E. Di Gristina, V. Ilardi, R. Schicchi & F. M. Raimondo

Conservation *ex situ* of Sicilian endemic or rare plants

Abstract

Di Gristina, E., Ilardi, V., Schicchi, R. & Raimondo, F. M.: Conservation *ex situ* of Sicilian endemic or rare plants. — Bocconea. 16(2): 797-806. 2003. — ISSN 1120-4060.

The experimental cultivation of vascular taxa both rare or endemic to Sicily has been carried out in order to acquire information on their reproductive biology, phenology and life cycle, with the aim to give a basic tool for the conservation ex situ of the most threatened among them. The research concerned 111 specific and infraspecific taxa belonging to 28 families, among which *Asteraceae*, *Plumbaginaceae*, *Liliaceae*, *Cruciferae*, *Fabaceae* and *Caryophyllaceae* were mostly represented.The cultivation was conducted using whole plants, parts of them and sees. Per each taxon 3-4 specimens were used, having care do not affect the population in the collecting localities.This material, was placed to sprout in pot within the Palermo Botanical garden, under different substrate conditions depending on the specific cases. After sprouting (more then 70% successful) it was planted in plots at Ficuzza, a hilly locality south of Palermo. Of these reproduced plants, about 80% flowered and 50% beared fruits. Their seeds were sowed in the Botanical garden of Palermo and rapidly germinated especially as far as the genera to *Stipa*, *Cerinthe*, *Piptatherum*, *Rhus*, *Retama*, *Syderitis*, *Trifolium* and *Achyranthes* are concerned.The vegetative propagation tests on *Berberis*, *Bupleurum*, *Celtis*, *Iberis*, *Genista*, *Rosa*, *Salvia*, *Thymus*, carried out in pots without using rhizogen hormones, had a limited result.

Introduction

The Mediterranean basin is among the most rich areas as far as animal and plant biodiversity is concerned. Since ancient times, many cultures have been sustained by the great variety of biological resources that rendered this area unique in the world.

Nowadays the technological progress and the social and economic evolution have generated environmental transformations that affected the balance of ecosystems so that such plant biodiversity is clearly suffering every kind of risks.

Therefore a strategy for conservation of the natural heritage is to be planned taking into account promotion of knowledge and popularization of the problems and direct and coordinate actions on specific questions as well.

In Italy a large part of the natural heritage is more or less subject to several risks; and Sicily, which is among the richest regions, is therefore among most exposed.

The wild vascular flora of this island and its archipelago, consists of about 2700 taxa of both specific and infraspecific rank. Considering its 26000 km^2 extention, Sicily is among the most relevant areas in the Mediterranean, with respect to the floristic richness

