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The vegetation around dry-wall stone huts on the Macereto plateau (Sibillini Mountains, Central Apennines)

Abstract

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On the Macereto plateau (Monti Sibillini, Central Apennines), at elevation between 800 and 1150 m, there is a settlement of round, dry-wall stone huts with conical rooves, similar to huts existing in other towns of the south-central Apennines. The huts served as shelter for shepherds and peasants during the period 1700-1940. All the huts of Macereto have collapsed, and the remaining stones from the walls and vault favor secondary succession by species of the following vegetation classes: *Asplenietea rupestris*, *Sedo-Scleranthetea*, *Thlaspietea rotundifolii*, *Rhamno-Prunetea* and *Quercо-Fagetea*. In particular, three shrub associations develop on the remaining piles of stones: *Milio vernalis-Aceretum campestris*, *Galio aparine-Prunetum mahaleb* and *Cytisophyllo sessilifolii-Prunetum spinosae*, which are typical of the meso-temperate altitudinal belt. Also present is *Atadinus alpinus* (*Rhamnus alpina*), a species of the supra-temperate belt, but which grows at lower altitudes where it is favored by the piles of stones, giving rise to these subassociations: *Milio venalis-Aceretum campestris atadinetosum alpini*, *Galio aparine-Prunetum mahaleb atadinetosum alpini* and *Cytisophyllo sessilifolii-Prunetum spinosae atadinetosum alpini*.

Key words: Vegetation of dry-stone huts, *Milio vernalis -Aceretum campestris*, *Atadinus alpinus*.

Introduction

On the plateau of Macereto (Sibillini Mountains, central Apennines), at elevations of 800-1200 m, there is a settlement of round, dry-wall stone huts with conical rooves, similar to huts existing in other towns of the south-central Apennines (e.g. the *trulli* of Puglia). These “dry-wall” huts were constructed without mortar and will hereafter be called simply ‘dry-stone’ huts. These served as shelter for shepherds and farmers during the summer. The huts are located on some plains and slopes at the base of the western slope of Monte la Banditella (1583 m).

Almost at the center of the plateau is the sanctuary of Macereto (998 m), built in the years 1528-1556 and surrounded by a vast area destined for sheep farming since very ancient times. Macereto is considered the “center of the pastoral life of the Sibillini Mountains” (Venanzangeli 1996).

Near a knoll on Monte Grotagna (or Rotagna), called the Poggio of Macereto, there was a castle with annexed possessions over a large surrounding area. Possession of this castle was subject to various struggles until 1521, when a decree by Giovanni Maria Varano settled the dispute for many years (Pirri 1916). In the documents of the time, many references are made to the pastoral agro-silvo activities that took place on the Macereto Plateau, but no mention is made of the stone huts.

According to the Statutes of the ancient Municipality of Visso (1461), as reported by Venanzoni (1960), there were at that time four inhabited localities on the Macereto Plateau, including one called Macereto, which was located on the Colle di San Giovanni (see Fig. 1). In another part of his contribution, these places are called "villages", and he says they were formed of "houses" and not of "huts". On the Colle di San Giovanni today, there are the remains of a village of dry-stone huts.

Such huts are present in south-central Italy from Basilicata to the Marche; in the Marche Region they are found on the Montagna dei Fiori and on the Sibillini Mountains, where they constituted their northernmost town. The huts on the Montagna dei Fiori are generally well preserved (Cappelli 2007), but the huts of the Sibillini Mountains have almost all collapsed, and only some still retain their perimeter walls.

Various species of herbaceous and woody plants have become established on the hut remains. The purpose of this note is to describe how the colonization of the Altipiano of Macereto hut remains occurs and the plant associations that develop on them.

The dry-stone huts of the Apennines

The dry-stone huts of the Apennines are round, with rooves made by a pseudo-vault technique. These are called *thòlos* by archaeologists, and their archaic architecture was brought northward from Puglia (where they were called *trulli*) with the seasonally migrating shepherds. On the Apennines they are found from Basilicata to the southern Marche, on the Montagna dei Fiori (Nanni & Properzi 1975; Paone 1987; Micati 2001; Gisotti 2003; Cappelli 2007; Miosi 2013), as was shown clearly in a paper by Miosi (2012). Dry-stone huts comparable to those of the Appenines are the *thòlos* – called also with the local name "cùbburo" – from the territories of the Nebrodi, Peloritani and Iblei, in Sicily (Imbornone 1994).

