



# New national and regional Annex I Habitat records: from #139 to #147\*

Giovanni Riviuccio<sup>1</sup>, Silvia Assini<sup>2</sup>, Simonetta Bagella<sup>1</sup>, Cristina Blandino<sup>3</sup>, Salvatore Cambria<sup>3</sup>, Cristina Caporusso<sup>2</sup>, Maria Carmela Caria<sup>1</sup>, Emanuele Costanzo<sup>4</sup>, Lorenzo Gianguzzi<sup>5,6</sup>, Giorgio Gervasio<sup>7,8</sup>, Elio Giuliano<sup>9</sup>, Antonino La Mantia<sup>10</sup>, Michele Lonati<sup>8</sup>, Giuseppe Longo<sup>11</sup>, Antonio Morabito<sup>12</sup>, Carmelo Maria Musarella<sup>12</sup>, Enrico Vito Perrino<sup>11</sup>, Giovanni Spampinato<sup>12</sup>, Gianmarco Tavilla<sup>13</sup>, Valeria Tomaselli<sup>14</sup>, Alessio Turco<sup>15</sup>, Giuseppe Bazan<sup>16</sup>

1 Department of Chemical, Physical, Mathematical and Natural Sciences, University of Sassari, Sassari, Italy

2 Section of Landscape Ecology, Department of Earth and Environmental Sciences, University of Pavia, Pavia, Italy

3 Department of Biological, Geological and Environmental Sciences, University of Catania, Catania, Italy

4 Institute of Atmospheric Pollution Research, CNR, Bari, Italy

5 NBFC, National Biodiversity Future Center, Palermo, Italy

6 Department Agricultural, Food and Forest Sciences, University of Palermo, Palermo, Italy

7 University School for Advanced Studies IUSS Pavia, Pavia, Italy

8 Department of Agricultural, Forest and Food Sciences (DISAFA), University of Torino, Torino, Italy

9 Borgata Cresto, Sant'Antonino di Susa, Torino, Italy

10 Department of Rural and Territorial Development, Regione Siciliana, Palermo, Italy

11 Department of Agriculture, Food, Natural Resources and Engineering (DAFNE), University of Foggia, Foggia, Italy

12 Department of Agriculture, Università "Mediterranea" di Reggio Calabria, Reggio Calabria, Italy

13 National Coalition of Independent Scholars, South Bend, USA

14 Department of Biosciences, Biotechnologies and Environment, University of Bari "Aldo Moro", Bari, Italy

15 Faculty of Education, Free University of Bozen-Bolzano, Brixen-Bressanone, Italy

16 Department of Biological, Chemical, and Pharmaceutical Sciences and Technologies, University of Palermo, Palermo, Italy

Corresponding author: Giovanni Riviuccio ([griviuccio@uniss.it](mailto:griviuccio@uniss.it))

Academic editor: Federica Bonini ♦ Received 5 June 2025 ♦ Accepted 28 June 2025 ♦ Published 12 August 2025

## Abstract

This contribution presents new Italian data on the distribution of Annex I Habitats. Specifically, 9 records are reported, including 3 occurrences within Natura 2000 sites and the addition of 9 new cells to the EEA 10 km × 10 km reference grid. The new data refer to the Italian administrative regions of Apulia, Basilicata, Calabria, Piedmont, Sardinia, and Sicily.

## Keywords

vegetation, 3150, 3170\*, 5110, 5230\*, 6220\*, 9330, 9380, 9580\*

\* Topical Collection: "Towards 2030: efforts in habitat recording and the reporting cycle of the Habitats Directive - A scientific collection for habitat conservation". Edited by Daniela Gigante, Giovanni Riviuccio, Federica Bonini.

## Introduction

This is the 12<sup>th</sup> contribution on this journal reporting on new occurrences of Annex I Habitats across Europe. When compared to the 4<sup>th</sup> Report ex-Art. 17 of Annex I Habitat Monitoring in Europe (Eionet 2019), these occurrences are newly recorded for Italy. The phytosociological relevés corresponding to each of these records are included in the Italian database “VegItaly” (Gigante et al. 2012; Landucci et al. 2012).

## Habitats records

In accordance with the guidelines set out by Gigante et al. (2019), we provide vegetation data, site information, and descriptions for each of the new records, from #139 to #147. A concise summary of these records is presented in Table 1. For mapping, we utilized the open-source QGIS Geographic Information System (QGIS.org 2020). The phytosociological relevés and figures are available in Suppl. materials 1, 2, respectively.

**#139. Annex I Habitat: 3150 Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation (Costanzo E, Tomaselli V)**

**EUNIS Classification system:** C1 – Surface standing waters (EEA 2019).

**Biogeographical Region:** Mediterranean.

**National Habitat Checklist of reference:** Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

**Phytosociological reference:** *Potamogetonion* Libbert 1931, *Potamogetonetalia* Koch 1926, *Potamogetonetea* Klika in Klika et Novák 1941 (Mucina et al. 2016).

**Geographic information:** Italy, Apulia, Lesina Lake, 1 m a.s.l., Coordinates: 41.893939°N, 15.529322°E (Suppl. material 1: table S1, Rel. 1); *ibidem*, Coordinates: 41.894212°N, 15.530880°E (Suppl. material 1: table S1, Rel. 2).

**Cell ID in the EEA reference grid:** 10kmE478N210 (Suppl. material 2: fig. S1).

**Natura 2000 Site Code:** SAC IT9110015 “Duna e lago di Lesina-Foce del Fortore”.

**Phytosociological table:** Suppl. material 1: table S1; nomenclature and taxa delimitation according to Portal to the Flora of Italy (2025).

