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RELATIONSHIPS BETWEEN SOILS, CLIMATE AND VEGETATION IN *QUERCUS SUBER* L. FORMATIONS OF THE SULCIS-IGLESIENTE (SOUTHERN SARDINIA, ITALY)

G. SERRA[1], S. LODDO[1], AND G. BACCHETTA[2]

1-Università degli Studi di Cagliari Dipartimento di Scienze della Terra
via Trentino, 5109127 Cagliari (Italy) - (lserra@tiscalinet.it, loddo@unica.it).
2-Università degli Studi di Cagliari - Dipartimento di Scienze Botaniche,
viale Sant'Ignazio da Laconi, 13 09123 Cagliari (Italy) - (bacchet@unica.it)

Introduction

All over the Mediterranean region *Quercus suber* woods are forest ecosystems sustained by human activities because of the variety of functions they perform. In agricultural ecosystems, cork-oak woods present a general degradation of soil in form of erosion of upper layers, compaction, reduced permeability and loss of organic matter, hence lowering the fertility of the soil. Degradation is frequently aggravated when the human contributing factors (fires, overgrazing, cultivation under the trees) are concomitant and/or consequential.

This paper shows the first results of the study of cork-oak forest soils and *Quercus suber* L. formations in the Sulcis-Iglesiente (South-West of Sardinia). The research defines soils, forest floor and phytosociological aspects of cork-oak formations.

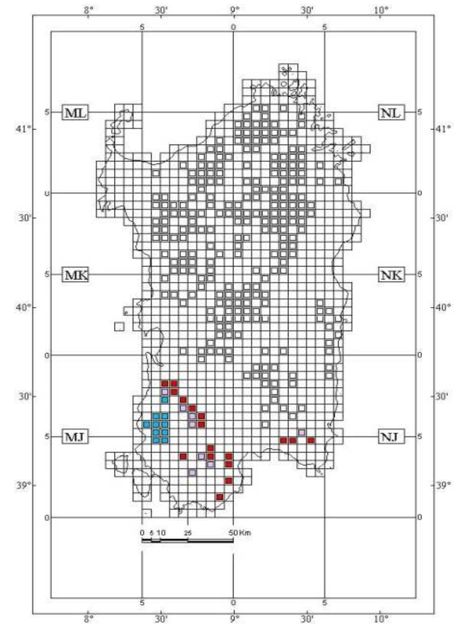

Figure 1. Distribution of *Quercus suber* L. in Sardinia, (Arrigoni, 1968) modified.
Symbols:
red = *Myrto-Quercetum suberis*,
violet = mesophilic variant with *Limodorum abortivum*,
blue = *Cytiso-Quercetum suberis*.

Materials and methods

Six representative soil profiles have been observed in cork oak formations. Soil samples have been analysed in the laboratory following the standard soil analysis procedures. The soils were classified according to the U.S.D.A. Soil Taxonomy (Soil Survey Staff, 1998).

Humus forms were observed and classified according to the taxonomy purposed by Green *et al*. (1993). It is based on the readily recognisable morphological properties and is organised similary to the Soil Taxonomy approach. The diverse humus forms have been described for each soil profile.

Bioclimatic analyses are realised in accord with Rivas-Martínez *et al.* (1999). Starting from 33 thermopluviometric stations, the following indexes has been calculated: mean temperature in C° (Ti), mean of maximum temperatures in C° (Mi), mean of minimum temperatures in C° (mi), mean of absolute maximum temperatures in C° (T'i), mean of absolute minimum temperatures in C° (m'i), mean monthly precipitations in mm. (Pi), total annual precipitations in mm. (P), potential monthly evapotranspirations in mm. (EPi), potential annual evapotranspiration in mm. (EP).

Bioclimatic indexes for the biogeographic area of Sulcis-Iglesiente, have been elaborated with dedicated software (BIOCLI). The results permitted a classification of macrobioclimate, bioclimate, bioclimatic levels and their horizons.

