

The hidden Mediterranean diet: wild vegetables traditionally gathered and consumed in the Gargano area, Apulia, SE Italy

Nello Biscotti¹, Andrea Pieroni^{2*}

¹ Corso Carmine 84, 71018 Vico del Gargano (Foggia), Italy

² University of Gastronomic Sciences, Piazza Vittorio Emanuele 9, 12060 Bra/Pollenzo, Italy

Abstract

Despite the extensive bio-scientific literature concerning the Mediterranean diet, which emerged in the last three decades, systematic ethnography-centered investigations on a crucial portion of this food system, linked to the traditional consumption of non-cultivated vegetables, are still largely lacking in many areas of the Mediterranean Basin.

In this research, an ethnobotanical field study focusing on wild vegetables traditionally gathered and consumed locally, was conducted in a few centers and villages located in the Gargano area, northern Apulia, SE Italy, by interviewing twenty-five elderly informants. The folk culinary uses of seventy-nine botanical taxa of wild vascular plants, belonging to nineteen families, were recorded, thus showing a remarkable resilience of traditional environmental knowledge (TEK) related to wild food plants. In particular, approximately one-fourth of the recorded wild vegetables are still very commonly gathered and consumed nowadays, while ten taxa have never been reported in previous ethnobotanical studies conducted in Southern Italy. These findings demonstrate the crucial cultural role played by folk cuisines in preserving TEK, despite significant socio-economic changes that have affected the study area during the past four decades.

Keywords: ethnobotany; wild food plants; Apulia; Mediterranean diet; Italy

Introduction

The Mediterranean diet – the theorization of which was proposed for the first time in the cross-cultural epidemiological “Seven countries study” by the American nutritionist Ancel Benjamin Keys [1,2] – has been defined as a diet “characterized by abundant plant foods, fresh fruit as the typical daily dessert, olive oil as the principal source of fat, dairy products (principally cheese and yogurt), and fish and poultry consumed in low to moderate amounts, zero to four eggs consumed weekly, red meat consumed in low amounts, and wine consumed in low to moderate amounts, normally with meals” [3].

Moreover, this diet has been ascribed to “food patterns typical of Crete, much of the rest of Greece, and southern Italy in the early 1960s, where adult life expectancy was among the highest in the world and rates of coronary heart disease, certain cancers, and other diet-related chronic diseases were among the lowest” [3].

Within this context, the consumption of wild vegetables in Southern Europe, however, still represents a kind of “hidden” part of the Mediterranean diet, despite the large scientific

literature pointing out the benefits of this dietary pattern and the fact that this diet has been recently recognized as a UNESCO Intangible Cultural Heritage of Humanity [4], officially ascribed to a few circum-Mediterranean countries: Italy, Spain, Portugal, Morocco, Greece, Cyprus, and Croatia.

Wild vegetables of the Mediterranean diet have been at the center of a series of phytochemical and phytopharmacological studies in recent years that have demonstrated their role in counteracting metabolic diseases and as remarkable anti-oxidants [5–10]; moreover, wild vegetables are nowadays also the focus of many new trends of contemporary European cuisine, which stress the importance of the health benefits of local foods and expressions of terroirs/“sense of place” [11].

Despite the fact that these plants have represented for centuries and millennia the folk daily foods in the Mediterranean and the Near East, particularly during the winter and spring months, in-depth ethnography-based ethnobotanical studies published in the international literature and specifically focusing on the identification of traditionally gathered wild vegetables, as well as on the detailed documentation of their folk culinary uses, are still relatively scarce for the Mediterranean Basin, if we exclude some areas of Spain, inland southern Italy and Sicily, the Western Aegean part of Turkey, and Dalmatia [12–30].

The global scientific community should maybe consider the urgency of collecting information about these neglected

* Corresponding author. Email: a.pieroni@netcologne.de

Handling Editor: Łukasz Łuczaj

foods from the remaining traditional knowledge holders in order to record in detail the plant-based part of the folk daily diet of the rural classes of the Mediterranean region.

In this study, we contribute to this challenging task by conducting an ethnobotanical survey on the wild vegetables still gathered and consumed in the Gargano area, SE Italy. This area is in fact considered crucial for understanding the true nature of vegetable-based diets in Italy, as it is located within a region (Apulia) where the local folk cuisine is well-known for its remarkable use of both neglected (cultivated) and wild plants.

The specific aims of this study were:

- (i) to record the local names and specific traditional culinary uses of wild vegetables, which are still gathered in the selected area;
- (ii) to compare the collected ethnobotanical data with the south Italian and South European ethnobotanical literature, in order to point out possible new or unusual plant culinary uses; and
- (iii) to compare the collected data with an ethnography-centered ethnobotanical investigation conducted in the same area in 1961, in order to observe the continuity and change of folk culinary uses of wild vegetables.

Material and methods

Selected site

The field study site consisted of the Gargano area, located within the Foggia Province, northern Apulia region, SE Italy (Fig. 1). Gargano is mainly represented by a hilly promontory that extends into the Adriatic Sea; since 1991, it has been entirely included within Gargano National Park, which has an area of 1180 km², of which half is devoted to agro-pastoral activities and approximately one-fifth is covered by forests.

This promontory is characterized by a particular Mediterranean climate, largely influenced by north winds, which bring humidity and significant rainfall (up to 1300 mm per year). This peculiarity, together with the mainly karstic

geology of the promontory, has enabled the development of a remarkable variety of habitats: karst plateaus with steep cliffs falling into the sea, coastal lagoons, salty steppes, maquis shrublands, hills, and woody valleys. The coastal and sub-coastal areas are covered by prickly junipers (*Juniperus oxycedrus* L.), as well as Aleppo pines (*Pinus halepensis* Mill.), diverse oak species (*Quercus* spp.), hop hornbeams (*Ostrya carpinifolia* Scop.), and Italian maples [*Acer opalus* subsp. *obtusatum* (Waldst. & Kit. ex Willd.) Gams]. In the mountainous areas, which are wooded up to approximately 830 m a.s.l., Turkey and Italian oaks (*Quercus cerris* L., *Q. frainetto* Ten.), chestnut trees (*Castanea sativa* L.), European hornbeams (*Carpinus betulus* L.), beeches (*Fagus sylvatica* L.), yews (*Taxus baccata* L.), and field maples (*Acer campestre* L.) dominate. Finally, in the most humid canyons the dominant species are bay laurels (*Laurus nobilis* L.), wych elms (*Ulmus glabra* Huds.), and large-leaved lime trees (*Tilia platyphyllos* Scop.).

