

Forest nurseries and the National Recovery and Resilience Plan: the case of Sicily and Apulia (Italy)

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Abstract

In Italy, the National Recovery and Resilience Plan (NRRP) foresees the planting of *ca.* 6.6 million trees to establish urban and peri-urban forests in 14 metropolitan cities. This ambitious project requires a significant number of native trees and shrubs, currently unavailable in Italian public and private nurseries. This survey analyzes the state of forest nurseries in two administrative regions of southern Italy, i.e. the “Filici” forest nursery (province of Agrigento, Sicily) and the Gargano Mountain Reclamation Consortium (province of Foggia, Apulia), to evaluate the adequacy of Sicilian and Apulian forest nurseries as potential sources of plant material to meet the requirements of the NRRP. The census carried out at the “Filici” nursery revealed the presence of more than 22,000 seedlings in cultivation, comprising 55 species, 26 genera, and 26 families. The autochthonous species are 43 (78.2%), while the exotic ones are 12 (21.8%). The Gargano Mountain Reclamation Consortium forest nursery has 190,876 seedlings in cultivation. A total of 80 species are present, belonging to 59 genera and 32 families. Of these, 68 (85%) are native species, 12 (15%) are exotic. An analysis of the plant material being cultivated in these forest nurseries shows the presence of a share of autochthonous species of interest for urban reforestation initiatives, however these are still insufficient in number.

Keywords

Mediterranean area, native species, shrubs, southern Italy, trees

Introduction

The Italian National Recovery and Resilience Plan (NRRP), Mission 2, Component 4, Investment 3.1 “Protection and Enhancement of Urban and Suburban Green Areas” (approved by the EU Council of Ministers on 12 January 2021) foresees a series of widescale actions. The main objectives of the Plan are: a) improve the quality of life and well-being of citizens through the protection of existing green areas and the construction of new ones; b) preserve and enhance biodiversity and ecological processes related to the full functionality of ecosystems; c) preserve and enhance biodiversity, in line with the European Biodiversity Strategy; d) contribute to the reduction of air pollution in metropolitan areas; e) reduce the number of infringement procedures, related to air quality; f) curb land consumption and restore useful soils; g) restore man-made landscapes and improve protected areas contiguous to metropolitan areas. Besides, Article 4 of Decree-Law no. 111 of October 14, 2019, transposed with amendments into Law no. 141 of December 12, 2019, defines modalities for the design of tree planting in metropolitan cities. Specifically, the Urban and Suburban Forestation Plan establishes a series of actions, focused in the 14 Italian metropolitan cities, to fight air pollution and protect biodiversity. The goal is to establish and expand urban and peri-urban forests by planting about 6.6 million trees. All the initiatives that envisage the planting of trees and new reforestation, especially in urban and peri-urban areas, represent an important driving force for the relaunch of forest nurseries.

Starting in the 1930s, the main task of Italian foresters was to reforest vast degraded areas to counteract the widespread hydrogeological instability of the territory. This situation has favored the proliferation of many forest nurseries, which provided their product free of charge, as required by almost all subsequent Forest Laws until the 1960s (Mariotti et al. 2014; Martini et al. 2022). In the 1970s, the need to reforest Italy’s mountainous territory became less pressing, and many forest nurseries ceased their activities (Mariotti et al. 2014). Nowadays, there is again the need and urgency to propose reforestation and tree-planting activities. Besides, there is a marked increase in the demand for ecosystem services to combat erosion, flooding, pollution, and heat islands and for green and forested areas, especially near urban populations. The purpose of these initiatives is to increase the quality of life and to focus on issues that correlate “green” areas and health, as widely witnessed in the period of pandemic restrictions (Martini et al. 2022).

The awareness that forest nursery activity is essential for the success of any intervention aimed at environmental requalification has stimulated interest in better understanding the state of this activity in southern Italy, especially in Apulia and Sicily. Currently, in Apulia, there are 20 forest nurseries distributed in the provinces of Foggia (3), Lecce (9), Bari (5), Taranto (2), and Brindisi (1). Seven regional forest nurseries are managed by the Regional Agency for Irrigation and Forestry Activities (ARIF), while the remaining 13 are private. In 1989, the Sicilian regional government, established the “Regional Nursery Center”. Currently, the Center includes 16 forest nurseries distributed in the provinces of Agrigento (4), Palermo (3), Catania (2), Enna (2), and one in each of the remaining five provinces. Each one is specialized in a specific

production. In our study, for Apulia, the forestry nursery of the Gargano Mountain Reclamation Consortium of San Marco in Lamis (province of Foggia) was examined, as it is the most representative nursery in the Regional Register, both for the abundance of forest species produced and marketed and for its internal organization. As regards the Sicilian territory, we examined the “Filici” forest nursery of Cammarata (province of Agrigento). With the establishment of the Regional Nursery Center, it has become the largest forest nursery in terms of plant production in order to meet the needs of the Sicilian Forestry Administration (Candore and Girgenti 2019).

The purpose of our survey was to analyze the plants growing in the “Filici” nursery and in that of the Gargano Mountain Reclamation Consortium and to evaluate their adequacy as a potential source of plant material to meet the needs of the NRRP.

Case study 1: The “Filici” forest nursery

The “Filici” forest nursery falls in the municipality of Cammarata (CW-Sicily) in the province of Agrigento (Fig. 1). The nursery was established in the early 1950s at the same time as the reforestation work began on the slopes of Mount Cammarata. The nursery is under the direction of the “Regional Department of Rural and Territorial Development” and is managed by the Provincial Office Service n°8 of Agrigento. Currently, the staff is represented by one forestry technician who acts as construction manager, one team leader, and three seasonal forestry workers (on a fixed-term basis) with 51, 101, and 151 working days/year depending on their category. In the past, the seasonal workers engaged reached 10 units.

The farm area covers a total of 2 ha and has an average slope of 20%. Because of the slope, the entire productive area of the nursery (1.5 ha, about 75% of the entire area) is organized in plots arranged in steps with retaining walls lined with local limestone. Irrigation is done manually or through an automated sprinkler system. The nursery’s main objective is to produce plants that have genetic, morphological, and health characteristics that can offer excellent guarantees of rooting, development, and adaptability, thus ensuring success for plantings from scratch or intended for eventual reforestation on state lands. The “Filici” nursery uses seeds collected in forests located in the neighboring areas that are included in the list of “Sicilian Seed Woods” established by the Sicilian Region, which lists the forests from where seeds can be taken for forest propagation. There are two cultivation practices: with a root ball, the most widely used as the use of containers guarantees planting, and bare-root cultivation, which, however, is little used. Average annual nursery production in the past reached 400,000 seedlings; currently, due to the significant decrease in funds assigned to the nursery, it does not exceed 50,000 seedlings. The average annual mortality is estimated at 10%.