A little further north of the Montagna dei Fiori, on the Macereto Plateau (Monti Sibillini), there is another, previously unknown complex with over 150 huts. A dry-stone hut with a square plan is also present in the Val di Bove, at about 1500 m (G. De Rosa, Camerino, *in litt.*).

The huts now present in the central Apennines, also called "caselle", are all of recent construction. According to Redi (2009) they were not built before 1600-1700, and most date from the 1800s. The construction technique, however, is very ancient and has remained intact over the millennia.

The dates of the Macereto huts are not known, but by analogy with the Abruzzo huts one can think of the same years, even though the Sanctuary of Macereto, which is much earlier (mid-1500s), could make one think of more ancient times.

The types of huts are quite different, especially the shape of the dome (Gisotti 2003; Miosi 2012), which was difficult to establish for the Macereto huts because the vaults have

collapsed and only the perimeter walls remain. The huts were abandoned in different years, but some were still in use until just before the Second World War.

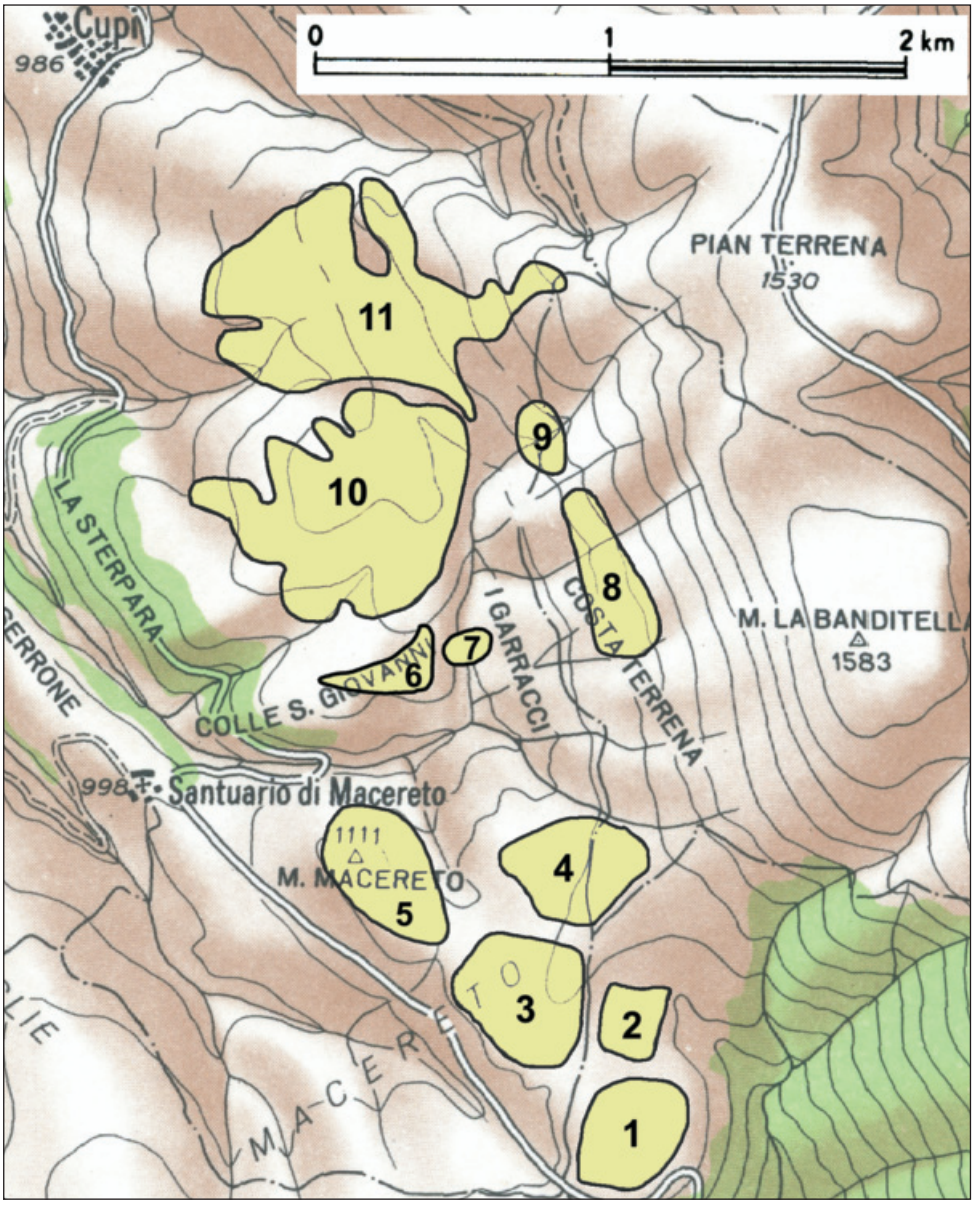

Fig. 1. The dry-stone hut villages of the Macereto Plateau; 1-7 villages with many huts; 8-9 villages with few huts; 10-11 areas used in the past for agriculture, with few isolated huts, not united in villages (topographic map from the Associazione Valorizzazione Monti Sibillini, 1977).