**Notes:** The habitat was found along a drainage canal surrounding cultivated fields near the southern shore of the Lesina Lake. The dominant species is *Myriophyllum spicatum*, a floating rooting hydrophyte, usually completely submerged with only the inflorescences emerging from the water during the flowering period. These communities, with late-summer phenology, and which usually appear as almost monospecific phytocoenoses, according to literature (Lastrucci et al. 2012; Viciani et al. 2022) can be referred to the *Potamogetono pectinati-Myriophylletum spicati* Rivas Goday 1964 (syn. *Myriophylletum spicati* Soó 1927), association considered as poor quality water indicator and typical of standing or weakly flowing, eutrophic waters (Ceschin and Salerno 2008; Lastrucci et al. 2012). In this case, the surveyed communities can be considered as a floristically impoverished stage of the association, due to the poor conservation status. This vegetation is in catenal contact with helophytic communities of the *Helosciadietum nodiflori* Br.-Bl. 1952 and *Phragmitetum communis* (Koch 1926) Schmale 1939 (Spampinato et al. 2023) (Suppl. material 2: fig. S2).

**#140. Annex I Habitat: 3150 Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation (Caporusso C, Tomaselli V, Assini S)**

**EUNIS Classification system:** C1.32 – Free-floating vegetation of eutrophic waterbodies, C1.33 – Rooted submerged vegetation of eutrophic waterbodies (EEA 2019).

**Biogeographical Region:** Mediterranean.

**National Habitat Checklist of reference:** Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

**Phytosociological reference:** *Lemnetum minoris* von Soó 1927, *Lemnion minoris* O. de Bolòs et Masclans 1955,

**Table 1.** Synthetic overview of the newly reported data.

Hab ID	Hab name	Cell ID	Country	BR	N2000 Site	Authors
3150	Natural eutrophic lakes with <i>Magnopotamion</i> or <i>Hydrocharition</i> -type vegetation	10kmE478N210	Italy	MED	IT9110015	Costanzo E, Tomaselli V
		10kmE485N204			-	Caporusso C, Tomaselli V, Assini S
3170*	Mediterranean temporary ponds	10kmE422N178	Italy	MED	ITB041105	Riviuccio G, Caria MC, Bagella S
5110	Stable xerothermophilous formations with <i>Buxus sempervirens</i> on rock slopes ( <i>Berberidion</i> p.)	10kmE408N245	Italy	ALP	-	Gervasio G, Giuliano E, Lonati M
5230*	Arborescent matorral with <i>Laurus nobilis</i>	10kmE475N167	Italy	MED	-	Gianguzzi L, La Mantia A, Bazan G
6220*	Pseudo-steppe with grasses and annuals of the <i>Thero-Brachypodietea</i>	10kmE485N195	Italy	MED	-	Perrino EV, Longo G, Turco A
9330	<i>Quercus suber</i> forests	10kmE459N165	Italy	MED	-	Gianguzzi L, La Mantia A, Bazan G
9380	Forests of <i>Ilex aquifolium</i>	10kmE485N170	Italy	MED	-	Morabito A, Musarella CM, Spampinato G
9580*	Mediterranean <i>Taxus baccata</i> woods	10kmE475N166	Italy	MED	ITA030043	Blandino C, Cambria S, Tavilla G

*Lemnetalia minoris* O. de Bolòs et Masclans 1955, *Lemnetalia minoris* O. de Bolòs et Masclans 1955 (Suppl. material 1: table S2, Rel. 1 and 2); *Zannichellietum palustris* Lang 1967, *Potamogetonion* Libbert 1931, *Potamogetonalia* Koch 1926, *Potamogetonetea* Klika in Klika et Novák 1941 (Suppl. material 1: table S2, Rel. 3) (Mucina et al. 2016).

**Geographic information:** Italy, Apulia, Barletta-Andria-Trani, Barletta, 3 m a.s.l., Coordinates: 41.30514°N, 16.349626°E (Suppl. material 1: table S2, Rel. 1); *ibidem*, Coordinates: 41.301968°N, 16.34531°E (Suppl. material 1: table S2, Rel. 2); *ibidem*, Coordinates: 41.302198°N, 16.348683°E (Suppl. material 1: table S2, Rel. 3).

**Cells ID in the EEA reference grid:** 10kmE485N204 (Suppl. material 2: fig. S1).

**Natura 2000 Site Code:** Currently not included in any Natura 2000 Site.

**Phytosociological table:** Suppl. material 1: table S2; nomenclature and taxa delimitation according to Portal to the Flora of Italy (2025).

**Notes:** The habitat was found at the sea level within irrigation channels in a semi-natural context (agroecosystem). Although these small wetland areas are embedded within a semi-natural landscape matrix, they host valuable hydrophytic communities (Suppl. material 2: fig. S3) and hold significant conservation interest.

#141. Annex I Habitat: 3170\* Mediterranean temporary ponds (Rivieccio G, Caria MC, Bagella S)

**EUNIS Classification system:** C3.4 – Species-poor beds of low-growing water-fringing or amphibious vegetation (EEA 2019).

**Biogeographical Region:** Mediterranean.

**National Habitat Checklist of reference:** Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

**Phytosociological reference:** *Isoëtium* Br.-Bl. 1936, *Isoëtetalia* Br.-Bl. 1936, *Isoëto-Nanojuncetea* Br.-Bl. et Tx. in Br.-Bl. et al. 1952 (Mucina et al. 2016; Brullo et al. 2025).

**Geographic information:** Italy, Sardinia, Cagliari, Assemmini, Is Pauceri locality, 231 m a.s.l., Coordinates: 39.138227°N, 8.890139°E (Suppl. material 1: table S3, Rel. 1); *ibidem*, Coordinates: 39.138214°N, 8.890189°E (Suppl. material 1: table S3, Rel. 2); *ibidem*, Coordinates: 39.138212°N, 8.890286°E (Suppl. material 1: table S3, Rel. 3).

