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An Ethnobotanical investigation of traditional knowledge and uses of edible wild plants in the Umbria Region, Central Italy

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Summary

These days edible wild plants (EWPs) play a fundamental role in the Mediterranean diet, thanks to their content of mineral elements and bioactive compounds with proven benefits for human health. The present study aims to document ethnobotanical knowledge and uses of EWPs in Central Italy so that this knowledge will not be lost. During various nature fairs and exhibitions in Umbria three hundred subjects were interviewed face-to-face between March and May 2013-2015. The participants provided information on local plant names, where and when the plants were collected, part(s) used, categories used, folk medicinal uses, taste perception and other uses. The results were analyzed using two ethnobotanical indices: the Relative Frequency of Citation (RFC) and Relative Importance Index (RII). The 100 EWPs mentioned by the respondents belonged to 23 families, Asteraceae (33%), Brassicaceae (17%) and Lamiaceae (11%) being the most dominant. The part(s) used were leaves (49%), shoots (17%), flowers and inflorescences (10%). Fourteen food use categories were cited, of which boiled 31%, 28% raw, 12% in vegetable soups, 11% fried in fat, without or with beaten eggs. Twenty-seven plant species were also mentioned as having folk medicinal uses.

Keywords: Central Italy, Umbria Region, edible wild plants, ethnobotanical knowledge, folk medicinal uses, taste perception

Introduction

Plants are an essential part of food intake; these days the bulk of our food requirements is satisfied by a few plant species of cultivated crops. In particular only seven species supply 90% of calories pro-capita worldwide, among them wheat, maize, rice and potatoes. However, it should not be forgotten that thousands of plant species are eaten locally, of which very few have been partially domesticated; indeed most are collected in the wild and belong to the immense patrimony of edible wild plants (EWPs) present on our planet (HEYWOOD, 2011).

Over the last two decades there has been a growing interest in EWPs which has prompted researchers to record local knowledge of various uses to preserve traditions and disseminate information. Numerous research projects have shown how the European continent, for example countries such as Poland (ŁUCZAJ and SZYMAŃSKI, 2007), Slovakia (ŁUCZAJ, 2012), the Iberian Peninsula (TARDÍO et al., 2006; PARDO DE SANTAYANA et al., 2007), Italy (RANFA, 2005; SIGNORINI et al., 2009; RANFA et al., 2011; GUARRERA and SAVO, 2013; RANFA, 2014; SANSANELLI and TASSONI, 2014; RANFA et al., 2015) and Greece (DELLA et al., 2006), possess a rich and varied culture with respect to EWP uses (PARDO DE SANTAYANA et al., 2010; ŁUCZAJ et al., 2012). These species are in the centre of a new approach concerning food which focuses on health and uncontaminated food sources (ŁUCZAJ et al., 2012). Especially in the Mediterranean area, numerous studies have explored the extraordinary richness of wild

species and the traditional uses associated with them (DELLA et al., 2006; DOGAN, 2012), as well as looking into their importance as a source of bioactive compounds (SANCHEZ MATA et al., 2012). Indeed in the Mediterranean area there is still a strong tradition in the use of EWPs. Currently, around 2 300 wild plant and mushroom species are used directly in human food consumption or to prepare condiments and drinks (CANEVA et al., 2013).

In Italy there are at present 828 edible species belonging to 98 botanical families whose ethnobotanical uses have been documented (ROMOJARO et al., 2013). Furthermore these species are arousing much interest thanks to their nutraceutical value and the benefits that derive from frequent, habitual use (NEBEL et al., 2006). Some studies carried out in Italy have shown that these species have significant nutraceutical values, as they are rich in mineral elements and bioactive compounds, with proven benefits for human health (RANFA et al., 2011; GUARRERA and SAVO, 2013; RANFA et al., 2014; MAURIZI et al., 2015; RANFA et al., 2015) thanks to their high polyphenol and unsaturated fatty acid contents (DE LORGERIL and SALEN, 2007). In the past, most studies in Umbria concentrated on recovering local knowledge regarding medicinal (LEPORATTI et al., 1985; NARDELLI, 1987) and food uses (DALLA RAGIONE I, DALLA RAGIONE L., 2003), while more recent research has shown that, with respect to many cultivated species, EWPs possess higher fibre content, are anti-oxidant and flavonoid-rich, and have beneficial effects in preventing chronic modern-day diseases (RANFA et al., 2011; MAURIZI et al., 2015; RANFA et al., 2015).

The aim of this study is to collect and document local knowledge of traditional EWP uses together with information on collecting, processing, cooking and folk medicinal uses. Until now, in Umbria little research, fragmented to say the least, has been carried out in this field. Therefore, this study represents one of the first attempts to document and preserve an important part of our ethnobotanical heritage which risks being lost.

Field work

The study was conducted in Umbria, Central Italy, in an area of 8 456 km² ca. with 895 259 inhabitants (Fig. 1). The river Tiber flows through the region, which is typified by a wide range of physical and climatic features, thus determining a great floristic diversity with over 2 000 different plant species (CONTI et al., 2007).

The landscape features extensive plains where anthropogenic activity is concentrated and where over the years a progressive reduction of floristic diversity has been observed. On the other hand, the hilly and mountainous areas maintain high naturalistic diversity with a high percentage of forest cover and a low percentage of urbanization (AA.VV., 2004).

Umbria is a region of rich biodiversity, having 95 Sites of Community Importance (SCIs) and 5 Special Protection Areas (SPAs) that cover 15% of the regional territory (MINISTERO DELL'AMBIENTE E DELLA TUTELA DEL TERRITORIO E DEL MARE, 2015). There are still extensive rural areas dotted with small villages where the countryside has altered very little, and where the knowledge and use of EWPs is still very much alive (Fig. 1) (RANFA et al., 2011, 2014, 2015).

