

**Review of plant communities from Greek dunes and salt-marshes,
a preliminary summarizing list**

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INTRODUCTION AND METHODS

A review of the plant communities occurring along the Greek coast is in preparation. From literature 1290 relevés were taken (see references). These relevés were put into a database by means of TURBOVEG. Species names are according to Flora Europaea. Subspecies were treated on the species level only, as it can never be sure if different authors did recognize subspecies or not. We agree with Golub (1994) that "these "smaller species" are often not suitable for syntaxonomic syntheses covering large territories.

A structured table was produced by means of TWINSPAN. Some relevés were reshuffled by hand. A synoptic table was made containing both presence class and characteristic cover. Species were grouped to syntaxonomic species groups. After this some clusters were reshuffled. In the resulting table communities could clearly be distinguished. As comparison with literature from Greece and the surrounding countries, description of synecology and the production of distribution maps has still to be done, only a first preliminary list of the communities apparant in the table is presented here. Subassociations are suggested, but these have not yet been compared to previously described subassociations. Relevé's of the Ammophiletea, Cakiletea, Thero-Salicornietea and Arthrocnemetea are most numerous. Some clusters belonging to communities of other classes consist of few relevés only. Nevertheless, they are also presented to show which communities have been found in the Greek data.

RUPPIETEA J.Tx. 1960

* *Ruppium maritima* (Warming 1906) Béguinot 1941

Diagnostic species:

Ruppia maritima (dominant)

ZOSTERETEA MARINAE Pignatti 1953

* *Zosteretum noltii* (Syn. *Zosteretum nanae*)

Diagnostic species

Zostera noltii

POTAMETEA Tüxen & Preising 1942

* *Zannichellietum palustris* (Baumann 1911) G. Lang 1967

Diagnostic species

Zannichellia palustris (dominant)

THERO-SALICORNIA (Tx. 1954) Tx & Oberd. 1958

Thero-Salicornietalia (Tx. 1954) Tx & Oberd. 1958

Thero-Salicornion (Br.-Bl. 1931) Tx. 1950

* *Salicornietum europaea* (Warming 1906) Beefink 1962.Including *Salicornietum patulae* (Brullo et Furnari 1976) Géhu 1984.Syn. *Salicornietum herbaceae*.

Diagnostic species

*Salicornia europaea*** *typicum*** *suaedetosum maritimi*

Differential species

Suaeda maritima, *Halimione portulacoides*, *Arthrocnemum fruticosum*, *Aeluropus littoralis*,* *Halopeplidietum amplexicaulis* Burolet 1927

Diagnostic species

Halopeplis amplexicaulis

ARTHROCNEMETEA FRUTICOSI Tx. & Oberd. 1958

Arthrocnemetalia fruticosi Tx. & Oberd. 1958

Arthrocnemion fruticosi Br.-Bl. 1931 em. Riv. Mart. et al 1980.

* *Salicornio-Halocnemum strobilacei* Wolff 1969 (Stacion orientale ?)syn. *Arthrocnemum glaucum-Halocnemum strobilaceum-ass.* Oberd. 1952
p.p.

Diagnostic species

Halocnemum strobilaceum (dominant)** *typicum*** *Spergularietosum marinae* (syn. *Halocnemum strobilaceum-Spergularia salina-ass.* *Halocnemum-Spergularietum salinae*)Differential species *Spergularia marina*, *Hordeum marinum*, *Sphenopus divaricatus*.* *Arthrocnemum glauci*syn. *Arthrocnemum glaucum-Halocnemum strobilaceum-ass.* Oberd. 1952
p.p.

Diagnostic species

Arthrocnemum glaucum (dominant)

** **typicum**

** **parapholietosum strigosae**

Differential species: *Parapholis strigosa*, *Parapholis incurva*, *Plantago coronopus*, *Spergularia marina*, *Arthrocnemum perenne*, *Sphenopus divaricatus*.

