

Salvatore Brullo • Cristian Brullo •  
Salvatore Cambria • Gianpietro Giusso del Galdo

# The Vegetation of the Maltese Islands

# Contents

|          |                                                                                                       |           |
|----------|-------------------------------------------------------------------------------------------------------|-----------|
| <b>1</b> | <b>Introduction</b> . . . . .                                                                         | <b>1</b>  |
| <b>2</b> | <b>Physiography</b> . . . . .                                                                         | <b>7</b>  |
| 2.1      | Geographical Characteristics and History of Malta . . . . .                                           | 7         |
| 2.2      | Geology . . . . .                                                                                     | 10        |
| 2.3      | Soils . . . . .                                                                                       | 14        |
| 2.4      | Climate . . . . .                                                                                     | 16        |
| <b>3</b> | <b>History of the Flora and Vegetation</b> . . . . .                                                  | <b>21</b> |
| 3.1      | Flora . . . . .                                                                                       | 21        |
| 3.2      | Vegetation . . . . .                                                                                  | 29        |
| <b>4</b> | <b>Syntaxonomical Arrangment of Vegetation</b> . . . . .                                              | <b>33</b> |
| <b>5</b> | <b>Woody Vegetation</b> . . . . .                                                                     | <b>41</b> |
| 5.1      | <i>Pistacio lentisci-Quercetum ilicis</i> Brullo & Marcenò 1985 . . . .                               | 41        |
| 5.2      | <i>Asparago aphylli-Tetraclinidetum articulatae</i><br>ass. nov. hoc loco . . . . .                   | 44        |
| 5.3      | <i>Periploco angustifoliae-Euphorbietum dendroidis</i><br>Brullo, Di Martino & Marcenò 1977 . . . . . | 46        |
| 5.4      | <i>Erico multiflorae-Antyllidetum melitensis</i><br>Brullo, Minissale & Spampinato 1997 corr. . . . . | 46        |
| 5.5      | <i>Erico multiflorae-Coronilletum glaucae</i> ass. nov. hoc loco . . . .                              | 50        |
| 5.6      | <i>Suaedo verae-Darnielletum melitensis</i> ass. nov. hoc loco . . . .                                | 52        |
| <b>6</b> | <b>Chasmophilous Vegetation</b> . . . . .                                                             | <b>57</b> |
| 6.1      | <i>Hyperico webbii-Chiliadenetum bocconeii</i> Brullo & Marcenò<br>1979 corr. . . . .                 | 57        |
| 6.2      | <i>Putorio calabricae-Micromerietum microphyllae</i><br>Brullo & Marcenò 1979 . . . . .               | 64        |
| 6.3      | <i>Eucladio verticillati-Adiantetum capilli-veneris</i><br>Br.-Bl. ex Horvatić 1934 . . . . .         | 66        |