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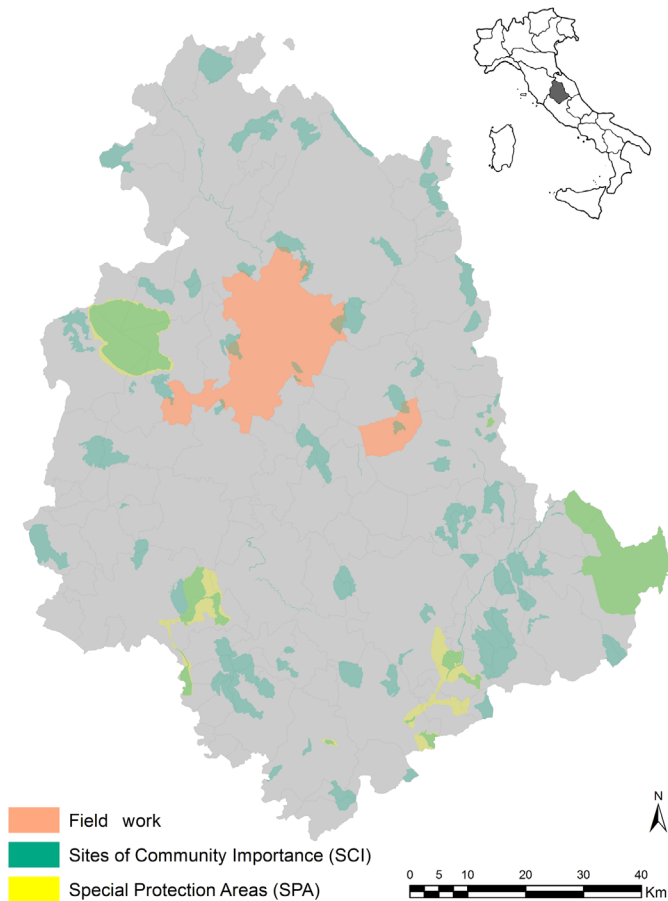


Fig. 1: Field work. Perugia and Spello, the municipalities where the themed events were organized. (Source: Umbria Geo Database, Umbria Region)

Material and methods

Ethnobotanical data were collected during some events centred on EWP which took place in Umbria, in the Perugia and Spello municipalities, aiming to disseminate and promote knowledge of wild

plant species. Of particular importance are the 2013, 2014, and 2015 editions of the *Mostra delle erbe spontanee*, organized by the Perugia Mycological and Field Naturalists' Association (Circolo Micologico Natualistico Perugino), where potted wild plants bearing labels that described botanical characteristics, food use and medicinal properties were on display, and also the 2014 and 2015 editions of the Wild Plants Show ('Subasio con Gusto - Rassegna delle Erbe Campagnole') held in the Spello municipality where various events promoted information on and uses of EWPs.

The data collected during these themed events were representative of the entire Umbria region as participation was high and the informants came from various localities throughout Umbria.

In both municipalities various field trips encouraged the general public to participate in the collection and identification of wild species. Therefore, over the past few years these species, for example 'raonzoli' (*Campanula rapunculus* L.), 'caccialepre' [*Reichardia picroides* (L.) Roth], 'papavero' (*Papaver rhoeas* L.) and 'borragine' (*Borago officinalis* L.) are beginning to appear more frequently in local street markets (Fig. 2 a, b, c, d, e). Moreover, local restaurants are including dishes based on wild plants in their menus, one of the most recent being a 'pesto' made with wild greens (Fig. 2-f).

Research on the uses of EWPs began in 2012 (RANFA et al., 2013) and continued in 2013, 2014 and 2015. With respect to data collected in 2012, information relative to the aforementioned species has been integrated to include food use categories, taste perception and other uses. Furthermore 55 new species have been indicated.

Ethnobotanical information was collected by means of standard ethnobotanical tools (ALEXIADES, 1996), through 881 open anonymous and face-to-face interviews. The 300 informants were represented by 180 females and 120 males, aged between 45 and 80 years, of which only 10 informants were under 55 years of age. Each informant, chosen at random, filled in more than one form and supplied information on 2-3, and in some cases 3-4, wild plant species, including local name, places of collection, period of collection, part(s) used, categories used, folk medicinal uses, taste perception and knowledge of particular anecdotes and recipes. For the data in the manuscript, the local and national guidelines have been used and appropriate permission for the study were requested. Regarding local names, the informants indicated the names commonly used in their own areas. However, only the informants over 65 years of age supplied typically local names because mainly this group still conserves this know-



Fig. 2: Exhibition of wild plants: field work to collect and identify wild plants, Spello, during the 'Subasio con gusto' event (a); wild edible plants on sale in a local market: 'raonzoli' (*Campanula rapunculus* L.) (b); common edible wild plants in the Umbria region, for example 'caccialepre' [*Reichardia picroides* (L.) Roth] (c), 'papavero' (*Papaver rhoeas* L.) (d) and 'borragine' (*Borago officinalis* L.) (e); pesto made with wild edible greens (f).

ledge, while the others gave more widely-known names which were similar, if not identical, to the Italian scientific names, probably due to the large amount of information available through various channels (i.e. the internet, many thematic books, etc). The voucher specimens collected have been deposited in the Plant Bioresources for the Environment Laboratory of Civil and Environmental Engineering Department, University of Perugia, Italy. These samples constitute the voucher specimens used in this research, and the herbarium will be enriched and extended over time with the addition of further species identified by future informants.

Successively, the International Plant Names Index (<http://www.ipni.org/>) was consulted to verify the accepted nomenclature for each species.

Two indices were calculated for data analysis: the *Relative Frequency of Citation (RFC)* (TARDÍO and PARDO-DE-SANTAYANA, 2008) and the *Relative Importance Index (RII)* (PARDO-DE-SANTAYANA, 2003; TARDÍO and PARDO-DE-SANTAYANA, 2008). The *Relative Frequency of Citation (RFC)* is obtained by dividing the number of informants who mention the use of the species which correspond to the frequency of citation (FC) by the total number of informants participating in the investigation (N) (eq. 1).

$$RFC_s = \frac{FC_s}{N} \quad (1)$$

where FC is the frequency of citation of the species, that is, the number of informants who cited that species, and N is the total number of informants who participated in the study. This index varies from 0 if the species was not cited to 1 if the species was cited by all informants.

The *Relative Importance Index (RII)* regards both the number of informants and the number of uses. In this case only food use was taken into consideration because the informants cited it most frequently (eq. 2):

$$RI_s = \frac{RFC_{s(max)} + RN_f U_{s(max)}}{2} \quad (2)$$

where $RFC_{s(max)}$ is the relationship between the frequency of citation of a given species (FC_s) divided by the maximum number of informants citing any species and $RN_f U_{s(max)}$ is the relationship between number of food uses (NfU) given for that species by the total number of food uses given for all species. A correlation analysis of the two indices was then carried out using Pearson's correlation Index (r) which represents a measure of the strength of the linear relationship between two variables.

Results

A total of 100 uses for EWP (Tab. 1) was documented.

