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Phytosociological remarks on residual woodlands of *Laurus nobilis* in Sicily

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Abstract: Gianguzzi L., D'Amico, A. & Romano, *S. Phytosociological remarks on residual woodlands of Laurus nobilis in Sicily. Lazaroa 31: 67-84 (2010).*

A phytosociological study was done of *Laurus nobilis* woodlands in Sicily. The analysis, based on 18 relevés, supports the definition of a new syntaxon (*Acantho mollis-Lauretum nobilis* ass. nov.), considered as a vicariant of similar vegetation aspects described in other Mediterranean areas (Iberian and Italian peninsulas). The study mainly includes some unpublished sites where polycormic individuals of laurel, sometimes reaching 13-15 meters in height, dominates the tree layer. This vegetation is also characterized by some laurophyllous species (*Hedera helix, Rhamnus alaternus, Smilax aspera* and *sometimes Viburnum tinus*) and lianas (*Rubia peregrina* var. *longifolia, Asparagus acutifolius, Tamus communis, Clematis vitalba, Calystegia sylvatica* and *Rubus ulmifolius*), while in the undergrowth comprises particularly various broadleaved elements such as *Cyclamen hederifolium* subsp. *confusum*, and *Acanthus mollis* subsp. *mollis*, both included in the characteristic species combination together with *Pistacia terebinthus* and *Orobanche hederae*. The coenosis is typical of the humic soils, often rich in lithic components, of shaded ravines and perirriparian environments, in the thermo- and mesomediterranean thermotype (Mediterranean pluviseasonal oceanic bioclimate). In view of the relictual status of this vegetation - also included as a "Priority Habitat" in Council Directive 92/43/EEC - we underline the need for a suitable protection and conservation of these small, fragmented and isolated patches.

Keywords: *Laurus nobilis* matorral, *Quercetea ilicis*, Mediterranean region, relic vegetation.

Resumen: Gianguzzi L., D'Amico, A. & Romano, S. *Estudio fitosociológico de las comunidades de Laurus nobilis en Sicilia Lazaroa 31: 67-84 (2010).*

Se ha realizado un estudio fitosociológico sobre los bosques de Laurus nobilis en Sicilia. El análisis, basado en 18 inventarios nos ha servido para la definición de un nuevo sintaxon (*Acantho mollis-Lauretum nobilis nova*), que puede ser considerado como un vicariante de tipos de vegetación similares descritos en otras áreas mediterráneas (Península Ibérica e Itálica). El estudio incluye el muestreo de sitios inéditos donde los individuos de laurel alcanzan hasta 13-15 metros de altura y dominan el estrato arbóreo. Este tipo de vegetación también está caracterizado por otras especies lauroides (*Hedera helix, Rhamnus alaternus, Smilax aspera* y, a veces, *Viburnum tinus*) y lianas (*Rubia peregrina* var. *longifolia, Asparagus acutifolius, Tamus communis, Clematis vitalba, Calystegia sylvatica* y *Rubus ulmifolius*), mientras el estrato arbustivo comprende varios elementos de hoja ancha como *Cyclamen hederifolium* subsp. *confusum*, y *Acanthus mollis*, junto a *Pistacia terebinthus* u *Orobanche hederae*. Esta comunidad es típica de los suelos húmicos, a menudo pedregosos y propio de barrancos sombríos y medios peri-riparios, en los pisos bioclimáticos termo-y mesomediterráneo (Mediterráneo pluviestacional oceánico). A la vista del estado reliquial de este tipo de bosque, incluido como un "Hábitat Prioritario" en el Consejo la Directiva 92/43/EEC, subrayamos la necesidad de definir la protección más conveniente y la conservación de estos pequeños, fragmentados y aislados bosquetes.

Palabras clave: bosquetes de *Laurus nobilis, Quercetea ilicis*, Región Mediterránea, vegetación relíctica.

INTRODUCTION

Laurus nobilis L. (bay laurel), together with *L. azorica* (Seub.) Franco, and *L. novocanariensis* Rivas Mart., Lousa, Fern. Prieto, E. Días, J. C. Costa & Aguiar (= *L. canariensis* Webb & Berthel.), is one of the three known species of the genus and also the only representative of Laura-

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ceae in continental Europe - a family including about 2500 taxa distributed in tropical and subtropical areas (FERGUSON, 1974; HEYWOOD, 1993; MABBERLEY, 1997). Given that the other two species are located in the Azores, with isolated sites in Morocco (BARBERO & QUEZEL, 1994; and as recently revealed (RIVAS-MARTÍNEZ & *al*., 2002), in the Canary Islands and Madeira (JALAS & SUOMINEN, 1991; TUTIN & al., 1993).

L. nobilis occurs in different areas of the Mediterranean basin, such as in the south-east France, Italy, ex-Yugoslavia, Albania, Greece, Turkey, Cyprus, Lebanon, Israel, Cyrenaica, Algeria, Morocco, Sicily, Sardinia, Corsica and the Balearic Island (MEUSEL & *al*., 1965; FENAROLI & GAMBI, 1976; JALAS & SUOMINEN, 1991). The species also occurs in other areas of the Eurosiberian Region, as along the Black Sea basin (KOMAROV, 1937; MEUSEL & *al*., 1965; FENAROLI & GAMBI, 1976), the Atlantic coasts of the Iberian peninsula, northern France, southern England and Ireland (JALAS & SUOMINEN, 1991; STACE, 1991). Nevertheless, because of its ancient cultivation - dating back at least to the Roman period - and its out-standing tendency to naturalize, it is essential to identify its indigenous geographical areas, in view of the lack of molecular studies, in order to clarify phyletic relationships among different populations (FILIBECK, 2006).

Bay laurel is typical of thermo-hygrophilous coenosis of Mediterranean areas (Table 1), mainly represented in pre-forest mantles or woodlands, where it appears frequently as a sporadic shrub species. More rare are the vegetation types in which *L. nobilis* shows a tree habitus, which can probably be interpreted as relictual fragments of a Laurinee thermo-hygrophilous vegetation widely represented in continental Europe during the Tertiary and the warm periods at the beginning of the Quaternary (MONTELUCCI, 1946; GIACOMINI & FENAROLI, 1958; PIGNATTI, 1976; 1995). As a consequence of climate change during the Pleistocene, most of the dominant species became extinct, while others, like *L. nobilis*, found refugia in some new communities which colonized the region. As a result, some laurophyllous vegetation aspects, with an impoverished floristic composition, became isolated along the Atlantic coast of Europe or in the extreme southern part of the continent. This is the case of the formation of communities dominated by *Laurus nobilis* on the Iberian peninsula (BUENO SÁNCHEZ & FERNÁNDEZ PRIETO, 1991; RODRÍGUEZ GUITÍAN & *al*., 2007), or fragmentarily represented in the Apennines area (ALLEGREZZA & *al*., 2006), as well as in Sardinia (BACCHETTA & *al*., 2007) and Sicily, where they were known in the Madonie (RAIMONDO & *al*., 1980) and Hyblaean mountains (BRULLO & *al*., 2001).

Some interesting new discoveries of *Laurus nobilis* woodlands in central-western Sicily gave rise to a regional phytosociological analysis of this vegetation, and a subsequent comparison to other similar aspects known from the Mediterranean area. The research considered particularly those phytocoenotic expressions where bay laurel has a strong dominant role, or where it definitely characterizes the physiognomy of the tree layer.

DISTRIBUTION OF *LAURUS NOBILIS* IN SICILY

In Sicily *Laurus nobilis* shows a very scattered distribution, while it is absent from the small circum-Sicilian islets. GUSSONE (1842-44) indicated its presence in Lampedusa Island (in Vallone dello Scoglio), where it became extinct, probably due to the strong anthropization during last century (BARTOLO & *al*., 1990b; PASTA, 2001). LOJACONO (1904) considered bay laurel in the region to be an element that was "...rather cultivated than decidedly indigenous ..." an opinion also shared by ALBO (1919) and BÉGUINOT (1929). More recently, other authors agreed on the indigenous status of the species in the region (RAIMONDO & *al*., 1980; BRULLO & *al*., 2001; GIANGUZZI & *al*., 2007).