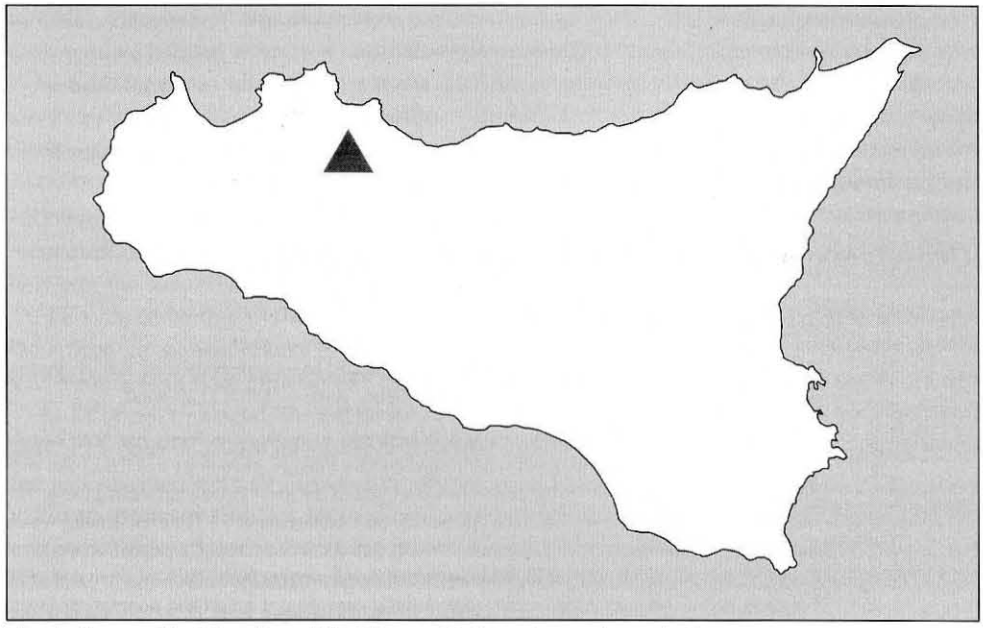
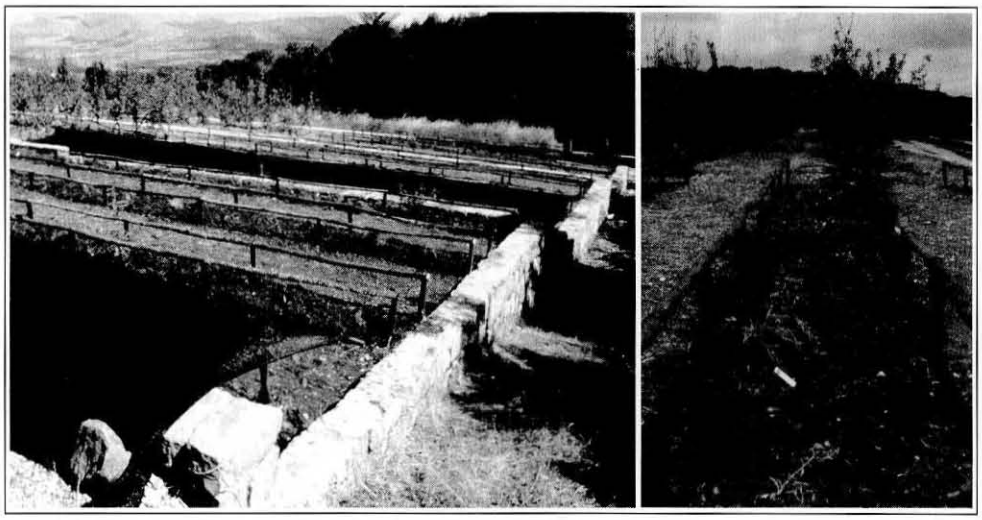


Fig. 1. Geographical location of the Ficuzza (Palermo) experimental plot.



Figs 2-3. Aspects of the experimental plot at Ficuzza (Palermo).

(Raimondo & al. 1992). The great variety of substrata, geomorphology, elevation and climatic range are clearly the main factors that generated such high biodiversity.

From the biogeographic point of view, the flora in question is peculiar since it includes about 15% endemics, partly exclusive to Sicily (Raimondo & al. 1992), that are on the whole the most exposed part of the regional plant heritage, including many small populations often by themselves subject to extinction risk. Also exposed, although in a lesser extent, are the taxa rare or phytogeographycally relevant, as testifying past geographical connections between Sicily and other Mediterranean regions or to be classified al glacial or Messinian relics.

On the basis of field surveys, herbarium revisions and literature, about 750 specific and infraspecific taxa, i.e. 25% of the Sicilian flora more or less exposed, being their habitats subject to more or less intense anthropogenic pressure. The most exposed taxa belong to 359 genera of 96 families among which the most rich are *Asteraceae*, *Fabaceae*, *Plumbaginaceae*, *Liliaceae*, *Cruciferae*, *Graminae* and *Caryophyllaceae* (Raimondo & al. 1992).

In the frame of the project «Protection of the threatened endemic species» (Interreg Community Action Program II C, Archi-Med) – concerning the setting up of both strategies and provision of interventions in the central-eastern Mediterranean area – experimental cultivation of vascular taxa rare and/or endemic to Sicily has been undertaken.

This, with the aim of aquiring information on reproductive biology, phenology, life cycle duration etc., concerning the taxa taken into account.