Case study 2: The Gargano Mountain Reclamation Consortium Forest

The forest nursery belonging to the Gargano Mountain Reclamation Consortium is located in San Marco in Lamis, (Borgo Celano, province of Foggia) (Fig. 1). It is a public law body under Article 59 of Royal Decree No. 215 of February 13, 1933, Article 826



Figure 1. Geographical distribution of the forest nurseries “Filici” and “Gargano Mountain Reclamation Consortium”.

of the Civil Code. It was established and regulated by Presidential Decree no. 6907 of March 13, 1957. The nursery was established in 2011 and its purpose was extended to include the conservation of plant biodiversity in the Gargano area. The aim is to produce native plants for reforestation, naturalistic engineering, recovery of degraded sites, and the protection of endangered fruit species. The nursery also houses a small botanical garden of rare and endangered species of the Gargano flora, and environmental education activities can be carried out. The nursery occupies a total area of 1.1 ha, 0.5 of which is for production purposes, with a 15% slope. Currently, irrigation is done manually through direct water supply from the aqueduct, but work is ongoing to build rainwater harvesting tanks. The nursery includes an office for administration, a laboratory for seed processing, a teaching room, and a seed storage room. In addition, the facility comprises an archive, a laboratory for direct seeding, and a greenhouse used for growing seedlings that do not tolerate low temperatures. There is also storage for tools and two sheds for farm machinery. The latter consist of 2 backpack brush cutters, and 2 electric wheelbarrows. The workforce comprises two full-time workers, and two part-time employees. Consistent with the Regional objectives, the nursery aims to produce suitable material, especially from phytosanitary, genetic, and morphological perspectives, to try to avoid the problems related to the pathogen *Xylella fastidiosa* (Raju et al. 1986). In most cases, the plants, are destined for reforestation projects in

the Apulian territory, so the choice of forest material, and its origin, is the main factor that ensures the success of the species' establishment. Cultivation practices are root ball and bare-root. The latter, however, is little used. The average annual production is 150,000 seedlings and the average mortality is around 20%.

Material and methods

The census was carried out between spring 2021 and autumn 2022, on the basis of *in situ* surveys and observations. For each taxon, the number of cultivated seedlings was counted (Table 1). Taxa are grouped by families and ordered alphabetically. Their biological form and chorology according to Raunkiaer (1934) and Pignatti (2017, 2018, 2019) are reported. The table also distinguishes between native and exotic taxa. Nomenclature and definition of native/exotic status follows Bartolucci et al. (2018a, b, c, 2019a, b, 2020a, b, 2021a, b, 2022) and Galasso et al. (2018a, b, c, 2019a, b, 2020a, b, 2021a, b, 2022).

Results

The census carried out at the “Filici” nursery revealed the presence of 22,360 seedlings in cultivation (Table 1). The taxa with at least 1,000 specimens are *Quercus ilex* L. (5,000) and *Q. pubescens* Willd. (5,000), followed by *Cupressus sempervirens* L. (2,000), *Olea europea* L. var. *sylvestris* (Mill.) Lehr (2,000), *Abies cephalonica* Loud. (1,000), and *Pyrus spinosa* Forssk. (1,000). In the “Filici” nursery there are 55 species, belonging to 26 genera and 26 families. The most represented families are Rosaceae (11 species and 7 genera), Pinaceae (5 species and 3 genera), Fagaceae (5 species and 2 genera), Fabaceae (4 species and 4 genera), and Oleaceae (4 species and 4 genera) (Table 1). The most frequent genera are *Quercus* L. (4 species) and *Prunus* L. (3 species). The autochthonous species are 43 (78.2%), while 12 are the exotics (21.8%) (Fig. 4). Among cultivated species, the presence of *Abies nebrodensis* (Lojac.) Mattei, an endangered species and Sicilian forest endemism (Mirabile et al. 2023), is noteworthy. However, the presence in cultivation of the exotic *A. cephalonica*, present with a large number of seedlings, should be excluded as it is potentially capable of hybridizing with the endemic Sicilian fir (Raimondo and Schicchi 2005).

The Gargano Mountain Reclamation Consortium nursery has 190,876 seedlings in cultivation (Table 1). The most abundant species are *Quercus ilex* (28,654), *Q. cerris* L. (25,968), *Q. pubescens* (17,780), and *Fraxinus ornus* L. (18,292), followed by *Spartium junceum* L. (13,031), *Salix alba* L. (6,611), *Acer campestre* L. (5,544), *Pinus halepensis* Mill. (4,690), *Castanea sativa* Mill. (4,501), and *Fagus sylvatica* L. (3,779) (Table 1). A total of 80 species are present, belonging to 59 genera and 32 families. The most representative families are: Rosaceae (14 species and 7 genera), Fabaceae (5 species and 4 genera), Fagaceae (5 species and 3 genera), Lamiaceae (5 species and 4

Table 1. Taxa growing at the forest nurseries “Filici” (Nursery 1) and “Gargano Mountain Reclamation Consortium” (Nursery 2).

