

Article

# First contribution to the ethnobotanical knowledge in the Peloritani Mounts (NE Sicily)

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**Abstract:** This paper presents the results of an ethnobotanical survey carried out in the Peloritani Mounts (NE Sicily). This investigation aims to illustrate the first record known of the traditional uses of plants in this territory through the case study of a small rural suburb named Tipoldo (Messina). The data were collected from 20 informants over the age of 66, who were mainly farmers and shepherds, and were analyzed using two quantitative ethnobotanical indicators. For each plant was reported the Latin name, life form, vernacular name, parts used, ethnobotany category, claimed uses, status, and their relative indexes. Based on semi-structured interviews carried out between February 2017 and May 2018, a listing was compiled of 126 wild plants belonging to 51 families, the most predominant being Asteraceae (19 species) and Fabaceae (15 species). The most common ethnobotanical uses reported are medicinal (30%) and agropastoral use (19%). Among the preparation methods indicated, leaves (39%) were the most commonly used parts of the plants, while the species most mentioned in connection with ethnobotanical applied indexes were: *Crepis vesicaria*, *Dittrichia graveolens*, *Hypochaeris radicata*, *Salvia Rosmarinus* and *Clinopodium nepeta*. These practices are presently performed only by a few elderly people, who rely on plants solely for a few activities. Furthermore, ethnobotanical studies are fundamental to clear up the knowledge on the traditional plant uses that are still current in this part of Sicily, to preserve this cultural heritage for future generations.

**Keywords:** Ethnobotany; Medicinal Plant; Mediterranean Basin; Messina; Vascular Plants; Traditional Plant Uses; Wild Food Plants.

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## 1. Introduction

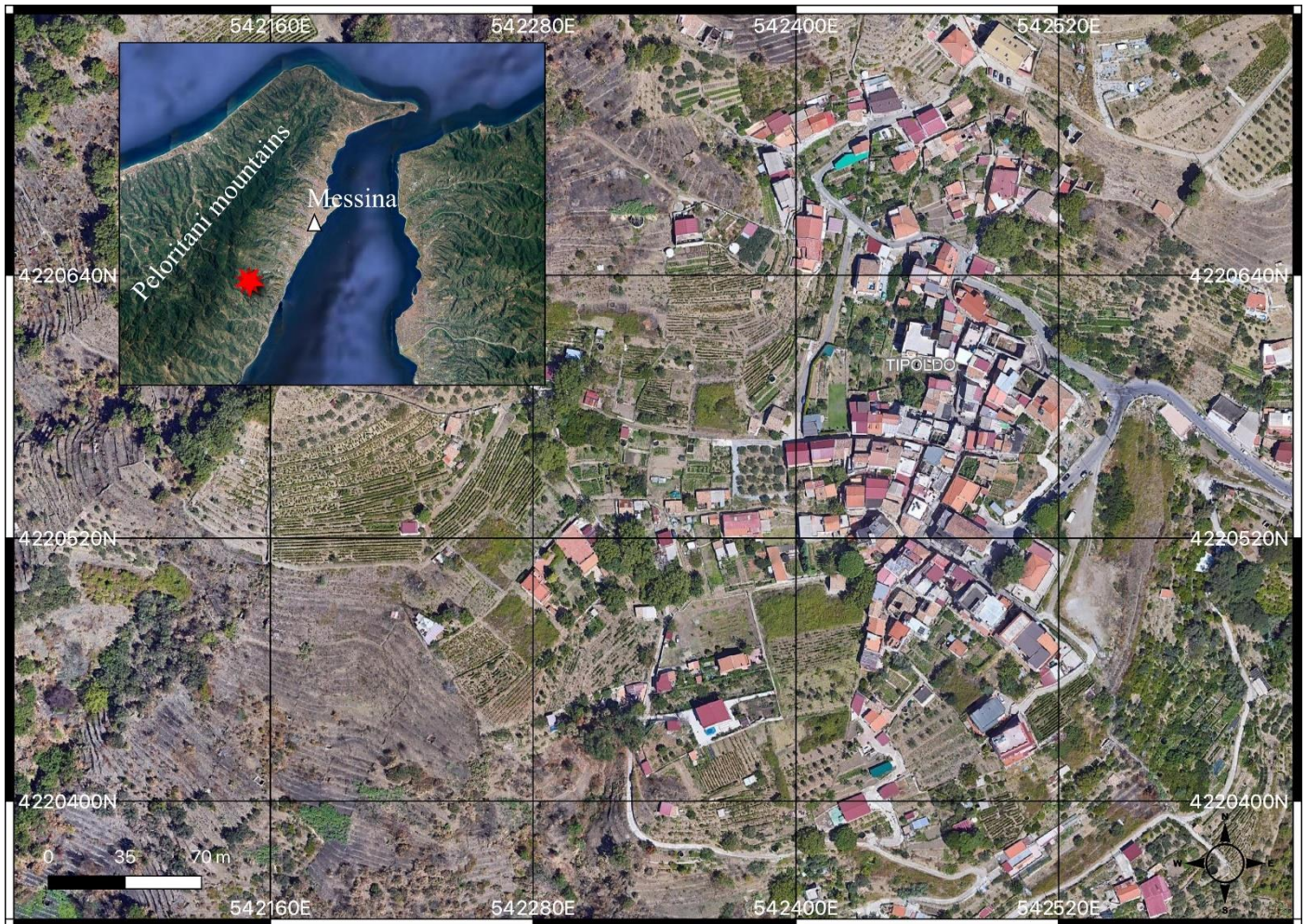
The term ethnobotany refers to the study of the relationships occurring between humans and plants of a place [1,2]. The use of wild plants, especially in medicine, has very ancient links with humans [3,4]. The earliest evidence of man's interest in plants dates to the prehistoric period. The remnants of several plants were found in a Neanderthal female's tomb in Iraq dated 50,000 years ago, and most of these plants are still used for medicinal purposes [5,6]. This relationship between humans and plants has been strengthened during history, and men started looking for plants to feed, heal, build, raise animals, do magic rituals, etc. Obviously, the most significant field in which plants are utilized, until now, is the medicinal one. In fact, about 13,000 plants are currently used in the therapeutic field all over the world. It should be noted that plants are at the base of every therapy only in countries where traditional medicine is still practiced (e.g., Africa

and Asia), whereas this is no longer the case for the ones that utilize modern medicine practices [7]. Therefore, it is clear how important is to preserve the local ethnobotanical knowledge, which can surely provide further uses in other research's fields and represent a socio-cultural heritage for many territories [3,4,8,9]. The Mediterranean basin is one of the richest territories for biological diversity in the world and it is estimated to host about 25,000 plant species, many of which are considered endemic [10,11]. Furthermore, in this area, there are many islands, and the biggest one is Sicily, which is located in the center of the Mediterranean basin. This island is also considered a biodiversity hotspot [12]. Due to its plant richness, people from Sicily have developed deep knowledge on what are the uses of different plants in many fields. In the last years, several ethnobotanical studies have been carried out in Italy to enhance the traditional knowledge of a place [9,13-23]. The most common traditional plant uses studied in Sicily were those related to food and medicine [24-36]. Recent floristic data estimated that there are about 3,500 taxa on the island and that 442 of them are endemic [37]. Despite this floristic richness, new species are continuously described [38-41]. As concerns the ethnobotanical studies carried out in the north-eastern part of Sicily, they are mainly focused on Nebrodi mountains area [42-44]. Instead, we were not able to find any papers or significant research on this topic for the area of the Peloritani Mountains. However, it is worth mentioning that some ancient pharmacopeias describe the medical uses of the various plants growing in this territory [45-47]. The Peloritani Mountains are a remarkable center of speciation and plant refuge, and its phytogeographical framework coincides with the limit given by structural geologists [48]. The purpose of this article is to study and report the ethnobotanical knowledge present in the Peloritani territory, through the case study of a survey carried out in a small and rural community in the province of Messina. Nowadays, this knowledge is a prerogative of elderly people, whereby it is in danger of disappearing, as well as being compromised by globalization and social change.