|          |                                                                                                                                                                     |           |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>7</b> | <b>Rocky Coast Vegetation</b> . . . . .                                                                                                                             | <b>67</b> |
| 7.1      | <i>Limonietum zeraphae</i> ass. nov. hoc loco . . . . .                                                                                                             | 67        |
| 7.2      | <i>Limonietum melitensis</i> ass. nov. hoc loco . . . . .                                                                                                           | 71        |
| 7.3      | <i>Crithmo maritimi-Limonietum virgati</i> Pirone 1995 . . . . .                                                                                                    | 71        |
| 7.4      | <i>Anthyllido melitensis-Euphorbietum melitensis</i> ass. nov.<br>hoc loco . . . . .                                                                                | 74        |
| 7.5      | <i>Crucianello rupestris-Helichrysetum melitensis</i> ass. nov.<br>hoc loco . . . . .                                                                               | 80        |
| <b>8</b> | <b>Psammophilous Vegetation</b> . . . . .                                                                                                                           | <b>83</b> |
| 8.1      | <i>Eryngio maritimi-Sporobolietum arenarii</i><br>(Arènes ex Géhu & Biondi 1994) Rivas Martinez & Cantò<br>in Rivas Martinez et al. 2002 . . . . .                  | 83        |
| 8.2      | <i>Cypero capitati-Agropyretum juncei</i><br>(Kuhnholz-Lordat 1923) Br.-Bl. 1933 . . . . .                                                                          | 86        |
| 8.3      | <i>Medicagini marinae-Ammophiletum australis</i><br>Br.-Bl. 1921 corr. Prieto & Diaz 1991 . . . . .                                                                 | 86        |
| 8.4      | <i>Centaureo sphaerocephalae-Ononidetum ramosissimae</i> Br.-Bl.<br>& M. Frei in M. Frei 1937 . . . . .                                                             | 87        |
| 8.5      | <i>Salsolo tragi-Cakiletum maritimae</i> Costa & Mansanet 1981,<br>nom. corr. hoc loco . . . . .                                                                    | 87        |
| <b>9</b> | <b>Salt Marshes Vegetation</b> . . . . .                                                                                                                            | <b>91</b> |
| 9.1      | <i>Arthrocnemo macrostachyi-Juncetum subulati</i><br>Brullo & Furnari 1976 . . . . .                                                                                | 91        |
| 9.2      | <i>Agropyro scirpei-Inuletum longifoliae</i> Brullo in Brullo et al.<br>1988 nom. corr. hoc loco . . . . .                                                          | 92        |
| 9.3      | <i>Halimiono portulacoidis-Suaedetum verae</i> (Molinier & Tallon<br>1970) Géhu in Géhu et al. 1984 . . . . .                                                       | 93        |
| 9.4      | <i>Inulo longifoliae-Juncetum maritimi</i> Brullo in<br>Brullo et al. 1988 nom. corr. hoc loco . . . . .                                                            | 94        |
| 9.5      | <i>Juncetum maritimo-acuti</i> Horvatic 1934 . . . . .                                                                                                              | 95        |
| 9.6      | <i>Caricetum divisae</i> Br. -Bl. in Br.-Bl., Roussine<br>& Nègre 1952 . . . . .                                                                                    | 96        |
| 9.7      | <i>Suaedo spicatae-Salicornietum patulae</i> Brullo & Furnari ex<br>Géhu & Géhu-Franck 1984 corr. Alcaraz, Ríos, De la Torre,<br>Delgado & Inocencio 1998 . . . . . | 97        |
| 9.8      | <i>Salsoletum sodae</i> Pignatti 1953 . . . . .                                                                                                                     | 98        |
| 9.9      | <i>Suaedetum spicatae</i> Pignatti 1953 corr. hoc loco . . . . .                                                                                                    | 98        |
| 9.10     | <i>Cressetum creticae</i> Brullo & Furnari 1976 . . . . .                                                                                                           | 100       |
| 9.11     | <i>Lamprothamnietum papulosi</i> Corillion 1957 . . . . .                                                                                                           | 101       |
| 9.12     | <i>Enteromorpha intestinalidis-Ruppiaetum maritimae</i> Westhoff<br>ex R. Tx. & Böckelmann 1957 . . . . .                                                           | 101       |
| 9.13     | <i>Ruppiaetum drepanensis</i> Brullo & Furnari 1976 . . . . .                                                                                                       | 102       |

