

PLANT SOCIOLOGY

formerly FITOSOCIOLOGIA

Volume 54 (1) - June 2017



RIVISTA SEMESTRALE - POSTE ITALIANE S.P.A. - SPED. ABB. POST. - D.L. 353/2003 - (CONV. INL. 27/02/2004 N. 46) ART. 1, COMMA 2, DOB ANCONA TASSA RISCOSSA-TAXE PERCUE-OMPAN
EDITO DALLA SOCIETÀ ITALIANA DI SCIENZA DELLA VEGETAZIONE ONLUS - PAVIA - DIRETTORE RESPONSABILE PROF. E. BONDI - VOLUME 1 - I° SEMESTRE 2017

Journal of the Italian Society for Vegetation Science

Phytosociological investigation on the class *Crithmo maritimi-Limonietea* in Greece

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Abstract

The authors examine the plant communities belonging to the *Crithmo maritimi-Limonietea* class occurring along the rocky coast of continental and insular Greece. In order to highlight the syntaxonomic relationships among the eastern Mediterranean plant communities and the remaining Euro-Mediterranean territories, all known literature on this type of vegetation was considered and evaluated. Basing on these data, an updated syntaxonomical arrangement is provided. In particular, within the *Crithmo maritimi-Limonietea* class, three well differentiated orders can be recognized: a) *Crithmo maritimi-Limonietalia* distributed along the Mediterranean and South Atlantic Iberian coasts; b) *Crithmo maritimi-Armerietalia maritimae*, circumscribed to the European Atlantic coasts, from the North Iberian territories up to the British Isles as well as Azores Islands; c) *Frankenio ericifoliae-Astydamietalia latifoliae*, regarding the Macaronesian Archipelago (Canary Islands and Madeira) and coasts of southern Morocco. The so far known alliances and suballiances of each order are examined, highlighting their proper nomenclatural and phytogeographical aspects. As concerns the Greek territories, this vegetation is included in the order *Crithmo maritimi-Limonietalia*, which is represented by two alliances, i.e. *Cichorio spinosi-Limonion roridi*, distributed in the Aegean area, and *Crithmo maritimi-Elytrigion athericae* replacing the previous one in the Ionian coasts. For both syntaxa, two suballiances are recognized, the homotypic ones gather the most halophilous associations localized in the belt very closed to the sea and usually differentiated by the dominance of *Limonium* species, respectively proposed as *Cichorio spinosi-Limonienion roridi* and *Crithmo maritimi-Elytrigienion athericae*, while the other ones group the less salt tolerant phytocoenoses occurring in the innermost band and characterized by pulvinate dwarf shrubs, respectively proposed as *Phagnalo graeci-Anthyllidenion hermanniae* and *Elytrigio athericae-Anthyllidenion hermanniae*. Due to the remarkable extension of the Greek coasts, accentuated by the extraordinary number of islands and islets, the *Crithmo maritimi-Limonietea* class is represented by numerous associations, many of which characterized by endemic *Limonium*, whose identification is based on a recent monograph on the genus *Limonium* in Greece. In the past, the poor knowledge on this genus in Greece often led to a misidentification of the *Limonium* species, with quite relevant syntaxonomical consequences. Basing on several unpublished phytosociological relevés, carried out during the last three decades, many associations (80) are here described, most of which are new. For each of them, nomenclatural, floristic, structural, ecological, chorological and syntaxonomical information are provided.

Key words: *Crithmo maritimi-Limonietea*, Greece, phytosociology, rocky coast, syntaxonomy, vegetation.

Introduction

The rocky coasts of the Euro-Mediterranean territories are usually colonized by a really specialized vegetation featured by dwarf perennial plants, which are linked to a more or less pronounced edaphic salinity. These habitats are severely affected by marine agents and particularly by sea storms, aerosol, wind, etc., all elements determining peculiar environmental conditions, which allow the establishment of few and specialized plants. The vegetation colonizing these rocky coast and the bottom of the cliffs is usually represented by some halophytes linked to these habitat, such as *Crithmum maritimum* and *Limonium* sp. pl., which grow together with few other chasmophytes and chomophytes. These species are localized in the crevices and hollows of the rocky surfaces, where a feeble accumulation of soil, more or less salty, is possible. On the whole, they are represented by chamaephytes, nano-phanerophytes, hemicryptophytes and sometimes therophytes, which constitute a typically aeroaline vegetation and whose arrangement in characteristics

dynamic series is strictly linked to the edaphic and geomorphological factors. These plant communities are represented by pioneer associations, usually playing a permanent role and quite stable over time. They have catenal contacts with more mature plant communities, not linked to any edaphic salinity, such as garigues, maquis or grasslands.

Many authors carried out phytosociological investigations on these coastal habitats, recognizing a huge number of associations and proposing different syntaxonomical arrangements. According to the massive literature, the most surveyed areas are the European Atlantic and Western Mediterranean coasts, especially United Kingdom (Malloch, 1971; Malloch & Okusanya, 1979; Géhu, 1997; Rodwell *et al.*, 2000), Northern France (Kuhnholtz-Lordat, 1926; Pavillard, 1928; Roux & Lahondré, 1960; Géhu, 1962, 1964a, 1964b, 1968, 1973, 1975, 2006a, 2008; Géhu *et al.*, 1984; Géhu & Géhu-Franck, 1984; Lahondré & Bioret, 1995; Bioret & Géhu, 2008; Bioret *et al.*, 2014), Northern Spain (Guinea, 1949, 1953; Rivas-Martínez, 1978; Géhu & Géhu-Frank, 1980; Navarro, 1983; Ve-

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lasco, 1983; Fernandez Prieto & Loidi, 1984; Loriente, 1984; Fernández Prieto & Herrera Gallastegui, 1993; Rivas-Martínez *et al.*, 2002), Portugal (Rothmaler, 1943; Rivas-Martínez *et al.*, 1990, 2002; Costa *et al.*, 1998, 2012; Neto *et al.*, 2001, 2005, 2009; Aguiar *et al.*, 2003), Canary Islands (Lohmeyer & Trautman, 1970; Santos, 1976; Rivas-Martínez *et al.*, 1993, 2003, 2011), Madeira (Capelo *et al.*, 2000; Rivas-Martínez *et al.*, 2002; Jardim *et al.*, 2003; Costa *et al.*, 2012), Azores Islands (Sjögren, 1973; Lüpnitz, 1976; Fernandez Prieto *et al.*, 2006; Costa *et al.*, 2012), Southern Spain (Bolos, 1967; Riguall Magallon, 1972; Folch, 1981, 1986; Costa M., 1982; Asensi, 1984; Bolos & Vigo, 1984; Franquesa, 1995; Rivas-Martínez *et al.*, 1999, 2002; Crespo *et al.*, 2003), Balearic Islands (Bolòs & Molinier, 1958; Bolòs *et al.*, 1970; Rivas-Martínez *et al.*, 1992a, 1992b; Gil & Llorens, 1995; Crespo *et al.*, 2003), Southern France (Molinier, 1934, 1937, 1954; Braun-Blanquet *et al.*, 1952; Rioux *et al.*, 1955; Lapraz, 1979; Géhu *et al.*, 1988), Italian Peninsula (Arrigoni & Di Tommaso, 1981, 1997; Paola, 1986; Brullo & De Marco, 1989; Bartolo *et al.*, 1992; Biondi *et al.*, 1997; Foggi & Grigioni, 1999; Foggi *et al.*, 2000, 2006a, 2006b; Brullo *et al.*, 2001; Perrino *et al.*, 2006), Sicily (Brullo *et al.*, 1977; Bartolo *et al.*, 1982, 1988; Barbagallo *et al.*, 1983; Brullo & Marcenò, 1983; Bartolo & Brullo, 1993; Brullo & Siracusa, 1996; Gianguzzi, 1999; Biondi 2007; Gianguzzi & La Mantia, 2008), Sardinia (Molinier & Molinier, 1955a; De Marco & Mossa, 1980; Géhu *et al.*, 1989; Biondi, 1992; Biondi & Mossa, 1992; Biondi *et al.*, 1993, 2001; Mayer, 1995; Biondi & Bagella, 2005), Corsica (Malcuit 1931; Molinier & Molinier, 1955b; Molinier, 1959; Gamisans & Murraciòle, 1985; Gamisans, 1991; Gamisans & Paradis, 1992; Géhu & Biondi, 1994; Paradis, 1997, 2006), Tunisia (Brullo & Signorello 1992; Chaabane 1997), Algeria (Pons A. & Quézel, 1955; Négre 1964; Géhu *et al.* 1987, 1992, 1994; Rebbas *et al.*, 2011), Morocco (Deil, 1994; Deil & Hammoumi, 1997; Géhu & Biondi, 1998), Albania (Mullaj *et al.*, 2000) and Croatia (Horvatic, 1934, 1939, 1963; Lovric, 1969; Ilijanic & Hecimović, 1982; Lovric & Rac, 1991; Pavletić, 1992). Despite this impressive literature, just few phytosociological studies are focussed on the eastern Mediterranean territories, e.g. Cyprus (Costa *et al.*, 1984; Géhu *et al.*, 1990), Turkey (Géhu *et al.*, 1992; Lovric & Uslu, 1993), Cyrenaica (Brullo & Furnari, 1981, 1988) and Greece (Géhu *et al.*, 1987, 1992; Mayer, 1995; Brullo & Guarino, 2000).

From the phytosociological viewpoint, this vegetation was included in the *Crithmo-Staticetea* class (=*Crithmo-Limonietea* nom. mut.), a Mediterranean-Atlantic class described by Braun-Blanquet in Braun-Blanquet *et al.* (1952). Initially, only one order was recognized within this class, corresponding to the *Crithmo-Staticetalia* Molinier 1934 (=*Crithmo-Limo-*

nietalia nom. mut.), described from the Mediterranean coast of France. Afterwards, other orders were included in this class, i.e. *Frankenio ericifoliae-Astydamietalia latifoliae* Santos 1976 for the Canaries and *Crithmo-Armerietalia maritimae* Géhu ex Géhu & Géhu-Franck 1984 for the Atlantic coasts of Europe. In particular, the last order was attributed by some authors to the class *Juncetea maritimi* Br.-Bl. in Br.-Bl. *et al.* 1952 (=*Asteretea tripolium* Westhoff & Beaufort in Beaufort 1962), syntaxon grouping perennial grasslands linked to damp soils with fresh and more or less salty waters (cf. Géhu & Géhu-Franck, 1984; Rivas-Martínez *et al.*, 1999, 2002; Bardat *et al.*, 2004; Fernández Prieto *et al.*, 2006), while Bioret & Géhu (2008) proposed to include this order in a new class, namely *Armerio maritimae-Festucetea pruinosa*. More recently, Rivas-Martínez *et al.* (2011) and Costa *et al.* (2012) considered more appropriate to ascribe the order *Crithmo-Armerietalia maritimi* to the *Crithmo maritimi-Limonietea* class. We fully agree with the last authors, since this arrangement is strongly supported by the floristic, structural and ecological affinities of the plant communities of this order with those ones belonging to the *Crithmo maritimi-Limonietalia*.

In the framework of field researches aiming at improving the knowledge on this particular type of vegetation, the outcomes of a phytosociological study carried out in the East Mediterranean area are provided. Our investigations, started several years ago, are chiefly focused on the plant communities of the *Crithmo maritimi-Limonietea* class occurring in the insular and continental territories of Greece. The results of this investigation could not be published before having an updated taxonomical study on the species of the genus *Limonium* in Greece, which were in most cases just poorly known. Considering the crucial role played by the *Limonium* species within this vegetation, any phytosociological study on the *Crithmo-Limonietea* class in the eastern Mediterranean area without such support would have been scientifically weak or otherwise unreliable. Therefore, an in-depth taxonomic study on this genus, lasted about thirty years, led to the publication of a monograph (Brullo & Erben, 2016) which provides detailed information on the *Limonium* species growing in Greece and their current distribution.

Materials and methods

The phytosociological investigation carried out along the rocky coast of Greece is based on about 1150 unpublished relevés performed in the period 1986–2013, plus 55 published relevés (Géhu *et al.*, 1987, 1992; Mayer, 1995; Brullo & Guarino, 2000). The nomenclature used for the floristical analysis refers to Dimopoulos *et al.* (2013) and Strid (2016). From the methodological viewpoint, the phytosociological stu-

dy was performed following the Zurich-Montpellier Sigmist School approach (Braun-Blanquet, 1964) and later integrations (Géhu & Rivas-Martínez, 1981; Géhu, 2006b; Biondi, 2011; Pott, 2011). The bioclimatic considerations are based on Rivas-Martínez *et al.* (2004). In addition, the syntaxonomic issue regarding the *Crithmo-Limonietea* class are tackled basing on the International Phytosociological Nomenclature Code, ICPN (Weber *et al.*, 2000).

Results

According to the huge literature, the *Crithmo maritimi-Limonietea* class has a wide Euro-Mediterranean distribution, where it exclusively occurs along the rocky stands near the sea. It is floristically differentiated by a lot of species, mainly represented by halophilous or halo-tolerant small chamaephytes or dwarf shrubs and more rarely by hemicryptophytes. From the structural and dynamic point of view, two main types of plant communities can be identified, one of which localized along the belt closer to the shoreline, featured by a more remarkable halophily, while another is confined to the stands rather far from the sea and, therefore, showing a less halophily than the previous one. The first one is characterized by the dominance of *Limonium* species, mostly endemic, showing very low cover value, the second one is more dense and differentiated by pulvinate dwarf shrubs. On the basis of the current knowledge, numerous syntaxa were recognized within this class or referred to it, but unfortunately some of them have been invalidly described. Therefore, it must be said that the arrangements proposed by various authors are often conflicting or not always sharable, thus determining further confusion in an already syntaxonomically tricky class. In particular, the several authors who studied this vegetation (Rothmaler, 1943; Braun-Blanquet *et al.*, 1952; Molinier, 1954; Bartolo *et al.*, 1982, 1992; Bòlos & Vigo, 1984; Gamisans & Muracciole, 1984; Folch, 1986; Brullo & Furnari, 1988; Brullo & De Marco, 1989; Rivas-Martínez *et al.*, 1990, 1999, 2002, 2011; Géhu *et al.*, 1992; Géhu & Biondi, 1994; Gil & Llorens, 1995; Mayer, 1995; Brullo & Guarino, 2000; Biondi, 2007; Biondi *et al.*, 2014), proposed several syntaxa at level of order, alliances and suballiances, although their treatments and floristical, ecological and chorographical characterization are not always in agreement with the phytosociological nomenclature code (ICPN). Actually, the most widely spread order is *Crithmo maritimi-Limonietalia*, distributed in the whole Mediterranean and southern Atlantic coast of Europe, within which several alliances and suballiances have been recognized. In particular, among them there are: *Crithmo maritimi-Limonion pseudominuti* Molinier 1934 from western Mediterranean territories, *Crithmo maritimi-Daucion*

halophili Rivas-Martínez *et al.* 1990 from Southern Atlantic Iberian territories, *Erodion corsici* (Gamisans & Muracciole, 1984) Géhu & Biondi 1994 from Sardinia and Corsica, *Crucianellion rupestris* Brullo & Furnari 1988 from Central Mediterranean territories, *Anthyllidion barbae-jovis* Brullo & De Marco 1989 from Thyrrenian and Adriatic territories, *Cichorio spinosi-Limonion roridi* Brullo & Guarino 2000 from Aegean area. All these alliances are floristically well differentiated and they include associations belonging to both above mentioned typologies. Besides, within the *Crithmo maritimi-Limonion pseudominuti* can be recognized various suballiances, such as: a) *Crithmo maritimi-Limonenion pseuodminuti*, occurring in the whole distribution range of the alliance and gathering the markedly halophilous communities close to the sea; b) *Plantagini subulatae-Thymelaeeneion hirsutae* Bartolo *et al.*, 1982 (=*Astragalion tragacanthae* Rivas-Martínez *et al.*, 2002), including the dwarf shrub communities occurring in several countries of the western Mediterranean; c) *Launaeenion cervicornis* O. Bolòs & Vigo ex Y. Gil & Llorens 1995, structurally similar to the previous one, is circumscribed to the Balearic Islands. In the case of *Cichorio spinosi-Limonion roridi*, it is represented by two suballiances, such as *Cichorio spinosi-Limonienion roridi* and *Phagnalo graeci-Anthyllidenion hermanniae* suball. nov. The last alliance is replaced in the Ionian Greek coasts by another new alliance, represented by *Crithmo maritimi-Elytrigion athericae* with two suballiances, indicated as *Crithmo maritimi-Elytrigienion athericae* and *Elytrigio athericae-Anthyllidenion hermanniae*. In the Macaronesian region (Canary Islands and Madeira), the *Crithmo maritimi-Limonietalia* is replaced by the *Frankenio ericifoliae-Astydamietalia latifoliae* Santos 1976, syntaxon floristically and ecologically well differentiated from the previous one. In fact, it is characterized by a pool of Macaronesian species, usually linked to the volcanic rocky coast of this archipelago, some of which also found in the Atlantic coast of southern Morocco. According to literature (Rivas-Martínez *et al.*, 2002, 2011; Costa *et al.*, 2012; Mucina *et al.*, 2016), two alliance were recognized: *Frankenio ericifoliae-Astydamion latifoliae* Santos 1976 from Canary Islands and *Helichryson obconico-devium* Rivas-Martínez *et al.* 2002 from Madeira. As concerns, the Atlantic rocky coasts between the northern Iberian Peninsula and Great Britain including the Azores, this vegetation was included in a distinct order named *Crithmo maritimi-Armerietalia maritimae* Géhu ex Géhu & Géhu-Frank 1984, split in two geographical distinguished alliances, i.e. *Crithmion martimi* Pavillard ex R. Tx. & Oberd. 1958 (=*Crithmo maritimi-Armerion maritimae* Géhu ex Géhu & Géhu-Frank 1984), distributed in the European coasts and *Euphorbio azoricae-Festucion petraeae* Lüpnitz 1976 exclusive of the vul-

canic rocky shore of the Azores. Within the *Crithmion maritimi* two suballiances were recognized by Bioret & Géhu (2008), such as *Crithmo maritimi-Limonienion binervosi* Géhu & Géhu-Frank ex Boiret & Géhu 2008 and *Sileno maritimae-Festucenion pruinosa* Géhu & Géhu-Frank ex Boiret & Géhu 2008, both well differentiated from the floristic, ecological and structural viewpoint. Therefore, the following syntaxonomical arrangement of the *Crithmo maritimi-Limonietea* class at suballiance level is provided:

CRITHMO MARITIMI-LIMONIETEA Br.-Bl. in Br.-Bl., Roussine & Nègre 1952
CRITHMO MARITIMI-LIMONIETALIA Molinier 1934
Crithmo maritimi-Limonion pseudominuti Molinier 1934
Crithmo maritimi-Limonienion pseudominuti
Plantagini subulatae-Thymelaeenion hirsutae Bartolo, Brullo & Marcendò 1982
Launaeenion cervicornis O. Bolòs & Vigo ex Y. Gil & Llorens 1995
Crithmo maritimi-Daucion halophili Rivas-Martínez, Lousã, T. E. Diaz, Fernández-González & J. C. Costa 1990
Erodion corsici (Gamisans & Muracciole 1984) Géhu & Biondi 1994
Crucianellion rupestris Brullo & Furnari 1988
Anthyllidion barbae-jovis Brullo & De Marco 1989
Cichorio spinosi-Limonion roridi Brullo & Guarino 2000
Cichorio spinosi-Limonienion roridi
Phagnalo graeci-Anthyllidenion hermanniae suball. nov.
Crithmo maritimi-Elytrigion athericae all. nov.
Crithmo maritimi-Elytrigienon athericae
Elytrigio athericae-Anthyllidenion hermanniae suball. nov.
FRANKENIO ERICIFOLIAE-ASTYDAMIETALIA LATIFOLIAE Santos 1976
Frankenio ericifoliae-Astydamion latifoliae Santos 1976
Helichryson obconico-devium Rivas-Martínez, Diaz, Fernandez-Gonzalez, Izco, Loidi, Lousã & Penas 2002
CRITHMO MARITIMI-ARMERIETALIA MARITIMA Géhu ex Géhu & Géhu-Frank 1984
Crithmion maritimi Pavillard ex R. Tx. & Oberd. 1958
Crithmo maritimi-Limonienion binervosi Géhu & Géhu-Frank ex Boiret & Géhu 2008
Sileno maritimae-Festucenion pruinosa Géhu & Géhu-Frank ex Boiret & Géhu 2008
Euphorbio azoricae-Festucion petraeae Lüpnitz 1976.

Phytosociological investigations in Greece

As already highlighted, the associations found along the Greek coasts and belonging to the *Crithmo maritimi-Limonietea* class fall within the order *Crithmo maritimi-Limonietalia*. In particular, they should be split in two alliances, namely *Cichorio spinosi-Limonion roridi* occurring in the Aegean territory and

Crithmo maritimi-Elytrigion athericae confined to the islands and coast of the Ionian area. In addition, depending to the structure, ecology and floristic set, each alliance is further split into two suballiances. In particular, the homotypic suballiance, corresponding to the *Cichorio spinosi-Limonienion roridi* and *Crithmo maritimi-Elytrigienon athericae* respectively, group the most halophilous plant communities characterized by the dominance of *Limonium* sp. pl., while the other two suballiances, i.e. *Phagnalo graeci-Anthyllidenion hermanniae* and *Elytrigio athericae-Anthyllidenion hermanniae*, gather the dwarf shrubby vegetation occurring far from the sea. As concerns the plant communities belonging to the homotypic suballiances, they are widely spread and usually found almost everywhere along the rocky coasts. Actually, these are more severely influenced by sea, particularly by aerosol and storm surges, while the plant communities belonging to the second suballiances are mainly found along the low windy reefs whose shrubby vegetation show a typical pulvinate habit, being well adapted to the peculiar ecological conditions of the dwelled sites (Fig. 1). The last vegetation type is more common in the islands with low sea shores. Quite the reverse can be observed along the high and slightly wind coasts, particularly in those countries characterized by more mesic climatic conditions, since the associations with *Limonium* are directly in contact with the maquis or sometimes the phrygana (Fig. 2). Finally, the *Limonium*-dominated vegetation occurring at the bottom of the cliffs is replaced in the upper part of this stands by chasmophytic communities belonging to the *Asplenietea trichomanis* class (Fig. 3). From the geological view point, in Greece the plant communities of *Crithmo-Limonietea* are found on different substrata, such as limestones, basalts, granites, schists, tuffs, sandstones, marls, etc., often very extended inward. Basing on the several unpublished phytosociological relevés and the literature data (Géhu et al., 1987, 1992; Mayer, 1995; Brullo & Guarino, 2000), the main outcomes results of this research are provided. For each identified synta-

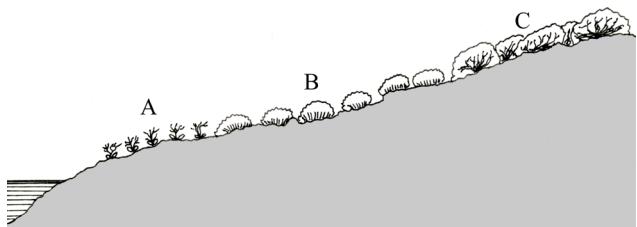


Fig. 1 - Transect of the vegetation along the low coast in Greece. A. Halophilous associations of the *Cichorio spinosi-Limonienion roridi* and *Crithmo maritimi-Elytrigienon athericae*; B. Halo-tolerant pulvinate associations of the *Phagnalo graeci-Anthyllidenion hermanniae* and *Elytrigio athericae-Anthyllidenion hermanniae*; C. Maquis or phrygana communities.