**Cell ID in the EEA reference grid:** 10kmE422N178 (Suppl. material 2: fig. S4).

**Natura 2000 Site Code:** SAC ITB041105 “Foresta di Monte Arcosu”.

**Phytosociological table:** Suppl. material 1: table S3; nomenclature and taxa delimitation according to World Flora Online (2025).

**Notes:** This habitat, newly recorded for the SAC “Foresta di Monte Arcosu”, has not been previously documented for this Natura 2000 site. While the surveyed area is small, it supports a floristic assemblage of significant conserva-

tion value, including species such as *Cicendia filiformis*, not reported for this site before (Bagella et al. 2009; Camarda et al. 1995) (Suppl. material 2: fig. S5). However, Camarda et al. (1995) noted that this ephemeral vegetation typically occurs on siliceous substrates and is common in the Pantaleo-Monte Arcosu area, although confined to small patches.

The surveyed area shows clear wheel marks in the wetter zones, likely due to its proximity to the road and the Is Pauceri picnic area, suggesting being frequently used for parking or vehicle manoeuvring. This underscores the importance of documenting the presence and distribution of such small, temporary habitats to inform conservation efforts (Biggs et al. 2017; Boix et al. 2020). Furthermore, this record suggests that the habitat may be well-represented in scattered patches across the site, forming a mosaic with other habitats, and pointing to the presence of a larger, connected pondscape (Barta et al. 2024).

#142. Annex I Habitat: 5110 Stable xerothermophilous formations with *Buxus sempervirens* on rock slopes (*Berberidion* p.) (Gervasio G, Giuliano E, Lonati M)

**EUNIS Classification system:** S52 – Submediterranean pseudomaquis (EEA 2021).

**Biogeographical Region:** Alpine.

**National Habitat Checklist of reference:** Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

**Phytosociological reference:** *Berberidion vulgaris* Br.-Bl. ex Tx. 1952, *Prunetalia spinosae* Tx. 1952, *Crataego-Prunetea* Tx. 1962 (Mucina et al. 2016).

**Geographic information:** Italy, Piedmont, Torino, Susa, Loc. Gorge della Dora, 642 m a.s.l., Coordinates: 45.136026°N, 7.032162°E (Suppl. material 1: table S4, Rel. 1).

**Cell ID in the EEA reference grid:** 10kmE408N245 (Suppl. material 2: fig. S6).

**Natura 2000 Site Code:** Currently not included in any Natura 2000 Site.

**Phytosociological table:** Suppl. material 1: table S4; nomenclature and taxa delimitation according to Portal to the Flora of Italy (2025).

**Notes:** This record represents the northernmost known limit of *Buxus sempervirens* in the western Italian Alps, distinctly separated from the southern populations of the Maira, Grana, and Vermenagna valleys (Mondino 1989). In the surveyed area, boxwood colonizes the steep slopes of Dora Riparia river right bank, forming rupicolous communities belonging to the habitat “5110 Stable xerothermophilous formations with *Buxus sempervirens* on rocky slopes (*Berberidion* p.p.)” (Biondi et al. 2009). The community develops on shallow soils rich in exposed rocky surfaces, derived from a lithological matrix of calcschists. *B. sempervirens* dominates the vegetation, accompanied by some typical shrubs of the habitat 5110 (e.g., *Amelanchier ovalis*, *Ligustrum vulgare*) (Suppl. material 2: fig. S7).

In the Italian Alpine biogeographical region, the habitat 5110 is classified as “unfavourable-inadequate” (Eionet 2019), threatened also by the potential invasion of the defoliating phytophagous insect *Cydalima perspectalis* (Angelini et al. 2016), which already shows significant incidence in the adjacent oak-boxwood formation. However, at the time of reporting, the surveyed rupicolous population showed no evident attacks by the moth. The geographical isolation of this population in the Alpine range is of particular interest, because peripheral populations, despite reduced genetic variability, may develop marked evolutionary plasticity in response to local conditions (Papuga et al. 2018). This aspect, relevant in the context of climate change, deserves consideration when planning site conservation strategies (Fady et al. 2016).

**#143 Annex I Habitat: 5230\* Arborescent matorral with *Laurus nobilis* (Gianguzzi L, La Mantia A, Bazan G)**

**EUNIS Classification system:** S51 – Mediterranean maquis and arborescent matorral (EEA 2021).

**Biogeographical Region:** Mediterranean.

**National Habitat Checklist of reference:** Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

**Phytosociological reference:** *Acantho mollis*–*Lauretum nobilis* Gianguzzi, D’Amico et Romano 2010, *Asparagus acutifolii*–*Laurion nobilis* Gianguzzi, Cuttonaro, Cusimano, Romano 2016, *Quercetalia ilicis* Br.-Bl. ex Molinier 1934, *Quercetalia ilicis* Br.-Bl. ex A. Bolòs et O. de Bolòs in A. Bolòs y Vayreda 1950 (Gianguzzi et al. 2016a).

**Geographic information:** Italy, Sicily, Messina, Ucria, vallone affluente del torrente Pudarà, 480 m a.s.l., Coordinates: 38.051519°N, 14.887007°E (Suppl. material 1: table S5, Rel. 1).

**Cell ID in the EEA reference grid:** 10kmE475N167 (Suppl. material 2: fig. S5).

**Natura 2000 Site Code:** Currently not included in any Natura 2000 Site.

**Phytosociological table:** Suppl. material 1: table S5; nomenclature and taxa delimitation according to Portal to the Flora of Italy (2025).

**Notes:** The vegetation dominated by *Laurus nobilis* in Sicily defines a peculiar habitat, forming small-scale, fragmented, and relict micro-woodlands (Brullo et al. 2001). These forest formations are of particular biogeographical significance and are attributed to the association *Acantho mollis*–*Lauretum nobilis* (Gianguzzi et al. 2010), which is in turn classified within the alliance *Asparagus acutifolii*–*Laurion nobilis* (order *Quercetalia ilicis*, class *Quercetalia ilicis*), described for the Italo-Tyrrhenian biogeographic province (Gianguzzi et al. 2016a).