Study area

The dry-stone huts of the Altipiano of Macereto are distributed in 9 adjoining groups, separated by small valleys and hills, on slope exposed partly to the west and partly to the southwest of Monte la Banditella, at altitudes between 800 and 1200 m (Fig. 1). The toponyms that recur on topographical maps are those of Monte Macereto, Colle di S. Giovanni, the Arette, the Garracci, Costa Terrena, the Piane, the Piannellucci and the Fienili.

The substrate is exclusively calcareous, and all the Monte la Banditella and its slopes, including Colle S.Giovanni, is formed of *scaglia rossa*, a red scaly Cretaceous limestone. In some areas *scaglia variegata* and *scaglia cinerea* also emerge (Pierantoni 2013). The huts are built with stones made from *cinerea* and *variegata* chips.

The area has been subjected for centuries to two types of very intense human activity, namely agriculture and mountain pasturing, which led to complete deforestation with strong soil erosion, with the exception of some valleys that retained residual coppice forests of a S*cutellario columnae-Ostryetum carpinifoliae*.

The cultivation areas are still easily recognizable today due to the presence of piles of stones, the *maceras*, locally called "moregghini", representing the stones that were removed over the years. There are frequent traces of terraces and other geometric shapes, due to the ancient parceling (Fig. 2). Cereals were cultivated there and also 'cicerchia' (*Lathyrus sativus*), 'moco' (*Vicia ervilia*) and 'roviglio' (*Pisum sativum* subsp. *elatius*) (Rosi 2005). The vegetation of these areas, in the past cultivated but today only sparse xeric meadows, is undergoing the processes of regression and secondary succession.

The areas intended for the summer stay of the shepherds and grazing animals are recognizable by the presence of the huts, which preferably occupied flat or only slightly sloping areas. The most favorable areas around the huts were designated for cultivation. Here there were low xeric meadows used for grazing, with cover degree varying from 80 to 100% (since sometimes there are rocky outcrops and scattered stones that interrupt the continuity of the turf). These meadows are partly undergoing regression, partly secondary succession, and partly fluctuation of anthropic origin in the periods when they are still partially subjected to sheep grazing.

It is possible to distinguish 11 complexes of huts as follows: 7 temporary villages formed by many huts (40-50) (Fig. 3); 2 temporary villages with few huts (8-9); and 2 areas destined in the past for agriculture, with few isolated huts not united in villages (10-11, Fig. 1). The areas corresponding to the villages 1-7 were mainly destined for cattle breeding, because in them there are few traces of cultivation and they are today undergoing secondary succession. Areas 8-9 were mainly dedicated to agriculture. Here one can see terraces, geometric shapes and many 'maceras'; on the outer edge there are few isolated huts, not gathered in villages. Outside of these there are other areas, sometimes very large, that in the past had been cultivated, such as the slopes of Costa Terrena and Pian Terrena, on which the parcels of the old properties are still visible, mainly in rectangular shapes.

In the area under study, there are the following types of man-made structures: *caciare*, huts gathered in villages and sometimes isolated; dry-stone walls along some roads and also near the huts, presumably used to delimit the pens; *arette*, threshing floors for the beating of wheat and other cereals obtained by placing flat stones on the ground to form a floor, recognizable today only with difficulty; salt licks for the sheep; flattened stones (in

Fig. 2. The dry-stone hut villages of the Macereto Plateau; the meaning of the numbers is the same as in the previous figure (satellite image).

the Marche called “spianche”) placed in the grass where the salt was spread; and *macere*, heaps of stones that had been removed. The *arette* are the same as those found on Monte Cardosa, not far from Macereto (Rosi 2005), where some are still well preserved. The *spianche* are similar to those found at the Pian Grande of Castelluccio di Norcia and on the Montagna di Torricchio (Cortini Pedrotti & al. 1973; Pedrotti 1981).