## 2. Materials and Methods

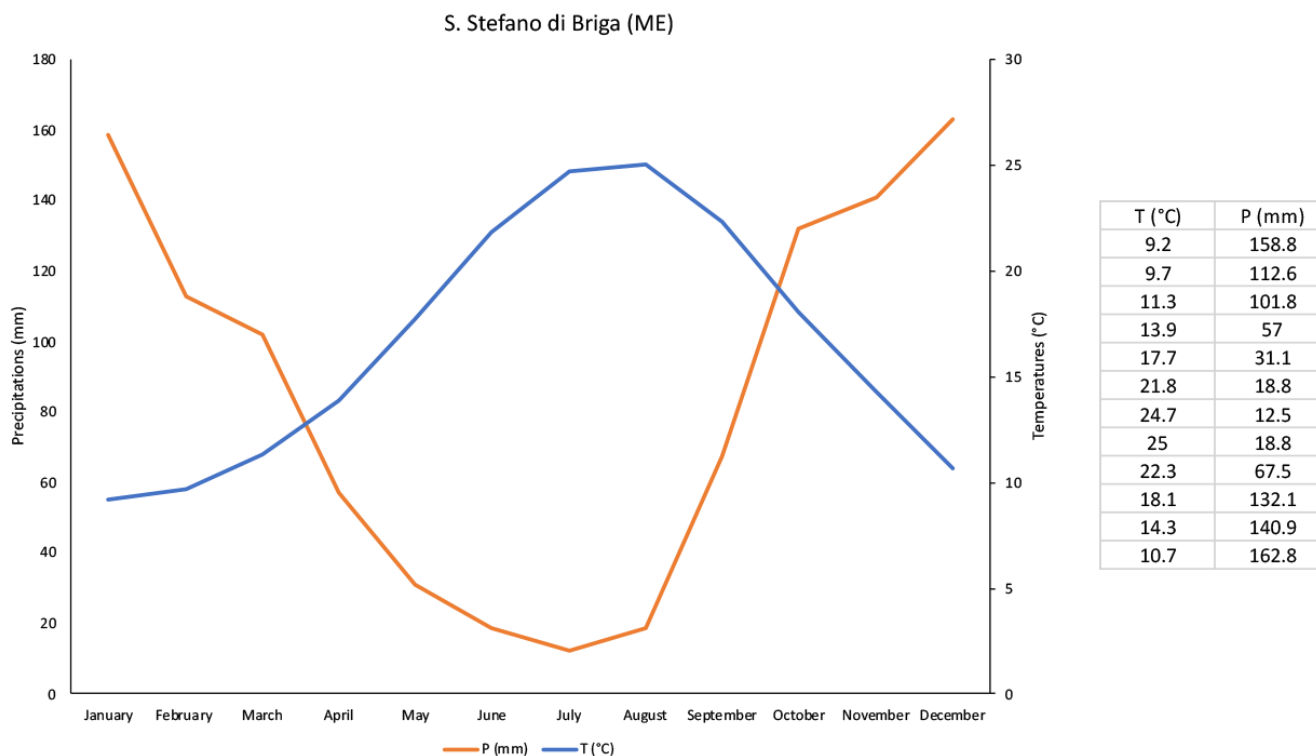
### 2.1. Study area

The Peloritani Mountains are located in the north-eastern part of Sicily. They are mainly made of metamorphic rocks, such as gneiss, schistose and phylladic alternations, and represent a section of the Calabria-Peloritani Arc Province [49,50]. Among the highest peaks, as well as the most important from a floristic viewpoint, we can mention: Montagna Grande (1374 m), Rocca Novara (1340 m), Pizzo Vernà (1287 m), Monte Poverello (1279 m), and Monte Scuderi (1253 m). Our ethnobotanical surveys were carried out in a small and rural suburb of Messina named Tipoldo counting approximately 300 inhabitants. It is located in the southern sector of the city, at an altitude of 400 m a.s.l. between Mili San Pietro and Larderìa Superiore (Figure 1).



**Figure 1.** Map of Tipoldo village (red star) and its location in the Peloritani Mountains (Map data: Google Maps © 2022 Maxar Technologies).

Until 1960, there was no road and the residents used mule tracks and country trails through the hills to reach the towns near the village. The territory surrounding Tipoldo has a considerable extension of dry stonewall terraces (in local vernacular dialect named “armacie”), once cultivated mainly to host vineyards, olive groves and orchards, but today they are partially abandoned. The natural vegetation of the area consists mainly of evergreen Mediterranean maquis, oaks, and public forest plantations. According to Rivas-Martínez [51,52] classification, the Peloritani area is characterized by a Mediterranean pluvi-seasonal oceanic bioclimate. Moreover, the thermo-pluviometric data from the Santo Stefano di Briga meteorological station (Messina) allowed to produce the thermo-udogram of Walter and Lieth (Figure 2) [53].



**Figure 2.** Thermo-udogram according to Walter & Lieth.

In particular, the average annual temperature is 16.5 °C and the average annual precipitation is 1014.6 mm, distributed mainly from January to March, and from October to December. From a bioclimatic point of view, the territory presents a bioclimate with meso-Mediterranean thermotype with sub-humid upper ombrotype [54,55]. From a geological viewpoint, Tipoldo is characterized by metamorphic rocks attributable to the Kabilo-Calabridi Unit [56].

## 2.2. Ethnobotanical surveys and data collection

Field surveys and research activities were carried out in the village from February 2017 to May 2018. This study area was chosen for its traditional plant use that is still well preserved in the memory of older residents. Semi-structured interviews were used to gather information [57,58], allowing us to personalize the questions while preserving spontaneity. The interviews were conducted separately through informal chats, except in rare cases where more than one participant took part in the interview. In the first part of the interview, there were no plant specimens presented to the informants, and no images to identify the plants. In a second step, we showed to the residents wild plants collected in the surrounding area of Tipoldo, but without suggesting the use. The purpose of the interviews was to allow the informants to speak freely and without restriction, to gather a list of plants truly used in the territory. The conversations were mostly carried out using local dialect and were recorded to avoid information leaks. We interviewed a total of 20 people ranging in age from 66 and 92 years, with 9 men and 11 women. The regulations by the International Society of Ethnobiology (available at <https://www.ethnobiology.net>, accessed on 1 December 2021) were followed during the whole study and for data compilation. All the information obtained through the interviews were stored in an excel file, where we reported the following: Latin name, botanical family, life form, vernacular name, part used, ethnobotanical category, claimed uses, native or exotic status. In this paper, two quantitative ethnobotanical indexes were applied to analyze the collected data: Frequency Index and Relative Importance. In particular, the Frequency Index [59] is a

quantitative measure of the percentage of times a particular botanical species is mentioned by informants. This index was calculated using the following formula:

$$FI = \frac{FC}{N} \times 100 \quad (1)$$

where FC is the number of informants who mentioned using the species, and N denotes the total number of informants. Relative Importance (RI) index [60] was calculated by using the formula:

$$RI = \frac{(RFC(\max) + RNU(\max))}{2} \times 100 \quad (2)$$

where RFC(max) and RNU(max) represent respectively the relative number of quotations compared to the max value among all the plants recorded, and the relative numbers of usage (NU) compared to the max value listed, were computed using the formulas:

$$RFC(\max) = \frac{\text{FC of a given plant taxa}}{\text{maximum FC of all reported plant taxa}} \quad (3)$$

$$RNU(\max) = \frac{\text{NU of a given plant}}{\text{maximum NU of all reported plant taxa}} \quad (4)$$

The family, status, life form, and the scientific name according to the Flora of Italy [61-64] were assigned to each taxon. The nomenclature follows the checklists of Bartolucci *et al.* [65] and Galasso *et al.* [66] and their subsequent updates [37]. The different traditional local uses have been classified into 9 ethnobotanical categories: food, medicine, veterinary, handcraft, domestic, agropastoral, hunting, fishing, religious and recreational, following the classification proposed by Caneva [59]. Specimens were kept in the Herbarium of the University of Messina (MS, acronym according to Thiers [67]).