Taxon	No. Phytoceles Nursery 1	No. Phytoceles Nursery 2	Family	Biological form	Chorology	Native/ exotic
<i>Abies cephalonica</i> Loudon	1000	–	Pinaceae	P scap	E-Medit.	Exotic
<i>Abies nebrodensis</i> (Lojac.) Mattei	10	–	Pinaceae	P scap	Endemic Sicily	Native
<i>Acer campestre</i> L.	100	5544	Sapindaceae	P scap	Europ.-Caucas.	Native
<i>Acer negundo</i> L.	10	–	Sapindaceae	P scap	N-America	Exotic
<i>Acer opalus</i> L.	–	1419	Sapindaceae	P caesp	W-Europ.	Native
<i>Acer pseudoplatanus</i> L.	–	2023	Sapindaceae	P scap	Europ.-Caucas.	Native
<i>Anagyris foetida</i> L.	–	50	Fabaceae	P caesp	S-Medit.	Native
<i>Arbutus unedo</i> L.	500	200	Ericaceae	P caesp	Stenomedit.	Native
<i>Buxus sempervirens</i> L.	20	–	Buxaceae	P caesp	Submedit.-subatl.	Native
<i>Carpinus betulus</i> L.	–	971	Betulaceae	P caesp	Europ.-Caucas.	Native
<i>Carpinus orientalis</i> Mill.	–	245	Betulaceae	P caesp	Pontic	Native
<i>Castanea sativa</i> Mill.	20	4501	Fagaceae	P scap	SE-Europ. (?)	Native
<i>Cedrus atlantica</i> (Endl.) Carrière	50	–	Pinaceae	P scap	N-Africa	Exotic
<i>Celtis australis</i> L.	300	2617	Cannabaceae	P scap	Eurimedit.	Native
<i>Ceratonia siliqua</i> L.	20	1872	Fabaceae	P scap	S-Stenomedit.	Exotic
<i>Cercis siliquastrum</i> L.	100	–	Fabaceae	P scap	S-Europ.	Native
<i>Cistus creticus</i> L.	–	938	Cistaceae	NP	Centromedit.	Native
<i>Citrus ×aurantium</i> L.	50	120	Rutaceae	P scap	Asia trop.	Exotic
<i>Colutea arborescens</i> L.	–	50	Fabaceae	P caesp	Euri-Medit.	Native
<i>Cornus sanguinea</i> L.	10	1266	Cornaceae	P scap	Eurasiat.	Native
<i>Colutea arborescens</i> L.	–	50	Fabaceae	P caesp	Euri-Medit.	Native
<i>Cornus mas</i> L.	–	805	Cornaceae	P caesp	SE-Europ.-Pontic	Native
<i>Corylus avellana</i> L.	10	533	Betulaceae	P caesp	Europ.-Caucas.	Native
<i>Crataegus monogyna</i> Jacq.	500	2844	Rosaceae	P caesp	Paleotemp.	Native
<i>Cupressus sempervirens</i> L.	2000	50	Cupressaceae	P scap	E.-Medit.	Exotic
<i>Cydonia oblonga</i> Mill.	15	90	Rosaceae	P scap	SW-Asia	Native
<i>Diospyros kaki</i> Thunb.	–	110	Ebenaceae	P scap	E-Asiat.	Exotic
<i>Emerus major</i> Mill. subsp. <i>emeroides</i> (Boiss. & Spruner) Soldano & F.Conti	–	1817	Fabaceae	NP	E-Medit.-Pontic	Native
<i>Erica multiflora</i> L.	–	67	Ericaceae	NP	Steno-Medit.	Native
<i>Euonymus europaeus</i> L.	–	2634	Celastraceae	P caesp	Eurasiat.	Native
<i>Fagus sylvatica</i> L.	–	3779	Fagaceae	P scap	Europ.	Native
<i>Ficus carica</i> L.	–	28	Moraceae	P scap	Medit.-Turan.	Native
<i>Fraxinus ornus</i> L.	500	18292	Oleaceae	P scap	S-Europ.-Sudsub.	Native
<i>Ilex aquifolium</i> L.	20	420	Aquifoliaceae	P caesp	Eurimedit.	Native
<i>Juglans regia</i> L.	100	1390	Juglandaceae	P scap	SW-Asia	Native
<i>Juniperus macrocarpa</i> Sm.	–	802	Cupressaceae	P caesp	Euri-Medit.	Native
<i>Juniperus turbinata</i> Guss.	–	408	Cupressaceae	P caesp	W-Medit.	Native
<i>Laurus nobilis</i> L.	200	2050	Lauraceae	P caesp	Stenomedit.	Native
<i>Lavandula angustifolia</i> Mill.	20	2001	Lamiaceae	NP	Stenomedit.	Native
<i>Ligustrum lucidum</i> W.T.Aiton	100	–	Oleaceae	P caesp	Asia or.	Exotic
<i>Ligustrum vulgare</i> L.	–	1000	Oleaceae	NP	Eurasiat.	Native
<i>Matthiola incana</i> W.T.Aiton	20	–	Brassicaceae	Ch suffr	Stenomedit.	Native
<i>Mespilus germanica</i> L.	–	254	Rosaceae	P caesp	Europ.	Native
<i>Morus alba</i> L.	–	1	Moraceae	P caesp	E-Asiat.	Exotic
<i>Myrtus communis</i> L.	200	1701	Myrtaceae	P caesp	Stenomedit.	Native
<i>Olea europea</i> var. <i>sylvestris</i> (Mill.) Lehr	2000	262	Oleaceae	P caesp	Stenomedit.	Native
<i>Ostrya carpinifolia</i> Scop.	–	3113	Betulaceae	P scap	S-Europ.	Native
<i>Paliurus spina-christi</i> Mill.	–	40	Rhamnaceae	P caesp	SE-Europ.	Native
<i>Phillyrea angustifolia</i> L.	–	472	Oleaceae	P caesp	Stenomedit.	Native
<i>Phillyrea latifolia</i> L.	10	2000	Oleaceae	P caesp	Stenomedit.	Native