A further stand of this vegetation has recently been identified in the Nebrodi Mountains (northeastern Sicily), in the territory of Ucria, at elevation between 465 and 500 m a.s.l. It is located along a tributary of the Pudarà

Stream, colonizing a gorge sector developed on substrates geologically attributed to the Capo D’Orlando Flysch, within the lower subhumid mesomediterranean bioclimatic belt.

The vegetation structure is characterized by the dominance of *Laurus nobilis*, with individuals exceeding 10 meters in height (Suppl. material 2: fig. S9). Few other woody species are present, such as *Ostrya carpinifolia*, *Fraxinus ornus*, *Ficus carica*, and *Sambucus nigra*, along with climbing plants like *Hedera helix*, *Clematis vitalba*, and *Discorea communis*. Among the few herbaceous species in the shaded understory, *Acanthus mollis* and *Ruscus aculeatus* are frequently recorded, along with some ferns (*Polypodium cambricum*, *Asplenium onopteris*, *Polystichum setiferum*) and a well-developed moss layer.

The surrounding vegetation landscape is largely dominated by hazel groves, occasionally interspersed with woodland patches of *Quercus pubescens* s.l. or *Castanea sativa* (on deep soils), or *Ostrya carpinifolia* (on rocky outcrops).

**#144. Annex I Habitat: 6220\* Pseudo-steppe with grasses and annuals of the *Thero-Brachypodietea* (Perrino EV, Longo G, Turco A)**

**EUNIS Classification system:** R1E – Mediterranean tall perennial dry grassland (EEA 2021).

**Biogeographical Region:** Mediterranean.

**National Habitat Checklist of reference:** Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

**Phytosociological reference:** *Camphorosmo-Lygeetum* Corbetta, Ubaldi et Zanotti 1992, *Moricandio-Lygeion sparti* S. Brullo et al. 1990, *Lygeo-Stipetalia tenacissimae* Br.-Bl. et O. Bolòs 1958, *Lygeo sparti-Stipetalia tenacissimae* Rivas-Mart. 1978 (Corbetta et al. 1992; Mucina et al. 2016).

**Geographic information:** Italy, Basilicata, Matera, San Mauro Forte, Serra d’Olivo, 328 m a.s.l., Coordinates: 40.477818°N, 16.319137°E (Suppl. material 1: table S6, Rel. 1); Italy, Basilicata, Matera, San Mauro Forte, Masseria Arcieri, 308 m a.s.l., Coordinates: 40.471929°N, 16.323736°E (Suppl. material 1: table S6, Rel. 2); Masseria Micci, 325 m a.s.l., Coordinates: 40.435216°N, 16.342841°E (Suppl. material 1: table S6, Rel. 3).

**ID of the cell in the EEA 10 km × 10 km Reference grid:** 10kmE485N195 (Suppl. material 2: fig. S10).

**Natura 2000 Site Code:** Currently not included in any Natura 2000 Site.

**Phytosociological table:** Suppl. material 1: table S6; nomenclature and taxa delimitation according to Bartolucci et al. (2024).

**Notes:** *Lygeum spartum* grasslands are located on clayey badlands, limited to places with dry or sub-humid thermo-Mediterranean bioclimate. In Italy, the *Camphorosmo-Lygeetum* Corbetta, Ubaldi et Zanotti 1992 of alliance *Polygonion tenoreani* Brullo, De Marco et Signorello 1992

characterizes the perennial grasslands of limited area of Basilicata (Corbetta et al. 1992). The surveyed vegetation is located on deposits with a prevalence of Pliocene-Pleistocene clays, along the provincial road SP4 between the towns of San Mauro in Forte and Salandra, shifted south-east towards the town of Craco (Suppl. material 2: figs S11, S12). In the study area, the *Lygeum spartum* badlands communities, that are the greatest conservation value sites, comes into contact with sclerophyllous scrub vegetation. Both vegetations types are in contact with the flat or slightly sloping areas where the arable land is found (Suppl. material 2: fig. S13).

#### #145. Annex I Habitat: 9330 *Quercus suber* forests (Gianguzzi L, La Mantia A, Bazan G)

**EUNIS Classification system:** T211 – *Quercus suber* forest (EEA 2021).

**Biogeographical Region:** Mediterranean.

**National Habitat Checklist of reference:** Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

**Phytosociological reference:** *Genisto aristatae-Quercetum suberis* Brullo 1984 *pistacietosum lentisci* Brullo, Gianguzzi, La Mantia et Siracusa 2008; *Erico arborea-Quercion ilicis* Brullo, Di Martino et Marcenò 1977; *Quercetalia ilicis* Br.-Bl. ex Molinier 1934; *Quercetea ilicis* Br.-Bl. in Br.-Bl., Roussine et Nègre 1952 (Biondi and Blasi 2015).

**Geographic information:** Italy, Sicily, Monreale, Cozzo Balletto, 350 m a.s.l., Coordinates: 37.91995989°N, 13.1443844°E (Suppl. material 1: table S7, Rel. 1).

**Cell ID in the EEA reference grid:** 10kmE459N165 (Suppl. material 2: fig. S14).

**Natura 2000 Site Code:** Currently not included in any Natura 2000 Site.

**Phytosociological table:** Suppl. material 1: table S7; nomenclature and taxa delimitation according to Portal to the Flora of Italy (2025).

