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### Wild and semi-domesticated food plant consumption in seven circum-Mediterranean areas

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## Wild and semi-domesticated food plant consumption in seven circum-Mediterranean areas

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### Abstract

The use of local Mediterranean food plants is at the brink of disappearance. Even though there is relatively abundant information on inventories of wild edible taxa, there is also a crucial need to understand how these plants are consumed and when and how these consumption phenomena change over time and place around the Mediterranean. Additionally, it is important to study such knowledge systems and find innovative ways of infusing them to the future Mediterranean generations. During the years 2003–2006 a circum-Mediterranean ethnobotanical field survey for wild food plants was conducted in selected study sites in seven Mediterranean areas (European Union-funded RUBIA Project). Structured and semi-structured questionnaires have been administered to indigenous people and 294 wild food plant taxa were documented in the survey. A comparative analysis of the data was undertaken showing that the quantity and quality of traditional knowledge varies among the several study areas and is closely related to the traditions, environment and cultural heritage of each country. More similarities of wild edible popular use were revealed between the Eastern Mediterranean and the Western Mediterranean.

**Keywords:** *Ethnobotany, Mediterranean diet, ethnobiology, wild food plants, food medicine*

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## Introduction

Food and dishes always reflect the regional identity of people, ethnic groups and communities, and the use of wild food plants is an example that exemplifies local knowledge or traditional ecological knowledge. The Mediterranean traditional food knowledge has sometimes been described as a diet mainly composed of vegetables, salads, fruits and spices, pasta, olive oil, wine, seafood and only a little red meat, and it was termed the “Mediterranean diet”. The term “Mediterranean diet” was coined in a book written by the nutritionists Ancel and Margaret Keys (Keys and Keys 1959). However, the many different cultures, religious, beliefs, ecologic backgrounds and historic development around the Mediterranean resulted in many diets, which share a multitude of elements but also revolve around distinct local or regional traditions.

While food plants have always been significant in the folk traditions of the Mediterranean region, food and medicinal uses have always been two of the most relevant reasons for popular plant management, and are among the most persistent ones, even in cultures that are progressively losing their close relationship with nature. It is for this reason that ethno-directed (i.e. with an ethnobotanical or ethnopharmacological basis) research is very useful in new food resources and in drug discovery and development (Chadwick and Marsh 1994; Cox and Balick 1994; Khafagi and Deward 2000; Heinrich and Gibbons 2001). It is of outmost importance to obtain data about popular uses of wild food plants before this knowledge disappears. In many Mediterranean regions these traditions are at risk of disappearing, and hence the urgent need to study such knowledge system (Pieroni et al. 2005).

Wild plants have an important role in the life of indigenous people around the world. There are several exhaustive global catalogues of edible plants of the world including crops, wild plants and weeds (Hedrick 1919; Uphof 1968; Tanaka 1976). Similar information is available for individual countries around the Mediterranean (Grossheim 1952; Le Floc’h 1983; Rivera & Obón 1991).

During the past 25 years, the collection and consumption of non-cultivated food plants have been the focus of an increasing number of field studies aimed at documenting traditional knowledge (TK) in an anthropological and ethnoecological/ethnobotanical context: in Africa (Etkin and Ross 1982; Ogle and Grivetti 1985a,b,c,d; Johns and Kokwaro 1991; Johns et al. 1996a, 1996b; Schackleton et al. 1998; Lockett et al. 2000; Asfaw and Tadesse 2001; Marshall 2001; Mertz et al. 2001; Ogoye-Ndegwa and Aagaard-Hansen 2003; Addis et al. 2005), in the Americas (Bye 1981; Lepofski et al. 1985; Kuhnlein 1992; Turner 1995, 1997; Ladio and Lozada 2000; Ladio 2001; Vierya-Odilon and Vibrans 2001), and in Asia (Moreno-Black et al. 1996; Pemberton and Lee 1996; Leimar Price 1997; Tukan et al. 1998; Ertug 2000; Khasbagan et al. 2000; Johnson and Grivetti 2002; Ogle et al. 2003).

Within the Mediterranean in the past decade, few studies have systematically analysed in sufficient detail the consumption of non-cultivated botanicals in specific regions of the Mediterranean area (Forbes 1976; Meilleur 1982, 1986; Paelotti et al. 1995; Pieroni 1999; Pieroni et al. 2002, Bonet and Vallès 2002; Tardio et al. 2002; Guarrena 2003; Pieroni et al. 2005; Della et al. 2006). At a circum-Mediterranean level, most ethnobotanical and ethnopharmacological studies conducted have primarily addressed medicinal (Moerman et al. 1999) or ethnoveterinary (Pieroni et al. 2006) plants and have ignored food plants, while Rivera et al. (2006) analysed in a comprehensive publication the gathered Mediterranean food plants. All studies have

clearly demonstrated that these gathered food plants represent a relevant part of traditional Mediterranean diets.

While in many European regions the use of non-cultivated plants for food and medicines is slowly disappearing, recent studies confirm that the gathering of wild plants is gaining an increase importance in household economies in Central Europe, especially among migrant communities (Jonsson et al. 2002a, 2002b) and in post-communist societies (Ekström et al. 2003). In fact, ethnobotanical studies in industrialized countries in general are particularly urgent because in the last few generations there has been a considerable loss of TK about plants. On the one hand rural places have suffered an important depopulation, and on the other hand people still living adopted a few features of urbanized societies culture to the detriment of their 'traditional' one, considered inferior, in a process that has been defined as acculturation (Ember and Ember 1997).

The present research performed in the framework of the European Union-funded RUBIA Project. The Consortium included scholars with backgrounds and experiences in a variety of research areas and was conceived to give to the study on wild food plants consumption a multi-disciplinary perspective.

The perspectives of this research project were to record ethnobotanical knowledge related to traditional plant uses of wild and neglected cultivated plants for food, medicine, textiles, dyeing, handicrafts, and basketry, as well as to identify and evaluate the socio-economic and anthropological context in which these plants have been gathered and processed. We deposited all these data in a centralized database, compared them and evaluated a few plant resources under their perspectives of their agronomic feasibility and the small-scale eco-sustainable production of medicinal plants' products.

As a part of this broad study, wild food plants have been recorded in selected areas in seven Mediterranean countries aiming to fill the gap revealed from previous studies in Mediterranean, demonstrating that even though there is relatively abundant information on wild food taxa consumed in the Mediterranean countries, there is a crucial need to understand how these plants are consumed and when and how these consumption phenomena change over place and time.

Within RUBIA the ethnobotanical field studies were conducted in order to record not only the wild food plants that are still gathered in the selected Mediterranean sites, but also all processes, technologies and tools used for gathering, storing, washing, detoxifying (where applicable), cooking, and consuming the recorded plants.

Therefore, the aim of this paper is to:

- document the detailed ethnobotanical uses of the wild food plants consumed in the seven study areas;
- compare the traditional plant uses from the point of view of the collection, plant parts used and models of consumption, and highlight the most referred wild food plants, analysing the plants recorded by more than one country;
- discuss the contribution of wild edibles as food medicine in the selected areas;
- analyse the field data under the perspective of a presumed 'common' circum-Mediterranean cultural heritage; and
- give indications for the infusion of TK related to food plant uses to future generations.

## Methodology

### *Location and study area*

An ethnobotanical research with a circum-Mediterranean participation of seven countries—from the Eastern Mediterranean (Cyprus, Greece), the Western Mediterranean (Italy, Spain), the Adriatic/Balkan Mediterranean (Albania) and the North-African Mediterranean (Egypt, Morocco)—was carried out. One or two sites were selected by each country. The decision was made in order to fulfil the criteria set by the European Union RUBIA Consortium for rural areas administratively, geographically and ecologically homogeneous with similar socio-economic context.

The sites were chosen by each research team individually; none of the other groups influenced their choice in any way and therefore the data collected are basically bias-free. It should be emphasized that each site represents a small part of each country and therefore it cannot be assumed that this restricted area is a phytogeographically representative of the entire flora or culture of the relevant country. However, specific cultural and social aspects of each area, as well as dietary patterns in the selected rural region, were identified and provide comprehensive information on the social framework related to the nutritional behaviours (Table I).

### *Common ethnographic methodologies followed*

The field methodological framework chosen for this research was that used in ethnobiology (Martin 1995; Alexiades and Shelton 1996; Cotton 1996). Field research was conducted by collecting ethnobotanical information during structured and semi-structured interviews with knowledgeable people native in each site territory. No special selection criteria were used in the choice of the informants because one of the aims of this work was to assess the breadth of popular heritage in the field of wild edible plants, knowledge that is widespread among locals. The data acquired for each plant comprise details on the common local name, the claimed uses, the part of the plant used and its preparation and administration processes. Whenever possible, the conversation was recorded on cassettes and the procedures were photographed and video recorded.