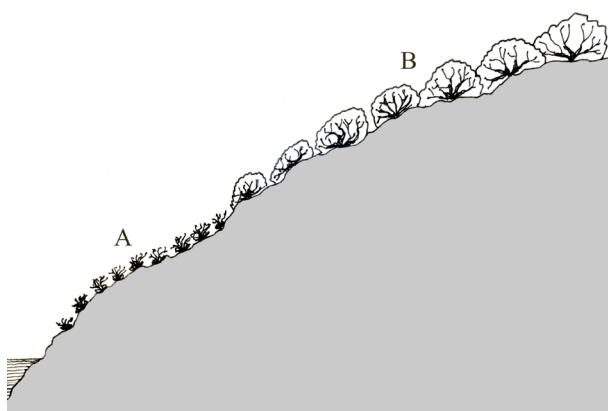


Fig. 2 - Transect of the vegetation along the high coast in Greece. A. Halophilous associations of the *Cichorio spinosi-Limonienion roridi* and *Crithmo maritimi-Elytrigienion athericae*; B. Maquis or phrygana communities.

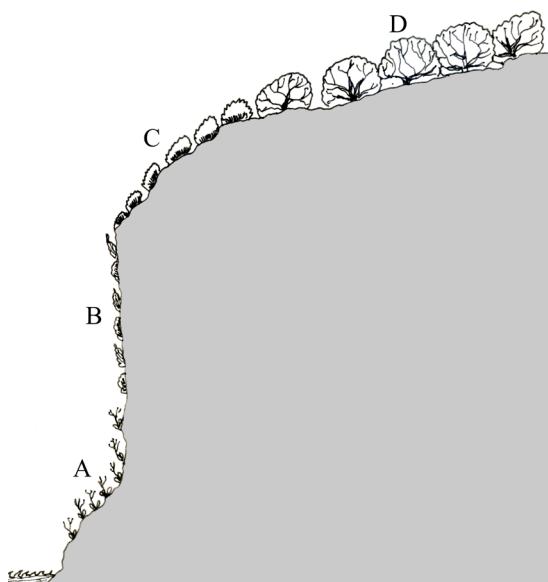


Fig. 3 - Transect of the vegetation on the sea cliffs in Greece. A. Halophilous associations of the *Cichorio spinosi-Limonienion roridi* and *Crithmo maritimi-Elytrigienion athericae*; B. Halo-tolerant chasmophilous vegetation of the *Asplenietea trichomanis*; C. Halo-tolerant pulvinate associations of the *Phagnalo graeci-Anthyllidenion hermanniae* and *Elytrigio athericae-Anthyllidenion hermanniae*; D. Maquis or phrygana communities.

xon, its nomenclature, syntaxonomy, floristic composition, ecology, structure, as well as its distribution are examined. Remarks on the the nomenclatural issues and controversial syntaxonomic treatments, if any, are examined in the notes.

CRITHMO MARITIMI-LIMONIETEA Br.-Bl. in Br.-Bl., Roussine & Nègre, Group. Vég. France Medit.; 32, 1952, nom. mut. (art. 45).

Syn.: *Crithmo-Staticetea* Br.-Bl. in Br.-Bl., Emberger & Molinier, 1947, nom. inval. (art. 8); *Crithmo-Staticetea* Br.-Bl. in Br.-Bl., Roussine & Nègre 1952, Group. Vég. France Medit.; 32, 1952; *Armerio maritimae-Festucetea pruinosa* Bioret & Géhu, Fitosociologia 45 (1): 107, 2008.

Holotypus: *Crithmo maritimi-Limonietalia* Molinier 1934.

Characteristic species: *Crithmum maritimum*, *Dactylis marina*, *Daucus gingidium*.

Ecology: The class gathers plant communities characterized by the dominance of nanophanerophytes, mainly pulvinate, chamaephytes and sometimes by hemicryptophytes, growing along the rocky shore and sea cliffs, directly affected by marine agents. It is a perennial vegetation featured by a remarkable halophily or halotolerance and linked to rocky coast with various geological substrata. Dynamically, this vegetation is usually permanent, showing an edaphoclimatic role. From the bioclimatic point of view, these plant communities occur within the infra-, thermo- and meso-mediterranean belts, as concerns the Mediterranean territories and within thermo- and mesotemperate belts as regards the Euro-Atlantic ones. In the belt closer to the sea, this vegetation is floristically characterized by the dominance of *Limonium* species, mainly represented by local endemics, while in the stands far from the sea it is featured by many pulvinate dwarf shrubs. In this habitat very frequent is also *Crithmum maritimum*.

Distribution: Mediterranean Basin and central-southern Atlantic coast of Europe (Great Britain, North France and North Iberian Peninsula), as well as the Atlantic Islands (Azores, Madeira and Canary) and Atlantic coast of North Morocco.

Note: This class was originally described by Braun-Blanquet in Braun-Blanquet et al. (1952) as *Crithmo-Staticetea*, using the name of the taxa belonging to two genera, i.e. *Crithmum*, represented by a single species (*C. maritimum*), and *Statice*, being considered a *nomen ambiguum*, was not used anymore for the last 70 years, since it included several genera of *Plumbaginaceae* (*Limonium*, *Armeria*, *Limoniastrum*, *Goniolimon*, *Acantholimon*, etc.). In particular, the genus *Statice* L. s.str. is typified by *Statice armeria* L. and therefore it is rejected as homotypic synonym of *Armeria* Willd. nom. cons. (ICBN, App. III). Therefore, according to the art. 45 of the I.C.P.N., the generic name *Statice* can not be used to form the name of a syntaxon. This new name *Crithmo maritimi-Limonietea* has been accepted by the Nomenclature Commission (Willner et al. 2011: 65).

CRITHMO MARITIMI-LIMONIETALIA Molinier, Ann. Mus. Hist. Nat. Marseille 27 (1): 82, 1934, nom. mut.

Syn: *Crithmo-Staticetalia* Molinier, Ann. Mus. Hist. Nat. Marseille 27 (1): 82, 1934.

Holotypus: *Crithmo maritimi-Limonion pseudomimicae* Molinier, Ann. Mus. Hist. Nat. Marseille 27 (1): 82, 1934.

nuti Molinier, Ann. Mus. Hist. Nat. Marseille 27 (1): 82, 1934, nom. nov. (=*Crithmo maritimi-Staticetum minutae* Molinier 1934).

Characteristic species: *Allium commutatum*, *Daucus carota* subsp. *hispanicus*, subsp. *commutatus*, subsp. *gummifer* and subsp. *hispidus*, *Frankenia corymbosa*, *Frankenia hirsuta*, *Helichrysum conglobatum*, *Jacobsaea maritima* subsp. *bicolor*, *Limbarda crithmoides* subsp. *longifolia*, *Limonium virgatum*, *Lotus cytisoides*, *Pallenis maritima*, *Plantago macrorizha*, *Reichardia picroides* var. *maritima*, *Silene sedoides*.

Ecology: It is a thermophilous order grouping haloruprestrial communities, occurring along the rocky coast close to the shoreline. This vegetation is usually characterized by endemic species of *Limonium* and by small, pulvinate shrubs well adapted to the strong winds blowing in these stands. It is linked to the infra-thermo-mesomediterranean bioclimatic belts, with semiarid to subhumid ombrotype.

Distribution: Mediterranean rocky coast, Atlantic coast of N Morocco and S-W Iberian Peninsula.

Note: Similarly to the class, even the name proposed by the aforesaid author for the order, can not be used and therefore a new name is adopted. As for previous syntaxon also this name has been accepted by the Nomenclature Commission (Willner et al., 2011: 65).

CICHORIO SPINOSI-LIMONIENION RORIDI Brullo & Guarino, Fl. Medit. 10: 279, 2000.

Syn: *Crithmo-Limonion graeci* Géhu, Apostolides, Géhu-Franck & Arnold, Coll. Phytosoc. 19: 557, 1992, nom. inval. (art. 3f, 8); *Crithmo-Frankenion hirsutae* Mayer, Libri Botanici 15: 112, 1995, nom. inval. et nom. dub. (art. 3f, 38).

Holotypus: *Limonietum chrisiani* Brullo & Guarino, Fl. Medit. 10: 279, tab. 5, 2000.

Characteristic species: *Allium phalereum*, *A. staticiforme*, *Cichorium spinosum*, *Elytrigia rechingeri*, *Galatella cretica*, *Goniolimon sartorii*, *Limonium aegaeum*, *L. ammophilon*, *L. amopicum*, *L. aucheri*, *L. brevipetiolatum*, *L. compactum*, *L. crateriforme*, *L. dolihense*, *L. frederici*, *L. ocytumifolium*, *L. oligotrichum*, *L. parosicum*, *L. pigadiense*, *L. proliferum*, *L. recticaule*, *L. roridum*, *L. spreitzenhoferi*, *L. stenotatum*, *Paronichya macrosepala*, *Trifolium uniflorum*.

Ecology: This alliance groups plant communities distributed along the rocky coast formed by various substrata. The associations of this syntaxon usually colonize more or less wide belts that may occupy up to 100 m inwards. Close to the sea, the vegetation is really scattered with very low cover value, but it gradually becomes thicker and rather less affected by edaphic salinity.

Distribution: It is distributed along the rocky coast of Aegean area, including the continental Greece, W Anatolia and Aegean islands. This alliance can be con-

sidered an eastern vicariant of syntaxa distributed in the West and Central Mediterranean, such as *Crithmo maritimi-Limonion pseudominuti* Molinier 1934, *Crucianellion rupestris* Brullo & Furnari 1988 and *Crithmo maritimi-Daucion halophili* Rivas-Martínez et al. 1990.

Note: As concerns the East Mediterranean area, Brullo & Guarino (2000) proposed a new alliance, namely *Cichorio spinosi-Limonion roridi*, replacing the alliances described by Géhu et al. (1992) as *Crithmo-Limonion graeci* nom. inval. (art. 3f, 8) and by Mayer (1995) as *Crithmo-Frankenion hirsutae* nom. inval. et dub. (art. 3f, 38). On this last syntaxon other informations are provided in notes of *Cichorio spinosi-Limonietum graeci* ass. nova, since Mucina et al. (2016) consider it a valid name.

CICHORIO SPINOSI-LIMONIENION RORIDI suball. nova *hoc loco (typicum)*

Holotypus: see alliance

Characteristic species: see alliance

Ecology: This syntaxon gathers the association growing along the rock belt closer to the shoreline. Therefore, it includes the plant communities characterized by a remarkable halophily, being directly affected by the sea aerosol and wave action. They are physiognomically dominated by species of the genus *Limonium*.

Distribution: see alliance

1. *LIMONIETUM ATHINENSIS* ass. nova *hoc loco* (Tab. 1, A)

Holotypus: Rel. 5, Tab. 1, *hoc loco*.

Characteristic species: *Limonium athinense*.

Ecology: This association is linked to crumbly arenaceous or arenaceous-conglomeratic substrata. It is found on more or less steep and terraced surfaces, and it is characterized by the occurrence of a small endemic *Limonium*, represented by *L. athinense*. This species grows together with other *Limonium* species, such as *L. roridum*, *L. compactum*, *L. aegaeum*, *L. virgatum* and some other alophytes typical of this environments, such as *Elytrigia rechingeri*, *Allium phalareum*, *Frankenia hirsuta*, *Reichardia maritima*, *Lotus cytisoides*.

Distribution: This community, very rare and scattered, was surveyed along the Piraeus coast, near Athens (Fig. 4D). Currently, the habitat where this association is several threatened by the urban sprawl and turistic facilities.

2. *LIMONIETUM ATTICI* ass. nova *hoc loco* (Tab. 2)

Holotypus: Rel. 15, Tab. 2, *hoc loco*.

Characteristic species: *Limonium atticum*.

Ecology: This association is spread on rocky coast characterized by limestones (rarely conglomerates). It grows on more or less flat surfaces, with fewly ac-

cumulation of soil in the rocky crevices. Physiognomically, it is dominated by *Limonium atticum*, often showing high covering value, which is usually associated with other species of *Limonium* (*L. aegaeum*, *L. compactum*, *L. virgatum*) and other halophytes, such as *Elytrigia rechingeri*, *Lotus cytisoides*, *Frankenia hirsuta*, *Silene sedoides*, etc.

Distribution: It is localized in the southern part of Attica, between Agios Nicolaos and Laurion (Fig. 4 A).

3. *LIMONIETUM VRAVRONENSIS* ass. nova *hoc loco* (Tab. 1, B)

Holotypus: Rel. 15, Tab. 1, *hoc loco*.

Characteristic species: *Limonium vravronense*.

Ecology: This association replaces the previous one on siliceous substrata, featured by more or less steep surfaces close to the sea. It is characterized by the occurrence of *Limonium vravronense*, which grows often together with *Goniolimon sartorii*, *Limonium roridum*, *L. aegaeum*, *Elytrigia rechingeri*, *Frankenia hirsuta*, *Lotus cytisoides* and more rarely with *Crithmum maritimum*.

Distribution: It is very rare and scattered, and it chiefly occurs near Vravrona in southern Attica (Fig. 4 B).

4. *CRITHMO MARITIMI-LIMONIETUM CORINTHIACI* ass. nova *hoc loco* (Tab. 3)

Holotypus: Rel. 11, Tab. 3, *hoc loco*.

Characteristic species: *Limonium corinthiacum*, *L. heraionense*.

Ecology: It is a very peculiar plant community, growing on rocky places even quite far from the sea, forming a belt up to 50-60 m wide. Substrates are usually represented by mesozoic limestone, sometimes very steep. Dominant species is *Limonium corinthiacum*, which may grow in some places together with *L. heraionense*, an extremely rare species. Some other halophytes are quite frequent, such as *Cichorium spinosum*, *Crithmum maritimum*, *Lotus cytisoides*, *Frankenia hirsuta*, etc.

Distribution: The association, circumscribed to the western part of Attica, in a small area of the Strait of Corinthos near Heraion excavations and also in some localities of Saronikos Gulf (Fig. 4 E).

5. *CRITHMO MARITIMI-LIMONIETUM KARDAMYLI* ass. nova *hoc loco* (Tab. 4)

Holotypus: Rel. 3, Tab. 4, *hoc loco*.

Characteristic species: *Limonium kardamylii*.

Ecology: The association is localized in very flat rocky coast characterized by severe erosion, which led to the formation of deep cracks and small depressions, where very few soil mixed to organic material is accumulated. The substratum is represented by conglomerates or arenaceous-limestones. This vegetation is dominated by *Limonium kardamylii* and *Crithmum*

maritimum, in association with few other halophytes.

Distribution: This community is exclusive of the Peloponnese, where it is distributed along a narrow stretch of coast in the north-western part of Mani peninsula, between Kardamili and Agios Nikolaos (Fig. 4 F).

6. *LIMONIETUM ALBOMARGINATI* ass. nova *hoc loco* (Tab. 5, A)

Holotypus: Rel. 1, Tab. 5, *hoc loco*.

Characteristic species: *Limonium albomarginatum*.

Ecology: The association is linked to impervious and steep rocky coast constituted by Mesozoic limestones. The halophilous vegetation occurring on this rocky ridges, rather inaccessible, is characterized by *Limonium albomarginatum*, a rare endemic, which grows together with *Cichorium spinosum*, *Lotus cytisoides*, *Matthiola incana*, etc.

Distribution: It is localized on the short tract of coast in the south-western part of Mani peninsula (Peloponnese), near Gerolimenas (Fig. 4 I).

7. *LIMONIETUM TAENARI* ass. nova *hoc loco* (Tab. 5, B)

Holotypus: Rel. 9, Tab. 5, *hoc loco*.

Characteristic species: *Limonium taenari*.

Ecology: The association is linked to calcareous rocks, more or less steep, colonizing a wide belt, strongly affected by aerosol, wind, waves, etc. Physiognomically, it is characterized by *Limonium taenari*, which grows together with few other halophytes, among which *Elytrigia rechingeri*.

Distribution: This community is circumscribed to the southern most point of Mani peninsula in the South Peloponnese (Fig. 4 H).

8. *CRITHMO MARITIMI-LIMONIETUM XILIENSIS* ass. nova *hoc loco* (Tab. 5, C)

Holotypus: Rel. 17, Tab. 5, *hoc loco*.

Characteristic species: *Limonium xiliense*.

Ecology: The association mainly occurs on calcarenous substrata, rarely on limestones, where it prefers flat and eroded surfaces with very salty and thin layer of soil. This vegetation is dominated by *Limonium xiliense*, which grows together with other halophytes, such as *Crithmum maritimum*, *Elytrigia rechingeri*, *Lotus cytisoides*, *Cichorium spinosum*, etc.

Distribution: It is rather common along the rocky coast between Archangelos and Elea (Fig. 4 G), in the southern Lakonia (Peloponnese).

9. *CRITHMO MARITIMI-LIMONIETUM AEGAEI* ass. nova *hoc loco* (Tab. 6)

Holotypus: Rel. 21, Tab. 6, *hoc loco*.

Characteristic species: *Limonium aegaeum*.

Ecology: Association characterized by the domi-

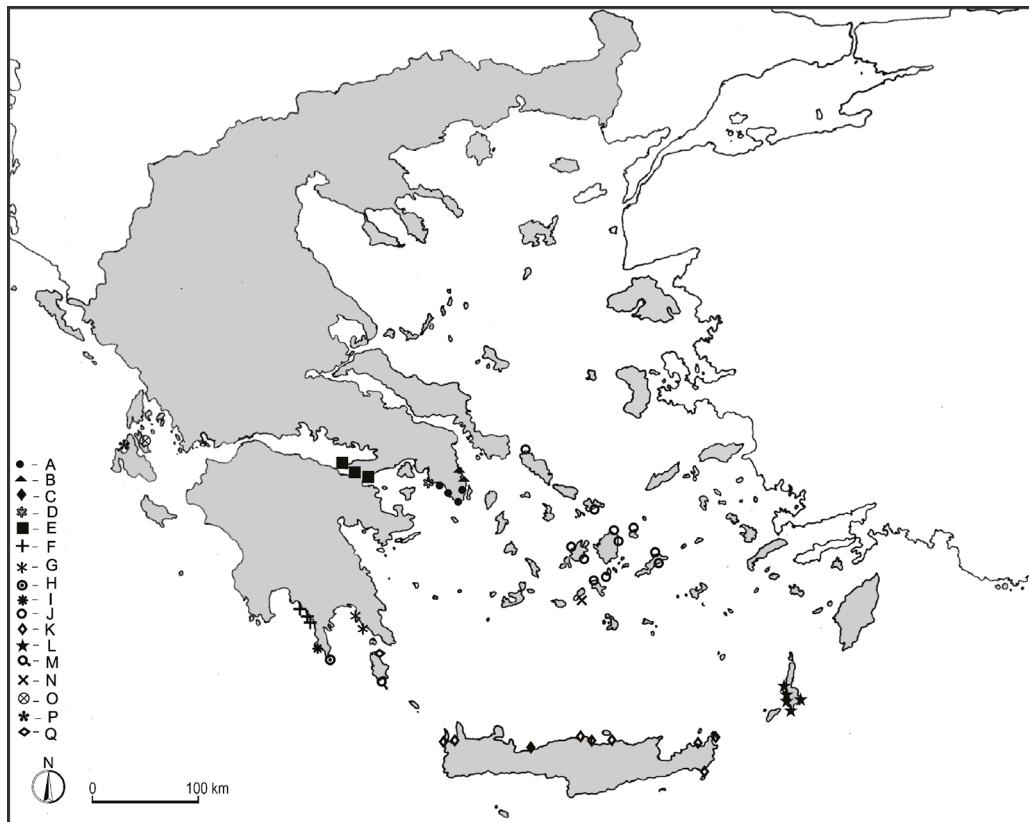


Fig. 4 - Geographical distribution of some associations of *Crithmo maritimi-Limonietea* in Greece: A. *Limonietum attici*; B. *Limonietum vravronensis*; C. *Crithmo maritimi-Limonietum calliopsii*; D. *Limonietum athinensis*; E. *Crithmo maritimi-Limonietum corinthiaci*; F. *Crithmo maritimi-Limonietum kardamylii*; G. *Crithmo maritimi-Limonietum xilensis*; H. *Limonietum taenari*; I. *Limonietum albomarginati*; J. *Cichorio spinosi-Limonietum graeci*; K. *Crithmo maritimi-Limonietum stenotati*; L. *Cichorio spinosi-Limonietum crateriformis*; M. *Crithmo maritimi-Limonietum aphroditae*; N. *Limonietum sirenici*; O. *Elytrigio athericae-Limonietum ithacensis*; P. *Inulo verbascifoliae-Lomelosietum dallaportae*; Q. *Limonietum spreitzhoferi*.

nance of *Limonium aegaeum*, while other species of *Limonium* are very rare or sporadic. In this community many other halophytes are quite frequent, such as *Cichorium spinosum*, *Elytrigia rechingeri*, *Lotus cytoides*, *Crithmum maritimum*, *Silene sedoides*, *Frankenia hirsuta*, etc. Examples of this vegetation have been found on various substrata (schists, conglomerates, limestones), limitately to a more or less narrow belt near the sea, severely affected by sea factors.

Distribution: This community was found in numerous localities of Attica, in Euboea island and sporadically also in some Cyclades islands, as Kimolos and Sifnos (Fig. 7 A).

10. CRITHMO MARITIMI-LIMONIETUM RORIDI ass. nova *hoc loco* (Tab. 7a, 7b)

Holotypus: Rel. 32, Tab. 7a, *hoc loco*.

Characteristic species: *Limonium roridum*.

Ecology: This association physiognomically dominated by *Limonium roridum*, can be considered a very thermophilous plant community, occurring in arid stands and usually on surfaces higher than sea level. Therefore, it is mostly affected by sea aerosol, and does

not seem linked to any particular type of substratum. In this plant communities several halophytes are very frequent, such as *Cichorium spinosum*, *Elytrigia rechingeri*, *Lotus cytoides*, *Crithmum maritimum*, *Silene sedoides*, etc.

Distribution: It is widely spread in many Aegean islands (Chios, Amorgos, Mykonos, Delos, Sikinos, Naxos, Crete, Kithira, Andros, Milos, Kythnos, Tinos and Syros) and in some stands of Attica (Fig. 6A).

Note: Géhu et al. (1992, Coll. Phytosoc. 19: 552) described from Karphatos island a new association named *Frankenio hirsutae-Limonietum hyssopifolii*, found in the small promontory of Cape Kastello. As concerns, *Limonium hyssopifolium*, which was considered by the author characteristic of this syntaxon, is indeed a synonym of *L. roridum* (cfr. Brullo & Erben, 2016). Actually, this species is very rare in Karphatos and is absent in the aforesaid locality (from personal observations), where instead other *Limonium* species occur, e.g. *L. amopicum*, *L. crateriforme* and *L. pigadiense*. Therefore, it is clearly impossible to establish which of the just mentioned species, was identified by the authors as *L. hyssopifolium*, this name must be

considered a *nomen dubium*, since it cannot be unequivocally assigned to a specific association (art. 37).

11. *CICHORIO SPINOSI-LIMONIETUM PROLIFERI* ass. nova *hoc loco* (Tab. 8a, 8b)

Holotypus: Rel. 20, Tab. 8a, *hoc loco*.

Characteristic species: *Limonium proliferum*.

Ecology: The association is characterized by the occurrence of *Limonium proliferum*, often having a dominant role, especially on surfaces usually covered by relatively thick layers of silty-sandy soils. These accumulations of soil on bare rock are mainly due to wind and sea storms. The substrata are quite various and mostly represented by limestones, schists, granites, conglomerates, etc. On the whole, this vegetation shows a not constant floristical set. Among the species more frequent there are *Cichorium spinosum*, *Silene sedoides*, *Lotus cytisoides*, *Frankenia hirsuta*, etc., while quite rare are other species of *Limonium*.

Distribution: It is widespread in many islands of central-southern Aegean (Crete, Rhodos, Paros, Amorgos, Donoussa, Koufonisi, Shinoussa, Chios, Ios, Kalymnos, Syros and Tinos), as well as along the coast of Attica (Fig. 5 A).

12. *CICHORIO SPINOSI-LIMONIETUM SIEBERI* ass. nova *hoc loco* (Tab. 9a, 9b)

Holotypus: Rel. 10, Tab. 9a, *hoc loco*.

