

Review

Wild Plants Used as Herbs and Spices in Italy: An Ethnobotanical Review

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Abstract: Wild edible plants are an essential component of people's diets in the Mediterranean basin. In Italy, ethnobotanical surveys have received increasing attention in the past two centuries, with some of these studies focusing on wild edible plants. In this regard, the literature in Italy lacks the coverage of some major issues focusing on plants used as herbs and spices. I searched national journals for articles on the use of wild food plants in Italy, published from 1963 to 2020. Aims of the present review were to document plant lore regarding wild herbs and spices in Italy, identify the wild plants most frequently used as spices, analyze the distribution of wild herbs and spices used at a national scale, and finally, to describe the most common phytochemical compounds present in wild plant species. Based on the 34 studies reviewed, I documented 78 wild taxa as being used in Italy as herbs or spices. The studies I included in this systematic review demonstrate that wild species used as herbs and spices enrich Italian folk cuisine and can represent an important resource for profitable, integrated local small-scale activities.

Keywords: ethnobotany; food plants; spices; herbs; Italy

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1. Introduction

In recent decades, detailed ethnobotanical studies have revealed the widespread use of wild plants in the Mediterranean basin [1–4]. Ethnobotany is a multidisciplinary investigation of interrelations between people and plants [5], and plays a key role in ascertaining the various plant species used in traditional cuisine. Indeed, ethnobotany of food plants is a fairly well-developed research field in several geographical areas and social communities [6–8]. Moreover, ethnobotanical studies concerning food plants offer novel ways to analyze and preserve traditional knowledge and agrobiodiversity in the Mediterranean area [3].

Herbs and spices produced from aromatic plants are largely used to enhance food taste and palatability. Sometimes used as synonyms, the distinction between the two terms (herbs and spices) could be summarized as follows: herbs are types of plants whose leaves are used in cooking to give flavor to particular dishes, while a spice is defined as any of the various aromatic products obtained from plants in the form of powder or seeds or other plant parts and used to add taste to food (e.g., [9–12]). According to Van der Veen and Morales [13] neither definition fully conveys the array of plants nor the range of purposes for which such plants are used. A further lexical complication is that, in the ethnobotanical literature, there are many terms to indicate the use of plants in cooking, e.g., aromatic, aromatizer, condiment, flavoring, and spice. In the present review, I refer to the wild species (the whole plant or parts of it) used for flavoring various dishes in the Italian folk tradition. In this context, I use the term “wild” to refer to non-cultivated or naturally occurring plants gathered in the field, although sometimes for convenience of use, some species are grown or deliberately tolerated in home gardens [14,15]. In some cases, food plants are also eaten for their health-giving properties and many species are commonly used as herbal medicines in folk phytotherapy for the treatment of ailments [16,17].

In Italy, ethnobotanical surveys have received increasing attention in recent decades, seeking to investigate the traditional uses of plants and their products (e.g., [18–20]). Some of these studies focus on wild edible plants (e.g., [21,22]), while others infer the use of wild plants as food through more general studies of ethnobotany (e.g., [23,24]). In this regard, the literature in Italy lacks the coverage of some major issues focusing on plants used as spices.

In this context, the aim of the present work is to review and highlight the use of wild plants as traditional herbs and spices in folk cuisine in Italy.

The specific aims of this study were: (a) to document plant lore regarding wild herbs and spices in Italy; (b) to identify the wild plants most frequently used as spices; (c) to analyze the distribution of wild herbs and spices used at a national scale; (d) to describe the most common phytochemical compounds present in wild plant species.

2. Results

General Data

Based on the 34 studies providing adequate and relevant data, I documented 78 wild taxa as being used in Italy as herbs or spices (Table 1). The plant species belong to 19 families and 49 genera. Lamiaceae (38.8%) is the most frequently cited family, followed by Amaryllidaceae (12.5%), Apiaceae (11.3%), Asteraceae (7.5%) and Rosaceae (6.3%). The most species-rich genus is *Allium* (9 species), followed by *Mentha* (8), *Thymus* (6) and *Salvia* (5). Leaves (63.0%) were the most frequently used plant parts, followed by fruits (10.9%), and flowers (8.7%). The remaining parts (including bulbs, seeds and roots) accounted for 17.4% overall.