All species belong to 23 botanical families, most frequently represented by Asteraceae (33%), followed by Brassicaceae (17%) and Lamiaceae (11%).

Part(s) used

Tab. 2 shows the percentages of part(s) used. Leaves are mainly eaten when young and tender as a raw vegetable or cooked in traditional dishes, for example as a filling for ravioli or in savoury pies. *Lepidium latifolium* leaves are used as mustard or pepper. *Mentha aquatica*, *Mentha pulegium*, *Mentha suaveolens*, *Origanum vulgare* and *Origanum majorana* leaves are used for infusions or dried and used to season meat and fish.

Bellis perennis, *Borago officinalis*, *Calendula arvensis*, *Campanula rapunculus*, *Viola odorata* flowers or inflorescences are eaten raw in salads, used to make jam or else candied. *Ranunculus ficaria*, *Urospermum dalechampii* and *Taraxacum officinale* flower buds are used in place of capers. *Smilax aspera* flowers are eaten in salads. Young shoots are eaten raw or boiled; *Melissa officinalis* shoots are used in alcoholic beverages, *Smilax aspera* shoots are preserved in oil or pickled, while *Rubus ulmifolius* shoots are used like asparagus in omelettes.

Chenopodium album, *Alliaria petiolata* and *Diplotaxis tenuifolia* are all eaten; *Foeniculum vulgare* seeds are used in alcoholic beverages, *Papaver rhoeas* seeds are added to bread and cookies, and *Sinapis alba* seeds are used to make mustard.

In 5% of the plants the stems are eaten, especially in *Brassica nigra* and in *Foeniculum vulgare* in which stems are eaten for their refreshing properties.

In some species the roots are roasted as a coffee substitute (i.e.: *Chondrilla juncea*, *Cichorium intybus*, *Reichardia picroides*, *Sonchus* spp., *Taraxacum officinale*). *Muscari comosum* bulbs are boiled, preserved in oil or pickled. *Ragadiolus stellatus* rhizomes are also eaten.

Food use categories

The most frequent method is boiling (B) to produce 'cooked greens' (Tab. 2) which are then seasoned with oil, salt and lemon juice, the most commonly used species being *Sonchus* spp., *Cichorium intybus*, *Crepis* spp., *Rumex* spp. and *Urospermum dalechampii*. About 28% of EWPs are eaten raw (R) in mixed-leaf salads where the sweeter herbs such as *Plantago lanceolata* and *Borago officinalis* mitigate the bitterness of *Cichorium intybus*, *Taraxacum officinale* and *Helminthotheca echioides*. In raw salads *Sanguisorba minor*, *Campanula rapunculus*, *Tordylium apulum*, *Reichardia picroides*, *Daucus carota*, and *Capsella bursa-pastoris* are indicated as being very tasty. About 12% of the species are used in vegetable soups (VS), such as *Achillea millefolium*, *Arctium lappa*, *Cardamine hirsuta* and *Foeniculum vulgare*.

11% are fried in fat, with or without beaten eggs ("frittata") (F), for example *Asparagus acutifolius*, *Clematis vitalba*, *Calamintha nepeta*, *Humulus lupulus* and *Sonchus aspera*.

About 6% are used as a filling in ravioli or savoury pies (FIL) especially *Borago officinalis* and *Urtica dioica*, and 2% in risotto such as *Silene vulgaris*, *Allium* spp. and *Diplotaxis muralis*.

Some species are used in alcoholic beverages (AB). For example, *Achillea millefolium* seeds are placed in wine barrels to improve wine preservation.

Other uses included, for example, *Allium neapolitanum* used to make repellents for moths, beetles and other insects, dried *Calendula arvensis* petals are used to aromatize wine, which after being left in the sun for ten days becomes excellent vinegar. *Clematis vitalba* roots are smoked, *Parietaria officinalis* leaves are used to clean wine flasks, while *Taraxacum officinale* leaves are used in infusions and the flowers used to make jam. Details are shown in Tab. 2.

Taste perception

The EWPs with a bitter taste were *Urospermum dalechampii*, *Clematis vitalba*, *Cichorium intybus*, *Crepis* spp. and *Taraxacum officinale*. Many of the informants stated that flavor depends greatly on when the plants are collected, and that they are less bitter before flowering. EWPs with a spicy taste are *Sanguisorba minor* that tastes like fresh walnuts, *Tordylium apulum* that tastes a little like cucumber, and then there are the aromatic plants such as *Origanum* spp. and *Thymus* spp. *Campanula rapunculus* roots are sweet while the leaves are rather bitter, *Tragopogon pratensis* leaves are bitter while the root tastes like walnuts. The EWPs which are reputed to have a sweet taste are *Lactuca* spp., *Malva sylvestris*, *Papaver rhoeas*, *Ragadiolus stellatus*, *Silene vulgaris* and *Sonchus* spp.

Local dishes

The informants provided various traditional recipes. In particular, a popular springtime salad consists of 'caccialepre' (*Reichardia picroides*) leaves which are dressed with heated olive oil, salted an-

Tab. 1: List of the edible wild plants cited in the study area.