The flora is extremely rich and includes ca. 2100 plant species [31], with a number of important endemic taxa (such as *Asperula garganica* Huter, Porta & Rigo ex Ehrend. & Krendl, *Campanula garganica* Ten.), rare species of the Italian flora [i.e., *Cistus clusii* Dunal, *Clinopodium serpyllifolium* subsp. *fruticosum* (L.) Bräuchler], and Balkan elements as well [i.e., *Scabiosa crenata* subsp. *dallaportae* (Heldr. ex Boiss.) Hayek, *Inula verbascifolia* (Willd.) Haussk.].

The agronomic landscape is characterized by orchards of citrus species, almond (Fig. 2), carob, and olive trees. Until a few decades ago, the traditional economic model of the area was characterized by a mixture of agricultural and pastoralist (sheep and cattle breeding) activities. While the development of tourism has changed this in the last few decades, the area still hosts a number of small-scale farmers.

The main town of Foggia is home to a daily fruit and vegetable market, where, during the winter and the spring months, a dozen stalls – a few of them managed unofficially by elderly farmers/sellers – offer several wild vegetables; the same happens on street corners of this city as well as in a number of minor centers of the province.

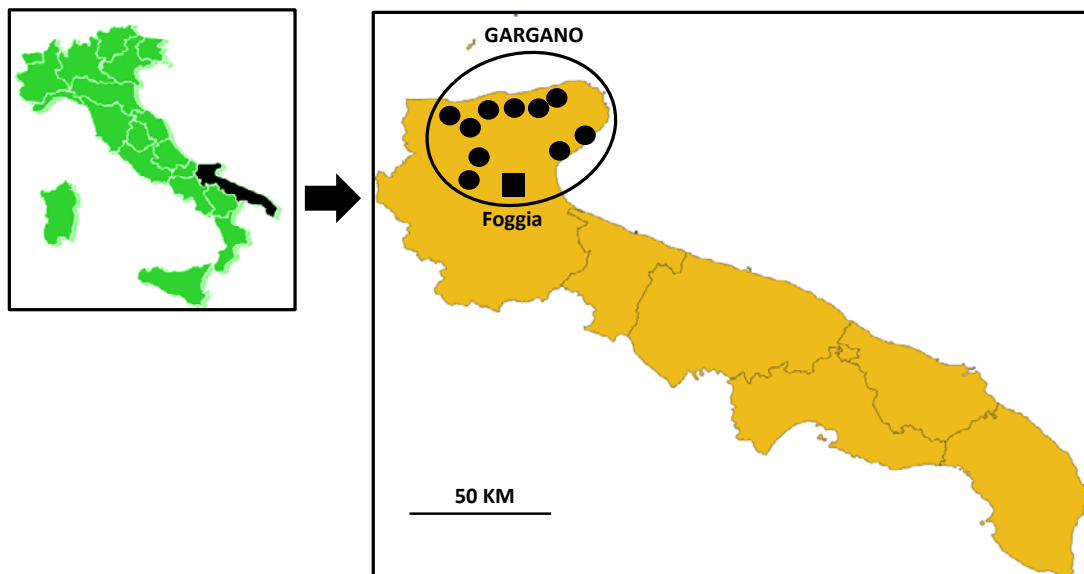


Fig. 1 The study site and visited centers.



Fig. 2 Almond tree orchards in the Gargano, one of the most favorite spots for gathering wild vegetables in the winter and spring months.

In Foggia, the foraging of wild vegetables was part of the “specialized” skills retained by a specific section of the local city population, called *Terrazzani*. These “marginal” peoples were historically, and are still partially nowadays, involved in the gathering/foraging activities of wild food plants, and also mushrooms, snails, frogs, and (mainly illegally hunted) wild birds and small mammals, such as wild rabbits, hedgehogs, and badgers, for food. In the past, Terrazzani were used to gather and sell these items to the local agrarian bourgeoisie; nowadays, the few remaining Terrazzani sell their foraged foods on the street corners of Foggia (Fig. 3, Fig. 4).

The major part of the local population of the Gargano area is employed nowadays in small-scale agricultural activities (particularly related to olive tree and vegetable farming) and especially in the touristic industry, (the Gargano area hosting nowadays approximately 80% of all tourists visiting Apulia). The area is still heavily affected by migration of the youngest generations to northern Italy and Germany, motivated by the search for better job opportunities.

The local population of the Gargano area speaks a variety of dialects, which belong to the Daunian branch of the southern Italian languages.

Field study

In the years 2011–2014, the following centers and villages of the Gargano area were visited: Foggia, San Severo, Manfredonia, Cagnano Varano, Scanzano, San Nicandro, Vico del Gargano, Apricena, Lesina, Carpino, Lucera, and Mattinata. Twenty-five elderly informants between the ages of 39 and 80 years (but primarily 65–75 years) were selected among those locals who could be identified as traditional knowledge holders (normally Terrazzani and elderly small-scale farmers and shepherds), employing snowball-sampling techniques. These individuals then were interviewed after prior informed consent was verbally obtained. The focus of the interviews, which were conducted in both standard Italian and the Daunian dialect, was the folk knowledge (name and use) of the wild vegetables they still gather during the winter and spring months, i.e., the focus of the study was on current (and not past) wild vegetables perceptions and uses.

The Code of Ethics of the International Society of Ethnobiology [32] was strictly followed.

The wild plant species mentioned by the informants were collected, when available, and identified by the first author according to *Flora d'Italia* [33], and stored at the Herbarium



Fig. 3 One of the last *Terrazzani* and most knowledgeable informants in the present study, while selling wild vegetables in the city center of Foggia: Antonio Marzano (nickname: *U' Cinese*, “The Chinese”).



Fig. 4 Young man selling wild asparagus (*Asparagus acutifolius*) shoots.

Anconitanum (Marche Polytechnical University, Ancona, Italy). Nomenclature follows the standards set by The Plant List database [34], while plant family assignments follow the current Angiosperm Phylogeny Group designations [35].

Data analysis

We compared the data gathered during the field study with the following sources: the entire Italian ethnobotanical database (last updated in 2004) [36], the south-Italian ethnobotanical surveys that have been published in international journals and have (also) considered wild plants traditionally used in local cuisines [21–26,37–41], national ethnobotanical literature sources and popular references in which sound ethnobotanical observations were reported [42–54], as well as wild food plant-centered ethnobotanical studies conducted in Southern Europe and published in international journals [12–20,27–30].

Finally, we compared the collected data with an ethnography-centered ethnobotanical investigation conducted in the same area in 1961 [55].