Table 1. Wild herbs and spices traditionally used in Italy (Abr—Abruzzo; Bas—Basilicata; Cal—Calabria; Cam—Campania; Emr—Emilia Romagna; Fvg—Friuli Venezia Giulia; Lig—Liguria; Lom—Lombardy; Mol—Molise; Pie—Piedmont; Pug—Puglia; Sar—Sardinia; Sic—Sicily; Tus—Tuscany).

| Species | Family | Vernacular Name | Part Used | Culinary Uses | Region | References | Therapeutic Uses |
|------------------------------------|----------------|------------------------------------------|---------------|---------------------------------------------------------------------|-------------------------|---------------|-----------------------------------------------------------------|
| <i>Achillea millefolium</i> L. | Asteraceae | Tanéda | Flowers | Soup flavoring | Pie | [25] | N/A |
| <i>Achillea moschata</i> Wulfen | Asteraceae | Tanéda matta | Flowers | To flavor salt, pizzoccheri, risotto, salmi, semifreddo and sorbet. | Lom | [23] | N/A |
| <i>Allium lusitanicum</i> Lam. | Amaryllidaceae | Aij mat | Bulbs, leaves | Flavoring in several dishes | Lom | [23] | Blood pressure regulator. |
| <i>Allium neapolitanum</i> Cirillo | Amaryllidaceae | Agghie | Bulbs, leaves | Raw or cooked as herb | Cam | [26] | Blood pressure regulator. |
| <i>Allium nigrum</i> L. | Amaryllidaceae | | | Added to the tomato sauce | Sic | [22] | N/A |
| <i>Allium roseum</i> L. | Amaryllidaceae | Aglio selvatico, agghie | Bulbs, leaves | Raw or cooked in salads and soups | Abr, Cam, Tus | [16,26,27] | For gastrointestinal disorders. |
| <i>Allium schoenoprasum</i> L. | Amaryllidaceae | Erba cipollina, Cílon, aiet, poureto | Leaves | To flavor rice, pasta, salads, soups, fritters and risotto | Emr, Fvg, Pie, Lom, Tus | [23,25,27–31] | Anthelmintic, diuretic, disinfectant, blood pressure regulator. |
| <i>Allium subhirsutum</i> L. | Amaryllidaceae | | Leaves | To flavor salads | Sar | [32] | N/A |
| <i>Allium triquetrum</i> L. | Amaryllidaceae | Agghie, àggiu | Bulbs, leaves | To flavor potato cake, fritters, salads and soups | Cam, Lig, Sar; Tus | [26,27,32,33] | Anthelmintic, diuretic, disinfectant, blood pressure regulator. |
| <i>Allium ursinum</i> L. | Amaryllidaceae | Aglio ursino, agliustro, aglio selvatico | Bulbs, leaves | Flavoring in soups | Abr, Cam, Emr | [16,27,34] | Anthelmintic, diuretic, disinfectant, |

| | | | | | | | blood pressure regulator. |
|----------------------------------------------------------------------------------------------------|----------------|-------------------------------------------------------------------------------|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|------------------------------------------|-----------------------------------------------------|
| <i>Allium vineale</i> L. | Amaryllidaceae | Aglio pippolino | Bulbs, leaves | Flavoring soups, salads and sauces | Tus, Pie | [25,27,30] | N/A |
| <i>Anethum graveolens</i> L. | Apiaceae | F'nucchiast | Leaves | Spice for sausages and Easter cakes | Bas, Mol | [35,36] | N/A |
| <i>Armoracia rusticana</i> G. Gaertn., B. Mey. and Scherb. | Brassicaceae | Cren, hrne | Roots | As spicy flavoring in sauces and soups | Fvg | [31] | N/A |
| <i>Artemisia vulgaris</i> L. | Asteraceae | Arsemize | Leaves | Flavoring soups and omelettes | Pie | [29] | N/A |
| <i>Brassica nigra</i> (L.) W. D. J. Koch | Brassicaceae | Senape | Seeds | Aromatic herb | Abr | [16] | N/A |
| <i>Calamintha sylvatica</i> L. | Lamiaceae | | Leaves | Condiment. | Bas | [37] | N/A |
| <i>Capparis spinosa</i> L. (incl. <i>C. ovata</i> Desf.) | Capparaceae | Chiapparo, chiapparu | Buds | Flavoring for salads, pasta, meat, fish, sauces, pasta and garnishes to add a pungent spicy flavor. | Cal, Cam, Sic, Tus | [22,27,38–40] | Digestive and aperient. |
| <i>Carum carvi</i> L. | Apiaceae | Choré, chiréi, chimmel | Seeds | Flavoring (especially meat and poultry, particularly rabbit, or sarass, a local fermented and spiced ricotta cheese). Flavoring in bread. | Lom, Pie | [23,28,29] | Carminative, digestive, galactagogue. |
| <i>Clinopodium nepeta</i> (L.) Kuntze subsp. <i>nepeta</i> (= <i>Calamintha nepeta</i> (L.) Savi.) | Lamiaceae | Anipeta, nepetella | Leaves | In soups and to aromatize artichokes, tomatoes, zucchini and chickpea salads, or as flavoring for fried or preserved in oil mushrooms. | Cal, Cam, Sic, Tus | [22,26,27,30,34,38,41] | Against stomach ache. |
| <i>Crataegus monogyna</i> Jacq. | Rosaceae | Biancospino | Fruits | As spice. | Cam | [34] | N/A |
| <i>Crithmum maritimum</i> L. | Apiaceae | Finucchiaddu maritimum | Leaves | As flavoring. | Sic | [42] | N/A |
| <i>Cydonia oblonga</i> L. | Rosaceae | | Fruits | Flavoring in the <i>sapa de ficu murisca</i> | Sar | [32] | N/A |
| <i>Daucus carota</i> L. subsp. <i>carota</i> | Apiaceae | | Leaves | To flavor game meat. | Sar | [32] | N/A |
| <i>Foeniculum vulgare</i> Miller | Apiaceae | Finocchio selvatico, aniedd, frucchio, finucc, fenùcciu, finocchiu sàrvaticum | Leaves; seeds; fruits; young stems | Fruits to flavor bread, dried figs and pickled olives, and sausages. Finely chopped | Abr, Bas, Cal, Cam, Emr, Lig, Pug, Sar, Sic, Tus | [16,21,22,24,25,27,30,32–34,37–41,43–46] | Digestive, carminative, gastrointestinal disorders. |