The vegetation developed on the huts and the other structures mentioned earlier can be summarized as follows. On the *arette* and the *spianche* there are some species with ruderal

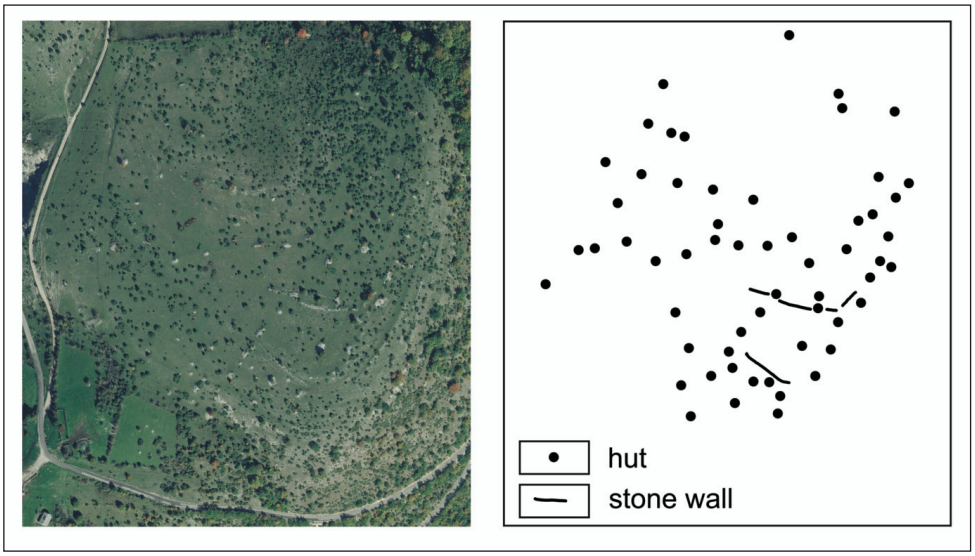

Fig. 3. The distribution of the huts in the village no. 1.

behavior, such as *Capsella bursa-pastoris, Lolium perenne, Poa infirma, Medicago lupulina,* and *Plantago major,* with a very low cover degree and with isolated individuals. These do not form a definite plant association.

Along the dry-stone walls there are hedges of the *Cytisophyllo sessilifolii-Prunetum spinosae* and sometimes alignments of *Quercus pubescens* saplings.

On the heaps of stones (*macère*), some species of the *Festuco-Brometea* class (order *Phleo-Brometalia*) and of the class *Sedo-Scleranthetea* can become established, with a very low coverage (10-15%); establishment along the outer margins of the stone piles was possible for some rare species of the group *Cytisophyllo sessilifolii-Prunetum spinosae.*

On the remains of the stone huts, species of the *Rhamno-Prunetea* class have settled and constitute three shrub associations: *Milio vernalis-Aceretum campestris, Galio aparine-Prunetum mahaleb* and *Cytisophyllo sessilifolii-Prunetum spinosae*. There are also herbaceous species with a very low cover (10-20%), which belong to different classes of vegetation, including the *Sedo-Scleranthetea*, *Thlaspietea rotundifolii* and *Festuco-Brometea.*

The xeric grasslands belong to the order *Phleo-Brometalia* and to the *Phleo ambigui-Bromion* alliance, with the following main species: *Bromus erectus*, *Phleum ambiguum*, *Festuca center-apennina*, *Orchis morio*, *Neotinea tridentata*, *Poterium sanguisorba*, *Muscari atlanticum, Saxifraga granulata*, *Asperula purpurea*, *Anthyllis vulneraria*, *Valeriana tuberosa*, *Eryngium amethystinum*, *Helianthemum grandifolium*. These can be traced partly to the association *Asperulo purpureae-Brometum erecti*. In some of the prairie areas, there are groups of individual plants of *Helichrysum italicum*, the last remnants of the ancient crops then abandoned.

The secondary succession is due mainly to a single species, *Juniperus deltoides*, which is spread massively by birds. Juniper shrubs also foster seed germination by tree species such as *Ostrya carpinifolia*, *Quercus pubescens*, *Sorbus aria* and others, and therefore function as a development center for the biogroups.

The next step, which should involve progressive development of the woody species up to the formation of the pre-forest stage, has not yet become established.

The dry-stone huts of the Macereto Plateau

The dry-stone huts of the plateau of Macereto are called "*caciare*" and take this name from "cacio" (cheese). They are all round in shape, except for some rectangular *caciara*. They are concentrated in agro-pastoral complexes, as they are defined by Colecchia (2015), which, seen anthropogeographically, can be considered mountain villages inhabited only in the summer months for the mountain pastures and partly for agriculture. These settlements correspond to temporary villages of the mid-coast and are quite similar to those in some mountain areas of the Alps, as on the Lombard side of the Ortles-Cevedale Group, where they were illustrated by Albertini (1955). The architecture in the two cases, however, is evidently very different.