Table I. Environmental and socio-economic characteristics of the study areas.

Country	Area	Environmental characteristics	Socio-economy
Albania	Upper Kelmend	Mountainous	Pastoral
Cyprus	Larnaca mixed farming zone	Plain	Agropastoral
	Paphos vine zone	Semi-mountain	Vines
Egypt	Saint Catherine, Sinai Peninsula	Arid	Pastoral
Greece	North-West Crete	Coastal land	Agropastoral
	East Crete	Semi-mountainous	
Italy	Capannori, Eastern Tuscany	Plain	Industrial district
	Bagnacavallo, Romagna	Plain	Intensive agriculture
Morocco	Circle de Ouezanne	Semi-arid	Agropastoral
Spain	Sierra de Aracena y Picos, Aroche	Semi-arid	Agropastoral
	Natural Park, Huelva province		

Prior informed consent was verbally obtained before commencing any of the interviews. Ethical guidelines adopted by the American Anthropological Association and by the International Society of Ethnobiology were rigorously followed.

### *Botanical identification*

Most of the mentioned plants were recognized by the villagers *in situ* during short field walks and were collected for scientific identification. Herbarium specimens of most of the taxa cited were prepared and deposited in National Herbaria of the several countries—Agricultural Research Institute (ARI), Technical University of Crete (TUC), University of Granada (GDA), University of Florence (CAP/BAGN), University of Mansura (FD), University of Wageningen (LEP), Institut National des Plantes Medicinales et Aromatiques, Morocco (MOR).

Nomenclature followed the standard botanical work for each country: *Flora Europaea* (Tutin 1963 [1984]), *Flora d' Italia* (Pignatti 1982), *Flora de Andalusia Occidental* (Valdés et al. 1987), *Flore de l' Albanie* (Paparisto and Qosia 1988 [2000]), *Flora of Cyprus* (Meikle 1977 [1985]), *Flore de l' Afrique du Nord* (Maire 1952 [1987]), *Flora of Egypt* (Tackholm 1974; Boulos 1999 [2002]), and *Flore Pratique du Maroc* (Fennane et al. 1999).

### *Database and data analysis*

Plant data and their related information were entered into a local database that was merged with the centralized RUBIA database hosted by the Greek Institution.

Data analysis for this paper was carried out using very common software packages with the aim of comparing the parameters of plant taxa and wild edible plant usages emphasizing a qualitative approach.

## **Results and discussion**

### *Wild food plants currently consumed by seven ethnic groups around the Mediterranean*

One thousand and twenty-one interviews were administered to 534 informants, of which 45% were women and 55% were men. Informants were between the ages of 40 and 85 years with an average age of 63 years.

A total of 406 plants are gathered and consumed in the seven study areas of the Mediterranean, comprising 294 different taxa. From the 294 taxa recorded, 68 (23%) have been recorded by more than one country while the rest 226 (77%) are used exclusively at a local level. This makes clear the fact that even though some plants are distributed and used around the Mediterranean some others are closely related to the traditions, environment and cultural heritage of each country, since there is an inextricable link between cultural and biological diversity. The percentage of species used exclusively in each country as well as the percentage of plants of each country common with at least one more country can be seen in Figure 1.

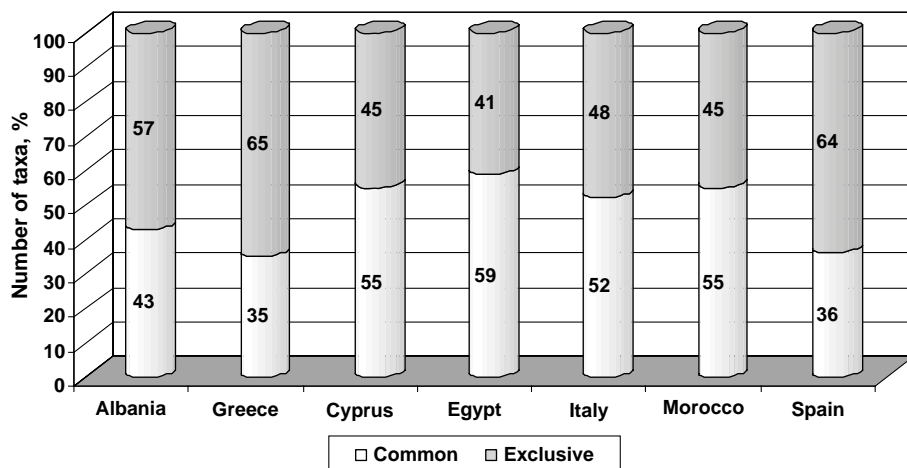


Figure 1. Common and exclusive wild food plants in the seven study areas.

#### Comparative analysis of the plants recorded by more than one study area

As it is expected, people do not eat all edible plants available in their environments but only a small part of the local flora. What makes the difference is the cultural decision that is behind each repertoire of gathered food plants (Rivera et al. 2006).

There are many different factors that determine the choice of a specific species as a food: availability, cultural preferences, processing technologies, ability to collect it in the optimal period and genetic features of the consumers (e.g. presence of detoxifying enzymes) to allow the safe consumption of the plant. Therefore, the selective local profile of food is found in different scales (local to regional) and, of course, it is a part of individual TK systems.

Comparing the food plants recorded in the seven countries it can be seen that no one plant is used by all countries. However, plants recorded from four study areas and more can be characterized as widespread, and these represent only the 3%. Wild food plants that are used by more than one country can be comparatively seen in Table II.

*Portulaca oleracea* L. is a good example of a circum-Mediterranean plant. It is a very popular plant in six out of the seven countries and its leaves are used raw in salads (Cyprus, Crete, Albania) or cooked (Spain, Morocco, Egypt). Our study confirms that of Rivera et al. (2006) about the widespread use of perslaine around Mediterranean.

Six plants (*Mentha pulegium*, *Capparis spinosa*, *Ficus carica*, *Foeniculum vulgare*, *Myrtus communis*, and *Sonchus oleraceus*) were recorded to be used by five study areas. Sometimes a plant is prepared and administered the same way in the five countries, as happens in the case of *C. spinosa* of which the leaves/flowering bund/fruits are used pickled in vinegar, while in some other cases the plant is used in a different way within the area recorded. For example, *F. vulgare* in Cyprus (leaves /stems) are used raw with salad or olives, pickled in vinegar, cooked with potatoes or as scent in traditional recipes (TR) called 'eliotas' (olive-pies), 'kolokotes' (pumpkin-pies) and 'spanakopites' (spinach-pies). With the term TR we actually mean a recipe that is supposed to be used/prepared since at least two generations. In Greece the leaves are used sautéed mixture with other greens, in Spain the leaves/stems are used cooked or as a scent,

Table II. Ways of consumption of the wild food plants recorded to be gathered in more than two study areas.

Food plant	Cyprus	Greece	Spain	Italy	Morocco	Albania	Egypt
<i>Allium ampeloprasum</i> L. (Alliaceae), Wild leek, bulbs, ARI 5739	Raw with olives or boiled with legumes	Sauté in mixture with other greens	Fried				
<i>Allium neapolitanum</i> Cyr. (Alliaceae), Naples garlic, bulbs, ARI 5743	Raw with olives or boiled with legumes		Cooked				
<i>Amaranthus retroflexus</i> L. (Amaranthaceae), Amaranth, leaves, TUC 071		Boiled and garnished by olive oil and lemon			Raw or cooked in a TR		
<i>Ammi majus</i> L. (Apiaceae), Wild celery, young stems, ARI 5862	Raw in salad, dried and used as a scent or boiled alone, boiled with legumes or fried	Sauté					
<i>Anchusa azurea</i> Mill. (Boraginaceae), Alkanet, young leaves, ARI 5872	Boiled alone, boiled with legumes or fried		Cooked			Flowers raw as a snack	
<i>Arbutus unedo</i> L. (Ericaceae), Strawberry tree, fruits, CAP 3F			Cooked	Raw or for the preparation of jam			
<i>Asparagus acutifolius</i> L. (Asparagaceae), Asparagus, young shoots, ARI 5789	Boiled or fried with eggs or barbeque		Boiled or fried with eggs	Cooked for the preparation of omelettes, rice dishes and soups			

