



Original Research Article

An investigation into the medicinal plants of Semnan province with taxonomic and therapeutic aspects

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ABSTRACT

In the field of ethnopharmacology, precise identification of collected medicinal plants plays an important role to take a plant-derived compound from local traditional healers to the pharmacy. Therefore, this study is concerned with botanical research on medicinal plants of Semnan province (Iran). According to 379 collected herbarium specimens, 244 medicinal species belonging to 66 plant families and 102 genera were identified. The largest families were Lamiaceae (29 species), Asteraceae (27 species), and Fabaceae (19 species). The most frequently used plant organs were leaves and aerial parts. The most treated used category was the digestive system, followed by the metabolic and immune system, urological problems, respiratory system, gynecology, and dermatological problems. The outstanding therapeutic effects of some less widely known species which traditionally are used among indigenous people were reviewed. The fundamental role of botanists in pharmacological research and the disadvantages of wrong identifications in this field were highlighted.

ARTICLE HISTORY

Received: 16 October 2022
Revised: 23 December 2022
Accepted: 27 December 2022
ePublished: 29 December 2022

KEYWORDS

Bioactive compounds
Botany
Iran
Phytochemistry
Traditional herbal medicine
Wrong identification

doi: 20.1001.1.25883623.2022.6.4.5.7

1. Introduction

Medicinal plants are plants, which are used directly or indirectly in different ways such as fresh, dried, or extracted materials for health, prevention, and therapeutic purposes in humans, animals, and other plants (Farzad, 2013; Omidbaigi, 2005). The history of plants as medicine dates back to human existence at least 5,000 years because after suffering from an illness, humans had no choice except to resort to plants and explore the environment to cure themselves (Zargari, 1989-1991; Pan et al, 2014). Nowadays, as human health is encountered ever-increasing threats and the efficiency of synthetic drugs is dropping more and more, herbal materials can be used as a feasible alternative for human health (Dias et al., 2013; Fierascu et al., 2015; Erhabor et al., 2019). Since humans can extract pharmaceutical products from plants, it is vital to find more effective drugs with

fewer side effects (Lynch and Berry, 2007; Amini Navaie et al., 2015). Also, due to global awareness of the harmful side effects of chemical drugs, investigations have been focused on the therapeutic effects of herbal products (Bashi et al., 2012). World Health Organization (WHO, 2002) reported that many people are dependent upon traditional medicine, e.g. in Africa (80% of people) and China (40%), or complementary and alternative medicine is used to treat different disorders and diseases, e.g. in Canada (70%) and Australia (48%). Information on the chemical components of plants is a great help in discovering therapeutic effects (Mohammadhosseini et al., 2021b). There is a wide range of bioactive compounds in plants such as vitamins, alkaloids, tannins, flavonoids, carnitine, dithiolthiones, choline, carotenoids, glucosinolates, phytoestrogens, coenzyme Q, polyphenols, phytosterols, and taurine which are the most fundamental bioactive components of the plants (Muhammad et al., 2015). Some of these bioactive components are chemotaxonomically

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characteristics of plant families (Mohammadhosseini et al., 2021a; Nahar et al., 2021) and can be effectively used for species identification. The study of traditional medicine based on such bioactive compounds is conducted by interdisciplinary research such as ethnobotany. Ethnopharmacology has recently been defined as the observation, identification, description, and experimental investigation of the ingredients and the effects of indigenous drugs (Hedberg, 1993). Bennett and Balick (2014) discussed the importance of plant taxonomy in medical research. They emphasized that taking a plant-derived compound from local traditional healers to the pharmacy requires the teamwork of all expertise especially plant taxonomists.

According to recent studies, the number of medicinal plants in Iran is estimated to be between 875 to 1500 species (Sefidkon, 2008; Mozaffarian, 2015). Ethnobotanical background in Semnan province is poor while many studies have been conducted on this subject in other provinces (Abbasi et al., 2012; Ahvazi et al., 2012; Dolatkahi et al., 2012, 2014; Rajaei and Mohamadi, 2012; Khajoei Nasab and Khosravi, 2014; Sadeghi et al., 2014; Sharififar et al., 2014; Azizi and Keshavarzi, 2015; Mosaddegh et al., 2016; Vakili Shahrabaki, 2016; Sadat-Hosseini et al., 2017; Jahantab et al., 2018). Among the studies carried out with a botanical approach in Semnan province, we can refer to the ones including the identification of medicinal plants (Roadi et al., 2008; Goudarzi, 2016), floristic studies of Touran biosphere reserve (Asri et al., 2000), Garmsar (Iranbakhsh et al., 2008), Damghan (Karimi, 2009; Masoudian et al., 2009; Ghaderi et al., 2010), Dibaj (Bardsiri et al., 2017) and a study on the distribution of the plant species in the herbarium of Damghan University (Zakeri et al., 2019). However, based on a review conducted by us on literature, a limited number of plant samples have been collected from Semnan province (Rechinger, 1963-2015; Assadi et al., 1988-2018), and no comprehensive botanical/ethnobotanical study has been done in this area. This study aims at collecting, identifying, and preserving the medicinal plant species at the herbarium of Damghan University. This paper is the first comprehensive compilation of medicinal plants of Semnan province with detailed information on therapeutic effects based on botanical investigation, and literature review.