Taxon	No. Phytoceils Nursery 1	No. Phytoceils Nursery 2	Family	Biological form	Chorology	Native/ exotic
<i>Pinus halepensis</i> Mill.	100	4690	Pinaceae	P scap	Stenomedit.	Native
<i>Pinus pinea</i> L.	500	–	Pinaceae	P scap	Eurimedit.	Exotic
<i>Pistacia lentiscus</i> L.	10	1563	Anacardiaceae	P caesp	S-Stenomedit.	Native
<i>Pistacia terebinthus</i> L.	500	2008	Anacardiaceae	P caesp	Eurimedit.	Native
<i>Pistacia vera</i> L.	–	1322	Anacardiaceae	P scap	E-Medit.	Exotic
<i>Populus alba</i> L.	–	17	Salicaceae	P scap	Paleotemp.	Native
<i>Populus nigra</i> L.	50	–	Salicaceae	P scap	Paleotemp.	Native
<i>Populus tremula</i> L.	–	26	Salicaceae	P scap	Eurosib.	Native
<i>Prunus armeniaca</i> L.	–	24	Rosaceae	P scap	Asiat.	Exotic
<i>Prunus avium</i> L.	10	–	Rosaceae	P scap	Pontic (? Europ.- Caucas.)	Native
<i>Prunus cerasus</i> L.	–	18	Rosaceae	P scap	Pontica	Exotic
<i>Prunus domestica</i> L.	–	218	Rosaceae	P caesp	SW-Asiat.	Exotic
<i>Prunus dulcis</i> (Mill.) D.A.Webb.	200	–	Rosaceae	P caesp	S-Europ.-Sudsib.	Exotic
<i>Prunus mahaleb</i> L.	–	2271	Rosaceae	P caesp	S-Europ.	Native
<i>Prunus spinosa</i> L.	500	1398	Rosaceae	P caesp	Europ.-Caucas.	Native
<i>Prunus webbii</i> (Spach) Vierh.	–	630	Rosaceae	P caesp	E-Medit.	Native
<i>Punica granatum</i> L.	20	1941	Lythraceae	P scap	SW-Asia	Exotic
<i>Pyracantha coccinea</i> M. Roem.	30	–	Rosaceae	P caesp	Stenomedit.	Native
<i>Pyrus spinosa</i> Forssk.	1000	3116	Rosaceae	P caesp	Stenomedit.	Native
<i>Quercus coccifera</i> L.	200	–	Fagaceae	P caesp	W-Stenomedit.	Native
<i>Quercus cerris</i> L.	–	25968	Fagaceae	P scap	Eurimedit.	Native
<i>Quercus ilex</i> L.	5000	28654	Fagaceae	P scap	Stenomedit.	Native
<i>Quercus pubescens</i> Willd.	5000	17780	Fagaceae	P scap	Europ.-Subpontic	Native
<i>Quercus suber</i> L.	100	–	Fagaceae	P scap	W-Eurimedit.	Native
<i>Rhamnus alaternus</i> L.	200	320	Rhamnaceae	P caesp	Stenomedit.	Native
<i>Rhamnus saxatilis</i> Jacq.	–	52	Rhamnaceae	P caesp	SE-Europ.	Native
<i>Ribes uva-crispa</i> L.	–	76	Grossulariaceae	NP	Eurasiat.	Native
<i>Robinia pseudoacacia</i> L.	100	–	Fabaceae	P scap	N-America	Exotic
<i>Rosa canina</i> L.	50	402	Rosaceae	NP	Paleotemp.	Native
<i>Rosa sempervirens</i> L.	50	–	Rosaceae	NP	W.-Medit.-Mont.	Native
<i>Ruscus aculeatus</i> L.	–	85	Asparagaceae	Ch frut (G rhiz)	Eurimedit.	Native
<i>Salix alba</i> L.	–	6611	Salicaceae	P scap	Paleotemp.	Native
<i>Salix babylonica</i> L.	15	–	Salicaceae	P scap	Subtrop.-Asiat.	Exotic
<i>Salix xfragilis</i> L.	–	117	Salicaceae	P caesp	Eurisiber.	Exotic
<i>Salvia officinalis</i> L.	–	200	Lamiaceae	Ch suffr	Stenomedit.	Native
<i>Salvia rosmarinus</i> Spenn.	20	1540	Lamiaceae	NP	Steno-Medit.	Native
<i>Sambucus nigra</i> L.	–	1080	Viburnaceae	P caesp	Europ.-Caucas.	Native
<i>Smilax aspera</i> L.	50	130	Smilacaceae	NP (G rhiz)	Paleosubtrop.	Native
<i>Sorbus aria</i> (L.) Crantz	500	17	Rosaceae	P caesp	Paleotemp.	Native
<i>Sorbus domestica</i> L.	200	114	Rosaceae	P scap	Eurimedit.	Native
<i>Sorbus torminalis</i> (L.) Crantz	–	442	Rosaceae	P caesp	Paleotemp.	Native
<i>Spartium junceum</i> L.	30	13031	Fabaceae	P caesp	Eurimedit.	Native
<i>Stachys major</i> (L.) Bartolucci & Peruzzi	–	30	Lamiaceae	Ch frut	Stenomedit.	Native
<i>Tamarix africana</i> Poir.	–	2000	Tamaricaceae	P scap	W-Medit.	Native
<i>Tamarix gallica</i> L.	10	–	Tamaricaceae	P caesp	W-Stenomedit.	Native
<i>Teucrium fruticans</i> L.	–	1026	Lamiaceae	NP	Stenomedit.	Native
<i>Thymus vulgaris</i> L.	20	–	Lamiaceae	Ch frut	Stenomedit.	Native
<i>Tilia cordata</i> Mill.	10	–	Malvaceae	P scap	Europ.-Caucas.	Native
<i>Tilia platyphyllos</i> Scop.	–	161	Malvaceae	P caesp	Europ.-Caucas.	Native
<i>Ulmus minor</i> Mill.	–	26	Ulmaceae	P caesp	Europ.-Caucas.	Native
<i>Viburnum tinus</i> L.	–	2905	Viburnaceae	P caesp	Stenomedit.	Native
<i>Ziziphus jujuba</i> Mill.	–	88	Rhamnaceae	P caesp	E-Asiat.	Exotic



Figure 2. View of the nursery “Filici” (Cammarata, province of Agrigento).



Figure 3. View of the nursery “Gargano Mountain Reclamation Consortium” (Borgo Celano, province of Foggia).

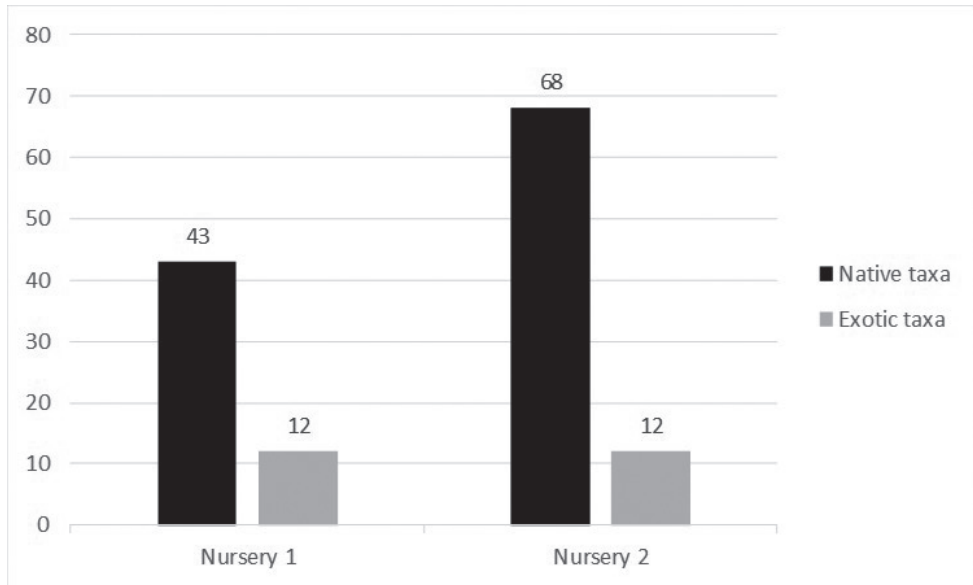


Figure 4. Number of native and exotic taxa cultivated at “Filici” (Nursery 1) and “Gargano Mountain Reclamation Consortium” (Nursery 2).

genera), and Oleaceae (5 species and 4 genera). *Prunus* (6 species), *Acer* L. (3), *Quercus* (3), and *Sorbus* L. (3) are the most frequent genera (Table 1). The autochthonous taxa are 68 (85%), while the exotic ones are 12 (15%) (Fig. 4).

In both nurseries, native species clearly dominate over exotic ones. Most of the latter are not invasive and, indeed, have a long list of traditional uses of ethnobotanical interest (*Citrus ×aurantium*, *Diospyros kaki*, *Morus alba*, *Punica granatum*, *Ziziphus jujuba*, etc.). However, alongside these taxa, there are others, such as *Acer negundo*, *Ligustrum lucidum*, and *Robinia pseudoacacia* capable of becoming invasive if planted in natural areas. It would be advisable to stop the production of these three species.

The age of the plants produced in the two forest nurseries range from 1 to 5 years old and, overall, the phytosanitary status of the plants is good.

Discussion

A few decades after the first plantings, forest nursery production began to have difficulties in maintaining native forest biodiversity. The most important reason for these failures is the use of allochthonous genotypes of unproven adaptability (Mariotti et al. 2014). In fact, for the proper implementation of reforestation, forest reconstitution of degraded forest stands, and wood arboriculture plantings, the quality of the forest propagation material to be used is crucial (Konnert et al. 2015).