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|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------------------------------------------------------------------------------------------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|--------------------------------------------|--------------------------------------------------------------------|
| | | | | leaves as flavoring in soups, omelettes, meat and fish dishes | | | |
| <i>Gymnadenia rhellicani</i> (Teppner and E.Klein) Teppner and E.Klein (= <i>Nigritella rhellicani</i> Teppner and E. Klein; <i>N.</i> <i>nigra</i> (L.) Rchb.) | Orchidaceae | Vaniglione, moréti | Flowers | Flavoring in sweets. | Lom | [17,23] | N/A |
| <i>Helichrysum italicum</i> (Roth) Don | Asteraceae | Rosmarina sarvaggia | Leaves | As spice. | Sic | [22] | N/A |
| <i>Juniperus communis</i> L. | Cupressaceae | Ginepro, zenéivu, zenéivru, giùpp, anèbri, genebbolo, zinebro, gènébbre, chais | Fruits | To flavor various dishes, and in particular those based on game (e.g., boar), roasted meat and fish | Abr, Cam, Emr, Lig, Lom, Mol, Tus, Pie | [16,17,23,25,27,28,3 0,33,34,36,43] | Against cough and sore throat, as diuretic and digestive. |
| <i>Juniperus oxycedrus</i> L. | Cupressaceae | Ginepro, zenéivu, zenéivru | Fruits | | Abr, Lig | [16,33] | N/A |
| <i>Juniperus sabina</i> L. | Cupressaceae | Ginepro | Fruits | | Abr | [16] | N/A |
| <i>Laurus nobilis</i> L. | Lauraceae | Alloro, l'uro, eufoggiu, osì, orbàga, lauru, addauru, orbaco, loriè | Leaves | To season boiled chestnuts, roast meats, jellied pork, codfish, sausages, chili peppers and dried figs. Much appreciated as a condiment is the extra virgin olive oil in which rosemary twigs and leaves are left to macerate [43]. | Abr, Bas, Cal; Cam, Emr, Lig, Lom, Sar, Sic, Tus, Pie | [16,17,21– 23,27,29,33,36– 40,43–48] | Digestive, gastrointestinal disorders. |
| <i>Lavandula angustifolia</i> Miller | Lamiaceae | Steccadò | Flowers | For flavoring salads and meat. | Pie | [25] | N/A |
| <i>Melissa officinalis</i> L. | Lamiaceae | Melissa, cedroncella | Leaves | For flavoring salads and omelettes. | Abr, Cal, Cam, Emr, Tus | [16,27,34,43,49] | Spasmolytic. |
| <i>Mentha arvensis</i> L. | Lamiaceae | Menta | Leaves | Aromatic herb. | Abr, Cal | [16,38] | N/A |
| <i>Mentha longifolia</i> L. | Lamiaceae | Menta, mëntatre | Leaves | For flavoring salads and omelettes. | Cam, Fvg, Pie | [26,29,31] | N/A |
| <i>Mentha pulegium</i> L. | Lamiaceae | Menta | Leaves | In sauces and fish dishes. | Abr, Cal, Cam, Sic | [16,22,26,45,50] | N/A |
| <i>Mentha spicata</i> L. | Lamiaceae | Menta | Leaves | Flavoring for pancakes, sauces and stewed broad beans. | Abr, Bas, Cam, Sic, Pie | [16,22,26,28,37] | Digestive. |
| <i>Mentha</i> spp. | Lamiaceae | Menta | Leaves | Flavoring of potato ravioli and vegetable pies; fritters. | Lig, Pie | [25,43] | N/A |