Materials and methods

The experimental cultivation concerned 111 specific and infraspecif taxa belonging to 75 genera of 28 families (Tables 1, 3, 4 and 5), among which *Asteraceae*, *Cruciferae*, *Caryophyllaceae*, *Fabaceae*, *Plumbaginaceae*, *Liliaceae*, *Labiatae* and *Umbelliferae* (Table 1) are the most represented. Among the taxa taken into account, 65% are endemic or subendemic, and the remaining 35% are rare in Sicily. With respect to their IUCN status (Conti & al. 1997), 68,4% of the taxa are under a low risk (LR), 20,8% are vulnerable (VU) endangered (EN) and critically threatened (CR) considered together are 5,4% (Table 2). It is to be noted that the "low risk" status concerns taxa more or less protected at least against the human pressure.

Nomenclature and chorology of the taxa studied follow Pignatti (1982).

The experimental cultivation has been carried out in two plots, respectively located within the Botanical Garden of Palermo and at Ficuzza, a locality in the inland hills south of Palermo (Fig. 1).

From the bioclimatic point of view, the Botancial garden of Palermo, under 18,1 °C annual average temperatrure and 584,1 mm annual mean rainfall, with 71 rainy days (Duro & al. 1993), falls under the lower thermomediterranean type with a lower dry ombrotype.

The experimental plot of Ficuzza (Figs 2, 3) is located at 681 m a.s.l. within an abandoned nursery of the Regional forestry staff. Its bioclimate belongs to the upper mesomediterranean thermotype and to the lower-subhumid ombrotype, based on 852,3 mm annual mean rainfall and on 14,6 °C annual average temperature (Duro & al. 1993).

The soil is a subacid mature loam evolved on siliceous substrate.

The experimental cultivation has been carried out using whole plants, parts of them and seeds. For each taxon 3-4 individuals were taken, having care do not affect the population in the collecting localities.

The first reproductive stage was carried out in the Botanical garden of Palermo, using both traditional and plastic pots and different substrata depending on the specific edaphic requirements. In the case of acidophilous species a mixture mainly base on Sphagnum peath. The rocky plants were grown using a sandy mixture. The cutting for the vegetative reproduction were placed in a 50% sand/peat mixture. No hormonal stimulation was practised during the rooting phase. In the sowing a sandy substratum was used and 8cm in diameter pots. All experimental trials were carried out in open air except for the sowing. The seed material was mainly provided by the Botanical garden of Palermo and later by the plants ripened in the experimental plots. No cultural practices were made except for irrigation and weeding just when necessary. After a year the whole of the reproducted material was transferred at Ficuzza and there implanted in the plots.

Table 1. Prospect of the plants under experimental cultivation.

Family	Genus	Species	Subspecies and varieties	Endemics
Asteraceae	16	30	5	20
Asclepiadaceae	1	1	-	-
Berberidaceae	1	1	-	1
Boraginaceae	2	2	-	1
Campanulaceae	1	1	1	-
Caryophyllaceae	5	8	1	5
Convolvulaceae	1	1	-	-
Cruciferae	7	9	1	5
Dipsacaceae	2	1	-	1
Euphorbiaceae	1	3	1	1
Fabaceae	2	6	1	5
Iridaceae	3	3	-	2
Labiatae	5	6	-	2
Liliaceae	3	7	-	4
Linaceae	1	1	-	-
Malvaceae	1	1	-	1
Onagraceae	1	1	-	-
Paeoniaceae	1	1	1	-
Pinaceae	1	1	-	1
Plumbaginaceae	3	8	-	7
Poaceae	1	1	-	1
Ranunculaceae	3	3	1	1
Rosaceae	2	2	-	-
Rubiaceae	1	1	-	1
Scrophulariaeáe	2	2	-	2
Ulmaceae	2	2	-	2
Umbelliferae	5	6	2	4
Violaceae	1	1	-	1

Table 2. Division of the total number of the cultivated taxa and percentage incidence, following the status I.U.C.N. The abbreviations relating to the status conform to the International Union for Nature Conservation (I.U.C.N.): EX = Extinct; EW = Extinct in the Wild; CR = Critically endangered; EN = Endangered; VU = Vulnerable; LR = Lower Risk; DD = Data Deficient; NE = Not Evaluated.