### 3. Results and Discussion

The investigations accomplished in the territory of Tipoldo allowed us to compile a list of 126 species belonging to 51 families (Table 1).

**Table 1.** Plants traditionally used in the study area (MED medicinal, AGR agropastoral, FOOD alimentary use, HC handcraft, DM domestic, VET veterinary, REL religious, REC recreational use, HN hunting, FI fishing).

Taxa	Family	Life form	Vernacular name	Part used	Ethnobotany category	Claimed use(s)	Use - Reports Mentioned by Informants	Frequency Index (FI)	Relative Importance (RI)	Native (N) / Alien (A) / Crop/Cultivated (C)
<i>Acanthus mollis</i> L. subsp. <i>mollis</i>	Acant haceae	H	ebba 'n canna, ebb'in canna	Leaves	MED	the leaves crushed are combined with oil to cure inflammation of the wrist and fat cysts	3	15	24.56	N
<i>Achillea ligustica</i> All.	Astera ceae	H	canfariddh ara	Leaves \ Whole plant	MED, VET	the leaves crushed are used as hemostat for the skin; the whole plant is used as food for rabbits	2	10	21.93	N
<i>Agave americana</i> L. subsp. <i>americana</i>	Aspar agacea e	P	zammarun ara	Leaves	HC, MED	they are used to make fibers to build the seat and the back of the chairs; they crushed are used as a remedy for burns; the mucilage to remove callus to heal insect bites, cough; decoction for kidney stones; cataphylls named "limpa" are used as hemostat	8	40	37.72	A
<i>Allium cepa</i> L.	Amary llidace ae	G	cipuddha	Bulb	MED	to cure gastrointestinal worms in children; the infusion is used to improve the bloodstream	5	25	29.82	C
<i>Allium sativum</i> L.	Amary llidace ae	G	agghiu	Bulb	MED	to cure gastrointestinal worms in children; the infusion is used to improve the bloodstream	6	30	32.46	C

<i>Aloe arborescens</i> Mill.	Asphodelaceae	NP	aloe	Leaves	DM, MED	they are lenitive and heal burns and are useful for facial cleansing	10	50	42.98	A
<i>Ampelodesmos mauritanicus</i> (Poir.) T. Durand & Schinz	Poaceae	H	ddisa	Leaves	AGR	are used as binding material in agriculture	9	45	40.35	N
<i>Arbutus unedo</i> L.	Ericaceae	P	'mbriachid dhara	Leaves \ Stem \ Fruit	FOOD, HC, REL	the stem is used to produce coal and spoons; the fruits are edible; the branches fructified are used as religious ornament	12	60	48.25	N
<i>Artemisia arborescens</i> (Vaill.) L.	Asteraceae	NP	ebba 'nfanta, ebba janca	Leaves \ Stem	DM, MED	the decoction as anti-gastritis; the stem is used as a support for silkworms	10	50	42.98	N
<i>Arundo donax</i> L.	Poaceae	G	canna	Leaves \ Stem	AGR, HC, MED	culms used for the construction of various tools; the cambium membrane located in the nodes inside of the culm is used as hemostatic; leaves are used as binding material in agriculture	14	70	53.51	A
<i>Asparagus acutifolius</i> L.	Asparagaceae	G	spina pulici	Whole plant	REL	is used as religious decoration	10	50	42.98	N
<i>Asphodelus ramosus</i> L. subsp. <i>ramosus</i>	Asphodelaceae	G	purrazzu, bastuni i San Gnuseppi	Leaves \ Root	AGR, MED, VET	dried leaves are used as food for goats; crushed roots to remove worms from animal wounds	11	55	45.61	N
<i>Asplenium ceterach</i> L.	Aspleniaceae	H	spacca petrhi	Whole plant	MED	the decoction has diuretic properties and eliminates kidney stones	17	85	61.40	N
<i>Avena barbata</i> Pott ex Link	Poaceae	T	aina	Whole plant	AGR	is used as food for rabbits	5	25	29.82	N

<i>Biscutella maritima</i> Ten.	Brassicaceae	T		Leaves	FOOD	eaten in the typical dish “minestra sabbaggia”	2	10	21.93	N
<i>Bituminaria bituminosa</i> (L.) C.H. Stirt	Fabaceae	H	suddhara sabbaggia	Whole plant	AGR	is used as food for rabbits	2	10	21.93	N
<i>Borago officinalis</i> L.	Boraginaceae	T	burrانيا	Leaves	FOOD	eaten in the typical dish “minestra sabbaggia”	18	90	64.04	N
<i>Brassica fruticulosa</i> Cirillo subsp. <i>fruticulosa</i>	Brassicaceae	H	cauliceedd hu	Leaves	FOOD	eaten in the typical dish “minestra sabbaggia”	14	70	53.51	N
<i>Carlina hispanica</i> Lam. subsp. <i>globosa</i> (Arcang.) Meusel & Kästner	Asteraceae	H	carduni niru	Whole plant \ Fruit	AGR, HN	the whole plant is used as food for donkeys; fruits are used as bait to catch wild birds	4	20	27.19	N
<i>Castanea sativa</i> Mill.	Fagaceae	P	castagnara	Stem	HC	is used to build Sicilian baskets named “cofani”	7	35	35.09	N
<i>Celtis australis</i> L. subsp. <i>australis</i>	Cannabaceae	P	melicuccu, fafarecu	Stem \ Fruit	HC, REC	the fruits are edible and the seeds were used as bullets for the blowguns; the stems were used to craft the collars of the sheep and the containers for the ricotta	12	60	48.25	N
<i>Centranthus ruber</i> (L.) DC. subsp. <i>ruber</i>	Valerianaceae	Ch	rumpi quattara	Leaves \ Whole plant	FOOD, REL	the leaves are eaten in the typical dish “minestra sabbaggia”; whole plant is used as a religious ornament	4	20	27.19	N
<i>Chamaerops humilis</i> L.	Arecaceae	NP	pammara	Leaves	HC	are used to make oven brooms	2	10	21.93	N



<i>Charybdis pancration</i> (Steinh.) Speta	Asparagaceae	G	cipuddha sebbaggia	Leaves	MED	are scrubbed against leg pain	1	5	19.30	N
<i>Chasmanthe aethiopica</i> (L.) N.E. Br.	Iridaceae	G		Leaves	AGR	are used as binding material in agriculture	3	15	24.56	A
<i>Cistus salviifolius</i> L.	Cistaceae	NP	rusareddha	Whole plant	AGR	is used as food for rabbits	2	10	21.93	N
<i>Citrus limon</i> (L.) Osbeck	Rutaceae	P	limuniara, limiunara	Fruit	MED, AGR	The fumigation with the juice is used to relieve headaches; it is rubbed on the beehives against the swarming of bees	7	35	35.09	C
<i>Citrus sinensis</i> (L.) Osbeck	Rutaceae	P	aranciu	Fruit	MED	the boiled juice is used to soothe the cough	2	10	21.93	C
<i>Cladanthus mixtus</i> (L.) Chevall.	Asteraceae	T	camumiddha sabbaggia	Whole plant	DM	used to lighten hair	1	5	19.30	N
<i>Clinopodium nepeta</i> (L.) Kuntze	Lamiaceae	H	niputeddha	Leaves \ Whole plant	DM, MED	crushed leaves are used to heal insect bites; the decoction for finger infections; the fumigation to treat the cold; the infusion in alcohol of leaves is used as antiseptic; the whole plant is used to get rid of flies	18	90	64.04	N
<i>Convolvulus silvaticus</i> Kit.	Convolvulaceae	H	curriola	Leaves	MED	leaves mixed with oil are used to treat pimples	6	30	32.46	N
<i>Crepis vesicaria</i> L. subsp. <i>vesicaria</i>	Asteraceae	H	cost'amara	Leaves	FOOD	eaten in the typical dish "minestra sabbaggia"	19	95	66.67	N