In Sicily, vegetation aspects in which *L. nobilis* plays a relevant role have been cited for different sites in: -Mt. Cammarata (BONOMO & *al*., 1978); -Madonie, near the Vicaretto stream (RAIMONDO & *al*., 1980); -Peloritani, in Vallone della Santissima (BARTOLO & *al*., 1990) and Valloncello Passo del Corvo, between Borgo Morfia and Portella Mandrazzi (GUARINO, 1998); -the hills

Table 1
Aspects of vegetation with *Laurus nobilis* known for Mediterranean Region.

A) SCLEROPHYLL EVERGREEN WOODLANDS	
Quercus ilex	Italian peninsula (Pavari, 1933; Giacobbe 1939; Biondi, 1972, 1982; Anzalone & *al*., 1977; Brullo & Guarino 1998; Biondi & *al*., 2002; Filibeck, 2006); Sicily (Brullo & Marcenò, 1985; Gianguzzi & *al*., 1996); Sardinia (Chiappini 1960, Bacchetta & *al*., 2007); Iberian peninsula (Días González & Fernández Prieto 1974; Rivas-Martínez, 1975; Bueno Sánchez & Fernández 1991; Loidi & *al*., 1997; Rodríguez Guitián & *al*., 2007); Creete (Barbero & Quezel, 1980); Greece (Barbero & Quezel, 1978).
Quercus suber	Central Italy, near Fossanova Latina (Lucchese, 1996).
Quercus calliprinos	Palestine (Zohary, 1960); Greece (Knapp, 1965).
B) DECIDUOUS WOODLAND	
Quercus pubescens	Italian penisula (Biondi 1982; Ubaldi & *al*., 1984; Ubaldi 1988; Filibeck, 2006); Southern France (Barbero & Quezel, 1994).
Quercus robur	Central Italy in Tuscany, in Migliarino and S. Rossore forests (Montelucci, 1964); northwest of Iberian peninsula (*Blechno spicant-Quercetum roboris* subass. *lauretosum nobilis*; Rodríguez Guitián & *al*., 2007).
Quercus cerris	Lazio (Lucchese, 1992; Filibeck, 2006).
Quercus virgiliana	Central Italy (Montelucci, 1946); southeastern Sicily (*Lauro nobilis-Quercetum virgilianae*; Brullo & *al*., 2001).
Quercus ichnusae	Sardinia (*Ornithogalo pyrenaici-Quercetum ichnusae* subass. *lauretosum nobilis*; Bacchetta & *al*., 2007).
Quercus canariensis	Nordafrica (Barbero & al., 1981; Barbero & Quezel, 1994).
Carpinus betulus	Central Italy in Lazio coastal area, in Bracciano and Tolfa mountains (Spada, 1977; Lucchese & Pignatti, 1990).
Ulmus minor	Central Italy in Lazio (Leporatti & Lattanzi, 1996).
Ostrya carpinifolia and *Tilia platyphyllos*	Sicily in Peloritani mountains (Bartolo & *al*., 1990).
C) RIPARIAN WOODLANDS	
Alnus glutinosa	Northern Italy (Brullo & Guarino, 1998).
Populus canescens	Central Italy in Marche and Umbria, (Allegrezza & *al*., 2006).
Salix pedicellata and Populus nigra	Northwestern Sicily (*Ulmo canescentis-Salicetum pedicellatae*; Brullo & Spampinato, 1990).
Salix atrocinerea	Sardinia (*Myrto communis-Salicetum atrocinereae* subass. *lauretosum nobilis*; BACCHETTA & *al*., 2007).
Fraxinus angustifolia subsp. *oxycarpa*	Albany (Karpati & Karpati , 1961); Italian peninsula (Pedrotti & Gafta, 1992).
Liquidambar orientalis	Southern Anatolia (Akman & *al*., 1978; 1993).

around Palermo, in Oreto valley (GIANGUZZI & *al*., 1995); -the Hyblaean mountains, along the slopes of Mount Lauro (BRULLO & *al*., 2001); -in the Nature Reserve *Grotta di Santa Ninfa* (PASTA & LA MANTIA, 2001); -Nebrodi, near Frazzanò (GIANGUZZI, 1999; BRULLO & *al*., 2002); -Vallone Cerasa in Mezzojuso (BRULLO & *al*., 2002); -Bosco della Ficuzza (BRULLO & SPAMPINATO 1990; GIANGUZZI, 2004); -Erice mountain (SCUDERI, 2006).

A census has been already taken of most of these biotopes in the context of the research project on priority habitats in Italy (Council Directive 92/43/EEC), under the coordination of the Italian Botanical Society, on behalf of the Ministry of Environment (BRULLO & *al*., 2002).

PHYTOSOCIOLOGY AND SYNTAXONOMY

From the phytosociological point of view, the first described syntaxon relative to a bay laurel formation is the *Hedero helicis-Lauretum nobilis*, -proposed by BUENO SÁNCHEZ & FERNÁNDEZ PRIETO (1991) - occurring along the Atlantic coasts of the Iberian peninsula, between Cantabria and Asturias. The association is described as pre-forest edaphophilous and calcicolous vegetation, occurring on rocky outcrops, included in the *Pistacio-Rhamnetalia alaterni* order. In other studies the syntaxon is refers to *Arbuto-Laurion nobilis*, a new alliance, including shrubby and woody vegetation aspects abundant in laurophyllous species, with a shade-loving character, occurring in an oceanic bioclimate (RIVAS MARTÍNEZ & LOIDI, 1988; LOIDI & *al*., 1997; RIVAS-MARTÍNEZ & *al*., 1999).

Another laurel association - described on the basis of a single survey - was proposed by DÍAZ GONZÁLEZ & FERNÁNDEZ PRIETO (1994), as *Calluno vulgaris-Lauretum nobilis* (PRIETO & *al*., 1994), a thermophilous and subalophilous formation, occurring along the Galician and Asturian coasts. The association was subsequently reconfirmed by ÁLVAREZ ARBESÚ (2005) and RODRÍGUEZ GUITIÁN & *al*. (2007) who also clarify its floristic characterization. According to these authors, the coenosis is typical in particular of a thermotemperate thermotype (with an ombrotype ranging from upper-sub-humid to lower-humid), in soils developed from *in situ* alteration of siliceous rocks.

On the data from the above-quoted chart presented by BUENO SÁNCHEZ & FERNÁNDEZ PRIETO (1991), once more DÍAZ GONZÁLEZ & FERNÁNDEZ PRIETO, 1994) *Hedero helicis-Lauretum nobilis* is differentiated into two sub-associations: the *lauretosum nobilis* (referring to the typical aspect, related to decidedly coastal and more or less salty environments) and the *euphorbietosum amygdaloidis* (more typical of inland areas).

A third association -recently proposed by HORNADO & *al*. (2003)- is *Omphalodo nitidae-Lauretum nobilis*, occurring over siliceous substrata in north-east Portugal.

More recently, RODRÍGUEZ GUITIÁN & *al*. (2007), in a study on lauroid formations in the Cantabrian mountains (northeast Iberia), proposed, two further Laurel associations for this area: *Tamo communis-Lauretum nobilis* - calcicolous coenosis, already known sub *Hedero helicis-Lauretum nobilis euphorbietosum amygdaloidis* (DÍAZ GONZÁLEZ & FERNÁNDEZ PRIETO, 1994) - and *Holco mollis-Lauretum nobilis*, with an acid-loving character.

Other similar vegetation aspects with *L. nobilis* have been indicated for the Balearic Islands, in the Serra de Tramuntana of Majorca (MORAGUES & MORAGUES, 2004). However, no phytosociological data or syntaxonomic reference was cited in the study. Among other species, it refers to the presence of *Hedera helix, Ruscus aculeatus, Viburnum tinus* and *Asplenium onopteris*.

In the Mediterranean area, further laurel vegetation is cited by BRULLO & *al*. (2001) for south east Sicily (Hyblaean mountains), and refers to *Hedero helicis-Lauretum nobilis*, an association indicated also for Kefalonia Island (Greece), based on the surveys of BOLÒS & *al*. (1996).