Characteristic species: *Limonium sieberi*.

Ecology: This association is floristically differentiated by the occurrence and often dominance of *Limonium sieberi*. It is a typically calcicolous species (it was rarely observed on siliceous substrata), usually growing on more or less steep compact limestone and sometimes on cliffs. This very peculiar species is a member of a quite poor vegetation, characterized by few and often sporadic halophytes, such as *Cichorium spinosum*, *Lotus cytisoides*, *Crithmum maritimum*, *Silene sedoides*, etc., while other species of *Limonium* are not very frequent.

Distribution: This community is widespread in North-West Crete, Kythira island, southern Peloponnese and Euboea island (Fig. 5H).

Note: Previously, Géhu in Géhu *et al.* [1987, Ecol. Medit. 13(1-2):102] used *Limonium sieberi* as characteristic species of a new association from Crete, named *Crithmo-Limonietum sieberi*. Unfortunately, this author did not quote the locality where carried out the relevés of this association, while he reports generically the south-east volcanic coast of Crete. Basing on Brullo & Erben (2016), *L. sieberi* exclusively occurs along the north-west calcareous coast of the island, while in the area quoted by Géhu (l.c.) does not exist any volcanic substratum and in addition, other species of *Limonium* occur, such as *L. cornarianum*, *L. hierapetrae*, *L. minoicum*, *L. roridum*, *L. aegaeum*, etc.

Therefore since is not possible to proper identification of the taxon corresponding to the relevés published by the aforesaid author, this syntaxon must be rejected as *nomen dubium*, not being able to be assigned it to any specific association (art. 37).

13. *CICHORIO SPINOSI-LIMONIETUM GRAECI* ass. nova *hoc loco* (Tab. 10)

Holotypus: Rel. 16, Tab. 10, *hoc loco*.

Characteristic species: *Limonium graecum*.

Ecology: The association is usually linked to compact limestones, more rarely it occurs also on schists and granites. The surfaces colonized by this vegetation are represented by quite higher stands and sometimes far from the shoreline. *Limonium graecum*, which is the characteristic species of this association, often grows together with other *Limonium*, as *L. roridum* and *L. proliferum*. Several other halophytes are very frequent in this community, such as *Cichorium spinosum*, *Lotus cytisoides*, *Silene sedoides*, *Crithmum maritimum*, *Frankenia hirsuta*, *Elytrigia rechingeri*, etc.

Distribution: Basing on the current distribution of *Limonium graecum*, this association occurs in the Cyclades islands of Donoussa, Mykonos, Ios, Andros, Iraklia, Paros, Amorgos and Naxos (Fig. 4 J).

Note: *Limonium graecum* was used by Mayer (1995, Libri Bot. 15:112, 116) for naming two new associations, both from Crete. The first one was named by him *Anthemido-Limonietum graeci*, but the name of this syntaxon is invalid because in the relevé designated as holotype, *Anthemis rigida* is absent (art. 3f, 15). Besides, this syntaxon must be considered a *nomen dubium*, since *L. graecum* does not occur in Crete, where it is replaced by other 25 species of *Limonium* (art. 37). Furthermore, in the area where the author carried out the relevé chosen as holotype six different species of *Limonium* occur. In relation to what, even the alliance *Crithmo-Frankenion hirsutae* proposed by the same author being typified by this association is invalid. The second one was named *Limonium graeci-Artochne-metum macrostachyi*, but also it is an invalid name, because in the relevé designated by the author as holotype, *Limonium graecum* is absent (art. 3f, 15). Similarly to the previous case, *L. graecum* does not occur in the island, while basing on the localities quoted for the relevés of this association, the *Limonium* has to be attributed to a different species, in particular that one corresponding to the relevé chosen as holotype of the subass. *limonietosum graeci*. can be likely attributed to *L. roridum*. Therefore, this syntaxon similarly to the previous one represents also a *nomen dubium* (art. 37).

14. *LIMONIETUM MICROCYCLADICI* ass. nova *hoc loco* (Tab. 11, A)

Holotypus: Rel. 6, Tab. 11, *hoc loco*.

Characteristic species: *Limonium microcycladicum*.

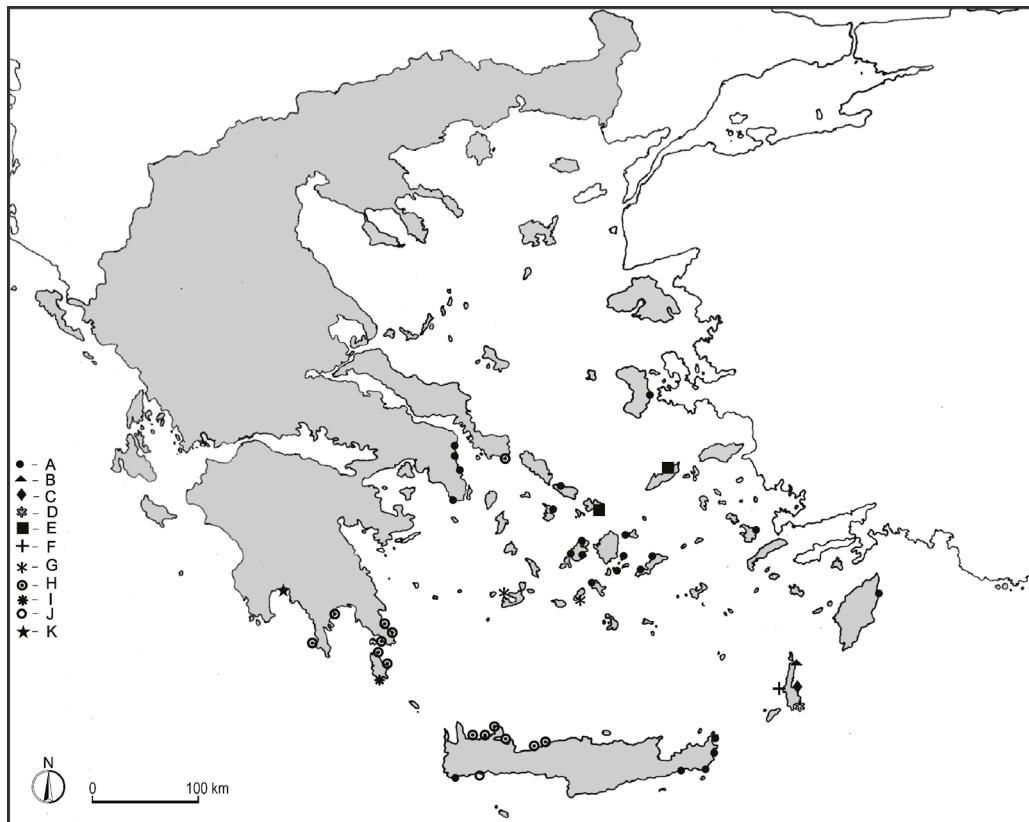


Fig. 5 - Geographical distribution of some associations of *Crithmo maritimi-Limonietea* in Greece: A. *Cichorio spinosi-Limonietum proliferi*; B. *Limonietum vanandensis*; C. *Crithmo-Limonietum meandrini*; D. *Limonietum fragilis*; E. *Crithmo maritimi-Silenetum fabariae*; F. *Limonietum oligotrichi*; G. *Crithmo maritimi-Limonietum ocymifolii*; H. *Cichorio spinosi-Limonietum sieberi*; I. *Crithmo maritimi-Limonietum cytherei*; J. *Limonietum sougiae*; K. *Crithmo maritimi-Limonietum messeniaci*.

Ecology: The association occurs on the rocky coast in stands quite far from the sea, since the belt close to the sea is without vegetation, mainly due to the intense wave action. The substrata are very variable and chiefly represented by Mesozoic limestones and by schistose calcarenites. It is characterized by the occurrence of *Limonium microcycladicum*, rare endemic species, which grows together with few other halophytes.

Distribution: It is very localized and exclusively found in some islands of Micro Cyclades, as Shinoussa and Iraklia (Fig. 7 M).

15. *ELYTRIGIO RECHINGERI-LIMONIETUM SARTORIANI* ass. nova *hoc loco* (Tab. 11B)

Holotypus: Rel. 13, Tab. 11, *hoc loco*.

Characteristic species: *Limonium sartorianum*.

Ecology: It is a really peculiar association exclusively found in the small cliffs very far from the sea, but strongly affected by sea aerosol. The substrata are represented by friable schists with various exposure, which are usually covered by a very dense vegetation. In these stands *Limonium sartorianum*, a very peculiar endemic species, has its *optimum*. It grows together with several other halophytes, such as *Elytrigia*

rechingeri, *Cichorium spinosum*, *Lotus cytisoides*, *Silene sedoides*, *Crithmum maritimum*, etc.

Distribution: The association is known only for Andros (Cyclades islands), where it is very rare (Fig. 7B).

16. *LIMONIETUM ARCHEOTHIRAE* ass. nova *hoc loco* (Tab. 11, C)

Holotypus: Rel. 22, Tab. 11, *hoc loco*.

Characteristic species: *Limonium archeothirae*.

Ecology: This association is localized on calcareous rocky coast constituted by Mesozoic limestones, more rarely on the volcanic substrata. It occurs on more or less steep surfaces and is floristically characterized by the occurrence of *Limonium archeothirae*, small rare endemic colonizing the rocky crevices. This vegetation is floristically very poor and with low cover values.

Distribution: It is exclusive of a small area in the eastern part of Santorini island (Fig. 4 E).

17. *LIMONIETUM THIRAE* ass. nova *hoc loco* (Tab. 12, A)

Holotypus: Rel. 3, Tab. 12, *hoc loco*.

Characteristic species: *Limonium thirae*.

Ecology: This association replaces the previous one

on volcanic rocks, showing also a scattered distribution. It is localized on impervious and often inaccessible stands of the rocky coast and it is characterized by the occurrence of *Limonium thirae*, which grows with few other halophytes.

Distribution: It is exclusive of Santorini island (Fig. 6C).

18. LIMONIETUM ASTYPALEANI ass. nova *hoc loco* (Tab. 12, B)

Holotypus: Rel. 8, Tab. 12, *hoc loco*.

Characteristic species: *Limonium astypaleanum*.

Ecology: The association colonizes the rocky outcrops more or less steep near the sea and typically showing low covering values. The substrata are usually represented by friable schists. Significant it is the occurrence of *Limonium astypaleanum*, rare endemic species, which grows together with few other halophytes, such as *Cichorium spinosum*.

Distribution: It is exclusive of Astypalea island in southern Aegean, where it is quite rare (Fig. 6 B).

19. CICHORIO SPINOSI-LIMONIETUM PUSILLI ass. nova *hoc loco* (Tab. 12, C)

Holotypus: Rel. 11, Tab. 12, *hoc loco*.

Characteristic species: *Limonium pusillum*.

Ecology: The association characterized by the dominance of *Limonium pusillum*, small pulvinate endemic species, is localized on schistose rocky coast, usually quite flat or slightly inclined. This vegetation occupies a rather extended belt, mainly due to exposure to the sea wind and storms. In these places *Cichorium spinosum* is very frequent and abundant.

Distribution: Similarly to the previous one, this plant community occurs in Astypalea island (Fig. 7 C).

20. CRITHMO MARITIMI-LIMONIETUM OCYMI-FOLII ass. nova *hoc loco* (Tab. 12, D)

Holotypus: Rel. 19, Tab. 12, *hoc loco*.

Characteristic species: *Limonium ocymifolium*.

Ecology: The association occurs on the rocky coasts characterized by marly limestones, severely eroded by the waves. The dominant species is *Limonium ocymifolium*, which grows together with *Crithmum maritimum*, *Frankenia hirsuta*, *Caroxylon aegaeum*, *Cichorium spinosum*, *Limonium roridum*, etc. This vegetation featured a marked coverage, tends to colonize a narrow belt near the shoreline.

Distribution: It is surveyed in Milos and Sikinos, islands of Cyclades (Fig. 5 G).

Note: Previously, *Limonium ocymifolium* was used by Mayer (1995) for the characterization of an association surveyed on Crete island, named *Salsola aegaeae-Limonietum ocymifoliae*, but this syntaxon is invalid. In fact, in the relevés designated by the author as holotype, *Salsola aegaea*, species used for give the

name to the association, is absent (art. 3f, 15). Besides *L. ocymifolium* is lacking in Crete and the specimens identified by the author with this name can be probably attributed to *L. cornarianum*.

21. CRITHMO MARITIMI- SILENETUM FABARIAE ass. nova *hoc loco* (Tab. 13, A)

Holotypus: Rel. 4, Tab. 13, *hoc loco*

Characteristic species: *Silene fabaria*.

Ecology: It is a typical casmophilous association linked to siliceous cliffs, near the sea. From the geological viewpoint, the substrata are represented by quite friable granites or schistes, directly affected by sea aerosol. Floristically, it is characterized by the dominance of *Silene fabaria*, which usually grows together with *Crithmum maritimum*, *Elytrigia rechingeri*, *Lotus cytisoides*, etc., while no *Limonium* species occur.

Distribution: Exemples of this vegetation were observed in the Aegean islands of Mykonos and Ikaria (Fig. 5 E).

22. LIMONIETUM SIRINICI ass. nova *hoc loco* (Tab. 13, B)

Holotypus: Rel. 16, Tab. 13, *hoc loco*.

Characteristic species: *Limonium sirinicum*.

Ecology: The association is widespread along the siliceous rocky coast, constituted by micaschists. It colonizes low surfaces, eroded by waves, covering a very wide belt and it is floristically characterized by the occurrence of *Limonium sirinicum*. The species grows together with many other halophytes, represented mainly by *Silene sedoides*, *Lotus cytisoides*, *Jacobsaea maritima* subsp. *bicolor*, *Crithmum maritimum*, etc.

Distribution: This community is exclusive of Sikinos, island of the Cyclades (Fig. 4 N).

23. LIMONIETUM SCHINOUSAЕ ass. nova *hoc loco* (Tab. 13, C)

Holotypus: Rel. 22, Tab. 13, *hoc loco*.

Characteristic species: *Limonium schinousaе*.

Ecology: The association occurs on the calcareous rocky coast, represented by compact Mesozoic limestones, markedly incised and jagged by the waves. Usually the surfaces are quite raised and the halophytes grow in the deep crevices. This vegetation is characterized by *Limonium schinousaе*, puntiform endemic, which grows together with few species, such as *Cichorium spinosum*, *Limonium proliferum* and *Lotus cytisoides*.

Distribution: This vegetation is known only for few costal sites of Shinoussa, small islet of Micro Cyclades archipelago (Fig. 6 M).

24. LIMONIETUM SPREITZENHOFERI ass. nova *hoc loco* (Tab. 14, A)

Holotypus: Rel. 4, Tab. 14, *hoc loco*.

Characteristic species: *Limonium spreitzenhoferi*.

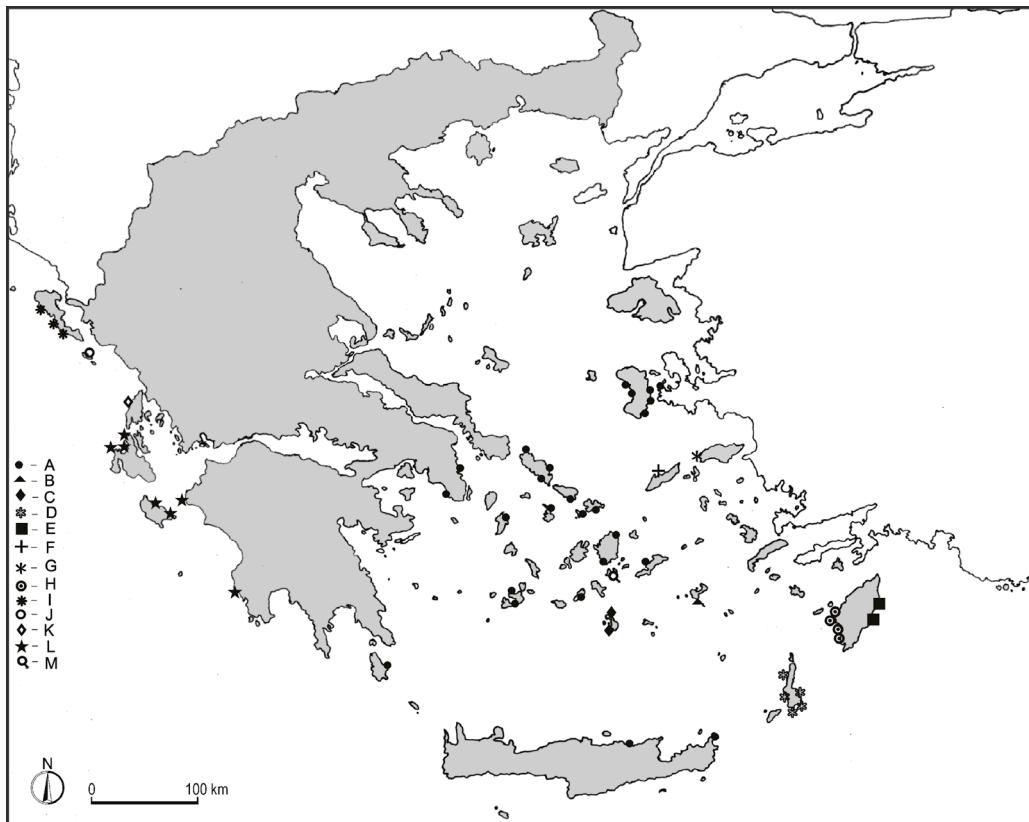


Fig. 6 - Geographical distribution of some associations of *Crithmo maritimi-Limonietea* in Greece: A. *Crithmo maritimi-Limonietum roridi*; B. *Limonietum astypaleani*; C. *Limonietum thirae*; D. *Crithmo-Limonietum pigadiensis*; E. *Limonietum hirsuticalycis*; F. *Crithmo maritimi-Limonietum ikarici*; G. *Crithmo maritimi-Limonietum isidori*; H. *Limonietum monolithici*; I. *Elytrigio athericae-Helichrysetum italicici*; J. *Centaureo paxorum-Putorietum calabricae*; K. *Ptilostemo chamapeuces-Jacobaeetum bicoloris*; L. *Crithmo maritimi-Helichrysetum conglobati*; M. *Limonietum schinouiae*.

Ecology: The association is linked to calcareous rocky coast, characterized by low and very jagged surfaces, strongly affected by waves. It is differentiated by the occurrence of *Limonium spreitzenhoferi*, quite rare endemic, growing together with few other halophytes, among them *Cichorium spinosum*, *Lotus cytisoides*, *Silene sedoides*, *Frankenia hirsuta*, *Crithmum maritimum*, etc.

Distribution: It is spread along the northern coast of Kithira, island near Neapolis in the southern Peloponnese (Fig. 4 Q).

25. CRITHMO MARITIMI-LIMONIETUM APHRODITAE ass. nova *hoc loco* (Tab. 14, B)

Holotypus: Rel. 7, Tab. 14, *hoc loco*.

Characteristic species: *Limonium aphroditae*.

Ecology: The association is localized on calcareous outcrops in correspondence of pebble beaches. It is characterized by the occurrence of *Limonium aphroditae*, narrow endemism growing in the rocky crevices together with *Cichorium spinosum*, *Crithmum maritimum* and *Silene sedoides*.

Distribution: It is a very rare community exclusive of

western coast of Kithira island (Fig. 4 M).

26. CRITHMO MARITIMI-LIMONIETUM CYTHEREI ass. nova *hoc loco* (Tab. 14, C)

Holotypus: Rel. 13, Tab. 14, *hoc loco*.

Characteristic species: *Limonium cythereum*.

Ecology: It is a chasmophilous vegetation colonizing the calcareous cliffs in contact with sandy beaches. In this association *Limonium cythereum*, a very peculiar endemic species, is localized. Usually, it grows with other halophytes, among them *Cichorium spinosum*, *Elytrigia rechingeri*, *Lotus cytisoides*, *Crithmum maritimum*, *Limbara crithmoides* subsp. *longifolia*, *Silene sedoides*, etc.

Distribution: This association was found in the southern coast of Kithira island (Fig. 5 I).

27. CRITHMO MARITIMI-LIMONIETUM CALLIOP-SII ass. nova *hoc loco* (Tab. 15)

Holotypus: Rel. 12, Tab. 15, *hoc loco*.

Characteristic species: *Limonium calliopsium*.

Ecology: The association colonizes the cliffs and the steep, north-facing rocky coast directly affected by

sea aerosol. The substrata are mainly represented by Mesozoic limestones, which allows to establishment of a typically chasmophilous vegetation. Differential species of this plant community is *Limonium calliposum*, quite rare endemic, growing together with several halophytes such as *Cichorium spinosum*, *Crithmum maritimum*, *Lotus cytisoides*, *Silene sedoides*, etc.

Distribution: It is localized along some coastal area of North-western Crete, near Rethymnos (Fig. 4 C).

28. CRITHMO MARITIMI-LIMONIETUM STENOTATI ass. nova *hoc loco* (Tab. 16)

Holotypus: Rel. 7, Tab. 16, *hoc loco*.

Characteristic species: *Limonium stenotatum*.

Ecology: The association is localized on coastal tracts characterized by friable substrata, constitute by arenaceous or marly limestones, schists and conglomerates, usually quite sloped. Floristically, it is differentiated by *Limonium stenotatum*, endemic species previously confused with *L. hyssopifolium*, usually growing with *Cichorium spinosum*, *Elytrigia rechingeri*, *Limonium roridum*, *L. recticaule*, *Crithmum maritimum*, *Lotus cytisoides*, *Silene sedoides*, etc.

Distribution: It is distributed in the coastal stands of north-western and eastern of Crete (Fig. 4 K).

29. LIMONIETUM SOUGIAE ass. nova *hoc loco* (Tab. 17, A)

Holotypus: Rel. 1, Tab. 17, *hoc loco*.

Characteristic species: *Limonium sougiae*.

Ecology: The association is linked to calcareous rocky coast with steep surfaces mixed to sandy beach. It is a very poor vegetation, characterized by the occurrence of *Limonium sougiae*, very rare endemic species, growing with few halophytes.

Distribution: It is exclusive of a short tract of coast near Sougia in the south western Crete (Fig. 5 J).

30. LIMONIETUM XEROCAMPOSI CI ass. nova *hoc loco* (Tab. 17, B)

Holotypus: Rel. 3, Tab. 17, *hoc loco*.

Characteristic species: *Limonium xerocamposicum*.

Ecology: The association was surveyed in the rocky carbonatic coast, where colonizes flat or gently sloping surfaces. It is a very xeric community differentiated by *Limonium xerocamposicum*, rare endemic species growing together with *Cichorium spinosum*, *Crithmum maritimum*, *Lotus cytisoides*, etc.

Distribution: It is localized along the rocky coast near Xerokampos, eastern Crete (Fig. 7 P).

31. LIMONIETUM SITIACI ass. nova *hoc loco* (Tab. 17, C)

Holotypus: Rel. 9, Tab. 17, *hoc loco*.

Characteristic species: *Limonium sitiacum*.

Ecology: The association mainly occurs on calca-

reous rocky coast, more rarely on schists, where it grows along the narrow belt very close to the sea. It is linked to very steep surfaces markedly affected by marine aerosol. Physiognomically, it is characterized by the dominance of *Limonium sitiacum*, very peculiar endemic species showing a well developed and caespitose habit, which grows together with other halophytes such as *Cichorium spinosum*, *Trifolium uniflorum*, *Limonium stenotatum*, *Lotus cytisoides*, *Silene sedoides*, etc.

Distribution: It is distributed in several stands of the north-eastern coast of Crete (Fig. 7 G).

32. CICHORIO SPINOSI-LIMONIETUM CORNARIANI ass. nova *hoc loco* (Tab. 18, A)

Holotypus: Rel. 4, Tab. 18, *hoc loco*.

Characteristic species: *Limonium cornarianum*.