<i>Cynara cardunculus</i> L. subsp. <i>cardunculus</i>	Asteraceae	H	lambrusco, cipudazzu	Flowers	MED	the decoction facilitates diuresis	7	35	35.09	N
<i>Cynodon dactylon</i> (L.) Pers.	Poaceae	G	'ramigna	Whole plant \ Stem	AGR, MED, VET	the whole plant is used as food for rabbits and when boiled is a healthy food for sheep's gastrointestinal problem; the decoction of the stem is used to cure the urinary tract and has also a purgative effect	10	50	42.98	N
<i>Cytisus infestus</i> (C.Presl) Guss. subsp. <i>infestus</i>	Fabaceae	P	spin'e i coddha	Stem	DM	used as wood for the oven	9	45	40.35	N
<i>Cytisus villosus</i> Pourr.	Fabaceae	P	muddhacchina	Leaves	MED	crushed leaves are used to heal the skin wounds	18	90	64.04	N
<i>Dactylis glomerata</i> L. subsp. <i>hispanica</i> (Roth) Nyman	Poaceae	H	ebb'e mazza	Whole plant \ Stem	AGR, REC	the whole plant is used as food for the goats; the culms are used as skewers to carry the blackberries	7	35	35.09	N
<i>Daphne laureola</i> L.	Thymelaeaceae	P	cul'amprescia	Stem	REC, MED	used as a purgant in moderate doses	5	25	29.82	N
<i>Daucus carota</i> L. subsp. <i>carota</i>	Apiaceae	H	bastunaca	Leaves	AGR, FOOD	eaten in the typical dish "minestra sabbaggia" and used as food for rabbits	4	20	27.19	N
<i>Dittrichia graveolens</i> (L.) Greuter	Asteraceae	T	pulicara	Leaves	DM, MED	used as a hemostatic and as a fragrance	19	95	66.67	N
<i>Dittrichia viscosa</i> (L.) Greuter subsp. <i>viscosa</i>	Asteraceae	T	pulicara	Leaves \ Whole plant	DM, MED	leaves are used as hemostat; the whole dried plant used to light the fire	15	75	56.14	N

<i>Ecballium elaterium</i> (L.) A. Rich.	Cucurbitaceae	T	proiettili	Fruit	REC	fruits are used for recreational purposes by young people	3	15	24.56	N
<i>Erica arborea</i> L.	Ericaceae	NP	elicara	Stem \ Fruit	HC	the stems are used to make the poles in the vineyards; the roots are used to craft pipes, spoons and musical instruments; the branches are used to make the coal used for baking bread	13	65	50.88	N
<i>Eucalyptus</i> sp. pl.	Myrtaceae	P	calipsu	Leaves	MED	are used to make a footbath against the feet stinking	1	5	19.30	A
<i>Euphorbia ceratocarpa</i> Ten.	Euphorbiaceae	Ch	tassu	Latex stem	FI	latex was used to stun eels in the river	4	20	27.19	N
<i>Ferula communis</i> L. subsp. <i>communis</i>	Apiaceae	H	ferra	Stem	HC, VET	are used to craft small chairs and used to make a sort of plaster for the broken limbs of goats (mixed with manure and bounding with ropes)	14	70	53.51	N
<i>Festuca fasciculata</i> Forssk.	Poaceae	T	pili i cani	Whole plant	AGR	are used to cover the snow pits	3	15	24.56	N
<i>Ficus carica</i> L.	Moraceae	P	ficara	Latex stem	AGR, HC, MED	latex is used to heal insect bites and as rennet to make ricotta; the stem is used to craft musical instruments	12	60	48.25	N
<i>Foeniculum vulgare</i> Mill. subsp. <i>vulgare</i>	Apiaceae	H	finucchiaru sabbaggiu	Fruit / Stem	FOOD, MED	the infusion of fruit is used to heal stomach pain; fruits are used to aromatize the food; the stem is chewed against the heartburn	17	85	61.40	N
<i>Galactites tomentosus</i> Moench	Asteraceae	H	cadduni iancu	Stem	FOOD	eaten raw after being skinned	2	10	21.93	N
<i>Genista monspessulana</i> (L.) L.A.S.Johnson	Fabaceae	P	muddhacchina	Leaves	MED	the crushed leaves are used as hemostats	2	10	21.93	N

<i>Helosciadium nodiflorum</i> (L.) W.D.J.Koch subsp. <i>nodiflorum</i>	Apiaceae	H	scauni	Leaves	FOOD	eaten in the salad	2	10	21.93	N
<i>Hyparrhenia hirta</i> (L.) Stapf subsp. <i>hirta</i>	Poaceae	H	silipu, siliparu	Whole plant	AGR	used as fodder for cows and horses	6	30	32.46	N
<i>Hypochaeris achyrophorus</i> L.	Asteraceae	T	lattughedd' e nonna	Leaves	FOOD	eaten in the typical dish "minestra sabbaggia"	8	40	37.72	N
<i>Hypochaeris radicata</i> L.	Asteraceae	H	cost'i vecchia	Leaves	FOOD	eaten in the typical dish "minestra sabbaggia"	19	95	66.67	N
<i>Isatis tinctoria</i> L. subsp. <i>tinctoria</i>	Brassicaceae	H		Leaves	DM	used to dye indigo wool	6	30	32.46	A
<i>Juglans regia</i> L.	Juglandaceae	P	nuciara	Leaves \ Stem	DM, MED	the boiled leaves are used to heal hemorrhoids and as a colorant; the stem is used to craft parts of musical instruments	4	20	27.19	A
<i>Juncus acutus</i> L. subsp. <i>acutus</i>	Juncaceae	H	u juncu	Stem	AGR	used as binding material in agriculture	2	10	21.93	N
<i>Lactuca sativa</i> L. subsp. <i>sativa</i>	Asteraceae	H	lattuca	Leaves	MED	the boiled leaves are applied on the gums to soothe the toothache	4	20	27.19	C
<i>Lactuca viminea</i> (L.) J.Presl & C.Presl subsp. <i>viminea</i>	Asteraceae	H	ped'i jaddhina	Leaves	FOOD	eaten in the typical dish "minestra sabbaggia"	3	15	24.56	N

<i>Lagurus ovatus</i> L. subsp. <i>ovatus</i>	Poaceae	T	baff'i cunigghiu	Whole plant	REC	used for recreational purposes	3	15	24.56	N
<i>Lathyrus clymenum</i> L.	Fabaceae	T	cucula	Whole plant	AGR	is used as food for animals	6	30	32.46	N
<i>Laurus nobilis</i> L.	Lauraceae	P	lauro	Leaves	MED	the tea is used for stomach pain	9	45	40.35	N
<i>Linum usitatissimum</i> L. subsp. <i>angustifolium</i> (Huds.) Thell.	Linaceae	H	linu	Seeds	MED	the boiled seeds ("linusa") were applied to treat pimples ("campunchi") and cysts around the neck ("tracina")	8	40	37.72	N
<i>Lotus rectus</i> L.	Fabaceae	Ch	faciularu	Whole plant	AGR	are used as food for animals	3	15	24.56	N
<i>Lupinus luteus</i> L.	Fabaceae	T	luppinu sabbagghiu	Whole plant \ Seeds	AGR, MED	the plant is used as fertilizer; fresh seeds are used to treat brucellosis	5	25	29.82	N
<i>Malva multiflora</i> (Cav.) Soldano, Banfi & Galasso	Malvaceae	T	mavva, ebba mavva	Leaves	FOOD, MED, VET	the decoction is used for sore throat, inflammation of the gums and pimples or it is given to sheep for the placenta elimination; fresh leaves are used as hemostatic	7	35	35.09	N
<i>Marrubium vulgare</i> L.	Lamiaceae	H	marrubbiu	Whole plant \ Root	MED, VET	the whole plant is placed in the henhouse against mites and lice; the decoction of the root is drunk as refreshing	12	60	48.25	N
<i>Medicago arabica</i> (L.) Huds.	Fabaceae	T	trhifogghiu	Whole plant	AGR	are used as food for animals	4	20	27.19	N