The vaults of the Altipiano of Macereto huts have all fallen in and at best only the perimeter walls remain (Fig. 4). The fallen remains form heaps of stones of various sizes, with the flattened stones of the walls and the vault predominating. Often these remains are still delimited by the lower part of the perimeter walls, just 30-40 cm high, which formed the walls of the hut. The size of the huts is variable, from diameters of 5, 8, 10 meters and a little more, up to 11 meters.

The settlement system constituted by the villages of the *caciare* of Macereto is very characteristic but is not mentioned in the specific literature of the Sibillini Mountains that deals with human settlements, or even in hiking guides (see, for example, Bittarelli 1985; Alesi & Calibani 1992; Vitalini Sacconi 1998; Sargolini 2000; Masè & Brunelli 2002).

The vegetation of the *caciare*

On the remains of the *caciare* some herbaceous and woody plant species have settled and, as a whole, give rise to a rather heterogeneous vegetation situation, which nevertheless can be assigned to some very specific phytosociological units. The species found belong to the following vegetation classes: *Asplenietea rupestris*, *Thlaspietea rotundifolii*, *Sedo-Scleranthetea*, *Festuco-Brometea*, *Rhamno-Prunetea* and *Querco-Fagetea*.

The class *Asplenietea rupestris* is limited to the sporadic presence of some rare clumps of *Asplenium trichomanes*, *A. ruta-muraria* and *Ceterach officinarum* on the outer perimeter walls of the huts.

Of the class *Thlaspietea rotundifolii*, only *Drypis spinosa* is present, on the thin debris of a few collapsed huts.

The *Sedo-Scleranthetea* class occupies the same type of substrate as the previous class, but with a soil layer of 1-2 cm; it is present everywhere, at all the huts. The species are *Sedum album* and *Sedum sexangulare*, accompanied by a group of pterophytes, namely

Fig. 4. Hut with a circular plan, remains of the perimeter walls (Photo F. Pedrotti, 2018).

Saxifraga tridactylites, Draba verna, Alyssum minus, Arenaria serpyllifolia, Thlaspi praecox and *Cerastium brachypetalum.*

The species of the *Festuco-Brometea* class, coming from the xeric prairies, are present in the open spaces (ie not covered by shrubby species) of the debris of the collapsed huts, with sparse and isolated individuals, with a degree of covering that rarely exceeds 10-15% (*Festuca centro-apenninica, Bromus erectus, Poterium sanguisorba, Cerastium arvense* and a few others). Only on the external edge can one speak, sometimes, of a band (one meter wide or slightly less) of grassland with a brometo covering 90% and up to 100%, but it is a very variable grouping.

The species of the *Rhamno-Prunetea* class are numerous: *Clematis vitalba, Cornus mas, Crataegus laevigata, Cytisophyllum sessilifolius, Evonymus europaeus, Juniperus deltoides, Malus sylvestris, Prunus mahaleb, Prunus spinosa, Atadinus alpinus* (*Rhamnus alpina*), *Rosa canina, Rubus ulmifolius*; and also *Daphne laureola, Ribes alpinum* and *Viburnum lantana*.

These are all species of the meso-temperate belt, plus *Atadinus alpinus* from the supra-temperate belt. This species is reported on the Sibillini Mountains between 1200 and 1800 m, with a location also at lower altitudes, 700-750 m, in the Rio Terro Valley (Sarnano) in a rocky gorge (Ballelli & al. 2005). It occurs therefore from the meso-temperate belt to the supra-temperate and oro-temperate belts.

The location of the study is between 800 and 1150 m, so it is a station that can be considered heterotopic, considering the presence of *Atadinus alpinus*, found more commonly at 1500-1800 m. The remains of stone huts have allowed *Atadinus alpinus*, transported there by birds, to settle about 400 m lower than the altitudinal range normally occupied by this species.

On the stone huts, the species listed above form the following shrub associations: *Milio vernalis-Aceretum campestris* Pedrotti 1982, *Galio aparine-Prunetum mahaleb* Pedrotti 1994 and *Cytisophyllo sessilifolii-Prunetum spinosae* Cianfaglione and Pedrotti 2016.

The species of the *Querco-Fagetea* class are *Acer monspessulanum, Acer obtusatum, Acer campestre, Fraxinus ornus, Quercus pubescens, Lonicera xylosteum*, and *Sorbus aria*; these always grow as isolated individuals, favored by other species, especially by *Juniperus deltoides*. There are, however, two exceptions, namely *Acer campestre*, which forms very dense thickets on some huts; and *Quercus pubescens*, which sometimes grows along dry stone walls, forming an alignment of saplings.