Ecology: The association is localized on the flat and corroded surfaces covering a wide belt, often rather extended inwards. The rocks are usually represented by fossiliferous limestones and conglomerates. This vegetation is dominated by *Limonium cornarianum*, small chamaephyte growing in the rock crevices, mixed to few other halophytes, as *Cichorium spinosum*, *Caroxylon aegaeum*, *Lotus cytisoides*, *Silene sedoides*, etc.

Distribution: It occurs along the carbonatic coast of south-eastern Crete (Fig. 7 H).

33. LIMONIETUM HIERAPETRAE ass. nova *hoc loco* (Tab. 18, B)

Holotypus: Rel. 16, Tab. 18, *hoc loco*.

Characteristic species: *Limonium hierapetrae*.

Ecology: The association grows on rocky stands near the sea, mainly on marls or sometimes marly conglomerates. The surfaces are usually more or less sloped and eroded by the waves. This vegetation is differentiated by the occurrence of *Limonium hierapetrae*, rare species, growing together few other halophytes, as *Elytrigia rechingeri*, *Limonium virgatum*, *Frankenia hirsuta*, etc.

Distribution: It is a quite rare vegetation known only for few stands near Hierapetra in south-eastern Crete (Fig. 7 J).

34. CRITHMO MARITIMI-LIMONIETUM MINOICI ass. nova *hoc loco* (Tab. 18, C)

Holotypus: Rel. 23, Tab. 18, *hoc loco*.

Characteristic species: *Limonium minoicum*.

Ecology: The association occurs along the rocky coast in the stands near the sea, showing a scattered distribution. It prefers the marly or calcarenitic substrata characterized by gentle sloping surfaces. The vegetation is characterized by *Limonium minoicum*, usually growing together with *Crithmum maritimum*, often quite abundant, associated with other halophytes as

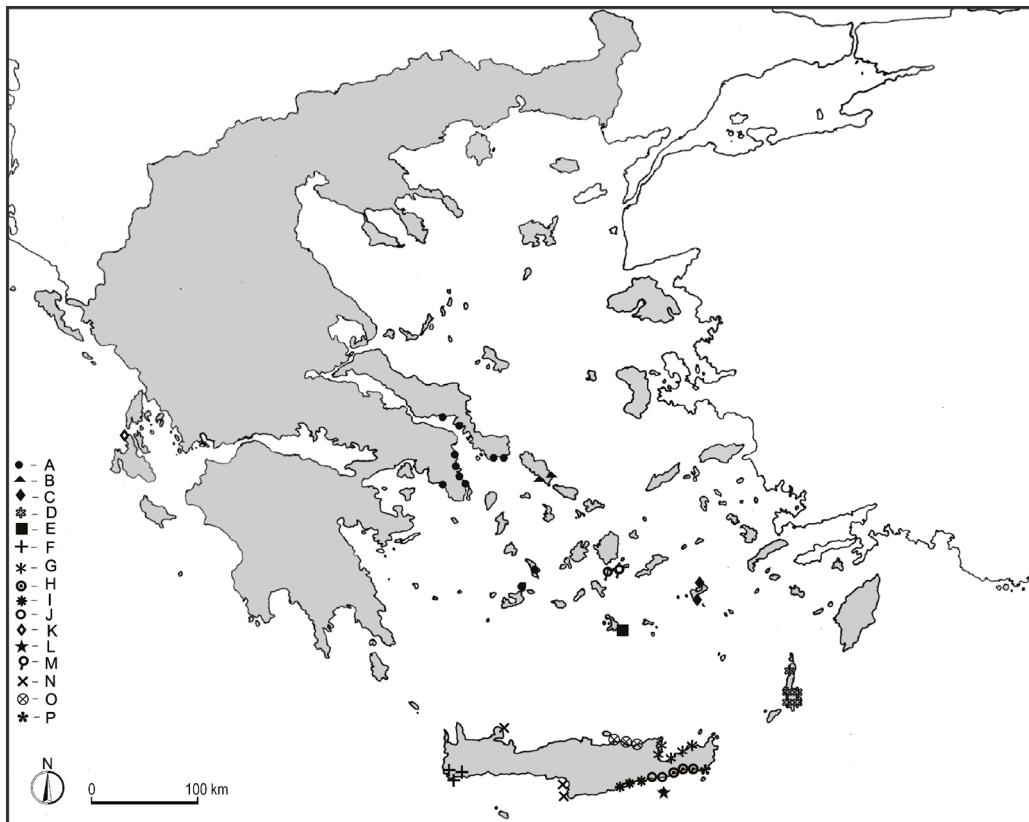


Fig. 7 - Geographical distribution of some associations of *Crithmo maritimi-Limonietea* in Greece: A. *Crithmo-Limonietum aegaei*; B. *Elytrigio rechingeri-Limonietum sartoriani*; C. *Cichorio spinosi-Limonietum pusilli*; D. *Limonietum amopici*; E. *Limonietum archeothirae*; F. *Crithmo maritimi-Limonietum elaphonisici*; G. *Limonietum sitiaci*; H. *Cichorio spinosi-Limonietum cornariani*; I. *Crithmo maritimi-Limonietum minoici*; J. *Limonietum hierapetrae*; K. *Diantho occidentalis-Jacobaetum bicoloris*; L. *Limonietum chrisianii*; M. *Limonietum microcycladici*; N. *Crithmo maritimi-Limonietum cretici*; O. *Crithmo maritimi-Limonietum recticaulis*; P. *Limonietum xerocamposici*.

Elytrigia rechingeri, *Caroxylon aegaeum*, *Silene sedoides*, etc.

Distribution: It is widespread in the central-southern part of Crete, between Hierapetra and Lentas (Fig. 7 I).

35. CRITHMO MARITIMI-LIMONIETUM ELAPHONISICI ass. nova *hoc loco* (Tab. 20, A)

Holotypus: Rel. 4, Tab. 20, *hoc loco*.

Characteristic species: *Limonium elaphonisicum*.

Ecology: The association is localized on calcarenous substrata, often superficially covered by sands, due to the proximity of dune systems. It is differentiated by the occurrence of *Limonium elaphonisicum*, which grows together other halophytes as *Cichorium spinosum*, *Limonium roridum*, *L. stenotatum*, *Crithmum maritimum*, *Lotus cytisoides*, etc.

Distribution: It is circumscribed to south-western part of Crete (Fig. 7 F).

36. CRITHMO MARITIMI-LIMONIETUM RETICULATI ass. nova *hoc loco* (Tab. 19)

Holotypus: Rel. 5, Tab. 19, *hoc loco*.

Characteristic species: *Limonium creticum*.

Ecology: The association occurs mainly on marls or marly limestones, colonizing more or less flat surfaces or also very sloped rocky walls. Physiognomically it is differentiated by *Limonium creticum*, rare huge chamaephyte, growing with many other halophytes as *Cichorium spinosum*, *Elytrigia rechingeri*, *Crithmum maritimum*, *Limonium virgatum*, *Lotus cytisoides*, *Frankenia corymbosa*, *Silene sedoides*, etc.

Distribution: This vegetation occurs in Crete (Fig. 7 N), where it is localized in the Akrotiri peninsula (north-west sector) and between Kalamaki and Matala (central-south sector).

37. CRITHMO MARITIMI-LIMONIETUM RETICAULIS ass. nova *hoc loco* (Tab. 20, B)

Holotypus: Rel. 12, Tab. 20, *hoc loco*.

Characteristic species: *Limonium recticaule*.

Ecology: The association is usually linked to rocky coasts characterized by limestones or conglomerates of stands affected by fresh bioclimatic conditions. The vegetation is differentiated by *Limonium recticaule*, usually growing with *L. roridum* and several other halophytes, as *Cichorium spinosum*, *Elytrigia rechingeri*,

ri, Crithmum maritimum, Lotus cytisoides, Frankenia hirsuta, Silene sedoides, etc.

Distribution: It is distributed in the northern coast of Crete, between Iraklion and Malia (Fig. 7 O).

38. **LIMONIETUM CHRISIANI** Brullo & Guarino, Fl. Medit. 10: 279, 2000. (Tab. 20, C)

Holotypus: Rel. 4, Tab. 5 (Brullo & Guarino, 2000).

Characteristic species: *Limonium chrisianum*.

Ecology: The association is localized on limestones, with flat and corroded surfaces of territories characterized by very arid bioclimate. This vegetation constitute a narrow belt near the sea strongly affected by marine aerosol. It is floristically differentiated by *Limonium chrisianum*, rare endemic species, usually growing together with *L. roridum* and other halophytes as *Cichorium spinosum*, *Frankenia hirsuta*, *Crithmum maritimum*, etc.

Distribution: It is endemic of Khrisi, small island in the southern part of Crete (Fig. 7 L).

39. **CRITHMO-LIMONIETUM PIGADIENSIS** Géhu, Apostolides, Géhu-Frank & Arnold, Coll. Phytosoc. 19: 551, 1992. (Tab. 21)

Holotypus: Rel. 3, Tab. 18 (Géhu *et al.* 1992).

Characteristic species: *Limonium pigadiense*.

Ecology: The association occurs on limestones or conglomerates of stands characterized by more or less flat surfaces, but colonizing also the vertical cliffs near the sea. This vegetation shows often high values of coverage and is differentiated by the occurrence of *Limonium pigadiense*, growing sometimes with other species of *Limonium*, such as *L. amopicum* *L. oligotrichum*, *L. proliferum*, *L. crateriforme*. Among the other halophytes are frequent *Cichorium spinosum*, *Lotus cytisoides*, *Silene sedoides*, etc., while *Crithmum maritimum* is quite rare.

Distribution: It is widespread in the Karpathos island (Fig. 6 D).

40. **CRITHMO-LIMONIETUM MEANDRINI** Géhu, Apostolides, Géhu-Frank & Arnold, Coll. Phytosoc. 19: 551, 1992, nom nov. (Tab. 22, A)

Holotypus: Rel. 9, Tab. 19 (Géhu *et al.* 1992).

Syn.: *Crithmo-Limonietum hyssopifolii* Géhu, Apostolides, Géhu-Frank & Arnold, Coll. Phytosoc. 19: 551, 1992, p. p. nom. reject (art. 39, 44).

Characteristic species: *Limonium meandrini*.

Ecology: The association is localized on the upper part of the reefs, where it colonizes very steep surfaces. The substrata are usually represented by compact limestones, covered by a dense vegetation dominated by *Limonium meandrini*. This rare endemic species grows together with *Silene sedoides*, *Lotus cytisoides*, *Crithmum maritimum*, *Matthiola incana*, etc.

Distribution: It is exclusive of Karpathos, where it

occurs on a small area in the southern-east part of the island (Fig. 5 C).

Note: For Karpathos island Géhu *et al.* (1992, Coll. Phytosoc. 19: 551) described an association named *Crithmo-Limonietum hyssopifolii*, floristically characterized by *Limonium hyssopifolium*. According to Brullo & Erben (2015), this species is synonym of *L. roridum*, but in the localities where the authors carried out the relevés, the species is lacking, while other species of *Limonium* occur, such as *L. meandrini*, *L. ammophilum*, *L. amopicum* and *L. pigadiense*. In particular, the dominant species in Kira Panagia, which is the locality of the holotype, must be attributed to *L. meandrini*. Therefore, the name of this syntaxon has to be changed in *Crithmo-Limonietum meandrini* nom. nov. and the relevés referable to this association are exclusively those ones corresponding to the numbers 5 and 9, while the other relevés present in the Table 19 are to be referred to other associations.

41. **LIMONIETUM OLIGOTRICHI** ass. nova *hoc loco* (Tab. 22, B)

Holotypus: Rel. 16, Tab. 22, *hoc loco*.

Characteristic species: *Limonium oligotrichum*.

Ecology: The association was surveyed on rocky coast characterized by marls or calcarenitic substrata. The surfaces are flat or gently sloped, strongly eroded by waves and colonized by a vegetation where *Limonium oligotrichum* finds its optimum. Other halophytes are usually scattered and rather rare, such as *Cichorium spinosum*, *Lotus cytisoides*, etc.

Distribution: It is circumscribed to a small area of western Karpathos, near Lefkos (Fig. 5 F).

42. **LIMONIETUM AMOPICI** ass. nova *hoc loco* (Tab. 23)

Holotypus: Rel. 2, Tab. 23, *hoc loco*.

Characteristic species: *Limonium amopicum*.

Ecology: The association is localized on calcarenitic and marly substrata, colonizing more or less flat surfaces and also very steep rocky stands. This vegetation is dominated by *Limonium amopicum*, with rather high cover values. Sometimes the species is mixed with other *Limonium* as *L. frederici*, *L. oligotrichum*, *L. crateriforme* and *L. pigadiense*. Besides, other halophytes are quite frequent, such as *Cichorium spinosum*, *Lotus cytisoides*, *Silene sedoides*, *Crithmum maritimum*, etc.

Distribution: It occurs in Karpathos, where it shows a scattered distribution in several localities of the island (Fig. 7 D).

43. **CICHORIO SPINOSI-LIMONIETUM CRATERIFORMIS** ass. nova *hoc loco* (Tab. 24)

Holotypus: Rel. 18, Tab. 24, *hoc loco*.

Characteristic species: *Limonium crateriforme*.

Ecology: The association shows remarkable xero-

philous requirements, mainly occurring on calcarenous rocky coast. It prefers very eroded surfaces, which are flat or gently sloping, often mixed with sand soils. Physiognomically, it is dominated by *Limonium craterriforme*, sometimes growing together with other *Limonium* and several halophytes, such as *L. oligotrichum*, *L. pigadiense*, *L. amopicum*, *Cichorium spinosum*, *Elytrigia rechingeri*, *Crithmum maritimum*, *Lotus cytisoides*, *Frankenia hirsuta*, etc.

Distribution: It is very spread along the rocky coast of Karphatos, where it was found in many localities (Fig. 4 L).

44. LIMONIETUM VANANDENSIS ass. nova *hoc loco* (Tab. 25, A)

Holotypus: Rel. 5, Tab. 25, *hoc loco*.

Characteristic species: *Limonium vanandense*.

Ecology: The association is localized along the metamorphic rocky coast represented by very steep and sometimes vertical surfaces. In these stands overhanging the sea, *Limonium vanandense*, a very rare endemism, seems to have its optimum. The species grows together with few other halophytes such as *Cichorium spinosum*, *Silene sedoides*, *Lotus cytisoides*, etc.

Distribution: It is exclusive of Vananda, a small locality in the North-East part of Karphatos (Fig. 5 B).

45. LIMONIETUM FRAGILIS ass. nova *hoc loco* (Tab. 25, B)

Holotypus: Rel. 8, Tab. 25, *hoc loco*.

Characteristic species: *Limonium fragile*.

Ecology: The association occurs exclusively on flat and very indented rocky coasts, chiefly formed by compact limestone, which are sheltered by a high cliff. In this stand strongly affected by waves, grows *Limonium fragile*, a very peculiar and small endemic species, usually associated with *L. amopicum*. It is a remarkable halophilous vegetation, where few other species occur, such as *Cichorium spinosum*, *Lotus cytisoides*, *Silene sedoides*, etc.

Distribution: It is circumscribed to Akro Scopi, a small place in the south-eastern Karphatos (Fig. 5 D).

46. LIMONIETUM CARPATHI Géhu, Apostolides, Géhu-Frank & Arnold, Coll. Phytosoc. 19: 551, 1992. (Tab. 26)

Holotypus: Rel. 10, Tab. 16. (Géhu et al. 1992).

Characteristic species: *Limonium carpathum*.

Ecology: The association is linked to rocky coasts usually flat or sloping, where it colonizes a wide belt very extended inward. The substrata are mainly represented by compact limestones or conglomerates, with small eroded hollows. Physiognomically, the vegetation, occurring in these stands, is dominated by *Limonium carpathum*, a markedly halophilous species, growing with few other species, such as *Cichorium*

spinosum, *Silene sedoides*, *Lotus cytisoides*, *Crithmum maritimum*, etc.

Distribution: It is widespread in several localities of Karphatos (Fig. 8 A).

47. LIMONIETUM MONOLITHICI ass. nova *hoc loco* (Tab. 25, C)

Holotypus: Rel. 17, Tab. 25, *hoc loco*.

Characteristic species: *Limonium monolithicum*.

Ecology: The association occurs on compact limestones, showing a smooth and irregular surface. It colonizes a rocky high coast limitedly to the stands quite near the sea. The differential species is *Limonium monolithicum*, rare endemic species taxonomically similar to *L. carpathum*, growing together with few other halophytes such as *Cichorium spinosum*, *Limonium aucheri*, *Lotus cytisoides*, *Silene sedoides*, *Crithmum maritimum*, etc.

Distribution: It is exclusive of Rhodos, where it is localized in the southern-west part of the island (Fig. 6 H).

48. LIMONIETUM HIRSUTICALYCIS ass. nova *hoc loco* (Tab. 27)

Holotypus: Rel. 1, Tab. 27, *hoc loco*.

Characteristic species: *Limonium hirsuticalyx*.

Ecology: This association is localized along coastal stands characterized by surfaces with quite deep crevices, which are protected by waves and affected by sea aerosol. The substrata are represented by eroded limestones, represented by low reefs or rarely cliffs. The vegetation is dominated by *Limonium hirsuticalyx*, which shows a habit very similar to *L. narbonense*, often forming dense populations. This species grows usually with *Caroxylon aegaeum*, *Cichorium spinosum*, *Lotus cytisoides*, *Frankenia hirsuta*, etc.

Distribution: It was found in eastern slope of Rhodos, where it occurs in some isolated stands (Fig. 6 E).

49. CRITHMO MARITIMI-LIMONIETUM QUINNII ass. nova *hoc loco* (Tab. 29, A)

Holotypus: Rel. 4, Tab. 29, *hoc loco*.

Characteristic species: *Limonium quinnii*.

Ecology: The association colonizes a wide coastal area rather extended inward, characterized by flat surfaces, strongly eroded and fissured due to the intensive wave action. The substrata are represented by compact limestones. Physiognomically, it is dominated by *Limonium quinnii*, species growing together with *Cichorium spinosum*, *Crithmum maritimum*, *Lotus cytisoides*, *Silene sedoides*, etc.

Distribution: It is exclusive of the north-eastern Rhodos (Fig. 8 G).

50. LIMONIETUM AUCHERI ass. nova *hoc loco* (Tab. 28)

Holotypus: Rel. 27, Tab. 28, *hoc loco*.

Characteristic species: *Limonium aucheri*.

Ecology: The association is usually linked to friable substrata represented by schists, calcarenites, marls and volcanic rocks. The surfaces colonized by this vegetation are flat and quite eroded due to the sea proximity. The vegetation, tendentially mesophilous, is characterized by *Limonium aucheri*, which often grows together with other *Limonium*, e.g. *L. roridum*, *L. ammophilon*, *L. aegaeum*. Several halophytes are quite frequent such as *Elytrigia rechingeri*, *Cichorium spinosum*, *Crithmum maritimum*, *Silene sedoides*, *Lotus cytisoides*, *Limbarda crithmoides* subsp. *longifolia*, etc.

Distribution: It is widely spread in several Aegean islands, such as Rhodos, Kos, Nisyros, Kithira, Andros, Kythnos and Syros (Fig. 8 C).

51. CRITHMO MARITIMI-LIMONIETUM DOLIHENSIS ass. nova *hoc loco* (Tab. 29, B)

Holotypus: Rel. 11, Tab. 29, *hoc loco*.

Characteristic species: *Limonium dolihense*.

Ecology: The association occurs on the vertical north-facing surfaces near the sea, chiefly constitutes by friable schistous rocks. In this stands, the vegetation shows high values of coverage and is characterized by the occurrence of *Limonium dolihense*, rare endemic species, growing together with other species, such as *Elytrigia rechingeri*, *Crithmum maritimum*, *Lotus cytisoides*, *Silene sedoides*, etc. Due to the occurrence of *Silene fabaria*, the relevés 10-12 represent a transition aspect toward the *Crithmo-Silenetum fabariae*.

Distribution: It is restricted to few stands of Ikaria, near Kampos (Fig. 8 F).

52. CRITHMO MARITIMI-LIMONIETUM IKARICI ass. nova *hoc loco* (Tab. 29, C)

Holotypus: Rel. 25, Tab. 29, *hoc loco*.

Characteristic species: *Limonium ikaricum*.

Ecology: The association colonizes the flat rocky coast characterized by granites, where it is strongly affected by sea aerosol. This vegetation is dominated by *Limonium ikaricum*, often showing low cover values, which grows together with other halophytes, such as *Cichorium spinosum*, *Trifolium uniflorum*, *Crithmum maritimum*, *Silene sedoides*, etc. In the stands rather far from the sea this plant community is replaced by a shrubby vegetation featured by *Helichrysum italicum*, where *L. ikaricum* is very rare and even lacking (rel. 7).

Distribution: It was found at Ikaria, where it is localized near Evdilos (Fig. 6 F).

53. CRITHMO MARITIMI-LIMONIETUM SAMII ass. nova *hoc loco* (Tab. 30, A)

Holotypus: Rel. 5, Tab. 30, *hoc loco*.

Characteristic species: *Limonium samium*.

Ecology: The association is linked to rocky coast

more or less steep, formed by compact limestones. The surfaces are very eroded and strongly affected by sea aerosol and waves. The vegetation is dominated by *Limonium samium*, which grows together with other halophytes, such as *Elytrigia rechingeri*, *Crithmum maritimum*, etc.

Distribution: It is localized in the northern coast of Samos (Fig. 8 E).

54. CRITHMO MARITIMI-LIMONIETUM ISIDORI ass. nova *hoc loco* (Tab. 30, B)

Holotypus: Rel. 11, Tab. 30, *hoc loco*.

Characteristic species: *Limonium isidorum*.

Ecology: The association occurs on the rocky coast characterized by crystalline limestones (marbles). It colonizes quite smooth surfaces, not very close to the sea, but affected by wave motion. In these stands rather relevant it is the occurrence of *Limonium isidorum*, very rare endemic, growing together with other halophytes, as *Elytrigia rechingeri*, *Crithmum maritimum*, etc.

Distribution: It is exclusive of the North-West part of Samos, where it is very rare (Fig. 6 G).

55. CRITHMO MARITIMI-LIMONIETUM AMMOPHILI ass. nova *hoc loco* (Tab. 30, C)

Holotypus: Rel. 13, Tab. 30, *hoc loco*.

Characteristic species: *Limonium ammophilon*.

Ecology: The association is characterized by *Limonium ammophilon*, species mainly occurring on sandy soils. This species colonizes also the rocky coast but exclusively on friable substrata, mainly represented by schists, calcarenites and soft limestones. In this stands, it grows together with some halophytes, often showing high cover values, among them *Crithmum maritimum*, *Limonium aegaeum*, *Trifolium uniflorum*, *Lotus cytisoides*, etc.

Distribution: It was found in some Aegean islands, such as Rhodos, Chios and Syros, but considering the current distribution of *Limonium ammophilon*, it is likely that this plant community may occur also in other islands (Fig. 8 B).

56. ELYTRIGIO RECHINGERI-LIMONIUM HELENAE ass. nova *hoc loco* (Tab. 30, D)

Holotypus: Rel. 23, Tab. 30, *hoc loco*.

Characteristic species: *Limonium helenae*.