Status	N° Taxa	%
EX	-	-
EW	-	-
CR	6	5,4
EN	6	5,4
VU	23	20,8
LR	76	68,4
DD	-	-
NE	-	-

Results

Sprouting was successful in more than 70% of the propagation material in the Botanical garden of Palermo. 80% of them flowered and 50% fructified (Tables 3, 4 and 5). Reproduction and cultivation 37% of dotted endemics and rare taxa flowered and fructified (Tables 3, 5), while the resting endemics and subendemics were successfully cultivated in 65% of the cases (Table 4). Cultivation in the pots was 82% successful (Tables 3, 4 and 5). The transplanting crisis affected 50% of the plants in the Ficuzza plots, especially as far as the herbaceous species were concerned that, nevertheless almost of them had a significant vegetative renewal (Fig. 4).

Fig. 4. *Genista madoniensis*, endemic to Madonie Mts, cultivated in the Ficuzza experimental plot.

Table 3. Strictly local endemics.

Status	Taxa	Family	Chorotype	Harvesting stations	Vegetative Conditions	Flowering (*)	Fructification(*)
CR	*Abies nebrodensis* (Lojac.) Mattei	Pinaceae	Endem.	Piano Zucchi (Madonie)	Good	Absent	Absent
LR	*Alyssum nebrodense* Tineo	Cruciferae	Endem.	Quacella (Madonie)	Good	Present	Present
VU	*Anthemis ismelia* Lojac.	Asteraceae	Endem.	Monte Gallo (Pa)	Excellent	Present	Present
LR	*Armeria gussonei* Boiss.	Plumbaginaceae	Endem.	Rocca Busambra	Mediocre	Present	Absent
LR	*Astracantha nebrodensis* (Guss.) Greuter	Fabaceae	Endem.	Quacella (Madonie)	Mediocre	Absent	Absent
VU	*Brassica drepanensis* (Caruel) Ponzo	Cruciferae	Endem.	Monte S. Giuliano (Tp)	Good	Present	Present
VU	*Bupleurum dianthifolium* Guss.	Umbelliferae	Endem.	Marettimo	Good	Absent	Absent
VU	*Calendula maritima* Guss.	Asteraceae	Endem.	Litorale di Trapani	Good	Present	Present
VU	*Centaurea aeolica* Guss.	Asteraceae	Endem.	Lipari	Good	Absent	Absent
VU	*Centaurea crassifolia* Bertol.	Asteraceae	Endem.	Malta	Excellent	Absent	Absent
VU	*Dianthus paniculatus* Lojac.	Caryophyllaceae	Endem.	Rocca Busambra (Pa)	Mediocre	Absent	Absent
LR	*Genista cupanii* Guss.	Fabaceae	Endem.	Vall. Madonna degli Angeli (Madonie)	Mediocre	Present	Absent
EN	*Genista gasparrinii* Guss.	Fabaceae	Endem.	Monte Gallo (Pa)	Good	Present	Present
VU	*Genista madoniensis* Raimondo	Fabaceae	Endem.	Gratteri (Madonie)	Excellent	Absent	Absent
LR	*Helichrysum nebrodense* Heldr.	Asteraceae	Endem.	Quacella (Madonie)	Good	Absent	Absent
VU	*Hieracium cophanense* Lojac.	Asteraceae	Endem.	Monte Passo del Lupo (Tp)	Excellent	Present	Present
EN	*Hieracium lucidum* Guss.	Asteraceae	Endem.	Monte Gallo (Pa)	Excellent	Present	Present
VU	*Hieracium symphytifolium* Froel.	Asteraceae	Endem.	Quacella (Madonie)	Good	Present	Present
LR	*Jurinea bocconii* (Guss.) DC.	Asteraceae	Endem.	Quacella (Madonie)	Mediocre	Absent	Absent
LR	*Laserpitium garganicum* (Ten.) Bertol. subsp.*siculum* (Spreng.) Pignatti	Umbelliferae	Endem.	Quacella (Madonie)	Mediocre	Absent	Absent
CR	*Limonium calcarae* (Tod.) Pignatti	Plumbaginaceae	Endem.	Terrapilata (Cl)	Scarce	Absent	Absent
LR	*Limonium catanzaroi* Brullo	Plumbaginaceae	Endem.	Capo Bianco (Ag)	Good	Present	Present
CR	*Limonium melancholicum* Brullo, Marcenò & Romano	Plumbaginaceae	Endem.	Capo San Marco (Sciacca)	Good	Present	Absent
VU	*Limonium panormitanum* (Tod.) Pignatti	Plumbaginaceae	Endem.	Capo Gallo (Pa)	Good	Present	Absent
CR	*Limonium todaroanum* Raimondo & Pignatti	Plumbaginaceae	Endem.	Monte Passo del Lupo (Tp)	Excellent	Present	Present
VU	*Peucedanum nebrodense* (Guss.) Strobl	Umbelliferae	Endem.	Fosse di San Gandolfo (Madonie)	Mediocre	Absent	Absent
VU	*Pseudoscabiosa limonifolia* (Vahl) Devesa	Dipsacaceae	Endem.	Monte Gallo (Pa)	Good	Present	Present
LR	*Ptilostemon niveus* (C. Presl.) Greuter	Asteraceae	Endem.	Quacella (Madonie)	Mediocre	Absent	Absent
VU	*Viola tineorum* Erben & Raimondo	Violaceae	Endem.	Rocca Busambra (Pa)	Mediocre	Absent	Absent
CR	*Zelkova sicula* Di Pasquale, Garfì & Quezel	Ulmaceae	Endem.	Bosco Pisano (Monte Lauro)	Good	Absent	Absent