Further laurel associations, occurring in oceanic climate, have recently been described in Italy and included in the alliance *Fraxino orni-Quercion ilicis* (*Quercetalia ilicis*). They are: *Rusco hypoglossi-Lauretum nobilis* (BIONDI & *al*., 2004), occurring in the central Apennines; -*Fraxino orni-Lauretum nobilis*, indicated for the

hilly area of the Adriatic sector (ALLEGREZZA & *al*., 2006); - *Celtido australis-Lauretum nobilis* (BACCHETTA & *al*., 2007), localized on effusive and metamorphic volcanic substrata in central and north-west Sardinia.

DATA AND METHODS

The distributional update of vegetation aspects for the habitat "Arborescent Matorral with *Laurus nobilis* (5230)" in Sicily, was carried out based on bibliographical data and field research (Figure 1). Table 2 shows the main characteristics of these sites, in addition to information about altitude, geolithological and bioclimatic data. Grid references used refers to the *Floristic Map of Central Europe* (PIGNATTI, 1978).

Vegetation analysis, carried out according to the classic sigmatist method of the Zurigo-Montpellier school (BRAUN-BLANQUET, 1932), was based on 18 phytosociological relevés, as well as on other available bibliographic data concerning the vegetation aspect of Mount Lauro (BRULLO & *al*., 2001).

In order to make floristic-phytocoenotic comparisons, we considered further *L. nobilis* communities described for the Mediterranean and Atlantic areas whose data are summarized in synthetic columns of Table 4. These refer in particular to the aspects reported in BRULLO & *al*. (2001) for the Hyblaean area (SE Sicily), as well as to aspects proposed for associations already described on the Italian peninsula (ALLEGREZZA & *al*., 2006) and the Iberian peninsula (BUENO SÁNCHEZ & FERNÁNDEZ PRIETO, 1991; DÍAZ GONZÁLEZ & FERNÁNDEZ PRIETO, 1994; HONRADO & *al*., 2003; RODRÍGUEZ GUITIÁN & *al*., 2007).

Taxonomic nomenclature of the species in Table 3 refers to PIGNATTI (1982) and to the more recent updates reported in the checklist of CONTI & *al*. (2005). Nomenclature of the other taxa in Table 4 follows CASTROVIEJO & *al*., (1986-2003) and TUTIN & *al*., 1964-80 and 1993.

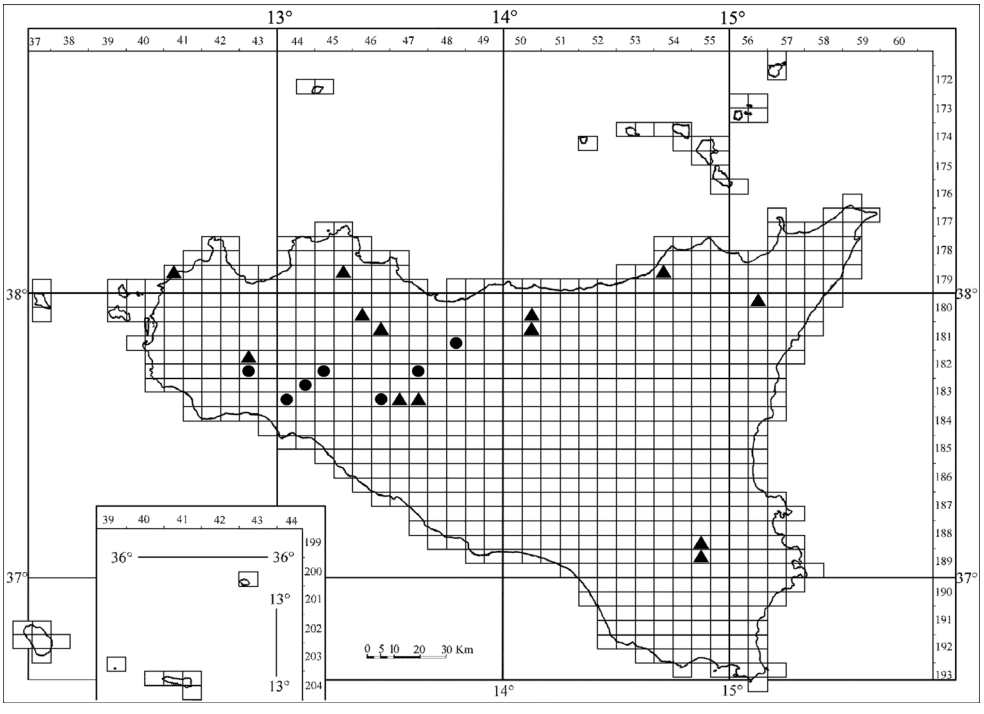

Figure 1. – Distribution of *Laurus nobilis* woodlands in Sicily (triangles refer to previously known sites from bibliography; circles indicate the new and unpublished sites).

Table 2
General data of studied sites.

Site Locality	Mean elevation (m s.l.m.)	Surface (m^2)	Lithology	Thermotype and ombrotype (Mediterranean pluviseasonal ocanic bioclimate)
Santa Ninfa (TP), Contrada Biviere	450	250	Gypseous clay	Mesomediterranean lower subhumid
Partanna (TP), Vallone Binaia in Contrada Stretto	280	1.500	Gypseous clay	Thermomediterranean lower subhumid
Sambuca di Sicilia (AG), Contrada Arancio	300	6.000	Limestones	Thermomediterranean upper dry
Sambuca di Sicilia (AG), Contrada Menta	80	8.000	Clays and limestone marls	Thermomediterranean lower subhumid
Bivona (AG), Torrente Alba	615	1.000	Limestone marls	Mesomediterranean lower subhumid
Menfi (AG), Monte Arancio	330	3.000	Calcarenites and sands	Thermomediterranean upper dry
Sciacca (AG), Lago Arancio	240	2.000	Calcarenites and sands	Thermomediterranean upper dry
Bisacquino (PA), Contrada Alvano	375	400	Marls and sandy clays	Thermomediterranean lower subhumid
Bisacquino (PA), Contrada Gallinaro	475	300	Sandy clays	Thermomediterranean lower subhumid
Castronovo di Sicilia (PA), Ponte Morello	450	300	Clayey marls and alluvium	Mesomediterranean upper dry
Montemaggiore Belsito (PA), Bosco della Favara	800	300	Sandstone	Mesomediterranean upper dry
Buccheri e Buscemi (SR), Monte Lauro	700	500	Limestone marls	Mesomediterranean upper dry

RESULTS AND DISCUSSION

From the elaboration of *L. nobilis* relevés of the vegetation -carried out in different Sicilian sites (Table 3)- and from comparison with the synthetic columns referring to the other *L. nobilis* coenosis already noted (Table 4), it can be seen that there is a clear syntaxonomic independence of the formations in the study. Based on the floristic, phytogeographical and ecological peculiarities of the Sicilian aspects we propose that they should be attributed to a new association *Acantho mollis-Lauretum nobilis ass. nova hoc loco* (Table 3, *holotypus* rel. 14), that we consider as vicariant for the south-central Mediterranean area.

The association is dominated by *L. nobilis*, and shows a relevant abundance of some other laurophyllous species (*Hedera helix, Rhamnus alaternus* subsp. *alaternus, Ruscus aculeatus, Smilax aspera* and sometimes also *Viburnum tinus*), lianas (*Rubia peregrin*a var. *longifolia, Asparagus acutifolius, Tamus communis, Clematis vitalba, Calystegia sylvatica* and *Rubus ulmifolius*) together with few other broad-leaved grasses in the undergrowth such as *Acanthus mollis* and *Cyclamen hederifolium* subsp. *confusum*. The last two entities are both included in the characteristic species combination, together with *Pistacia terebinthus* and *Orobanche hederae*.