Ecology: This association is localized on rocky coast characterized by compact limestones or conglomerates, colonizing eroded and fissured surfaces, flat or gently sloping. The vegetation is differentiated by the occurrence of *Limonium helenae*, very rare species growing together with *Elytrigia rechingeri*, *Crithmum maritimum*, *Lotus cytisoides*, *Frankenia hirsuta*, *Daucus gingidium*, etc. In these stands, *Limonium narbonense* and *Halimione portulacoides* are very frequent,

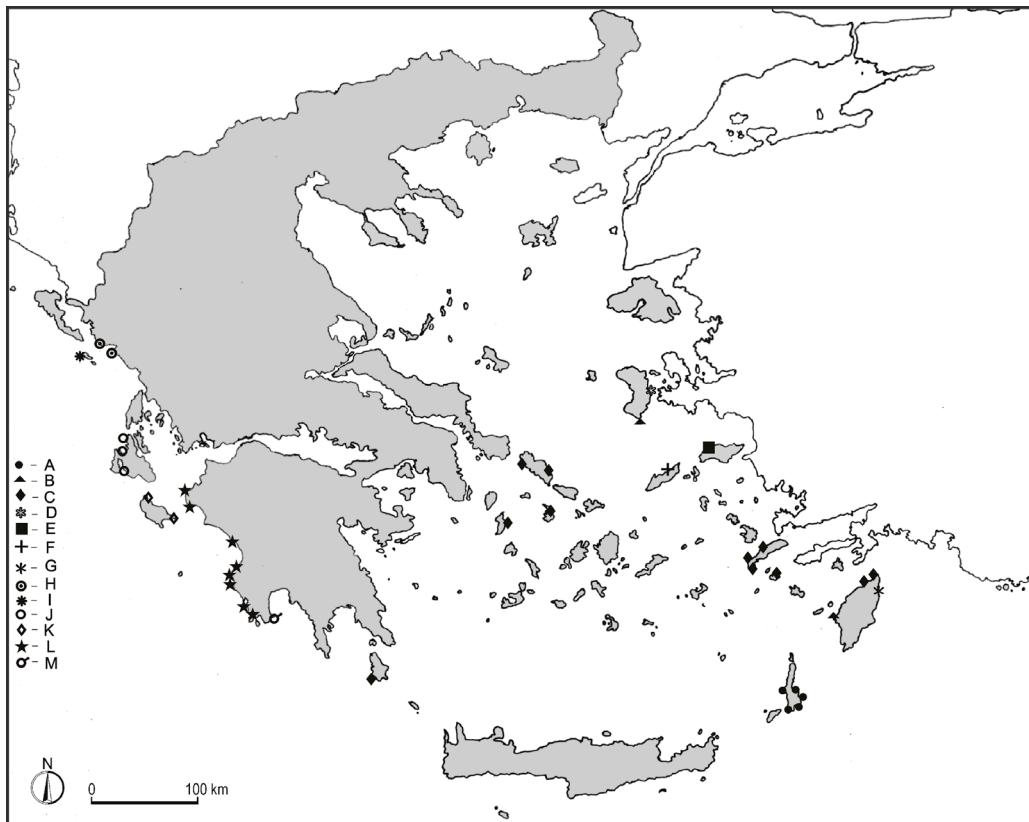


Fig. 8 - Geographical distribution of some associations of *Crithmo maritimi-Limonietea* in Greece: A. *Limonietum carpathi*; B. *Crithmo maritimi-Limonietum ammophili*; C. *Limonietum aucheri*; D. *Elytrigio rechingeri-Limonium heleneae*; E. *Crithmo maritimi-Limonietum samii*; F. *Crithmo maritimi-Limonietum dolihensis*; G. *Crithmo maritimi-Limonietum quinnii*; H. *Limonietum epirotici*; I. *Centaureo paxorum-Jacobaetum bicoloris*; J. *Crithmo maritimi-Limonietum cephalonici*; K. *Crithmo maritimi-Limonietum phitosiani*; L. *Crithmo maritimi-Limonietum pylii*; M. *Limonietum coronensis*.

thus highlighting the remarkable halophilous feature of this vegetation.

Distribution: It is exclusive of a small coastal area in eastern Chios, near Cape Elenis (Fig. 8 D).

PHAGNOLO GRAECI-ANTHYLLIDENION HERMAN-NIAE suball. nova *hoc loco*.

Holotypus: *Cichorio spinosi-Helichrysetum conglobati* ass. nova *hoc loco*.

Characteristic species: *Achillea cretica*, *Anthyllis hermanniae* subsp. *hermanniae*, *Capparis orientalis*, *Centaurea raphanina* subsp. *mixta*, *Helichrysum italicum*, *Matthiola incana*, *Phagnalon graecum*, *Thymelaea tartonraira* subsp. *argentea*.

Ecology: This syntaxon groupes the plant community found in the inner belt in contact with the associations dominated by *Limonium* sp. pl., which are linked to more halophilous conditions. From the structural point of view, this kind of vegetation is dominated by thorny dwarf shrubs, usually showing a cushion-like habit. These species are mostly represented by xerophytes, which are able to survive in the extremely harsh environmental conditions, such as winds, sea aerosol,

edaphic salinity, storm sea, etc. This vegetation is often quite homogenous and dense, covering quite huge surfaces in-between the belt dominated by *Limonium* sp. pl. (close to the sea) and the maquis of the innermost stands. Plant communities belonging to this suballiance are not very frequent, but it is possible to observe them mainly in the coastal stands affected by strong winds during most of the year. The suballiance at issue can be considered an eastern Mediterranean of the *Plantagini subulatae-Thymelaeneion hirsutae* Bartolo, Brullo & Marcenò 1982 and *Launaenion cervicornis* O. Boldò & Vigo ex Y. Gil & Llorens 1995 occurring in the western Mediterranean territories.

Distribution: It is widespread mainly in the central and southern part of the Aegean area.

57. LIMONIO SINUATI-CENTAUREETUM SPINOSAE Mayer, Libri Bot. 15:174 1995, nom. invers. propon. (Tab. 31)

Syn.: *Centaureo spinosae-Limonietum sinuati* Mayer, Libri Bot. 15: 174, 1995.

Holotypus: Rel. 945 (52), Tab. 18 (Mayer, 1995).

Characteristic species: *Centaurea spinosa*.

Ecology: The association is physiognomically differentiated by the dominance of the huge thorny pulvines of *Centaurea spinosa*, often covering very large surfaces. In this stands quite far from the sea, it replaces the vegetation characterized by *Limonium* species, occurring along the rocky coast close to the shoreline. On the whole, this vegetation form a dense well developed and homogenous belt, in contact inwards with the maquis or phrygana. *C. spinosa* is usually associated with *Anthyllis hermanniae* subsp. *hermanniae*, *Helichrysum italicum*, *Cichorium spinosum*, *Elytrigia rechingeri* and several elements of *Crithmo-Limonietea*. As concerns the substrata, it does not seem to be linked to any particular type, but it mostly occurs on schists, limestones, conglomerates and calcarenites.

Distribution: It is well represented in several islands of central Aegean area (Samos, Milos, Kythnos, Sifnos, Tinos, Syros, Crete) and also in Attica (Fig. 9A).

Notes: This associations was originally described by Mayer (1995) sub *Centaureo spinosae-Limonietum sinuati*, but due to the clear dominance of *Centaurea spinosa*, the inversion of the name is here proposed (art. 42).

58. *CICHORIO SPINOSI-CARLINETUM TRAGACANTHIFOLIAE* Géhu, Apostolides, Géhu-Frank & Arnold, Coll. Phytosoc. 19: 552, 1992. (Tab. 32)

Holotypus: Rel. 14, Tab. 22 (Géhu *et al.*, 1992).

Characteristic species: *Carlina tragacanthifolia*.

Ecology: This association, described by Géhu *et al.* (1992), occurs in the coastal stands quite far from the sea, establishing a serial contact toward the halophilous community characterized by *Limonium* species. It is linked to various eroded substrata, such as limestones, calcarenites, schistes, marls, conglomerates, etc. This vegetation is dominated by *Carlina tragacanthifolia*, endemic species mainly spread in the coastal stands, where it grows together with *Cichorium spinosum* and *Helichrysum conglobatum*. Usually it is replaced inwards by more mature plant communities, represented by phrygana or maquis.

Distribution: It was found in Rhodos and Karpathos islands, where it is very common (Fig. 9 B).

59. *HELICRYSO CONGLOBATI-ACHILLEETUM CRETICAE* Géhu, Costa & Uslu, Coll. Phytosoc. 12: 214, 1990 (Tab. 33)

Holotypus: Rel. 1, Tab. 20 (Géhu *et al.*, 1990).

Characteristic species: *Achillea cretica*.

Ecology: The association occurs on elevated coastal stands, at the top of the cliffs not directly affected by marine agents. It seems to prefer calcareous surfaces more or less flat, very exposed to winds. The vegetation is dominated by *Achillea cretica*, which usually shows high cover values. The more frequent species are small pulvinate chamaephytes, e.g. *Helichrysum*

conglobatum, *Anthyllis hermanniae* subsp. *hermanniae*, *Cichorium spinosum*, etc. Due to the ecological conditions, the halophytes are poorly represented, while are more common some species of *Cisto-Micromerietea*. In the tracts nearest the sea, this plant community is in contact with *Cichorio spinosi-Carlinetum tragacanthifoliae*.

Distribution: It is distributed in some Aegean islands, such as Koufounisi, Donoussa, Crete and Rhodos (Fig. 9 D). It occurs also in Cyprus.

Note: The association was described by Géhu *et al.* (1990) from Cyprus and successively by Géhu *et al.* (1992) from Rhodos. The relevés published by the aforesaid authors are very rich in shrubby species of *Cisto-Micromerietea* class and they were likely carried out on stands in contact with phrygana community belonging to this class.

60. *CICHORIO SPINOSI-HELICRYSETUM CONGLOBATI* ass. nova *hoc loco* (Tab. 34, A)

Holotypus: Rel. 1, Tab. 34, *hoc loco*.

Characteristic species: *Helichrysum conglobatum*.

Ecology: The association colonizes eroded substrata constitutes by calcarenites very rich in sandy component. It is localized in the inner belt than to that one occupied by the *Limonium* communities. Dominant species is *Helichrysum conglobatum*, which grows together with *Cichorium spinosum* and other halophytes such as *Silene sedoides*, *Crithmum maritimum* and *Limonium* sp. pl.

Distribution: It was observed only in some localities of Crete (Fig. 9 F).

61. *CICHORIO SPINOSI-ELYTRIGIETUM RECHINGERI* ass. nova *hoc loco* (Tab. 34, B)

Holotypus: Rel. 10, Tab. 34, *hoc loco*.

Characteristic species: *Elytrigia rechingeri*.

Ecology: The association occurs on limestone in stands quite distant from the sea and not directly affected by the sea. This vegetation is dominated by *Elytrigia rechingeri*, which forms dense tufts mixed to some dwarf shrub, such as *Thymelaea hirsuta*, *Capparis orientalis* and several halophytes, among them *Cichorium spinosum*, *Crithmum maritimum*, *Frankenia hirsuta*, *Lotus cytisoides*, etc.

Distribution: Examples of this vegetation were observed in the central-eastern part of Crete (Fig. 9 C).

62. *ASPERULO TAYGETEAE-MATTHIOLETUM INCANAE* ass. nova *hoc loco* (Tab. 34, C)

Holotypus: Rel. 19, Tab. 34, *hoc loco*.

Characteristic species: *Asperula taygetea*, *Matthiola incana*.

Ecology: This association is localized on compact limestones, forming steep cliffs. In these stands *Asperula taygetea* is quite frequent, which grows together

with *Matthiola incana*, colonizing the rocky crevices. It can be considered a semi rupestrian vegetation, in contact inward with the casmophilous plant communities of *Aplenietea trichomanis* class. Some halophytes are quite frequent, such as *Cichorium spinosum*, *Lotus cytisoides* and *Silene sedoides*.

Distribution: It is localized in the South Peloponnesse, near Gerolimenas (Fig. 9 E).

CRITHMO MARITIMI-ELYTRIGION ATERICAE
all. nova *hoc loco*.

Holotypus: *Crithmo maritimi-Limonietum arcuati*
ass. nova *hoc loco*.

Characteristic species: *Elytrigia atherica*, *Hypericum aegypticum* subsp. *webbii*, *Limonium arcuatum*, *L. cephalonicum*, *L. phitosianum*, *L. saracinatum*, *Putoria calabrica*, *Stachys ionica*.

Ecology: This alliance can be considered a geographical vicariant in the eastern Adriatic and Ionian area of the true Mediterranean syntaxa, such as *Crithmo maritimi-Limonion pseudominuti* or *Cichorio spinosi-Limonion roridi*. The association belonging to this alliance are usually localized on rocky coastal stands (chiefly limestones) affected by more mesic bioclimatic conditions. Floristically these plant communities are characterized by the occurrence of several endemic species of *Limonium*, but also by some very peculiar species, which seem to have in these habitats their optimum, such as in particular *Elytrigia aetherica*, or more rarely *Hypericum aegypticum* subsp. *webbii* and *Putoria calabrica*.

Distribution: Basing on field investigation and literature (Horvatic 1934, 1963; Bartolo et al. 1992, Ilijanic & Hecimović 1982, Mullaj et al., 2000) this alliance is distributed in the Ionian Greek Islands (e.g. Kerkyra, Paxi, Antipaxi, Lefkas, Cephalonia, Itaka, Zakynthos), continental coast of W Greece (Epirus and western Peloponnese), as well as along the Adriatic coasts of Albania, Croatia and Apulia (Italy).

Note: Recently, Mucina et al. (2016) included within the *Crithmo maritimi-Limonietalia* another alliance, represented by *Limonion anfracti-cancellati* (Horvatic 1934) Mucina in Mucina et al. 2016, which is a new name of *Staticion dalmaticum* Horvatic 1934, designating as lectotype *Plantagini-Staticetum cancellati* Horvatic 1934. However, according to Horvatic (1934) and also Braun-Blanquet (1933), this syntaxon is a geographical vicariant of *Staticion galloprovincialis* Br.-Bl. 1933, whose correct name is *Limonion confusi* (Br.-Bl. 1933) Rivas-Martínez & Costa 1984. The last syntaxon is an alliance belonging to the *Sarcocornietea fruticosae*, typified by *Artemisio galliae-Limonietum virgati* Br.-Bl. 1933. In this regard, Horvatic (1934) gathered in this alliance three new associations: *Staticeto angustifoliae-Artemisietum caerulecentis*, *Staticeto virgatae-Goniolimonetum*

dalmatici and *Plantaginetum holostei-Staticetum cancellatae*. Whereas, as already emphasized by Braun Blanquet (1933), Horvatic (1963) and Stancic (2008), the first two associations occur in the salt marshes and represent typical communities of *Sarcocornietea fruticosae*, while the third one is a rocky coast community of the *Crithmo maritimi-Limonietea*. On the basis of this, the *Staticion dalmaticum* cannot be lectotypified by the *Plantaginetum holostei-Staticetum cancellatae*, but by one of the two associations of *Sarcocornietea fruticosae*. Therefore, from the nomenclatural viewpoint, the lectotypification by Mucina (in Mucina et al. 2016) is uncorrect. Given that, a new proposal reflecting the concept of the original authors: *Limonio narbonensis-Artemision caerulescens* (Horvatic 1934) Brullo nom. nov. *hoc loco* (= *Staticion dalmaticum* Horvatic 1934, Prirod. Istraž. Kral. Jugosl. 19: 243, nom. illeg. art. 43) is provided. As lectotype is here designated *Limonio narbonensis-Artemisietum caerulecentis* Horvatic 1934, nom. mut. (art. 45) (= *Statice-to angustifoliae-Artemisietum caerulecentis* Horvatic 1934). As concerns *Plantagini-Staticetum cancellati* Horvatic 1934 (= *Plantagini holostei-Limonietum cancellati* nom corr.), it must be included in the *Crithmo maritimi-Elytrigion aethericae*.

CRITHMO MARITIMI-ELYTRIGENION ATERICAE suball. nova *hoc loco* (*typicum*)

Holotypus: see alliance.

Characteristic species: see alliance.

Ecology: This syntaxon gathers the markedly halophilous communities, growing in the belt nearest the shoreline, characterized by the dominance of *Limonium* sp. pl..

Distribution: see alliance.

63. CRITHMO MARITIMI-LIMONIETUM ARCUATI
ass. nova *hoc loco* (Tab. 35, A)

Holotypus: Rel. 1, Tab. 35, *hoc loco*.

Characteristic species: *Limonium arcuatum*.

Ecology: The association occurs on more or less sloped carbonatic stands near the sea, more rarely on flat surfaces. It is in contact with pine woods, maquis and phrygana, which are developed on stands strongly affected by marine aerosol and waves. The vegetation is characterized by *Limonium arcuatum*, growing together with *Crithmum maritimum*, *Elytrigia atherica*, *Lotus cytisoides*, *Allium commutatum*, *Daucus gingidium*, etc.

Distribution: It is localized in the western coast of Kerkyra (Fig. 9 G).

64. CRITHMO MARITIMI-LIMONIETUM ANTIPAXORUM ass. nova *hoc loco* (Tab. 35, B)

Holotypus: Rel. 18, Tab. 35, *hoc loco*.

Characteristic species: *Limonium antipaxorum*.

Ecology: The association colonizes the calcareous

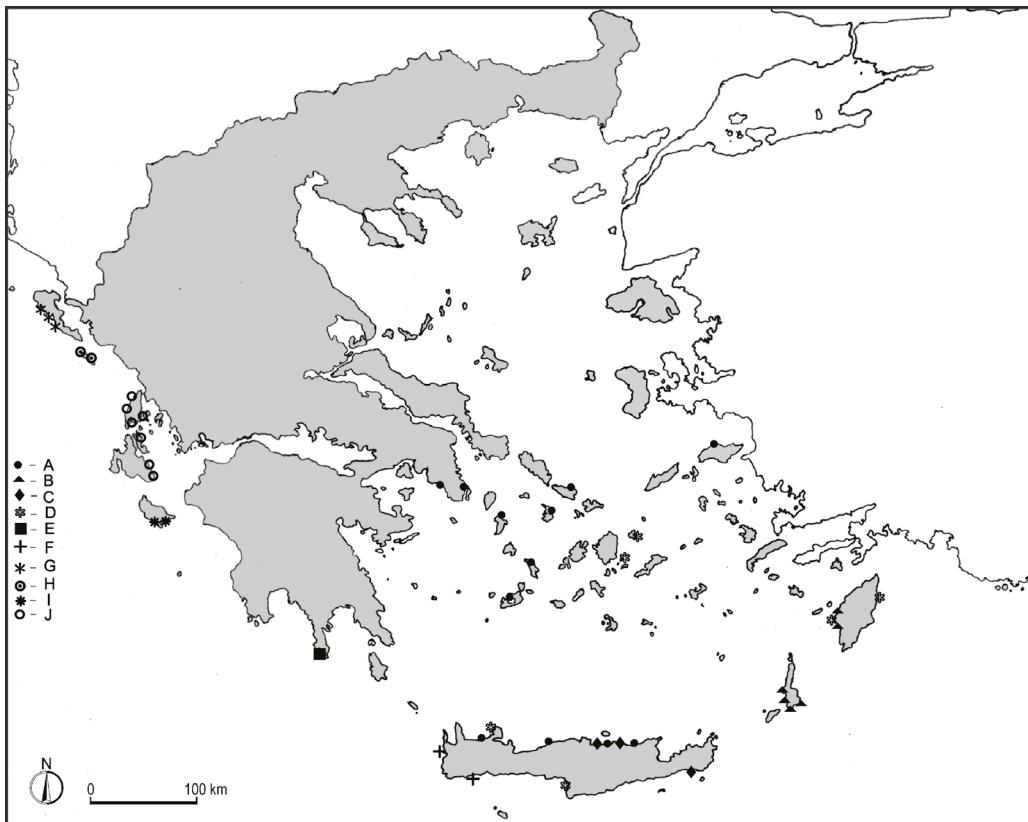


Fig. 9 - Geographical distribution of some associations of *Crithmo maritimi-Limonietea* in Greece: A. *Limonio sinuati-Centaurreetum spinosae*; B. *Cichorio spinosi-Carlinetum tragacanthifoliae*; C. *Cichorio spinosi-Elytrigietum rechingeri*; D. *Helichryso conglobati-Achilleetum cretiae*; E. *Asperulo taygetae-Matthioletum incanae*; F. *Cichorio spinosi-Helichrysetum conglobati*; G. *Crithmo maritimi-Limonietum arcuati*; H. *Crithmo maritimi-Limonietum antipaxorum*; I. *Limonietum zacynthii*; J. *Crithmo maritimi-Limonietum saracinati*.

rocky coast, mainly represented by flat or gently sloping surfaces. It often forms wide belts strongly affected by wind and marine aerosol, in contact inwards with less halophilous shrubby plant communities, as the *Centaureo paxorum-Putorietum calabriae*. The vegetation is physiognomically differentiated by *Limonium antipaxorum*, which grows with several halophytes, as *Crithmum maritimum*, *Elytrigia atherica*, *Lotus cytisoides*, *Daucus gingidium*, etc.

Distribution: It is frequent in the islands of Paxi and Antipaxi (Fig. 9 H).

65. CRITHMO MARITIMI-LIMONIETUM SARACINATI ass. nova *hoc loco* (Tab. 36)

Holotypus: Rel. 14, Tab. 36, *hoc loco*.

Characteristic species: *Limonium saracinatum*.

Ecology: The association is chiefly linked to very acclive rocky coast, sometimes subvertical, and also to slightly or flat surfaces, constituted by fissured limestones. In the stands far from the sea it is usually replaced by shrub phytocoenoses or pine woods. In this vegetation several halophytes are quite frequent, such as *Crithmum maritimum*, *Elytrigia atherica*, *Lotus*

cytisoides, *Stachys ionica*, etc., which grow together with *Limonium saracinatum*.

Distribution: It is widespread in some Ionian islands, e.g. Lefkas, Cephalonia and Itaka (Fig. 9 J).

66. CRITHMO MARITIMI-LIMONIETUM CEPHALONICI ass. nova *hoc loco* (Tab. 37)

Holotypus: Rel. 5, Tab. 37, *hoc loco*.

Characteristic species: *Limonium cephalonicum*.

Ecology: The association occurs along the rocky coast characterized by compact limestones, where it colonizes the more or less flat surfaces as well as the steep slopes or cliffs. Differential species is *Limonium cephalonicum*, usually showing high cover values, which grows together with other halophytes, as *Crithmum maritimum*, *Lotus cytisoides*, *Silene sedoides*, *Cichorium spinosum*, *Elytrigia atherica*, *Hypericum aegypticum* subsp. *webbii*, etc. This vegetation forms a wide belts near the sea and it is usually replaced inward by subhalophilous shrub plant community represented by *Inulo verbascifoliae-Lomelosietum dalaportae*.

Distribution: It is widespread at Cephalonia (Fig. 8J).

67. *ELYTRIGIO AATHERICAE-LIMONIETUM ITHACENSIS* ass. nova *hoc loco* (Tab. 38, A)

Holotypus: Rel. 9, Tab. 38, *hoc loco*.

Characteristic species: *Limonium ithacense*.

Ecology: The association is localized on calcareous stands, rather sheltered by winds, constituting a narrow belt, in contact with the coastal maquis. The surfaces are slightly sloping and eroded. The vegetation is characterized by the dominance of *Limonium ithacense*, growing with other halophytes such as *Elytrigia atherica*, *Lotus cytisoides*, *Crithmum maritimum*, etc.

Distribution: It occurs in the islands of Itaka and Cephalonia, where it is rare (Fig. 4 O).

68. *LIMONIETUM ZACYNTHII* ass. nova *hoc loco* (Tab. 38, B)

Holotypus: Rel. 18, Tab. 38, *hoc loco*.

Characteristic species: *Limonium zacynthium*.

Ecology: The association occurs in the rocky coast characterized by marly substrata or sometimes soft limestones. The surfaces are usually more or less flat or gently sloping, severely affected by sea aerosol. Dominant species is *Limonium zacynthium*, showing high cover values in association with few other halophytes, as *Elytrigia atherica*, *Lotus cytisoides*, *Crithmum maritimum*, etc.

Distribution: It is localized at Zakynthos, where is quite rare (Fig. 9 I).

69. *CRITHMO MARITIMI-LIMONIETUM PHITOSIANI* ass. nova *hoc loco* (Tab. 40, A)

Holotypus: Rel. 5, Tab. 40, *hoc loco*.

Characteristic species: *Limonium phitosianum*.