Results

Tab. 1 shows the recorded folk names and culinary uses of wild vegetables.

Sixty-seven folk taxa corresponding to seventy-nine botanical taxa of wild vascular plants, belonging to nineteen families, were found to represent the current local wild vegetable-based culinary heritage. The discrepancy between the two numbers is due, as already well documented for wild vegetables in other South-European areas [21], to the phenomenon known in ethnobiological linguistics as *under-differentiation* (locals naming diverse, mainly “similar”, botanical taxa with one folk name only).

If we compare this data with the south Italian ethnobotanical literature of the last two decades [28–36], this is probably one the richest heritages in terms of the diversity of wild food plants still gathered and consumed ever recorded in mainland Italy.

Most of the reported wild vegetables are represented by “greens”, i.e., wild leafy vegetables, that mainly belong to the families of Asteraceae (30 botanical taxa) and Brassicaceae (10 botanical taxa), as is the case in most Mediterranean wild food plant-based folk cuisines, and, for what regards the popularity of wild food Brassicaceae, particularly in Sicily [25].

The prevalence of these two families may be explained by both the appreciation of the bitter and pungent tastes of the gathered botanical species belonging to these families, and the fact that elderly locals tend to link these tastes to the belief that these ingredients are important elements of a “healthy” diet, sometimes even ascribing them clear medicinal properties, as described in other studies focusing on the South-Italian paradigm of wild plant-based food-medicines and folk functional foods [21,56,57].

Beyond leafy vegetables, there are, however, a few exceptions: two vines (*Dioscorea communis*, *Smilax aspera*) and one shrub (*Pistacia terebinthus*), of which Gargano locals use the young, tender shoots; three wild leek and garlic species

(*Allium ampeloprasum*, *A. commutatum*, and *A. pendulinum*), of which (also) the bulbs are consumed; and tassel hyacinth (*Leopoldia comosa*), whose bulbs may represent the most iconic foraged ingredient of Apulian folk cuisine, according to which they are fried with eggs to make a kind of bitter omelette (Fig. 5).

The most common culinary use of the recorded wild greens is boiling them in mixtures, locally known as *fogghjà mmisché* (“mixed leaves”), and simply consuming them dressed only with olive oil and vinegar or lemon juice.

A variation of this mixture is the folk culinary preparation *pancotto*, in which old bread is boiled in water together with the wild greens, and, at the end, the entire preparation is dressed with abundant olive oil.

With some of the reported taxa (notably *Diplotaxis tenuifolia*, *Foeniculum vulgare*, *Sinapis* spp., *Raphanus raphanistrum*) a typical local festivity dish is prepared: home-made pasta (*maccheroni* or *orecchiette*) is “married” with the wild vegetables, either raw or blanched, which are then fried together in a pan with olive oil and garlic.

In rare cases, specific wild greens become the main ingredients of special dishes, such as eel-based (*Tripolium pannonicum*, *Taraxacum obovatum*) or lake fish-based (*Sonchus maritimus*) soups, as well as side dishes of roasted lamb meat during Easter festivities (*Scolymus hispanicus*).

A small number of taxa are simply consumed raw, as a snack, with bread, or, more often, in salads (*Reichardia picroides*, *Diplotaxis tenuifolia*, *Sanguisorba minor*, and even the light toxic shoots of *Dioscorea communis*); for example, a peculiar traditional salad preparation consists of mixing the young aerial parts of *Cerinth major* with oranges (Fig. 6). It is also worth mentioning the culinary tradition of roasting wild garlic and leek bulbs (particularly *Allium ampeloprasum*, but also *A. commutatum* and *A. pendulinum* which are very rarely used elsewhere in Italy), and especially young shoots of *Asphodeline* spp.

Moreover, we compared the collected data with an in-depth folkloric investigation conducted in the same area in 1961 by the ethnographer and cleric Cleto Corrain [55]. The wild vegetables which were mentioned as widely used 55 years ago were: *Asparagus acutifolius*, *Beta vulgaris*, *Capparis* spp., *Cichorium intybus*, *Foeniculum vulgare*, *Hirschfeldia incana*, *Portulaca oleracea*, *Reichardia picroides*, *Sonchus* spp., *Sinapis* spp., and *Taraxacum officinale*. These species represented and still represent the core of the wild vegetable-based folk cuisine of the Gargano area. The collection of wild *Ruta* ssp. (probably as seasoning) and *Sedum acre*, which were mentioned by the Reverend Corrain, seem to have been abandoned in the study area.

Discussion

Although traditional small-scale agro-pastoral activities increasingly mixed in the last few decades with the development of tourism, and the lifestyle of peasants during the past several centuries no longer exists in the study area, the use of wild vegetables in folk cuisines is still very much alive.

The reasons for this permanence can be found in the resilience of a plant-based traditional cuisine, which retains

Tab. 1 Wild vegetables gathered and consumed in the study area.

