacca di Bellocchio (foce del Reno). Suppl. alle Ricerche di Biologia della selvaggina 7, 247—270.

Corbetta, F., E. Bachiocco, 1972: Lineamenti della vegetazione di Monte Conero. Giorn. Bot. It. *106,* 274—275.

Corbetta, F., D. Pettener, 1976: Lineamenti vegetazionali del Bosco della Mesola. Giorn. Bot. It. *110,* 448—449.

Giacomini, V., 1974: Il paesaggio vegetale. In: *Scossiroli, R.,* ed. Influenza di insediamenti industriali sul circostante ambiente naturale. Compositori, Bologna.

Horvatić, S., 1963: Biljnogeografski položaj i raščlanjenje našeg primorja u svjetlu suvremenih fitocenoloških istraživanja. Acta Bot. Croat. *22,* 27—81.

Jaccard, P., 1901: Etude comparative de la distribution florale dans une portion des Alpes et du Jura. Bull. Soc. Vaud. Sc. Nat. *37,* 547—579.

Lausi, D., L. Poldini, 1962: Il paesaggio vegetale della costiera triestina. Boll. Soc. Adr. Sc. *52,* 1—63.

Pedrotti, F., 1970: Un relitto di bosco planiziare a *Quercus robur* e *Fraxinus angustifolia* lungo il fiume Sinello in Abruzzo. Camerino.

Piccoli, F., R. Gerdol, 1980: Typology and dynamics of a wood in the Po plane (N-Italy): the »Bosco della Mesola«. Colloques phytosociologiques IX-Les forets alluviales. Strasbourg.

Pignatti, S., 1959: Il popolamento vegetale — Ricerche sull'ecologia e sul popolamento delle dune del litorale di Venezia. Bull. Mus. Civ. St. Nat. Venezia *12,* 61—141.

Pignatti, S., 1966: La vegetazione alofila della laguna veneta. Mem. Ist. Ven. Sc. Lett. Arti *33*(1), 3—174.

Pirola, A., 1974: a) La vegetazione della Pineta di S. Vitale. b) La vegetazione psammofila e del primo cordone dunale. In: *Scossiroli, R.* (ed.) Influenza di insediamenti industriali sul circostante ambiente naturale. Compositori, Bologna.

Turroni, E., N. Merloni, 1982: Osservazioni sulla flora e vegetazione acquatica del territorio ravennate. Classense, *13,* 28—44.

Wishart, D., 1969: Clustan 1A, User Manual. St. Andrews.

Zangheri, P., 1976: Flora Italica. Cedam, Padova.

RIASSUNTO

LINEAMENTI VEGETAZIONALI DELLA ZONA COSTIERA DELL'ALTO ADRIATICO

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Nel presente lavoro si propone una sintesi delle conoscenze attualmente disponibili sui principali aspetti della vegetazione costiera (boschi a *Quercus ilex*, aggruppamenti forestali igrofili, vegetazione alofila e psammofila) del territorio compreso tra le foci del Po e il promontorio del Conero.

Le tipologie individuate (per le quali vengono presentate le relative tabelle sintetiche) sono il risultato di elaborazioni quantitative effettuate mediante cluster analysis su un numero considerevole di rilievi fitosociologici (circa 750) in parte già pubblicati, in parte inediti.

SAŽETAK

PREGLED VEGETACIJE OBALNOG POJASA SJEVERNOG JADRANA

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Na temelju analize oko 750 fitocenoloških snimaka autori donose sintetski pregled današnje kserofilne i higrofilne vegetacije, te halofilnih i psamofilnih fitocenoza obalnog područja sjevernog Jadrana od delte rijeke Po do okolice Ancone (Monte Conero) u Italiji.

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