These activities require the use of plant material adapted to the microclimatic and soil conditions of individual localities. This also helps to preserve biodiversity, enhance

taxonomic entities and ecotypes of high genetic value, safeguard endangered species, and avoid genetic pollution. In this regard, forest nurseries play an important role as they should meet this requirement by supplying seedlings produced from seed of native origin.

Despite the awareness of the importance of forest nurseries, in recent years in Italy, there has been a progressive disinterest and abandonment of this activity as part of an ill-advised forestry policy undertaken by regional governments. Urban reforestation, within the actions of the Italian Recovery Fund, is the bet for the future of Italian cities and for the quality of life of the next generations. It will be necessary to overcome the difficulties in finding areas for reforestation in urban areas (lack of political sensitivity, constraints, etc.).

The number of native plants useful for reforestation kept in nursery stocks is still quite limited, partly due to the drastic reduction of regional nurseries and qualified personnel. It is, therefore, necessary to know the current stock of existing nurseries and implement the number of native species for more effective actions in the territory.

The analysis of the two forest nurseries in Sicily and Apulia showed that the available species meet the reforestation plan requirements. In fact, the propagated plant material comes entirely from local autochthonous populations, thus guaranteeing the availability of genotypes that are adapted to the environment in which they will be used and able to cope with the predicted climate change (Selvi et al. 2023). However, although qualitatively adequate, the plant material produced is still quantitatively insufficient to respond to the ever-increasing demands that have arisen following the current “green-oriented” policy.

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References

- Bartolucci F, Peruzzi L, Galasso G, Albano A, Alessandrini A, Ardenghi NMG, Astuti G, Bacchetta G, Ballelli S, Banfi E, Barberis G, Bernardo L, Bouvet D, Bovio M, Cecchi L, Di Pietro R, Domina G, Fascetti S, Fenu G, Festi F, Foggi B, Gallo L, Gottschlich G, Gubellini L, Iamónico D, Iberite M, Jimenez-Mejias P, Lattanzi E, Marchetti D, Martinetto E, Masin RR, Medagli P, Passalacqua NG, Peccenini S, Pennesi R, Pierini B, Poldini L, Prosser F, Raimondo FM, Roma-Marzio F, Rosati L, Santangelo A, Scoppola A, Scortegagna S, Selvaggi A, Selvi F, Soldano A, Stinca A, Wagensommer RP, Wilhelm T, Conti F (2018a) An updated checklist of the vascular flora native to Italy. *Plant Biosystems* 152(2): 179–303. <https://doi.org/10.1080/11263504.2017.1419996>

- Bartolucci F, Domina G, Ardenghi NMG, Banfi E, Bernardo L, Bonari G, Buccomino G, Calvia G, Carruggio F, Cavallaro V, Chianese G, Conti F, Facioni L, Del Vico E, Di Gristina E, Falcinelli F, Forte L, Gargano D, Mantino F, Martino M, Mei G, Mereu G, Olivieri N, Passalacqua NG, Paziienza G, Peruzzi L, Roma-Marzio F, Scafidi F, Scoppola A, Stinca A, Nepi C (2018b) Notulae to the Italian native vascular flora: 5. *Italian Botanist* 5: 71–81. <https://doi.org/10.3897/italianbotanist.5.25892>
- Bartolucci F, Domina G, Ardenghi NMG, Bacchetta G, Bernardo L, Buccomino G, Buono S, Caldararo F, Calvia G, Carruggio F, Cavagna A, D'Amico FS, Di Carlo F, Festi F, Forte L, Galasso G, Gargano D, Gottschlich G, Lazzaro L, Magrini S, Maiorca G, Medagli P, Mei G, Mennini F, Mereu G, Miserocchi D, Olivieri N, Passalacqua NG, Paziienza G, Peruzzi L, Prosser F, Rempicci M, Roma-Marzio F, Ruggero A, Sani A, Saulle D, Steffanini C, Stinca A, Terzi M, Tondi G, Trenchi M, Viciani D, Wagensommer RP, Nepi C (2018c) Notulae to the Italian native vascular flora: 6. *Italian Botanist* 6: 45–64. <https://doi.org/10.3897/italianbotanist.6.30575>
- Bartolucci F, Domina G, Alessandrini A, Angiolini C, Ardenghi NMG, Bacchetta G, Banfi E, Bolpagni R, Bonari G, Bräuchler C, Calvia G, Cancellieri L, Cannucci S, Carruggio F, Conti F, Cavallaro V, Fanfarillo E, Ferretti G, Festi F, Fiaschi T, Foggi B, Forte L, Fröhner SE, Galasso G, Gestri G, Gottschlich G, Labadessa R, Lastrucci L, Lazzaro L, Mereu G, Morabito A, Mugnai M, Musarella CM, Orsenigo S, Paziienza G, Pennesi R, Peruzzi L, Pierini B, Podda L, Prosser F, Rossi G, Scoppola A, Spampinato G, Stinca A, Tomaselli V, Zangari G, Nepi C (2019a) Notulae to the Italian native vascular flora: 7. *Italian Botanist* 7: 125–148. <https://doi.org/10.3897/italianbotanist.7.36148>
- Bartolucci F, Domina G, Ardenghi NMG, Bacaro G, Bacchetta G, Ballarin F, Banfi E, Barberis G, Beccarisi L, Bernardo L, Bonari G, Bonini F, Brullo S, Buono S, Buono V, Calbi M, Caldararo F, Calvia G, Cancellieri L, Cannavò S, Dagnino D, Esposito A, Fascetti S, Filibeck G, Fiorini G, Forte L, Galasso G, Gestri G, Gigante D, Gottschlich G, Gubellini L, Hofmann N, Lastrucci L, Lonati M, Lorenz R, Lunardi L, Magrini S, Mainetti A, Maiorca G, Mereu G, Messa Ballarin RT, Minuto L, Mossini S, Musarella CM, Nimis PL, Passalacqua NG, Peccenini S, Petriglia B, Podda L, Potenza G, Ravetto Enri S, Roma-Marzio F, Rosati L, Ruggero A, Spampinato G, Stinca A, Tiburtini M, Tietto C, Tomaselli V, Turcato C, Viciani D, Wagensommer RP, Nepi C (2019b) Notulae to the Italian native vascular flora: 8. *Italian Botanist* 8: 95–116. <https://doi.org/10.3897/italianbotanist.8.48626>
- Bartolucci F, Domina G, Andreatta S, Angius R, Ardenghi NMG, Bacchetta G, Ballelli S, Banfi E, Barberis D, Barberis G, Bernardo L, Bertolli A, Bonari G, Bovio M, Briozzo I, Buccomino G, Calvia G, Chianese G, Cibeï C, Conti F, Copez M, Crisanti A, Dagnino D, Di Filippo A, Esposito A, Fanni S, Festi F, Forte L, Galasso G, Gentili R, Gottschlich G, Lattanzi E, Liguori P, Locci MC, Longo D, Lonati M, Lucchese F, Marchetti D, Mariotti MG, Menini F, Minuto L, Orrù G, Pala ML, Passalacqua NG, Pellegrino M, Pennesi R, Peruzzi L, Pinzani L, Pirastru G, Prosser F, Ravetto Enri S, Roma-Marzio F, Russo G, Scoppola A, Silletti G, Stinca A, Toffolo C, Tomaselli V, Tondi G, Trenchi M, Turcato C, Nepi C (2020a) Notulae to the Italian native vascular flora: 9. *Italian Botanist* 9: 71–86. <https://doi.org/10.3897/italianbotanist.9.53429>