2. Material and Methods

2.1. Study area

Iran is a vast country with an area of 1648195 km². About four-fifths of its surface is located above an altitude of one thousand meters (Zohary, 1973). According to being ecotone and having an intermediate state between the Hyrcanian district (Northern provinces of Iran) and Irano-Turanian region, Semnan province enjoys a rich diversity of flora and fauna. This province is located in the Irano-Turanian region and the two Atropatanean and Central Iran subprovinces (Fig. 1A, Takhtajan, 1986; Assadi, 2006). The most striking features of the Atropatanean subprovince are the presence of xerophytes plants, cushion formation, spiny species, different types of

shrubs, and closed and open woodlands, especially *Juniperus* woodlands (Yousefi, 2007). The Central Iran subprovince is the refuge to steppe and desert species that creates the Irano-Turanian region, and the vast area of this subprovince is covered by the association of *Artemisia* (Zohary, 1973). Semnan province with an area of 97491 km² ranging from 645 to 3885 m a.s.l. is located between 34° 13'–37° 20' N and 51° 51'–57° 03' E and covers 5.9% of the total area of Iran (Fig. 1B). In terms of area, it is the 6th province in Iran. Due to being ecotone and having an intermediate state between Hyrcanian and Irano-Turanian districts, this province has a highly diverse flora and fauna (Bardsiri et al., 2017).

2.2. Climate and vegetation types

Meteorological data shows that Semnan climate is cold in mountainous areas, mild in mountain slopes, and warm around the desert (Fayaz, 2016). The average data for 10 years (2010-2019) given by 6 meteorological stations including Semnan, Shahrood, Damghan, Garmsar, Biyarjomand, and Shahmirzad stations, and the Ambrothermic curve resulted from them shows that this province is dry for 10 months from March to December. The annual mean temperature is 16.95 °C, with an annual average maximum of 22.39 °C and a minimum of 10.57 °C. The lowest temperature reported is minus 19.5 °C in September (2016) and the highest temperature recorded is 46.2 °C in July (2010). The annual mean precipitation is 122.16 mm. The vastness of plant types in Semnan province is 5289603 ha. Different types of plants cover 54.3% of the total lands. The characteristic species are *Salsola dendroides* Pall., *Zygophyllum artiplicoides* Fisch. & C.A. Mey., *Artemisia aucheri* Boiss., *Seidlitzia rosmarinus* Bunge ex Boiss., *Haloxylon ammodendron* (C.A. Mey.) Bunge ex Fenzl, *Astragalus aureus* Willd., *Tamarix ramosissima* Ledeb., *Juniperus excelsa* M. Bieb., *Onobrychis cornuta* (L.) Desv. and *Peganum harmala* L. (Fayaz, 2016).

2.3. Collection and Identification

Since the establishment of the herbarium of Damghan University, plant samples from different parts of Semnan province have been collected and conserved. An important function of an herbarium is to house voucher specimens of medicinal plant material. According to the Index Herbariorum (New York Botanical Garden), there are only two accepted-international herbaria in Semnan province, namely, Damghan University and Islamic Azad University Garmsar. The herbarium of Damghan University was established in 2009 and was registered formally in the index with the herbarium code DU. Our aim is to identify medicinal plants, and collect and conserve plant species of Iran particularly xerophytes and halophytes of deserts, alpine and nival species of the Alborz mountain range. For the time being, there are 6000 standard herbarium specimens from vascular plants being kept in this herbarium and being managed and classified with the Biota software. We chose this herbarium because approximately 70% of the medicinal specimens of