| | | | | | | | |
|---------------------------------------------------------------------------------------------------------------|---------------|--------------------------------------------------------------------------|--------|-----------------------------------------------------------------------------------------|---------------------------------------------|------------------------------------|----------------------------------------------------------|
| <i>Mentha suaveolens</i> Ehrh. | Lamiaceae | Menta, mentastra | Leaves | To aromatize grilled food, sauces, risotto, soups and salads. | Abr, Sic, Tus | [16,22,27] | Digestive. |
| <i>Mentha suaveolens</i> Ehrh. ssp. <i>insularis</i> (Req.) Greuter | Apiaceae | | Leaves | To flavor a kind of black pudding. | Sar | [32] | N/A |
| <i>Mentha x piperita</i> L. | Lamiaceae | Menta piperita, mintaster | Leaves | Flavoring in salads, soups and risotto. | Tus | [27] | Digestive. |
| <i>Mercurialis annua</i> L. | Euphorbiaceae | Mercurella | Leaves | To aromatize codfish. | Tus | [27] | Aperient. |
| <i>Myrtus communis</i> L. | Myrtaceae | Murtidda, mortedda, mortella, murtuëlla | Leaves | To flavor game meat. | Cal, Lig, Sar | [33,48,50] | Gastrointestinal disorders. |
| <i>Nepeta cataria</i> L. | Lamiaceae | Mentastro | Leaves | Aromatizer for goat meat. | Cam | [51] | N/A |
| <i>Oenanthe pimpinelloides</i> L. | Apiaceae | Prezzemolo selvatico | Leaves | To aromatize boiled chestnuts, pig liver boiled. | Tus | [30] | N/A |
| <i>Olea europaea</i> L. | Oleaceae | Olivo, uivu | Leaves | To flavor meat (rabbit, boar, goat). | Cal, Lig | [33,38] | Blood pressure regulator. |
| <i>Origanum vulgare</i> L. subsp. <i>viridulum</i> (Martrin-Donos) Nyman (= <i>Origanum heracleoticum</i> L.) | Lamiaceae | Rigono, arigano, harigana janca, rinu | Leaves | To flavor poultry, fish, and other dishes; as a spice in tomato-based sauces or salads. | Bas, Cam, Pie, Sic | [21,22,25,34,37,41,45,46,51] | Appetizer, carminative, depurative, digestive. |
| <i>Origanum vulgare</i> L. subsp. <i>vulgare</i> | Lamiaceae | Origano, orècano, arregano, harigana rossa, cornabuggia, orighen, regano | Leaves | To flavor poultry, fish, and other dishes; as a spice in tomato-based sauces or salads. | Abr, Cal, Cam, Lig, Lom, Tus, Pie | [16,22,23,27,29,33,38,43,44,50,51] | Appetizer, carminative, depurative, digestive, sedative. |
| <i>Papaver rhoeas</i> L. | Papaveraceae | Rosolaccio | Seeds | Flavoring for bread. | Tus | [27] | N/A |
| <i>Phlomis fruticosa</i> L. | Lamiaceae | Sarvia sarvaggia | Leaves | To aromatize meat and pasta flavoring. | Sic | [22] | N/A |
| <i>Pimpinella anisoides</i> V. Brig. | Apiaceae | Ciminu | Leaves | Flavoring for biscuits and taralli. | Cal | [38,49,50] | N/A |
| <i>Pimpinella anisum</i> L. | Apiaceae | Anice, anici, anèsc | Seeds | As flavoring in bread, sweet and dishes of meat. | Abr, Lom | [16,23] | Carminative, digestive. |
| <i>Pinus mugo</i> Turra | Pinaceae | Mùgh | Buds | Flavoring dishes of fish and meat. | Lom | [17] | N/A |
| <i>Raphanus raphanistrum</i> L. subsp. <i>raphanistrum</i> | Brassicaceae | Rafano | Roots | To season spaghetti. | Cam | [41] | N/A |
| <i>Rosmarinus officinalis</i> L. (= <i>Salvia rosmarinus</i> Spenn.) | Lamiaceae | Rosmarino, rosamarina, rumain, ošmarin, rrosmarinu, tresmarino | Leaves | Flavoring for meat roasts, potatoes, soups, bread and focaccia. | Abr, Bas, Cal, Cam, Emr, Lig, Lom, Sic, Tus | [16,22,23,26,27,33,37,38,43–47] | Digestive. |