Botanical taxon/taxa, family, and voucher specimen code(s)	Local name(s)	Used parts	Traditional culinary use(s)	Frequency of quotation	Previous records in the south Italian ethnobotanical literature
<i>Allium ampeloprasum</i> L., Amaryllidaceae, 6430	Riddiddé, Cipoddé carraré	Bulb, stem, young leaves	Raw in mixed salads; roasted and dressed with olive oil	C	yes
<i>Allium commutatum</i> Guss., Amaryllidaceae, 9331	Agghié selvaggé	Bulb, stem, young leaves	Raw in mixed salads; roasted and dressed with olive oil	C	yes
<i>Allium pendulinum</i> Ten., Amaryllidaceae, 16384	Liscina	Bulb, stem, young leaves	Raw in mixed salads; roasted and dressed with olive oil	R	yes
<i>Amaranthus retroflexus</i> L., Amaranthaceae, 13354	Agghjitàné	Young leaves	Boiled, then on pasta	C	yes
<i>Ammi majus</i> L., Apiaceae, 14790	Spróvlé	Aerial parts	Boiled then on pasta, dressing with "pecorino" cheese and olive oil	R	yes
<i>Apium nodiflorum</i> (L.) Lag., Apiaceae, 13466	Accio selvaggé	Aerial parts	Raw in salads; seasoning soups	C	yes
<i>Asparagus acutifolius</i> L., Asparagaceae, 17188	Spar'jé	Young shoots	Boiled and dressed with olive oil; fried with eggs; boiled, then on pasta; boiled and pickled in olive oil	VC	yes
<i>Asphodeline lutea</i> (L.) Rchb. and <i>A. liburnica</i> (Scop.) Rchb., Xanthorrhoeaceae, 10115 and 9504	Calcacavallo, Coda di Cavallo	Shoots	Roasted (shoots have to be previously peeled)	C	yes
<i>Beta vulgaris</i> L., Amaranthaceae, 10593	Ghjéeta	Whorls	Boiled, on pasta or in boiled mixtures	VC	yes
<i>Borago officinalis</i> L., Boraginaceae	Burraccèllé, Burraccèddé, Vurràine, Murraine, Vorràine	Aerial parts	Boiled and dressed with olive oil; in soups with pumpkin and fava beans	VC	yes
<i>Bunias erucago</i> L., Brassicaceae, 25978	Pisciacane, Cagnapurcedd, Làs'n'	Whorls	Boiled in mixtures	C	yes
<i>Calepina irregularis</i> (Asso) Thell., Brassicaceae, 16354	Insalata selvaggia	Whorls	Raw in mixed salads; boiled in mixtures	R	
<i>Capparis spinosa</i> L., Capparaceae, 12266	Chjapparini	Flower buds, fruits	In salads; boiled and pickled; seasoning	VC	yes
<i>Capsella bursa-pastoris</i> (L.) Medik., Brassicaceae, 13286	Insalata selvaggia	Whorls	Boiled on pasta or in mixtures	R	yes
<i>Carlina corymbosa</i> L. and <i>C. vulgaris</i> L., Asteraceae, 19591	Cardücci	Young leaves	Boiled in mixtures	R	yes
<i>Centaurea sicula</i> L. and <i>C. solstitialis</i> L., Asteraceae, 19337 and 19344	Occhio ruggio, Ciarucciolo	Young leaves	Boiled in mixtures	R	yes
<i>Cerintho major</i> L., Boraginaceae, 25388	Sucamèlé	Young leaves and flowers	Raw in salads with orange slices, dressing with olive oil and vinegar	R	
<i>Chondrilla juncea</i> L., Asteraceae, 24304	J'nstróddé	Young shoots	Raw, as a snack with bread	R	yes
<i>Cichorium intybus</i> L., Asteraceae, 20684	C'còrji, Cicurieddé	Whorls, shoots	Blanched and fried on pasta, or with eggs; in boiled mixtures	VC	yes
<i>Clematis vitalba</i> L., Ranunculaceae, 19431	Focomorto, Vutàcchjé, Vitécchjé	Shoots	Omelettes; boiled in mixtures	R	yes
<i>Crepis vesicaria</i> L. subsp. <i>taraxacifolia</i> (Thuill.) Thellung, Asteraceae	Cicuriuné	Young leaves	Boiled in mixtures	C	yes

Tab. 1 (continued)

Botanical taxon/taxa, family, and voucher specimen code(s)	Local name(s)	Used parts	Traditional culinary use(s)	Frequency of quotation	Previous records in the south Italian ethnobotanical literature
<i>Crithmum maritimum</i> L., Apiaceae, 16865	Finùcchjé di mare	Young leaves, shoots	Boiled and dressed with vinegar (or lemon juice) and olive oil	R	yes
<i>Cynara cardunculus</i> L., Asteraceae	Cardùnè, Scarciòf'lé	Stems, whorls	Boiled and then deep fried	R	yes
<i>Diplotaxis tenuifolia</i> (L.) DC., Brassicaceae, 15816	Ruchetta	Young aerial parts	Raw with bread; in salads with tomatoes, olive oil and vinegar; on pasta	VC	yes
<i>Dioscorea communis</i> (L.) Caddick & Wilkin, Dioscoreaceae, 17101	Ràfané	Leaves, young stems	Raw as a snack, with bread; boiled and dressed with vinegar and olive oil; pickled	R	yes
<i>Dipsacum fullonum</i> L., Caprifoliaceae, 11275	Cicoriuné, Brùschié	Young leaves	Boiled in mixtures	R	
<i>Foeniculum vulgare</i> ssp. <i>piperitum</i> (C. Presl.) Bég, Apiaceae, 11506	Finucchjiddé, Finucchjiàstré	Young aerial parts and fruits	Boiled, then on pasta or in mixed vegetables	VC	yes
<i>Ferula communis</i> L., Apiaceae, 12554	Frèula	Inflorescences	Deep fried	R	yes
<i>Helminthotheca echioides</i> (L.) Holub. and <i>Picris hieracioides</i> Sibth. & Sim., Asteraceae, 14488 and 19873	Spurràiné, Raspalingua Sfurràina, Spràiné	Whorls	Boiled in mixtures	C	yes
<i>Hirschfeldia incana</i> (L.) Lagr.-Foss., Brassicaceae, 16476	Cimamarélla	Whorls and shoots	Boiled, then on pasta or in boiled mixtures	C	yes
<i>Hyoseris radiata</i> L., Asteraceae, 11934	Raspuliddé, Ruspigné	Inflorescences	Raw as a snack, with bread, or in salads	R	yes
<i>Hypochaeris laevigata</i> (L.) Ces. & al., Asteraceae	Ngìna	Young leaves	Boiled in mixtures	R	yes
<i>Hypochaeris radicata</i> L., Asteraceae, 23348	Lingua di pecora	Young leaves	Boiled in mixtures	R	yes
<i>Knautia integrifolia</i> (Honck. ex L.) Bertol., Caprifoliaceae, 13659	Sghirbiùs'	Young leaves	Boiled in mixtures	C	
<i>Lactuca serriola</i> L., Asteraceae, 11297	Scaròla, Lattuquèddé	Whorls	Boiled in mixtures	R	yes
<i>Lactuca viminea</i> (L.) J. Presl & C. Presl., Asteraceae, 14072	Spaccaprété	Whorls	Boiled in mixtures	C	yes
<i>Lasiozona hirsuta</i> (Gouan) Cass., Asteraceae, 14540	Panefarro	Whorls, young stems	Raw as a snack, with bread; in mixed vegetables	R	yes
<i>Leopoldia comosa</i> (L.) Parl., Asparagaceae, 17120	Lampascione, Cipudduzzé	Bulbs	Roasted with lamb meat; boiled, then in salads, dressing with olive oil and vinegar; boiled and fried; pickled; in omelettes	VC	yes
<i>Nasturtium officinale</i> R. Br., Brassicaceae, 15207	Lauriddé, Ciotole	Aerial parts	Raw in salad, dressing with vinegar and olive oil	C	yes
<i>Ornithogalum pyramidale</i> L., Asparagaceae, 9621	Lampascione bianco	Bulbs	Roasted; boiled and pickled, consumed with goat meat	R	Yes (<i>O. umbellatum</i> L.)
<i>Papaver rhoeas</i> L., Papaveraceae, 19916	Papagna	Whorls	Boiled in mixtures	C	yes