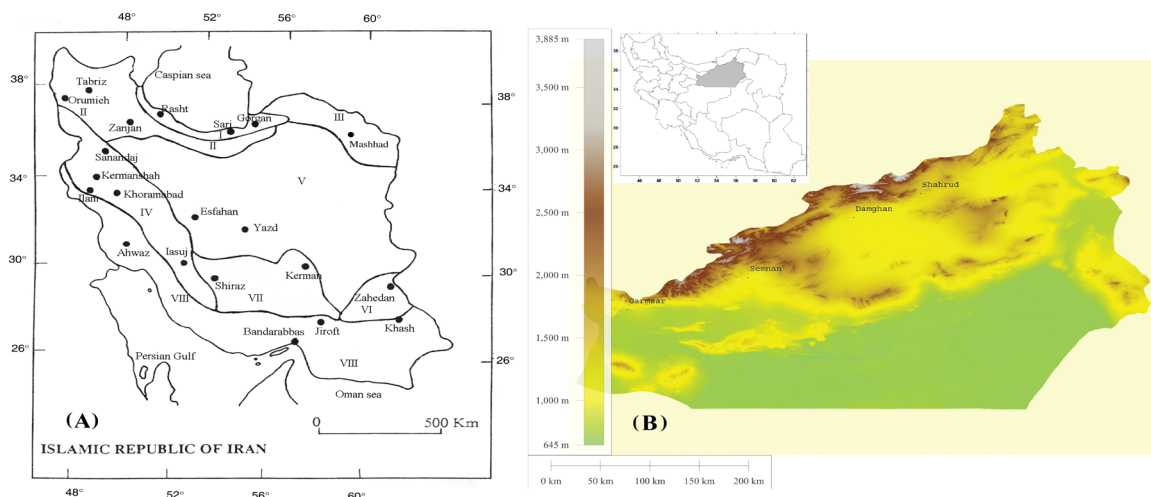


Fig. 1. A. Phytogeographical subprovinces of Iran (Assadi, 2006): I. Hyrcanian; II. Atropatanean; III. N. Khorassan; IV. Kurdo-Zagrosian; V. Central Iran; VI. N. Baluchistan; VII. Fars-Kerman; VIII. Nubo-Sindian. B. The geographical location of Semnan province in the Eastern Alborz Mountains. As can be seen, its height decreases from north to south and leads to the desert plains.

Semnan province are kept at Damghan University. Floristic exploration and collection were made during the period 2013-2018. The floristic data are also being used for further ongoing analyses. Plant identification was carried out based on *Flora of Iran* (Assadi et al., 1988-2018) and *Flora Iranica* (Rechinger, 1963-2015). To have a more precise identification, other resources such as *Flora of Turkey and the East Aegean Island* (Davis, 1965-1988), *Flora Europaea* (Tutin and Heywood, 1964-1980), *Flora of Iraq* (Townsend et al., 1966-1985), *Flora of U.S.S.R* (Komarov, 1934-1957) were also used. Plant specimens with images of the type and collected herbarium specimens existing in the virtual herbaria like Edinburgh, Berlin, Kew, Vienna, etc. were compared; also scientific names of the identified species were conformed to IPNI (2012). Medicinal properties and bioactive compounds of plant species were indicated based on the literature review of 639 published papers (Al-Fattly, 2016; Azadmehr et al., 2014; Zargari, 1989-1991; Naghibi et al., 2005; Yazdanparast et al., 2008; Lakić et al., 2010; Pourmotabbed et al., 2010; Ibraheim et al., 2011; Bahrami et al., 2013; Raei et al., 2014; Hamzeloo-Moghadam et al., 2015; Moghadam et al., 2017; Wang et al., 2017; Bardaweel et al., 2018; Kadam et al., 2018; Kalantari et al., 2018; Jafarinia and Jafarinia, 2019). In the phytochemical papers, a variety of techniques were used for the extraction, isolation, and identification of chemical compounds such as Hydrodistillation (HD), Steam distillation (SD), and Solvent-free microwave extraction (SFME) methods, TLC chromatography, HPLC chromatography, Gas chromatography-mass spectrometry (GC-MS) and NMR spectroscopy. Finally, the Persian names of the identified species were introduced based on the dictionary of Iranian plant names (Mozaffarian, 2009). In this paper, we fully mentioned voucher specimens such as collector names, collector numbers, and herbarium numbers, for example, one of the voucher specimens of *Artemisia aucheri* is Naderi 1626 (DU000349) in which "Naderi" is

a plant collector, "1626" is the collector code. DU is the abbreviation of the herbarium of Damghan University and 000349 is the specimen code belonging to that sheet.