Data in Table 3 reveal an extreme floristic poverty of *L. nobilis* woodland, since their tree layer markedly reduces light intensity at the soil level. In the undergrowth, grasses and ferns are rather reduced,

Table 3

Acantho mollis-Lauretum nobilis ass. nova

(*Arbuto unedonis-Laurion nobilis, Pistacio lentisci-Rhamnetalia alaterni, Quercetea ilicis*)

Biotypes																			Frequency	Synthetic relevé
	Elevation (m a.s.l.)	345	240	455	445	449	580	617	620	610	375	383	375	305	588	370	475	302	600		
	Slope (°)	20	18	20	10	35	25	20	10	7	8	70	60	18	30	10	30	10	5		
	Exposure	N	NE	W	E	N	S	NE	S	S	N	E	E	NE	S	N	E	N	S		
	Area (m^2)	100	100	80	80	80	80	80	100	100	100	150	120	100	80	100	100	100	100		
	Total coverage (%)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	95	100	100	100		
	Tree layer cov. (%)	100	100	100	100	100	90	90	100	100	90	100	95	100	90	80	100	100	80		
	Shrub layer cov. (%)	30	40	30	20	60	70	80	40	50	60	20	20	50	70	70	30	30	70		
	Grass layer cov. (%)	40	40	10	10	20	30	50	15	20	50	20	20	50	45	60	10	45	20		
	Mean height of veg. (m)	6	8	6	6	5	5	6	12	11	6	11	8	12	5	5	6	8	9		
	N. species	18	18	19	19	20	21	21	21	22	21	23	23	23	22	23	23	25	31		
	N. relevé	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		
	Characteristics of assoc.																				
P	*Laurus nobilis*	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	18	V
P	*Hedera helix*	4	3	.	.	+	2	3	3	3	2	2	3	4	1	1	1	4	3	16	V
	Characteristics and differentials of assoc.																				
H	*Acanthus mollis*	2	2	3	2	2	1	+	3	2	3	3	2	2	2	3	3	1	2	18	V
G	*Cyclamen hederifolium* subsp. *confusum*	2	1	1	+	+	+	.	1	1	1	1	1	+	1	+	+	2	2	17	V
P	*Pistacia terebinthus*	2	1	.	1	1	1	2	.	1	.	1	.	1	2	.	1	.	.	10	III
T	*Orobanche hederae*	+	.	.	+	.	+	+	.	.	.	+	+	.	+	.	.	.	.	6	II
	Characteristics of *Pistacio-Rhamnetalia* and *Quercetea ilicis*																				
NP	*Asparagus acutifolius*	1	1	1	2	2	2	1	+	1	2	+	1	1	2	1	2	1	1	18	V
P	*Rubia peregrina* subsp. *longifolia*	+	1	1	1	1	+	1	1	1	1	+	1	1	1	1	1	1	2	18	V
G	*Arisarum vulgare*	+	+	+	1	1	1	1	+	1	1	1	1	1	1	1	+	1	+	18	V
G	*Allium subhirsutum*	1	+	1	1	+	+	+	1	2	+	.	+	1	+	+	+	+	1	17	V
NP	*Smilax aspera*	.	2	3	2	1	+	.	1	+	2	2	2	1	.	2	3	.	1	14	IV
G	*Tamus communis*	.	1	1	1	.	.	+	1	1	2	.	+	+	+	1	+	+	1	14	IV
NP	*Euphorbia characias*	.	.	.	.	.	+	.	.	+	+	.	.	+	+	+	+	1	+	9	III
P	*Rhamnus alaternus*	.	1	1	2	.	+	2	.	.	.	1	1	.	3	.	.	1	.	9	III
NP	*Osyris alba*	.	1	.	.	.	+	+	2	2	.	.	.	.	+	.	1	.	+	8	III
NP	*Rosa sempervirens*	.	.	.	.	.	.	.	1	1	.	+	+	.	1	.	2	.	1	7	II
P	*Fraxinus ornus*	.	.	1	.	2	1	.	.	.	1	1	.	.	.	.	.	.	.	5	II
P	*Quercus virgiliana*	.	.	.	1	.	.	.	.	1	.	.	.	.	.	.	+	.	1	4	II
H	*Carex distachya*	.	.	.	.	.	.	.	1	+	.	+	.	.	.	.	.	.	+	4	II
P	*Celtis australis*	.	.	.	.	.	1	.	.	.	.	1	.	.	.	1	.	.	.	3	I
P	*Chamaerops humilis*	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	1	.	2	I
G	*Ruscus aculeatus*	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	1	.	.	2	I
H	*Asplenium onopteris*	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	I
P	*Quercus ilex*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	1	I
P	*Viburnum tinus*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	1	I
P	*Rhamnus oleoides*	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	I
	Trasgressives of *Salici-Populetea*																				
G	*Arum italicum*	1	1	1	1	+	1	.	.	.	+	+	.	1	1	+	+	+	.	13	IV
P	*Ficus carica* var. *caprificus*	1	1	.	.	1	.	.	1	.	.	1	1	1	.	.	.	1	1	9	III
P	*Populus nigra*	.	.	.	.	.	.	.	1	.	.	2	2	.	.	.	.	1	1	5	II
H	*Brachypodium sylvaticum*	+	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	+	+	5	II
P	*Ulmus minor*	.	1	.	.	.	.	.	.	.	.	1	2	.	.	.	.	.	+	4	II
H	*Carex pendula*	.	.	.	.	.	.	.	.	1	.	.	+	.	.	.	.	.	1	3	I

	N. relevé	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		
P	*Populus alba*	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	2	.	2	I
P	*Salix pedicellata*	.	.	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	2	I
P	*Tamarix africana*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	1	I
P	*Sambucus nigra*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	1	I
NP	*Solanum dulcamara*	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	1	I
G	*Equisetum telmateja*	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	1	I
NP	*Hypericum hircinum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1	I
	Trasgressives of *Rhamno-Prunetea*																				
NP	*Rubus* gr. *ulmifolius*	2	1	1	2	3	2	2	1	2	2	+	1	1	2	2	1	2	2	18	V
P	*Clematis vitalba*	.	.	2	2	1	+	.	1	1	2	1	.	.	1	1	1	.	1	12	IV
H	*Calystegia sylvatica*	.	1	.	.	.	+	.	1	+	1	.	.	+	.	+	+	+	1	10	III
P	*Prunus spinosa*	.	.	.	.	.	.	+	.	.	1	.	.	.	1	2	.	+	.	5	II
P	*Crataegus monogyna*	.	.	.	.	.	.	.	.	1	.	.	.	1	.	.	.	1	+	4	II
NP	*Rhus coriaria*	.	.	.	.	1	.	1	.	.	.	.	.	.	.	.	.	.	.	2	I
P	*Pyrus spinosa*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	2	I
NP	*Rosa canina*	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1	I
	Companions																				
H	*Smyrnium olusatrum*	1	+	.	.	.	+	+	1	.	1	.	.	1	+	1	.	+	+	11	IV
H	*Piptatherum miliaceum*	+		.	.	.	.	1	.	.	.	.	.	.	1	+	+	+	.	6	II
G	*Arundo collina*	.	.	1	1	1	.	.	.	.	.	+	.	.	.	.	.	.	.	4	II
H	*Ampelodesmos mauritanicus*	.	.	.	.	.	.	.	.	.	1	+	.	.	.	1	.	1	.	4	II
G	*Oxalis pes-caprae*	.	.	+	+	+	.	.	.	.	.	.	.	.	.	.	1	.	.	4	II
H	*Parietaria judaica*	.	.	.	.	.	.	+	+	.	.	.	.	+	.	.	.	.	+	4	II
G	*Allium triquetrum*	.	.	.	.	.	.	.	.	.	+	+		.	.	+	.	.	.	3	I
G	*Adiantum capillus-veneris*	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	r	2	I
H	*Carex divulsa*	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	2	I
H	*Polypodium cambricum* subsp. *serrulatum*	.	.	.	.		.	.	.	.	.	+	+	.	.	.	.	.	.	2	I

Companions: *Cirsium scabrum* 1 in 1; *Thalictrum calabricum* + in 4; *Euphorbia ceratocarpa*+ in 5; *Biarum tenuifolium* 1 in 7; *Ballota rupestris*+ in 9; *Arundo donax* 1 in 13; *Dorycnium rectum* + in 13; *Ferula communis* + in 14; *Geranium robertianum, Picris echioides* and *Polypogon viridis* + in 18.