* **Puccinellio-Halimionetum portulacoidis**

Diagnostic species

Halimione portulacoides (dominant)

* **Transition between Puccinellio-Halimionetum and Arthrocnemetum fruticosi**

Diagnostic species combination

Halimione portulacoides and *Arthrocnemum fruticosum* codominating

* **Arthrocnemetum perenne**

Syn. *Salicornia radicans*-ass. Br.-Bl. 1928, *Salicornietum radicans* Br.-Bl. 1931.

Diagnostic species

Arthrocnemum perenne (dominant)

** **arthrocnemetosum fruticosi**

Differential species

Arthrocnemum fruticosum

** **puccinellietosum festuciformis**

Differential species

Puccinellia festuciformis, *Spergularia marina*, *Plantago coronopus*, *Limonium vulgare*, *Parapholis strigosa*, *Aeluropus litoralis*, *Arthrocnemum glaucum*.

** **Transition between the arthrocnemetosum and the puccinellietosum**

* **Aeluropetum litoralis** Babalónas 1979

Syn. community of *Aeluropus litoralis* Géhu et al. 1990

Limonio-Aeluropetum litoralis (Bab. 1979) Géhu et al. 1986.

Diagnostic species

Aeluropus litoralis

* **Limonietum gmelinii** Babalónas 1979 (Stacion orientale?).

Diagnostic species

Limonium gmelinii, *Puccinellia festuciformis*, *Bupleurum tenuissimum*, *Hordeum marinum*, *Halimione portulacoides*, *Juncus gerardii*, *Centaurium pulchellum*, *Plantago coronopus*, *Limonium bellidifolium*, *Lolium rigidum*.

** **typicum**

** **scirpetosum maritimi**

Differential species

Scirpus maritimus, *Salicornia europaea*, *Scirpus litoralis*, *Arthrocnemum perenne*, *Cyperus laevigatus*, *Juncus acutus*.

* **Arthrocnemetum fruticosi**

Syn. *Salicornietum fruticosae* Br.-Bl. 1928

Diagnostic species

Arthrocnemum fruticosum (dominant)

**** juncetosum maritimi**

Differential species

Juncus maritimus, *Arthrocnemum perenne*, *Juncus subulatus*,

**** typicum**

**** puccinellietosum festuciformis**

Syn. *Puccinellia festuciformis*-*Arthrocnemum fruticosum* (Br. Bl. 1928) Géhu 1976.

Differential species

Puccinellia festuciformis, *Aeluropus litoralis*

**** suaedetosum maritimi**

Differential species

Suaeda maritima, *Arthrocnemum glaucum*, *Limonium bellidifolium*, *Puccinellia distans*, *Hordeum marinum*, *Spergularia media*.

* **Petrosimonia-Bupleuretum gracilis** Oberd. 1952

Syn. *Arthrocnemum glaucum*-*Puccinellia distans* ass., *Petrosimonia crassifolia*-*Bupleurum gracile* subass. Lavrentiades 1963.

Diagnostic species

Petrosimonia oppositifolia (dominant), *Bupleurum gracile*.

JUNCETEA MARITIMI Br.-Bl. (1931)1952

Juncetalia maritimi Br.-Bl. 1931

Juncion maritimi Br.-Bl. 1931

* **Limonio-Juncetum subulati** Géhu et al. 1990

Diagnostic species

Juncus subulatus (dominant)

* **Juncetum maritimi** (Rübel 1930) Pignatti 1953

Diagnostic species

Juncus maritimus (dominant)

* **Juncetum acuti** (Molinio-Juncetea?)

Diagnostic species

Juncus acutus (dominant)

**** juncetosum maritimi**

Differential species

Juncus maritimus, *Halimione portulacoides*, *Aster tripolium*, *Carex extensa*.