| | | | | | | | |
|----------------------------------------------------------------------------------------|------------|-----------------------------------------|-----------------|------------------------------------------------------------------------------------------------|----------------------------------------|------------------------------|----------------|
| <i>Rubus idaeus</i> L. | Rosaceae | Mora | Fruits | Flavoring in dishes of meat. | Lom | [23] | Mild laxative. |
| <i>Ruta chalepensis</i> (L.) Savi | Rutaceae | Ruta | Leaves | Flavor for olive brine. | Lig | [43] | N/A |
| <i>Salvia glutinosa</i> L. | Lamiaceae | Salvia selvatica | Leaves | To flavor many dishes: soups, roasts, liver, rolls, beans, tortellini, sauces, etc. | Abr | [16] | Digestive |
| <i>Salvia officinalis</i> L. | Lamiaceae | Salvia, sarvia, addori ri costa | Leaves | To flavor many dishes: soups, roasts, liver, rolls, beans, tortellini, sauces, etc. | Abr, Bas, Cal, Cam, Lig, Lom, Sic, Tus | [16,22,23,27,37,38,43,49–51] | Digestive. |
| <i>Salvia pratensis</i> L. | Lamiaceae | Salvia selvatica, erba da osei | Leaves | To flavor many dishes: soups, roasts, liver, rolls, beans, tortellini, sauces, etc. | Abr, Emr, Lom | [16,17,27] | Digestive. |
| <i>Salvia sclarea</i> L. | Lamiaceae | Erva muscatiddara | Leaves | To aromatize various main dishes. | Sic | [22] | N/A |
| <i>Salvia verbenaca</i> L. | Lamiaceae | Cavolo moro | Leaves | To season salads, risotto and beans soups. | Tus | [27] | Digestive. |
| <i>Sambucus nigra</i> L. | Adoxaceae | Pepe di maio, sambucu, sambùch, savùcu | Fruits, flowers | Flavoring for bread, batters. | Cal, Lom, Sic | [23,38,40] | N/A |
| <i>Sanguisorba minor</i> L. | Rosaceae | Salvastrella | Leaves | To season soups and salads. | Tus | [27] | Astringent. |
| <i>Satureja hortensis</i> L. (Lamiaceae) | Lamiaceae | Santoreggia | Leaves | Flavoring. | Emr | [27] | N/A |
| <i>Satureja montana</i> L. subsp. <i>montana</i> | Lamiaceae | Sarapuddu, harihanedda, izzòppu, trombo | Leaves | Aromatizer, for goat meat, omelettes and risotto. | Bas, Cam, Lig, Pie, Tus | [21,25–27,33,43,51] | N/A |
| <i>Tanacetum vulgare</i> L. | Asteraceae | Archebüse | Leaves | Flavoring in omelettes and soups. | Pie | [29] | N/A |
| <i>Taraxacum campyloides</i> G.E.Haglund. | Asteraceae | Mourpoursin | Leaves | Pickled in brine and used as flavoring. | Pie | [29] | N/A |
| <i>Teucrium polium</i> L. subsp. <i>capitatum</i> (L.) Arcang. | Lamiaceae | | Leaves | Flavoring. | Bas | [21] | N/A |
| <i>Thymbra capitata</i> (L.) Cav. (= <i>Thymus capitatus</i> (L.) Hoffmanns. and Link) | Lamiaceae | Tümmaru | Leaves | To aromatize bread, fish and meat dishes. | Cal, Sic | [22,42,49] | N/A |
| <i>Thymus longicaulis</i> C. Presl (incl. <i>T. serpyllum</i> L.) | Lamiaceae | Timo, peverina, pepolino, serpoul | Leaves | As a condiment for omelettes, meatballs, flans, sauces, stuffed with meat, soups, snails, etc. | Abr, Cam, Lig, Tus, Pie | [16,25,27–29,34,43,44] | Digestive. |
| <i>Thymus polytrichus</i> Kern. ex Borbás | Lamiaceae | Érbapeverina | Leaves | | Lom | [23] | Digestive. |
| <i>Thymus pulegioides</i> L. | Lamiaceae | Timo, retümmu, pepolino | Leaves | As <i>Th. longicaulis</i> . | Abr, Lig, Lom, Tus | [16,23,27,33] | Digestive. |

| | | | | | | | |
|-------------------------------|-----------|-------------------------|---------|-----------------------------|---------------|------------|-----|
| <i>Thymus spinulosus</i> Ten. | Lamiaceae | Timo | Leaves | Aromatic herb. | Sic | [22] | N/A |
| <i>Thymus</i> spp. | Lamiaceae | Timo | Leaves | Aromatic herb. | Cal, Emr | [27,43] | N/A |
| <i>Thymus vulgaris</i> L. | Lamiaceae | Timo, retümmu, pepolino | Leaves | As <i>Th. longicaulis</i> . | Abr, Lig, Tus | [16,27,33] | N/A |
| <i>Trifolium medium</i> L. | Fabaceae | Treföl | Flowers | As flavoring in cakes. | Lom | [23] | N/A |
| <i>Trifolium pratense</i> L. | Fabaceae | Treföl | Flowers | As flavoring in cakes. | Lom | [23] | N/A |
| <i>Ulmus minor</i> L. | Ulmaceae | Olmo | Fruits | As flavoring in salads | Tus | [27] | N/A |

As shown in Figure 1a, from the analyses carried out at a regional scale, I found that Tuscany has the largest number of species used in a single region (24), followed by Campania (23), Abruzzo and Lombardy (22 each). The Ethnobotanicity Index values are significantly lower than those of other Italian regions (range 5.4–11%) or Iberian Peninsula (range 8.8–27.9%) that are calculated on medicinal, cosmetic, veterinary, and food species [17,52,53]. Although it is not possible to make a comparison with the same use category, results suggested that the knowledge of wild plants used as flavoring is still consolidated in the above-mentioned regions that are also among the most species-rich in Italy [54]. (Figure 1b). Papers containing reports of wild plants specifically used for flavoring are reported in the Supplementary Materials.