Ostrya carpinifolia has never been observed on the huts, while it is quite easy to observe it as a component of the biogroups.

Milio vernalis-Aceretum campestris

The *Milio vernalis-Aceretum campestris* is a shrub association attributed to the alliance *Berberidion* (Poldini & al. 2002), which is frequent in the Umbria-Marche Apennines, where it forms hedges at the edge of the parcels and along walls, as well as patches of limited extent. When the hedges are no longer pruned periodically, some species quickly take on an arborescent habit, especially *Acer campestre*, and tend to evolve towards forest associations, as happens in the hedges of the Torricchio Nature Reserve (Pedrotti 2010). On Monte Fiegni (Camerino), the *Milio vernalis-Aceretum campestris* forms hedges along the terraces, but in a flat summit area it has colonized a heap of stones removed from the cultivated areas (Pedrotti 1982).

Fig. 5. Remains of a collapsed hut on which the association *Milio vernalis-Aceretum campestris* has developed; on the right a plant of *Juniperus deltoides* (Photo F. Pedrotti, 2018).

Table. 1. Associations of *Rhamno-Prunetea* class.

Relevé number	1	2	3	4	5	6	7	8	9*	10	11	12	13+	14	15	16	17	18	19	20	21°	Occurr. rel. 1-10	Occurr. rel. 11-14	Occurr. rel. 15-21
Altitude (m a.s.l.)	1050	1100	1000	900	950	1100	1100	980	900	1050	900	950	920	880	1000	1100	1100	1200	1050	980	900			
Aspect	-	-	-	-	W	S-W	-	-	-	S	W	S-W	W	S-S-W	-	-	-	S	S-W	W	W			
Slope (°)	-	-	-	-	5	10	-	-	-	5	5	10	5	5	-	-	-	10	10	5	10			
Cover (%)	100	100	100	90	90	100	90	100	90	90	100	100	100	100	90	90	90	90	90	90	90			
Relevé area (m^2)																								
Diagnotic specie of *Milio vernalis - Aceretum campestris*																								
Acer campestre	5.5	3.4	5.5	3.3	2.3	4.4	1.1	1.1	1.1	1.1	.	.	.	.	1.1	1.1	1.1	.	+	.	.	10	.	4
Milium vernale	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.
Diagnostic species of *Galio aparine-Prunetum mahaleb*																								
Prunus mahaleb	.	+	+	.	.	+	.	+	1.1	1.1	3.3	1.1	4.4	1.1	.	.	.	.	.	+	+	6	4	2
Galium aparine	1.1	.	1.1	+	.	+	.	.	+	.	+	.	+	.	.	.	.	.	.	.	.	5	2	.
Diagnostic specie of *Cytis. sessilifolii-Prunetum spinosae*																								
Prunus spinosa	+	.	+	+	+	.	.	+	+	.	1.1	1.1	+	+	1.1	1.1	2.2	3.3	1.1	2.2	2.2	6	4	7
Cytisophyllum sessilifolium	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	1
Differential species of subassociations *Milio vernalis-Acer. camp. atadinetosum alpini*, *Galio aparine-Prunet. mahaleb atadinetosum alpini*, *Cytis. sess.-Prunetum spinosae atadinetosum alpini*																								
Atadinus alpinus	.	.	.	.	1.1	1.1	2.2	3.3	3.3	3.3	.	2.2	1.1	1.1	.	.	+	+	+	+	1.1	6	3	5
Characteristic sp. of all. (*Berberidion* and *Cytision sess.*) •, ord. (*Prunetalia spinosae*) and cl. (*Rhamno-Prunetea*)																								
Juniperus deltoides	+	+	+	.	1.1	+	.	+	1.1	1.1	+	+	+	2.3	3.3	3.3	+	1.1	3.3	1.1	3.3	8	4	7
Rosa canina	+	+	+	.	+	.	+	.	+	.	1.1	.	+	+	+	+	.	1.1	1.1	.	+	6	3	5
Rubus fruticosus	.	+	+	.	.	.	.	+	.	.	+	+	+	.	+	.	.	.	.	+	.	3	3	2
Crataegus laevigata	.	.	+	+	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	.	2	1	1
Evonymus europaeus	.	.	1.1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
Corylus avellana	.	.	.	2.2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
Clematis vitalba	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
Cornus mas	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	1
Other species																								
Geranium lucidum	1.1	2.3	2.2	1.2	1.1	1.2	1.2	.	.	+	2.2	2.3	.	+	.	+	.	.	.	.	.	8	3	1
Rumex acetosa	+	+	+	+	+	.	.	+	.	.	+	+	+	.	.	.	.	.	.	.	.	6	3	.
Silene cucubalus	+	+	.	.	.	.	.	+	+	+	.	+	1.1	.	.	.	.	.	.	.	.	5	2	.
Lonicera xylosteum	.	+	.	+	.	+	.	.	+	+	.	.	+	+	+	1.1	1.1	.	+	.	.	5	2	4

Table. 1. continued.