3. Results and Discussion

3.1. Plant diversity

According to the obtained information, Semnan province has 244 medicinal taxa which belong to 102 genera and 66 plant families. Lamiaceae, with 29 species and 21 genera have the highest number of medicinal species in this province. Asteraceae, with 27 species and 22 genera; Fabaceae, with 19 species and 17 genera; Rosaceae, with 16 species and 11 genera; Apiaceae, with 14 species and 12 genera; Brassicaceae, with 10 species and 9 genera; and Chenopodiaceae, with 9 species and 7 genera are ranked in the next places in terms of the number of medicinal plants (Fig. 2). The genus *Prunus* (with 5 species), *Solanum* (with 4 species), and *Artemisia*, *Chenopodium*, *Rumex*, *Thymus*, *Ziziphora*, each with 3 species, have the highest species richness, and for the rest of the genera 1 or 2 medicinal species were identified. Structures of the isolated compounds of some medicinal plants in Semnan province including 5-O-caffeoylquinic acid (*Cydonia oblonga* Mill., *Cynara scolymus* L., *Hypericum androsaemum* L., and *Prunus cerasus* L.), epicatechin (*Capparis spinosa* L., *Polygonum lapathifolium* L., and *Solanum nigrum* L.), and artemisinin (*Artemisia annua* L., *A. aucheri* Boiss., and *A. scoparia* Waldst. & Kitam.) are shown in Fig. 3. 226 species belong to dicotyledons, 13 species to monocotyledons including *Allium akaka* S.G.Gmel. ex Schult. & Schult.f., *A. cepa* L., *Yucca filamentosa* L., *Phoenix dactylifera* L., *Arundo donax* L., *Avena sativa* L., *Cymbopogon jwarancusa* (Jones) Schult., *Cynodon dactylon* (L.) Pers., *Hordeum vulgare* L., *Phragmites australis* (Cav.) Trin. ex Steud., *Triticum aestivum* L., *Cyperus rotundus* L., and *Typha*

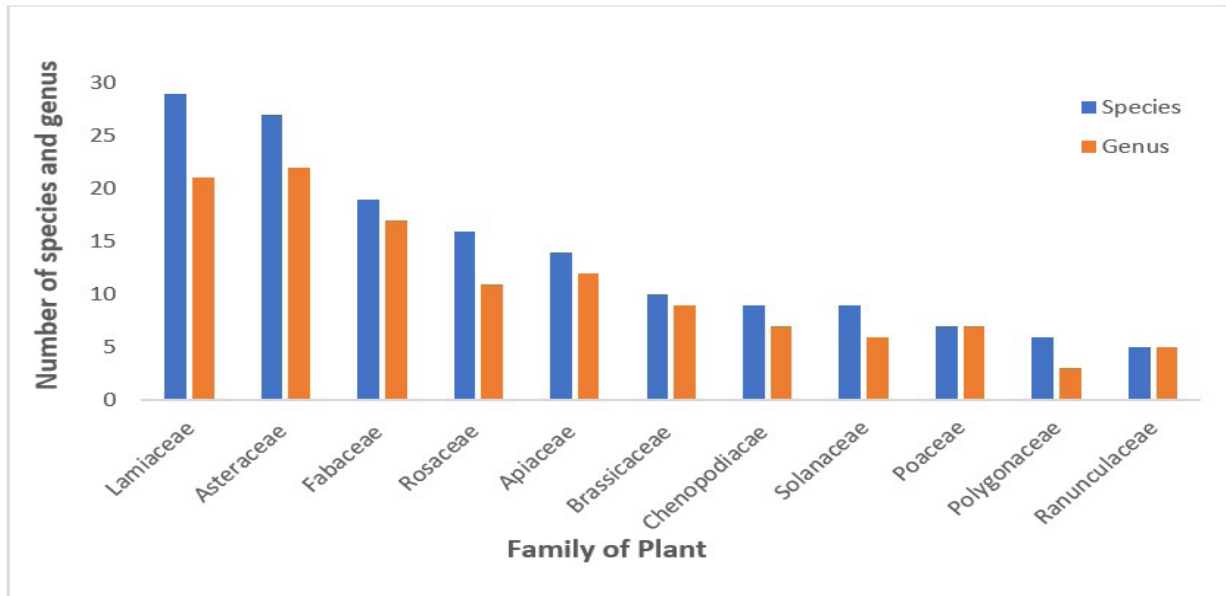


Fig. 2. Plant families with the highest number of species and genus.