Vegetation has been studied by 15 phytosociological surveys, with the sigmatist method of the Zurigo-Montpellier school (S.I.G.M.A., Station Internationale Geobotanique Mediterranéenne et Alpine). Surveys were carried out in homogeneous areas (for physiognomy and structure), with elementary populations well distinct, using the sociability and dominance indexes purposed by Braun-Blanquet (1951).

Phytosociological data have been elaborated using the EL.TA.FI. and ARCVEG 2 programmes. Using MS Excel 2000 and REBLOCK softwares, phytosociological tables have been realised. Multivariate statistical analysis has been carried up using the SYN-TAX 5.0 package programmes (PODANI, 1993).

Results and Discussions

By cluster analysis two main groups (Fig. 2) were individualized and distincted in functions of litology, soils, bioclimate, floristic and ecological factors (Bacchetta, 2000).

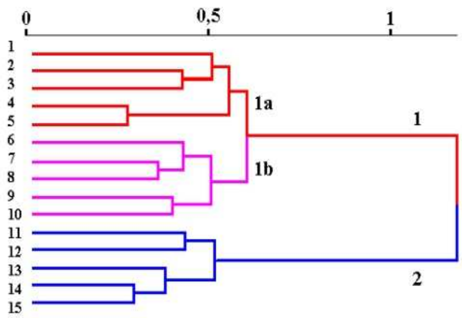

Figure 2. Dendrogram of the *Myrto communis-Quercetum suberis* Barbero, Quézel et Rivas-Martínez 1981 (1a), mesophilic variant with *Limodorum abortivum* (L.) Swartz (1b) and *Cytiso villosi-Quercetum suberis* Br.-Bl. 1953 (2), obtained with a medium bond starting from binary data as differential factor.

Table 1. Results of florisic surveys.