Localities:1: Menfi, Agrigento, Arancio Mountain, 14.11.2007; 2: Sciacca, Agrigento, eastern from the weir of the Lake Arancio, 14.11.2007; 3-4: Castronovo di Sicilia, Palermo, Ponte Morello, 8.05.2007; 5 : Nature Reserve S. Ninfa, Trapani, Contrada Biviere, 14.05.2007; 6-7: Sambuca di Sicilia, Palermo, Contrada Menta, 5.12.2006; 8-9: Bivona, Agrigento, Torrente Alba, 24.05.2007; 10: Sambuca di Sicilia, Palermo, Contrada Menta, 5.12.2006; 11-12: Partanna, Trapani, Vallone Binaia, in Contrada Stretto, 20.03.2008; 13: Sambuca di Sicilia, Agrigento, Contrada Arancio, 14.11.2007; 14: Sambuca di Sicilia, Palermo, Contrada Menta, 5.12.2006 *holotypus ass*.; 15: Bisacquino, Agrigento, Contrada Alvano, 4.05.2007; 16: Bisacquino, Agrigento, Contrada Gallinaro, 4.05.2007; 17: Sambuca di Sicilia, Agrigento, Contrada Arancio, 14.11.2007; 18: Bivona, Agrigento, Torrente Alba, 24.05.2007.

as compared to a notable abundance of bryophytes and lichens. A considerable presence of shaded leaves can be observed in the same *L. nobilis* individuals - together with dried leaves on lower branches, showing cortical necrosis caused by fungi.

Regarding the phytosociological floristic aspect, there is an abundance of elements from *Quercetea ilicis* (the following also appear, in addition to the already-listed species: *Euphorbia characias, Osyris alba, Carex distachya*, etc.), *Salici purpureae-Populetea nigrae* (*Arum italicum, Ficus carica* var. *caprificus, Populus nigra, Populus alba, Salix pedicellata, Sambucus nigra*, etc.) and *Rhamno-Prunetea* (*Rubus ulmifolius, Clematis vitalba, Prunus spinosa, Crataegus monogyna*, etc.).

Following the syntaxonomic classification proposed by other authors (Brullo & *al*., 2001; Rodríguez Guitián & *al*., 2007), the coenosis was referred to the *Arbuto unedonis-Laurion nobilis* alliance and to the order *Pistacio lentisci-Rhamnetalia alaterni*.

Table 4
Simplified synoptic table of Laurus nobilis communities in Mediterranean and Atlantic area

Number of relevés	18	10	15	4	7	1	1	41	27	4	19	21	9	9
Number of table	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Characteristics and differentials of assoc.														
Laurus nobilis	V	V	V	4	V	5	4	V	V	4	V	V	V	V
Hedera helix	V	V	V	4	V	2	3	V	V	4	V	V	.	V
Acanthus mollis	V	V	I	.	.	.	.	.	.	.	.	.	.	.
Cyclamen hederifolium subsp. *confusum*	V	V	.	.	.	.	.	.	.	.	.	.	.	.
Pistacia terebinthus	III	II	.	.	.	.	.	.	.	.	.	.	.	.
Orobanche hederae	II	I	I	.	.	.	.	.	.	.	.	.	.	.
Celtis australis	I	III	III	.	.	.	.	.	.	.	.	.	.	.
Ficus carica var. *caprificus*	II	II	III	.	.	.	.	.	.	.	.	.	.	.
Cyclamen repandum	.	.	II	.	.	.	.	.	.	.	.	.	.	.
Fraxinus ornus	I	.	.	3	.	.	.	.	.	.	.	.	.	.
Cyclamen hederifolium	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Daucus gummifer	.	.	.	.	II	.	.	.	.	.	.	.	.	.
Asparagus prostratus	.	.	.	.	I	.	.	.	.	.	.	.	.	.
Rumex biformis	.	.	.	.	II	.	.	.	.	.	.	.	.	.
Leucanthemum crassifolium	.	.	.	.	II	.	.	.	.	.	.	.	.	.
Genista occidentalis	.	.	.	.	IV	.	.	.	.	.	.	.	.	.
Lithodora diffusa	.	.	.	.	IV	.	.	.	.	.	.	.	.	.
Silene divaricata	.	.	.	.	III	.	.	.	.	.	.	.	.	.
Vincetoxicum hirundinaria	.	.	.	.	II	.	.	.	.	.	.	.	.	.
Carduus argemone	.	.	.	.	II	.	.	.	.	.	.	.	.	.
Scabiosa columbaria	.	.	.	.	I	.	.	.	.	.	.	.	.	.
Crepis albida	.	.	.	.	I	.	.	.	.	.	.	.	.	.
Dianthus monspessulanum	.	.	.	.	I	.	.	.	.	.	.	.	.	.
Rumex acetosa subsp. *biformis*	.	.	.	.	.	.	+	I	II	.	.	.	.	.
Silene uniflora	.	.	.	.	.	.	+	I	II	.	.	.	.	.
Leucanthemum pluriflorum	.	.	.	.	.	.	+	I	II	.	.	.	.	.
Crithmum maritimum	.	.	.	.	I	.	.	.	III	.	.	.	.	.
Festuca rubra subsp. *pruinosa*	.	.	.	.	.	.	1	.	III	.	.	.	.	.
Calluna vulgaris	.	.	.	.	.	.	3	.	.	.	.	.	.	.
Daucus carota subsp. *gummifer*	.	.	.	.	.	.	.	.	I	.	.	.	.	.
Inula crithmoides	.	.	.	.	.	.	.	.	I	.	.	.	.	.
Brassica oleracea var. *sylvestris*	.	.	.	.	.	.	.	.	I	.	.	.	.	.
Armeria maritima	.	.	.	.	.	.	.	.	I	.	.	.	.	.
Asplenium marinum	.	.	.	.	.	.	.	.	I	.	.	.	.	.
Mercurialis perennis	.	.	.	.	II	.	.	I	I	2	II	I	.	II
Iris foetidissima	.	.	.	.	II	.	.	.	III	1	II	III	.	.
Cornus sanguinea	.	.	.	2	III	+	.	.	.	3	.	II	.	.
Phyllitis scolopendrium	.	.	.	.		.	.	I	II	.	II	III	.	I
Primula acaulis	.	.	.	.	.	.	.	I	II	.	.	I	.	I
Hypericum androsaeum	.	.	.	.	.	.	.	.	I	.	I	I	I	.
Ilex aquifolium	.	.	.	.	.	.	.	.	I	.	.	II	.	I
Fraxinus excelsior	.	.	.	.	.	+	.	.	.	.	.	III	.	.
Omphalodes nitida	.	.	.	.	.	.	+	I	I	.	.	.	III	II
Athyrium filix foemina	.	.	.	.	.	.	.	I	I	.	.	I	IV	I
Salix atrocinerea	.	.	.	.	.	.	.	I	.	.	.	.	III	I
Osmunda regalis	.	.	.	.	.	.	.	.	I	.	.	.	IV	.
Acer pseudoplatanus	.	.	.	.	.	.	.	.	.	.	.	I	II	.
Blechnum spicant	.	.	.	.	.	.	.	.	.	.	.	.	III	I
Woodwardia radicans	.	.	.	.	.	.	.	.	.	.	.	.	III	.
Frangula alnus	.	.	.	.	.	.	.	.	.	.	.	.	II	.
Fraxinus angustifolia	.	.	.	.	.	.	.	.	.	.	.	.	II	.
Hedera hibernica	.	.	.	.	.	.	.	.	.	.	.	.	V	.