Ecology: The association is usually linked to compact limestones, where often it constitutes a wide belt along the rocky coast. The surfaces colonized by this vegetation are more or less flat, gently sloping and sometimes subvertical. This community is characterized by *Limonium phitosianum*, growing together with *Crithmum maritimum*, *Lotus cytisoides*, *Allium commutatum*, *Limonium virgatum*, *Elytrigia atherica*, etc.

Distribution: It is exclusive of Zakynthos, where it is quite common (Fig. 8 K).

70. *CRITHMO MARITIMI-LIMONIETUM PYLI* ass. nova *hoc loco* (Tab. 39)

Holotypus: Rel. 28, Tab. 39, *hoc loco*.

Characteristic species: *Limonium pylium*.

Ecology: The association is localized on calcarenites or more rarely limestones, colonizing more or less flat surfaces, sometimes it occurs also on steep surfaces. It is in contact inwards with the coastal maquis or sometimes with subhalophilous shrub community referable to *Crithmo maritimi-Helichrysetum conglobati*. Differential species of this vegetation is *Limonium pylium*, growing together with many other halophytes, as *Lo-*

tus cytisoides, *Crithmum maritimum*, *Silene sedoides*, *Allium commutatum*, *Cichorium spinosum*, *Limonium virgatum*, *Limbara crithmoides* subsp. *longifolia*, *Elytrigia atherica*, etc.

Distribution: It is widespread in the western Peloponnese (Fig. 8 L).

71. *LIMONIETUM CORONENSIS* ass. nova *hoc loco* (Tab. 38, C)

Holotypus: Rel. 26, Tab. 38, *hoc loco*.

Characteristic species: *Limonium coronense*.

Ecology: The association colonizes the rocky coast represented by calcarenites, localizing on more or less flat surfaces, as well on very steep rocks. This vegetation is directly affected by sea aerosol and is dominated by *Limonium coronense*, a very rare species. In these stands some halophytes are frequent, such as *Elytrigia atherica*, *Silene sedoides*, *Lotus cytisoides*, *Allium commutatum*, *Limbara crithmoides* subsp. *longifolia*, etc.

Distribution: It is a very rare and localized association, occurring near Koroni in the southern Peloponnesse (Fig. 8 M).

72. *CRITHMO MARITIMI-LIMONIETUM MESSENIACI* ass. nova *hoc loco* (Tab. 40, B)

Holotypus: Rel. 22, Tab. 40, *hoc loco*.

Characteristic species: *Limonium messeniacum*.

Ecology: The association is linked to conglomeratic limestones, quite eroded and markedly affected by sea aerosol. It is differentiated by the occurrence of *Limonium messeniacum*, very rare species growing together few halophytes, as *Crithmum maritimum*, *Lotus cytisoides*, *Silene sedoides*, *Elytrigia atherica*, etc.

Distribution: It is localized in a short tract of coast near Kalamata, southern Peloponnesse (Fig. 5 K).

73. *LIMONIETUM EPIROTICI* ass. nova *hoc loco* (Tab. 40, C)

Holotypus: Rel. 26, Tab. 40, *hoc loco*.

Characteristic species: *Limonium epiroticum*.

Ecology: The association colonizes the eroded conglomerates in the stands near the sea. The surfaces are slightly steep or often flat, which are covered by a quite dense vegetation dominated by *Limonium epiroticum* Brullo. In these places some halophytes are frequent, as *Lotus cytisoides*, *Crithmum maritimum*, *Silene sedoides*, *Elytrigia atherica*, etc.

Distribution: It is distributed along the coast of Epirro region in North-West Greece (Fig. 8 K).

Note: The characteristic species is a taxon new to science, which is here described. “*Limonium epiroticum* Brullo sp. nova – From *Limonium arcuatum* Artelari differ in following diagnostic characters: stems max. 30 cm tall, rugose-scabrous, minutely hispid lower, sterile branches straight, never curved, 0.4-2 cm

long, leaves 10-28 x 2-6 mm, spikelets 3-4-flowered, 1-3 per cm, curved at the apex, strictly acute, inner bract max. 3.7 mm long, with terminal tip 0.3-0.6 mm long, hyaline margin 0.5 mm wide, calyx densely hairy below, with ribs ending in the middle of the lobes, which are triangular, acute, 0.7-0.8 mm long. Holotype: Greece, Epirus, Agios Giorgios, near Parga, 15.07.2011, S. Brullo & G. Giacalone s.n. (CAT!)”.

ELYTRIGIO AATHERICAE-ANTHYLLIDENION HERMANNIAE suball. nova *hoc loco*

Holotypus: *Ptilostemo chamaepeuces-Jacobaeetum bicoloris* ass. nova *hoc loco*

Characteristic species: *Anthyllis hermanniae* subsp. *hermanniae*, *Brassica cretica* subsp. *aegaea*, *Centaurea paxorum*, *Jacobaea maritima* subsp. *bicolor*, *Matthiola incana* subsp. *incana*, *Phagnalon graecum*, *Ptilostemon chamaepeuce* var. *chamaepeuce*.

Ecology: This suballiance replaces in the inner coastal belt the halophilous communities belonging to *Crithmo maritimi-Elytrigienion athericæ*. From the floristical and structural point of view, it groups communities dominated by small chamaephytes or nanophanerophytes, showing subhalophilous requirements.

Distribution: This syntaxon shows the same geographical distribution of the alliance *Crithmo maritimi-Elytrigion athericæ*.

74. ELYTRIGIO AATHERICAE-HELICHRYSETUM ITALICI ass. nova *hoc loco* (Tab. 41, A)

Holotypus: Rel. 4, Tab. 41, *hoc loco*.

Characteristic species: *Helichrysum italicum*, *Ptilostemon gnaphalooides* subsp. *gnaphalooides*.

Ecology: The association is confined to the inner part of the coastal belt, occurring in rather steep surfaces characterized by compact limestones. The stands colonized by this vegetation are usually located at the bottom of cliffs, where quite frequent are rupestrian plant community of the *Asplenietea trichomanis* class. Physiognomically, this association is characterized by the dominance of *Helichrysum italicum*, usually growing together with *Ptilostemon gnaphalooides* subsp. *gnaphalooides*, *Elytrigia atherica* and several halophytes such as *Crithmum maritimum*, *Lotus cytisoides*, *Allium commutatum*, *Daucus gingidium*, etc. In the belt near the sea this shrub vegetation is replaced by the *Crithmo maritimi-Limonietum arcuati*.

Distribution: It is distributed in the island of Kerkyra (Fig. 6 I).

75. CENTAUREO PAXORUM-PUTORIETUM CALABRICAE ass. nova *hoc loco* (Tab. 41, B)

Holotypus: Rel. 7, Tab. 41, *hoc loco*.

Characteristic species: *Centaurea paxorum*, *Putoria calabrica*.

Ecology: The association is localized in the more

or less flat carbonatic rocky coast, replacing the *Crithmo maritimi-Limonietum antipaxorum* in the stands quite far from the shoreline. It is characterized by the occurrence of small prostrate shrubs, such as *Centaurea paxorum* and *Putoria calabrica*, which grow together with some halophytes, as *Crithmum maritimum*, *Elytrigia atherica*, *Daucus gingidium*, etc.

Distribution: It occurs in the island of Paxi (Fig. 6 J).

76. CENTAUREO PAXORUM- JACOBEEETUM BICOLORIS ass. nova *hoc loco* (Tab. 42, A)

Holotypus: Rel. 1, Tab. 42, *hoc loco*.

Characteristic species: *Centaurea paxorum*, *Jacobaea maritima* subsp. *bicolor*.

Ecology: This association replaces the *Centaureo paxorum-Putorietum calabricae* on the north facing carbonatic cliffs. Floristically it is characterized by the dominance of *Jacobaea maritima* subsp. *bicolor*, which grows together with *Centaurea paxorum* and *Anthyllis hermanniae* subsp. *hermanniae*. Very frequent are some halophytes, such as *Lotus cytisoides*, *Allium commutatum*, *Daucus gingidium*, *Crithmum maritimum*, etc.

Distribution: It occurs in the islands of Paxi (Fig. 8 I).

77. DIANTHO OCCIDENTALIS-JACOBEEETUM BICOLORIS ass. nova *hoc loco* (Tab. 42, B)

Holotypus: Rel. 11, Tab. 42, *hoc loco*.

Characteristic species: *Jacobaea maritima* subsp. *bicolor*, *Dianthus fruticosus* subsp. *occidentalis*.

Ecology: The association can be considered a geographic vicariant of the *Centaureo paxorum-Jacobaeetum bicoloris*, being linked to carbonatic cliffs, always with a northern exposure. It is also dominated by *Jacobaea maritima* subsp. *bicolor*, but it is associated to two rare chasmophytes such as *Dianthus fruticosus* subsp. *occidentalis* and *Stachys ionica*. Among the halophytes *Lotus cytisoides*, *Allium commutatum* and *Crithmum maritimum* are also frequent.

Distribution: It is surveyed in the island of Cephalaria, where it is very rare (Fig. 7 K).

78. PTILOSTEMO CHAMAPEUACES-JACOBEEETUM BICOLORIS ass. nova *hoc loco* (Tab. 41, C)

Holotypus: Rel. 20, Tab. 41, *hoc loco*.

Characteristic species: *Jacobaea maritima* subsp. *bicolor*, *Ptilostemon chamaepeuce* var. *chamaepeuce*.

Ecology: The association shows marked thermophilous requirements compared to the previous one communities. It can be considered a strictly halo-casmophilous vegetation, exclusive of cliffs with an eastern and western exposure, rarely with northern exposure. Physiognomically, it is dominated by *Ptilostemon chamaepeuce* var. *chamaepeuce*, which grows together with other shrubs, suchs as *Jacobaea maritima* subsp. *bicolor*, *Matthiola incana* subsp. *incana*, *Anthyllis her-*

manniae subsp. *hermanniae*, *Brassica cretica* subsp. *aegaea*. Several halophytes are also occurring in this community, e.g. *Lotus cytisoides*, *Crithmum maritimum*, *Daucus gingidium*, *Allium commutatum*, etc.

Distribution: It is widely spread at Lefkas and Cephalonia (Fig. 6 K).

79. *INULO VERBASCIFOLIAE-LOMELOSIETUM DALLAPORTAE* ass. nova *hoc loco* (Tab. 42, C)

Holotypus: Rel. 16, Tab. 42, *hoc loco*.

Characteristic species: *Inula verbascifolia* subsp. *verbascifolia*, *Lomelosia crenata* subsp. *dallaportae*, *Fumana procumbens* and *Teucrium halacsyanum*.

Ecology: The association is localized on gently slopes, with more or less terraced areas. The substrata are usually represented by limestones which constitute a wide and elevated rocky coast. Usually the vegetation shows a more or less dense coverage, dominated by several pulvinate shrubs, such as *Lomelosia crenata* subsp. *dallaportae*, *Inula verbascifolia* subsp. *verbascifolia*, *Fumana procumbens* and *Teucrium halacsyanum*. These species grow together with *Putoria calabrica*,

Stachys ionica, *Anthyllis hermanniae* subsp. *hermanniae*, etc., while the halophytes are not so frequent.

Distribution: It is exclusive of Cephalonia (Fig. 4 P).

80. *CRITHMO MARITIMI-HELICHRYSETUM CONGLOBATI* ass. nova *hoc loco* (Tab. 43)

Holotypus: Rel. 14, Tab. 43, *hoc loco*.

Characteristic species: *Helichrysum conglobatum*.

Ecology: The association colonizes the calcareous and calcarenitic rocky coast, characterized by more or less flat surfaces. It is confined to the stands far from the shoreline, usually not directly affected by sea storms or marine areosol, replacing the vegetation dominated by *Limonium* sp. pl., which are more adapted to the edaphic salinity. This vegetation is physiognomically characterized by *Helichrysum conglobatum*, which grows together with *Crithmum maritimum* and *Anthyllis hermanniae* subsp. *hermanniae* and other halophytes.

Distribution: It occurs in the western Peloponnese and in the islands of Cephalonia and Zakynthos (Fig. 9 F).

Crithmo maritimi-Limonietum cytherei ass. nova

Crithmo maritimi-Limonietum calliopsii ass. nova

Crithmo maritimi-Limonietum stenotati ass. nova

Limonietum sougiae ass. nova

Limonietum xerocamposici ass. nova

Limonietum sitiaci ass. nova

Cichorio spinosi-Limonietum cornariani ass. nova

Limonietum hierapetrae ass. nova

Crithmo maritimi-Limonietum minoici ass. nova

Crithmo maritimi-Limonietum elaphonisici ass. nova

Crithmo maritimi-Limonietum cretici ass. nova

Crithmo maritimi-Limonietum recticaulis ass. nova

Limonietum chrisiani Brullo & Guarino 2000

Crithmo-Limonietum pigadiensis Géhu, Apostolides, Géhu-Frank & Arnold 1992

Crithmo-Limonietum meandrini Géhu, Apostolides, Géhu-Frank & Arnold 1992, nom. nov.

Limonietum oligotrichi ass. nova

Limonietum amopici ass. nova

Cichorio spinosi-Limonietum crateriformis ass. nova

Limonietum vanandensis ass. nova

Limonietum fragilis ass. nova

Limonietum carpathi Géhu, Apostolides, Géhu-Frank & Arnold 1992

Limonietum monolithici ass. nova

Limonietum hirsuticalycis ass. nova

Crithmo maritimi-Limonietum quinnii ass. nova

Limonietum aucheri ass. nova

Crithmo maritimi-Limonietum dolihensis ass. nova

Crithmo maritimi-Limonietum ikarici ass. nova

Crithmo maritimi-Limonietum samii ass. nova

Crithmo maritimi-Limonietum isidori ass. nova

Crithmo maritimi-Limonietum ammophili ass. nova

Syntaxonomic scheme

CRITHMO MARITIMI-LIMONIETEA Br.-Bl. in Br.-Bl., Roussine & Nègre 1952

CRITHMO MARITIMI-LIMONIETALIA Molinier 1954

Cichorio spinosi-Limonion roridi Brullo & Guarino 2000

Cichorio spinosi-Limonienion roridi suball. nova

Limonietum athinensis ass. nova

Limonietum attici ass. nova

Limonietum vravronensis ass. nova

Crithmo maritimi-Limonietum corinthiaci ass. nova

Crithmo maritimi-Limonietum kardamylii ass. nova

Limonietum albomarginati ass. nova

Limonietum taenari ass. nova

Crithmo maritimi-Limonietum xiliensis ass. nova

Crithmo maritimi-Limonietum aegaei ass. nova

Crithmo maritimi-Limonietum roridi ass. nova

Cichorio spinosi-Limonietum proliferi ass. nova

Cichorio spinosi-Limonietum sieberi ass. nova

Cichorio spinosi-Limonietum graeci ass. nova

Limonietum microcycladici ass. nova

Elytrigio rechingeri-Limonietum sartoriani ass. nova

Limonietum archeothirae ass. nova

Limonietum thirae ass. nova

Limonietum astypaleani ass. nova

Cichorio spinosi-Limonietum pusilli ass. nova

Crithmo maritimi-Limonietum ocytifolii ass. nova

Crithmo maritimi-Silenetum fabariae ass. nova

Limonietum sirinici ass. nova

Limonietum schinouiae ass. nova

Limonietum spreitzenhoferi ass. nova

Crithmo maritimi-Limonietum aphroditae ass. nova

Elytrigio rechingeri-Limonium helenae ass. nova
Phagnolo graeci-Anthyllidenion hermanniae suball. nova
Limonio sinuati-Centaureetum spinosae Mayer 1995
Cichorio spinosi-Carlinetum tragacanthifoliae Géhu, Apostolides, Géhu-Frank & Arnold 1992
Helichryso conglobati-Achilleetum cretiae Géhu, Costa & Uslu 1990
Cichorio spinosi-Helichrysetum conglobati ass. nova
Cichorio spinosi-Elytrigietum rechingeri ass. nova
Asperulo taygetae-Matthioletum incanae ass. nova
Crithmo maritimi-Elytrigion athericæ all. nova
Crithmo maritimi-Elytrigienion athericæ suball. nova
Crithmo maritimi-Limonietum arcuati ass. nova
Crithmo maritimi-Limonietum antipaxorum ass. nova
Crithmo maritimi-Limonietum saracinati ass. nova
Crithmo maritimi-Limonietum cephalonici ass. nova
Elytrigio athericæ-Limonietum ithacensis ass. nova

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Crithmo maritimi-Limonietum pylii ass. nova
Limonietum coronensis ass. nova
Crithmo maritimi-Limonietum messeniaci ass. nova
Limonietum epiroticci ass. nova
Elytrigio athericæ-Anthyllidenion hermanniae suball. nova
Elytrigio athericæ-Helichrysetum italicici ass. nova
Centaureo paxorum-Putorietum calabricae ass. nova
Centaureo paxorum-Jacobaetum bicoloris ass. nova
Diantho occidentalis-Jacobaetum bicoloris ass. nova
Ptilostemo chamapeuces-Jacobaetum bicoloris ass. nova
Inulo verbascifoliae-Lomelosietum dallaportae ass. nova
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Tables

Tab. 1 - *Limonietum athinensis* ass. nov. (A), *Limonietum vravronensis* ass. nov. (B).

Number of the relevé	1	2	3	4	5*	6	7	8	9	10	11	12	13	14	15*	16	17	18	19	A Presences	B Presences
Surface (m ²)	10	10	10	10	20	5	10	10	10	15	10	20	25	10	10	10	10	20	10		
Coverage (%)	50	60	50	70	80	60	50	60	50	30	50	60	40	40	50	50	50	50	50		
Association	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B		
Char. Association																				8	-
Limonium athinense	+	1	2	3	3	2	2	3	.	.	.	.	.	.	.	.	.	.	.	-
Limonium vravronense	.	.	.	.	.	.	.	.	3	2	3	3	2	1	3	2	2	1	1	-	11
Char. Alliance (<i>Cichorio spinosi-Limonion roridi</i>)																				8	6
Limonium roridum	1	2	+	+	1	2	2	1	.	.	.	.	.	2	2	2	2	3	3	8	6
Limonium aegaeum	1	1	.	2	1	3	2	1	.	.	.	.	.	+	1	+	.	.	+	7	4
Elytrigia rechingeri	.	.	1	+	1	.	+	2	1	1	2	3	2	.	.	.	.	.	.	5	5
Limonium compactum	2	2	+	1	2	+	1	1	.	.	.	.	.	.	.	.	.	.	.	8	-
Goniolimon sartorii	.	.	.	.	.	.	.	.	1	+	+	.	+	+	1	+	+	.	.	8	-
Allium phalareum	.	.	.	.	.	2	1	1	.	.	.	.	.	.	.	.	.	.	3	-	
Char. Order (<i>Crithmo maritimi-Limonietalia</i>) and Class (<i>Crithmo maritimi-Limonietea</i>)																				7	11
Reichardia picroides var. maritima	+	+	1	+	1	+	+	.	+	+	+	+	+	1	+	+	1	+	7	11	-
Frankenia hirsuta	2	2	1	+	2	2	1	2	2	1	1	1	2	.	.	1	2	1	2	8	9
Lotus cytisoides	1	+	.	+	+	.	.	.	+	1	.	+	1	+	+	2	1	2	1	4	10
Silene sedoides	.	.	.	.	.	.	.	.	+	+	+	+	+	1	+	+	1	+	.	11	
Limonium virgatum	1	1	1	3	2	1	+	+	.	.	.	.	.	.	.	.	.	.	.	8	-
Helichrysum conglobatum	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1	1	.	5	-
Crithmum maritimum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+	+	3	.	4	-
Other species																				8	-
Limonium echioïdes	.	.	.	.	.	.	.	.	+	+	+	.	+	.	.	1	+	+	+	.	8
Anthemis tomentosa	.	.	.	.	.	1	+	+	.	.	.	.	+	.	+	.	+	+	+	3	4
Malcolmia flexuosa	.	.	.	.	2	+	+	+	+	+	+	.	.	.	.	.	.	.	3	4	-
Parapholis incurva	+	2	+	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	4	-	
Plantago coronopus	1	+	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	4	-	
Halimione portulacoides	.	.	.	.	1	+	1	.	.	.	.	.	.	.	.	.	.	.	3	-	
Matthiola incana subsp. incana	.	.	.	.	.	.	.	+	.	1	+	.	.	.	.	.	.	.	3	-	
Centaurea raphanina subsp. mixta	.	.	.	.	.	.	+	.	+	.	+	.	.	.	.	.	.	.	3	-	
Limonium sinuatum	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	2	-	
Cardopodium corymbosum	.	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	1	-	
Convolvulus oleifolius	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	1	-	

Tab. 2 - *Limonietum attici* ass. nov.

Number of the relevé	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15*	16	17	18	19	20	21	Presences		
Surface (m ²)	10	10	10	10	10	15	10	10	20	10	10	10	10	10	20	20	20	20	25	20	20			
Coverage (%)	50	50	40	40	40	60	30	50	50	70	70	60	50	60	70	70	70	60	60	50	60			
Association																								
Limonium atticum	2	3	2	1	3	3	2	3	3	4	4	4	3	3	2	2	3	2	3	3	21			
Char. Association																								
Limonium atticum	2	3	2	1	3	3	2	3	3	4	4	4	3	3	2	2	3	2	3	3	21			
Char. Alliance (<i>Cichorio spinosi-Limonion roridi</i>)																								
Elytrigia rechingeri	.	.	.	.	.	.	2	1	2	2	.	.	2	2	3	2	3	2	2	11	-	
Trifolium uniflorum	.	.	.	.	.	+	+	1	.	+	.	.	1	+	+	2	+	1	1	11	-	
Allium phalareum	.	.	.	.	+	+	.	.	.	.	.	.	1	1	+	+	+	.	+	8	-	
Paronychia macrosepala	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	+	+	2	1	2	7	-
Cichorium spinosum	.	.	.	.	1	+	.	.	.	.	.	.	3	3	+	1	.	.	.	6	-	
Limonium aegaeum	1	1	+	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	6	-	
Limonium compactum	2	1	2	2	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	5	-	
Goniolimon sartorii	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	2	1	2	5	-	
Char. Order (<i>Crithmo maritimi-Limonietalia</i>) and Class (<i>Crithmo maritimi-Limonietea</i>)																								
Silene sedoides	1	+	.	1	+	1	1	1	+	1	1	1	1	1	+	+	+	1	+	+	19	-		
Lotus cytisoides	2	2	1	2	1	1	+	1	+	1	1	1	.	.	+	+	1	.	1	1	1	15	-	
Frankenia hirsuta	1	3	.	+	2	1	+	.	1	2	1	+	2	2	2	1	2	15	-	
Reichardia picroides var. maritima	+	+	1	.	+	+	.	.	+	.	+	.	2	1	1	1	1	1	+	1	13	-		
Crithmum maritimum	1	2	+	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	-	
Limonium virgatum	.	.	.	1	+	2	.	.	.	.	.	.	.	.	.	.	.	.	.	3	-	
Other species																					12	-		
Malcolmia flexuosa	+	1	+	+	+	1	+	+	+	+	1	1	2	1	7	-
Limonium sinuatum	1	+	1	1	.	1	2	1	7	-		

Tab. 3 - *Crithmo maritimi-Limonietum corinthiaci* ass. nov.

Tab. 4 - *Crithmo maritimi-Limonietum kardamyliae* ass. nov.

Tab. 14 - *Limonietum spreitzenhoferi* ass. nov. (A), *Crithmo maritimi-Limonietum aphroditeae* ass. nov. (B), *Crithmo maritimi-Limonietum cytherei* ass. nov. (C).

Tab. 15 - *Crithmo maritimi-Limonietum calliopsii* ass. nov.

Tab. 16 - *Crithmo maritimi-Limonietum stenotati* ass. nov.