			Myrto communis-Quercetum suberis Barbero, Quézel *et* Rivas-Martínez 1981										*Cytiso villosi-Quercetum suberis* Br.-Bl. (1952) 1953 *corr.*					PRESENCES
								mesophilic variant with *Limodorum abortivum*										
		Survey number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
		Survey code	S24	S1	S3	S4	S7	1/97	3/97	4/97	2/97	5/97	S16	S13	S15	S14	S18	
		Altitude (m. u.s.l.)	240	250	265	255	200	380	400	400	375	420	550	320	370	440	450	
		Exposure	SSE	ESE	ENE	ESE	NW	NNW	NW	SE	N	N	ESE	NE	ESE	E	WSW	
		Slope (°)	30	10	5	10	30	20	5	30	25	10	45	45	30	35	25	
		Lithology	Gra	Gra	Gra	Gra	Gra	Gra	Gra	Gra	Gra	Gra	Met	Met	Met	Met	Met	
		Rockness (%)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
		Stoniness (%)	.	10	.	.	70	10	10	5	20	20	10	10	20	10	.	
		Survey surface (mq)	100	100	100	100	100	100	200	200	200	200	100	100	80	100	100	
		Cover degree (%)	100	90	90	90	90	90	90	80	90	100	90	100	100	90	80	
		Mean height of vegetation (m)	10	12	12	12	13	9	12	8	11	10	8	10	11	12	8	
		Number of plants	20	23	23	19	24	19	22	19	18	22	21	20	20	26	23	
		Characteristic and differential taxa of association and *Quercenion suberis**																
P scap	W-Medit.	*Quercus suber* L.*	4	4	4	4	5	4	5	4	5	5	4	4	5	4	4	15
H scap	Eurimedit.	*Pulicaria odora* (L.) Rchb.*	1	2	1	2	1	1	+	1	2	1	1	.	1	2	+	14
P caesp	Stenomedit.	*Myrtus communis* L.	1	1	2	1	2	+	+	.	.	.	.	.	.	.	.	7
G rhiz	Eurimedit.	*Limodorum abortivum* (L.) Swartz	.	.	.	.	.	1	+	+	1	1	.	.	.	.	.	5
P caesp	W-C-Medit.	*Cytisus villosus* Pourret	.	.	.	.	.	.	.	.	.	.	3	4	4	4	3	5
		Characteristic taxa of *Oleo-Ceratonion* Br.-Bl. *ex* Guinochet *et* Drouineau 1944 *em.* Rivas-Martínez 1975 and *Pistacio lentisci-Rhamnetalia alaterni* Rivas-Martínez 1975																
P caesp	Stenomedit.	*Pistacia lentiscus* L.	+	+	.	.	+	.	.	.	.	.	.	.	.	.	.	3
P caesp	Stenomedit.	*Rhamnus alaternus* L.	.	.	.	.	.	.	.	.	.	.	+	1	+	+	+	5
P scap	Stenomedit.	*Olea europaea* L. var. *sylvestris* Brot.	.	.	.	.	.	.	.	.	.	.	2	1	.	1	.	3
		Characteristic taxa of *Quercetalia ilicis* Br.-Bl. *ex* Molinier 1934 *em.* Rivas-Martínez 1975 and *Quercetea ilicis* Br.-Bl. *ex* A. *et* O. Bolòs 1950																
P lian	Stenomedit.	*Rubia peregrina* L. subsp. *peregrina*	1	1	1	1	1	1	+	1	+	+	+	1	1	+	+	15
P lian	Subtrop.	*Smilax aspera* L.	+	1	+	+	+	.	.	+	+	+	2	1	1	2	+	13
G rhiz	Stenomedit.	*Asparagus acutifolius* L.	+	+	+	.	+	+	+	1	.	+	1	+	1	1	1	13
H ros	Subtrop.	*Asplenium onopteris* L.	+	1	.	.	+	1	1	+	1	2	+	1	1	.	+	12
H caesp	Eurimedit.	*Luzula forsteri* (Sm.) DC.	.	2	1	1	+	1	+	+	+	+	.	1	.	+	1	12
H scap	W-Stenomedit.	*Galium scabrum* L.*	1	1	1	2	.	+	+	+	1	1	.	+	1	2	.	12
H caesp	Stenomedit.	*Carex distachya* Desf.	.	+	+	.	2	.	+	+	+	+	.	2	1	+	1	11
Ch frut	Eurimedit.	*Ruscus aculeatus* L.	.	1	+	.	+	+	1	.	.	+	+	.	+	.	.	8
G rad	Eurimedit.	*Tamus communis* L.	.	.	.	.	1	.	+	.	.	.	1	.	.	+	+	5
P caesp	W-Stenomedit.	*Daphne gnidium* L.	.	.	+	+	.	+	.	+	.	.	.	.	.	.	.	4
G bulb	NW-Stenomedit.	*Cyclamen repandum* Sibth. *et* Sm.	2	2	2	2	2	2	2	+	1	3	+	.	.	.	.	11