Number of table	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Saxifraga spathularis	.	.	.	.	.	.	.	.	.	.	.	I	II	III
Crepis lampsanoides	.	.	.	.	.	.	.	.	.	.	.	I	I	II
Dryopteris affinis	.	.	.	.	.	.	.	.	.	.	.	.	III	III
Holcus mollis	.	.	.	.	.	.	.	.	II	.	.	.	.	IV
Oxalis acetosella	.	.	.	.	.	.	.	.	.	.	.	I	.	II
Rumex acetosa	.	.	.	.	.	.	.	.	.	.	.	.	.	II
Dryopteris dilatata	.	.	.	.	.	.	.	.	.	.	.	.	.	II
Characteristics of *Pistacio-Rhamnetalia* and. *Quercetea ilicis*														
Rubia peregrina s.l.	V	IV	II	4	V	+	1	IV	V	4	IV	IV	II	II
Smilax aspera	IV	III	IV	3	V	2	2	IV	III	4	V	V	.	I
Ruscus aculeatus	I	V	IV	.	IV	1	+	III	IV	4	IV	IV	V	III
Tamus communis	IV	I	V	.	IV	+	.	III	IV	4	II	V	II	IV
Asplenium onopteris	.	I	IV	.	II	.	.	V	IV	.	III	III	V	III
Rosa sempervirens	II	IV	II	1	I	+	.	.	I	1	.	I	.	.
Rhamnus alaternus	III	V	II	.	III	+	.	.	I	3	III	III	.	.
Osyris alba	III	III	.	.	II	.	.	.	.	.	I	I	I	.
Asparagus acutifolius	V	III	IV	4	.	.	.	.	.	.	.	.	.	.
Erica arborea	.	.	.	.	.	.	.	I	I	.	.	.	II	I
Arisarum vulgare	I	.	III	.	.	.	.	.	.	.	.	I	.	.
Arbutus unedo	.	.	.	.	.	.	.	.	I	.	.	.	III	I
Carex distachya	III	.	I	.	.	.	.	.	.	.	.	.	.	.
Anagyris foetida	I	I	.	.	.	.	.	.	.	.	.	.	.	.
Clematis cirrhosa	.	II	I	.	.	.	.	.	.	.	.	.	.	.
Quercus ilex	.	I	.	.	.	.	.	.	.	.	I	.	.	.
Phillyrea latifolia	.	.	III	.	.	.	.	.	.	.	.	.	.	I
Euphorbia characias	III	.	.	.	.	.	.	.	.	.	.	.	.	.
Quercus virgiliana	I	.	.	.	.	.	.	.	.	.	.	.	.	.
Viburnum tinus	I	.	.	.	.	.	.	.	.	.	.	.	.	.
Viola alba subsp. dehnhardtii	.	I	.	.	.	.	.	.	.	.	.	.	.	.
Asparagus albus	.	.	.	3	.	.	.	.	.	.	.	.	.	.
Cyclamen hederifolium	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Quercus suber	.	.	.	.	.	.	.	.	I	.	.	.	.	.
Daphne gnidium	.	.	.	.	.	.	.	.	I	.	.	.	.	.
Trasgressives of *Salici-Populetea*														
Arum italicum	IV	IV	II	1	II	+	.	I	II	1	III	III	.	.
Sambucus nigra	I	I	I	4	.	.	.	II	I	.	I	II	.	I
Brachypodium sylvaticum	II	IV	.	.	.	.	.	.	I	.	.	.	II	III
Ulmus minor	II	III	.	1	.	.	.	.	.	.	.	.	.	.
Solanum dulcamara	I	.	.	.	I	.	.	.	.	I	.	.	.	.
Salix pedicellata	II	I	.	.	.	.	.	.	.	.	.	.	.	.
Hypericum hircinum	.	I	I	.	.	.	.	.	.	.	.	.	.	.
Populus nigra	II	.	.	.	.	.	.	.	.	.	.	.	.	.
Vitis vinifera subsp. *sylvestris*	.	.	II	.	.	.	.	.	.	.	.	.	.	.
Salix alba	.	.	I	.	.	.	.	.	.	.	.	.	.	.
Populus alba	.	.	I	.	.	.	.	.	.	.	.	.	.	.
Salix purpurea	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Trasgressives of *Rhamno-Prunetea*														
Rubus gr. *ulmifolius* (incl. *Rubus* sp., col. 6-8)	III	V	IV	4	V	+	+	V	IV	4	IV	V	IV	V
Crataegus monogyna	II	I	I	1	.	+	.	I	III	.	.	II	.	III
Prunus spinosa	III	I	I	.	III	.	.	I	II	2	.	III	.	I
Lonicera periclymenum	.	.	.	.	II	+	1	.	.	1	II	II	III	IV
Clematis vitalba	IV	II	II	2	.	.	.	.	.	.	.	I	.	I
Companions														
Polypodium cambricum	I	.	II	.	IV	.	+	.	I	3	.	II	I	I
Geranium robertianum	I	.	.	.	III	.	.	I	II	3	II	I	.	III
Brachypodium rupestre	.	.	.	.	V	.	.	I	V	4	IV	III	.	II
Parietaria judaica	II	II	.	.	III	.	.	I	IV	II	.	.	.	.

Number of table	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Umbilicus rupestris	I	.	I	.	.	.	.	I	III	.	.	II	.	IV
Asplenium trichomanes	.	.	II	.	I	.	.	.	.	1	I	II	.	III
Teucrium scorodonia	.	.	I	.	.	.	1	III	III	.	.	I	.	IV
Polystichum setiferum	.	.	I	.	.	.	.	III	III	.	I	II	.	III
Quercus robur	.	.	.	.	.	5	.	I	II	.	.	II	IV	III
Pteridium aquilinum	.	.	.	.	.	.	1	III	III	.	II	II	.	III
Corylus avellana	.	.	.	.	.	.	.	.	I	.	I	I	II	II
Viola riviniana	.	.	.	.	.	.	.	.	I	.	I	II	II	III
Castanea sativa	.	.	.	.	.	+	.	.	I	.	.	II	.	II
Asplenium adiantum-nigrum	.	.	.	.	.	.	1	.	III	.	I	II	.	.
Ulex europaeus	.	.	.	.	.	.	1	I	II	.	.	I	.	.

Procedence of relevés: 1: *Acantho mollis-Lauretum nobilis* ass. nov. (Table 1); 2: *Acantho mollis-Lauretum nobilis* ass. nov. (Brullo & *al*., 2001; Table 1); 3: *Celtido australis-Lauretum nobilis* (Bacchetta & *al*., 2007; Table 1, rels. 1-15); 4: *Fraxino orni-Lauretum nobilis* (Allegrezza & *al*., 1991; Table 4); 5 : *Hedero helicis-Lauretum nobilis* (Bueno Sánchez & Fernández Prieto, 1991; Table 3); 6: *Hedero helicis-Lauretum nobilis* (Loidi et *al*. 1997; Table 25, rel. 32); 7: *Calluno vulgaris-Lauretum nobilis* (Días González & Fernández Prieto, 1994; rel. type); 8 : *Calluno vulgaris-Lauretum nobilis* (Álvarez Arbesu, 2005); 9: *Calluno vulgaris-Lauretum nobilis* (Rodríguez Guitián & *al*., 2007; Table 3, rels. 1-27); 10: *Tamo communis-Lauretum nobilis* (Bueno Sánchez & Fernández Prieto, 1991; sub *Hedero helicis-Lauretum nobilis* subass. *euphorbietoum amygdaloidis*); 11: *Tamo communis-Lauretum nobilis* (Álvarez Arbesu, 2005; sub *Hedero helicis-Lauretum nobilis*); 12: *Tamo communis-Lauretum nobilis* (Rodríguez Guitián & *al*., 2007; Table 5, rels. 1-19); 13: *Omphalodo nitidae-Lauretum nobilis* (Honrado & *al*., 2003); 14: *Holco mollis-Lauretum nobilis* (Rodríguez Guitián & *al*., 2007; Table 5, rels. 22-30).

Synecology

Sicily is placed in the Mediterranean Region, Western Mediterranean sub-region, Italo-Thyrrenian Province and in the Siculo sector: its area is characterized by a Mediterranean pluviseasonal oceanic bioclimate (Rivas-Martínez & al., 2002). *L. nobilis* - a species which is notably sensitive to the rigidity of the winter climate, but also well to substantial water stress in the summer - generally dominates woodlands located in inland areas of Thermo-Mesomediterranean thermotypes, with a subhumid ombrotype (mean annual rainfall: 700-800 mm). More specifically, these woodland aspects can be observed on slopes of low inclination (Nature Reserve S. Ninfa, Menfi, Sciacca, Bisacquino, Buccheri), in moist depressions (Sambuca di Sicilia, Montemaggiore Belsito), along river (Bisacquino) or stream beds (Partanna, Bivona, Sambuca di Sicilia) or even in shaded ravines (M. Hyblaean near S. Andrea and Pietra di Valle; Brullo & *al*., 2001).