Number of the relevé	1	2	3	4	5	6	7*	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	Presences
Surface (m ²)	20	20	10	25	20	50	20	30	10	10	10	10	50	50	50	20	20	20	20	10	10	10	10	10	10	
Coverage (%)	50	70	70	40	70	50	60	60	60	60	70	50	60	50	50	40	60	40	50	50	50	60	40	70	60	
Slope (°)	-	-	-	70	-	-	-	-	70	80	60	-	-	-	30	25	-	-	-	-	-	-	-	-		
Exposure	-	-	-	NO	-	-	-	-	N	NE	NE	-	-	-	E	E	-	-	-	-	-	-	-	-		
Char. Association																										
Limonium stenotatum	2	4	4	2	4	2	3	2	3	3	4	3	2	3	3	3	4	2	2	3	3	3	2	4	2	
Char. Alliance (<i>Cichorio spinosi-Limonion roridi</i>)																										
Cichorium spinosum	+	+	1	.	.	+	1	1	1	+	+	+	1	+	1	.	+	1	2	+	+	1	.	+	21	
Elytrigia rechingeri	+	1	3	+	2	2	2	2	1	1	1	.	1	1	+	14	
Limonium roridum	.	.	.	.	1	1	1	.	.	.	.	.	.	.	.	.	.	2	2	2	1	+	2	9
Limonium recticulae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1	+	1	1	1	1	6
Trifolium uniflorum	.	.	.	+	.	.	.	+	.	.	1	.	.	.	.	2	2	.	.	.	.	.	.	5
Char. Order (<i>Crithmo maritimii-Limonietalia</i>) and Class (<i>Crithmo maritimii-Limonietea</i>)																										
Reichardia picroides var. maritima	+	+	+	1	1	+	+	2	2	1	1	.	+	+	+	+	+	+	+	+	+	1	+	23		
Lotus cytisoides	.	.	.	.	1	+	1	2	1	1	1	1	+	+	+	.	2	1	1	1	2	1	22	
Crithmum maritimum	3	2	3	.	2	2	2	3	2	1	2	2	.	.	.	.	.	1	3	+	2	+	1	17
Silene sedoides	1	+	+	1	+	+	+	+	.	.	.	.	+	+	.	.	.	+	+	+	+	+	1	16
Frankenia hirsuta	.	.	.	.	1	+	1	1	.	.	.	.	.	1	1	.	1	1	2	2	1	2	12	
Helichrysum globosum	.	.	.	.	.	.	.	.	.	.	.	1	+	1	1	+	.	.	.	.	.	.	.	5
Frankenia corymbosa	.	.	.	.	.	.	.	.	.	.	3	2	2	.	.	.	.	.	.	.	.	.	.	3
Other species																										
Arthrocnemum macrostachyum	+	2	.	.	1	.	.	2	.	.	.	.	.	.	.	.	2	2	2	1	+	2	10	
Capparis orientalis	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	1	1	.	1	1	+	6		
Scorzonera cretica	.	.	.	.	.	.	.	.	.	.	.	+	1	1	1	1	.	+	.	.	.	.	.	6
Limonium sinuatum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	+	+	.	.	4	
Pancratium maritimum	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
Dactylis hispanica	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	2
Sarcocornia fruticosa	.	.	.	.	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
Teucrium divaricatum	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Juncus maritimus	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Mesembryanthemum nodiflorum	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1

Tab. 17 - *Limonietum sougiae* ass. nov. (A), *Limonietum xerocamposici* ass. nov. (B), *Limonietum sitiaci* ass. nov. (C).

Number of the relevé	1*	2	3*	4	5	6	7	8	9	10*	11	12	13	14	15	16	17	18	19	20	21	A Presences	B Presences	C Presences
Surface (m ²)	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	50			
Coverage (%)	40	30	30	40	60	40	30	50	30	50	30	60	50	60	50	60	50	20	60	30	60			
Association	A	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	A	B	C	
Char. Association																						1	-	-
Limonium sougiae	3	1	-	-
Limonium xerocamposicum	.	2	2	2	3	-	-
Limonium sitiacum	2	3	2	2	2	3	1	2	3	2	3	2	3	2	4	2	3	-	-	17
Char. Alliance (<i>Cichorio spinosi-Limonion roridi</i>)																								
Cichorium spinosum	.	1	1	2	2	1	1	2	+	1	1	2	1	1	1	2	2	1	1	1	2	-	3	13
Trifolium uniflorum	.	.	.	1	2	+	.	1	.	+	+	.	1	1	+	.	.	.	+	-	1	9		
Limonium stenotatum	.	.	.	.	2	1	1	2	1	2	.	.	.	.	.	2	1	.	.	.	-	-	6
Elytrigia rechingeri	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	.	.	.	-	-	2
Char. Order (<i>Crithmo maritimii-Limonietalia</i>) and Class (<i>Crithmo maritimii-Limonietea</i>)																								
Reichardia picroides var. maritima	.	+	+	1	1	1	+	+	1	1	1	1	1	1	1	2	2	1	1	1	1	-	2	17
Silene sedoides	1	2	1	+	1	+	+	1	+	1	2	2	1	+	1	1	+	+	1	1	3	15		
Lotus cytisoides	1	.	+	+	.	+	.	1	+	2	.	1	.	.	.	.	.	.	.	+	1	2	6
Crithmum maritimum	.	+	1	+	.	.	1	.	.	.	1	2	.	.	.	2	.	.	.	.	-	3	4
Frankenia hirsuta	.	.	.	.	.	.	.	.	.	.	.	.	+	1	2	1	1	.	.	.	-	-	5
Helichrysum globosum	.	.	.	.	.	.	.	.	.	.	.	2	1	1	+	.	.	.	.	1	-	-	5
Other species																								
Dactylis hispanica	.	.	.	+	1	1	+	1	+	1	+	+	.	2	2	+	1	+	.	.	+	2	-	14
Scorzonera cretica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	1	+	.	.	-	-	4
Piptatherum miliaceum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+	1	.	.	.	-	-	3
Paronychia macrosepala	.	.	.	+	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	-	-
Cynodon dactylon	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	-	-
Carlina graeca	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	-	-
Bituminaria bituminosa	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	-	-
Anthyllis hermanniae subsp. hermanniae	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	-	-
Euphorbia dimorphocaulon	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	-	-
Euphorbia acanthothamnos	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	-	-

Echinops cfr. spinosissimus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5
Globularia alypum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5
Asperula aristata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
Phlomis fruticosa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
Teucrium flavum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
Micromeria sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
Euphorbia dendroides	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
Silene gigantea subsp. gigantea	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
Osyris alba	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
Asparagus acutifolius	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
Bubon macedonicum	.	.	1	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
Charybdis maritima s.l.	.	.	.	.	.	.	1	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	-
Juniperus turbinata	.	.	.	.	.	.	.	.	+	1	.	.	.	.	.	.	.	.	.	.	.	.	2	-
Pistacia lentiscus	+	1	-
Helianthemum nummularium	2	-
Teucrium capitatum	1	-

Tab. 43 - *Crithmo maritimi-Helichrysetum conglobati* ass. nov.

Number of the relevé	1	2	3	4	5	6	7	8	9	10	11	12	13	14*	15	16	17		Presences				
Surface (m ²)	10	10	10	10	10	10	10	10	10	10	50	50	50	50	50	50	50						
Coverage (%)	60	60	50	60	50	60	70	60	70	70	60	60	50	70	70	60	60						
Slope (°)	-	-	-	-	-	5	5	10	10	-	-	-	-	-	-	-	-						
Exposure	-	-	-	-	-	W	W	W	W	-	-	-	-	-	-	-	-						
Char. Association																							
Helichrysum conglobatum	3	3	2	3	2	3	3	3	4	3	3	3	2	3	3	3	3	17					
Char. Sub Alliance (<i>Elytrigio athericae-Anthyllidion hermanniae</i>)																							
Anthyllis hermanniae subsp. hermanniae	.	+	1	+	1	2	1	1	+	.	2	3	3	3	2	.	1	14					
Phagnalon graecum	+	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	3	
Brassica cretica subsp. aegaea	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1	.	.	2	
Char. Alliance (<i>Crithmo maritimi-Elytrigion athericae</i>)																							
Elytrigia atherica	+	1	+	.	1	.	.	.	.	2	.	.	.	.	.	.	1	6	
Stachys ionica	.	.	.	.	.	.	.	.	.	1	1	1	2	1	.	.	5		
Limonium phitosianum	1	.	+	.	+	.	.	.	.	.	.	.	.	.	1	.	4		
Limonium cephalonicum	.	.	.	.	.	.	.	.	.	1	+	+	.	.	.	.	3		
Putoria calabrica	.	1	1	.	+	3					
Char. Order (<i>Crithmo maritimi-Limonietalia</i>) and Class (<i>Crithmo maritimi-Limonietea</i>)																							
Lotus cytoides	1	+	1	1	+	1	1	1	+	+	.	1	1	1	1	2	1	2	16				
Crithmum maritimum	2	1	.	1	.	2	3	2	2	2	2	1	+	2	3	2	2	2	15				
Reichardia picroides var. maritima	+	+	+	+	+	1	1	1	+	1	.	.	.	.	2	1	12		
Silene sedoides	+	+	+	+	+	.	.	.	.	1	+	+	.	.	+	+	10		
Limonium virgatum	1	+	+	+	.	+	1	1	1	8					
Allium commutatum	1	+	+	+	.	+	+	.	+	.	.	.	+	.	.	.	2	8					
Cichorium spinosum	.	.	.	.	.	2	2	1	2	.	.	.	.	.	.	.	4		
Daucus gingidium	.	.	.	.	.	.	.	.	.	.	.	.	1	2	.	.	2		
Frankenia hirsuta	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1	.		
Other species																							
Thymbra capitata	2	3	3	3	3	+	+	.	+	2	.	.	.	2	.	.	.	10					
Fumana procumbens	1	1	1	1	+	5					
Dactylis hispanica	+	1	.	2	1	.	.	4						
Petrohragia fasciculata var. cephalenica	.	+	+	1	1	4						
Hyparrhenia hirta	.	.	+	.	+	2						
Sarcopoterium spinosum	1	1						
Carlina gummifera	+	1					

Appendix I: Relevés localities and dates

Tab. 1: rel. 1-5, Greece, Athens, Voula, conglomerates (26.08.2002); rel. 6-8, Greece, Athens, Akro Kavori, arenaceous conglomerates (26.08.2002); rel. 9-13, Greece, Attica Vgethi, schists (27.08.2002); rel. 14-19, Greece, Attica Vravrona-Amolia, arenaceous conglomerates (28.08.2002).

Tab. 2: rel. 1-4, Greece, Attica, Agios Dimitrios, limestones (26.08.2002); rel. 5-6, Greece, Attica, Agios Nicolaos, conglomerates (27.08.2002); rel. 7, Greece, Attica, Agios Nicolaos, limestones (27.08.2002); rel. 8-11, Greece, Attica, Legrena Bay, limestones (27.08.2002); rel. 12, Greece, Attica, Akro Sounio, limestones (27.08.2002); rel. 13-18, Greece, Attica, Laurion, limestones (27.08.2002); rel. 19-21\, Greece, Attica, Laurion, limestones (12.07.2016)

Tab.3: rel. 1-5, Greece, Attica, Kineta, near Korinthos, limestones (01.09.2002); rel. 6-18, Greece, Attica, Akro Ireo, near Korinthos, limestones (01.09.2002); rel. 19, Greece, Attica, excavations of Heraion, near Korinthos limestones (01.09.2002); rel. 20-24, Greece, Attica, North-West Coast of Loutraki near Korinthos, conglomerates (01.09.2002).

Tab. 4: rel. 1-8, Peloponnese Kardamili, conglomerates (28.08.1999); rel. 9-11, Peloponnese Stupo near Neihori, limestones (26.08.1999); rel. 12-15, Peloponnese, Agios Nikolaos, S of Neohori, arenaceous limestones (26.08.1999); rel. 16-20, Peloponnese, Kardamili, conglomerates (20.07.2011).

Tab. 5: rel. 1-2, Peloponnese, Gerolimenas, limestone (21.06.1986); rel. 3-6, Peloponnese, Gerolimenas, limestone (04.09.2002); rel. 7-13, Peloponnese, Marmari Akro Tenaro, limestone (04.09.2002); rel. 14-20, Peloponnese, Akr. Archangelos (Elika), sandstones (03.09.2002); rel. 21, Peloponnese, North coast of Archangelos, sandstones (04.09.2002); rel. 22, Peloponnese, Plitra near Molai, sandstones (04.09.2002); rel. 23, Peloponnese, Elea, limestones (04.09.2002).

Tab. 6: rel. 1-3, Greece, Attica, Lagonisi, limestones and schists (27.08.2002); rel. 4-6, Greece, Attica, Kakkia Thalasa, arenaceous conglomerates (27.08.2002); rel. 7-8, Greece, Attica, Porto Raphti, limestones (28.08.2002); rel. 9-11, Greece, Eubaea, South coast of Marmaris, schists (28.08.2002); rel. 12-13, Greece, Eubaea, South-east coast of Karistos, schists (28.08.2002); rel. 14, Greece, Eubaea, North coast of Karistos, schists (29.08.2002); rel. 15-16, Greece, Eubaea, Mesohoria, schists (29.08.2002); rel. 17-19, Greece, Eubaea, Amarinthos, limestones (29.08.2002); rel. 20, Greece, Kimolos Island, limestones (03.07.1994); rel. 21-23, Greece, Sifnos Island, Heronissos, limestones (06.07.1994); rel. 24-25, Greece, Attica, Rafina, limestones (5.06.1992).

Tab. 7: rel. 1-2, Greece, Chios Island, Emporio, Mavra Volia, limestone (07.06.2005); rel. 3-5, Greece,

Chios Island, Cape Sani, sandstones (07.06.2005); rel. 6, Greece, Chios Island, M. Pangias Mirtidiotissas, calcareous conglomerates (08.06.2005); rel. 7, Greece, Amorgos Island, Agios Paulos, sandstones (01.09.2003); rel. 8, Greece, Mykonos Island, Paradise Bay, granites (03.09.2003); rel. 9-11, Turkey, Cesme, limestones (25.06.1987); rel. 12-13, Greece, Chios Island, Thimiana, sandstones (30.08.1992); rel. 14-17, Greece, Chios Island, Thimiana, Agios Ermioni (30.08.1992); rel. 18, Greece, Delos Island, granites (06.09.1992); rel. 19, Greece, Sikinos Island, Alopronia, limestones (24.08.1994); rel. 20, Greece, Naxos Island, Apollonas, schists(26.08.1994); rel. 21-22, Greece, Naxos Island, Aliki, granites (27.08.1994); rel. 23-24, Greece. Crete, Sideros, Oro Tenda, limestone (9.08 2000); rel. 25-27, Greece, Kithira Island, south of Diako Foti, near Makronisi, sandstones (15.06.2004); rel. 28-29, Greece, Attica, Saronida, conglomerates (27.08.2002); rel. 30, Greece, Attica, Loutsa C. Velani, sandstones (28.08.2002); rel. 31-34, Greece, Andros Island, Gravos, Agh. Petros, schists (30.08.2002). rel. 35-37, Greece, Andros Island, Chakolimiona, schists (30.08.2002); rel. 38-40, Greece, Andros Island, Ormos Korthi Bay, schists and limestones (30.08.2002); rel. 41-43, Greece, Andros Island, Atheni Panaghia, schists (31.08.2002); rel. 44-46, Greece, Milos Island, South Coast of Adamas, sandstones (01.07.1994); rel. 47, Greece, Milos Island, Mavra Gremna, limestones (01.07.1994); rel. 48-53, Greece, Milos Island, Papafranca, limestones (02.07.1994); rel. 54-56, Greece, Kythnos Island, Loutra, conglomerates (05.07.1994); rel. 57-58, Greece, Syros Island, schists (09.07.1994); rel. 59-61, Greece, Tinos Island, Kato Kosmos, limestones (10.07.1994); rel. 62-64, Greece, Crete, Mallia, limestones (04.08.1989); rel. 65-67, Mykonos Islands, Ftelia, limestones (7.07.2016); rel. 68-72, Mykonos Islands, Thygani Bay, limestones (7.07.2016). Tab. 8: rel. 1, Greece, Crete Island, between Makrijalos and Kalonero, conglomerates (28.06.2002); rel. 2, Greece, Crete Island, Akr. Mavromouri (Sitia), arenaceous conglomerates (28.06.2002); rel. 3-4, Greece, Crete Island, E of Sitia, schists (28.06.2002); rel. 5-6, Greece, Crete Island, Xerocampos, arenaceous conglomerates (28.06.2002); rel. 7-8, Greece, Paros Island, Agios Ioannis, granites (28.08.2003); rel. 9-10, Greece, Paros Island, Gria Cape near Langeri, limestone (28.08.2003); rel. 11-13, Greece, Amorgos Island, Paradhisia Bay, Kolofana, schists (31.08.2003); rel. 14-16, Greece, Amorgos Island, Nikouria Islet, limestones (01.09.2003); rel. 17-20, Greece, Donoussa Island, Stavros, sandstones (29.08.1998); rel. 21-23, Greece, Koufonisi Island, limestones (30.08.1998); rel. 24-25, Greece, Shinoussa Island, limestones (31.08.1998); rel. 26, Greece, Chios Island, Thimiana, sandstones (30.08.1992); rel. 27-29, Greece, Paros

Island, Logaras, near Piso Livadi, schists (04.09.1992); rel. 30-31, Greece, Ios Island, Koumbara, limestones (25.08.1994); rel. 32-33, Greece, Kalymnos Island, Kasteli, Ormos Arginonta, limestones (31.08.1994); rel. 34-37, Greece, Rhodos, Akr. Vodi (Kalitheas), limestones (23.08.1989); rel. 38-39, Greece, Attica, Palea Fokea south coast, limestones (27.08.2002); rel. 40-41, Greece, Attica, Tsonima, Agio Marina, schists (27.08.2002); rel. 42-43, Greece, Attica, Porto Raphiti, limestones (28.08.2002); rel. 44-46, Greece, Attica, Rafina Marikes, limestones (28.08.2002); rel. 47, Greece, Syros Island, Angathoges, limestones (09.07.1994); rel. 48-49, Greece, Tinos Island, Panormou, limestones (10.07.1994); rel. 50-51, Greece, Crete Island, Palehora, limestones (2.08.1989); rel. 52-53, Greece, Crete Island, Akro. Sideros, limestones (4.08.1989); rel. 54-55, Crete Island, Panagia Phaneromenis, sandstones (11.9.2016).

Tab. 9: rel. 1, Greece, Crete Island, Akrothiri, Gerani, Konakes, limestones (27.08.2009); rel. 2-3, Greece, Crete Island, Almirida, Kalives, limestones (27.08.2009); rel. 4-7, Greece, Crete Island, Rethymnos, limestones (26.08.1996); rel. 8-10, Greece, Crete Island, Gerani (W of Rethymnos), limestones (26.08.1996); rel. 11-13, Greece, Crete Island, 10 km west of Rethymnos, limestones (3.06.2000); rel. 14-15, Greece, Crete Island, Kalatas, limestones (3.06.2000); rel. 16-17, Greece, Crete Island, Chania, limestones (3.06.2000); rel. 18-19, Greece, Crete Island, Chania, Grave of Venizelo, limestone cliffs (4.06.2000); rel. 20-22, Peloponnese, Gythio, limestones (28.08.1999); rel. 23-24, Peloponnese, Monemvasia, limestones (28.08.1999); rel. 25-27, Peloponnese, Neapolis, Profitis Elias, conglomerates (04.06.2004); rel. 28-29, Greece, Kythira island, Fourni, limestones (14.06.2004); rel. 30, Greece, Kythira island, Platis Ammos, limestones (14.06.2004); rel. 31-32, Greece, Kythira island, Makronisi, limestones (15.06.2004); rel. 33-34, Greece, Kythira island, South coast of Diakofti, sandstones (15.06.2004); rel. 35-37, Greece, Kythira island, Avlemonas, Agios Nikolaos Bay, limestones (15.06.2004); rel. 38-40, Greece, Euboea, Costa sud presso Mandili, schists (28.08.2002); rel. 41-44, Greece, Peloponnese, Monemvasia, sandstones (03.09.2002); rel. 45-46, Greece, Peloponnese, Akr. Kremios, limestones (03.09.2002); rel. 47-48, Greece, Peloponnese, Monemvasia Bay, limestones (03.09.2002); rel. 49-50, Greece, Peloponnese, Monemvasia, Nomia, limestones (03.09.2002); rel. 51-52, Greece, Peloponnese, Monemvasia, Aghios Fokas, limestones (03.09.2002); rel. 53-54, Greece, Peloponnese, Trinisia (Gythio), limestones (04.09.2002); rel. 55-57, Greece, Peloponnese, Mezapos (Mani peninsula), limestones (04.09.2002); rel. 58-63, Greece, Crete Island, Kalathas (Akrotiri), limestones (1.08.1989); rel. 64-65, Greece, Crete Island, Stravros

(Akrotiri), limestones (1.08.1989).

Tab. 10: rel. 1-2, Greece, Paros Island, Glyfa, fossiliferous limestones (28.08.2003); rel. 3-4, Greece, Paros Island, Aliki, limestones (28.08.2003); rel. 5-6, Greece, Amorgos Island, Agios Ana, limestones (01.09.2003); rel. 7, Greece, Naxos Island, Moutsouna, schists (02.09.2003); rel. 8-9, Greece, Naxos Island, Klidhas, limestones (02.09.2003); rel. 10, Greece, Mykonos Island, Gran Paradise, granites (03.09.2003); rel. 11-18, Greece, Donoussa Island, limestones (28.08.1998); rel. 19-20, Greece, Iraklia Island, Livadi, sandstones (01.09.1998); rel. 21-23, Greece, Ios Island, Koumbara, limestones (25.08.1994); rel. 24-25, Greece, Naxos Island, Lionas, marbles (26.08.1994); rel. 26-27, Greece, Naxos Island, Monopetra, limestones (27.08.1994); rel. 28-29, Greece, Amorgos Island, Aegiali Bay, limestones (28.08.1994); rel. 30, Greece, Amorgos Island, Hozoriotissa Monastery, limestones (28.08.1994); rel. 31-37, Greece, Andros Island, Ormos Atheni, schists (31.08.2002).

Tab. 11: rel. 1-3, Greece, Shinoussa Island, schists (31.08.1998); rel. 4-7, Greece, Iraklia Island, Agios Georgios, limestones (01.09.1998); rel. 8-12, Greece, Andros Island, Kalamaki, Akr. Thiari, schists (30.08.2002); rel. 13-18, Greece, Andros Island, Ormos, Akr. Grias Pipima, schists (30.08.2002); rel. 19-22, Greece, Santorini Island, Perissa, limestone cliffs (23.08.1994); rel. 23, Greece, Santorini Island, Red Beach, Akrotiri, volcanic rocks (11.06.2000); rel. 24, Greece, Santorini Island, Akrotiri, limestone cliffs (11.06.2000).

Tab. 12: rel. 1-3, Greece, Santorini Island, Athinios, volcanic rocks (23.08.1994); rel. 4-7, Greece, Santorini Island, Akro Koulombo volcanic rocks (11.06.2000); rel. 8, Greece, Astypalea Island, presso il porto, Livadia, schists (29.08.1994); rel. 9-11, Greece, Astypalea Islands, Agios Andrea, schists (30.08.1994); rel. 12, Greece, Astypalea Islands, Stavros, schists (30.08.1994); rel. 13-15, Greece, Sikinos Island, Alopronia, limestones (24.08.1994); rel. 16-21, Greece, Milos Island, Firopotamos, limestones (02.07.1994).

Tab. 13: rel. 1-5, Greece, Mykonos Island, Kalo Livadi, granitic cliffs (04.09.2003); rel. 6-9, Greece, Ikaria Island, near Kampos, schistous cliffs (03.09.1992); rel. 10-20, Greece, Sikinos Island, Alopronia, schists (24.08.1994); rel. 21-23, Greece, Shinoussa Island, limestones (31.08.1998).

Tab. 14: rel. 1-5, Greece, Kithira Island, south of Platis Ammos, limestones (14.06.2004); rel. 6-10, Greece, Kithira Island, Limnaria bay, limestones (15.06.2004); rel. 11-16, Greece, Kithira Island, Chalkos Bay, limestones (15.06.2004).