Geum urbanum	+	1.2	+	1.1	.	.	.	+	1.1	.	.	.	.	.	.	.	.	.	.	.	.	.	6	.	.
Dactylis glomerata	.	.	+	+	.	.	.	.	+	.	.	.	+	+	.	.	.	.	.	.	.	.	3	2	.
Malus sylvestris	.	+	.	1.1	.	.	+	.	.	.	+	.	+	.	.	.	.	.	+	.	.	3	2	1
Galium mollugo	.	2.2	1.1	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	3	1	.
Poterium sanguisorba	.	.	.	.	.	.	+	.	.	+	.	.	.	+	.	.	.	.	.	.	.	2	1	.
Geranium purpureum	+	.	.	.	.	.	+	.	.	.	.	.	+	+	.	.	.	.	.	.	.	2	2	.
Silene italica	.	.	.	+	.	.	+	.	+	.	+	.	.	.	.	.	.	.	.	+	.	3	1	1
Urtica dioica	.	+	+	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	2	1	.
Quercus pubescens	.	.	.	.	.	.	2.2	+	.	.	.	.	.	+	.	.	+	.	.	.	.	2	1	1
Helleborus bocconei	.	.	.	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.
Acer monspessulanum	.	.	.	.	1.1	.	+	+	.	.	.	.	.	.	.	.	.	.	.	+	.	3	.	1
Teucrium chamaedrys	.	.	.	+	.	1.2	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	3	1	.
Muscari atlanticum	+	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.
Geranium pyrenaicum	.	.	+	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.
Poa nemoralis	.	+	.	.	.	.	.	.	.	,	.	.	.	.	.	.	.	.	.	.	.	1	.	.
Lathyrus aphaca	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.
Draba muralis	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.
Cruciata glabra	.	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.
Viola dehnhardtii	.	.	+	1.2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.
Daphne laureola	.	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.
Fraxinus ornus	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	.	.	.	1	.	1
Bunium bulbocastanum	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	1	.
Ribes alpinum	.	.	+	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	1	1	.
Festuca heterophylla	1.2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
Sorbus aria	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
Anchusa azurea	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
Tragopogon crocifolius	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
Lotus corniculatus	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
Hypericum perforatum	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
Ranunculus ficaria	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
Saxifraga granulata	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
Bellis perennis	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
Digitalis ferruginea	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
Trifolium ochroleucum	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
Bromus erectus	.	.	.	.	.	.	.	.	.	.	.	.	1.1	.	.	.	.	.	.	.	.	.	1	.
Number of sp. per relevé	14	15	22	16	10	10	12	19	20	9	11	11	16	11	6	6	6	5	7	9	6			

- Milio vernalis-Aceretum campestris (Berberidion)
- Galio aparine-Prunetum mahaleb (Cytision sessilifolii)
- Cytisofilo sessilifolii-Prunetum spinosae (Cytision sessilifolii)

* Holotypus of Milio vernalis-Aceretum campestris atadinetosum alpini subass. nova hoc loco
\+ Holotypus of Galio aparine-Prunetum mahaleb atadinetosum alpini subass. nova hoc loco
° Holotypus of Cytisophyllo sessilifolii-Prunetum spinosae atadinetosum alpini subass. nova hoc loco

On the remains of the huts of Monte la Banditella, this association is very frequent and presents itself with two different aspects: that of scrub of limited extent that occupies only part of the collapsed hut, and that of a round grove that occupies the whole area, corresponding to the perimeter of the fallen huts (Fig. 5). In both cases one can certainly recognize the association *Milio vernalis-Aceretum campestris*, which however has a less rich floristic composition than that of the hedges. The findings of 0. 1 can be distinguished in two groups: relevés 1-4 are similar to those described for hedges, while relevés 5-10 differ from the previous by having also *Atadinus alpinus*. This permits describing a new sub-association, the *Milio vernalis-Aceretum campestris atadinetosum alpini*, subass. nova hoc loco (holotypus no. 9, Tab. 1).