Scientific names	Family	Local names	Part(s) used	Food use categories*	Taste perception	Folk medicinal uses	Other uses	Number of citations
1 <i>Achillea millefolium</i> L.	Asteraceae	achillea, millefoglie	leaves	AB, R, VS	bitter	boiled leaves applied to cuts and wounds for healing	seeds tied in a cotton bag placed in wine barrels to improve wine preservation	15
2 <i>Ajuga reptans</i> L.	Lamiaceae	bugula, consolida, erba di S. Lorenzo, erba mora	shoots, young leaves	B, R	bitter			5
3 <i>Alliaria petiolata</i> Cavara & Grande	Brassicaceae	alliarina comune, erba aglima	seeds, young leaves	B, R, VS, Oth.	tasty	leaves applied to gums to treat gingivitis, seeds stimulate appetite	seeds used in the same way as mustard seeds	3
4 <i>Allium neapolitanum</i> Cirillo	Alliaceae	aglio bianco, aglio napoletano	leaves, young bulbs	B, R, F, VS	spicy		used as an insect and moth repellent	13
5 <i>Allium triquetrum</i> L.	Alliaceae	aglio angolare, aglio trigono, aglio selvatico	leaves, young bulbs	B, R, F, VS	spicy	reduces hypertension, antibiotic, disinfectant, reduces glycemia, cardiostimulant		5
6 <i>Allium ursinum</i> L.	Alliaceae	aglio orsino	leaves, young bulbs	B, R, F, VS	spicy	fresh leaves applied to the skin act as a rubifacient, pounded and used as a poultice to soothe abscesses and boils		6
7 <i>Arctium lappa</i> L.	Asteraceae	bardana maggiore, lappa bardana, lappola	leaves, rhizomes, stems, young shoots	B, R, VS	bitter	infusion stimulates hair growth		10
8 <i>Asparagus acutifolius</i> L.	Liliaceae	asparago, asparago dei boschi	turiones	B, F, R	bitter			25
9 <i>Barbarea vulgaris</i> R. Br.	Brassicaceae	erba di S. Barbara comune, rucola palustre	flowers, leaves, shoots	B, VS	spicy			3
10 <i>Bellis perennis</i> L.	Asteraceae	margheritina, pratolina	flowers, leaves	B, R, Oth.	bitter	leaves applied to the gums to soothe small cuts, chewed to refresh the mouth	flowers used for ludic activities 'loves me, loves me not'; leaves used as a tea surrogate	25
11 <i>Borago officinalis</i> L.	Borraginaceae	borragine, boragine	flowers, leaves	B, F, FL., R	sweet		flowers macerated in wine for a week make an excellent body-cleansing drink; flowers macerated in white vinegar turn blue; flowers frozen in ice cubes	40
12 <i>Brassica nigra</i> (L.) W.D.J. Koch	Brassicaceae	cavolo senape-nera, rapa selvatica	flowers, leaves, seeds, stems	B, F, R, Oth.	tasty	seeds in the water for foot baths		5
13 <i>Bunias erucago</i> L.	Brassicaceae	casellora, casellore comune, cassella, coteccacchie, navone selvatico	leaves, young shoots	B, R	spicy	leaves are diuretic		8

14	<i>Calamintha nepeta</i> (L.) Savi	Lamiaceae	calamento, mentuccia comune, nepetella selvatica, poleggio selvatico	flowers, young leaves	B, F	tasty	stimulates bile production, stimulates appetite, leaves rubbed on insect bites		20
15	<i>Calendula arvensis</i> L.	Asteraceae	calendula dei campi, fiorencio selvatico	flowers, leaves	B, R	sweet	leaves heal wounds	dried petals give aroma to wine which, after ten days in the sun, becomes an excellent vinegar	10
16	<i>Campanula rapunculus</i> L.	Campanulaceae	raponzolo, ramponzolo, raperonzolo, rapunzoli	flowers, leaves, roots or rootstocks, young shoots	B, R	root sweet, leaves bitter	used to treat inflammation of the oral cavity, leaves used to treat warts, infusion of flowers used as a gargle		25
17	<i>Capsella bursa-pastoris</i> (L.) Medik. subsp. <i>bursa-pastoris</i>	Brassicaceae	borsa di pastore, borsacchina, erba borsa, erba ciocca, erba raperina	leaves, young shoots	B, F, R, VS	tasty			20
18	<i>Cardamine hirsuta</i> L.	Brassicaceae	billeri primaticcio, cardamine	flowers, leaves	B, R, VS	tasty			2
19	<i>Carlina acaulis</i> L. s.l.	Asteraceae	carciofo di montagna, cardo di san Pellegrino	flower heads	B, R	bitter			3
20	<i>Centranthus ruber</i> (L.) DC. subsp. <i>ruber</i>	Valerianaceae	barba di Giove, camarezza comune, saonina, valeriana rossa	young leaves	B, R, VS	bitter			5
21	<i>Chenopodium album</i> L.	Chenopodiaceae	abitillo, farinaccio, farinello comune	leaves, young shoots	B, R, Fil., VS	bitter			5
22	<i>Chenopodium bonus-henricus</i> L.	Chenopodiaceae	farinello buon-enrico, farinello tutta buona	leaves, young shoots	B, R	bitter			5
23	<i>Chondrilla juncea</i> L.	Asteraceae	erba pizzuta, ginestrella, lattajola, mastri, piole, pioletta	leaves, young shoots	B, F, R, Oth.	tasty	fresh leaves applied directly heal wounds, cuts and ulcers, acne and eczema		15
24	<i>Cichorium intybus</i> L.	Asteraceae	cicoria, cicorietta, radicchio selvatico, radici amare	leaves, leaves stalks, root, young shoots	B, Fil., R, Oth.	bitter		toasted root substitutes coffee	30
25	<i>Cirsium arvense</i> (L.) Scop.	Asteraceae	cardo campestre, scardaccione, stoppione, stoppolone	leaves, young shoots	B, F, VS	bitter			5
26	<i>Clematis vitalba</i> L.	Ranunculaceae	clematide, vitabbia	young shoots	F, Ris., R, VS	bitter		roots smoked in the same way as tobacco	38
27	<i>Crepis sancta</i> (L.) Bab. subsp. <i>sancta</i>	Asteraceae	crepide, dolcetta, radicehiella di terrasanta	young leaves	B, R	bitter			10
28	<i>Crepis vesicaria</i> L.	Asteraceae	cota, crepide vescicosa, radicehiella vescicosa, radicehiello scollato	young leaves	B, R	bitter			3
29	<i>Daucus carota</i> L.	Apiaceae	capo bianco, carota selvatica, gallinacci, pasticciona	roots, young leaves	B, R	sweet		treatment for bronchitis in horses, the infusion is a strong diuretic	10