<i>Melissa officinalis</i> subsp. <i>altissima</i> (Sm.) Arcang.	Lamiaceae	H	ment'ell'api , ment'ill'api	Whole plant	AGR	is rubbed on the walls of the beehives to avoid the swarming of bees	6	30	32.46	N
<i>Mentha pulegium</i> L. subsp. <i>pulegium</i>	Lamiaceae	H	puleu	Whole plant \ Leaves	DM, MED	the fumigation with the leaves cures the cold, congested nose and headache; the burnt plant is used to get rid of the flies; the dried plant placed under the pillow promotes sleep	10	50	42.98	N
<i>Morus alba</i> L.	Moraceae	P	ghiosu bianco	Leaves	AGR	used as fodder for young silkworms	14	70	53.51	C
<i>Morus nigra</i> L.	Moraceae	P	ghiosu niru	Leaves \ Latex stem	HC, AGR, MED	the leaf is used to forage adult silkworms; the stem to make spoons and containers; the latex of the stem to treat dermatitis of hands	13	65	50.88	C
<i>Mycelis muralis</i> (L.) Dumort. subsp. <i>muralis</i>	Asteraceae	H	occh'i pinnici	Leaves	FOOD	eaten in the typical dish "minestra sabbaggia"	2	10	21.93	N
<i>Olea europaea</i> L. subsp. <i>sylvestris</i>	Oleaceae	P	gghiastraro	Stem \ Fruit	HC, REL	the stem used to make baskets; from the fruits is extracted an oil used in religious rites or as fuel for lamps	8	40	37.72	N
<i>Olea europaea</i> L. subsp. <i>europaea</i>	Oleaceae	P	luara, livara	Leaves	MED	the decoction is used to low the blood pressure	1	5	19.30	N
<i>Opuntia ficus-</i> <i>indica</i> (L.) Mill.	Cactaceae	P	ficadinniar a, chiappirara	Stem \ Flowers	HN, MED	the stem is used for liver pain, as a hemostat, as a fuel for the oven, as a trap for birds; the flower tea cures the stomach pain	15	75	56.14	A
<i>Oxalis pes-caprae</i> L.	Oxalidaceae	G	ddhreu	Bulb	FOOD	eaten raw or roasted	4	20	27.19	A
<i>Papaver rhoeas</i> L.	Papaveraceae	T	paparina	Leaves \ Flowers	FOOD, DM	the leaves are eaten in the typical dish "minestra sabbaggia"; the flower is used to dye red and to make ink	5	25	29.82	N

<i>Parietaria judaica</i> L.	Urtica ceae	H	ebb'e muru	Whole plant \ Leaves	AGR, DM, MED	the decoction of the stem for kidneys and the leaves are used as food for rabbits and hens; the leaves for the wounds of the skin and for cleaning	12	60	48.25	N
<i>Phagnalon saxatile</i> (L.) Cass.	Astera ceae	Ch	ebba janca	Whole plant	AGR	used as a support for silkworms	3	15	24.56	N
<i>Pistacia lentiscus</i> L.	Anaca rdiace ae	P	lentiscara	Stem	DM	used as wood for the furnace	2	10	21.93	N
<i>Plantago lanceolata</i> L.	Planta ginace ae	H	centu nebbi	Leaves	MED	are used to cure the pimples	2	10	21.93	N
<i>Plantago major</i> L.	Planta ginace ae	H	ebb'e margi,	Leaves	MED	are used to cure the pimples	4	20	27.19	N
<i>Polypodium cambricum</i> L.	Polypo diaceae	H	filici (filicia)	Leaves	AGR	are used to cure the pimples	1	5	19.30	N
<i>Populus alba</i> L.	Salicac eae	P	ghiuppo	Stem	HC	used as food for goats	7	35	35.09	N
<i>Populus nigra</i> L. subsp. <i>nigra</i>	Salicac eae	P	ghiuppu	Stem	HC	used to craft kitchen utensils	8	40	37.72	N
<i>Portulaca oleracea</i> L.	Portul acaceae	T	purciddhan a	Leaves	FOOD	eaten in the salad	9	45	40.35	A
<i>Prunus armeniaca</i> L.	Rosace ae	P	pricipara	Stem	HC	used for the construction of parts of the bagpipe	3	15	24.56	A

<i>Prunus avium</i> (L.) L.	Rosaceae	P	girasara	Fruit	MED	the fruit is dried and used as an herbal tea against cystitis	1	5	19.30	N
<i>Prunus dulcis</i> (Mill.) D.A. Webb	Rosaceae	P	mennulara	Stem	HC	used for the construction of the pipes and bagpipes	5	25	29.82	A
<i>Pteridium aquilinum</i> (L.) Kuhn subsp. <i>aquilinum</i>	Dennstaedtiaceae	G	filicia	Leaves	HC, DM	used as a flycatcher, thermal insulation, for the construction of beds, for the realization of headgear and as a fire fuel	6	30	32.46	N
<i>Pyrus spinosa</i> Forssk.	Rosaceae	P	prainaru	Stem	HC, VET	used to build the bagpipes, treat cataracts in goats, the thorns are used to sting the poisoned part of the animal to cure it (e.g., venom of toads)	6	30	32.46	N
<i>Quercus virgiliana</i> (Ten.) Ten.	Fagaceae	P	ruulu	Leaves \ Fruit	AGR, FOOD	the leaves are used as food for sheep and cows; fruit eaten as a coffee substitute	8	40	37.72	N
<i>Reichardia picroides</i> (L.) Roth	Asteraceae	H	caccia lepri, caddhazzina	Leaves	FOOD, MED	eaten in the typical dish "minestra sabbaggia" and also to cure the stomachache	16	80	58.77	N
<i>Rhus coriaria</i> L.	Anacardiaceae	P	sammaccaru	Leaves \ Flowers \ Fruit	DM	leaves and fruits used as black dye; infructescence sold to produce dyes for shoes	11	55	45.61	A
<i>Robinia pseudoacacia</i> L.	Fabaceae	P	caciara	Stem	HC	used for making agricultural poles	1	5	19.30	A
<i>Rubus ulmifolius</i> Schott	Rosaceae	NP	ruettu, ruettaru	Leaves \ Flowers \ Fruit	FOOD, MED	the decoction of the leaves cures the toothache and together bramble, weeds and sorb used to cure the sore throat; the whole plant is used for making the coal and as a component of the gunpowder; the fruits and the buds are edible	15	75	56.14	N