- Bartolucci F, Domina G, Bagella S, Barberis G, Briozzo I, Calbi M, Caria MC, Cavallaro V, Chianese G, Cibeï C, Conti F, Dagnino D, Esposito A, Galasso G, Giacanelli V, Forte L, Gottschlich G, Lattanzi E, Longo D, Mei G, Merli M, Orsenigo S, Pau GB, Paziienza G, Peccenini S, Pisanu S, Riviaccio G, Roma-Marzio F, Scafidi F, Selvi F, Stinca A, Turcato C, Nepi C (2020b) Notulae to the Italian native vascularflora: 10. Italian Botanist 10: 47–55. <https://doi.org/10.3897/italianbotanist.10.60743>
- Bartolucci F, Domina G, Andreatta S, Argenti C, Bacchetta G, Ballelli S, Banfi E, Barberis D, Barberis G, Bedini G, Bolpagni R, Bonali F, Bovio M, Briozzo I, Brusco A, Caldarella O, Campus G, Cancellieri L, Carotenuto L, Cheli E, Dagnino D, Del Guacchio E, Farris E, Ferretti G, Filibeck G, Foggi B, Gabellini A, Galasso G, Gianguzzi L, Gottschlich G, Gubellini L, Hofmann N, Iamonico D, Laface VLA, Lonati M, Lucarini D, Lupoletti J, Marchianò R, Marenzi P, Martignoni M, Mei G, Menini F, Merli M, Musarella CM, Orsenigo S, Peccenini S, Pennesi R, Peruzzi L, Pica A, Pinzani L, Piovesan G, Pittarello M, Podda L, Ravetto Enri S, Roma-Marzio F, Rosati L, Spampinato G, Stinca A, Tonelli S, Trenchi M, Turcato C, Viciani D, Lastrucci L (2021a) Notulae to the Italian native vascular flora: 11. Italian Botanist 11: 77–92. <https://doi.org/10.3897/italianbotanist.11.68048>
- Bartolucci F, Domina G, Argenti C, Bacchetta G, Ballelli S, Banfi E, Barberis D, Barberis G, Bertolli A, Bolpagni R, Bonari G, Bonini F, Briozzo I, Brundu G, Bruschi T, Calbi M, Callegari M, Calvia G, Campoccia D, Cancellieri L, Cangelmi G, Carfagno S, Carruggio F, Casazza G, Cavallaro V, Cherchi S, Ciocia B, Conti F, Crisafulli A, Dagnino D, Dalla Vecchia A, De Fine G, Del Nero V, Di Filippo A, Dunkel FG, Festi F, Filibeck G, Fois M, Forte L, Fratolin F, Galasso G, Gigante D, Gottschlich G, Gubellini L, Hofmann N, Jiménez-Mejías P, Laface VLA, Lonati M, Lozano V, Mainetti A, Mariotti M, Mei G, Minutillo F, Minuto L, Musarella CM, Nota G, Orsenigo S, Pallanza M, Passalacqua NG, Paziienza G, Pinzani L, Pittarello M, Podda L, Prosser F, Ravetto Enri S, Riva G, Santi F, Scoppola A, Selvaggi A, Selvi F, Spampinato G, Stinca A, Tomaselli V, Tomasi G, Tondi G, Turcato C, Wilhalm T, Lastrucci L (2021b) Notulae to the Italian native vascular flora: 12. Italian Botanist 12: 85–103. <https://doi.org/10.3897/italianbotanist.12.78038>
- Bartolucci F, Domina G, Andreatta S, Argenti C, Astuti G, Ballelli S, Ballestrin S, Banfi E, Barberis D, Bernardo L, Bertolli A, Bonali F, Bonini F, Bruschi T, Buccomino G, Caldarella O, Cancellieri L, Caputo P, Conti F, Crisanti A, Del Guacchio E, Falcinelli F, Festi F, Ferri V, Filibeck G, Galasso G, Gestri G, Gigante D, Gubellini L, Gottschlich G, Guarino R, Hofmann N, Király G, Laghi P, Lazzeri V, Lonati M, Luchino F, Lupoletti J, Mei G, Merli M, Pagitz K, Paura B, Pennesi R, Perrino EV, Pica A, Pierini B, Pinzani L, Pittarello M, Praleskouskaya S, Prosser F, Roma-Marzio F, Santi F, Saiani D, Sebellin A, Soldano A, Spilli T, Stinca A, Terzi M, Tiburtini M, Tomasi G, Venanzoni R, Lastrucci L (2022) Notulae to the Italian native vascular flora: 13. Italian Botanist 13: 67–84. <https://doi.org/10.3897/italianbotanist.13.86403>
- Candore M, Girgenti P (2019) Disposizioni sull'organizzazione e funzionamento del Centro Vivaistico Regionale (C.V.R.). Regione Siciliana, Assessorato Regionale dell'Agricoltura, dello Sviluppo Rurale e della Pesca Mediterranea, Allegato "A". D.D.G. n. 248/2019. [In Italian]
- Galasso G, Conti F, Peruzzi L, Ardenghi NMG, Banfi E, Celesti-Grapow L, Albano A, Alesandrini A, Bacchetta G, Ballelli S, Bandini Mazzanti M, Barberis G, Bernardo L, Blasi C,