P scap	Stenomedit.	*Quercus ilex* L.	+	.	+	1	1	1	+	+	1	+	+	.	.	.	.	10
P caesp	Stenomedit.	*Arbutus unedo* L.	2	3	2	2	1	2	2	1	2	2	.	.	.	.	.	10
P caesp	Stenomedit.	*Erica arborea* L.	3	2	3	3	3	1	1	2	2	+	.	.	.	.	.	10
P caesp	Stenomedit.	*Viburnum tinus* L.	.	2	2	1	+	+	1	.	1	2	.	.	.	.	.	8
P scap	Stenomedit.	*Phillyrea latifolia* L.	1	1	2	1	2	+	+	.	.	+	.	.	.	.	.	8
P lian	Stenomedit.	*Lonicera implexa* Aiton	1	+	1	1	.	+	.	.	.	+	.	.	.	.	.	6
Ch rept	Stenomedit.	*Selaginella denticulata* (L.) Spring	+	1	.	.	+	+	.	.	+	.	.	.	.	.	.	5
P scap	Eurimedit.	*Juniperus oxycederus* L. subsp. *oxycedrus*	.	+	1	+	1	.	.	.	.	.	.	.	.	.	.	4
NP	Eurimedit.	*Osyris alba* L.	.	.	.	.	.	.	+	.	+	+	.	.	.	.	.	3
P lian	Stenomedit.	*Rosa sempervirens* L.	.	.	.	.	.	.	.	.	.	+	1	1	1	2	1	6
G rhiz	Stenomedit.	*Arisarum vulgare* Targ.-Tozz.	.	.	.	.	.	.	.	.	.	.	2	+	2	2	+	5
P lian	Stenomedit.	*Clematis cirrhosa* L.	.	+	.	.	.	.	.	.	.	.	.	1	+	2	+	5
P lian	Eurimedit.	*Hedera helix* L. subsp. *helix*	.	.	.	.	.	.	.	.	.	.	1	1	1	.	+	4
		Characteristic taxa of *Querco roboris-Fagetea sylvaticae* Br.-Bl. *et* Vlieger *in* Vlieger 1937																
H caesp	W-Stenomedit.	*Brachypodium sylvaticum* (Hudson) Beauv.	.	.	.	.	.	.	.	.	+	+	1	1	1	+	+	7
G rhiz	Cosmop.	*Pteridium aquilinum* (L.) Kuhn	.	.	.	.	.	.	.	.	.	.	.	2	.	+	1	3
P caesp	Paleotemp.	*Crataegus monogyna* Jacq. subsp. *monogyna*	.	.	.	.	.	.	.	.	.	.	+	.	+	+	.	3
H caesp	Eurimedit.	*Carex divulsa* Stokes	.	.	.	.	.	.	.	.	.	.	.	+	.	.	1	2
		Companions																
NP	Eurimedit.	*Rubus* gr. *ulmifolius* Schott	.	.	+	+	.	.	+	.	.	+	1	+	1	1	1	9
NP	Stenomedit.	*Cistus salvifolius* L.	+	.	+	+	+	.	+	+	+	.	.	.	.	+	.	8
G rhiz	Stenomedit.	*Asphodelus ramosus* L. subsp. *ramosus* var. *ramosus*	+	.	+	.	1	.	+	+	.	.	.	.	.	1	+	7
H ros	Eurimedit.	*Polypodium cambricum* L. subsp. *serrulatum* (Sch. *ex* Arcang.) Pichi-Serm.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	2
NP	Stenomedit.	*Lavandula stoechas* L.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	2
NP	Stenomedit.	*Cistus creticus* L. subsp. *eriocephalus* (Viv.) Greuter *et* Burdet	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	2
G bulb	Eurimedit.	*Neotinea maculata* (Desf.) Stearn	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	1
H scap	S-Medit.	*Ferula communis* L. subsp. *communis*	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	1
P caesp	W-Stenomedit.	*Teline monspessulana* (L.) Koch	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	1
G bulb	Stenomedit.	*Allium triquetrum* L.	.	+	.	.	.	.	.	.	.	.	+	.	+	+	+	5
H scap	Eurosib.	*Achillea millefolium* L.	.	.	.	.	.	.	.	.	.	.	+	+	.	+	+	4
H caesp	Stenomedit.	*Oryzopsis miliacea* (L.) Asch. *et* Schweinf. subsp. *miliacea*	.	.	.	.	.	.	.	.	.	.	.	.	1	1	+	3
T scap	Eurimedit.	*Cynosurus echinatus* L.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	1
P caesp	Stenomedit.	*Pyrus amygdaliformis* Vill.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	1