Tab. 1 (continued)

Botanical taxon/taxa, family, and voucher specimen code(s)	Local name(s)	Used parts	Traditional culinary use(s)	Frequency of quotation	Previous records in the south Italian ethnobotanical literature
<i>Pistacia terebinthus</i> L., Anacardiaceae, 8935	Legnamaro	Shoots	Raw as a snack or in boiled mixtures	R	
<i>Portulaca oleracea</i> L., Portulacaceae	Perchiàcchia, Perchiàzzé, Purchàcchia	Aerial parts	Raw in salads, eventually mixed with other vegetables	VC	yes
<i>Raphanus raphanistrum</i> L., Brassicaceae, 6064	Pisciàcànè, Lass'né	Whorls	Boiled, then on pasta or in mixtures	VC	yes
<i>Reichardia picroides</i> (L.) Roth., Asteraceae, 21571	Caccialepre, Lattuqueddé	Whorls	Raw in salads	C	yes
<i>Rubus ulmifolius</i> Schott, Rosaceae, 3883	Rùvè, Ruvtálé	Young shoots and leaves	Boiled in mixtures	R	yes
<i>Ruscus aculeatus</i> L., Asparagaceae, 17080	Scupa pungicosa, Scopa pungente, Scopa fiscale, Scopa fruscale	Shoots	Boiled	R	yes
<i>Salicornia emerici</i> Duval-Jouve, <i>S. patula</i> Duval-Jouve, and <i>Sarcocornia fruticosa</i> (L.) A.J. Scott, Amaranthaceae, 25441, 26638, and 12255	Savzòddé, Scorf'né, Sauzariddé	Young stems	Boiled and dressed with olive oil, vinegar or lemon juice; pickled	VC	yes
<i>Salsola soda</i> L., Amaranthaceae, 10044	Varvé di crèpé	Aerial parts	Boiled and dressed with vinegar and olive oil	C	yes
<i>Sanguisorba minor</i> Scop., Rosaceae, 22152	Pampanella	Young leaves	Raw in mixed salads	C	yes
<i>Scolymus hispanicus</i> L., Asteraceae, 5632	Cardùcci, Cardunciddé	Leaf stalks	Cooked with eggs and cheese	VC	yes
<i>Scorzonera villosa</i> Scop., Asteraceae, 16266	Jèrvé di cràpé	Whorls, young stems	Raw as a snack; boiled in mixtures	R	
<i>Scrophularia peregrina</i> L., Scrophulariaceae, 2303	Riddica selvaggia	Whorls, young stems	Boiled, alone or in mixtures	R	
<i>Sinapis alba</i> L. and <i>S. arvensis</i> L., Brassicaceae, 13263 and 4445	Sinapè selvaggia, Cimarèddé dé chjiànè, Foggjhè di chiànè	Whorls, young stems, inflorescences	Boiled and then on pasta; or boiled in mixtures	VC	yes
<i>Sinapis pubescens</i> L., Brassicaceae, 16846	Paniconcato, Pane di Gesù Cristo	Young aerial parts	Boiled in mixtures	R	yes
<i>Smilax aspera</i> L., Smilacaceae, 19514	Stracciagatté	Shoots	Raw as a snack; boiled; pickled	R	yes
<i>Smyrniolum olusatrum</i> L., Apiaceae	Cannèla	Young aerial parts	Raw in salad, with vinegar and olive oil	R	yes
<i>Sonchus asper</i> (L.) Hill and <i>S. oleraceus</i> L., Asteraceae, 1647 and 14785	Sévònè, Cecevedé, Cascigno	Young aerial parts	Boiled, alone or in mixtures	VC	yes
<i>Sonchus maritimus</i> L., Asteraceae, 12253	Lattuqueddé	Whorls	In fish-based soups	C	
<i>Stellaria media</i> (L.) Vill., Caryophyllaceae, 18343	Centògghjé	Young aerial parts	Raw in salads; boiled in mixtures	R	yes
<i>Symphytum bulbosum</i> K.F. Schimp., Boraginaceae, 23286	Virrainóla	Young aerial parts	In boiled mixtures	R	
<i>Taraxacum campylodes</i> G.E. Haglund and other <i>Taraxacum</i> species [<i>T. laevigatum</i> (Willd.) DC., <i>T. megalorrhizon</i> (Forssk.) Hand.-Mazz., and <i>T. obovatum</i> (Willd.) DC.], Asteraceae, 9718	Cicuriùnè	Whorls	Boiled in mixtures; in eel-based soups (<i>T. obovatum</i>)	C	yes
<i>Tragopogon porrifolius</i> L., Asteraceae, 12086	Jèrvé de crèpé, varve de crèpr, lenga di pecura	Leaves, young stems	Raw as a snack, or in mixed salads	C	yes

Tab. 1 (continued)

Botanical taxon/taxa, family, and voucher specimen code(s)	Local name(s)	Used parts	Traditional culinary use(s)	Frequency of quotation	Previous records in the south Italian ethnobotanical literature
<i>Tripolium pannonicum</i> (Jacq.) Dobroc., Asteraceae, 9958	Cet'la	Whorls, shoots	In lake fish-based soups	C	
<i>Urospermum dalechampii</i> (L.) Scop.ex F.W. Schmidt, Asteraceae, 17000	Cicuriuné riccio, Cicuriuné gentile	Whorls	Boiled in mixtures	C	yes
<i>Urospermum picroides</i> (L.) Scop.ex F.W. Schmidt, Asteraceae, 25909	Iaddina grassa Lattuquédde, Fogghjé di vacca	Whorls	Boiled in mixtures	VC	yes
<i>Urtica dioica</i> L., Urticaceae, 13962	Riddica	Young leaves	Boiled in mixtures	R	yes

Frequency of citations: VC – very common: quoted by 40% ($n = 10$) of the informants or more; C – common: quoted by 10–39% ($n = 4–9$) of the informants; R – rare: quoted by less than 10% ($n = 1–3$) of the informants.



Fig. 5 The symbol of the Apulian wild vegetable-based cuisine: omelette made with the bulbs of wild *Leopoldia comosa*.

a crucial cultural value in northern Apulia and in SE Italy in general. The fact that approximately one-third of the recorded wild vegetables are still very frequently used in folk cuisine shows how the preservation of traditional environmental knowledge (TEK) related to wild food plants is actually enormously linked to the cultural meaning of the entire domain of traditional foods.