**Notes:** In western Sicily, natural forest formations are infrequent, having been largely destroyed over time by human activity to make room for agricultural land (Gianguzzi et al. 2016b). This is the case for cork oak woodlands, which are currently present only as isolated and fragmented patches, both along the southern coastal belt – from the Agrigento area (Bazan et al. 2021) to the Trapani area (La Rosa et al. 2021) – and along the northern Tyrrhenian slopes, where they occur, still in a fragmented manner, in the hills of Trapani [Zingaro Nature Reserve, Bosco Scorace, Mt. Inici, Bosco Calatafimi (Rivieccio et al. 2022)] and Palermo [Fiume Jato, Partinico (Gianguzzi et al. 2008), Piana degli Albanesi, Rebuttone, Belmonte Mezzagno, Altofonte (Rivieccio et al. 2024), Misilmeri, Mt. Cani (Caldarella et al. 2009)]. These formations significantly decline further inland, including in the Sicani Mountains (Gianguzzi et al. 2016a), reaching as far as Pizzo Telegrafo (Gianguzzi et al. 2014a; 2014b).

The habitat described here concerns an extremely isolated woodland nucleus of *Quercus suber*, located on a sandy-conglomeratic outcrop in the Sicilian interior, specifically in the locality of Balletto (municipality of Monreale, Province of Palermo). Geologically, the area belongs to the Terravecchia Formation (Upper Tortonian–Lower Messinian) and falls within the lower subhumid mesomediterranean bioclimatic belt. The site lies within a broad valley area upstream of Lake Poma, in a landscape predominantly characterized by intensive agriculture.

Despite its limited extent – approximately 1000 m<sup>2</sup> with about thirty individual trees, some of them notably old – this relict nucleus holds significant naturalistic and environmental value. Floristically, the community is impoverished (Suppl. material 2: fig. S15), likely due to its isolation and its high vulnerability to wildfires (Capotorti et al. 2020). From a phytosociological perspective, the formation is assigned to *Genisto aristatae-Quercetum suberis pistacetosum lentisci*, a syntaxon described for the northern sector of Sicily (Brullo et al. 2008).

#### #146. Annex I Habitat: 9380 Forests of *Ilex aquifolium* (Morabito A, Musarella CM, Spampinato G)

**EUNIS Classification system:** T27 – *Ilex aquifolium* forest (EEA 2021).

**Biogeographical Region:** Mediterranean.

**National Habitat Checklist of reference:** Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

**Phytosociological reference:** *Anemone apenninae-Fagetum sylvaticae* (Gentile 1969) Brullo 1984, *Geranio versicoloris-Fagion sylvaticae* Gentile 1970, *Fagetalia sylvaticae* Pawłowski in Pawłowski, Sokołowski et Wallisch 1928, *Quercus roboris-Fagetea sylvaticae* Br.-Bl. et Vlieger in Vlieger 1937 (Biondi et al. 2014).

**Geographic information:** Italy, Calabria, Reggio Calabria, Ciminà, Lacco di Pintirudi, 1016 m a.s.l. Coordinates: 38.267819°N, 16.074281°E (Suppl. material 1: table S8, Rel. 1).

**Cells ID in the EEA reference grid:** 10kmE485N170 (Suppl. material 2: fig. S16).

**Natura 2000 Site Code:** Currently not included in any Natura 2000 Site.

**Phytosociological table:** Suppl. material 1: table S8; nomenclature and taxa delimitation according to Portal to the Flora of Italy (2025).

**Notes:** In Calabria, this habitat is characterized by the presence of *Ilex aquifolium*, and it is mainly found within the macrothermic beechwoods of the *Anemone apenninae-Fagetum sylvaticae* (Gentile 1969) Brullo 1984 association. Its presence is particularly marked in areas with a climate more influenced by the sea (Suppl. material 2: fig. S17). The origin of these plant communities can be traced back to various types of forests with holly in the undergrowth, where the tree cover has been removed.

In fact, the ideal bioclimatic belt for *Ilex aquifolium* (Maniscalco and Raimondo 2003) extends between the meso-Mediterranean and the lower supra-Mediterranean zones, at elevations between 1000 and 1500 m a.s.l., coinciding with the distribution of mesophilic deciduous oak woods and the lower limit of the beech forest belt.

#147. Annex I Habitat: 9580\*:  
Mediterranean *Taxus baccata* woods  
(Blandino C, Cambria S, Tavilla G)

**EUNIS Classification system:** T3C – *Taxus baccata* forest (EEA 2021).

**Biogeographical Region:** Mediterranean.

**National Habitat Checklist of reference:** Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

**Phytosociological reference:** *Ilici-Taxetum baccatae* Brullo, Minissale, Signorello et Spampinato 1996, *Geranio versicoloris-Fagion sylvaticae* Gentile 1970, *Fagetalia sylvaticae* Pawlowski in Pawlowski et al. 1928, *Carpino-Fagetalia sylvaticae* Jakucs ex Passarge 1968 (Mucina et al. 2016; Brullo et al. 1996).

**Geographic information:** Italy, Sicily, Tortorici (ME), Poggio del Moro, 1314 m a.s.l., Coordinates: 37.973239°N, 14.859069°E (Suppl. material 1: table S9, Rels. 1–3).

**Cells ID in the EEA reference grid:** 10kmE475N166 (Suppl. material 2: fig. S18).

**Natura 2000 Site Code:** SPA ITA030043 “Monti Nebrodi”.

**Phytosociological table:** Suppl. material 1: table S9, nomenclature and taxa delimitation according to Pignatti et al. (2017–2019).