The first group of cork oak populations has been provisionally assigned to the association *Myrto communis-Quercetum suberis* (Barbero, Quézel, Rivas-Martínez 1981). Bioclimatic conditions are oceanic pluviseasonal Mediterranean, with thermotypes between the thermomediterranean superior and mesomediterranean inferior and umbrotypes from dry superior and subhumid superior. The flora (Tab. 1) is featured by *Myrtus communis* L.*, Limodorum abortivum* (L.) Swartz*, Viburnum tinus* L.*, Cyclamen repandum* Sibth. *et* Sm.*, Phillyrea latifolia* L.*, Daphne gnidium* L.*, Arbutus unedo* L.*, Erica arborea* L.*, Lonicera implexa* Aiton and *Selaginella denticulata* (L.) Spring.

Representative soils (Tab. 2) are classified as Typic Xerorthents, Dystric Xerorthents, Typic Dystroxerepts and Typic Palexeralfs (Tab. 4).

Table 2. *Myrto communis-Quercetum suberis* Barbero, Quézel et Rivas-Martínez 1981. Summary of the environmental aspects and chemical analysis of soils in the Sulcis area stations.

Profile	17				24		34			54		57
COMMON	Sarroch				Capoterra		Assemini			Assemini		Uta
PROVINCE	Cagliari				Cagliari		Cagliari			Cagliari		Cagliari
LOCALITY	Monte Nieddu				Is Stintionis		Punta Murtas			Is Antiogus		Gutturu Mannu
	Sulcis area				*Sulcis area*		*Sulcis area*			*Sulcis area*		*Sulcis area*
ALTITUDE	315 m. u.s.l.				110 m. u.s.l.		250 m. u.s.l.			250 m. u.s.l.		180 m. u.s.l.
SLOPE INCLINATION	30%				10%		70%			15%		10%
EXPOSURE	185°				50°		225°			75°		160°
LITHOLOGY	Weathered granites and weathering products				In place granites often weathered		Weathered granites and weathering products			Weathered granites and weathering products		In place Paleozoic metamorphic rocks
PHISIOGRAPHY	Midslope				Midslope		Midslope			Slope bottom		Slope bottom
STONINESS	1%				10%		10%			5%		10%
ROCKNESS	0%				0%		65%			10%		20%
SOIL HORIZONS	A	Bw1	Bw2	C1	A	C	A	BC1	BC2	A	A/C	A
UPPER LIMIT	0	35	110	157	0	18	0	12	39	0	14	0
LOWER LIMIT	35	110	157	210	18	32	12	39	90	14	40	25
PH IN H_2O	5.43	5.52	5.03	5.06	5.79	5.56	6.07	5.98	5.90	5.38	5.78	
TOTAL SAND %	56.75	36.30	58.45	66.9	63.65	33.35	69.9	70.2	75.6	77.95	74.60	56.60
TOTAL SILT %	19.05	31.1	14.6	9.75	14.15	28.60	13.6	14.6	12.0	13.70	14.30	24.00
CLAY %	24.20	32.60	26.95	23.35	22.20	38.05	16.5	15.1	12.4	8.25	11.10	19.40
TEXTURE	SCL	CL	SCL	SCL	SCL	CL	LS	LS	LS	LS	LS	LS
ORGANIC C %	0.65	0.30	0.26	0.19	1.45	0.61	2.26	-	-	0.652	0.658	2.37
ORGANIC MATTER %	1.12	0.52	0.45	0.32	2.50	1.05	3.90	-	-	1.12	1.13	4.08
TOTAL N %	0.12	0.07	0.04	19.0	0.21	0.02	0.105	-	-	0.032	0.038	0.134
C/N	5.41	4.28	6.5	32.0	6.90	30.5	21.52	-	-	20,37	17.31	17.68
CA^{++} (meq/100g)	6.29	4.13	1.50	3.94	3.04	2.80	7.35	2.93	1.96	0.709	0.535	3.285
MG^{++} (meq/100g)	0.97	2.88	0.46	0.96	0.49	1.18	5.49	5.06	4.22	0.306	0.488	1.463
K^+ (meq/100g)	0.34	0.29	0.12	0.29	0.04	0.21	0.54	0.32	0.22	0.029	0.053	0.165
NA^+ (meq/100g)	0.15	0.31	0.14	0.12	0.08	0.29	0.33	0.34	0.34	0.135	0.115	0.291
C.E.C. (meq/100g)	11.88	15.08	7.09	8.21	7.34	9.47	22.53	16.51	14.37	7.83	7.94	25.44
TOT. ACIDITY (meq/100g)	1.15	4.65	1.90	2.15	1.35	1.35	8.65	7.65	7.15	5.15	4.90	16.25
BASES SATURATION %	65.19	50.47	31.36	64.76	49.63	47.36	60.93	52.47	46.98	15.06	15.00	20.45