|           |                                                                                                                                                      |     |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>10</b> | <b>Hygrophilous Vegetation</b>                                                                                                                       | 103 |
| 10.1      | <i>Phragmitetum australis</i> Savič 1926                                                                                                             | 103 |
| 10.2      | <i>Typhetum domingensis</i> Brullo, Minissale & Spampinato 1994                                                                                      | 103 |
| 10.3      | <i>Polygono salicifolii-Phragmitetum australis</i> Barbagallo, Brullo & Furnari 1979                                                                 | 104 |
| 10.4      | <i>Cyperetum distachyi</i> O. Bolós & R. Molinier 1984                                                                                               | 106 |
| 10.5      | <i>Bolboschoenetum compacti</i> Van Langend. 1931 corr. Bueno & F. Prieto in Bueno 1997                                                              | 106 |
| 10.6      | <i>Helosciadietum nodiflori</i> Maire 1924                                                                                                           | 106 |
| 10.7      | <i>Apio nodiflori-Glycerietum plicatae</i> Brullo & Spampinato 1988                                                                                  | 107 |
| 10.8      | <i>Cyperetum longi</i> Micevski 1957                                                                                                                 | 109 |
| 10.9      | <i>Cypero longi-Caricetum cuprinae</i> R. Tx. ex Díaz Gonzalez & Fernández-Prieto 1994                                                               | 109 |
| 10.10     | <i>Caricetum hispidae</i> Brullo & Ronsisvalle 1975                                                                                                  | 112 |
| 10.11     | <i>Festuco arundinaceae-Caricetum distantis</i> J. Duvign. 1967                                                                                      | 113 |
| 10.12     | <i>Phalarido coerulescentis-Schedonoretum arundinacei</i> ass. nov. hoc loco                                                                         | 113 |
| 10.13     | <i>Schedonoro arundinacei-Caricetum divisae</i> ass. nov. hoc loco                                                                                   | 114 |
| 10.14     | <i>Potentillo reptantis-Panicetum repentis</i> ass. nov. hoc loco                                                                                    | 115 |
| 10.15     | <i>Ranunculetum trichophylli</i> Melendo, Cano & Valle 2003                                                                                          | 119 |
| 10.16     | <i>Lemnetum minoris</i> Oberd. ex Müller & Görs 1960                                                                                                 | 119 |
| <b>11</b> | <b>Seagrass Vegetation</b>                                                                                                                           | 121 |
| 11.1      | <i>Posidonietum oceanicae</i> Molinier 1960                                                                                                          | 121 |
| 11.2      | <i>Cymodoceetum nodosae</i> Giaccone & Pignatti 1967                                                                                                 | 122 |
| 11.3      | <i>Halophiletum stipulaceae</i> Augier ex Brullo ass. nov. hoc loco                                                                                  | 122 |
| <b>12</b> | <b>Rocky Pool Vegetation</b>                                                                                                                         | 125 |
| 12.1      | <i>Charetum vulgaris</i> Corillion 1957                                                                                                              | 125 |
| 12.2      | <i>Zanichellietum melitensis</i> ass. nov. hoc loco                                                                                                  | 126 |
| 12.3      | <i>Damasonio bourgaei-Ranunculetum saniculifolii</i> ass. nov. hoc loco                                                                              | 126 |
| 12.4      | <i>Crassulo vaillantii-Elatinetum gussonei</i> Bartolo, Brullo, Minissale & Spampinato 1990                                                          | 128 |
| 12.5      | <i>Lolio lepturoidis-Spergularietum marinae</i> ass. nov. hoc loco                                                                                   | 130 |
| 12.6      | <i>Triglochino laxiflori-Romuleetum melitensis</i> ass. nov. hoc loco                                                                                | 131 |
| 12.7      | <i>Damasonio bourgaei-Crypsietum aculeatae</i> Rivas-Martínez & Costa in Rivas-Martínez et al. 1980 corr. V. Silva & J.C. Costa in Costa et al. 2012 | 132 |