Laurel is known to prefer a certain soil coolness, although it avoids excessive water stagnation. It often lives on clay and flysh, near limestone outcrops, but sometimes also on gypseus and volcanites. In western and central Sicily these mainly contain brown soil (*Calcixerollic Xerochrepts*), rather humid and rich in detritic materials (Fierotti & *al*., 1988; Fierotti, 1997), associated with clay-rich soil.

In the southern area of the Sicani mountains, bay laurel woodlands shows a marked forest potential, suggesting the species might have been more widespread in the past, before the destruction of the original primary communities to obtain areas for cultivation.

Particularly interesting are the laurel aspects located in Contrada Menta (Sambuca di Sicilia), distributed in a wide area, close to limestone screes. Other similar aspects of the same vegetation were found in the perirparian area near Bivona (Torrente Alba), Partanna (Torrente Binaia in Contrada Stretto) and those located along carbon dorsals near Arancio Lake. These sites are characterized by very old *L. nobilis* stumps, showing signs of antique coppicing, with plenty of branches up to 13-15 metres high, and 30-45 cm in diameter. Individuals of bay laurel are in a good vegetative condition, with abundant fruiting, producing large quantity of seedlings in the undergrowth. Equally interesting are the aspects located in the Hyblaean area, with a continuous and dense structure and with very exuberant individuals (Brullo & *al*., 2001).

Some other bay laurel woodlands monitored in Sicily occupy smaller surfaces, up to 250-400 m^2. These are often scattered and degraded woodlands located in humid and shaded environments or on the edge of rocky outcrops, where they sometimes form luxuriant hedges, thereby enhancing the natural resources, the environment and the landscape, as well as being of use to fauna.

Vegetation series and catenal contacts

L. nobilis woodlands in Sicily often represent the most structured vegetation of an edaphic-hygrophilous series, ascribed to the *Acantho mollis-Lauro nobilis* sigmetum (Figure 2). This is dynamically related to mantle vegetation with *Rubus ulmifolius* (*Roso sempervirentis-Rubetum ulmifolii*), in which common species are *Prunus spinosa, Pyrus amygdaliformis, Rosa canina, Clematis vitalba, Rosa sempervirens*, etc. Close to rivers - often in high slope areas - bay laurel woodland appears at times with riparian vegetation of the series of *Populus nigra* and *Salix pedicellata* (*Ulmo canescentis-Salico pedicellatae* sigmetum).

On deeper soils with high clay content, *L. nobilis* woodland makes catenal contact with *Quercus virgiliana sigmetum* (*Lauro-Querco virgiliane* sigmetum), whose more structured aspect is represented by deciduous woodland of *Lauro nobilis-Quercetum virgilianae*. This association, described for south-eastern Sicily (Brullo & *al*., 2001), was also found in some scattered areas of the Sicani mountains, impoverished by humans in order to obtain fields for cultivation (Figure. 2).

Along the screes located at the base of limestones reliefs, the *Acantho mollis-Lauro nobilis* sigmetum also shows catenal contact with the *Quercus ilex* vegetation series (*Rhamno alaterni-Querco ilicis* sigmetum). In the study area of the Sicani mountains, this latter series is represented by *Quercus ilex* woodland referred to *Rhamno alaterni-Quercetum ilicis* subass. *pistacietosum terebinthi*; thickets with a predominance of *Pistacia terebinthus*; *Rhus coriaria* shrublands; *Ampelodesmos mauritanicus* grassland (*Helictotricho convoluti-Ampelodesmetum*); and therophytic grassland referred to the alliance *Trachynion distachyae*.

Close to limestone cliffs, the laurel vegetation makes catenal contact with *Rhamno alaterni-Eu-*

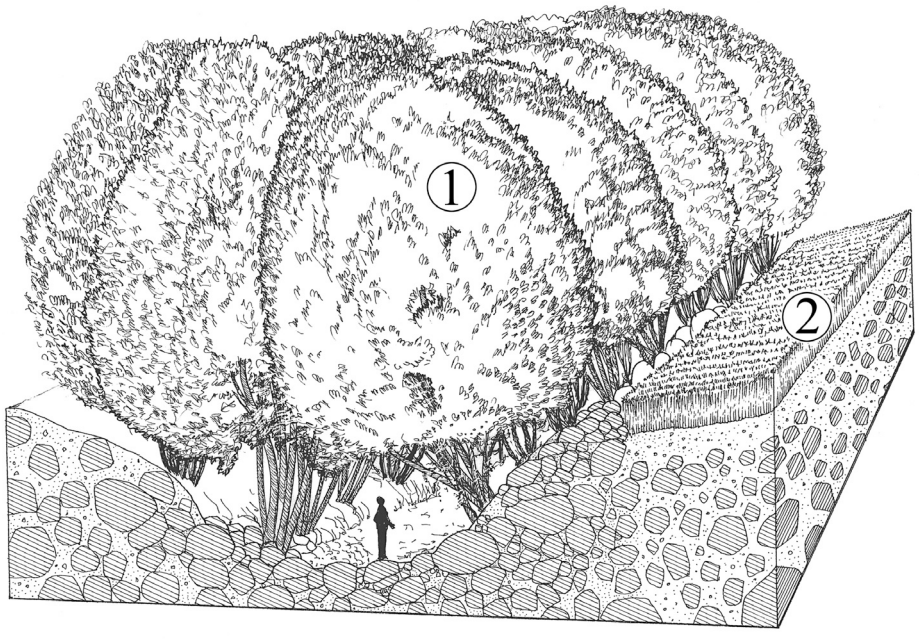

Figure 2.– Schematic block of vegetation: 1 - *Laurus nobilis* woodland (*Acantho mollis-Lauretum nobilis*); 2 - Cultivated field weed communities (*Legousio hybridae-Biforetum testiculatae*).

phorbio dendroidis euphorbietoso bivonae sigmetosum, located along xeric rocky outcrops, and represented by sclerophyllic and summer deciduous vegetation with *Olea europaea* var. *sylvestris* and *Euphorbia dendroides* (*Rhamno alaterni-Euphorbietum dendroidis* subass. *euphorbietosum bivonae*); *Hyparrhenia hirta* grassland (*Hyparrhenietum hirto-pubescentis*); and therophytic communities referred to the alliance *Trachynion distachyae*.

Conservation aspects

Council Directive 92/43/EEC, whose aim is the conservation of species and habitats biodiversity in Europe, considers "Arborescent Matorral with *Laurus nobilis*" (5230) to be, a priority habitat of Community importance. In a recent study carried out by the Italian Botanical Society (2002), only 25 sites were listed on the whole national territory: therefore the unpublished sites of the present paper serve as a contribution to the national list since they represent the best preserved and most extensive sites.

This vegetation is located in the Sicani mountains, and particularly in Sambuca di Sicilia (Contrada Menta) and Bivona (Torrente Alba). The first of these is included in Monte Genuardo and the Santa Maria del Bosco Nature Reserve, where one of the patches extends for almost one hectare (Figure 3). The second refers to another consistent laurel community extending for 6000 m², locally known as "Viale degli Allori" (Laurel Avenue), which refers to dense and intricate vegetation located along a stream. In both cases these are residual woodlands with large polycormic *L. nobilis* individuals, 12-14 metres in height, fortunately saved from the intense transformation of the territory. Considering the singularity, rarity and environmental-naturalistic importance of the coenosis, these sites should be given more appropriate protection, starting with the sites not included in protected areas.

Figure 3.– *Laurus nobilis* woodland in "Monte Genuardo and S. Maria del Bosco Nature Reserve" (Sambuca di Sicilia).

The main risks are related to this laurel vegetation's own ecology, which is closely dependent on a particular microclimate and hydrogeology of the same biotopes, and rapidly feel the effects of anthropic alterations (hydric regulation, lowering of water levels, etc.). It is also necessary to restrict coppicing and cutting, to provide continuous monitoring of the ecological factors, and eventually also a series of recovery and/or restoration measures in order to maintain this unique relict forest vegetation.