30	<i>Diplotaxis erucoides</i> (L.) DC. subsp. <i>erucoides</i>	Brassicaceae	maraiuole, ruchetta violacea, ruchettone	young leaves	B, R	tasty			10
31	<i>Diplotaxis muralis</i> (L.) DC.	Brassicaceae	ruchetta dei muri	young leaves	R	tasty			5
32	<i>Diplotaxis tenuifolia</i> (L.) DC.	Brassicaceae	erba diavola, rucola, rucoletta, rucoletta di campo, ruchetta selvatica	leaves, seeds	R, VS, Oth.	tasty		seeds used in the same way as mustard	10
33	<i>Echium vulgare</i> L.	Boraginaceae	erba viperina, viperina azzurra	leaves	B	sweet		infusion of seeds stimulates lactation	3
34	<i>Eruca sativa</i> Miller	Brassicaceae	rucola comune	leaves	B, R	tasty			5
35	<i>Foeniculum vulgare</i> Mill.	Apiaceae	finocchio comune	leaves, seeds, stems, young shoots	B, F, VS, Oth.	tasty		infusion calms hiccoughs	18
36	<i>Geum urbanum</i> L.	Rosaceae	cariofilata comune, garofanino	young leaves	R, Fil., VS	bitter			3
37	<i>Helminthotheca echitoides</i> (L.) Holub	Asteraceae	aspraggine volgare, erba brusca, erba bruscia, spraggine	leaves	B	bitter			3
38	<i>Humulus lupulus</i> L.	Cannabaceae	bruscandoli, luppolo comune	young shoots	B, F, Ris.	bitter			10
39	<i>Hyoseris radiata</i> L. subsp. <i>radiata</i>	Asteraceae	radicchio selvatico, trinette, trinciatella	young leaves	B, R	bitter			3
40	<i>Hypochaeris achyrophorus</i> L.	Asteraceae	costolina annuale	young leaves	B, R	bitter			4
41	<i>Hypochaeris radicata</i> L.	Asteraceae	costole d'asino, costolina giuncolina, ingrassaporcei, piattello	young leaves	B, FIL., R	tasty		roots fed to pigs	5
42	<i>Knautia arvensis</i> (L.) Coult.	Dipsacaceae	ambretta comune, vedovella, vedovina	leaves	R, VS	bitter			7
43	<i>Lactuca muralis</i> (L.) Gaertn.	Asteraceae	lattuga dei boschi	young leaves	R, VS	sweet			3
44	<i>Lactuca perennis</i> L. subsp. <i>perennis</i>	Asteraceae	lattuga perenne, lattuga rupestre	young leaves	B, R	bitter			3
45	<i>Lactuca serriola</i> L.	Asteraceae	erba bussola, lattona, lattuga selvatica, lattughella	leaves	B, R	sweet			5
46	<i>Lamium purpureum</i> L.	Lamiaceae	falsa ortica purpurea, ortica che non punge	young shoots	F, R, VS	sweet			6
47	<i>Lapsana communis</i> L. subsp. <i>communis</i>	Asteraceae	cavolo selvatico, erba delle mammelle, grespignolo amaro	young leaves	B, FIL.	bitter			2
48	<i>Leontodon autumnalis</i> L.	Asteraceae	dente di leone autunnale, dente di leone ramoso	young leaves	B, R, VS	bitter			2

49	<i>Leontodon crispus</i> Vill. subsp. <i>crispus</i>	Asteraceae	dente di leone crespo, spizzicapolli	young leaves	B, R	bitter			3
50	<i>Leontodon hispidus</i> L.	Asteraceae	dente di leone comune	young leaves	B, R	bitter			3
51	<i>Lepidium draba</i> L. subsp. <i>draba</i>	Brassicaceae	cocola, lattona	seeds, young leaves	B, F, VS, Oth.	spicy		spicy seeds as a substitute for pepper	3
52	<i>Lepidium latifolium</i> L.	Brassicaceae	lepidio latifoglio, mostardina, peperella	leaves, young shoots	R, Oth.	spicy		slices of the bulb applied to the temples soothe headache	3
53	<i>Malva sylvestris</i> L. subsp. <i>sylvestris</i>	Malvaceae	malva selvatica	flowers, leaves, young shoots	F, R, Ris, VS	sweet		infusions for the relief of heartburn and indigestion	15
54	<i>Melissa officinalis</i> L.	Lamiaceae	cedronella, citronella, erba limona, melissa vera	leaves, shoots	AB, F, R, Ris.	tasty			10
55	<i>Mentha aquatica</i> L. subsp. <i>aquatica</i>	Lamiaceae	menta d'acqua, mentastro d'acqua	flowers, leaves, stems	AB, F, Oth.	tasty			5
56	<i>Mentha pulegium</i> L. subsp. <i>pulegium</i>	Lamiaceae	menta poggio	leaves, stems	R, Oth.	tasty			3
57	<i>Mentha suaveolens</i> Ehrh.	Lamiaceae	menta a foglie rotonde, menta selvatica	leaves	R, Oth.	tasty			3
58	<i>Muscari comosum</i> (L.) Mill.	Liliaceae	cipollaccio, lampagione, lampascione, muscari selvatico	bulbs	B, Oth.	bitter			5
59	<i>Myagrum perfoliatum</i> L.	Brassicaceae	miagro liscio	stems, young leaves	B, FIL., R	tasty			5
60	<i>Nasturtium officinale</i> R. Br. subsp. <i>officinale</i>	Brassicaceae	crescione d'acqua, crescione delle fontane, crescione di sorgente	flowers, leaves, young stems	R	tasty			10
61	<i>Origanum majorana</i> L.	Lamiaceae	amarico, erba persa, maggiorana, origano maggiorana, persia	flowers, leaves	R, VS, F, Oth.	tasty		soothes earache	6
62	<i>Origanum vulgare</i> L. subsp. <i>vulgare</i>	Lamiaceae	acciughero, erba acciuga, erba rossa, maggiorana pelosa, origano comune, regamo	flowers, leaves	R, VS, F, Oth.	tasty		origano-flavoured wine	12
63	<i>Papaver rhoeas</i> L. subsp. <i>rhoeas</i>	Papaveraceae	papavero comune, patatina, rosolaccio	seeds, young leaves, young shoots	B, FIL., R, VS, Oth.	sweet		Pods used by children as 'stamps'	15
64	<i>Parietaria officinalis</i> L.	Urticaceae	vetriola comune	young leaves, young shoots	B, VS	sweet		leaves used to wash glass bottles	10
65	<i>Pastinaca sativa</i> L.	Apiaceae	pastinaca comune	roots, young leaves	B, R	bitter			10
66	<i>Petasites hybridus</i> (L.) P. Gaertn., B. Meyer et Scherb. subsp. <i>hybridus</i>	Asteraceae	farfaraccio maggiore	leaves stalks	B, FIL., R	bitter		infusion of leaves calms coughs	5
67	<i>Picris hieracioides</i> L.	Asteraceae	aspraggine comune, erba brusca	young leaves	B, R	bitter			10