**** iridetosum spuriae**

Differential species

Iris spuria, *Elymus elongatus*, *Apium graveolens*, *Plantago major*, *Trifolium fragiferum*, *Ononis spinosa*, *Althaea officinalis*, *Asperula purpurea*, *Vicia pubescens*, *Galium aparine*, *Eryngium amethystinum*.

**** limonietosum bellidifoliae**

Differential species

Limonium bellidifolium, *Plantago coronopus*, *Hordeum marinum*, *Carex distans*,

Melilotus indicus, *Juncus bufonius*, *Ranunculus muricatus*, *Poa annua*, *Briza minor*, *Bromus hordeaceus*, *Imperata cylindrica*.

**** typicum**

MOLINIO-JUNCETEA Br.-Bl.(31) 47,

Holoschoenetalia Br.-Bl.(31) 47

Molinio-Holoschoenion Br.-Bl. (1931) 1947

* **Eriantho-Schoenetum nigricantis** (Pign.53) Géhu 1984

Diagnostic species

Schoenus nigricans, *Saccharum ravennae*

**** juncetosum maritimi**

Syn. Schoeneto-Plantaginetum coronopi Lavrentiades 1975

Differential species

Plantago coronopus, *Arthrocnemum fruticosum*, *Aeluropus litoralis*, *Limonium gmelinii*, *Elymus elongatus*, *Polypogon maritimus*, *Juncus maritimus*, *Dittrichia viscosa*, *Elymus hispidus*, *Lotus tenuis*, *Carex distans*, *Centaurium pulchellum*, *Piptatherum miliaceum*, *Daucus carota*, *Cichorium intybus*, *Seseli tortuosum*, *Cynodon dactylon*.

**** scirpetosum holoschoeni**

Differential species

Scirpus holoschoenus, *Phragmites australis*.

BOLBOSCHOENETEA MARITIMI Tx. & Vicherek ap. Tx & Hülbusch 1971

BOLBOSCHOENETALIA Hejny 1967

Scirpion maritimi Dahl & Hadac 1941

* **Scirpetum maritimi** Tx. 1937

Diagnostic species

Scirpus maritimus (dominant)

AMMOPHILETEA Br.-Bl. & Tx. 1943

Ammophiletalia Br.-Bl (1931) 1933

* **Elymetum sabulosi** Babalónas 1979

Diagnostic species

Leymus racemosus ssp. *sabulosus* (dominant)

**** mellilotetosum albae**

Differential species

Melilotus albus, *Seseli tortuosum*, *Phragmites australis*.

**** cynodontetosum dactyli**

Differential species

Cynodon dactylon, *Artemisia campestris*, *Salsola kali*, *Cichorium intybus*, *Tamarix hampeana*.

**** elymetosum farcti**

Syn. Leymo sabulosi-Elymetum farcti Géhu et al. 1986.

Differential species

Elymus farctus,

* **Artemisietum campestris** Babalónas 1979

Diagnostic species

Artemisia campestris (dominant), *Nigella arvensis*.

* **Ephedra distachya-Silene subconica-ass.** Oberd. 1952

Diagnostic species

Jasione heldreichii, *Centaurea cuneifolia*, *Silene conica*, *Nigella arvensis*, *Verbascum pinnatifidum*, *Ephedra distachya*, *Silene dichotoma*.

**** ephederetosum distachyae**

Differential species

Chondrilla juncea, *Ephedra distachya*, *Rumex acetosella*, *Corynephorus divaricatus*, *Hypericum olympicum*.

**** ammophiletosum**

Differential species

Eryngium maritimum, *Euphorbia paralias*, *Ammophila arenaria*, *Sporobolus pungens*.

* **Ammophiletum arundinaceae** Br.-Bl. (1921) 1933

Syn. Eryngio-Ammophiletum arundinaceae (Oberd. 1952) -Géhu et al. 1984., *Ammophila arenaria*-*Medicago marina*- Ass Br.-Bl. 1933.

Diagnostic species

Ammophila arenaria.