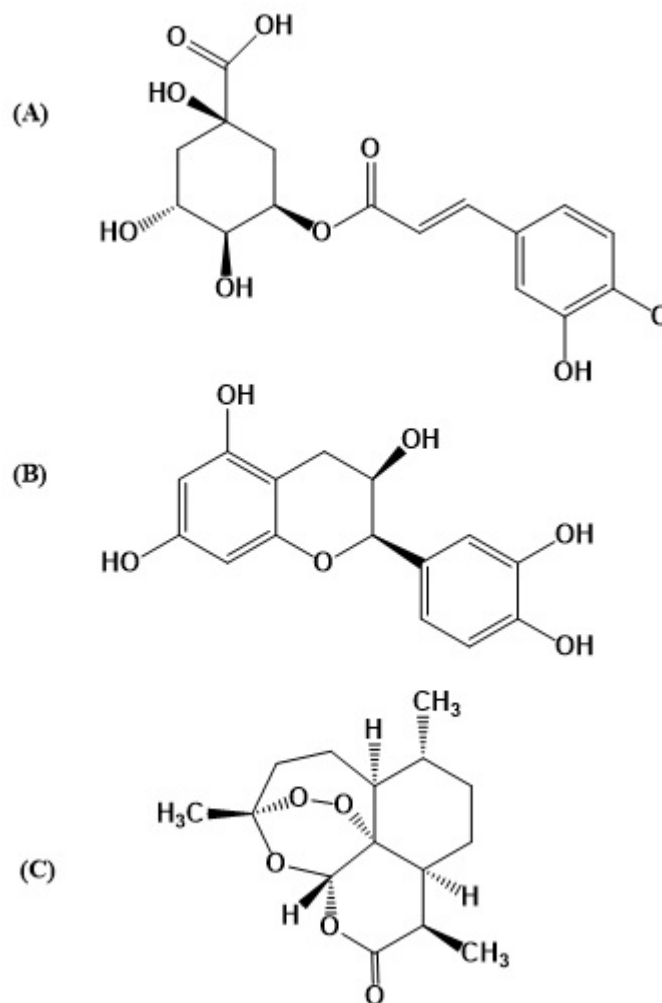


Fig. 3. Structure of the isolated compounds of some medicinal plants in Semnan province. A. 5-O-Caffeoylquinic acid (*Cydonia oblonga*, *Cynara scolymus*, *Hypericum androsaemum* and *Prunus cerasus*); B. Epicatechin (*Capparis spinosa*, *Polygonum lapathifolium* and *Solanum nigrum*); C. Artemisinin (*Artemisia annua*, *A. aucheri* and *A. scoparia*).



domingensis Pers.; 3 species belong to gymnosperms including *Juniperus communis* L., *J. sabina* L. and *Taxus baccata* L.; and 3 species belong to ferns including *Adiantum capillus-veneris* L., *Asplenium adiantum-nigrum* L. and *A. trichomanes* L. The list of medicinal plants is given in Table 1 and the scientific names, for ease and taxonomical classification, are sorted by alphabetical order of the plant families. The number of medicinal plants in Semnan province reported by previous studies is varied. The importance of medicinal plants in the region has been highlighted by Roadi et al. (2008) and Goudarzi (2016), which introduced 133 and 110 medicinal species, respectively. Our study could provide more comprehensive data (including 244 species) in comparison to the previous studies for this region. Perennial herbs represented the most diverse life-form of medicinal plants in the studied area (97 spp), followed by annual or biennial herbs (89 spp), and trees or shrubs (58 spp). Mahdavi et al. (2012) studied the life-form patterns of steppe vegetation in the Alborz Mountains. They declared that the number of annuals decreased while perennials (including hemicryptophytes chamaephytes) increased along the altitudinal gradient. According to the almost equal collection of perennial and annual or biennial species in our study (97 vs. 89), it can be concluded that the study could cover whole areas in both low and high altitudes. Ethnobotany is the investigation of how people use plants in their traditional societies, which can prepare new and helpful plant products to serve the world (IUCN, 1986). Ethnobotanical background in Semnan province is poor, however, Ghamari et al. (2021) by using questionnaire forms and interviews in Semnan city, identified 36 medicinal species belonging to 20 families of which Lamiaceae with 13 species was the richest family. Considerable ethnobotanical-pharmacological investigations have been done on medicinal plants in other provinces. Results of those investigations have revealed that Lamiaceae and Asteraceae have the most traditional usage among the Iranian people for treating diseases (Abbasi et al., 2012; Dolatkhahi et al., 2012, 2014; Mosaddegh et al., 2012, 2016; Rajaei and Mohamadi, 2012; Khajoei Nasab and Khosravi, 2014; Sadeghi et al., 2014; Shariffar et al., 2014; Azizi and Keshavarzi, 2015; Vakili Shahrabaki, 2016; Sadat-Hosseini et al., 2017; Jahantab et al., 2018; Maleki and Akhane, 2018). Our results indicate a high number of medicinal species within Lamiaceae (29 species and 21 genera) and Asteraceae (27 species and 22 genera) in Semnan province that are consistent with the previous studies. Lamiaceae is a large family, which is usually known for its opposite leaf and noticeably zygomorphic flowers. It encompasses more than 300 genera and 7000 species distributed throughout the world including herbs, shrubs and trees. Lamiaceae has a cosmopolitan distribution, ranging from sea level to high altitude, with several centers of diversification particularly in the Mediterranean region (Heywood et al., 2007). The family is famous for the essential oils contained in glands on epidermal cells and the presence of phenolic compounds in its members and is one of the major sources of aromatic and culinary herbs such as *Mentha*, *Origanum*, *Rosmarinus*, *Salvia*, and *Thymus*.