(*) after one year cultivation.

Table 4. Endemics and subendemics.

Status	Taxa	Family	Chorotype	Harvesting stations	Vegetative Conditions	Flowering (*)	Fructification(*)
LR	*Anthemis cupaniana* Tod. ex Lojac.	Asteraceae	Endem.	Monte Cammarata (Ag)	Excellent	Present	Present
LR	*Asperula rupestris* Tineo	Rubiaceae	Endem.	Monte Gallo (Pa)	Excellent	Present	Present
LR	*Aster sorrentinii* (Tod.) Lojac.	Asteraceae	Endem.	Bivona (Ag)	Good	Absent	Absent
LR	*Brassica rupestris* Raf.	Cruciferae	Endem.	Monte Pizzuta (Pa)	Excellent	Present	Present
LR	*Carlina nebrodensis* Guss.	Asteraceae	Endem.	Val. Madonna degli Angeli (Madonie)	Good	Present	Present
VU	*Celtis aetnensis* (Tornab.) Strobl	Ulmaceae	Endem.	Bronte (CT)	Good	Absent	Absent
LR	*Centaurea busambarensis* Guss.	Asteraceae	Endem.	Rocca Busambra (Pa)	Good	Present	Present
LR	*Centaurea parlatoris* Heldr.	Asteraceae	Endem.	Piano Zucchi (Madonie)	Good	Present	Present
LR	*Centaurea ucriae* Lacaita subsp. *umbrosa* (Lacaita) Pignatti	Asteraceae	Endem.	Monte Pelligrino (Pa)	Good	Present	Present
LR	*Cerastium tomentosum* L.	Caryophyllaceae	Endem.	Rocca Busambra (Pa)	Good	Present	Present
LR	*Dianthus rupicola* Biv.	Caryophyllaceae	Subendem.	Monte Pellegrino (Pa)	Good	Present	Present
LR	*Dianthus siculus* C.Presl	Caryophyllaceae	Endem.	Monte Pizzuta (Pa)	Good	Present	Present
LR	*Edraianthus graminifolius* (L.) DC. subsp. *siculus* (Strobl) W. Greuter & Burdet	Campanulaceae	Endem.	Quacella (Madonie)	Good	Present	Present
LR	*Erysimum bonannianum* C. Presl	Cruciferae	Endem.	Quacella (Madonie)	Good	Present	Present
EN	*Euphorbia corallioides* L.	Euphorbiaceae	Endem.	Tassita (Me)	Mediocre	Absent	Absent
VU	*Gagea ramulosa* A. Terracc.	Liliaceae	Endem.	Punte di Cuti (Pa)	Good	Present	Absent
LR	*Genista aristata* C. Presl	Fabaceae	Endem.	Bivio Munciarrati (Madonie)	Good	Absent	Absent
LR	*Genista cupanii* Guss.	Fabaceae	Endem.	Val. Madonna degli Angeli (Madonie)	Mediocre	Present	Absent
LR	*Helichrysum rupestre* (Raf.) DC. var. *rupestre*	Asteraceae	Endem.	Monte Pellegrino (Pa)	Excellent	Present	Present
LR	*Helleborus bocconei* Ten. subsp. *intermedius* (Guss.) Greuter & Burdet	Ranunculaceae	Endem.	Punte di Cuti (PA)	Good	Present	Present