- Bouvet D, Bovio M, Cecchi L, Del Guacchio E, Domina G, Fascetti S, Gallo L, Gubellini L, Guiggi A, Iamónico D, Iberite M, Jiménez-Mejías P, Lattanzi E, Marchetti D, Martinetto E, Masin RR, Medagli P, Passalacqua NG, Peccenini S, Pennesi R, Pierini B, Podda L, Poldini L, Prosser F, Raimondo FM, Roma-Marzio F, Rosati L, Santangelo A, Scoppola A, Scortegagna S, Selvaggi A, Selvi F, Soldano A, Stinca A, Wagensommer RP, Wilhelm T, Bartolucci F (2018a) An updated checklist of the vascular flora alien to Italy. *Plant Biosystems* 152(3): 556–592. <https://doi.org/10.1080/11263504.2018.1441197>
- Galasso G, Domina G, Adorni M, Ardenghi NMG, Bonari G, Buono S, Cancellieri L, Chianese G, Ferretti G, Fiaschi T, Forte L, Guarino R, Labadessa R, Lastrucci L, Lazzaro L, Magrini S, Minuto L, Mossini S, Olivieri N, Scoppola A, Stinca A, Turcato C, Nepi C (2018b) Notulae to the Italian alien vascular flora: 5. *Italian Botanist* 5: 45–56. <https://doi.org/10.3897/italianbotanist.5.25910>
- Galasso G, Domina G, Alessandrini A, Ardenghi NMG, Bacchetta G, Ballelli S, Bartolucci F, Brundu G, Buono S, Busnardo G, Calvia G, Capece P, D'Antraccoli M, Di Nuzzo L, Fanfarillo E, Ferretti G, Guarino R, Iamónico D, Iberite M, Latini M, Lazzaro L, Lonati M, Lozano V, Magrini S, Mei G, Mereu G, Moro A, Mugnai M, Nicoletta G, Nimis PL, Olivieri H, Pennesi R, Peruzzi L, Podda L, Probo M, Prosser F, Ravetto Enri S, Roma-Marzio F, Ruggiero A, Scafidi F, Stinca A, Nepi C (2018c) Notulae to the Italian alien vascular flora: 6. *Italian Botanist* 6: 65–90. <https://doi.org/10.3897/italianbotanist.6.30560>
- Galasso G, Domina G, Ardenghi NMG, Aristarchi C, Bacchetta G, Bartolucci F, Bonari G, Bouvet D, Brundu G, Buono S, Caldarella O, Calvia G, Cano-Ortiz A, Corti E, D'Amico FS, D'Antraccoli M, Di Turi A, Dutto M, Fanfarillo E, Ferretti G, Fiaschi T, Ganz C, Guarino R, Iberite M, Laface VLA, La Rosa A, Lastrucci L, Latini M, Lazzaro L, Lonati M, Lozano V, Luchino F, Magrini S, Mainetti A, Manca M, Mugnai M, Musarella CM, Nicoletta G, Olivieri N, Orrù I, Paziienza G, Peruzzi L, Podda L, Prosser F, Ravetto Enri S, Restivo S, Roma-Marzio F, Ruggiero A, Scoppola A, Selvi F, Spampinato G, Stinca A, Terzi M, Tiburtini M, Tornatore E, Vetromile R, Nepi C. (2019a) Notulae to the Italian alien vascular flora: 7. *Italian Botanist* 7: 157–182. <https://doi.org/10.3897/italianbotanist.7.36386>
- Galasso G, Domina G, Andreatta S, Angiolin, C, Ardenghi NMG, Aristarchi C, Arnoul M, Azzella MM, Bacchetta G, Bartolucci F, Bodino S, Bommartini G, Bonari G, Buono S, Buono V, Caldarella O, Calvia G, Corti E, D'Antraccoli M, De Luca R, De Mattia F, Di Natale S, Di Turi A, Esposito A, Ferretti G, Fiaschi T, Fogu MC, Forte L, Frigerio J, Gubellini L, Guzzetti L, Hofmann N, Laface VLA, Laghetti G, Lallai A, La Rosa A, Lazzaro L, Lodetti S, Lonati M, Luchino F, Magrini S, Mainetti A, Marignani M, Maruca G, Medagli P, Mei G, Menini F, Mezzasalma V, Misuri A, Mossini S, Mugnai M, Musarella CM, Nota G, Olivieri N, Padula A, Pascale M, Pasquini F, Peruzzi L, Picella G, Pinzani L, Pirani S, Pittarello M, Podda L, Ravetto Enri S, Rifici CD, Roma-Marzio F, Romano R, Rosati L, Scafidi F, Scarici E, Scarici M, Spampinato G, Stinca A, Wagensommer RP, Zanoni G, Nepi C (2019b) Notulae to the Italian alien vascular flora: 8. *Italian Botanist* 8: 63–93. <https://doi.org/10.3897/italianbotanist.8.48621>
- Galasso G, Domina G, Adorni M, Angiolini C, Apruzzese M, Ardenghi NMG, Assini S, Aversa M, Bacchetta G, Banfi E, Barberis G, Bartolucci F, Bernardo L, Bertolli A, Bonali F, Bonari

- G, Bonini I, Bracco F, Brundu G, Buccomino G, Buono S, Calvia G, Cambria S, Castagnini P, Ceschin S, Dagnino D, Di Gristina E, Di Turi A, Fascetti S, Ferretti G, Fois M, Gentili R, Gheza G, Gubellini L, Hofmann N, Iamónico D, Ilari A, Király A, Király G, Laface VLA, Lallai A, Lazzaro L, Lonati M, Longo D, Lozano V, Lupoletti J, Magrini S, Mainetti A, Manca M, Marchetti D, Mariani F, Mariotti MG, Masin RR, Mei G, Menini F, Merli M, Milani A, Minuto L, Mugnai M, Musarella CM, Olivieri N, Onnis L, Passalacqua NG, Peccenini S, Peruzzi L, Pica A, Pinzani L, Pittarello M, Podda L, Prosser F, Ravetto Enri S, Roma-Marzio F, Rosati L, Sarigu M, Scafidi F, Sciandrello S, Selvaggi A, Spampinato G, Stinca A, Tavilla G, Toffolo C, Tomasi G, Turcato C, Villano C, Nepi C (2020a) Notulae to the Italian alien vascular flora: 9. *Italian Botanist* 9: 47–70. <https://doi.org/10.3897/italianbotanist.9.53401>
- Galasso G, Domina G, Azzaro D, Bagella S, Barone G, Bartolucci F, Bianco M, Bolzani P, Bonari G, Boscutti F, Buono S, Cibeì C, Conti F, Di Gristina E, Fanfarillo E, Franzoni J, Giacanelli V, Gubellini L, Hofmann N, Laface VLA, Latini M, Liccari F, Lonati M, Longo D, Lunesu L, Lupoletti J, Magrini S, Mei G, Mereu G, Miconi F, Musarella CM, Nicoletta G, Olivieri N, Peruzzi L, Pica A, Pinzani L, Pittarello M, Prosser F, Ranno V, Ravetto Enri S, Rivièccio G, Roma-Marzio F, Scafidi F, Spampinato G, Stinca A, Tavilla G, Tiburtini M, Villa M, Wellstein C, Zerbe S, Nepi C (2020b) Notulae to the Italian alien vascular flora: 10. *Italian Botanist* 10: 57–71. <https://doi.org/10.3897/italianbotanist.10.60736>
- Galasso G, Domina G, Andreatta S, Argenti E, Bacchetta G, Bagella S, Banfi E, Barberis D, Bardi S, Barone G, Bartolucci F, Bertolli A, Biscotti N, Bonali F, Bonini F, Bonsanto D, Brundu G, Buono S, Caldarella O, Calvia G, Cambria S, Campus G, Caria MC, Contim F, Coppi A, Dagnino D, Del Guacchio E, Di Gristina E, Farris E, Ferretti G, Festi F, Fois M, Furlani F, Gigante D, Guarino R, Gubellini L, Hofmann N, Iamónico D, Jiménez-Mejías P, La Rosa A, Laface VLA, Lallai A, Lazzaro L, Lonati M, Lozano V, Luchino F, Lupoletti J, Magrini S, Mainetti A, Marchetti D, Marenzi P, Marignani M, Martignoni M, Mei G, Menini F, Merli M, Mugnai M, Musarella CM, Nicoletta G, Noor Hussain A, Olivieri N, Orlandini S, Peccenini S, Peruzzi L, Pica A, Pilon N, Pinzani L, Pittarello M, Podda L, Probo M, Prosser F, Raffaelli C, Ravetto Enri S, Rivièccio G, Rosati L, Sarmati S, Scafidi F, Selvi F, Sennikov AN, Sotgiu Cocco G, Spampinato G, Stinca A, Tavilla G, Tomaselli V, Tomasi D, Tomasi G, Trenchi M, Turcato C, Verloove F, Viciani D, Villa M, Wagensommer RP, Lastrucci L (2021a) Notulae to the Italian alien vascular flora: 11. *Italian Botanist* 11: 93–119. <https://doi.org/10.3897/italianbotanist.11.68063>
- Galasso G, Domina G, Angiolini C, Bacchetta G, Banfi E, Barberis D, Bardi S, Bartolucci F, Bonari G, Bovio M, Briozzo I, Brundu G, Buono S, Calvia G, Celesti-Grappow L, Cozzolino A, Cuenca-Lombrana A, Curuzzi M, D'Amico FS, Dagnino D, De Fine G, Fanfarillo E, Federici A, Ferraris P, Fiacchini D, Fiaschi T, Fois M, Gubellini L, Guidotti E, Hofmann N, Kindermann E, Laface VLA, Lallai A, Lanfredini P, Lazzaro L, Lazzeri V, Lonati M, Loreti M, Lozano V, Magrini S, Mainetti A, Marchini M, Marignani M, Martignoni M, Mei G, Minutillo F, Mondino GP, Motti R, Musarella CM, Nota G, Olivieri N, Pallanza M, Passalacqua NG, Patera G, Pilon N, Pinzani L, Pittarello M, Podda L, Probo M, Ravetto Enri S, Rosati L, Salerno P, Selvaggi A, Soldano A, Sotgiu Cocco G, Spampinato G, Stinca A, Terzi M, Tondi G, Turcato C, Wellstein C, Lastrucci L (2021b) Notulae to