CONCLUSIONS

Laurophyll vegetation is typical of subtropical climates with low seasonality. This climate currently occurs in some areas of the world such as Japan, China, Eastern Australia, Florida, Canary Islands, Argentina and in Natal, South Africa (PIGNATTI & NIMIS, 1995). *Laurus nobilis* woodlands in the Mediterranean region can be considered as "fragments" of vegetations widely occurring in warm and humid climate periods, isolated, as documented by the fossil record, some of them found in Sicily (BÉGUINOT, 1929; GIACOBBE, 1939; TORNABENE, 1859; PASTA, 2006). *L. nobilis* is indeed considered a residual element of an ancient Tertiary flora, re-adapted to the inside of the forest consortiums which colonized the territory after the Pleistocene climate changes (SCHMID, 1949; GIACOMINI & FENAROLI, 1958; MONTELUCCI, 1977; PALAMAREV, 1989; PIGNATTI, 1995; BARBERO & QUEZEL, 1994; FILIBECK & *al*., 2004; FILIBECK, 2006). The subsequent regression of this vegetation was presumably also caused by human activities such as deforestation and cultivation of the warm, moist and productive valley bottoms near humid zones, where relictual woodlands of *L. nobilis* can be found (GIANGUZZI, 2004).

The recognition of the *Acantho mollis-Lauretum nobilis* in Sicily is of particular phytogeographic interest, as well has having certain naturalistic-environmental value. The association interpreted as a southern vicariant of other coeno-

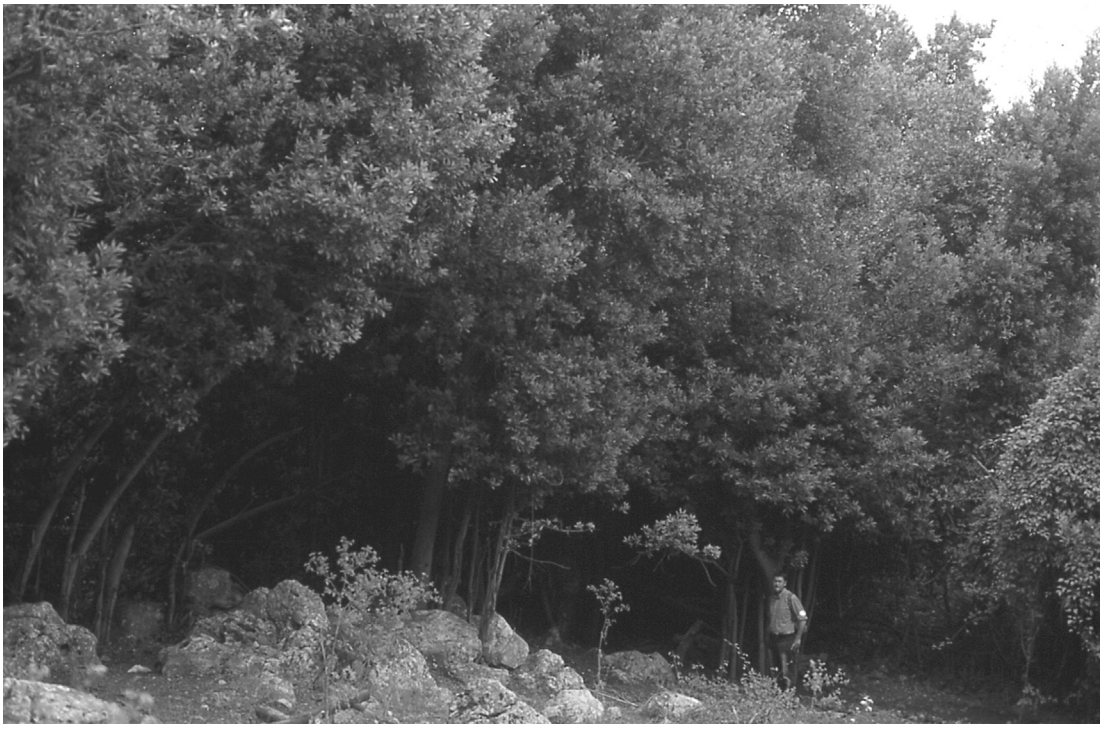

Figure 4.– Aspects of *Acantho mollis-Lauretum nobilis* in the Sicani mountains.

ses occurring in the Mediterranean area serves to increase the variability of the woody formations known so far, and also, supplies useful elements for the understanding the recent paleoenvironmental dynamic of the insular territory.

In accordance with RODRÍGUEZ GUITIÁN & *al.* (2007), referring to laurophyllous vegetation in the Iberian peninsula, in Sicily the distributional pattern of these patches seems to be indicative of refugia sites. That is to say, its floristic component, with low cold tolerance, was isolated during the most critical phases of the Pleistocene and Holocene.

An unresolved issue seems to be the syntaxonomic classification of *Laurus nobilis* vegetation, both at the alliance and at the order level. In fact, while some authors refer the different coenoses to the *Arbuto unedonis-Laurion nobilis* (*Pistacio lentisci-Rhamnetalia alaterni*), others consider it more appropriate to include the aspects from the Italian peninsula in the order *Quercetalia ilicis* (ALLEGREZZA & *al.*, 2006; BACCHETTA & *al.*, 2007; BIONDI & *al.*, 2002, 2004).

From the viewpoint of nature conservation, the sites in the study tend to be in a rather vulnerable state, although they often show a high capacity of renewal from seedlings. Considering the scientific-naturalistic relevance of the formation and its status of priority habitat, a more suitable protection of the residual populations would appear to be necessary.

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APPENDIX

List of syntaxa cited in the text

Calluno vulgaris-Lauretum nobilis F. Prieto, Arbesú & Bueno in T.E. Díaz & F. Prieto 1994; Blechno spicant-Quercetum roboris Tüxen & Oberdorfer 1958 subass. lauretosum nobilis Losa Quintana ex Izco, Amigo & Guitian 1990; Celtido australis-Lauretum nobilis Bacchetta, Farris, Fenu, Filigheddu, Mattana & Mulè 2007; Clematido cirrhosae-Quercenion ilicis Bacchetta, Bagella, Biondi, Farris, Filigheddu & Mossa 2004; Fraxino orni-Lauretum nobilis Allegrezza, Biondi & Felici 2006; Fraxino orni-Quercion ilicis Biondi, Casavecchia & Gigante 2003; Hedero helicis-Lauretum nobilis Bueno Sànchez & F. Prieto 1991 subass. lauretosum nobilis, subass. euphorbietosum amygdaloidis T.E. Díaz & F. Prieto 1994, subass. davallietosum canariensis Deil 1994; Helictotricho convoluti-Ampelodesmetum mauritanici Minissale 1994; Hyparrhenietum hirto-pubescentis A.& O. Bolòs & Br.-Bl. in A. & O. Bolòs 1950; Lauro-Quercetum virgilianae Brullo, Costanzo & Tomaselli 2001; Legousio hybridae-biforetum testiculatae Di Martino & Raimondo 1976; Myrto communis-Salicetum atrocinereae Biondi & Bagella 2006 subass. lauretosum nobilis Bacchetta, Farris, Fenu, Filigheddu, Mattana & Mulè 2007; Rhamno alaterni-Euphorbietum dendroidis (Trinajstic 1973) Géhu & Biondi 1997 subass. euphorbietosum bivonae (Gianguzzi, Ilardi & Raimondo 1996) Gianguzzi & La Mantia 2007; Ornithogalo pyrenaici-Quercetum ichnusae Bacchetta, Biondi, Farris, Filigheddu & Mossa 2004 subass. lauretosum nobilis Bacchetta, Farris, Fenu, Filigheddu, Mattana & Mulè 2007; Rusco aculeate-Quercetum ilicis Biondi, Gigante, Pignattelli & Venanzoni 2002; Omphalodo nitidae-Lauretum nobilis Honrado, P. Alves & F.B. Caldas 2003; Rhamno alaterni-Quercetum ilicis Brullo & Marcenò 1985 subass. pistacietosum terebinthi Gianguzzi, Ilardi & Raimondo 1996; Roso sempervirentis-Rubetum ulmifolii Blasi, Cutini, Di Pietro & Fortini 2001; Tamo communis-Lauretum nobilis Honrado, P. Alves & F.B. Caldas 2003; Ulmo canescentis-Salicetum pedicellatae Brullo & Spampinato 1990.