However, erosion of TEK related to wild vegetables is evident among the middle and youngest generations, and we question if this special environmental and culinary knowledge will be passed on to future generations of Gargano.

In the study area, local wild vegetables may have played an important role in the context of food security; the popularity of wild vegetables in the study area can also be traced in the historical socio-economic conditions of the rural classes in northern Apulia in the last few centuries. Gargano and the Foggia Province were (and partially still are) marked by large estates that occupy up to 80% of these territories, leaving until the recent past a multitude of “landless peasants” coping with dire economic conditions, which may have led them to shape their folk cuisine by using a significant diversity of wild food plants, instead of relying on cultivated vegetables.



Fig. 6 A peculiar dish of the local cuisine: salad with young aerial parts of *Cerinthe major* and oranges.

Additionally, the high diversity of taxa found in the study area could also be linked to environmental diversity, i.e., variety of landscapes and habitats in Gargano; this is demonstrated by the high variability of recorded plant uses: the use of *Picris echioides* dominates in San Nicandro, Apricena, San Severo, Foggia, and Vieste; the use of *Reichardia picroides*, *Smyrniolum olusatrum*, and *Smilax aspera* is prevalent in Vico del Gargano; the culinary utilization of *Tripolium pannonicum* is restricted to Cagnano Varano, *Sonchus maritimus* to Lesina, *Crithmum maritimum* to Vieste, and *Sarcocornia* and *Salicornia* spp. to Cagnano, San Nicandro, and Carpino.

Ten species were not previously recorded as edible items in the south Italian ethnobotany, thus showing that within southern Italy the Gargano area seems to have a special propensity for the survival of bio-cultural plant food refugia [58]. A few of these species are unknown or have been very rarely reported as part of the folk cuisines of South Europe: *Allium pendulinum*, *Calepina irregularis*, *Scrophularia peregrina*, *Tripolium pannonicum*, and *Cerinthe major*.

The unusual food uses of a few non-cultivated vegetables in the Gargano area, partially idiosyncratic with respect to southern Italian ethnobotany, can perhaps be explained as the result of not only the resilience of archaic uses which have disappeared elsewhere, but also the very complex historical vicissitudes that this area experienced over centuries. In particular, very diverse cultural influences and populations

can be traced in Gargano: from the autochthonous, ancient Daunians, which probably originated from an Illyrian substrate, to successive Mediaeval Swabian, French, Turk, and Aragonese dominations.

The findings of this study indicate that the preservation of the bio-cultural intangible heritage of the local cuisine may need to go beyond the usual representations of the Mediterranean diet made by the media, which generally underline “only” common cultivated food plants, olive oil, home-made durum wheat pasta, and cheese.

Wild vegetables have represented and still represent a crucial, yet largely unknown, section of the Mediterranean diet, and the “dynamic” conservation of this food heritage requires strategies that carefully consider natural landscapes and resources as well as cultural customs, as wild plant folk knowledge systems are the result of a continuous interplay between these domains, which took place over centuries.

In other words, any bio-conservation strategy must consider the traditional culinary heritage of a territory, which may in turn foster strategies of sustainable gastronomy [59], promoting awareness for the need of both healthy environments and healthy diets.

In this way, the most uncommon wild vegetables noted in this study could represent a source of inspiration for both local restaurants and educational initiatives, as well as small-scale circuits of sustainable gathering and marketing of wild food plant ingredients.

Acknowledgments

Special thanks are due to all the study participants, who graciously agreed to share their folk plant knowledge; in particular, to Dora Paciello, 64 y.o. (Foggia); Giuseppe Milonia, 78 y.o. (Manfredonia); Antonia Del Priore, 74 y.o., Lucia Strizzi, 64 y.o., Francesca Del Luca, 69 y.o., Matteo Di Cataldo, 69 y.o. (Cagnano Varano); Maria Grazia Perrone, 70 y.o., Michele Merla, 78 y.o., Michele Scanzano, 59 y.o., Costantino Scanzano, 39 y.o., Cascavelli Nicolina,

65 y.o., Massaro Incoronata, 80 y.o. (San Nicandro); Santino Zaffarano, 74 y.o. (Vico del Gargano); Grimaldi Pietro, 39 y.o., Antonio Mastrone, 55 y.o., Giuseppe Mastrone, 60 y.o., Paolo Colangelo, 70 y.o., Michele de Lilla, 50 y.o., Marzaro Assunta, 69 y.o. (San Severo); Luigi Giuliani, 75 y.o. (Apricena); Angelo Circelli (Lucera); and Giuseppe Sansone, 73 y.o. (Mattinata); to the University of Gastronomic Sciences, for having funded the data analysis and the publication of the present work.

Authors' contributions

The following declarations about authors' contributions to the research have been made: NB conducted the field study; AP and NB analyzed the data; AP drafted the first version of the manuscript, which was later revised by both authors.

Competing interests

No competing interests have been declared.