LR	*Hieracium macranthum* (Ten.) Zahn	Asteraceae	Endem.	Monte dei Cervi (Madonie)	Good	Present	Absent
LR	*Iberis semperflorens* L.	Cruciferae	Endem.	Rocca Busambra (Pa)	Good	Absent	Absent
LR	*Iris pseudopumila* Tineo	Iridaceae	Endem.	Monte Pizzuta (Pa)	Good	Absent	Absent
LR	*Lavatera agrigentina* Tineo	Malvaceae	Endem.	Sant'Angelo Muxaro (AG)	Scarce	Absent	Absent
LR	*Limonium bocconei* (Lojac.) Litard.	Plumbaginaceae	Endem.	Capo Gallo (Pa)	Good	Present	Present
VU	*Limonium panormitanum* (Tod.) Pignatti	Plumbaginaceae	Endem.	Capo Gallo (Pa)	Good	Present	Absent
LR	*Linaria purpurea* (L.) Miller	Scrophulariaceae	Endem.	Quacella (Madonie)	Good	Present	Present
LR	*Lithodora rosmarinifolia* (Ten.) Johnst.	Boraginaceae	Subendem.	Monte Passo del Lupo (Tp)	Good	Present	Absent
LR	*Matthiola fruticulosa* (L.) Maire	Cruciferae	Subendem.	Monte Cavallo (Cianciana)	Good	Present	Present
LR	*Micromeria fruticulosa* (Bertol.) Silić	Labiatae	Endem.	Monte Passo del Lupo (Tp)	Good	Present	Present
LR	*Odontites bocconei* (Guss.) Walp.	Scrophulariaceae	Endem.	Monte Gallo (Pa)	Good	Absent	Absent
LR	*Onosma canescens* C. Presl	Boraginaceae	Endem.	Quacella (Madonie)	Good	Present	Present
LR	*Paeonia mascula* (L.) Miller subsp. *russii* (Biv.) Cullen & Heywood	Paeoniaceae	Subendem.	Ficuzza (Pa)	Good	Present	Present
EN	*Scilla cupanii* Guss.	Liliaceae	Endem.	Portella del Vento (Busambra, Pa)	Good	Present	Absent
LR	*Seseli bocconi* Guss. subsp. *bocconi*	Umbelliferae	Endem.	Monte Gallo (Pa)	Excellent	Present	Present
LR	*Sesleria nitida* Ten.	Poaceae	Endem.	Monte Cammarata (Ag)	Good	Present	Present
LR	*Silene saxifraga* L. var. *lojaconoi* Lacaita	Caryophyllaceae	Endem.	Quacella (Madonie)	Good	Present	Present
LR	*Sisyrinchium siculum* Tod.	Iridaceae	Endem.	Lampedusa	Good	Present	Absent
LR	*Thymus spinulosus* Ten.	Labiatae	Endem.	Monte Cammarata (Ag)	Good	Present	Present
LR	*Tolpis virgata* (Desf.) Bertol. subsp. *grandiflora* (Ten.) Pignatti	Asteraceae	Endem.	Quacella (Madonie)	Good	Present	Present

(*) after one year cultivation.

Table 5. Taxa rare in Sicily.