The second group includes cork oak populations of the association *Cytiso villosi-Quercetum suberis* Br.-Bl. 1953 (Braun Blanquet J., 1952). Bioclimatic conditions are characterised by thermotypes between mesomediterranean inferior to mesomediterranean superior and umbrotypes from subhumid inferior and humid inferior. This association is an exclusive of Iglesiente massif, in Sardinia being mostly found in the north-eastern part of the island.

The flora is featured by *Cytisus villosus* Pourret, *Rosa sempervirens* L., *Brachypodium sylvaticum* (Hudson) Beauv., *Arisarum vulgare* Targ.-Tozz., *Crataegus monogyna* Jacq. subsp. *monogyna*, *Pteridium aquilinum* (L.) Kuhn and *Hedera helix* L. subsp. *helix* as given in Table 1. Representative soils (Tab. 3) are classified as Lithic Xerorthents and Typic Xerorthents (Tab. 4).

Table 3. *Cytiso villosi-Quercetum suberis* Br.-Bl. 1953. Summary of the environmental aspects and chemical analysis of soils in the Iglesiente area stations.

Profile	1			2				
COMMON	Iglesias			Iglesias				
PROVINCE	Cagliari			Cagliari				
LOCALITY	Genn'e Bogai *Iglesiente area*			Genn'e Bogai *Iglesiente area*				
ALTITUDE	535 m. u.s.l.			545 m. u.s.l.				
SLOPE INCLINATION	40%			20%				
EXPOSURE	280°			10°				
LITHOLOGY	In place Paleozoic metamorphic rocks			In place Paleozoic metamorphic rocks				
PHISIOGRAPHY	Midslope			Midslope				
STONINESS	5%			5%				
ROCKNESS	0%			0%				
SOIL HORIZONS	A	Bw	C	A	Bw1	Bw2	Bt1	Bt2
UPPER LIMIT	0	5	20	0	15	32	60	100
LOWER LIMIT	5	20	60	15	32	60	100	n.d
PH IN H_2O	6.82	5.25	5.02	6.04	5.61	5.75	5.52	5.69
TOTAL SAND %	50.12	54.61	51.28	56.05	57.65	50.38	49.35	44.65
TOTAL SILT %	25.38	22.39	16.76	20.20	24.74	22.21	20.18	17.60
CLAY %	24.50	23.00	31.96	23.75	17.61	27.41	30.47	37.35
TEXTURE	SCL	SCL	SCL	SCL	LS	SCL	SCL	CL
ORGANIC C %	5.72	5.27	4.82	8.45	2.01	1.96	0.95	0.48
ORGANIC MATTER %	9,86	9,09	8,31	14,57	3,47	3,38	1,64	0,83
TOTAL N %	0.45	0.32	0.27	0.65	0.36	0.24	0.02	0.01
C/N	12.7	16.46	17.85	13.0	5.68	8.16	47.5	48.0
CA^{++} (meq/100g)	38.26	4.56	1.74	4.88	6.21	3.60	2.89	2.49
MG^{++} (meq/100g)	6.51	0.96	0.40	2.84	1.69	1.61	2.38	2.15
K^{+} (meq/100g)	1.23	0.48	0.22	1.03	0.25	0.26	0.09	0.12
NA^{+} (meq/100g)	0.32	0.03	0.03	0.41	1.15	1.04	1.05	1.00
C.E.C. (meq/100g)	57.53	20.92	16.43	17.24	18.78	11.39	12.63	9.48
TOT. ACIDITY (meq/100g)	8.98	14.89	14.25	6.50	5.00	5.94	5.00	4.38
BASES SATURATION %	80.51	28.82	16.77	53.18	49.52	57.15	50.75	60.75

Table 4. Soil profiles and humus forms.