Due to high diversity and endemism in Lamiaceae, many species are customarily used by the indigenous people and traditional healers of Iran (Naghbi et al., 2005). The chemical compounds of this family are well-known as an analgesic and anti-inflammatory and have proapoptotic, antiproliferative, antioxidant, and antimicrobial activities (Pourmotabbed et al., 2010; Esmaeili-Mahani et al., 2014; Jassbi et al., 2014; Barreto et al., 2016; Bardaweel et al., 2018; Asadollahi et al., 2019). Asteraceae is one of the largest and best-known plant families which is widely distributed throughout the world, although absent in the Antarctic mainland. The family contains about 1600 genera and 25000 species and is one of the main constituents of the floras of the semiarid regions of the tropics and subtropics (Heywood et al., 2007). Many species of Asteraceae have therapeutic properties and some studies proved the anti-inflammatory, antibacterial and antifungal effects of several genera such as *Achillea*, *Artemisia*, *Centaurea*, *Cichorium*, *Gundelia*, *Helichrysum*, *Pterocaulon*, *Scorzonera*, *Tanacetum* and *Vernonia* (Toyang and Verpoorte, 2013; Achika et al., 2014; Suntar, 2014; Koc et al., 2015; Medeiros-Neves et al., 2018; Jafarinia and Jafarinia, 2019), these effects might be due to high amount of polyphenols, flavonoids and diterpenoids in these plants.

3.2. Plant organ used

The most frequently used organs were leaves (22%), followed by aerial parts (19.42%), fruits (15.66%), roots (12.47%), seeds (9.28%), flowers (8.70%), barks (5.22%), stems (4.64%), saps (2.32%) and bulbs (0.29%) (Fig. 4). According to the present investigation, plant organs have different effects on healing diseases. For example, leaf, stem, fruit, flower juice and root in *Vitex* spp. (Lamiaceae), are separately utilized as fumigation (pulmonary disorders), pertussis in children, female hormones regulator, diarrhea and antifebrile, respectively (Mozaffarian, 2015). Our results are consistent with previous ethnobotanical studies in which leaves or aerial parts were the most used parts for the treatment of various diseases among the Iranian people (Ghorbani, 2005; Mosaddegh et al., 2012; Rajaei and Mohamadi, 2012; Dolatkhahi et al., 2014; Sadeghi et al., 2014; Sadat-Hosseini et al., 2017; Jahantab et al., 2018; Maleki and Akhane, 2018). The high usage of these two organs might be due to the different concentrations of biological ingredients in contrast to other organs of the plant (Rehman et al., 2015). Leaves and aerial parts are active in photosynthesis and encompass more secondary compounds to protect themselves against herbivores (Ghorbani, 2005; Bhattarai et al., 2006; Srithi et al., 2009; Rehman et al., 2015). According to investigation on the six richest plant families in the studied area (see Fig. 2, it has been revealed that medicinal properties of those families are related to different organs of plants (e.g., aerial part, leaf, fruit, root, etc.) except Lamiaceae (aerial part, see above discussion) and Apiaceae (fruit). Amiri and Joharchi (2016) reviewed ethnobotanical uses of Apiaceae by the Iranian people and pointed out that the most used organs of Apiaceae were fruits (21 out of 70 spp.). Their results are congruent

Table 1. Medicinal plants of Semnan province (Iran).