**** subass. ?**

* **Eryngio-Elymetum farcti** Géhu 1987

Syn. Agropyretum mediterraneum Br.-Bl. 1933

Diagnostic species

Elymus farctus (dominant)

**** subass. ?**

* **Eryngio-Sporoboletum virginici (pungentis)** Géhu 1989

Diagnostic species

Sporobolus pungens (dominant)

* **Elymo-Zygophylletum albi** Géhu et al. 1990

Diagnostic species

Zygophyllum album (dominant)

**** salsoletosum kali**

Differential species

Salsola kali, *Medicago marina*, *Pancratium maritimum*, *Elymus farctus*, *Xanthium spinosum*, *Alhagi graecorum*.

**** typicum**

* *Euphorbia terracina-Silene nicaeensis*-ass. Lavrentiades 1964.

Diagnostic species

Vulpia fasciculata, *Bromus rigidus*, *Lagurus ovatus*, *Pseudorlaya pumila*, *Euphorbia terracina*, *Silene nicaeensis*, *Hedynnois cretica*.

This community occurs on stabilized dunes. In Greece there is a considerable reduction of species characteristic for higher ranks.

**** subassociations ?**

?AMMOPHILETEA

?Helichryso-Crucianelletalia

?Sileno-Jurion kilaeae

* *Stachyo subcrenatae-Centaureetum kilaeae* Géhu & Uslu 1989

Syn. Peucedano obtusifolii-Festucetum beckeri Géhu et Uslu 1989.

Diagnostic species

Centaurea kilea, *Stachys recta* and other species.

* *Sarcopoterio-Centaureetum spinosae* Secmen & Leblebici 1978

Diagnostic species

Centaurea spinosa (dominant), *Sarcopoterium spinosum*, *Lavandula stoechas*.

CAKILETEA MARITIMAE Tx. & Prsg. 1950

Euphorbion peplis Tx. 1950

* *Atriplicetum tataricae* Lavrentiades 1975

Syn. *Atriplex tatarica*-*Atriplex hastata*-ass. Lavrentiades 1963

Diagnostic species

Atriplex tatarica

**** typicum**

**** euphorbietosum peplis**

Differential species

Euphorbia peplis, *Salsola kali*

* *Anthemis muenteriana-Salsola kali*-ass. Lavrentiades 1964

Syn. *Salsola kali*-*Matthiola tricuspidata*-ass. Lavrentiades 1976.

Diagnostic species

Anthemis tomentosa, *Matthiola tricuspidata*.

**** limonietosum sinuati**

Differential species

Limonium sinuatum, *Lagurus ovatus*, *Pseudorlaya pumila*, *Euphorbia paralias*, *Medicago marina*, *Euphorbia peplis*, *Thymus capitatus*, *Glaucium flavum*, *Sideritis romana*,

**** sporoboletosum pungentis**

Differential species

Sporobolus pungens, *Eryngium maritimum*, *Cakile maritima*, *Arundo donax*.

**** betetosum vulgaris**

Diagnostic species

Beta vulgaris

* **Salsola kali-Xanthium strumarium-ass.** Oberd. & Tx. 1950

Diagnostic species

Xanthium strumarium

** **typicum**

** **ammophiletosum arenarii**

Ammophila arenaria, *Elymus farctus*, *Cynodon dactylon*, *Scirpus holoschoenus*, *Xanthium spinosum*, *Polygonum maritimum*, *Atriplex tatarica*, *Cyperus rotundus*, *Lolium rigidum*.

* **Salsola kali-community**

Diagnostic species

Salsola kali (dominant)

* **Cakile maritima community** (Cakiletum maritimae ?)

Diagnostic species

Cakile maritima (dominant).

** **salsoletosum kali**

Differential species

Salsola kali

** **typicum**

* **Beto-Matthioletum tricuspidatae** Wolff 1969.

Diagnostic species

Beta vulgaris, *Matthiola tricuspidata*

Thero-Suaedetalia (Br.-Bl. & De Bolos 1957) Beeftink 1962.