Table II (Continued)

Food plant	Cyprus	Greece	Spain	Italy	Morocco	Albania	Egypt
<i>Borago officinalis</i> L. (Boraginaceae), Borage, leaves/flowers, BAGN 7F	Boiled		Cooked	Raw in salad and boiled for doing soups, the leaves are also used like filling for stuffing pasta TR ( <i>tordelli</i> ) and for doing omelettes			
<i>Brassica nigra</i> (L.) Koch (Brassicaceae), Black mustard, seeds/ leaves, ARI 5664	Seeds are used as a scent in a TR <i>Mougra</i> made with cauliflower and flour, in mustard and as pickled			Leaves are used boiled with other herbs or used to colour home made pasta green or also <i>gnocchi</i> (a type of pasta made with potatoes and flour)			
<i>Calamintha nepeta</i> (L.) Savi (Lamiaceae), Lesser calamint, leaves/flowers, CAP 8F		Leaves and inflorescence are dried used as a scent in several dishes		Leaves used as a scent in food or cooked as a soup with other different herbs			
<i>Calendula arvensis</i> L. (Asteraceae), Field marigold, leaves, ARI 5814	Boiled alone or in a TR of meatballs	Boiled or sauté in a mixture of greens					
<i>Campanula rapunculus</i> L. (Campanulaceae), Rambion, roots/aerial part, CAP 9F			Roots raw in salads	Roots/ aerial part raw in salads			
<i>Capparis spinosa</i> L. (Capparidaceae), Caper, leaves/flower buds/fruits, ARI 5550	Pickled in vinegar	Pickled in vinegar		Pickled in vinegar	Crushed		Pickled in vinegar

Table II (Continued)

Food plant	Cyprus	Greece	Spain	Italy	Morocco	Albania	Egypt
<i>Capsella bursa-pastoris</i> (L.) Medik. (Brassicaceae), Shepherd's purse, aerial part, ARI 5816	Raw in salads			Soup with several herbs or boiled with other different herbs			
<i>Ceratonia siliqua</i> L. (Fabaceae), Carob tree, fruits, ARI 5569	Cooked in several TR <i>teratsomelo</i> , <i>houmachia</i> , <i>houlourouthkia</i> , garnish of pilaf, carob honey, <i>pasteli</i> , <i>pastellaki</i>	Raw or cooked as syrup made after long boiling—used for drinks					Raw
<i>Chenopodium album</i> L. (Chenopodiaceae), Fat hen, leaves/aerial part, GDA 49176			Raw			Boiled then mixed with butter or cream, and used as stuffing for pie (byrek)	
<i>Cichorium intybus</i> L. (Asteraceae), Wild chicory, leaves, ARI 5666	Raw or boiled alone, boiled with legumes or pickled in vinegar	Boiled		Raw in salad or boiled with other plants like side dish or used in soups			
<i>Cichorium pumilium</i> Jacq. (Asteraceae), Cichory, leaves, TUC 081		Boiled					Raw in salad
<i>Coridothymus capitatus</i> (L.) Rchb.f. (Lamiaceae), Thyme, aerial part, ARI 5806	Scent in a TR (Haloumia) and other recipes	Scent in several recipes					

Table II (Continued)

Food plant	Cyprus	Greece	Spain	Italy	Morocco	Albania	Egypt
<i>Crataegus monogyna</i> Jacq. (Rosaceae), Common hawthorn, fruits/leaves, BAGN 14F	Raw as fruits or cooked for the preparation of marmalade			Leaves raw in salads and fruits cooked for the preparation of jams			
<i>Crithmum maritimum</i> L. (Apiaceae), Rock samphire, leaves, TUC 685	Pickled in vinegar and eaten with salad	Pickled in vinegar and eaten with salad, or boiled					
<i>Cynara cornigera</i> Lindl. (Asteraceae), Wild artichoke, succulent receptacle/young stems/leaves, ARI 5864	The succulent receptacle is used raw and the young stems are used cooked with onions and tomatoes, boiled, boiled with legumes or fried	Leaves are used boiled or sauté					
<i>Daucus carota</i> L. (Apiaceae), Queen-Anne's lace, leaves/aerial part, TUC 366		Leaves boiled or sauté in mixture of greens		Aerial part is used in a soup or boiled with other different herbs			
<i>Echinops spinosissimus</i> Turra (Asteraceae), Globe thistle, young leaves, ARI 5782	Raw or boiled or fried with meat	Boiled					
<i>Eruca sativa</i> Mill. (Brassicaceae), Rocket, leaves, GDA 49230	Raw in salad	Raw in salad	Fried				

Table II (Continued)

Food plant	Cyprus	Greece	Spain	Italy	Morocco	Albania	Egypt
<i>Ficus carica</i> L. Moraceae, Fig tree, fruits, MOR 09	Raw fresh or dried, and cooked in TR pie ( <i>sikopittes</i> ) and traditional beverage ( <i>zivania</i> )	Fresh or cooked for the preparation of marmalade		Fresh or cooked in marmalade or candied and eaten with a typical cheese called <i>squacquerone</i>	Raw fresh or smoked or cooked		Raw fresh
<i>Foeniculum vulgare</i> Mill. (Apiaceae), Fennel, leaves/stems, GDA 49220	Raw with salad or lives, pickled in vinegar, cooked with potatoes and as scent in TR pies ( <i>eliotes</i> , <i>kolokotes</i> , <i>Dpanakopites</i> )	Fried with other greens sauté	Cooked or as a scent	Used like seasoning or used raw in salad. They are also used boiled with chestnuts, the recipe's name is tullore The dried seeds are cooked with pig's liver and <i>Z. mays</i> 's mixture called polenta, TR Raw			Cooked with rice, tomatoes, onions and Brassica (TR)
<i>Fragaria vesca</i> L. (Rosaceae), Wild strawberry, fruits, CAP 18F						Raw as snack, or transformed into a jam (adding sugar and boiled for approx. 30 min)	
<i>Humulus lupulus</i> L. (Cannabaceae), Hop, young leaves, MOR 1				Boiled or fried for the preparation of an omelette	Cooked, raw, dry and smoked		
<i>Laurus nobilis</i> L. (Lauraceae), Laurel, leaves, ARI 5882	Scent in TR ( <i>stiphado</i> )			Fresh or dried are used as condiment in recipes like a soup or boiled with chestnuts, in a TR ( <i>balloccioli</i> )	Fresh or dried are used as condiment in recipes		

Table II (Continued)

Food plant	Cyprus	Greece	Spain	Italy	Morocco	Albania	Egypt
<i>Leontodon tuberosum</i> L. (Asteraceae), Hawkbit, aerial part, TUC 640		Cooked as boiled		In soup with other different herbs or boiled alone			
<i>Malva silvestris</i> L. (Malvaceae), Mallow, leaves, ARI 5590	Boiled alone, fried or in a TR soup ( <i>molochosoupa</i> )	Sauté, in mixture with other greens	Boiled or fried				Cooked with meat soup and rice
<i>Mentha pulegium</i> L. (Apiaceae), Penny Royal, leaves, Mel	Raw in salad	Infusion	Raw as a condiment to recipes or cooked	Raw as a condiment to recipes	Raw or as condiment to recipes		
<i>Mentha spicata</i> L. (Apiaceae), Mint, leaves, ARI 5880	As a scent in several recipes (TR) <i>Ravioles</i> and <i>Φourekia</i>	Seasoning in several recipes					
<i>Mentha suaveolens</i> Ehrh. (Apiaceae), Round-leaved mint, leaves		Seasoning in several recipes fresh or dried	Seasoning in several recipes fresh or dried				
<i>Muscari comosum</i> (L.) Mill. (Hyacinthaceae), Tassel hyacinth, bulbs, TUC 189	Preserved in vinegar or boiled	Preserved in vinegar					
<i>Myrtus communis</i> L. (Myrtaceae), Myrtle, fruits/leaves, CAP 26F	Raw	For the preparation of marmalade and liqueur	Liqueur	Leaves used fresh or dried and the fruits are used like seasoning. The fruits are also distilled in alcohol and sugar	Raw		

Table II (Continued)