References

- Keys A, Mienotti A, Karvonen MJ, Aravanis C, Blackburn H, Buzina R, et al. The diet and 15-year death rate in the seven countries study. *Am J Epidemiol*. 1986;6:903–915.
- Keys A. Mediterranean diet and public health: Personal reflections. *Am J Clin Nutr*. 1995;61:1321S–1323S.
- Naska A, Trichopoulou A. Back to the future: the Mediterranean diet paradigm. *Nutr Metab Cardiovasc Dis*. 2014;24:216–219. <http://dx.doi.org/10.1016/j.numecd.2013.11.007>
- UNESCO [Internet]. Mediterranean diet. 2013 [cited 2015 May 6]. Available from: <http://www.unesco.org/culture/ich/index.php?lg=en&pg=00011&R&L=00884>
- Fragopoulou E, Detopoulou P, Nomikos T, Pliakis E, Panagiotakos DB, Antonopoulou S. Mediterranean wild plants reduce postprandial platelet aggregation in patients with metabolic syndrome. *Metabolism*. 2012;61(3):325–334. <http://dx.doi.org/10.1016/j.metabol.2011.07.006>
- Nomikos T, Detopoulou P, Fragopoulou E, Pliakis E, Antonopoulou S. Boiled wild artichoke reduces postprandial glycaemic and insulinemic responses in normal subjects but has no effect on metabolic syndrome patients. *Nutr Res*. 2007;27(12):741–749. <http://dx.doi.org/10.1016/j.nutres.2007.09.009>
- Heinrich M, Leonti M, Nebel S, Peschel W. “Local food – nutraceuticals”. An example of a multidisciplinary research project on local knowledge. *J Physiol Pharmacol*. 2505;56(S1):5–22.
- Conforti F, Marrelli M, Carmela C, Menichini F, Valentina P, Uzunov D, et al. Bioactive phytonutrients (omega fatty acids, tocopherols, polyphenols), in vitro inhibition of nitric oxide production and free radical scavenging activity of non-cultivated Mediterranean vegetables. *Food Chem*. 2011;129(4):1413–1419. <http://dx.doi.org/10.1016/j.foodchem.2011.05.085>
- Marrelli M, Loizzo MR, Nicoletti M, Menichini F, Conforti F. In vitro investigation of the potential health benefits of wild Mediterranean dietary plants as anti-obesity agents with α -amylase and pancreatic lipase inhibitory activities. *J Sci Food Agric*. 2014;94(11):2217–2224. <http://dx.doi.org/10.1002/jsfa.6544>
- Vasilopoulou E, Trichopoulou A. Green pies: the flavonoid rich Greek snack. *Food Chem*. 2011;126:855–858. <http://dx.doi.org/10.1016/j.foodchem.2010.11.051>
- Łuczaj Ł, Pieroni A, Tardío J, Pardo-De-Santayana M, Sökand R, Svanberg I, et al. Wild food plant use in 21st century Europe: the disappearance of old traditions and the search for new cuisines involving wild edibles. *Acta Soc Bot Pol*. 2012;81(4):359–370. <http://dx.doi.org/10.5586/asbp.2012.031>
- Łuczaj Ł, Zovkokoncic M, Milicevic T, Dolina K, Pandza M. Wild vegetable mixes sold in the markets of Dalmatia (southern Croatia). *J Ethnobiol Ethnomed*. 2013;9:2. <http://dx.doi.org/10.1186/1746-4269-9-2>
- Łuczaj Ł, Dolina K. A hundred years of change in wild vegetable use in southern Herzegovina. *J Ethnopharmacol*. 2015;166:297–304. <http://dx.doi.org/10.1016/j.jep.2015.02.033>
- Dolina K, Łuczaj Ł. Wild food plants used on the Dubrovnik coast (south-eastern Croatia). *Acta Soc Bot Pol*. 2014;83(3):175–181. <http://dx.doi.org/10.5586/asbp.2014.029>
- Dogan Y. Traditionally used wild edible greens in the Aegean Region of Turkey. *Acta Soc Bot Pol*. 2012;81(4):329–341. <http://dx.doi.org/10.5586/asbp.2012.037>
- Dogan Y, Ugulu I, Durkan, N. Wild edible plants sold in the local markets of Izmir, Turkey. *Pak J Bot*. 2013;45(S1):177–184.
- Ertuğ, F. Wild edible plants of the Bodrum area (Muğla, Turkey). *Turk J Bot*. 2004;28:161–174.
- Della A, Paraskeva-Hadjichambi D, Hadjichambis A. An ethnobotanical survey of wild edible plants of Paphos and Larnaca countryside of Cyprus. *J Ethnobiol Ethnomed*. 2006;2:34. <http://dx.doi.org/10.1186/1746-4269-2-34>
- Hadjichambis A, Paraskeva-Hadjichambi D, Della A, Giusti ME, de Pasquale C, Lenzarini C, et al. Wild and semi-domesticated food plant consumption in seven circum-Mediterranean areas. *Int J Food Sci Nutr*. 2008;59(5):383–414. <http://dx.doi.org/10.1080/09637480701566495>
- Leonti M, Nebel S, Rivera D, Heinrich M. Wild gathered food plants in the European Mediterranean: a comparative analysis. *Econ Bot*. 2006;60(2):130–142. [http://dx.doi.org/10.1663/0013-0001\(2006\)60\[130:WGFPT\]2.0.CO;2](http://dx.doi.org/10.1663/0013-0001(2006)60[130:WGFPT]2.0.CO;2)
- Pieroni A, Nebel S, Quave CL, Münz H, Heinrich M. Ethnopharmacology of liakra, traditional weedy vegetables of the Arbëreshë of the Vulture area in southern Italy. *J Ethnopharmacol*. 2002;81:165–185. [http://dx.doi.org/10.1016/S0378-8741\(02\)00052-1](http://dx.doi.org/10.1016/S0378-8741(02)00052-1)
- Pieroni A, Nebel S, Santoro RF, Heinrich M. Food for two seasons: culinary uses of non-cultivated local vegetables and mushrooms in a south Italian village. *Int J Food Sci Nutr*. 2005;56:245–272. <http://dx.doi.org/10.1080/09637480500146564>
- Nebel S, Pieroni A, Heinrich M. Ta chorta: wild edible greens used in the Graecanic area in Calabria, southern Italy. *Appetite*. 2006;47:333–342. <http://dx.doi.org/10.1016/j.appet.2006.05.010>
- Guarrera PM, Salerno G, Caneva G. Food, flavouring and feed plant traditions in the Tyrrhenian sector of Basilicata, Italy. *J Ethnobiol Ethnomed*. 2006;2:37. <http://dx.doi.org/10.1186/1746-4269-2-37>
- Lentini F, Venza F. Wild food plants of popular use in Sicily. *J Ethnobiol Ethnomed*. 2007;3:15. <http://dx.doi.org/10.1186/1746-4269-3-15>
- Ghirardini MP, Carli M, del Vecchio N, Rovati A, Cova O, Valigi F, et al. The importance of a taste. A comparative study on wild food plant consumption in twenty-one local communities in Italy. *J Ethnobiol Ethnomed*. 2007;3:22. <http://dx.doi.org/10.1186/1746-4269-3-22>
- Menendez-Baceta G, Aceituno-Mata L, Tardío J, Reyes-García V, Pardo-de-Santayana M. Wild edible plants traditionally gathered in Gorbeialdea (Biscay, Basque Country). *Genet Resour Crop Evol*. 2012;59(7):1329–1347. <http://dx.doi.org/10.1007/s10722-011-9760-z>
- Pardo-de-Santayana M, Tardío J, Blanco E, Carvalho AM, Lastra JJ, San Miguel E, et al. Traditional knowledge of wild edible plants used in the northwest of the Iberian Peninsula (Spain and Portugal): a comparative study. *J Ethnobiol Ethnomed*. 2007;3:27. <http://dx.doi.org/10.1186/1746-4269-3-27>
- Pardo-De-Santayana M, Tardío J, Morales R. The gathering and consumption of wild edible plants in the Campoo (Cantabria, Spain). *Int J Food Sci Nutr*. 2005;56(7):529–542.
- Tardío J, Pascual H, Morales R. Wild food plants traditionally used in the province of Madrid, central Spain. *Econ Bot*. 2005;59(2):122–136. [http://dx.doi.org/10.1663/0013-0001\(2005\)059\[0122:WFPTUI\]2.0.CO;2](http://dx.doi.org/10.1663/0013-0001(2005)059[0122:WFPTUI]2.0.CO;2)
- Biondi E, Casavecchia S, Biscotti N. Forest biodiversity of the Gargano Peninsula and a critical revision of the syntaxonomy of the mesophilous woods of southern Italy. *Fitosociologia*. 2008;45(2):93–127.
- Society of Ethnobiology [Internet]. The ISE Code of Ethics. 2008 [cited 2015 May 8]; Available from: <http://www.ethnobiology.net/what-we-do/core-programs/ise-ethics-program/code-of-ethics/code-in-english/>
- Pignatti S. *Flora d'Italia*. Bologna: Edagricole; 1997.
- The Plant List – version 1.1 [Internet]. 2012 [cited 2015 May 1]; Available from: <http://www.theplantlist.org/>
- Stevens PF. Angiosperm Phylogeny Website [Internet]. 2012 [cited 2015 April 2]; Available from: <http://www.mobot.org/MOBOT/research/APweb/>
- Guarrera PM. *Usi e tradizioni della flora italiana. Medicina popolare ed etnobotanica*. Rome: Aracne; 2006.
- Scherrer AM, Motti R, Weckerle CS. Traditional plant use in the