68	<i>Plantago coronopus</i> L. subsp. <i>coronopus</i>	Plantagina, ceae	barba del cappuccino, barba del frate, coronopo, erba saetta, erba stella	young leaves	B, F	bitter	decoction of roots as an antidote to viper bite	8
69	<i>Plantago lanceolata</i> L.	Plantagina, ceae	lanciutoia, lingua di cane, piantaggine minore, plantago	young leaves	B, FIL., R	bitter		9
70	<i>Portulaca oleracea</i> L.	Portulacaceae	erba grassa, porcacchia, porcellana comune	young leaves	B, R	bitter		5
71	<i>Ranunculus ficaria</i> L.	Ranunculaceae	celidonia minore, erba fava, ficaria, ranuncolo flavagello	bulbs, flowers, young leaves	B, R, Oth.	bitter	leaves chewed to clean teeth and refresh the mouth	8
72	<i>Raphanus raphanistrum</i> L. s.l.	Brassicaceae	rafano, ramolaccio selvatico, rapastello, ravanello selvatico	leaves, roots, stems	B, FIL., R	tasty	increases bile secretion	6
73	<i>Reichardia picroides</i> (L.) Roth	Asteraceae	caccialepre, crepatera, scaccialepre, grattalingua	flowers, leaves, roots	B, R, Oth.	bitter		40
74	<i>Rhagadiolus stellatus</i> (L.) Gaertn.	Asteraceae	erba cornetta, radicchio stellato, raggiolo, raggiolo	young leaves	B, R	sweet		5
75	<i>Rubus ulmifolius</i> Schott.	Rosaceae	rogo, rovo comune	young shoots	B, F	bitter		5
76	<i>Rumex acetosa</i> L. subsp. <i>acetosa</i>	Polygonaceae	acetosa, erba brusca, romice acetosa	young leaves	F, FIL., VS	bitter		5
77	<i>Rumex acetosella</i> L.	Polygonaceae	acetosella, romice acetosella	young leaves	B, FIL., R, VS	bitter		2
78	<i>Rumex crispus</i> L.	Polygonaceae	romice crespo	leaves	B, FIL., VS	bitter		6
79	<i>Ruscus aculeatus</i> L.	Liliaceae	piccasorci, pungitopo, ruscolo	turiones	B, F, R	bitter		1
80	<i>Salvia pratensis</i> L. subsp. <i>pratensis</i>	Lamiaceae	chiarella, salvia dei prati, salvia pratense	leaves	B, F, VS	bitter		3
81	<i>Sanguisorba minor</i> Scop.	Rosaceae	bibinella, bipinella, meloncello, pimpinella, salvastrella minore, vellutino rosso	leaves, young shoots	R, VS	tasty		20
82	<i>Scandix pecten-veneris</i> L.	Apiaceae	acicula minore, erba spilletta	leaves, young stems	R	bitter		5
83	<i>Silene vulgaris</i> (Moench) Garcke	Caryophyllaceae	bubbolini, concigli, erba del cucco, strigoli, stricoli	leaves, young shoots	F, Ris., R, VS	sweet, tasty	flowers pressed on the skin to make small 'explosions'	6
84	<i>Sinapis alba</i> L.	Brassicaceae	senape bianca	seeds, young leaves	B, Oth., VS	tasty		4
85	<i>Sinapis arvensis</i> L. subsp. <i>arvensis</i>	Brassicaceae	senape selvatica	stems, young leaves	B, VS, FIL.	tasty	oil extracted from the seeds used in lamps	3

86	<i>Smilax aspera</i> L.	Liliaceae	edera spinosa, salsa paesana, salasapariglia, stracciabraghe	leaves, young shoots	B, F, R, Oth.	bitter			3
87	<i>Sonchus asper</i> (L.) Hill	Asteraceae	crespigno spinoso, crespignola	leaves, roots, young shoots	B, FIL., R, Oth., VS	sweet	insect bites or as a remedy for mouth ulcers		15
88	<i>Sonchus oleraceus</i> L.	Asteraceae	gruspigno, cruspigno, crespigno, crespigno	leaves, roots, young shoots	B, FIL., R, Oth., VS	sweet		root roasted as a coffee surrogate	25
89	<i>Stellaria media</i> (L.) Vill.	Caryophyllaceae	centocchio comune, centocchio, erba gallinella	leaves, young shoots	B, F, R	sweet			5
90	<i>Sulla coronaria</i> (L.) Medik.	Fabaceae	guardarubio, sulla comune	flowers, stems, young leaves	B, F, R	sweet	astrigent, reduces blood cholesterol		3
91	<i>Taraxacum officinale</i> (group)	Asteraceae	dente di leone, pisciacane, piscialletto, radiccio dei prati, soffione, volarina	flowers, leaves, roots	B, R, FIL., VS, Oth.	bitter		root roasted as a surrogate for coffee	20
92	<i>Thymus serpyllum</i> s.l.	Lamiaceae	pepolino, serpillio, serpillino, timo serpillio	leaves	R, VS, Oth.	tasty			6
93	<i>Tordylium apulum</i> L.	Apiaceae	ombrellini di prato, ombrellini pugliesi, pimpinellone, saporitella	leaves	B, R	sweet, tasty	infusion reduces hair loss		12
94	<i>Tragopogon pratensis</i> L.	Asteraceae	baciapreti, barba di becco comune, barba di prete, salsefica	roots, stems, young leaves	B, F, R, Oth.	bitter	cleanses the body, calms coughs, root contains insulin, is suitable for diabetics	water distilled from the plant used to 'dry clean' leather	4
95	<i>Tragopogon porrifolius</i> L.	Asteraceae	barba di becco violetta, raperonzolo selvatico, salsefica	roots, young leaves	B, R	bitter			2
96	<i>Tussilago farfara</i> L.	Asteraceae	farfaraccio, farfuglio, piè d'asino, uigna d'asino	leaves	B, R	bitter	used to calm coughs		2
97	<i>Urospermum dalechampii</i> (L.) F.W. Schmidt	Asteraceae	amarago, cicoria matta, cotecacchia, grugno, grugnole, lattugaccio	flowers, leaves, roots	B, FIL., R	bitter		buds used in the same way as capers	15
98	<i>Urtica dioica</i> L. subsp. <i>dioica</i>	Urticaceae	ortica, urtica	leaves, young shoots	B, F, FIL., Ris.	sweet		run hands through hair before touching the plant to avoid pricks and stings	6
99	<i>Veronica beccabunga</i> L.	Scrophulariaceae	erba grassa, veronica beccabunga	young leaves, young shoots	R	bitter			6
100	<i>Viola odorata</i> L.	Violaceae	viola mammola	flowers	R, Oth.	sweet			4
Total									881

*Abbreviation food uses: AB: alcoholic beverages; B: boiled; F: fried in fat, without or with beaten eggs ("Frittata"); FIL.: ravioli filling or savoury pie filling; Oth: Other (used as mustard, pepper, seed in bread and cookies, pickled or in oil, root roasted as a coffee substitute, dried, infusion); Ris: risotto; R: raw; VS: vegetable soups.

chovies and vinegar and then tossed by hand to mix the condiments well. Risotto with 'strigoli' (*Silene vulgaris*) is also popular, while 'vitabbia' (*Clematis vitalba*), 'asparago' (*Asparagus acutifolius*) and 'pungitopo' or 'piccasorci' (*Ruscus aculeatus*) are used in omelettes. Another local traditional dish is a flatbread cooked on a hot stone slab (torta al testo), then split open and filled with cooked greens (called 'erba cotta') made up of a mixture of several species, including 'crespigno' (*Sonchus* spp.), 'cicoria' (*Cichorium intybus*) and 'grugno' (*Urospermum dalechampii*).