Food plant	Cyprus	Greece	Spain	Italy	Morocco	Albania	Egypt
<i>Nasturtium officinale</i> R. Br. (Brassicaceae), Water cress leaves/ aerial part, GDA 49110	Raw in salad		Raw in salad	Raw in salad or the aerial parts are boiled with other herbs and consumed like side dish or boiled with other plants for soups	x	x	x
<i>Nigella sativa</i> L. (Ranunculaceae), Black cumin, flowers/ fruits, TUC 410		Flowers used to flavour food			Fruits used raw or crushed in a TR		
<i>Notobasis syriaca</i> (L.) Cass. (Asteraceae), Milk thistle, leaves/ young stems, ARI 5673	Raw or boiled alone and boiled with legumes	Boiled and garnished by olive oil and lemon					
<i>Origanum majorana</i> L. (Apiaceae), Small leaf marjoram, aerial part, CAP 29F				Soup with other different herbs or for seasoning	Seasoning		
<i>Oxalis pes-caprae</i> L. (Oxalidaceae), Cape sorrel, leaves/young rhizomes, GDA 49193	Leaves used raw	Young rhizomes used raw fresh or as sauté	Leaves used raw				
<i>Papaver rhoeas</i> L. (Papaveraceae), Red poppy, leaves, ARI 5682	Boiled, fried or in TR pie ( <i>pourekia tou peteinou</i> )	Sauté, in mixture with other greens	Cooked	Raw in salad, boiled with other plants like side dish, boiled with other plants for doing soups. The leaves are also used like filling for a TR (crescione)			

Table II (Continued)

Food plant	Cyprus	Greece	Spain	Italy	Morocco	Albania	Egypt
<i>Picris echioides</i> L. (Asteraceae), Bristly ox-tongue, leaves, TUC 460		Boiled and garnished by olive oil and lemon		Boiled			
<i>Pistacia lentiscus</i> L. (Anacardiaceae), Lentisc, fruits/leaves, ARI 5625	Fruits are used in three TR: 1. Pies with flour, 2. Sausages, 3. <i>Skinolado</i> (oil)	Leaves are preserved as pickled in vinegar and eaten as appetizers with food					
<i>Pistacia terebinthus</i> L. (Anacardiaceae), Terebinth, stem shoots/fruits, ARI 5627	Edges of fresh stems are eaten raw or cooked. Fruits are used in three TR: <i>tremythenes</i> (pies with flour and the fruits), fried <i>tremythkia</i> (fried fruits) and <i>tremyholado</i> (oil derived from the fruits)		Aerial part				
<i>Plantago lanceolata</i> L. (Plantaginaceae), Ribwort plantain, leaves, TUC 237		Boiled and garnished by olive oil and lemon		Boiled			
<i>Plantago major</i> L. (Plantaginaceae), Common plantain, leaves, BAGN 48F			Raw	Raw			

Table II (Continued)

Food plant	Cyprus	Greece	Spain	Italy	Morocco	Albania	Egypt
<i>Portulaca oleracea</i> L. (Portulacaceae), Purslane, leaves, ARI 5889	Raw in salad	Raw in salad	Cooked		Cooked, dry or smoked	Raw in salad	Cooked
<i>Quercus ilex</i> L. (Fagaceae), Holly oak, fruits, GDA 49129		Raw	Cooked in a TR: Crush the fruit, mix-up with maize flour, knead as a cake and fry				
<i>Raphanus raphanistrum</i> L. (Brassicaceae), Wild radish, leaves, TUC 079		Boiled and garnished by olive oil and lemon		Boiled with other different herbs (cultivated and wild)			
<i>Reichardia picroides</i> (L.) Roth (Asteraceae), French scorzonera, fresh leaves, CAP 38F		Boiled and garnished by olive oil and lemon		Raw in salads			
<i>Rosmarinus officinalis</i> L. (Apiaceae), Rosemary, leaves, FD 09	Condiment in TR with fish ( <i>savoro</i> ) and with meat ( <i>zalatina</i> )	Scent in cooked recipes	Scent in cooked recipes	Scent in cooked recipes			Cooked as boiled and make beverage
<i>Rubus ulmifolius</i> Schott (Rosaceae), Elm-leaved bramble, young stems/leaves/fruits, CAP 41F			Young stems and fruits are used raw macerated with aguardiente liqueur	Young leaves are used cooked in omelette. Fruits used raw for the preparation of marmalade			
<i>Rumex acetosa</i> L. (Polygonaceae), Sorrel, aerial part, LEP-RUM2				Cooked as a soup with other different herbs (cultivated and wild)		Raw as a snack	

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Table II (Continued)

Food plant	Cyprus	Greece	Spain	Italy	Morocco	Albania	Egypt
<i>Rumex pulcher</i> L. (Polygonaceae), Fiddle dock, leaves, ARI 5675	Boiled with broad beans and in a TR ( <i>Xinopoureka</i> )	Sauté, in mixture with other greens	Cooked				
<i>Scolymus hispanicus</i> L. (Asteraceae), Spanish oyster, leaves/stems/ rhizome, GDA 49160	Leaves/stems used raw or boiled, fried alone or with eggs and 'Yiachni'	Boiled leaves/ rhizome	Fried leaves				
<i>Silene vulgaris</i> (Moench) Garcke (Caryophyllaceae), Bladder champion, leaves, ARI 5667	Fried with eggs or beans, boiled with legumes or in a TR pie ( <i>pourekouthkia</i> )	Sautee, in mixture with other greens	Fried	Fried for omelettes and pasta sauce with carrots, celery, onions and with or without tomato sauce	x		x
<i>Sinapis alba</i> L. (Brassicaceae), Mustard, aerial part, ARI 5672	Raw in salad or boiled alone, boiled with legumes or fried with onions and tomatoes						
<i>Sinapis arvensis</i> L. (Brassicaceae), Charlock, aerial part, ARI 5878	Raw in salad or boiled alone, boiled with legumes or fried with onions and tomatoes			Boiled alone			
<i>Smilax aspera</i> L. (Ruscaceae), Green-brier, young stems/leaves, TUC 597	Young stems boiled, fried alone or with eggs	Boiled leaves					
<i>Solanum nigrum</i> L. (Solanaceae), Blach nightshade, fruits/ leaves, TUC 674	Raw fruits	Boiled leaves					

Table II (Continued)

Food plant	Cyprus	Greece	Spain	Italy	Morocco	Albania	Egypt
<i>Sonchus asper</i> (L.) Hill (Asteraceae), Prickly sow thistle, leaves, CAP 48F			Raw	Raw in salads or boiled with other herbs			
<i>Sonchus oleraceus</i> L. (Asteraceae), Smooth saw thistle, leaves, GDA 49191	Raw in salad	Boiled	Raw	Boiled with other plants for doing soups, or alone for doing omelettes			Raw in salad
<i>Tragopogon sinuatus</i> Avi.-Lall. (Asteraceae), Goats beard, stems/leaves, ARI 5673	Stems boiled alone or boiled with legumes	Leaves boiled or Sautee, in mixture with other greens					
<i>Urtica dioica</i> L. (Urticaceae), Stinging nettle, leaves, LEP-ORT			Cooked	Fresh as a filling for stuffing pasta ( <i>tordelli</i> ) or for rice dishes, for doing omelettes, and like filling for a TR ( <i>urciòn</i> ) as filling for pie ( <i>byrek</i> )		Boiled with flour and milk, and used as a soup; boiled and used with cream ( <i>mazë</i> ) as filling for pie ( <i>byrek</i> ); boiled and eaten with fresh butter ( <i>burrofresko</i> ) or preserved with semi-liquid butter (obtained by heating fresh butter) ( <i>tëlymë</i> ) in soups; boiled and served with noodles	
<i>Urtica pilulifera</i> L. (Urticaceae), Roman nettle, leaves, Ur 1		Cooked			Cooked		

while in Italy the leaves are used raw in salad or cooked as boiled with chestnuts in a TR called 'tullore' and the dried seeds are cooked with pig's liver and *Zea mays* mixture called 'polenta'. In Egypt leaves are used cooked with rice, tomatoes, onions and Brassica.

*Most used plants.* The recorded plants in the seven selected regions belong to 53 different families. Asteraceae and Lamiaceae were with difference the most frequently encountered botanical families, while Liliaceae, Rosaceae and Apiaceae are among the five families with the greater number of representatives. The number of taxa cited in the overall of the most used botanical families can be seen in Figure 2.

These are big families with many representatives in the Mediterranean region, some of which are very common plants. The data of this study confirm that people tend to use preferably the plants that are easily available to them, excluding of course those that are toxic or noxious. As Bonet and Vallès (2002), Bonet et al. (1999), Johns et al. (1990) and Stepp and Moerman (2001) affirm, the more common a plant (family or species) is in an area, the greater is the probability of its popular use. Most of the times the wild food plants gathering at a local level depends mainly on the plant diversity of an area. Some plants that were very appreciated and frequently consumed in the past are now considered weeds and only rarely eaten.