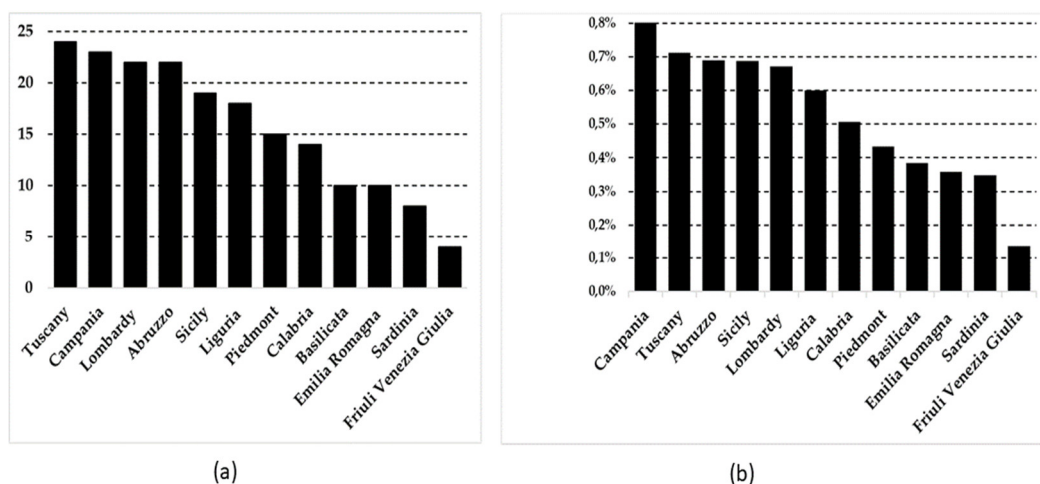


Figure 1. Number of species used per Italian regions (a) and EI for each region (b).

3. Botany and Phytochemistry

In Figure 2, I present a summary of the sixteen most commonly cited taxa Italy. For each species, I discuss its life form, chorology and phytochemical profiles.

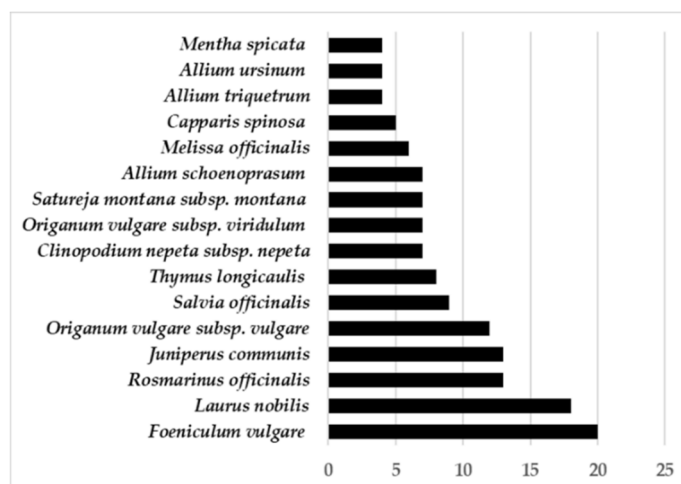


Figure 2. Most cited species in all Italian regions.

Fennel (*Foeniculum vulgare* Mill.) is a hardy, perennial herb native to Mediterranean coasts and widely naturalized in many parts of the world. Fennel seed is a rich source of volatile oil, with its main compounds being fenchone and trans-anethole. Other components of the essential oil are limonene, camphene, estragole and α -pinene [55,56]. The main constituents of the essential oils extracted from its leaves are trans-anethole, estragole, fenchone, and α -phellandrene; minor constituents are limonene, neophytadiene and phytol [57,58].

Bay laurel (*Laurus nobilis* L.) is an evergreen tree or large shrub native to the Mediterranean region. The aromatic leaves are rich in essential oils whose main components are: 1,8-Cineole, sabinene, α and β -pinene, α -terpinylacetate and linalool [59,60].

Rosemary (*Rosmarinus officinalis* L.) is an evergreen sclerophyllous shrub native to the Mediterranean basin. The main components of the essential oil are 1,8-Cineole, α and β -pinene, camphor, camphene and β -pinene [61]. Rosmarinic acid is an ester of caffeic acid and 3,4-dihydroxyphenyllactic acid, with a number of interesting biological activities (e.g., antiviral, antibacterial, anti-inflammatory and antioxidant) and is widely occurring in the Lamiaceae family.

The common juniper (*Juniperus communis* L.) is a multistemmed shrub or small tree, whose seed cones are usually called berries. This is the most widespread conifer in the world, native to temperate Eurasia, North America and northern Mexico, occupying an extraordinary range of habitats [62]. Juniper berry oil largely consists of monoterpene hydrocarbons such as β -pinene, α -pinene, sabinene, myrcene, and limonene [63].