Folk medicinal uses

Twenty-seven plant species were also mentioned as having therapeutic effects (see Tab. 1). *Achillea millefolium*, *Bellis perennis* and *Calendula arvensis* leaves were cited as being used to heal cuts; *Calendula arvensis* leaves are particularly effective in the treatment of bedsores, while *Chondrilla juncea* is used to treat ulcers, acne and eczema.

Alliaria petiolata leaves are used to soothe inflammation of the gums and mouth, *Bellis perennis* leaves are chewed to refresh the mouth and an infusion of *Cichorium intybus* acts as a powerful laxative and diuretic. Fresh *Allium ursinum* leaves are applied to the skin as a rubefacient or pounded and used as a cataplasm to soothe abscesses and boils. An infusion of *Arctium lappa* was reported to favor hair regrowth.

Ballota nigra leaves are used for footbaths, *Campanula rapunculus* leaves soothe inflammation of the oral cavity and reduce warts, while an infusion of the flowers is used as a gargle. Infusions of *Malva sylvestris* were indicated for the relief of heartburn and indigestion. *Daucus carota* is used to treat bronchitis in horses, while the infusion acts as a strong diuretic.

An infusion of *Echium vulgare* seeds stimulate milk production in lactating women, while an infusion of *Foeniculum vulgare* seeds calm hiccups and aid digestion. *Lactuca* spp. were indicated as having sedative properties, indeed in the past the latex was extracted (in particular from *Lactuca virosa*) and made into small balls to make 'lattucario,' similar to chewing gum, which was then given to hyperactive children.

Sliced *Lepidium latifolium* bulbs are applied to the temples to relieve headache. Infusions of *Nasturtium officinale*, *Mentha pulegium*, *Petasites hybridus* and *Tussilago farfara* are used to calm coughs and *Origanum majorana* is used to alleviate earache. A decoction of *Plantago coronopus* roots is used as an antidote for viper bites. *Ranunculus ficaria* leaves are chewed to clean teeth and refresh the mouth, and *Sonchus asper* is employed against insect bites or as a remedy for mouth ulcers. *Tordylium apulum* and *Urtica dioica* infusions reduce hair loss and brighten natural hair color.

Calamintha nepeta leaves are rubbed on insect bites. *Borago officinalis* flowers macerated in wine for a week produce an excellent purifying and diuretic beverage.

Other uses

Various other uses were also reported. Small cotton bags containing *Achillea millefolium* seeds are put into wine barrels to improve wine preservation. *Alliaria petiolata* seeds are used to make mustard, while *Lepidium draba* seeds are used like pepper. An infusion of *Bellis perennis* leaves produces a drink similar to tea, and the leaves left to macerate in vinegar give it a bluish tinge. The flowers are also added to ice cubes. Dried *Calendula arvensis* petals are used to aromatize wine, which, after having been left in the sun for ten days, becomes excellent vinegar. In the past large pieces of fresh *Clematis vitalba* vine were dried and then smoked like cigarettes. *Parietaria officinalis* leaves were used to wash glass bottles.

Some ludic uses were cited: *Bellis perennis* flowers were used to play

'He loves me, he loves me not', and children used *Papaver rhoeas* seed pods as stamps. *Silene vulgaris* flowers were squeezed to 'explode' on the skin like tiny bombs.

Tab. 2: EWP's studied: percentages of parts used, food use categories and taste perception.

Part(s) used	Leaves (49%), shoots (17%), flowers and inflorescences (10%), stems (7%), roots (6%), seeds (4%) and bulbs (3%)
Food use categories	Boiled (31%), raw (28%), vegetable soups (12%), fried without or with eggs (11%), filling (ravioli or savoury pie) (6%), risotto (2%), alcoholic beverage (1%), other (9%)
Taste perception	Bitter (48%), tasty (27%), sweet (25%)

Discussion

The comparison of the present study with studies other researches carried out in the Mediterranean area shows that the majority of the EWP's used for human consumption belong to the Asteraceae family as they are considered to be particularly appetizing and above all widely-known (FORBES, 1976; DELLA et al., 2006; DOGAN, 2012).

As other studies (GHIRARDINI et al., 2007) have also shown, the data demonstrate that collecting and consuming EWP's is still an important local activity. Moreover, many species are also known and collected for their medicinal properties (e.g. GUARRERA et al., 2005; PASSALACQUA et al., 2007; GUARRERA and SAVO, 2013). In Central Italy in particular ethnobotanical knowledge is very much alive (GUARRERA and LEPORATTI, 2007), while nutraceutical properties have been studied extensively (RANFA et al., 2014, 2015; MAURIZI et al., 2015).

With reference to the informants, there was a greater number of women, who provided more details than the male informants, probably because collecting and cooking wild plants is almost exclusively a female occupation, and it is them who possess the greatest knowledge of EWP's, in agreement with other studies (FORBES, 1976; RANFA et al., 2014; SANSANELLI and TASSONI, 2014). Some studies have shown a greater male presence, but this can be explained by the fact that the questionnaires were distributed in places such as cafes and social clubs where mainly men gather. Access to private homes, where women tend to spend the whole day, is usually more difficult, as the women themselves are diffident and shy of strangers (FORBES, 1976).

The data collected confirm that species such as *Cichorium intybus*, *Sonchus asper* and *Borago officinalis* are among the most widely known, as has also been reported in other studies (SANSANELLI and TASSONI, 2014). The parts most frequently used are the leaves (49%), see for example SANSANELLI and TASSONI (2014). In reference to food uses, the species are most commonly consumed boiled or eaten raw (RANFA et al., 2014; BODESMO et al., 2015). The raw consumption of these species is predominant in some parts of the Mediterranean area such as in the Turkish Aegean region and in Greece, where they are seasoned with olive oil or yoghurt (DELLA et al., 2006; DOGAN, 2012).