Many studies revealed that weeds have played a crucial role in ethnobotany and cultural history of plants. Lately, a distinction has been made between cryptocrops from weeds (Rivera et al. 2006). Both are not cultivated plants living in crop fields and competing with the main crop. Cryptocrops are gathered and used by local farmers in such way that they become a resource for them and a part of the local environmental management system. They are part of the TK system not only as a crude material but also as a tool for the complex management of secondary habitats. The distinction is not taxonomic but ethnobotanical. One single taxon is a weed or a cryptocrop depending on the way it is managed. Many weeds were first used as a cryptocrop and then became a weed. As revealed from our study, some plants that were very much appreciated and frequently consumed in the past are now considered weeds, and even though they have been mentioned in the study areas of Cyprus they are only rarely eaten; in the territories studied this is the case of *Sinapis alba* and *Sinapis arvensis*. *Sinapis* spp. are still eaten in other areas of Cyprus (Della et al. 2006). However, from our data (Table III) for the most quoted taxa, there is evidence that beyond the cryptocrops many wild food plants (shrub shoots, wild fruits and leaves) that are gathered from shrublands (*Thymus capitatus*, *Myrtus communis*, *Pistacia lentiscus*,

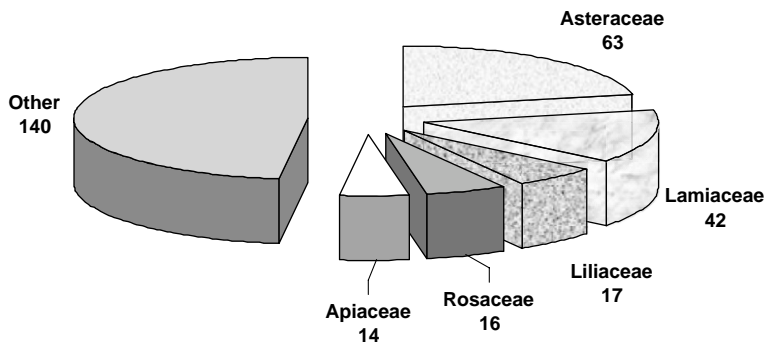


Figure 2. Most representative families.

Table III. The five plants most often quoted in each study area.

Country	First plant	Second plant	Third plant	Fourth plant	Fifth plant
Albania	<i>Chenopodium bonus-henricus</i> L. (40 citations)	<i>Fragaria vesca</i> L. (36 citations)	<i>Rubus idaeus</i> L. (35 citations)	<i>Allium triquetrum</i> L. (23 citations)	<i>Rumex alpinus</i> L. (15 citations)
Greece	<i>Scandix pecten-veneris</i> L. subsp. <i>pecten-veneris</i> (53 citations)	<i>Prasium majus</i> L. (36 citations)	<i>Sonchus oleraceus</i> L. (34 citations)	<i>Cichorium spinosum</i> L. (32 citations)	<i>Papaver rhoeas</i> L. (32 citations)
Cyprus	<i>Silene vulgaris</i> (Moench) Garcke (17 citations)	<i>Capparis spinosa</i> L. (16 citations),	<i>Asparagus acutifolius</i> L. (15 citations)	<i>Malva parviflora</i> L. (14 citations),	<i>Scolymus hispanicus</i> L. (13 citations),
Egypt	<i>Portulaca oleracea</i> L. (29 citations)	<i>Beta vulgaris</i> L. var. <i>cicla</i> L. (24 citations)	<i>Ziziphus spina-Christi</i> (L.) Willd (22 citations)	<i>Corchorus olitorius</i> L. (20 citations)	<i>Malva sylvestris</i> L. (20 citations)
Italy	<i>Cichorium intybus</i> L. (50 citations)	<i>Taraxacum officinale</i> Weber (47 citations)	<i>Urtica dioica</i> L. (47 citations)	<i>Hypochaeris radicata</i> L. (44 citations)	<i>Picris ichioides</i> L. (44 citations)
Morocco	<i>Origanum majorana</i> L. (37 citations)	<i>Mentha pulegium</i> L. (31 citations)	<i>Calamintha officinalis</i> Moench (27 citations)	<i>Ficus carica</i> L.	<i>Portulaca oleracea</i> L.
Spain	<i>Tamus communis</i> L. (15 citations)	<i>Thymus mastichina</i> L. (14 citations)	<i>Andryala integrifolia</i> L. (15 citations)	<i>Origanum virens</i> Hoffmanns. and Link (12 citations)	<i>Tolpis barbata</i> (L.) Gaertner (9 citations)

*Asparagus acutifolius*, *Crataegus azarolus*, *Crataegus monogyna* *Origanum virens*, *Origanum majorana*, pastures (*Anchusa italica*, *Anchusa strigosa*) grasslands (*Muscari comosum*), water courses (*Mentha pulegium*, *Nasturtium officinalis*) forests (*Quercus ilex*) and marshes (*Smilax aspera*) seem to be very much appreciated.

Ethnobotanists have often argued that a high rate of useful species in a family is a direct indicator of a family's importance (major plant family) (CBD 2001). However, the high species diversity of a particular plant family does not imply that these taxa or a family as a whole is of general dietary relevance. For instance, the Portulacaceae or Capparidaceae yield only one species each, but these *P. oleracea* and *C. spinosa* are the most widely consumed species. Additionally, wild food plants are an important element of local identity and a link of a community with its history, and the use of these botanical families is related with the traditional ecological knowledge. The five plants most times quoted in each country along with the times of citation in the area recorded can be seen in Table III.

It is clear that within the seven study areas the plant species most times quoted show great variability. In each area, a different group of five species is the most popular, showing only few similarities as in the case of *P. oleracea* (two areas). According to that data we can suggest that there is no common 'Mediterranean' cultural heritage in the selected areas regarding the gathered food plants, since even though the most quoted wild food taxa are sometimes the same, the cultural importance of these taxa is very different in the cuisine.

*Plant supply: availability throughout a year.* Most of the plants are collected in wild populations near the places where the informants live. Occasionally, there is a small-scale cultivation in their home gardens. In the local Mediterranean cuisine, greens and wild plants in general still have an important role. The gathering of wild greens is strongly seasonal. In the studied sites the wild greens are mainly collected from mid to late autumn until spring, where the number increases, depending on the temperature and precipitation. The number then decreases, and in summer many edible greens bloom and their leaves become tough. Many recipes with leafy wild greens include a broad range of species and reflect this seasonal aspect including variability in the use of species depending on seasonal availability. The availability of edible plants throughout a year in the seven countries can be seen in Figure 3.

According to the tools used for gathering, 55% of the plants are gathered simply by hand while 35% are gathered by a knife. Other tools such as a pair of scissors, sickles and some traditional tools are used in 10%.

*Plant parts.* Within the food plants, leaves (46%) are the plant parts most widely used. The aerial part and fruits follow at 18% and 13%, respectively. The distribution of plant part used within the seven countries can be seen in Figure 4.

*Models of consumption.* The wild food plants are consumed in many different ways and are prepared using diverse recipes according to local traditions. Some of them need only the washing of the part of the plant to be eaten, and some others imply a more or less complex preparation process. It is obvious that cooked recipes predominate in the models of consumption with a total percentage of 54% in the seven study areas, while raw edibles follow with the much lower percentage of 28%. This is in contrast with what people think about Mediterranean diets and that Mediterranean people always depicted eating vegetables raw. Someone could assume that one reason is due to the change of the socio-economic context of rural areas around the Mediterranean. Nowadays, people do not spend so much time outside in the natural environment in order to be feed with raw vegetables, and therefore, since they are influenced by contemporary dietary trends of cooked food, edible plants collected from the wild are

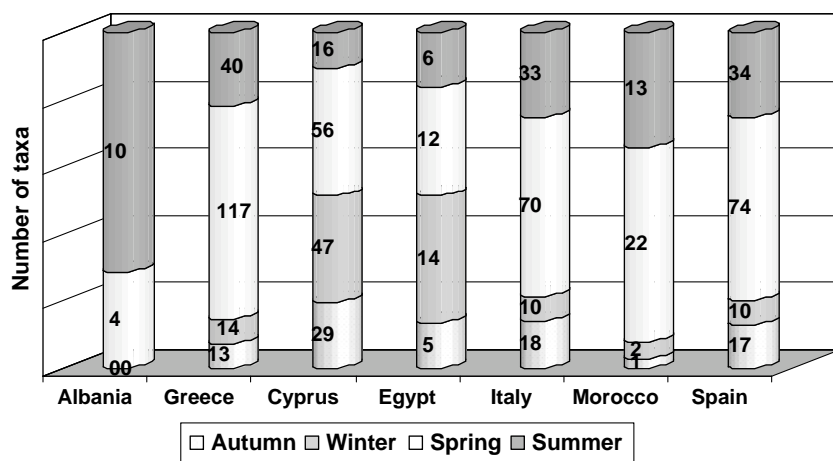


Figure 3. Availability of plants throughout the year.