**Notes:** In Sicily, *Taxus baccata* woods are found in small and fragmented patches (Di Benedetto et al. 1983; Mazzola and Domina 2006). These plant communities have been described and classified by Brullo et al. (1996) as *Ilici-Taxetum baccatae* Brullo, Minissale et Spampinato 1996. It is a relict woody vegetation occurring in valleys affected by recurrent fog, situated on deep siliceous soils within the humid supratemperate bioclimatic belt (1400–1600 m a.s.l.). Usually, the yew forests of Sicily are in catenal contact with the beech forests of *Anemone apenninae-Fagetum* (Gentile 1969) Brullo 1984 (Brullo et al. 2012) or sometimes with the more thermophilous holm oak woodlands. In particular, the aspect occurring at lower elevations (900–1000 m a.s.l.) has been attributed by Gianguzzi and La Mantia (2004) to the subassociation *ruscetosum aculeati*. Our relevés were recorded on the northern side of Poggio del Moro (Nebrodi Mountains) at an elevation of about 1300 m a.s.l. This surveyed area is particularly noteworthy because it is situated relatively far from the nearest known populations of *Taxus baccata* in Sicily, likely making it the easternmost yew stand on the island. Overall, the investigated area appears to be significantly degraded due to intensive grazing, which has resulted in severe floristic impoverishment and to the

near-total elimination of the original forest vegetation, which was probably mainly composed of beech trees (Suppl. material 2: fig. S19).

*Taxus baccata* poses a potential risk to livestock, prompting local shepherds to fence off the remaining yew populations in recent years. This has made the trees inaccessible to animals and has helped with their conservation. If these nuclei of yew trees are left undisturbed for several years, they may encourage the natural recolonization of forest cover on the hillside.

From a structural point of view, the investigated phytocoenosis often shows a clear dominance of *Taxus baccata*, with a more sporadic presence of *Ilex aquifolium*, while *Fagus sylvatica* is quite scarce. In the tree layer, the presence of young *Quercus ilex* plants is noteworthy, indicating a slightly more thermophilic character compared to the typical aspects of *Ilici-Taxetum* in Sicily. Besides, the yew trees serve as habitat islands, providing shelter for several typically nemoral species such as *Daphne laureola*, *Ajuga tenorei*, *Luzula sylvatica* subsp. *sieberi*, and *Primula vulgaris*. Additionally, it should be noted that this new record is located within zone B of the Regional Natural Park of the Nebrodi, and falls within a Natura 2000 site.

## Acknowledgements

#145–#143: This research is supported by NBFC to University of Palermo, funded by the Italian Ministry of University and Research, PNRR, Missione 4 Componente 2, “Dalla ricerca all’impresa”, Investimento 1.4, Project CN00000033.

CB, SC, and GT express their gratitude to S. Brisolese for reporting the site with *Taxus baccata*.

## References

- Angelini P, Casella L, Grignetti A, Genovesi P (2016) Manuali per il monitoraggio di specie e habitat di interesse comunitario (Direttiva 92/43/CEE) in Italia: habitat. ISPRA, Serie Manuali e linee guida, 142/2016.
- Bagella S, Caria MC, Farris E, Filigheddu R (2009) Spatial-time variability and conservation relevance of plant communities in Mediterranean temporary wet habitats: A case study in Sardinia (Italy). *Plant Biosystems* 143(3): 435–442. <https://doi.org/10.1080/11263500903187068>
- Barta B, Szabó A, Szabó B, Ptacnik R, Vad CF, Horváth Z (2024) How pondscape function: Connectivity matters for biodiversity even across small spatial scales in aquatic metacommunities. *Ecography* 2024(2): e06960. <https://doi.org/10.1111/ecog.06960>
- Bartolucci F, Peruzzi L, Galasso G, Alessandrini A, Ardenghi NMG, ... Conti F (2024) A second update to the checklist of the vascular flora native to Italy. *Plant Biosystems* 158(2): 219–296. <https://doi.org/10.1080/11263504.2024.2320126>
- Bazan G, Bacchetta G, Bagella S, Bonari G, Bonini F, ... Gianguzzi L (2021) New national and regional Annex I Habitat records: from # 21 to #25. *Plant Sociology* 58(1): 167–178. <https://doi.org/10.3897/pls2021581/09>