- areas of Monte Vesole and Ascea, Cilento National Park (Campania, Southern Italy). *J Ethnopharmacol* 2005;97:129–143. <http://dx.doi.org/10.1016/j.jep.2004.11.002>
38. Di Novella R, Di Novella N, de Martino L, Mancini L, de Feo V. Traditional plant use in the National Park of Cilento and Vallo di Diano. *J Ethnopharmacol*. 2013;145:328–342. <http://dx.doi.org/10.1016/j.jep.2012.10.065>
 39. de Natale A, Pezzati GB, Pollio A. Extending the temporal context of ethnobotanical databases; the case study of the Campania region (southern Italy). *J Ethnobiol Ethnomed*. 2009;5:7. <http://dx.doi.org/10.1186/1746-4269-5-7>
 40. Motti R, Antignani V, Idolo M. Traditional plant use in the Phlegrean Fields National Park (Campania, Southern Italy). *Hum Ecol*. 2009;37:775–782. <http://dx.doi.org/10.1007/s10745-009-9254-1>
 41. Guarino C, de Simone L, Santoro S. Ethnobotanical study of the Sannio area, Campania, southern Italy. *Ethnobotany Research and Applications*. 2008;6:255–317.
 42. Salerno G, Guarrera PM. Ricerche etnobotaniche nel Parco Nazionale del Cilento e Vallo di Diano: il territorio di Castel San Lorenzo (Campania, Salerno). *Informatore Botanico Italiano*. 2008;40:165–181.
 43. Arcidiacono S, Pavone P, Sameri C. Le piante alimurgiche [Internet]. Le piante spontanee di uso alimentare nel Territorio Etneo. 2005 [cited 2015 Apr 1]; Available from: <http://www.dipbot.unict.it/alimurgiche/introduzione.htm>
 44. Lupia C. *Etnobotanica. Le piante e i frutti spontanei della Sila Piccola catanzarese*. Catanzaro: Abramo Editore; 2004.
 45. Arcidiacono S, Costa R, Marletta G, Pavone P, Napoli M. Usi popolari delle piante selvatiche nel territorio di Villarosa (EN – Sicilia Centrale). *Quaderni di Botanica Ambientale e Applicata*. 2010;1:95–118.
 46. Arcidiacono S, Napoli M, Oddo G, Pavone P. Piante selvatiche d'uso popolare nei territori di Alcara Li Fusi e Militello Rosamarino (Messina). *Quaderni di Botanica Ambientale e Applicata*. 2007;18:104–144.
 47. Aleo M, Cambria S, Bazan G. Tradizioni etnofarmacobotaniche in alcune comunità rurali dei Monti di Trapani (Sicilia occidentale). *Quaderni di Botanica Ambientale e Applicata*. 2013;24:27–48.
 48. Caneva G, Pontrandolfi MA, Fascetti S. *Le piante alimentari spontanee della Basilicata*. Potenza: Regione Basilicata; 1997.
 49. Tartaglia M. *L'uomo e le piante del Vulture*. Milano: Franco Angeli; 2002.
 50. Bianco VV, Mariani R, Santamaria P. *Piante spontanee nella cucina tradizionale molese*. Bari: Levante Editori; 2009.
 51. Ditunno NM. *Sapori e aromi da piante e frutti spontanei della Puglia peninsulare*. Brindisi: Amici della A. De Leo; 1997.
 52. Accogli R, Medagli P. *Erbe spontanee salentine. Guida al riconoscimento e all'uso delle piante alimentari tradizionali*. Lecce: Edizioni Grifo; 2014.
 53. Leporatti ML, Guarrera P. Ethnobotanical remarks in Capitanata and Salento areas (Puglia, southern Italy). *Etnobiologia*. 2007;5:51–64.
 54. Lupia C, Lupia R. *Etnobotanica: piante e tradizioni popolari di Calabria. Viaggio alla scoperta di antichi saperi intorno al mondo delle piante*. Crotone: Grafi.Co.; 2013.
 55. Corrain C. Ricerche etnografiche nel Gargano. *La cultura materiale. Rivista di Etnografia*. 1962;1:63–98.
 56. Pieroni A, Quave CL. Functional foods or food-medicines? On the consumption of wild plants among Albanians and southern Italians in Lucania. In: Pieroni A, Price LL, editors. *Eating and healing: traditional food as medicine*. Binghamton; Haworth Press; 2006. p. 101–129.
 57. Guarrera PM, Savo V. Perceived health properties of wild and cultivated food plants in local and popular traditions of Italy: a review. *J Ethnopharmacol*. 2013;146:659–680. <http://dx.doi.org/10.1016/j.jep.2013.01.036>
 58. Barthel S, Crumley CL, Svedin U. Biocultural refugia: combating the erosion of diversity in landscapes of food production. *Ecol Soc*. 2013;18:71. <http://dx.doi.org/10.5751/ES-06207-180471>
 59. Biglino I, Olmo A, Pieroni A, Scaffidi C. Food policies and sustainability [Internet]. Bra: Slow Food / University of Gastronomic Sciences; 2011 [cited 2015 May 1]; Available from: https://www.slowfood.de/w/files/slow_themen/food_policies_eng.pdf