Regarding taste perception, 48% of the EWP's were indicated as having a bitter taste (see Tab. 2), the most bitter ones were *Urospermum dalechampii*, *Clematis vitalba*, *Cichorium intybus*, *Crepis* spp. and *Taraxacum officinale*, as also indicated by SANSANELLI and TASSONI (2014). GHIRARDINI et al. (2014) state that *Taraxacum officinale* (dandelion) also known as 'pisciacane' or 'piscialetto', is one of the most bitter species, and its flavor is particularly appreciated in Central and Southern Italy.

The data obtained in this research show that not only food, but also

folk medicinal uses, are widespread, already shown by other studies carried out in Central Italy, in Latium and the Abruzzo region in particular (GUARRERA et al., 2005).

Some species listed in Tab. 1 have also been recorded in other studies, for example *Bellis perennis* and *Calendula arvensis* leaves used to heal cuts, confirmed by other researchers (PASSALACQUA et al., 2007), *Cichorium intybus* used as a powerful laxative and diuretic, as reported in other studies (LENTINI and RAIMONDO, 1990; PASSALACQUA et al., 2007). Infusions of *Malva sylvestris* were indicated for the relief of heartburn and indigestion. Use in gastrointestinal disorders has been reported by other authors (DOGAN and UGULU, 2013; LETO et al., 2013). *Daucus carota* is used to treat bronchitis in horses, while the infusion acts as a strong diuretic (LETO et al., 2013). Other studies have mentioned the hypnotic properties of *Lactuca* spp. (YAKOOT et al., 2011; GUARRERA and SAVO, 2013).

Urtica dioica was often indicated as one of the most widely-known species in Central Italy for the treatment of various ailments, with Herpes zoster in first position (UNCINI MANGANELLI et al., 2005).

Calamintha nepeta leaves are rubbed on insect bites (PASSALACQUA et al., 2007). *Borago officinalis* flowers macerated in wine for a week produced an excellent purifying and diuretic beverage (LETO et al., 2013).

With reference to the RFC, the most frequently cited and most frequently used species are *Borago officinalis*, *Reichardia picroides* (RFC=0.05), *Clematis vitalba* (RFC=0.04), *Asparagus acutifolius*, *Bellis perennis*, *Campanula rapunculoides*, *Cichorium intybus* and *Sonchus oleraceus* (RFC=0.03).

It has also been demonstrated that *Borago officinalis* is one of the most frequently cited and used species in both the Southern and the Northern Italian sites (GHIRARDINI et al., 2007).

On the basis of the RII calculation, *Borago officinalis* and *Scandix pecten-veneris* (RII=0.32), *Cichorium intybus* (RII=0.30), and *Sonchus oleraceus* (RII=0.29) are the species with the greatest number of food uses, and therefore the most versatile. The two indices calculated by the Pearson coefficient correlation (0.51) showed a positive correlation, thus confirming that the most frequently cited species corresponded to those having the greatest number of food uses. Details are shown in Tab. 3.

Conclusion

The study shows that in Central Italy, and in the Umbria region in particular, knowledge and use of EWP is still very much alive, not only in food use, but also for medicinal and ludic purposes. However this knowledge is principally in the hands of the elderly who rarely, and with great difficulty, manage to transmit it to the younger generations due to lack of interest on their part, as was pointed out by more than one informant.

As the FAO recognizes, nutrition and biodiversity converge towards a common objective of making uncontaminated food available within a policy of sustainable development, and in this context wild species play a key role in safe global nutrition (FAO, 2009). The economic aspect must not be underestimated, as EWPs, which are sold mainly in local markets, are included in the diet of a billion people worldwide. Regulated markets do not exist, so despite their nutrition value, EWPs are excluded from official statistics on economic values of natural resources although in many countries they represent an important supplement to income.

Furthermore a renewed interest in these species would stimulate the study of local flora and also contribute to disseminating knowledge, thus encouraging the conservation of local customs and traditions as well as deepening the understanding of local communities' attitudes towards, and management of, their own resources, particularly the use of plants as food or medicine. This would permit these same communities to continue to draw sustainable benefit from their local ecosystems.

Moreover the importance of biodiversity conservation is also a central issue in Pope Francis' Encyclical Letter 'Laudato si' on care for our common home, which says: "...but a sober look at our world shows that the degree of human intervention, often in the service of business interests and consumerism, is actually making our earth less rich and beautiful, ever more limited and grey, even as technological advances and consumer goods continue to abound limitlessly. We seem to think that we can substitute an irreplaceable and irretrievable beauty with something which we have created ourselves...." (Pope Francis, 2015).

Tab. 3: Synthesis of the most relevant data

Most bitter species	<i>Cichorium intybus</i> , <i>Clematis vitalba</i> , <i>Crepis</i> spp., <i>Taraxacum officinale</i> , <i>Urospermum dalechampii</i>	
Most frequently cited and frequently used species	<i>Asparagus acutifolius</i> , <i>Bellis perennis</i> , <i>Borago officinalis</i> , <i>Campanula rapunculoides</i> , <i>Cichorium intybus</i> , <i>Clematis vitalba</i> , <i>Reichardia picroides</i> , <i>Sonchus oleraceus</i>	
Species with the greatest number of food uses	<i>Borago officinalis</i> , <i>Cichorium intybus</i> , <i>Scandix pecten-veneris</i> , <i>Sonchus oleraceus</i>	
Species with most folk medicinal uses	<i>Bellis perennis</i> , <i>Calendula arvensis</i>	used to heal cuts
	<i>Borago officinalis</i>	flowers macerated in wine for a week produced an excellent purifying and diuretic beverage
	<i>Calamintha nepeta</i>	leaves rubbed on insect bites
	<i>Cichorium intybus</i>	a powerful laxative and diuretic
	<i>Daucus carota</i>	used to treat bronchitis in horses, while the infusion acts as a strong diuretic
	<i>Malva sylvestris</i>	indicated for the relief of heartburn and indigestion
	<i>Urtica dioica</i>	often indicated as one of the most widely-known species in Central Italy for the treatment of various ailments, with Herpes zoster in first position

Authors' contributions

MB wrote the manuscript and processed statistical data and analysis. MB and AR collected ethnobotanical data, conducted interviews and wrote up the results. Both authors read and approved the final manuscript.

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