|           |                                                                                                        |     |
|-----------|--------------------------------------------------------------------------------------------------------|-----|
| <b>13</b> | <b>Woody Riparian Vegetation</b> . . . . .                                                             | 135 |
| 13.1      | <i>Tamarici gallicae-Viticetum agni-casti</i> ass. nova hoc loco . . . .                               | 135 |
| 13.2      | <i>Ulmo canescentis-Salicetum pedicellatae</i> Brullo & Spampinato, 1990 . . . . .                     | 136 |
| <b>14</b> | <b>Annual Xerophilous Vegetation</b> . . . . .                                                         | 139 |
| 14.1      | <i>Thero-Sedetum caerulei</i> Brullo 1975 . . . . .                                                    | 139 |
| 14.2      | <i>Vulpio ligusticae-Trisetarietum aureae</i> Brullo 1975 . . . . .                                    | 142 |
| 14.3      | <i>Ononido sieberi-Stipelletum capensis</i> ass. nova hoc loco . . . .                                 | 142 |
| 14.4      | <i>Allietum lojaconoi</i> Brullo 1985 . . . . .                                                        | 145 |
| 14.5      | <i>Silenetum melitensis</i> ass. nova hoc loco . . . . .                                               | 145 |
| 14.6      | <i>Phalaridetum paradoxae</i> ass. nov. hoc loco . . . . .                                             | 150 |
| 14.7      | <i>Catapodio balearici-Linarietum pseudolaxiflorae</i> ass. nova hoc loco . . . . .                    | 152 |
| 14.8      | <i>Cutandio maritimae-Pseudorlayetum pumilae</i> ass. nov. hoc loco . . . . .                          | 154 |
| <b>15</b> | <b>Xerophilous Grasslands</b> . . . . .                                                                | 157 |
| 15.1      | <i>Leontodonto tuberosi-Lygeetum sparti</i> ass. nov. hoc loco . . . .                                 | 157 |
| 15.2      | <i>Convolvulo oleifolii-Lygeetum sparti</i> ass. nov. hoc loco . . . .                                 | 160 |
| 15.3      | <i>Hyparrhenietum hirto-sinaicae</i> A. & O. Bolos & Br.-Bl. in A. & O. Bolos 1950 . . . . .           | 163 |
| 15.4      | <i>Chamaeleo gummiferis-Brachypodietum retusi</i> C. Brullo, Brullo, Giusso & Tomaselli 2006 . . . . . | 163 |
| 15.5      | <i>Diplotaxio tenuifoliae-Oryzopsietum miliaceae</i> Brullo 1984 . . .                                 | 168 |
| 15.6      | <i>Feruletum melitensis</i> ass. nov. hoc loco . . . . .                                               | 171 |
| 15.7      | <i>Romuleo melitensis-Ranunculetum bullati</i> ass. nov. hoc loco . .                                  | 175 |
| <b>16</b> | <b>Chasmo-nitrophilous Vegetation</b> . . . . .                                                        | 179 |
| 16.1      | <i>Oxalido-Parietarietum judaicae</i> (Br.-Bl. 1952) Segal 1969 . . .                                  | 179 |
| 16.2      | <i>Parietario judaicae-Matthioletum incanae</i> Vigo & Terrada 1969 . . . . .                          | 180 |
| 16.3      | <i>Capparidetum rupestris</i> O. Bolòs & Molinier 1958 . . . . .                                       | 181 |
| 16.4      | <i>Antirrhinetum siculi</i> Bartolo & Brullo 1986 . . . . .                                            | 183 |
| 16.5      | <i>Hyoscyamo albi-Parietarietum judaicae</i> Segal 1969 . . . . .                                      | 184 |
| <b>17</b> | <b>Annual Halophilous Vegetation</b> . . . . .                                                         | 185 |
| 17.1      | <i>Desmazerio pignattii-Senecionetum pygmaei</i> Brullo & Scelsi 1998 . . . . .                        | 185 |
| 17.2      | <i>Anthemido urvilleanae-Frankenietum pulverulentae</i> ass. nov. hoc loco . . . . .                   | 188 |
| 17.3      | <i>Parapholidetum filiformis</i> Brullo, Scelsi & Siracusa 1994 . . . .                                | 189 |
| <b>18</b> | <b>Ruderal Vegetation</b> . . . . .                                                                    | 191 |
| 18.1      | <i>Polycarpo tetraphylli-Spergularietum rubrae</i> Brullo & Marcenò 1976 . . . . .                     | 191 |
| 18.2      | <i>Trisetario aureae-Crepidetum bursifoliae</i> Brullo 1980 . . . . .                                  | 192 |