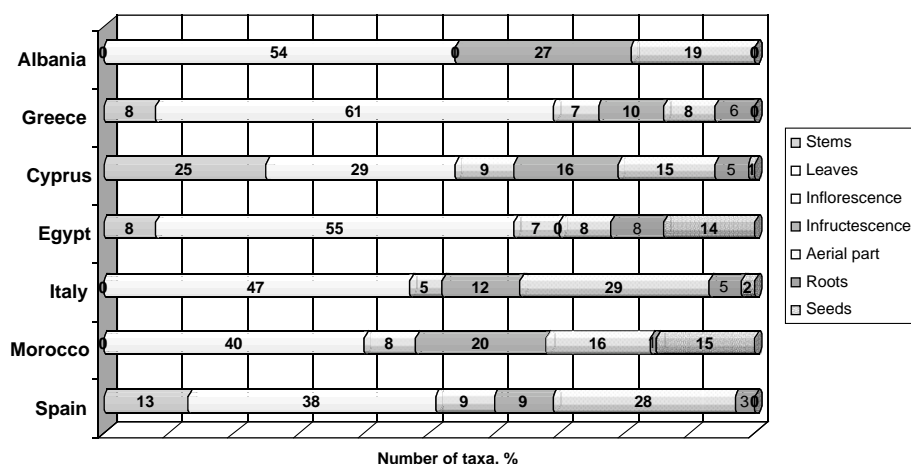


Figure 4. Distribution of the plant parts used.

brought home for more elaborate cooking recipes. The cooking process should be carefully considered when studying the nutritional properties of non-cultivated food resources because this influences the bio-availability of specific classes of natural constituents, and consequently beneficial effects of food, such as their antioxidant activity and their prevention of Acute Respiratory Distress Syndrome (ARDS) and cancer (Pieroni et al. 2006). However, most flavonoids remain after cooking. The fried vegetables are very popular in the areas studied and they accompany a wide variety of dishes like salads, greens, and roasted meat. Many elaborated recipes of pan-frying in Mediterranean countries especially in Greece, Cyprus, Italy and Spain often involve virgin olive oil. Frying is considered to have almost the same or even less effect on nutrient losses compared with other cooking methods (Bognar 1998), while the absorption of frying oils that are rich in vitamin E (Andrikopoulos et al. 1989) and unsaturated fatty acids (Fillion and Henry 1998) usually increase the nutritive value of fried food. Dietary evaluation of vegetables pan-fried in virgin olive oil (Kalogeropoulos et al. 2006) indicates that vegetables appear to represent a healthy lipid profile concerning fatty acid classes and their atherogenic and thrombogenic indices, while they furthermore provide an additional intake of monounsaturated fat, squalene and phytosterols for Mediterranean people.

Preserved plant parts and plants used as a condiment to food recipes have lower representation in the studied sites (11% and 7%, respectively).

The distribution of models of consumption in the seven countries can be seen in Figure 5.

The percentage of each type of consumption, the different uses and the two species more often quoted in each different use can be seen comparatively in the seven countries in Table IV.

*Plants consumed raw.* Within the seven study areas, many plants (28%) with edible leaves, roots or fruits are eaten raw. The majority of them are eaten fresh, directly after they are harvested. Many of them are used in salads and dressed with oil and vinegar or lemon or are eaten fresh with olives, onions and bread. This is the case of *P. oleracea*, *Apium nodiflorum*, *Taraxacum officinalis*, *Cichorium intybus*, *Nasturtium*

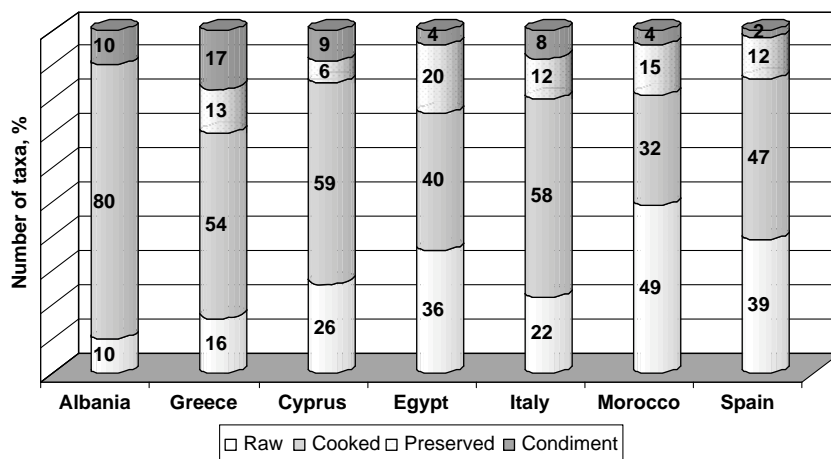


Figure 5. Models of food plant consumption.

*officinale*, *C. spinosa* and others. On the other hand, many edible fruits are consumed as desserts (*Pyrus syriaca*, *Crataegus azarolus*, *Ceratonia siliqua*, *Ziziphus spina-christi*, *Phoenix theophrasti* Greuter) or edible roots (*Muscari comosum* and *Daucus carota* among others), which are directly consumed in fresh form. Only in Spain (*Phlomis purpurea*, *Plantago major*) and Italy (*Borago officinalis*, *Viola odorata*) are flowers are consumed raw.

*Plants consumed cooked.* Most of the wild plants (54%) have been eaten cooked. Most of them are eaten boiled alone or with legumes, and are garnished with olive oil and lemon. The most popular plants used as boiled are *Scolymus hispanicus*, *Rumex* spp., and *Cichorium* spp. However, some more elaborated preparations have been recorded. Some plants are consumed fried using olive oil and especially in an omelette. The young shoots of *Asparagus acutifolius* (Cyprus, Spain, Italy), *Asparagus stipularis* (Cyprus) and the young leaves of *Silene vulgaris* (Cyprus, Greece, Spain, Italy), which are some examples in the sites studied, are cut, fried and mixed with eggs to make an omelette. *A. acutifolius* is prepared in the same way in some parts of Italy (Pieroni 1999), the Iberian Peninsula (Bonet and Vallès 2002) and in the Bodrum area of Turkey (Ertug 2004).

A number of wild edibles are used in traditional recipes. For example, the leaves of *Papaver rhoeas* in Cyprus are used in a TR (pie) called 'pourekia tou peteinou', while in Italy it is used as a filling for a TR called 'crescione'. Additionally, the leaves of *Urtica dioica* are used as filling for a TR pie called 'byrek' in Albania and 'urcìon' in Italy. The fruits of *Quercus ilex* in Spain are used cooked in a TR in which fruits are crushed, mixed-up with maize flour, and kneaded as a cakes and fry. Within each one of the seven countries, several plants are used in traditional recipes (Table II).

*Preserved plants.* A number of plants (11%) are gathered and preserved to be stored and consumed all year round. Many plants that are used as a scent are dried and stored in plastic bags, plastic bottles or glass vessels and therefore used all year round, while some other plants such as *C. spinosa* (Cyprus, Italy, Morocco, Egypt), *Eryngium creticum* (Cyprus), *Crithmum maritimum* (Cyprus, Greece) and *Muscari comosum*

Table IV. Types of consumption, the different uses and the two species most often quoted in each different use by the seven study areas.