Oregano (*Origanum vulgare* L. subsp. *vulgare*) is a perennial herb native to the temperate regions of Europe and Asia. The main constituents of the essential oil in its leaves are carvacrol, p-cymene, c-terpinene, limonene, terpinene, ocimene, caryophyllene, β -bisabolene, linalool, and 4-terpineol [64]. Oregano is added for its slightly bitter flavor to poultry, fish, and other dishes. *O. vulgare* L. subsp. *viridulum* (Martini-Donos) Nyman is also reported as a wild spice.

Sage (*Salvia officinalis* L.) is an evergreen subshrub native to the Mediterranean basin. The principal components in sage oil are 1,8-cineole, camphor, α -thujone, β -thujone, borneol, viridiflorol, caryophyllene and cineole [65,66]. Other *Salvia* species (*S. glutinosa* L., *S. pratensis* L., *S. sclarea* L., *S. verbenaca* L.) are also used.

Thyme (*Thymus longicaulis* C. Presl) is an evergreen subshrub native to southern Europe. Thyme essential oil consists of highly variable amounts of phenols, monoterpene hydrocarbons, and alcohols. Thymol is normally the main phenolic component followed by carvacrol [67]. The variability of the chemical components of *Thymus* species depends on several parameters including climatic, seasonal, and geographic conditions [68]. For

Thymbra capitata (L.) Cav., *Thymus polytrichus* Kern. ex Borbás, *T. pulegioides* L. and *T. spinulosus* Ten are also reported to have the same uses of *Th. longicaulis*.

Lesser calamint (*Clinopodium nepeta* (L.) Kuntze subsp. *nepeta*) is an erect herbaceous perennial species, sometimes woody at the base, native to southern Europe. Its essential oil is rich in menthone, pulegone, piperitone, neomenthol, menthol, and limonene [69,70].

Winter savory (*Satureja montana* L.) is a perennial, semi-evergreen subshrub, native to warm temperate regions of southern Europe and Africa. The volatile fraction of winter savory essential oil is mainly characterized by oxygenated monoterpenes like thymol and carvacrol [71]; other important compounds are the monoterpene hydrocarbons p-cymene and γ -terpinene [72].

Chives (*Allium schoenoprasum* L.) is a herb native to cold and temperate areas of Europe, Asia and North America; in Italy, it grows on mountains in central and northern regions. Green leaves of chives have sulfur compounds like 2-methyl-2-butenal, 2-methyl-2-pentenal, methyl-propyl disulfide and dipropyl disulfide. The major thiosulfinate compounds from chives are n-propyl groups, methyl and 1-propenyl groups [73].

Lemon balm (*Melissa officinalis* L.) is a perennial herbaceous plant native to central Europe, the Mediterranean Basin, and Central Asia, but now naturalized in the Americas and elsewhere [74] (WCSP 2020). The main components of the essential oil are citronellal, citral (citronellol, linalool) and geranial. In addition, this oil contains three terpinene, rosmarinic acid, and flavanol glycoside acids in low ratio [75,76].

Capers (*Capparis spinosa* L.) is a deciduous shrub native to Europe and Asia. The floral buds are harvested still closed in spring and summer and usually processed in brine. Cinnamaldehyde and benzaldehyde are the major constituents of the flavor profile of capers; of sulfur compounds, methyl-isothiocyanate is the main compound, followed by benzyl-isothiocyanate [77]. Rutin and kaempferol are the most abundant flavonol glucosides [78,79].

Garlic (*Allium triquetrum* L.; *A. ursinum* L.) is a bulb-forming herbaceous perennial plant, reported in the present review as a herb to flavor several dishes. Thiosulfates are responsible for its characteristic pungent aroma and taste [80]. When fresh garlic is chopped or crushed, the enzyme alliinase converts alliin into allicin, which is responsible for the aroma of fresh garlic [81]. The typical aroma of cooked garlic is due to allyl methyl trisulfide [82]. Garlic is also considered a functional food and is widely used for its antibacterial, hypoglycemic, hypotensive and hypocholesterolemic properties [83]. It is used in folk phytotherapy also as a galactofuge and anthelmintic [84,85]. Other wild garlics reported as herbs in the present review are: *A. lusitanicum* Lam., *A. neapolitanum* Cirillo, *A. roseum* L., *A. subhirsutum* L. and *A. vineale* L.

4. Discussion

The use of some species is linked to their presence in the various regional territories. *Gymnadenia rbellicani* (Teppner and E.Klein) Teppner and E.Klein, for example, is an orchid confined to the Alps, at altitudes of 1000–2800 m [86]. This species is reported as a sweet flavoring only in two papers concerning alpine ethnobotany in Lombardy [17,23]. Similar considerations can be made for *Pinus mugo* Turra, a species growing at high altitudes and reported in the same papers. *Pimpinella anisum* L. is a casual alien distributed in a few regions, whose use is reported only for Abruzzo and Lombardy [16,23], while the range of *P. anisoides* V. Brig. is in central-southern Italy and its use is reported only in Calabria [38,49,50]. *Allium schoenoprasum* L. is not spontaneous in southern and insular regions and, although it is also frequently grown in gardens throughout Italy, its use is reported only for central and northern regions.