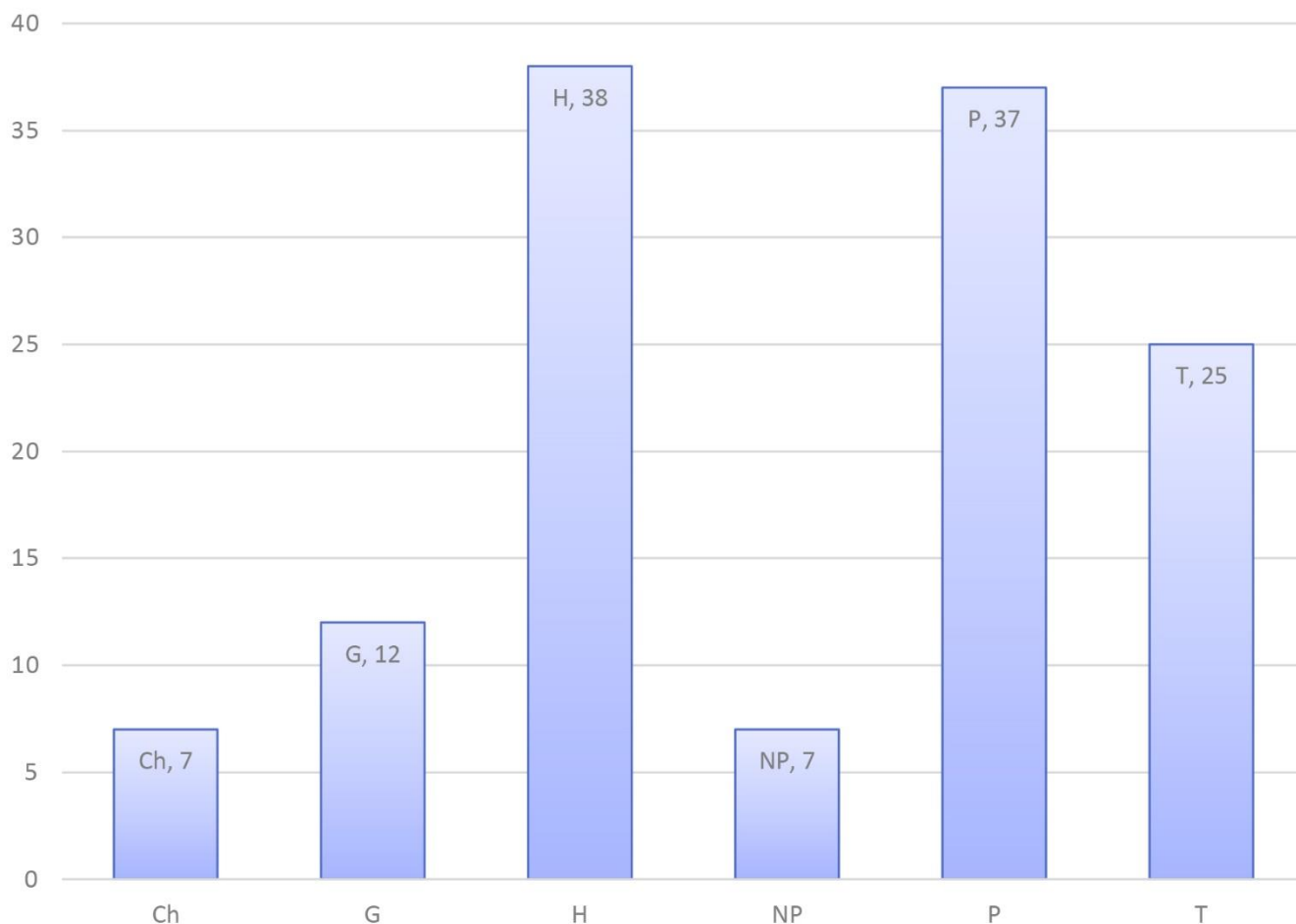


<i>Rumex bucephalophorus</i> L.	Polygonaceae	T	acituleddha	Whole plant	AGR	used as food for animals	2	10	21.93	N
<i>Rumex crispus</i> L.	Polygonaceae	H	lapazza	Leaves	MED	the poultice with oil is used to cure the pimples	2	10	21.93	N
<i>Ruscus aculeatus</i> L.	Asparagaceae	Ch	pungitopo	Leaves \ Fruit	REL	used as a religious decoration	4	20	27.19	N
<i>Ruta chalepensis</i> L.	Rutaceae	Ch	ruta	Leaves	FOOD, MED, VET	are used to aromatize the grappa or as vermifuge for dogs and children	13	65	50.88	N
<i>Salix alba</i> L.	Salicaceae	P	salici jancu	Stem	HC	are used to craft baskets	10	50	42.98	N
<i>Salix purpurea</i> L.	Salicaceae	P	salici russu	Stem	HC	are used to craft wicker	11	55	45.61	N
<i>Salvia officinalis</i> L. subsp. <i>officinalis</i>	Lamiaceae	Ch	salvia	Leaves	MED	the decoction cures stomach pain	16	80	58.77	A
<i>Salvia rosmarinus</i> Schleid.	Lamiaceae	NP	rosamarinu	Leaves	MED	the herbal tea cures constipation and stomach pain	19	95	66.67	N
<i>Sambucus nigra</i> L.	Adoxaceae	P	sammucara (sambucara)	Leaves \ Stem	HC	the leaves rubbed on the strings avoid fraying; wood is used for making parts of musical instruments	13	65	50.88	N
<i>Scirpoides holoschoenus</i> (L.) Soják	Cyperaceae	G	juncu	Stem	AGR, HC	used as binding material in agriculture and to craft the ricotta containers	10	50	42.98	N

<i>Silene vulgaris</i> (Moench) Garcke	Caryo- phylla- ceae	H	cualedda	Leaves \ Flowers	FOOD	eaten in the typical dish "minestra sabbaggia"	10	50	42.98	N
<i>Sinapis arvensis</i> L. subsp. <i>arvensis</i>	Brassic- aceae	T	senapa	Leaves	FOOD	eaten in the typical dish "minestra sabbaggia"	4	20	27.19	N
<i>Smilax aspera</i> L.	Smilac- aceae	P	raunìa	Shoot plant \ Whole plant	FOOD, REL	the buds are edible; the plant is used as a religious decoration	2	10	21.93	N
<i>Solanum</i> <i>lycopersicum</i> L.	Solana- ceae	T	pumadoru	Fruit	MED	the application of cut fruit is used to cure burns	1	5	19.30	C
<i>Solanum</i> <i>tuberosum</i> L.	Solana- ceae	T	patata	Tuber	MED	the application of cut fruit is used to cure burns	8	40	37.72	C
<i>Sonchus oleraceus</i> L.	Astera- ceae	T	cardeddha	Leaves	FOOD	eaten in the typical dish "minestra sabbaggia"	18	90	64.04	N
<i>Sorbus domestica</i> L.	Rosace- ae	P	subbara	Stem	HC	used for the construction of screws and walking sticks	16	80	58.77	N
<i>Spartium</i> <i>junceum</i> L.	Fabace- ae	P	jinstrhara	Stem	AGR	used as binding material in agriculture	17	85	61.40	N
<i>Sulla coronaria</i> (L.) Medik.	Fabace- ae	H	suddha	Whole plant \ Stem	AGR	used as food for donkeys	18	90	64.04	N
<i>Triticum</i> sp.pl.	Poacea- e	T	'ranu	Fruit	MED	used to cure the <i>Herpes zoster</i> virus	16	80	58.77	C

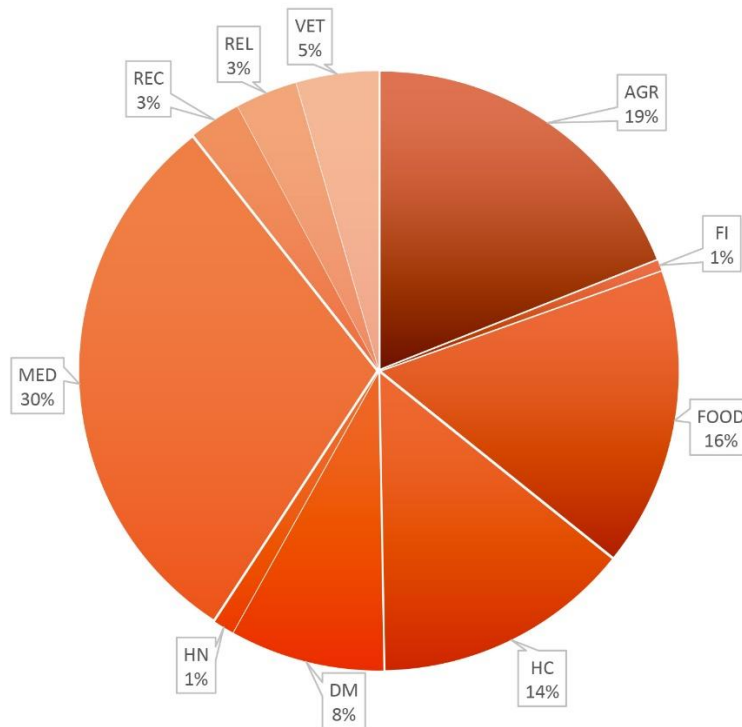
<i>Tussilago farfara</i> L.	Asteraceae	G	ugna cavaddhina	Leaves	MED	are used to cure the cyst	5	25	29.82	N
<i>Ulmus minor</i> Mill. subsp. <i>minor</i>	Ulmaceae	P	umbraru	Stem	HC, MED	used to craft rods and baskets; the glue obtained from the decoction of the bark and root is used to treat muscle contractures and as putty	8	40	37.72	N
<i>Urospermum picroides</i> (L.) Scop. ex F.W. Schmidt	Asteraceae	T	caddeddharizza	Leaves	FOOD	eaten in the typical dish "minestra sabbaggia"	5	25	29.82	N
<i>Urtica dioica</i> L. subsp. <i>dioica</i>	Urticaceae	H	fuddica masculina	Leaves \ Stem	AGR, FOOD, MED	used as fodder for chickens; is used in risotto; if macerated in ethyl alcohol cures rheumatism	17	85	61.40	N
<i>Verbascum macrurum</i> Ten.	Scrophulariaceae	H	babbascaru	Leaves \ Stem	AGR, MED	the infusion of leaves in boiling water is used to treat the hemorrhoids or the fresh leaves are used as a tray for the ricotta; the stem is used as binding material in the agricultural field	15	75	56.14	N
<i>Vicia faba</i> L.	Fabaceae	T	favara	Seeds	MED	eaten are used to cure the heartburn	7	35	35.09	A
<i>Vicia sativa</i> L.	Fabaceae	T	fraga	Whole plant	AGR	used as food for rabbits	4	20	27.19	N
<i>Ziziphus jujuba</i> Mill.	Rhamnaceae	P	'nzinzulara	Stem	HC	used to craft parts of bagpipe	1	5	19.30	A