Tab. 15: rel. 1-9, Greece, Crete Island, Gerani (W of Rethymnos), limestones (26.08.1996); rel. 10-20, Greece, Crete island, (West of Rethymnos), limestones

(3.06.2000); rel. 21-26, Greece, Crete island, (West of Rethymnos), limestones (1.08.1989).

Tab. 16: rel. 1-3, Greece, Crete Island, Falasarna, sandy limestones (28.08.2009); rel. 4, Greece, Crete Island, Iraklion, near Ligaria, schists (3.06.2000); rel. 5-8, Greece, Crete, Karteros (Iraklion), limestones (8.06.2000); rel. 9-12, Greece, Crete, Sitia, schists (9.06.2000); rel. 13-15, Greece, Crete, Metoxi, sandstones (9.08.2000); rel. 16-17, Greece, Crete, Itanos, schists (9.08.2000); rel. 18-19, Greece, Crete, Goudouras, conglomerates (10.08.2000); rel. 20-25, Greece, Crete Island, coast E of Iraklion, limestones (4.08.1989).

Tab. 17: rel. 1, Greece, Crete Island, Sougia, limestones (29.08.2009); rel. 2-3, Greece, Crete Island, Xerokampos, near Agia Irini, limestones (24.08.1996); rel. 4, Greece, Crete Island, Xerokampos, near Agia Irini, limestones (10.09.2016); rel. 5-10, Greece, Crete Island, coast in front of Mochlos, schists (25.08.1996); rel. 11-12, Greece, Crete Island, Tholos, limestones (25.08.1996); rel. 13-16, Greece, Crete Island, Pachia Ammos, limestones and conglomerates (25.08.1996); rel. 17-20, Greece, Crete Island, South of Agios Nikolaos, limestones (8.06.2000); rel. 21, Greece, Crete Island, Pachia Ammos, limestones (8.06.2000).

Tab. 18: rel. 1-3, Greece, Crete Island, Makri Gialos, conglomerates (24.08.1996); rel. 4-5, Greece, Crete Island, W coast of Kalo Nero, fossiliferous limestones (24.08.1996); rel. 6-7, Greece, Crete Island, Kalo Nero, fossiliferous limestones (24.08.1996); rel. 8, Greece, Crete Island, Kalo Nero, fossiliferous limestones (10.06.2000); rel. 9-12, Greece, Crete Island, near Kapsa monastery limestones (10.06.2000); rel. 13-15, Greece, Crete Island, Anatoli near Hierapetra, marls (22.08.1996); rel. 16-17, Greece, Crete Island, East Hierapetra, conglomerates (10.06.2000); rel. 18-20, Greece, Crete Island, Tertsia, sandstones (27.06.2002); rel. 21-22, Greece, Crete Island, Akro Theophilou, arenaceous conglomerates (27.06.2002); rel. 23-25, Greece, Crete Island, Faflangos, marls (22.08.1996); rel. 26-28, Greece, Crete Island, Tertsia, marls (22.08.1996); rel. 29, Greece, Crete Island, between Tertsia and Myrtos, marls (22.08.1996).

Tab. 19: rel. 1-5, Greece, Crete Island, Kalamaki, marls (26.06.2002); rel. 6-7, Greece, Crete Island, Kalamaki (Timbaki), marly limestones (03.09.2006); rel. 8, Greece, Crete Island, Vathy, marly limestones (03.09.2006); rel. 9-13, Greece, Crete Island, Kalamaki, marls (21.08.1996); rel. 14-18, Greece, Crete Island, Matala, marls (21.08.1996); rel. 19-23, Greece, Crete Island, Akrotiri Peninsula, limestones (26.08.1996); rel. 24-29, Greece, Crete Island, Matala, marls (3.08.1989).

Tab. 20: rel. 1-3, Greece, Crete Island, Elaphonissos Islet, arenaceous conglomerates (30.08.2006); rel. 4-8, Greece, Crete Island, Palehora, conglomerates

(5.06.2000); rel. 9-10, Greece, Crete Island, Cape Krios, arenaceous limestones (5.06.2000); rel. 11-14, Greece, Crete Island, Hersonissos, conglomerates (26.08.2010); rel. 15-17, Greece, Crete Island, coast E of Iraklion, limestones (25.08.1996); rel. 18-20, Greece, Crete Island, Hersonissos, conglomerates (8.06.2000); rel. 21-23, Greece, Crete Island, Mallia, conglomerates (8.06.2000); rel. 24-25, Greece, Crete Island, coast E of Iraklion, limestones (4.08.1989); rel. 26-33, Greece, Hrisi Island (23.08.1996). From Brullo & Guarino (2000), Tab. 5.

Tab. 21: rel. 1-2, Greece, Karpathos Island, Pigadia, limestone cliffs (29.06.2002); rel. 3-5, Greece, Karpathos Island, Amopi, limestones (29.06.2002); rel. 6-7, Greece, Karpathos Island, Damatria, conglomerates (30.06.2002); rel. 8-10, Greece, Karpathos Island, Akro Paleokastro, Artesia, limestones (30.06.2002); rel. 11-14, Greece, Karpathos Island, Evgonomos (SW Olimbos), limestones (04.07.2002); rel. 15-18, Greece, Karpathos Island, Agios Sophie, Akr. Paliokastro (Arkasa), limestones (30.08.1996); rel. 19-20, Greece, Karpathos Island, Coast near Myra Island, conglomerates (30.08.1996); rel. 21-22, Greece, Karpathos Island, Pigadia, Poseidon, conglomerates (29.08.1996); rel. 23-38, Greece, Karpathos Island, from Gehù *et al.* (1992), tab. 18.

Tab. 22: rel. 1-4, Greece, Karpathos Island, Kira Panagia, limestones (02.07.2002); rel. 5-6, Greece, Karpathos Island, Apella, limestones (02.07.2002); rel. 7-11, Greece, Karpathos Island, Kira Panagia, limestones (28.08.1996); rel. 12-13, Greece, Karpathos Island, from Gehù *et al.* (1992), tab. 19, rel. 5, 9; rel. 14-17, Greece, Karpathos Island, Ormos Limnari, sandstones (01.07.2002); rel. 18-19, Greece, Karpathos Island, Lefkos, marly limestones (01.07.2002); rel. 20, Greece, Karpathos Island, Lefkos, marls (04.07.2002).

Tab. 23: rel. 1-2, Greece, Karpathos Island, Akr. Kastello, sandstones (30.06.2002); rel. 3-7, Greece, Karpathos Island, Akro Pronj, sandstones (01.07.2002); rel. 8-14, Greece, Karpathos Island, Evgonomos (SW Olimbos), limestones (04.07.2002); rel. 15-16, Greece, Karpathos Island, Akr. Kastello, sandstones (30.08.1996); rel. 17-20, Greece, Karpathos Island, Akr. Kastello, limestones (30.08.1996); rel. 21-22, Greece, Karpathos Island, Amopi, marls (30.08.1996); rel. 23-28, Greece, Karpathos Island, Akro Pronj, sandstones (29.08.1996).

Tab. 24: rel. 1-3, Greece, Karpathos Island, Psoriari Plaka, sandstones (30.06.2002); rel. 4, Greece, Karpathos Island, Finiki, limestones (30.06.2002); rel. 5-8, Greece, Karpathos Island, Agios Theodoros, sandstones (30.06.2002); rel. 9-10, Greece, Karpathos Island, Adia, conglomerates (01.07.2002); rel. 11-13, Greece, Karpathos Island, Lefkos, sandstones (01.07.2002); rel. 14-17, Greece, Karpathos Island, Lefkos, sandstones (04.07.2002); rel. 18-19, Greece, Karpathos

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Tab. 25: rel. 1-7, Greece, Karpathos Island, Vananda, N of Diafani, metamorphic cliffs (03.07.2002); rel. 8-11, Greece, Karpathos Island, Akro Scopi, limestones (21.08.2003); rel. 12-16, Greece, Karpathos Island, Akro Scopi, limestones (30.08.1996); rel. 17-19, Greece, Rhodos Island, Akr. Armenistis (Monolithos), limestones (25.08.1989); rel. 20-22, Greece, Rhodos Island, Akr. Fourni (Monolithos), limestones (01.09.1996); rel. 23-25, Greece, Rhodos Island, Agios Georgios (Monolithos), limestones (01.09.1996); rel. 26-29, Greece, Rhodos Island, Amartos, limestones (01.09.1996).

Tab. 26: rel. 1-2, Greece, Karpathos Island, Amopi, limestones (29.06.2002); rel. 3-4, Greece, Karpathos Island, Lefkos, conglomerates (01.07.2002); rel. 5, Greece, Karpathos Island, Kira Panagia, limestones (02.07.2002); rel. 6-7, Greece, Karpathos Island, Ahatia, arenaceous conglomerates (02.07.2002); rel. 8-11, Greece, Karpathos Island, Lefkas Beach, limestones (29.08.1996); rel. 12-13, Karpathos Island, Kira Panagia, limestones (29.08.1996); rel. 14-15, Karpathos Island, Chania, limestones (29.08.1996); rel. 16-17, Karpathos Island, Vrotos, limestones (29.08.1996); rel. 18-21, Greece, Karpathos Island, Pigadia, Poseidon, conglomerates (29.08.1996); rel. 22-23, Greece, Karpathos Islands, from Gehù *et al.* (1992) tab. 16, ril. 10-11.

Tab. 27: rel. 1-3, Greece, Rhodos Island, Lindos, limestones (21.08.1989); rel. 4-10, Greece, Rhodos Island, Lindos, limestones (25.08.1989); rel. 11-16, Greece, Rhodos Island, Agati Beach, limestones (02.09.1996); rel. 17-18, Greece, Rhodos Island, Charaki, limestones (02.09.1996); rel. 19-25, Greece, Rhodos Island, Lindos, limestones (01.09.1996).

Tab. 28: rel. 1, Greece, Kos Island, Vaghi near Mastikari, sandstones (25.08.2013); rel. 2, Greece, Kos Island, Camilla Bay, Kampos, sandstones (25.08.2013); rel. 3; Greece, Kos Island, Agios Stefanos, Kampos, sandstones (25.08.2013); rel. 4-5, Greece, Kos Island, Limionas near Kefalos, sandstones (25.08.2013); rel. 6, Greece, Nisyros Island, Pali, volcanic rocks (26.08.2013); rel. 7-9, Greece, Kos Island, Kamari, sandstones (02.09.1994); rel. 10-13, Greece, Rhodes Island, Akro Vajia, marls (21.08.1989); rel. 14-15, Greece, Rhodes Island, Nord side of Rhodes, marls (27.08.1989); rel. 16-20, Greece, Kithira Island, Feloti Bay, Agh. Palaghia, near Chora Kithira, marls and sandstones (15.06.2004); rel. 21-29, Greece, Andros Island, Bassi, Akro Kolona, schists (30.08.2002); rel. 30-31, Greece, Andros Island, Ormos Korthi Bay, schists

and limestones (30.08.2002); rel. 32-35, Greece, Kythnos Island, schists (05.07.1994); rel. 36, Greece, Syros Island, Azolimnos, schists (09.07.1994); rel. 37, Greece, Rhodes Island, west coast of Rhodes city, marls (02.09.1996).

Tab. 29: rel. 1, Greece, Rhodos Island, Antony Quinn Bay, limestones (22.08.2013); rel. 2-9, Greece, Rhodos Island, tra Ladiko e Faliraki, limestones (21.08.1989); rel. 10-11, Greece, Ikaria Island, Kampos, schists (29.08.2003); rel. 12-21, Greece, Ikaria Island, Kampos, schists (03.09.1992); rel. 22-28, Greece, Ikaria Island, Avlaki-Evdilos, granites (29.08.2003).

Tab. 30: rel. 1-3, Greece, Samos Island, Agios Nicolaos, limestones (31.08.1992); rel. 4-9, Greece, Samos Island, Potami, limestones (30.06.2003); rel. 10-11, Greece, Samos Island, Agios Isidoros, limestones (9 June 2005); rel. 12-14, Greece, Chios Island, Emporio, limestones and sandstones (06.06.2005); rel. 15-19, Greece, Chios Island, Emporio, limestones (30.08.1992); rel. 20, Greece, Rhodos Island, Agios Georgios Monolithos, limestones (23.08.1989); rel. 21-22, Greece, Syros Island, Kini, schists (09.07.1994); rel. 23-28, Greece, Chios Island, Agios Elenis, limestones (05.06.2005); rel. 29, Greece, Chios Island, Cape Elenis, Karfas, conglomerates (12.10.2007).

Tab. 31: rel. 1-3, Greece, Samos Island, Potami, limestones (1.07.2003); rel. 4-5, Greece, Attica, Tsionima, Agio Marina, schists (27.08.2002); rel. 6-7, Greece, Attica, Vgethi, schists (27.08.2002); rel. 8-12, Greece, Milos Island, Papafranca, limestones (02.07.1994); rel. 13-14, Greece, Kythnos Island, schists (05.07.1994); rel. 15-16, Greece, Kythnos Island, Loutra, conglomerates (05.07.1994); rel. 17-18, Greece, Sifnos Island, Heronissos, limestones (06.07.1994); rel. 19, Greece, Sifnos Island, Kamaris, limestones (06-07.1994); rel. 20-21, Greece, Syros Island, schists (09.07.1994); rel. 22, Greece, Syros Island, Kini, schists (09.07.1994); rel. 23, Greece, Syros Island, Angathoges, limestones (09.07.1994); rel. 24, Greece, Tinos Island, Kato Kosmos, limestones (10.07.1994); rel. 25-31, Greece, Crete, from Mayer (1995), rel. 50-56, tab. 18; Greece, Attica, Laurion, limestones (12.07.2016)..

Tab. 32: rel. 1, Greece, Karpathos Island, Damatria, marls (30.06.2002); rel. 2-4, Greece, Karpathos Island, Damatria, clay rocks (30.06.2002); rel. 5, Greece, Karpathos Island, Vata, sandstones (30.06.2002); rel. 6, Greece, Karpathos Island, Akr. Kastello, near Diakofitis, limestones (30.06.2002); rel. 7, Greece, Karpathos Island, Finiki, limestones (30.06.2002); rel. 8, Greece, Karpathos Island, Ormos Limnari, sandstones (01.07.2002); rel. 9, Greece, Rhodos Island, Akr. Fourni (Monolithos), limestones (01.09.1996); rel. 10-11, Greece, Rhodos Island, Agios Georgios (Monolithos), limestones (01.09.1996); rel. 12-13, Greece, Rhodos Island, Amartos, limestones

(01.09.1996); rel. 14, Greece, Karpathos Island, Agios Sophie, Akr. Palioastro (Arkasa), limestones (30.08.1996); rel. 15-16, Greece, Karpathos Island, Akr. Kastello, limestones (30.08.1996); rel. 17, Greece, Karpathos Island, Akro Proni, limestones (29.08.1996); rel. 18-19, Greece, Karpathos Island, Lefka Beach, limestones (29.08.1996); rel. 20-21, Greece, Karpathos Island, Vrotos, limestones (29.08.1996); rel. 22-24, Greece, Karpathos Island, Pigadia, Poseidon, conglomerates (29.08.1996); rel. 25-39, Greece, Karphatos and Rhodos, from Gèhù *et al.* (1992), tab. 22, rel. 1-15.

Tab. 33: rel. 1-5, Greece, Donoussa Island, limestones (28.08.1998); rel. 6-14, Greece, Koufounisi Island, limestones (30.08.1998); rel. 15-19, Greece, Crete Island, Matala, marls (21.08.1996); rel. 20, Greece, Crete Island, Chania, Grave of Venizelo, limestone cliffs (04.06.2000); rel. 21-25, Greece, Rhodos, from Gèhù *et al.* (1992), tab. 23.

Tab. 34: rel. 1-2, Greece, Crete Island, Falasarna, sandy limestones (28.08.2009); rel. 3, Greece, Crete Island, Akr. Mavromouri (Sitia), arenaceous conglomerates (28.06.2002); rel. 4-6, Greece, Crete Island, near Ligaria, limestones (3.06.2000); rel. 7-11, Greece, Crete Island, Karteros, Iraklion, limestones (8.06.2000); rel. 12-14, Greece, Crete Island, Goudouras, conglomerates (10.08.2000); rel. 15-19, Greece, Peloponnese, Gerolimenas, limestones (21.06.1986).

Tab. 35: rel. 1-3, Greece, Kerkyra (Corfu) Island, Palaiokastritsa, limestones (19.08.1999); rel. 4-5, Greece, Kerkyra (Corfu) Island, Ermones, limestones (19.08.1999); rel. 6, Greece, Kerkyra (Corfu) Island, Glifada, limestones (19.08.1999); rel. 7, Greece, Paxi Island, Lakki, limestones (20.08.1999); rel. 8-15, Greece, Paxi Island, Plani, limestones (20.08.1999); rel. 16-19, Greece, Paxi Island, South coast, limestones (14.07.2011); rel. 20, Greece, Paxi Island, Lakkos, limestones (14.07.2011); rel. 21, Greece, Paxi Island, Nord del porto, limestones (14.07.2011).

Tab. 36: rel. 1-6, Greece, Lefkas Island, Vassiliki, conglomerates (21.08.1999); rel. 7-12, Greece, Lefkas Island, Kathisma, limestones (21.08.1999); rel. 13, Greece, Lefkas Island, Agios Nikitas, limestones (21.08.1999); rel. 14-15, Greece, Cephalonia Island, Poros, limestones (22.08.1999); rel. 16-17, Greece, Cephalonia Island, Kapri, Skala, limestones (22.08.1999); rel. 18-19, Greece, Ithaca Island, Vathi, limestones (23.08.1999); rel. 20-21, Greece, Ithaca Island, Sarakiniko Bay, limestones (23.08.1999); rel. 22-23, Greece, Ithaca Island, Akr. Sarakiniko, limestones (23.08.1999); rel. 24-26, Greece, Lefkas Island, Agios Nikitas, limestones (15.07.2011); rel. 27, Greece, Lefkas Island, South of Vassiliti, limestones (16.07.2011); rel. 28, Greece, Lefkas Island, Sivota, limestones (16.07.2011); rel. 29-30, Greece, Cephalonia

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Tab. 37: rel. 1-3, Greece, Cephalonia Island, Katavothres near Argostoli, limestones (22.08.1999); rel. 4-8, Greece, Cephalonia Island, Lassi, limestones (22.08.1999); rel. 9-16, Greece, Cephalonia Island, Assos, limestones (24.08.1999); rel. 17, Greece, Cephalonia Island, Agios Jerosolim, limestones (24.08.1999); rel. 18-23, Greece, Cephalonia Island, Alaties, limestones (24.08.1999); rel. 24-25, Greece, Cephalonia Island, Lepeda, sandstones (24.08.1999); rel. 26, Greece, Cephalonia Island, Aliate, limestones (17.07.2011); rel. 27, Greece, Cephalonia Island, Heorussalim, limestones (17.07.2011); rel. 28-29, Greece, Cephalonia Island, Assos, limestone cliffs (17.07.2011).

Tab. 38: rel. 1, Greece, Ithaca Island, Stavros, conglomerates (23.08.1999); rel. 2-3, Greece, Cephalonia Island, Falikadi, limestones (24.08.1999); rel. 4-7, Greece, Cephalonia Island, Fiskardo, limestones (24.08.1999); rel. 8-10, Greece, Cephalonia Island, Fiskardo, limestones (17.07.2011); rel. 11, Greece, Zakynthos Island, Ormos Keriou, limestones (25.08.1999); rel. 12-17, Greece, Zakynthos Island, Marathia, marls (25.08.1999); rel. 18-20, Greece, Zakynthos Island, Marathia, marls (19.07.2011); rel. 21-26, Peloponnese, Koroni, sandstones (26.08.1999); rel. 27-29, Peloponnese, Koroni, sandstones (19.07.2011).

Tab. 39: rel. 1-4, Peloponnese, Loutra Killini, sandstones (26.08.1999); rel. 5-6, Peloponnese, Gli-fi, sandstones (26.08.1999); rel. 7-11, Peloponnese, Katakolo, sandstones (26.08.1999); rel. 12-15, Peloponnese, Kiparissia, sandstones (26.08.1999); rel. 16-17, Peloponnese, coast S of Kiparissia, sandstones (26.08.1999); rel. 18, Peloponnese, Terpsithea, sandstones (26.08.1999); rel. 19-21, Peloponnese, Agios Kirilos, sandstones (26.08.1999); rel. 22, Peloponnese, Marathopoli, sandstones (26.08.1999); rel. 23-28, Peloponnese, Pilos, limestones (26.08.1999); rel. 29-31, Peloponnese, Methoni, limestones (26.08.1999); rel. 32, Peloponnese, Loutra, arenaceous limestones (20.07.2011); rel. 33, Peloponnese, Kiparissia, sandstones (20.07.2011); rel. 34, Peloponnese, Pilos, limestone cliffs (20.07.2011).

Tab. 40: rel. 1-6, Greece, Zakynthos Island, Porto Zoro, arenaceous limestones (25.08.1999); rel. 7-14, Greece, Zakynthos Island, Agios Nicolaos, limestones (25.08.1999); rel. 15-18, Greece, Zakynthos Island, Skinari, limestones (18.07.2011); rel. 19-20, Greece, Zakynthos Island, Porto Zoro, limestones (19.07.2011); rel. 21, Greece, Zakynthos Island, Porto Roma, Agios Stefanos, limestones (19.07.2011); rel. 22-24, Peloponnese, Kitries, near Messinias, conglomerates (20.07.2011); rel. 25-26, Greece, Epirus, Agios Giorgios, near Parga, conglomerates (15.07.2011); rel. 27-30, Greece, Epirus, Vrachos Beach near Loutsas, south of Ammouda, conglomerates (08.09.1989).

Tab. 41: rel. 1-3, Greece, Kerkyra (Corfù) Island, Paleocastrion, limestones (19.08.1999); rel. 4-5, Greece, Kerkyra (Corfù) Island, Ermones, limestones (19.08.1999); rel. 6, Greece, Kerkyra (Corfù) Island, Glifada, limestones (19.08.1999); rel. 7-11, Greece, Paxi Island, South coast, limestones (14.07.2011); rel. 12-16, Greece, Lefkas Island, Agios Nikitas, limestones (21.08.1999); rel. 17-19, Greece, Cephalonia Island, Poros, limestones (22.08.1999); rel. 20-23, Greece, Lefkas Island, Agios Nikitas, limestones (15.07.2011); rel. 24-25, Greece, Lefkas Island, South of Vassiliti, limestones (16.07.2011); rel. 26-27, Greece, Cephalonia island, Poros, limestone cliffs (18.07.2011).

Tab. 42: rel. 1-4, Greece, Paxi Island, Lakki, limestones (20.08.1999); rel. 5, Greece, Paxi Island, Pla-

ni, limestones (20.08.1999); rel. 6-10, Greece, Paxi Island, Lakkos, limestone cliffs (14.07.2011); rel. 11-12, Greece, Cephalonia Island, Ailate, limestone cliffs (17.07.2011); rel. 13-23, Greece, Cephalonia Island, Assos, limestones (24.08.1999); rel. 24, Greece, Cephalonia Island, Assos, limestones (17.07.2011).

Tab. 43: rel. 1-5, Greece, Zakynthos Island, Agios Nicolaos, limestones (25.08.1999); rel. 6-9, Greece, Peloponnese, Loutra Killini, sandstones (26.08.1999); rel. 10, Greece, Peloponnese, Glifi, sandstones (26.08.1999); rel. 11-13, Greece, Cephalonia Island, Ailate, limestones (17.07.2011); rel. 14-15, Greece, Cephalonia Island, Assos, limestones (17.07.2011); rel. 16, Greece, Zakynthos Island, Skinari, limestones (18.07.2011); rel. 17, Greece, Zakynthos Island, Porto Roma, Agios Stefanos, limestones (19.07.2011).