|       |                                                                                                                    |     |
|-------|--------------------------------------------------------------------------------------------------------------------|-----|
| 18.3  | <i>Galio muralis-Trifolietum suffocati</i> ass. nov. hoc loco . . . . .                                            | 193 |
| 18.4  | <i>Spergulario rubrae-Filaginetum congestae</i> ass., nov.<br>hoc loco . . . . .                                   | 195 |
| 18.5  | <i>Carthamo lanati-Onopordetum argolici</i> ass. nov. hoc loco . . .                                               | 195 |
| 18.6  | <i>Chrysanthemo coronarii-Malvetum parviflorae</i> Ferro 1980 . . .                                                | 197 |
| 18.7  | <i>Carduetum marmorati</i> Brullo 1983 corr. hoc loco . . . . .                                                    | 197 |
| 18.8  | <i>Chrysanthemo coronarii-Silybetum mariani</i> Brullo 1983 . . . .                                                | 199 |
| 18.9  | <i>Hordeo leporini-Sisymbrietum orientalis</i> Oberdorfer 1977 . . .                                               | 199 |
| 18.10 | <i>Acantho mollis-Smyrnetum olusatri</i><br>Brullo & Marcenò 1985 . . . . .                                        | 201 |
| 18.11 | <i>Lavatero creticae-Malvetum nicaeensis</i> ass. nov. hoc loco . . .                                              | 203 |
| 18.12 | <i>Spergulario marinae-Taraxacetum minimi</i> ass. nov. hoc loco . . .                                             | 207 |
| 18.13 | <i>Lavateretum arboreae</i> Br.-Bl. & Molinier 1935 . . . . .                                                      | 207 |
| 18.14 | <i>Mesembryanthemetum crystallino-nodiflori</i> O. Bolos 1957 . . .                                                | 210 |
| 18.15 | <i>Amarantho deflexi-Dysphanietum ambrosiodis</i> ass. nov.<br>hoc loco . . . . .                                  | 211 |
| 18.16 | <i>Parietario lusitanicae-Veronicetum cymbalariae</i><br>Brullo & Marcenò 1985 . . . . .                           | 213 |
| 18.17 | <i>Galio aparine-Conietum maculati</i><br>Rivas-Martínez ex López 1978 . . . . .                                   | 214 |
| 18.18 | <i>Calystegio sylvaticae-Arundinetum donacis</i><br>Brullo, Scelsi & Spampinato 2001 . . . . .                     | 214 |
| 18.19 | <i>Nicotiano glaucae-Ricinetum communis</i> de Foucault 2013 . . .                                                 | 215 |
| 19    | <b>Weedy Commensal Vegetation . . . . .</b>                                                                        | 219 |
| 19.1  | <i>Rapistro rugosi-Meliloletum infestae</i> Bartolo, Brullo,<br>Fagotto & Grillo 1983 . . . . .                    | 219 |
| 19.2  | <i>Calendulo tripterocarphae-Hypecoetum procumbentis</i><br>Bartolo, Brullo, Minissale & Spampinato 1990 . . . . . | 222 |
| 19.3  | <i>Fumario densiflorae-Veronietum hederifoliae</i> Brullo &<br>Marcenò 1985a, b . . . . .                          | 222 |
| 19.4  | <i>Fumarietum bicoloris</i> ass. nov. hoc loco . . . . .                                                           | 224 |
| 19.5  | <i>Diplotaxio erucoidis-Brassicetum sylvestris</i><br>ass. nov. hoc loco . . . . .                                 | 224 |
| 19.6  | <i>Chrozophoro tinctoriae-Kickxietum integrifoliae</i><br>Brullo & Marcenò 1980 . . . . .                          | 227 |
| 19.7  | <i>Setario pumilae-Echinochloetum colomum</i> A. & O. Bolós<br>ex O. Bolós 1956 . . . . .                          | 230 |
| 19.8  | <i>Setario ambigui-Cyperetum rotundi</i> Brullo,<br>Scelsi & Spampinato 2001c . . . . .                            | 230 |
| 19.9  | <i>Bromo diandri-Brassicetum sylvestris</i> Brullo & Marcenò<br>1985 . . . . .                                     | 232 |

|           |                                                                                                   |            |
|-----------|---------------------------------------------------------------------------------------------------|------------|
| <b>20</b> | <b>Subnitrophilous Vegetation of Uncultivated Lands . . . . .</b>                                 | <b>235</b> |
| 20.1      | <i>Chrysanthemo coronarii-Hippocrepidetum multisiliquosae</i><br>Brullo & Siracusa 1996 . . . . . | 235        |
| 20.2      | <i>Sullo coronariae-Ononidetum mitissimae</i> ass. nov. hoc loco . . .                            | 236        |
| 20.3      | <i>Meliloto messanensis-Hordeetum marini</i> Brullo 1983 . . . . .                                | 238        |
| <b>21</b> | <b>Syndinamic Considerations . . . . .</b>                                                        | <b>241</b> |
| <b>22</b> | <b>Maltese Habitat of Community Interest . . . . .</b>                                            | <b>251</b> |
|           | <b>References . . . . .</b>                                                                       | <b>255</b> |
|           | <b>Index . . . . .</b>                                                                            | <b>277</b> |