No	Scientific name	Family	Vernacular name	Some bioactive compounds	Medicinal properties	Organ used	Voucher specimens/citations
1	<i>Adiantum capillus-veneris</i> L.	Adiantaceae (Pteridaceae)	Parsiavash	Dodecanoic acid, ethyl ester, nonadecane, tetradecanoic acid, 3,7,11,15-tetramethyl-2-hexadecan-1-ol, acetic acid, 3,7,11,15-tetramethyl-hexadecyl ester, 3,7,11,15-tetramethyl-2-hexadecan-1-ol	Expectorant, laxative, diaphoretic	Leaf	(Assadi et al., 1988-2018)
2	<i>Gomphrena globosa</i> L.	Amaranthaceae	Tokmei	<i>p</i> -Coumaric, kaempferol-3- <i>O</i> -glucoside, kaempferol-3- <i>O</i> -rutinoside, isorhamnetin-3- <i>O</i> -glucoside, isorhamnetin-3- <i>O</i> -rutinoside	Cough, asthma, chronic bronchitis, pertussis	Whole organs	Mohammadi and Ghorbani 1862 (DU000604)
3	<i>Pistacia atlantica</i> Desf.	Anacardiaceae	Baneh	α -Pinene, sabinene, β -myrcene, α -terpinene, limonene, <i>cis</i> -ocimene, <i>trans</i> -ocimene	Diuretic, diarrhea	Bark and root	(Assadi et al., 1988-2018)
4	<i>Pistacia vera</i> L.	Anacardiaceae	Pesteh	Gallic acid, protocatechuic acid, chlorogenic acid, catechin, eriodictyol-7- <i>O</i> -glucoside, quercetin-3- <i>O</i> -rutinoside	Antioxidant, anemia, hyperlipidemia, cardiovascular problems, weight loss	Fruit	Alemi 187 (DU)
5	<i>Rhus coriaria</i> L.	Anacardiaceae	Somagh	Gallic acid, methyl gallate, amenthoflavone, cyanidin 3- <i>O</i> -glucoside, quercetin-3- <i>O</i> -glucoside, myricetin-3- <i>O</i> -rhamnos	Diarrhea, hemostatic, hemoptysis, tuberculosis, metrorrhagia	Whole organs	Hosseini 1874 (DU000615)
6	<i>Anethum graveolens</i> L.	Apiaceae	Shevid	α -Phellandrene, β -phellandrene, myristicin, <i>p</i> -cymene, α -pinene, limonene	Carminative, diuretic, anticonvulsant, antiemetic, galactagogue, digestive system tonic	Fruit and leaf	Rezaie 1823 (DU000565); Alemi 1822 (DU000564)
7	<i>Anthriscus cerefolium</i> (L.) Hoffm.	Apiaceae	Jafari Vahshi	Apiin, methylchavicol, 1-allyl-2,4-dimethoxybenzene, luteolin-7- <i>O</i> -apiosylglucoside, deoxypodophyllotoxin	Appetizing, diuretic, jaundice, gout, chronic skin diseases	Whole organs	(Rechinger, 1963-2015)
8	<i>Anthriscus sylvestris</i> (L.) Hoffm.	Apiaceae	Jafari Vahshi	3-Methoxy-4,5-methylenedioxybenzaldehyde, β -sitosterol, (Z)-2-angeloyloxymethyl-2-butenic acid, (-)-(<i>R</i>)-carveol, margaric acid triglycerides, 5-(3-methoxy-1-propenyl)-1,3-benzodioxole, isothricin, deoxypicropodophyllotoxin	Scrofula, eczema, tuberculosis, water retention (e.g. ascites)	Whole organs	(Assadi et al., 1988-2018)
9	<i>Bupleurum exaltatum</i> M.Bieb.	Apiaceae	Chatr Gandomi	<i>trans</i> -2-Hexenal, myrcene, limonene, (<i>E</i>)- β -farnesene, germacrene-D, caryophyllene oxide	Astringent, wound healing	Whole organs	(Rechinger, 1963-2015)
10	<i>Conium maculatum</i> L.	Apiaceae	Shokarane Kabir	Coniine, N-methylconiine, conhydrine, pseudoconhydrine, γ -coniceine, Conhydrinone	Asthma, lenitive, pertussis, sciatica, esophagus spasms	Fruit and leaf	(Roadi et al., 2008)
11	<i>Coriandrum sativum</i> L.	Apiaceae	Geshniz	Linalool, γ -terpinene, α -pinene, camphor, decanal geranyl acetate, limonene, geraniol, camphene	Carminative, diuretic, anticonvulsant, emmenagogue, epilepsy, anthelmintic	Fruit	Alemi 1825 (DU000567)
12	<i>Cuminum cyminum</i> L.	Apiaceae	Zire Sabz	Cuminal, safranal, 2-ethylidene-6-methyl-3,5-heptadienal, α -proyl-benzenemethanol	Epilepsy, anticonvulsant, stomach tonic, carminative, emmenagogue, diaphoretic	Fruit	Alemi 1826 (DU000568)
13	<i>Daucus carota</i> L.	Apiaceae	Havij	Falcarinol, falcarindiol, falcarindiol-3-acetate, carotenoids, lutein	Diuretic, water retention, stomach tonic, antifatulent, snake antivenom, cough, asthma, hemoptysis, aphrodisiac, hysteria, ischuria, gastrointestinal inflammation, anthelmintic	Seed and root	It is frequently seen in Semnan province
14	<i>Dorema ammoniacum</i> D. Don	Apiaceae	Vashagh	Chlorogenic acid, quercetin, mandelic acid, phloroglucinol, hydroxy benzoic acid, pyrogallol	Emmenagogue, expectorant, chronic bronchitis	Whole organs	Khajeh-zade 1824 (DU000566)
15	<i>Ferula assa-foetida</i> L.	Apiaceae	Anghooze	α -Pinene, β -inene, myrcene, limonene, terpenoids, resin	Anticonvulsant, emmenagogue, anthelmintic, larynx spasm, asthma, anti-constipation, digestive system diseases	Sap extracted from root and basal parts of stem	Recorded by Goudarzi (2016) but confirmation of its presence in Semnan province needs further investigation
16	<i>Ferula persica</i> Willd.	Apiaceae	Komaye-Irani	Dill-apiole, elemicin, limonene, 6-camphenol acetate	Constipation, antifatulent, hysteria	Sap extracted from root and basal parts of stem	(Rechinger, 1963-2015); (Goudarzi, 2016)
17	<i>Heracleum persicum</i> Desf. ex Fisch., C.A.Mey. & Avé-Lall.	Apiaceae	Golpar	<i>trans</i> -Carveol, α -terpineol, isobornyl formate	Flavoring, antifatulent	Fruit	Alemi 299 (DU)