Status	Taxa	Family	Chorotype	Harvesting stations	Vegetative Conditions	Flowering (*)	Fructification(*)
LR	*Aethionema saxatile* (L.) R. Br.	Cruciferae	Medit.-Mont.	Quacella (Madonie)	Good	Present	Present
LR	*Allium chamaemoly* L.	Liliaceae	Steno-Medit.	Bosco di Granza (Pa)	Good	Present	Present
LR	*Allium flavum* L.	Liliaceae	Euri-Medit.	Monte Fanusi	Good	Absent	Absent
VU	*Anemone palmata* L.	Ranunculaceae	S-Medit.	Sciare di Mazara	Excellent	Present	Absent
LR	*Anthemis montana* L. subsp. *montana*	Asteraceae	Orof. S-Europ.-W-Asiat.	Quacella (Madonie)	Good	Present	Absent
LR	*Arabis alpina* L. subsp. *caucasica* (Willd.) Briq.	Cruciferae	Medit.-Mont.	Monte Pizzuta (Pa)	Good	Present	Absent
LR	*Arenaria grandiflora* L.	Caryophyllaceae	(Circum) W-Medit.-Mont.	Quacella (Madonie)	Good	Present	Present
LR	*Artemisia alba* Turra	Asteraceae	S-Europ. (Submedit.)	Monte Cammarata (Ag)	Good	Absent	Absent
VU	*Aster tripolium* L.	Asteraceae	Eurasiat.	Cda. Porcaria (CT)	Good	Absent	Absent
LR	*Astragalus monspessulanus* L. subsp. *monspessulanus*	Fabaceae	Euri-Medit.	Nociazzi (Madonie)	Good	Absent	Absent
LR	*Bupleurum fruticosum* L.	Umbelliferae	Steno-Medit.	Cefalù	Excellent	Absent	Absent
EN	*Caralluma europaea* (Guss.) N. E. Br.	Asclepiadaceae	SW-Medit.	Lampedusa	Good	Present	Absent
LR	*Carduncellus pinnatus* (Desf.) DC.	Asteraceae	SW-Medit.	Portella Colla (Madonie)	Mediocre	Present	Absent
VU	*Centaurea acaulis* L.	Asteraceae	SW-Medit.(Steno-)	Lampedusa	Good	Present	Present
LR	*Convolvulus cneorum* L.	Convolvulaceae	N-Medit.	Monte Passo del Lupo (Tp)	Mediocre	Present	Present
LR	*Crocus albiflorus* Kit.	Iridaceae	Orof. SE-Europ.	Bosco di Granza (Pa)	Good	Present	Absent
LR	*Delphinium emarginatum* C. Presl	Ranunculaceae	SW-Medit.	Monte Passo del Lupo (Tp)	Good	Present	Present
LR	*Dianthus arrostii* C. Presl	Caryophyllaceae	SW-Medit.	Monte Rose (Ag)	Mediocre	Absent	Absent
VU	*Epilobium dodonaei* Vill.	Onagraceae	Orof.-S-Europ.-Caucas.	Longi (Nebrodi)	Good	Absent	Absent
LR	*Euphorbia amygdaloides* L. subsp. *arbuscula* Meusel	Euphorbiaceae	Centro-Europ.-Caucas.	Monte Pizzuta (Pa)	Good	Absent	Absent
LR	*Euphorbia myrsinites* L.	Euphorbiaceae	S-Europ.-Pontica	Pomieri (Madonie)	Good	Absent	Absent
LR	*Gagea foliosa* Schult.	Liliaceae	Orof. Centro- e W-Medit.	Caronie (Nebrodi)	Good	Present	Absent
LR	*Hieracium crinitum* Sibth. & Sm.	Asteraceae	Europ.-Caucas.	Mirto (Nebrodi)	Excellent	Present	Present
LR	*Iberis pruitii* Tineo	Cruciferae	Medit.-Mont.	Quacella (Madonie)	Good	Present	Absent
LR	*Leuzea conifera* (L.) DC.	Asteraceae	W-Medit.	Val. Madonna degli Angeli (Madonie)	Good	Present	Present
LR	*Limoniastrum monopetalum* (L.) Boiss.	Plumbaginaceae	SW-Medit.	Capo Rama (Pa)	Good	Present	Absent
LR	*Linum punctatum* C. Presl	Linaceae	Orof. NE Medit.	Quacella (Madonie)	Good	Present	Present
LR	*Pimpinella tragium* Vill.	Umbelliferae	Medit.-Turan.	Quacella (Madonie)	Scarce	Absent	Absent
LR	*Rosa sicula* Tratt.	Rosaceae	Medit.-Mont.	Quacella (Madonie)	Mediocre	Absent	Absent
VU	*Salvia argentea* L.	Labiatae	Steno-Medit.	Monte Rose (Ag)	Scarce	Absent	Absent
LR	*Salvia triloba* L.	Labiatae	N-Medit.-Mont.	Valle dell'Anapo (Ag)	Excellent	Absent	Absent
LR	*Sarcopoterium spinosum* (L.) Spach	Rosaceae	SE-Medit.	Monte Lauro (Sr)	Excellent	Present	Present
LR	*Scabiosa crenata* Cirillo	Dipsacaceae	Orof. S-Medit.	Quacella (Madonie)	Good	Present	Present
LR	*Senecio cineraria* DC.	Asteraceae	W-Medit.	Marettimo	Good	Present	Present
LR	*Serratula cichoracea* (L.) Dc. subsp. *mucronata* (Desf.) Lacaita	Asteraceae	SW-Medit.	Monte Passo del Lupo (Tp)	Good	Present	Present
LR	*Saponaria sicula* Raf.	Caryophyllaceae	S-Medit.-Mont.	Quacella (Madonie)	Scarce	Absent	Absent
LR	*Sideritis syriaca* L.	Labiatae	E-Medit.-Turan.	Quacella (Madonie)	Good	Present	Present
LR	*Taraxacum gasparrinii* Tineo	Asteraceae	Paleotemp.	Caronia (Nebrodi)	Good	Present	Present
EN	*Teucrium campanulatum* L.	Labiatae	Steno-Medit.-Occid.	Lago Gurrida (CT)	Mediocre	Absent	Absent