- Biggs J, Von Fumetti S, Kelly-Quinn M (2017) The importance of small waterbodies for biodiversity and ecosystem services: Implications for policy makers. *Hydrobiologia* 793: 3–39. <https://doi.org/10.1007/s10750-016-3007-0>
- Biondi E, Blasi C (2015) Prodrómo della vegetazione italiana. MATTM, SBI. <https://www.prodrómo-vegetazione-italia.org> [Accessed on 14 June 2025]
- Biondi E, Blasi C, Burrascano S, Casavecchia S, Copiz R, ... Zivkovic L (2009) Manuale Italiano di interpretazione degli habitat della Direttiva 92/43/CEE. Società Botanica Italiana. Ministero dell'Ambiente e della tutela del territorio e del mare, D.P.N. [Available online at] <http://vnr.unipg.it/habitat/> [accessed on 2025, May 25]
- Biondi E, Allegranza M, Casavecchia S, Galdenzi D, Gasparri R, ... Blasi C (2014) New and validated syntaxa for the checklist of Italian vegetation. *Plant Biosystems* 148(2): 318–332. <https://doi.org/10.1080/011263504.2014.892907>
- Boix D, Calhoun AJ, Mushet DM, Bell KP, Fitzsimons JA, Isselin-Non-dedeu F (2020) Conservation of temporary wetlands. In: Goldstein MI, DellaSala DA (Eds) *Encyclopedia of the world's biomes*. Elsevier Inc, 279–294. <https://doi.org/10.1016/B978-0-12-409548-9.12003-2>
- Brullo S, Minissale P, Signorello P, Spampinato G (1996) Contributo alla conoscenza della vegetazione forestale della Sicilia. *Colloques Phytosociologiques* 24: 635–647.
- Brullo S, Costanzo E, Tomaselli V (2001) Étude phytosociologique sur les peuplements à *Laurus nobilis* dans les Monts Iblei (Sicile sud-orientale). *Phytocoenologia* 31(2): 249–270. <https://doi.org/10.1127/phyto/31/2001/249>
- Brullo S, Gianguzzi L, La Mantia A, Siracusa G (2008) La classe *Quercetea ilicis* in Sicilia. *Boll. Acc. Gioenia Sci. Nat.* 41(369): 1–80.
- Brullo C, Brullo S, Giusso Del Galdo G, Guarino R, Siracusa G, Sciandrello S (2012) The class *Querceto-Fagetea sylvaticae* in Sicily: An example of boreo-temperate vegetation in the central Mediterranean region. *Annali di Botanica* 2: 19–38. <https://doi.org/10.4462/annbotrm-9342>
- Brullo S, Bacchetta G, Cambria S, Tomaselli V, Galdo GGd, ... Bagella S (2025) The plant communities of the class *Isoëto-Nanojuncetea* in Sardinia. *Plants* 14(14): 2187. <https://doi.org/10.3390/plants14142187>
- Caldarella O, Gianguzzi L, Romano S, Fici S (2009) The vascular flora of Nature Reserve “Pizzo Cane, Pizzo Trigna and Grotta Mazzamuto” (NW Sicily). *Webbia* 64(1): 101–151. <https://doi.org/10.1080/00837792.2009.10670854>
- Camarda I, Lucchese F, Pignatti E, Pignatti S (1995) La vegetazione dell'area Pantaleo-Gutturu Mannu-Punta Maxia-Monte Arcosu nel Sulcis-Iglesiente (Sardegna sud-occidentale). *Webbia* 49(2): 141–177. <https://doi.org/10.1080/00837792.1995.10670580>
- Capotorti G, Zavattero L, Copiz R, Del Vico E, Facioni L, ... Blasi C (2020) Implementation of IUCN criteria for the definition of the Red List of Ecosystems in Italy. *Plant Biosystems* 154(6): 1007–1011. <https://doi.org/10.1080/11263504.2020.1839806>
- Ceschin S, Salerno G (2008) La vegetazione del basso corso del Fiume Tevere e dei suoi affluenti (Lazio, Italia). *Fitosociologia* 45(1): 39–74.
- Corbetta F, Ubaldi D, Zanotti AL (1992) La vegetazione a *Lygeum spartum* nei calanchi della Valle del Basento (Basilicata). *Archivio Botanico Italiano* 67(3/4): 141–155.
- Di Benedetto L, Leonardi S, Poli E (1983) *Taxus baccata* L. in Sicilia. *Not. Fitosoc.* 18: 1–18. <https://doi.org/10.1515/arca.1983.18.1-3.258>
- EEA (2019) EUNIS habitat classification 2012 amended 2019. <https://eunis.eea.europa.eu/habitats-code-browser-revised.jsp> [Accessed on 2025, May 28]
- EEA (2021) EUNIS terrestrial habitat classification review 2021. <https://eunis.eea.europa.eu/habitats-code-browser.jsp> [Accessed on 2025, May 27]
- Eionet (2019) Eionet Central Data Repository. <https://cdr.eionet.europa.eu/> [Accessed on 2025, May 15]
- Fady B, Aravanopoulos FA, Alizoti P, Mátyás C, von Wühlisch G, ... Zlatanov T (2016) Evolution-based approach needed for the conservation and silviculture of peripheral forest tree populations. *Forest Ecology and Management* 375: 66–75. <https://doi.org/10.1016/j.foreco.2016.05.015>
- Gianguzzi L, La Mantia A (2004) Considerazioni su aspetti termofili di vegetazione a *Taxus baccata* L. nella fascia submontana dei Nebrodi (Sicilia nord-orientale). *Colloques Phytosociologiques* 28: 883–893.
- Gianguzzi L, Romano S, Caldarella O, La Rosa A (2008) Osservazioni fitosociologiche ed ecologiche su una formazione forestale a *Quercus suber* dei Monti di Palermo (Sicilia centro-occidentale) percorsa dal fuoco nell'estate del 2007. *Atti del 103° Congresso Società Botanica Italiana. Riassunti. Reggio Calabria 17–19 Settembre 2008*, 327.
- Gianguzzi L, D'Amico A, Romano S (2010) Phytosociological remarks on residual woodlands of *Laurus nobilis* in Sicily. *Lazaroa* 31: 67–84. [https://doi.org/10.5209/rev\\_LAZA.2010.v31.4](https://doi.org/10.5209/rev_LAZA.2010.v31.4)
- Gianguzzi L, Cusimano D, Cuttonaro P, Gianguzzi G, Romano S (2014a) Distribution, ecology and conservation survey on the *Celtis tournefortii* subsp. *aetnensis* (Celtidaceae-Cannabaceae) populations in Sicily. *Webbia* 69(2): 325–334. <https://doi.org/10.1080/00837792.2014.971586>
- Gianguzzi L, Cusimano D, Romano S (2014b) Phytosociological characterization of the *Celtis tournefortii* subsp. *aetnensis* microwoods in Sicily. *Plant Sociology* 51(2): 17–28.
- Gianguzzi L, Cuttonaro P, Cusimano D, Romano S (2016a) Contribution to the phytosociological characterization of the forest vegetation of the Sicani Mountains (inland of the north-western Sicily). *Plant Sociology* 53(1): 5–42. <https://doi.org/10.7338/pls2016531/02>
- Gianguzzi L, Papini F, Cusimano D (2016b) Phytosociological survey vegetation map of Sicily (Mediterranean region). *Journal of Maps* 12(5): 845–851. <https://doi.org/10.1080/17445647.2015.1094969>
- Gigante D, Acosta AT, Agrillo E, Attorre F, Cambria VE, ... Venanzoni R (2012) VegItaly: Technical features, crucial issues and some solutions. *Plant Sociology* 49: 71–79. <https://doi.org/10.7338/pls2012492/05>
- Gigante D, Allegranza M, Angiolini C, Bagella S, Caria MC, ... Zanatta K (2019) New national and regional Annex I Habitat records: #1–#8. *Plant Sociology* 56: 31–40. <https://doi.org/10.7338/pls2019561/04>
- Landucci F, Acosta AT, Agrillo E, Attorre F, Biondi E, ... Venanzoni R (2012) VegItaly: The Italian collaborative project for a national vegetation database. *Plant Biosystems* 146(4): 756–763. <https://doi.org/10.1080/11263504.2012.740093>
- La Rosa A, Gianguzzi L, Salluzzo G, Scuderi L, Pasta S (2021) Last tesserae of a fading mosaic: Floristic census and forest vegetation survey at Parche di Bilello (south-western Sicily, Italy), a site needing urgent protection measures. *Plant Sociology* 58(1): 55–74. <https://doi.org/10.3897/pls2020581/04>
- Lastrucci L, Landucci F, Gonnelli V, Barocco R, Foggi B, Venanzoni R (2012) The vegetation of the upper and middle River Tiber (Central Italy). *Plant Sociology* 49(2): 29–48. <https://doi.org/10.7338/pls2012492/02>
- Maniscalco M, Raimondo FM (2003) Ecology and optimal and heterotopical distribution of *Ilex aquifolium* (Aquifoliaceae) in Sicily. *Boccone* 16(2): 905–917.