	Albania	Greece	Cyprus	Egypt	Italy	Morocco	Spain
<b>Raw</b>	10%	16%	26%	36%	22%	52%	39%
Green leaves	<i>Portulaca oleracea</i> L.	<i>Cichorium spinosum</i> L., <i>candix. pecten-veneris</i> L. subsp. <i>pecten-veneris</i>	<i>Portulaca oleracea</i> L., <i>Apium nodiflorum</i> (L.) Lag.	<i>Portulaca oleracea</i> L., <i>Corchorus olitorius</i> L.	<i>Cichorium intybus</i> L., <i>Taraxacum officinale</i> Weber	<i>Portulaca oleracea</i> L., <i>Capparis spinosa</i> L.	<i>Nasturtium officinale</i> <i>R. Br Rumex scutatus</i> subsp. <i>induratus</i> (Boiss. & Reuter) Nyman <i>Campanula rapunculus</i> L.
Roots			<i>Muscari comosum</i> (L.) Mill.	<i>Beta vulgaris</i> L. subsp. <i>cicla</i> (L.) Alef.			
Fruits		<i>Ceratonia siliqua</i> L., <i>Phoenix theophrasti</i> Greuter	<i>Crataegus azarolus</i> L., <i>Pyrus syriaca</i> Boiss.	<i>Ceratonia siliqua</i> L., <i>iziphus spina-christi</i>	<i>Fragaria vesca</i> L., <i>Arbutus unedo</i> L.	<i>Chamaenops humulis</i> L.	<i>Quercus rotundifolia</i> Lam., <i>Arbutus unedo</i> L.
Flowers					<i>Borago officinalis</i> L., <i>Viola odorata</i> L.		<i>Phlomis purpurea</i> L., <i>Plantago major</i> L.
<b>Cooked</b>	80%	54%	59%	40%	58%	29%	47%
Boiled alone	<i>Allium triquetrum</i> L.	<i>Cichorium spinosum</i> L., <i>Scolymus hispanicus</i> L.	<i>Malva parviflora</i> L., <i>Carlina involucrata</i> Poir. subsp. <i>cyprica</i> Meusel et Kastner	<i>Rumex dentatus</i> L., <i>Corchorus olitorius</i> L.		<i>Ajuga iva</i> (L.) scherb	<i>Apium nodiflorum</i> (L.) Lag., <i>Raphanus raphanistrum</i> L. subsp. <i>microcarpus</i> (Lange) Thell.
Boiled with lexumes		<i>Scolymus hispanicus</i> L.	<i>Centaurea hyalolepis</i> Boiss., <i>Scolymus hispanicus</i> L.	<i>Malva silvestris</i> L.	<i>Cichorium intybus</i> L., <i>Taraxacum officinalis</i> Weber	<i>Calamintha officinalis</i> Moench	<i>Rumex pulcher</i> L., <i>Rumex conglomerates</i> Murray
Fried		<i>Tamus communis</i> L., <i>Asparagus aphyllus</i> L.	<i>Silene vulgaris</i> (Moench) Garcke, <i>Asparagus acutifolius</i> L.		<i>Robinia pseudoacacia</i> L., <i>Borago officinalis</i> L.		<i>Tolpis barbata</i> (L.) Gaertn., <i>Silene vulgaris</i> (Moench) Garcke
Traditional recipe	<i>Chenopodium bonus-henricus</i> L., <i>Rumex alpinus</i> L.	<i>Scandix pecten-veneris</i> L. subsp. <i>pecten-veneris</i> Prasium majus L.	<i>Pistacia terebinthus</i> L., <i>Foeniculum vulgare</i> Mill.	<i>Corchorus olitorius</i> L.	<i>Cichorium intybus</i> L., <i>Taraxacum officinalis</i> Weber	<i>Calamintha officinalis</i> Moench	<i>Mentha pulegium</i> L., <i>Thymus mastichina</i> L.
<b>Preserved in vinegar</b>	0%	13%	6%	20%	12%	15%	12%

Table IV (Continued)

	Albania	Greece	Cyprus	Egypt	Italy	Morocco	Spain
Jam		<i>Muscari comosum</i> (L.) Mill., <i>Capparis spinosa</i> L. <i>Rubus canescens</i> DC., <i>Ficus carica</i> L.	<i>Capparis spinosa</i> L., <i>Eryngium creticum</i> Lam. <i>Pyrus syriaca</i> Boiss., <i>Crataegus azarolus</i> L.	<i>Capparis spinosa</i> L.	<i>Arbutus unedo</i> L., <i>Sambucus nigra</i> L., <i>Viola odorata</i> L.		<i>Rubus ulmifolius</i> Schott
Dried and stored		<i>Salvia fruticosa</i> Miller, <i>Coridothymus capitatus</i> (L.) Reichenb. fil.	<i>Mentha spicata</i> L., <i>Origanum dubium</i> Boiss.		<i>Foeniculum vulgare</i> Mill., <i>Thymus serpyllum</i> L.	<i>Ficus carica</i> L.	
Liquor				<i>Rosmarinus officinalis</i> L.			<i>Quercus rotundifolia</i> Lam., <i>Myrtus communis</i> L.
Frozen							<i>Silene vulgaris</i> (Moench) Garcke, <i>Allium neapolitanum</i> Cirillo
Oil						<i>Olea europaea</i> L.	
Condiment/ spices	10%	17%	9%	4%	8%	4%	2%
	<i>Satureja Montana</i> L.	<i>Torilis arvensis</i> (Huds.) Link subsp. <i>arvensis</i> , <i>Tordylium apulum</i> L.	<i>Mentha spicata</i> L., <i>Origanum dubium</i> Boiss.	<i>Mentha microphylla</i> K. Koch	<i>Allium schoenoprasum</i> L., <i>Foeniculum vulgare</i> Mill.	<i>Origanum majorana</i> L.	<i>Origanum virens</i> Hoffmanns. and Link, <i>Thymus mastichina</i> L.

(Cyprus, Greece) are preserved in vinegar and eaten like appetizers with several kinds of food. Fruits of several wild trees are used for the preparation of jams and marmalades such as *Pyrus syriaca* (Cyprus) *Crataegus azarolus* (Cyprus), *Arbutus unedo* (Spain, Italy), and *Fragaria vesca* (Italy, Albania)

*Plants used as condiments.* Some plants (7%) are used to condiment stews, soups, pies or other dishes and traditional recipes. The most popular aromatic plants belong to genus of *Origanum*, *Lavandula*, and *Mentha*.

#### *Contribution of wild edible plants as food medicines around the Mediterranean*

At this point it should be noted that from the 406 edible plants recorded, 282 (69%) are used exclusively for food while 124 (31%) have been recorded to be used for food as well as for medicine. These plants (30% of the recorded plants, including condiments and spices) are food plants (actually eaten) that receive recognition as medicinal, either in traditional medicine, ethnomedicine or biomedicine and represent a part of medicinal ethnoflora. Overlapping between food and medicine is quite well known in traditional societies (Etkin and Ross 1982; Pieroni et al. 2002, 2005) and represents an often neglected field in ethnopharmaceutical research.

There is no clear dividing line between food and medicinal plants, especially in indigenous and local traditions. Food can be used as medicine and *vice versa*, while certain foods are used because of certain assumed health benefits and thus could be called medicinal foods (Johns 1990; Etkin 1994); for example, the aerial part of *Chrysanthemum segetum* in the Paphos area of Cyprus is consumed either raw or boiled with legumes because is perceived to cure bronchitis, while the leaves of *Cichorium intybus* in the Bagnocavallo area of Italy are eaten raw in salads because are perceived to contribute to the general good health of the intestine.

Medicinal gathered food plants include also species whose medicinal uses are remotely related or unrelated with their uses as food. For instance, the part used is different according to the culinary or medicinal purpose, or the plant is administered not orally and therefore is not comparable with its ingestion as food. For example in Cyprus this is the case among others of *Calendula arvensis*, the leaves of which are used cooked as boiled or in a TR of meatballs, while its flowers are used in a traditional ointment made by smashed flowers mixed up with olive oil for the treatment of wounds and mouth ulcers.

Plants used as spices in local cuisines of the some of the study areas (*Origanum dubium*, *Origanum majorana*, *Corydanthus capitatus*, *Laurus nobilis* among others) are often used in folk medicine as a digestive, so it may be that their presence in these often heavy dishes is not only culinary but medicinal, to increase the digestibility of the cooked food as also stated by Bonet and Vallès (2002). This confirms the fact that food and medicinal plant uses are closely related and can be relevant to the development of functional foods, pharmafoods or nutraceuticals (Etkin and Johns 1998; Bonet and Vallès 2002). The relatively common use of Asteraceae and Lamiaceae worldwide, as food as well as for medicine, could be due to the phytochemical features of many species of these groups, given that Asteraceae contain mainly sesquiterpene lactones while Lamiaceae contain many essential oils. This implies that these taxa have generally a very marked taste (bitter in the case of Asteraceae and aromatic in the case of Lamiaceae) (Pieroni et al. 2005). This could

have had a role in the selection of these medicinal plants by the first human groups (Brett and Heinrich 1998; Leonti et al. 2002; Pieroni et al. 2002).