In the meso-temperate belt (1100-1150 m) *Atadinus alpinus* participates in the formation of the sub-association *atadinetosum alpini* of the *Milio vernalis-Aceretum campestris*. In the supra-temperate belt (1400-1600 m) *Atadinus alpinus* becomes a component of the *Rhamno alpinae-Amelanchieretum ovalis* association, reported in various locations in the Sibillini Mountains (Pedrotti 1994). In the oro-temperate belt there are isolated shrubs, and Marchesoni (Ballelli & al. 2005) notes that on Monte Castelmanardo at 1700 m *Atadinus alpinus* forms the last shrub vegetation. In the National Park of Abruzzo, Lazio and Molise this species was observed up to 1900 m (Scuriello & al. 2014).

Galio aparine-Prunetum mahaleb

The *Galio aparine-Prunetum mahaleb* is an association of the *Cytision sessilifolii* alliance (Poldini & al. 2002) that develops in conditions quite different from those of the abandoned crop terraces and in the form of hedges along the country roads. In Macereto, this settled on the sloping huts facing west, thermally more favored than those on the plain. There are only 11 species in the relevé, as opposed to 28 in the relevés reported in Pedrotti (1994), which represented an early stage of the association. Similar associations are *Lonicero etruscae-Prunetum mahaleb* Biondi & al. 1988 and *Cytiso sessilifolii-Prunetum mahaleb* Pedrotti 1994 (Biondi & al. 1988; Pedrotti 1994; Poldini & al. 2002).

Also in this case one can distinguish a subassociation characterized by *Atadinus alpinus*, *Galio aparine-Prunetum mahaleb atadinetosum alpini* subass. nova hoc loco (holotypus no. 14, Tab. 1).

Cytiso sessilifolii-Prunetum spinosae

This association, also belonging to the *Cytision sessilifolii* alliance, is developed on the calcareous debris of the outermost parts of the collapsed huts, in much more xeric conditions than in the central part. It is very poor in species (Tab. 1), with only 6 to 9 species per relevé. The surveys carried out in the Pié Vettore locality (Monti Sibillini) are much richer in species, from 13 to 29 species per relevé (Cianfaglione & Pedrotti 2016). This case was also an initial stage of the association.

Atadinus alpinus is also present in this association, but with a very low degree of cover and with small plants. Similar to the two previous associations, here too it is possible to distinguish a sub-association with *Atadinus alpinus*, *Cytiso sessilifolii-Prunetum spinosae atadinetosum alpini*, subass. nova hoc loco (holotyus no. 20 Tab. 1).

Discussion

The stone huts of the Altipiano of Macereto (Monti Sibillini) are environments that favor the process of secondary succession, which occurs through colonization by herbaceous species (*Sedo-Scleranthete*a and *Festuco-Brometea* classes), then shrubs (class *Rhamno-Prunetea)* and sometimes trees (*Querco-Fagetea* class). The large stones of the perimeter walls and the vaulted ceilings, accumulated on the ground, and the small cavities between them, favor the condensation of atmospheric moisture. This is one of the factors that allows settlement by shrub species of the *Milio vernalis-Aceretum campest*ris and *Galio aparine-Prunetum mahaleb* associations. On smaller stones, this phenomenon is less marked, and in fact on them there develops the third shrubby association, the *Citysophyllo sessilifolii-Prunetum spinosae,* which is less demanding than the other two. On the collapsed huts these three associations of the meso-temperate belt are enriched with *Atadinus alpinus*, a species normally present in the supra-temperate belt. In this way each modification forms a peculiar subassociation, *atadinetosum alpini,* which is the most characteristic vegetation of the dry-stone huts of Macereto.

In the xeric prairies surrounding the huts, secondary succession is also in progress, but takes place much more slowly. In fact until today it has produced only the spread of isolated plants or groups of *Juniperus deltoides* and a few other species, such as *Rosa canina,* and the formation of biogroups, each of which consists of very few species, 4-5 species at most (in addition to *J. deltoides, Fraxinus ornus, Sorbus aria, Acer obtusatum, Rosa canina, Clematis vitalba, Cytisophyllum sessilifolium, Viburnum lantana, Lonicera xylosteum*, with very low levels of cover, from 1 to 10%). We cannot yet speak of associations, as is the case on huts.

Lastly, one should also remember the process of primary succession, with the development of groups of *Drypis spinosa* plants. This is a typical species of the Sibillini screes, from the meso-temperated belt to the oro-temperate.

Relevés locations (Tab. 1, rel. 1-21): Altipiano of Macereto (Sibillini Mountains, Central Apennines), VI-2018.

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