Among them, the most quoted families were Asteraceae (19 species) and Fabaceae (15 species), followed by Poaceae (9 species), Lamiaceae (6 species), Rosaceae (6 species), and Apiaceae, Asparagaceae, Brassicaceae, Salicaceae (each with 4 species). According to the Raunkiaer system [61-64] hemicryptophytes were the prevalent life form (38 taxa, i.e., 30% of the whole flora), closely followed by phanerophytes (37; 29%), therophytes (25; 20%) and geophytes (12; 9%), while the percentage of chamaephytes and nano-phanerophytes (7; 6%) was very low (Figure 3).



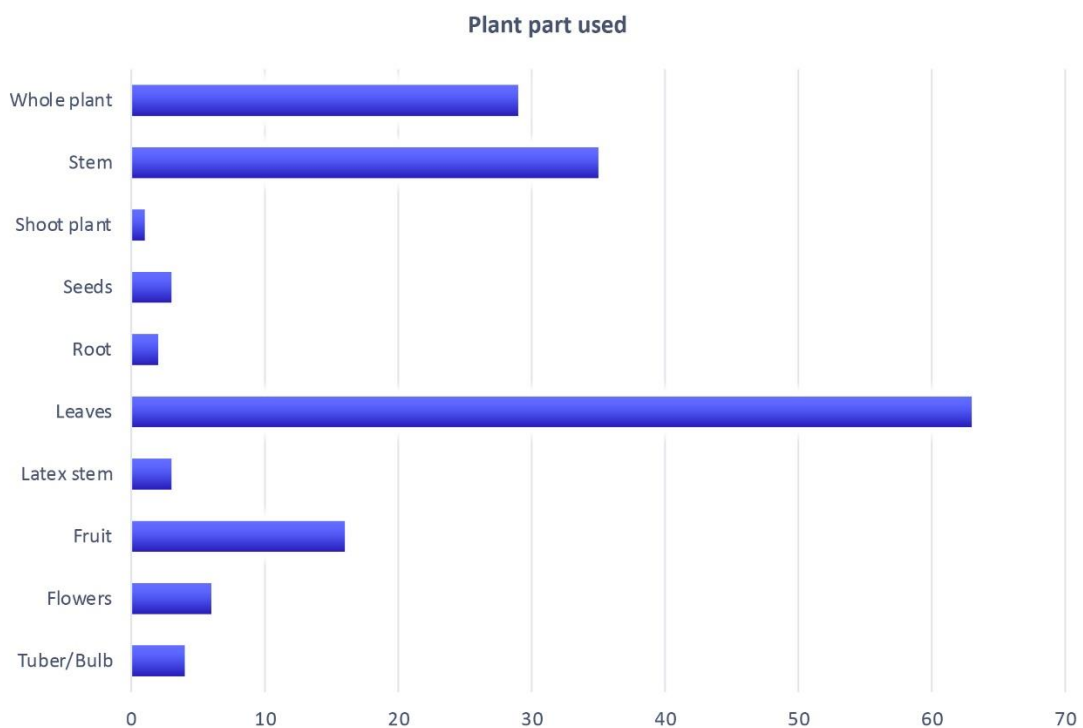
**Figure 3.** Life form spectrum of the taxa recorded from the interviews.

As concerns the ethnobotanical uses of the plants (Figure 4), the most common are the medicinal (30%) and agropastoral uses (19%), followed by alimentary use (16%).



**Figure 4.** Ethnobotanical uses of plants in Tipoldo village (%) (MED medicinal, AGR agropastoral, FOOD alimentary use, HC handcraft, DM domestic, VET veterinary, REL religious, REC recreational use, HN hunting, FI fishing).

Furthermore, among the preparation methods recorded in the ethnobotanical categories, leaves (39%), stem (21%), and whole plant (18%) are the parts most commonly used by local residents (Figure 5).



**Figure 5.** Plant parts used into all ethnobotanical categories.

### 3.1. Medicinal uses

The plants reported as health care by people interviewed are 54 species belonging to 28 families. Among the most quoted plants there is *Clinopodium nepeta* subsp. *nepeta*, a hemicryptophyte rich in essential oils [68,69], it is well known as an antiseptic in folk medicine, especially against insect bites, for example bees and hornets [70,71]. These medicinal properties are confirmed by many studies that highlighted its chemical composition [72,73]. Another one is *Dittrichia viscosa* subsp. *viscosa* which is used as a hemostatic for minor skin wounds [32,74], as what has been found in some places in Morocco [75], while in other regions of Italy, this species is used as an insect repellent [76,77]. The similarity between Moroccan and Sicilian medicinal usage is supported by other examples such as *Foeniculum vulgare* subsp. *vulgare*, *Mentha pulegium* and *Allium sativum*. Fruits of *F. vulgare* are used to cure stomach pain and gastrointestinal problems, leaves of *M. pulegium* are applied to treat the cold and *A. sativum* is quoted for its cardiovascular properties (e.g., to cure hypertension) [78,79]. Among those uses, from phytochemical viewpoint, were studied the fruits of *F. vulgare*, which have analgesic [80] and carminative [81] properties, therefore its utilization in folk medicine appears also well supported.

One more use, known also in modern medicine, regards *Asplenium ceterach* subsp. *ceterach* (Figure 6).



**Figure 6.** *Asplenium ceterach* stored by an informant.

The decoction of this small fern treats kidney stone [82], and several other authors confirm this common use [32,83-86]. Other species of medicinal interest worth to be cited are: the fresh leaves of *Achillea ligustica*, which are used as antimicrobial and hemostatic [87]; the leaves of *Ruta chalepensis*, which are rubbed on the stomach of the sick (in Tipoldo this practice was mainly applied to children) to cure gastrointestinal worms [88]; *Verbascum macrurum* whose leaves were immersed in boiling water, giving off vapors used to treat hemorrhoids; *Cynodon dactylon* whose decoction has a diuretic effect [89]. An unexpected report was the use of wheat to treat the *Herpes zoster* virus (in Italian named “fuoco di Sant’Antonio”). *Triticum* spp. in Tipoldo was used up to 20 years ago to treat this virus, for this purpose the fruits were overheated through direct contact with an

incandescent surface (usually the blade of a hoe) causing the release of a dark oil, which was applied while still hot on the skin. For these species (*Triticum* spp., *Achillea ligustica*, *Asplenium ceterach*, *Ruta chalepensis* and *Verbascum macrurum*) a clear correspondence was found between the uses reported to us by the informants in Tipoldo and the therapeutic virtues described in ancient medicinal systems, i.e., in the pharmacopoeia "i Discorsi" by Matthioli [90].