Many herbs and spices cited in the present review are also reported for their positive influence on health, especially for gastrointestinal disorders and more frequently as a digestive or appetizer (see Table 1). Many of these plants (e.g., *Thymus* spp., *Mentha* spp., *Salvia* spp., *Foeniculum vulgare*) are well known for their ability to stimulate the excretion of digestive enzymes and their carminative properties [66,68,87]. Many herbs and spices

(e.g., *Rosmarinus officinalis*, *Foeniculum vulgare*, *Allium* spp.) have other nutraceutical properties and in particular are rich in antioxidant compounds. Many studies (e.g., [88,89]) have highlighted that a dietary antioxidant intake has a protective effect against free radical-related pathologies, such as cardiovascular diseases, diabetes, cancer and neurodegenerative diseases. Recent studies have highlighted that the protective effect of nutraceuticals is linked to the association of several phytochemical molecules at low concentrations, as it occurs naturally in the diet [90]. These plants can, therefore, be identified as functional foods (foods that have beneficial effects on one or more functions of the human organism that go beyond their mere nutritional properties [91,92]), and are consumed because they have a positive effect on health. Moreover, many of the food plants mentioned above are also reported for their herbal uses and are consumed as tea or used for topical applications.

Wild herbs and spices also play an important role in traditional gastronomy because they are used in the recipes of many local dishes, and in a certain way, they contribute to the cultural identity of some geographical areas. According to Jordana [93], in order to be traditional, a product must be linked to a territory and it must also be part of a set of traditions, which will necessarily ensure its continuity over time. Such wild species are, indeed, related to the preservation of family or local traditions and, as pointed out by Luczaj et al. [2] and Pardo-de-Santayana et al. [15], they could also be considered a way to diversify the daily diet.

According to Pieroni et al. [14], the potential of wild plants should be further explored for the possible economic opportunities that could be generated for local gatherers and communities. The diversification of production using such resources could be a socio-economically sustainable activity in areas with non-optimal farming conditions by contributing to population stabilization in rural areas [94]. Herbs are, therefore, also an opportunity to develop a healthy diet that combines gastronomy, health and sustainability.

In conclusion, the studies we included in this systematic review demonstrate that wild species used as herbs and spices enrich Italian folk cuisine and can represent an important resource for profitable, integrated local small-scale activities. Wild food species contribute to local food systems and to the local gastronomy, playing an important role in the economy of small communities.

The role of ethnobotanical studies is to avoid the loss of traditional knowledge concerning the use of food plants and, at the same time, provide the basis for developing new drugs from phytochemical and biochemical research.

In this regard, new field investigations aimed at specific knowledge of wild herbs and spices are desirable in Italy.

5. Materials and Methods

5.1. Geographical Context

Italy comprises some of the world's most varied and scenic landscapes [95] and has an excursion of about 12 degrees of latitude (between 35° and 47° N). According to the Köppen climate classification [96], Italy is divided into ten types of climate [97]. The country, therefore, has an extreme variability of environments, ranging from coastal areas to the high altitudes of the Apennines and Alps. The whole Italian flora comprises 8195 native taxa, which is the highest number in Europe [98].

5.2. Data Collection

I searched both national and international journals for articles on the use of wild food plants in Italy from 1950 to 2020 and the first relevant publications date back to 1963. Publications were collected from online versions of the Science Citation Index, Elsevier Journal Finder, ISI web of knowledge, Scopus, and Google Scholar using the key words: ethnobotany, wild food plants, Italy. Further articles and books were gathered from

previously collected papers. The criteria for article selection were defined a priori to avoid personal bias. In all, 106 articles were found in both the databases as well as the previously collected papers, 34 of which contained reports of wild plants specifically used for flavoring (excluding liqueurs and herbal teas). No data concerning plant lore are available for three regions (Veneto, Val D'Aosta and Trentino-Alto Adige), while no data about wild plants used as flavoring are obtainable from five regions (Puglia, Marche, Umbria, Molise and Lazio).

5.3. Data Analysis

Based on the results obtained, I set up a checklist including taxon, family, vernacular names, plant part(s) used, Italian regions for which the use of the species is reported, bibliographic citations, and therapeutic uses. The nomenclature follows the Plant List Database [99]. Families are organized according to APG IV [100] for angiosperms. When helpful, due to the recent changes in nomenclature, synonyms are reported in parentheses.

With a view to assessing the importance of herbs and spices in the study area, I used the Ethnobotanicity Index (EI), sensu Portères [101], which is the ratio, expressed as a percentage, between the number of plants used and total number of plants that constitute the flora of each region.

Supplementary Materials: The following are available online at www.mdpi.com/2223-7747/10/3/563/s1, List S1: Papers which contain reports of wild plants specifically used for flavoring followed by the number of species from each source.

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