Several epidemiological studies, especially the 'Seven Countries Studies', have drawn much attention towards the health beneficial dietary patterns of the Mediterranean region (Keys et al. 1980). The consumption of fruits, vegetables, olive oil and red wine have often been correlated with lower rate in coronary heart disease, diabetes, cancer and with greater longevity (De Logeril et al. 1994; Thrichopoulou et al. 2000) not only in Mediterranean but also in non-Western populations of India or Israel (Hocking 1997; Maffi 2001).

From the RUBIA ethnobotanical field survey it was revealed that culinary preparations based on plants and considered to be part of a healthcare practices in the traditional cultures studied are mainly administered by the women of the household. These aspects should be investigated in greater depth in future ethnobotanical studies in the circum-Mediterranean area, as the household provision of care and healthcare (Niehof 2002) is often underestimated and most studies are privileging the 'medicine of the healers' instead of the 'medicine of the households' (Howard 2003).

#### *Mediterranean diets and traditional cuisines under the perspective of circum-Mediterranean cultural heritage*

For many people the idea of a Mediterranean diet suggests the combination of a diversity of vegetables, salads, fruits and spices, which are often derived from local traditions, including some widely known basic ingredients (pasta, olive oil, wine). More precisely, Mediterranean traditional food knowledge should be referred as Mediterranean diets since the many different cultures, religious beliefs, ecologic backgrounds and historic developments around the Mediterranean basin resulted in many diets, which share a multitude of elements but also revolve around distinct local or regional traditions.

Noah and Truswell (2001) distinguished various groups of diets in Mediterranean countries. From the study areas of RUBIA Research, Spain and Italy as Western Mediterranean countries consume bread, rice, pasta and potatoes as staple food, with vegetables and legumes. Olive oil consumption is high and pork is the most important meat. Greece and Cyprus as Eastern Mediterranean countries consume white flour products. Dill, parsley and oregano are essential herbs. Olive oil consumption is very high, especially in Greece. Chicken is important in this group. Morocco and Egypt as North African-Saharan Mediterranean countries eat bread made from wholewheat flour and barley flour. Couscous is eaten more than rice, and potato, pumpkin and chickpeas are major foods. Olive oil consumption ranges from high to very low in Egypt, and lamb seems to be the most used meat. Albania as part of the Adriatic Mediterranean has a high consumption of wheat flour as bread, also pitta. In this case olive oil use is low to moderate and beef is the most important meat.

Analysing the plants recorded by the seven study areas with similarity indices (Sorensen coefficient), it is pointed out that similarity indices are very low, ranging between 0.014 and 0.325, proving by statistical means that there is no common Mediterranean cultural heritage regarding the gathered food plants. The highest similarity (0.325), even though low, was revealed between Greece and Cyprus; this is,

however, only partially due to similar ethnobotanical patterns—instead this picture has heavily affected also by similarities of flora.

Statistical data (Table V) are in agreement with Table III, showing that the most quoted wild food plants of each area seemed to be very different from the other ones.

Grouping the seven study areas into four geographical groups, again the similarity indices are very low (Table VI). However, it can be seen that greater similarity is shown between Eastern Mediterranean and Western Mediterranean counties (0.21), followed by North African Mediterranean compared with Eastern Mediterranean (0.13).

Wild food plants are an example that exemplifies local TK. Food and dishes do always reflect a 'vision of the world' and consequently people, ethnic groups and communities are proud of their special dishes and the plants gathered and use; however, globalization has resulted in an increasing availability of similar foods in different cultures. A telling example from Mediterranean is *Eruca sativa* (Brassicaceae). In recent years rocket salad has become a new popular food in certain sectors of the European Community. Some health benefits have been scientifically investigated (Grossheim 1952). The aerial parts were originally well known only in the Central provinces of Italy (especially Umbria) and it was an important food of the Ancient Romans, which later fell into disuse in most regions. Remnants of this widespread reputation in ancient times are the persisting local uses as flavouring agent in traditional dishes. Its leaves have a prominent, spicy taste and in recent years have become common ingredients of many salads in North and Central European countries. Thus, rocket salad is a prime example of the transformation of a local food into a commercial product.

#### *Infusion of traditional knowledge to future generations*

Evidence from the ethnobotanical fieldwork of the RUBIA project suggests specific cultural and social aspects as well as dietary patterns in the selected rural regions providing comprehensive information on the social framework related to nutritional behaviours in the selected rural area. Elderly women and farmers in the several study areas are the main keepers of TK in the domain of wild edible plants. In some of the study areas, it was proved that fewer traditionally vegetables are consumed than in previous decades. This shift has also been observed in other Mediterranean regions (Bonet and Vallès 2002; Pieroni et al. 2005). It was verified that the transmission of folk uses of plants decreased in past generations and, surely, in urban areas the knowledge is very much delimited. Most of the interviewees were past retirement age, and agreed that today far fewer wild plants are consumed than in previous decades. A

Table V. Sorensen's similarity index for the plants recorded within the seven study areas.

	Albania	Cyprus	Greece	Italy	Spain	Egypt	Morocco
Albania	14	2	1	3	4	1	1
Cyprus	0.043	78	34	17	19	9	6
Greece	0.014	0.325	131	19	17	10	9
Italy	0.072	0.231	0.19	69	16	5	5
Spain	0.88	0.25	0.163	0.22	77	6	4
Egypt	0.064	0.19	0.14	0.12	0.13	17	3
Morocco	0.059	0.12	0.12	0.11	0.08	0.16	20

Table VI. Sorensen's similarity index for the geographical groups.

Mediterranean region	Eastern Mediterranean (Cyprus, Greece)	Western Mediterranean (Italy, Spain)	North African-Saharan Mediterranean	Adriatic Mediterranean
Eastern	209	38	16	1
Western	0.21	146	12	5
North African-Saharan	0.13	0.04	37	1
Adriatic	0.01	0.06	0.04	14

couple of the younger generation we met in Cyprus during the field survey declared that

it is much easier and less time and effort consuming to buying greens, fruits or spices from the markets, no matter if they are cultivated or even imported, instead of running to the fields. Since even though, going to the wild it is not easy to recognize the edible plants and in case can identify some of them they are not familiar with the way plants should be processed.

It is obvious that while nutritional habits change and the younger generation has been influenced by the contemporary western lifestyle, it has lost the TK necessary to identify, gather and process these species, while many middle-aged informants perceive the consumption of non-cultivated vegetables in a negative way, often as a symbol of poverty of the past.

## Conclusions

The circum-Mediterranean ethnobotanical study for traditional wild food plants in seven selected areas around the Mediterranean revealed that the collection of wild plants is inextricably embedded in cultural concepts describing the traditional management of natural resources and the spatial organization of the natural-cultural landscape, and therefore it is difficult to speak about Mediterranean ethnobotany as a whole. Consequently, we tend to agree with Pieroni et al. (2006) that instead we have a very variegated and composite Mediterranean made by many 'Mediterraneans'. It was clear that within the seven study areas the plant species recorded were very variable. In each area a different group of species was the most popular, showing only few similarities. According to our data, we can suggest that there is no common 'Mediterranean' cultural heritage in the selected areas regarding the gathered food plants, since even though the most quoted wild food taxa are sometimes the same, the cultural importance of these taxa is very different in the local cuisine.

The consumption of wild plants is as an addition or a complement to a diet of cultivated food plants and with a different extent within the seven studied areas, while the quantity and quality of TK varies among community members in the several studied areas. The many different cultures, religious, beliefs, ecologic backgrounds and historic development around the Mediterranean resulted in many diets, which share a multitude of elements, but also revolve around distinct local or regional traditions.

Evidence from the field suggests that wild gathered food plants still play an important role in rural people of Mediterranean, especially between late autumn and spring; however, it was realized that the transmission of folk uses of plants decreased in past generations, and consequently in urban areas the knowledge is expected to be very much limited.

The habit of using wild food plants is still alive, but is 'ageing'. The recording and preserving of this knowledge is pressing and fundamental. The scientific inventory should gain value within the local communities, and traditional ecological knowledge should be infused to future generations. The renaissance of this TK will require novel curricula in schools and universities (Verde Lopez and Fajardo Rodriguez 2003; Slow Food 2005), and the idea of developing innovative instructive material for schools or handbooks for dissemination is very useful. Additionally, substantial changes in the agenda of many local policy-makers and cultural stakeholders will be required in the Mediterranean. Sustaining food agro-biodiversity is meaningful only if the efforts take into account food's inextricable connections with cultural heritage.

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