Thero-Suaedion (Br.-Bl. 1931) Tx. 1950

* **Suaedo-Kochietum hirsutae** Br.-Bl. 1928

Diagnostic species

Bassia hirsuta (dominant)

* **Suaedo-Salsoletum sodae** Br.-Bl. 1931

Diagnostic species

Salsola soda (dominant)

* **Suaedetum splendentis**

Syn. *Salsola soda-Suaeda splendens-ass* Br.-Bl. 1930

Diagnostic species

Suaeda splendens

** **salicornietosum europaeae**

Differential species

Salicornia europaea

** **hordeetosum maritimi**

Differential species

Hordeum marinum, *Plantago coronopus*, *Spergularia marina*, *Petrosimonia oppositifolia*, *Atriplex tatarica*, *Agrostis stolonifera*, *Cynodon dactylon*.

CRITHMO-STATICETEA Br.-Bl. 1947 rocks

Crithmo-Staticetalia Mol. 1934

Crithmo-Staticion Mol. 1934

* **Frankenio hirsutae-Limonietum cypriani** Géhu et al. 1990 em. Babalonas et Sykora 1995

Diagnostic species:

Frankenia hirsuta, *Limonium album*** **typicum**** **cichorietosum spinosae**syn. *Limonio-Cichorietum spinosi* Géhu et al. 1990

Diagnostic species:

Cichorium spinosum, *Limonium oleifolium*, *Lotus cytisoides*, *Cynodon dactylon*.** **silenetosum sedoides**Syn. *Parapholis incurvae-Silenetum sedoidis* Géhu et al. 1990.

Diagnostic species:

Silene sedoides, *Parapholis incurva*, *Plantago coronopus*, *Triplachne nitens*, *Trifolium scabrum*, *Chamomilla aurea*, *Desmazeria marina*.* **Comm. of Crithmum maritimum and Silene sedoides** Christodoulakis & Georgiadis 1990

Diagnostic species

Crithmum maritimum, *Silene sedoides*, *Limonium graecum*, *Desmazeria marina*, *Euphorbia acanthothamnus*.* **Limonio virgati-Cichorietum spinosi** Géhu et al. 1984

Diagnostic species

Limonium oleifolium, *Cichorium spinosum*

ONONIDO-ROSMARINETEA Br.-Bl. 1947

Poterietalia spinosi-intermediae Zohari & Orshan 1966

Sarcopoterio spinosi-Genistion sphaclatae Costa et al. 1984

* **Teucrio micropodioidis-Sarcopoterietum spinosi** Costa et al. 1984

Diagnostic species

Thymus capitatus, *Sarcopoterium spinosum*, *Teucrium polium* etc.

PEGANO-SALSOLETEA Br.-Bl. et O. Bolos 1954

Diagnostic species

Polygonum equisetiforme ?* **Asparago-Atriplicetum halimi** Géhu et al. 1990.

Diagnostic species

Atriplex halimus, *Asparagus stipularis*, *Lycium ferocissimum*.* **Polygono equisetiformis-Suaedetum verae** Géhu et al. 1984.

Diagnostic species

Suaeda vera (dominant)

ISOETO-NANOJUNCETEA Br-Bl et Tx. 1943

* **Cresso-Crypsidetum aculeatae** Géhu et al 1990.

Diagnostic species

Crypsis aculeata, *Cressa cretica*, *Damasonium alisma*.

** *Subassociations damasonietosum* and *hordeetosum marini* can not be distinguished in the table.

SAGINETEA MARITIMAE (Tx. & Westhoff 1963)

* **Romuleo-Saginetum maritimae** Wolff 1969 ?

Diagnostic species

Romulea bulbocodium, *Romulea rollei*

* **Mesembryantheum nodifloro-cristallini** de Bolos 1957

Diagnostic species

Mesembryantheum nodiflorum (dominant), *Mesembryantheum crystallinum* (codominant).

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