- Mazzola P, Domina G (2006) Distribution and conservation perspectives of *Taxus baccata* L. (Taxaceae) in Sicily. *Bocconea* 19: 209–2215.
- Mondino GP (1989) I querceti a bosso delle Alpi Cozie meridionali. *Rivista Piemontese di Storia Naturale* 10: 69–92.
- Mucina L, Bültmann H, Dierßen K, Theurillat JP, Raus T, ... Tichý L (2016) Vegetation of Europe: Hierarchical floristic classification system of vascular plant, bryophyte, lichen, and algal communities. *Applied Vegetation Science* 19: 3–264. <https://doi.org/10.1111/avsc.12257>
- Papuga G, Gauthier P, Pons V, Farris E, Thompson JD (2018) Ecological niche differentiation in peripheral populations: A comparative analysis of eleven Mediterranean plant species. *Ecography* 41(10): 1650–1664. <https://doi.org/10.1111/ecog.03331>
- Pignatti S, Guarino R, La Rosa M (2017–2019) *Flora d'Italia*, 2<sup>nd</sup> edn. Media Business – Edagricole, Milano – Bologna, 4 vols.
- Portal to the Flora of Italy (2025) Portal to the Flora of Italy. <http://dryades.units.it/floritaly/> [Accessed on 2025, May 14]
- Riviuccio G, Angiolini C, Azzella MM, Bagella S, Bonari G, ... Bazan G (2022) New national and regional Annex I Habitat records: from #45 to #59. *Plant Sociology* 59(2): 71–98. <https://doi.org/10.3897/pls2022592/06>
- Riviuccio G, Bagella S, Bazan G, Bonari G, Brunco V, ... Angiolini C (2024) New national and regional Annex I Habitat records: from #123 to #138. *Plant Sociology* 61(2): 73–84. <https://doi.org/10.3897/pls2024612/05>
- Spampinato G, Tomaselli V, Forte L, Strumia S, Stinca A, ... Musarella CM (2023) Relevant but neglected habitat types by the Directive 92/43 EEC in southern Italy. *Rendiconti Lincei. Scienze Fisiche e Naturali* 34: 457–482. <https://doi.org/10.1007/s12210-023-01136-6>
- Viciani D, Angiolini C, Bonari G, Bottacci A, Dell'Olmo L, ... Lastrucci L (2022) Contribution to the knowledge of aquatic vegetation of montane and submontane areas of Northern Apennines (Italy). *Plant Sociology* 59(1): 25–35. <https://doi.org/10.3897/pls2022591/03>
- World Flora Online (2025) WFO Plant List. <https://wfoplantlist.org/> [Accessed on 2025, May 28]

## Supplementary material 1

### Phytosociological tables

Authors: Giovanni Riviuccio, Silvia Assini, Simonetta Bagella, Cristina Blandino, Salvatore Cambria, Cristina Caporusso, Maria Carmela Caria, Emanuele Costanzo, Lorenzo Gianguzzi, Giorgio Gervasio, Elio Giuliano, Antonino La Mantia, Michele Lonati, Giuseppe Longo, Antonio Morabito, Carmelo Maria Musarella, Enrico Vito Perrino, Giovanni Spampinato, Gianmarco Tavilla, Valeria Tomaselli, Alessio Turco, Giuseppe Bazan

Data type: pdf

Copyright notice: This dataset is made available under the Open Database License (<http://opendatacommons.org/licenses/odbl/1.0>). The Open Database License (ODbL) is a license agreement intended to allow users to freely share, modify, and use this Dataset while maintaining this same freedom for others, provided that the original source and author(s) are credited.

Link: <https://doi.org/10.3897/ved.160563.suppl1>

## Supplementary material 2

### Maps and photos

Authors: Giovanni Riviuccio, Silvia Assini, Simonetta Bagella, Cristina Blandino, Salvatore Cambria, Cristina Caporusso, Maria Carmela Caria, Emanuele Costanzo, Lorenzo Gianguzzi, Giorgio Gervasio, Elio Giuliano, Antonino La Mantia, Michele Lonati, Giuseppe Longo, Antonio Morabito, Carmelo Maria Musarella, Enrico Vito Perrino, Giovanni Spampinato, Gianmarco Tavilla, Valeria Tomaselli, Alessio Turco, Giuseppe Bazan

Data type: pdf

Copyright notice: This dataset is made available under the Open Database License (<http://opendatacommons.org/licenses/odbl/1.0>). The Open Database License (ODbL) is a license agreement intended to allow users to freely share, modify, and use this Dataset while maintaining this same freedom for others, provided that the original source and author(s) are credited.

Link: <https://doi.org/10.3897/ved.160563.suppl2>