### 3.2. Agropastoral uses

In the agropastoral field, the interviewees reported 34 species belonging to 15 families and the most representative are Fabaceae (9 species) and Poaceae (7 species). The plants reported are mainly used as animal fodder and rope plant in agriculture. In particular, the species utilized to feed the livestock are: *Avena barbata*, *Bituminaria bituminosa*, *Dactylis glomerata* subsp. *hispanica*, *Daucus carota*, *Hyparrhenia hirta*, *Lathyrus clymenum*, *Lotus rectus*, *Medicago arabica*, *Sulla coronaria*, *Urtica dioica*, and *Vicia sativa*. As concerns the rope plant, *Ampelodesmos mauritanicus* is very useful in farming because the leaves, after drying up, are an excellent and durable fiber to tie the support poles in the garden [91]. This application method of rope plants is still used by several locals in Tipoldo (Figure 7A,B). However, it was unusual to see the same traditional use with the stems of *Spartium junceum* (Figure 7C), which is used to hold the crop bales carried by mules, since its utilization in Sicily for agricultural purposes was known, but only to tie the chopped wood [43].



**Figure 7.** Plants used as binding material in agriculture: (A-B) *Ampelodesmos mauritanicus* with a detail of the knot made with this plant; (C) *Spartium junceum* used for the same usage.

### 3.3. Alimentary uses

About the edible plants, the interviewees reported 28 species belonging to 16 families the most representative of which is Asteraceae (9 species), followed by Apiaceae, and Brassicaceae both with 3 species. A recent research has identified 292 native wild food plants [92], which means that plants play an important role in folk cuisine and represent an important local heritage. Our investigations show the typical plants used for the traditional wild plant cuisine in the Messina province. The species gathered in this area of Sicily are mainly eaten in a dish named “minestra sabbaggia” (Figure 8A-C) and it seems to be exclusive of this territory since it does not appear reported by the surroundings territories in Sicily [93].

Among the wild plants typically used in the preparation of this traditional Messina dish, such as *Borago officinalis*, *Crepis vesicaria* subsp. *vesicaria*, *Sonchus oleraceus*, *Hypochaeris radicata*, *Brassica fruticulosa*, in the territory of Tipoldo are also added: *Hypochaeris achyrophorus*, *Lactuca viminea*, and *Mycelis muralis*. Another food plant well-known is *Portulaca oleracea*, in fact, it appears to have been used as a food plant since ancient times [94,95] and its fresh use in salad can be also found in Greek cuisine [96]. Furthermore, we found an unusual use of *Galactites tomentosus*, which does not seem to be reported in Sicilian literature. In fact, there have been evidence that young stems can be eaten raw after skinning them (Figure 8D).



**Figure 8.** Edible plants: some species eaten in the typical dish of Messina area named “minestra sabbaggia” used exclusively in Tipoldo, (A) *Lactuca viminea*, (B) *Mycelis muralis*, (C) *Hypochaeris*



*achyrophorus*; (D) the fresh stem after being skinned of *Galactites tomentosus* Moench ready to be eaten.

### 3.4. Handcraft and domestic uses

The plants reported by the interviewees for handcraft uses are 25 species belonging to 16 families, while for domestic uses they reported 15 species belonging to 10 families. In the handcraft field, the uses of *Morus nigra* wood for the construction of the “barìla” (flask for carrying wine and water) and the collars of sheep are worth mentioning. With the young branches of *Castanea sativa* and the longitudinally dissected culms of *Arundo donax*, the “còfani” (round baskets with the weaving made of wooden strips) were made, while the stems of *Scirpoides holoschoenus* were used to craft the ricotta cheese containers (Figure 9).



**Figure 9.** Handcrafted products: (A) “barìla” and crafted with *Morus nigra* wood; (B) sheep collar crafted with *Morus nigra* wood; (C) basket crafted with *Castanea sativa* and *Arundo donax*; (D) ricotta cheese containers crafted with *Scirpoides holoschoenus* stems.

Of particular interest is the deep knowledge of Tipoldo’s artisans in making musical instruments. An interviewee explained, in detail, how the different parts of the “ciaramedda” (bagpipe) are made using *Erica arborea* wood (Figure 10), which, however, is not the only species used for this purpose. In fact, wood from *Prunus dulcis*, *Prunus armeniaca*, *Ziziphus jujuba*, *Pyrus spinosa* can also be used to make the bagpipe. Moreover, the wood of *Erica arborea* can be also used to build the “friscalettu”, a wind instrument like a flute (Figure 11).



**Figure 10.** Musical instrument: manufacturing of some parts of the “ciaramedda” (bagpipe) with *Erica arborea* wood.



**Figure 11.** Musical instrument: manufacturing of the “friscalettu” (flute) with *Erica arborea* wood.

As part of the investigations carried out in Tipoldo, we visited the property of an interviewee where there was a “palmento” (a machine to crush grapes) dating back to 1740, whose beam was made out of oak wood (*Quercus virgiliana*) and the screw of sorb wood (*Sorbus domestica*, see [Figure 12](#)).



**Figure 12.** Eighteenth Century Palmento located in Tipoldo made with *Quercus virgiliana* and *Sorbus domestica* wood.

Other interesting domestically used plants were found, in particular, the leaves of *Morus nigra*, in addition to previous uses, were also utilized for feeding the silkworm. In other works, interviewers reported that the leaves of *Morus alba* are better than the latter, especially if the silkworm is in the first phase of growth. This shows the importance of the plant when the art of silk production was a source of income for the household [97,98].

Finally, another traditional use regarded the species *Isatis tinctoria* from which you can get the indigo, a blue dye, one of the oldest natural dyestuffs known to humans [99]. However, in literature this plant is also well-known for its medicinal uses throughout Eastern and Western cultures [100].

### 3.5. Cross-cultural ethnobotanical comparison in Sicily

As stated above, some traditional uses in the study area result in new or unknown to the adjacent territories (e.g., *Galactites tomentosus* and *Mycelis muralis*). It is revealed by comparing the Tipoldo's investigation with three Sicilian regional parks that our data set (126 species, of which 54 for medicinal uses) shows a good richness. In fact, scholars surveyed in the Nebrodi Regional Park 90 medicinal plants [42], in the Etna Regional Park 71 medicinal plants [33] and in the Madonie Regional Park 174 species (of which 100 for medicinal uses) [101], while in the Monti Sicani territory 144 medicinal plants [102] were investigated. Instead, the species most known in Sicily and confirmed by our research are the following: *Borrago officinalis*, *Clinopodium nepeta*, *Asplenium ceterach*, *Dittrichia viscosa* and *Reichardia picroides* [43]. The discovery of medicinal use of *Triticum* spp. in Tipoldo is an unusual component of this investigation and doesn't seem to be reported in other studies done in Sicily, even if recent studies show beneficial properties regarding ancient wheats (e.g., against insulin resistance) [103,104].

## 4. Conclusion

This paper reveals that traditional knowledge about wild plants is still present and well spread in the Tipoldo village, but the socio-economic changes that followed the Second World War have largely reduced people's ethnobotanical cultural heritage. This represents the first contribution to the Peloritani territory. In fact, although the area where the investigations were carried out is small, we obtained a big number of data compared to other studies made in other Sicilian territories and also many correlations with traditional plant uses in some areas of Morocco [33,42,101,102,105-107]. On the other hand, it is possible to hypothesize that this knowledge has been preserved due to the geographical isolation of Tipoldo from the city of Messina, and to the identity of its inhabitants, who are mainly farmers and shepherds. These traditional uses of wild plants in this community display a great cultural value. Some of them are like the methods reported in the pharmacopoeias of the 16<sup>th</sup> century [90]. The use of wild plants has gradually declined over the centuries, but today there is a renewed interest, especially for food plants, which are viewed as healthier option than crop plants. The medicinal plants are undergoing a gradual rediscovery by the new generation too. The flora of a territory not only represents a natural heritage, but the knowledge and traditions associated with it have a very strong cultural value, representing a legacy for future generations. The protection of the ethnobotanical heritage is fundamental and can become a starting point for further investigations in several research fields such as the pharmacology, anthropology, botany, and humanities. Finally, this study, through the collected data intends to provide a historical documentation of the usage of plants in the Peloritani area, which is currently understudied.

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**Human and animal rights:** This research involved human participants who gave a verbal informed consent prior to the interview.

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