PROFILE NUMBER	P17	P24	P34	P54	P57	P1	P2
HORIZONS AND THICKNESS IN CM.	Ln 2-1,5 Lv 1,5-1 Fz 1-0,5 Hz 0,5-0 A 0-35 Bw1 35-110 Bw2 110-157 C1 157-210 C2 over 210	Ln 3-2 Fz 2-1,5 Hz 1,5-0 A 0-18 C 18-32 R over 32	Lv 5-3 Fz 3-2 Hz 2-0 A 0-12 BC1 12-39 BC2 39-90 C over 90	Lv 4-3 Fz 3-2 Hz 2-0 A 0-14 A/C 14-40	Lv 3-0 A 0-25 C 25-40	Lv 3-1,5 Fz 1,5-0,5 Hz 0,5-0 A 0-5 Bw 5-20 C 20-60	Ln 3-1,5 Fz 1,5-1 Hz 1-0 A 0-15 Bw1 15-32 Bw2 32-60 Bt1 60-100 Bt2 100-n.d.
HUMUS FORM	MULLMODER	MULLMODER	MULLMODER	MULLMODER	N.D.	MULLMODER	MULLMODER
SOIL CLASSIFICATION	TYPIC DYSTROXEREPT	DYSTRIC XERORTHENT	TYPIC XERORTHENT	DYSTRIC XERORTHENT	LITHIC XERORTHENT	TYPIC HAPLOXEREPT	TYPIC HAPLOXERALF

Conclusions

In regard to sinphytosociological aspects, both the associations represent the most developed phases and can be considered at the top of the edaphophilic special dynamic series. They are in sequence with the climatophilic principal series and the edaphoigrophilic calcifugal series of Sardinia, typical in the thermo-mesomediterranean bioclimatic plains, with dry and subhumid umbrotypes.

From the sitaxonomic point of view, in accord with Rivas-Martínez *et al.* (1999), it is possible to include both the studied associations into the suballiance *Quercenion suberis* (=*Quercion suberis* Loisel 1971) of the alliance *Quercion ilicis* Br.-Bl. *ex* Molinier 1934 *em*. Rivas-Martínez 1975 and into the order *Quercetalia ilicis* Br.-Bl. *ex* Molinier 1934 *em*. Rivas-Martínez 1975, *Quercetea ilicis* Br.-Bl. *ex* A. *et* O. Bolòs 1950 class.

The *Myrto communis-Quercetum suberis* Barbero, Quézel, Rivas-Martínez 1981 stands on Typic Xerorthents, Dystric Xerorthents, and Typic Dystroxerepts. Soils are shallow or moderately deep (profiles 17, 24, 34, 54, 57). These soils developed on intrusive rocks (granites, granodiorites, leucogranites, etc.) of the Paleozoic and their slope deposits, with acid or mildly acid reaction, sandy-loam textural class, desaturated or partially desaturated.

This association develops also on deep soils classified as Typic Palexeralfs in areas with ondulating morphology and small nearly flat zones, with mildly acid reaction, clay-loam textural class, partially desaturated (Table 2). Humus forms are classified as Mullmoders, Turbic Mullmoders, Rhizic Mullmoders (Table 4).

The *Cytiso villosi-Quercetum suberis* Br.-Bl. 1953 (Braun Blanquet J., 1952) is typical of landscapes on metamorphic rocks (schists, arenaceous schists, shales) of the Paleozoic and their slope deposits. Soils (profiles 1, 2) are classified as Lithic Xerorthents and Typic Xerorthents, with mild acid reactions, sandy-loam textural class, desaturated, shallow or moderately deep. Humus forms are classified as Mullmoders and Lignomoders (Table 4).

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