(*) after one year cultivation.

Germination of seeds produced by herbaceous species was 80% successful and almost 100% in *Stipa sicula*, *Cerinthe auricolata* and *Trifolium bivonae*. Emergency of the seedlings happened mostly 7-15 days after sowing. Among the woody species, only *Prunus cupaniana*, *Retama raetam* subsp. *gussonei* and *Rhus pentaphylla* produced fertile seeds. Vegetative propagation of *Berberis aetnensis*, *Bupleurum dianthifolium*, *Celtis aetnensis*, *Iberis semperflorens*, *Genista gasparrinii*, *Rosa sicula*, *Salvia triloba* and *Thymus spinulosus* was positive.

Conclusion

The investigation allowed to acquire information – useful for ex situ conservation purposes - about ecology, biology and aptitude to cultivation of the endemic and/or rare taxa of the Sicilian vascular flora. As a result, the major part of the plants involved – particularly the endemic taxa – regularly developed and bore fruit even in cultivation, showing a high degree of adaptation to ecologic conditions different from the ones in the occurrence localities.

The germination percentage of the herbaceous species is high, while the seeds of the woody species showed a low germination rate probably depending on the lack of the necessary procedure, aimed at removing the seed quiescence, to be followed before the sowing.

The low cultural requirements and the high rate of successful sowing in the major part of the taxa experimented led to consider that the ex situ conservation is an effective strategy for the taxa under risk easily taken into cultivation.

Anthemis ismelia, *Genista gasparrinii*, *Hieracium lucidum* and *Limonium todaroanum* (Table 3) showed the best results.

In conclusion, the results obtained until now are on the whole satisfactory and suitable for planning ex situ conservation, restoring and reclaiming waste areas, through the reintroduction of germplasm of taxa of considerable phytogeographic interest according to the recent E.U. environment politics for the conservation of the biodiversity

Acknowledgements

This study has been carried out within the INTERREG II C Project (Pilot Action ARCHI-MED Central and Eastern Space, Project 2.1: Protection of threatened endemic species) and Assessorato Agricoltura e Foreste of Sicilian Region (L.R. 25/93).

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Addresses of the authors:
E. Di Gristina, V. Ilardi, R. Schicchi & F. M. Raimondo*, Dipartimento di Scienze Botaniche, Università degli Studi di Palermo, via Archirafi 28, 90123 Palermo, Italy.
(*)Email: raimondo@unipa.it