- the Italian alien vascular flora: 12. *Italian Botanist* 12: 105–121. <https://doi.org/10.3897/italianbotanist.12.78010>
- Galasso G, Domina G, Angiolini C, Azzaro D, Bacchetta G, Banfi E, Barberis D, Barone G, Bartolucci F, Bertolli A, Bolpagni R, Bonari G, Bracchetti L, Calvia G, Campus G, Cancellieri L, Cavallaro V, Conti F, Cuena-Lombraña A, D’Alessandro E, Dal Corso G, Dalla Vecchia A, De Natale A, Del Guacchio E, Di Gregorio G, Di Gristina E, Di Stefano M, Fanfarillo E, Federici A, Federici G, Ferretti G, Festi F, Fiaschi T, Filibeck G, Fois M, Gariboldi L, Gestri G, Gubellini L, Guiggi A, Hofmann N, Laface VLA, Lallai A, Lazzeri V, Lecis AP, Lonati M, Lucchese F, Lupoletti J, Maestri S, Mainetti A, Mantino F, Mascia F, Masin RR, Mei G, Merli M, Messina A, Konnert M, Fady B, Gömöry D, A’Hara S, Wolter F, Ducci F, Koskela J, Bozzano M, Maaten T, Kowalczyk J (2015) Use and transfer of forest reproductive material in Europe in the context of climate change. European Forest Genetic Resources Programme (EUFORGEN), Bioversity International, Rome, Italy, [xvi and] 75 pp.
- Musarella CM, Nota G, Olivieri N, Paura B, Pellegrini R, Pica A, Pittarello M, Podda L, Praleskouskaya S, Prosser F, Ratini G, Ravetto Enri S, Roma-Marzio F, Salerno G, Selvaggi A, Soldano A, Spampinato G, Stinca A, Tardella FM, Tavilla G, Tomaselli V, Tomasi G, Tosetto L, Venanzoni R, Lastrucci L (2022) Notulae to the Italian alien vascular flora: 13. *Italian Botanist* 13: 27–44. <https://doi.org/10.3897/italianbotanist.13.85863>
- Mariotti B, Maltoni A, Tani A (2014) Produzione vivaistica forestale e potenzialità applicative del “Traget Plant Concept”. Proceedings of the Second International Congresso of Silviculture, Florence, November 26th–29th.
- Martini S, Maltoni A, Monteverdi MC, De Dato G, Salbitano F, Marchetti M, Mariotti B (2022) Indagine sulla produzione vivaistica forestale pubblica in Italia. *Forest@* 19: 18–30. <https://doi.org/10.3832/efor4083-019>
- Mirabile G, Cirlincione F, Venturella G, Torta L (2023) Seed vitality and fungal contamination in *Abies nebrodensis*. *Plant Biosystems* 157(1): 112–118. <https://doi.org/10.1080/11263504.2022.2089765>
- Pardi R, Venturella G, Cirlincione F, Mirabile G, Di Gristina E, Gargano ML (2022) Forest ecosystems in the Monti Sicani Park (Sicily). *Flora Mediterranea* 32: 5–16. <https://doi.org/10.7320/FlMedit32.005>
- Pignatti S (2017) *Flora d’Italia* (Vols. 1–2). Edagricole, Milano.
- Pignatti S (2018) *Flora d’Italia* (Vol. 3). Edagricole, Milano.
- Pignatti S (2019) *Flora d’Italia* (Vol. 4). Edagricole, Milano.
- Raunkiaer C (1934) *The life forms of plants and statistical plant geography; being the collected papers of C. Raunkiaer*. Oxford University Press, Oxford.
- Raimondo FM, Schicchi R (2005) Rendiconto Sul Progetto LIFE Natura “Conservazione *In Situ* ed *Ex Situ* di *Abies nebrodensis* (Lojac.) Mattei”. <https://www.parcodellemadonie.it/webdoc/doc/life.pdf> [Accessed on 27 March 2023]
- Selvi F, Campetella G, Canullo R, Chelli S, Domina G, Farris E, Gasperini C, Rosati L, Wellstein C, Carrari E (2023) The Italian endemic forest plants: an annotated inventory and synthesis of knowledge. *Plant Ecology and Evolution* 156(1): 29–45. <https://doi.org/10.5091/plecevo.95929>