Table 1 Continued

No	Scientific name	Family	Vernacular name	Some bioactive compounds	Medicinal properties	Organ used	Voucher specimens/citations
18	<i>Pimpinella anisum</i> L.	Apiaceae	Anison	<i>trans</i> -Anethole, γ -himachalene, methyl chavicol, limonene, carvone	Stomach and intestine spasms, carminative, vertigo, cough, asthma, bronchitis, galactagogue, headache	Fruit	Cultivated in a few areas of Semnan province
19	<i>Pycnocyclus spinosa</i> Decne.	Apiaceae	Sag Dandan-e Khardar	<i>cis</i> -Asarone, widdra-2,4-diene, elemicin, caryophyllene oxide	Medicinal properties are unknown. People in south of Iran use some species of this genus for incense	Aerial parts	Saberi et al. 2287 (DU001005)
20	<i>Phoenix dactylifera</i> L.	Arecaceae	Nakhl, Khorma	Tubuloside A, dracunculifoside K, occidontoside, 2-acetyl-1,3-di[(<i>E</i>)-feruloyl]glycerol, tubuloside B, (<i>E</i>)-caffeoyl-6- <i>O</i> -D-gluconic acid	Cough, purgative, expectorant, aphrodisiac, thoracic disease, anemia	Fruit	Torabi and Salehi 1838 (DU000580); Bashiriyan 1837 (DU000579); Saeedi 1839 (DU000581)
21	<i>Cynanchum acutum</i> L.	Asclepiadaceae	Alaf Parastoo	Quercetin glycosides, tamarixtin glycosides, kaempferol galacturonoside	Purgative, poisonous	Sap	Naderi and Amirahmadi 2241 (DU000998); DU001007; DU001008; DU001009
22	<i>Asplenium adiantum-nigrum</i> L.	Aspleniaceae	Sarakhs-e Shakh Gavazni	1-Octen-3-ol, linalool, <i>n</i> -nonanal, α -terpineol, 2,4-di- <i>t</i> -butylphenol, dihydroactinidiolide, 1-hexadecene, hexahydrofarnesyl acetone, palmitic acid	Diuretic, laxative, hiccups, expectorant, emmenagogue, anthelmintic, aborticide, eye swelling, spleen and pulmonary disease	Whole organs	Naderi 2052 (DU000795)
23	<i>Asplenium trichomanes</i> L.	Aspleniaceae	Seporz Daroy-e Parsiavashi	<i>n</i> -Nonanal, camphor, 1-hexacosanal, 1-dodecene, 2,4-di- <i>t</i> -butylphenol, 1-hexadecene, hexahydrofarnesyl acetone	Expectorant, cold, cough	Leaf	Nadedi and Barjaste 2062 (DU000805)
24	<i>Achillea millefolium</i> L. subsp. <i>millefolium</i>	Asteraceae	Boomadaran-e Hezar Barg	<i>trans</i> -Carveol, (-)- β -pinene, <i>cis</i> -carveol	Nutritious, epilepsy, hemorrhoids, emmenagogue, hemostatic, wound healing, carminative, gastritis, heart tonic, nerve tonic	Leaf and aerial parts with flower	Naderi 1627 (DU000350); Naderi 1613 (DU000333)
25	<i>Achillea wilhelmsii</i> K.Koch	Asteraceae	Boomadaran	Carvacrol, dihydrocarvone, α -terpineol, Linalool, <i>cis</i> -jasmone, verbanol acetate, carvacrol	Expectorant, anthelmintic, carminative, cough, bellyache in children	Flower	Naderi 1617 (DU000340)
26	<i>Anthemis tinctoria</i> L.	Asteraceae	Baboone-ye Zard	Camphor, α -pinene, β -pinene (<i>E</i>)-caryophyllene, borneol spatulenol, <i>cis</i> -chrysanthenol, conduritol F-1- <i>O</i> -(6'- <i>O</i> - <i>E</i> - <i>p</i> -caffeoyl)- β -D-glucopyranoside	Appetizing, wound healing, purgative, spasmolytic, emmenagogue	Fruit and flower	Salamat 1999 (DU000740)
27	<i>Arctium lappa</i> L.	Asteraceae	Baba Adam	Purine, octanamide, arctiin, 1,1-diphenyl-2-picrylhydrazyl	Blood purification, decreasing blood sugar, acne, cholagogue, diuretic, diaphoretic, gout, kidney stones, measles, rheumatism, lung secretions, liver disease	Root	(Roadi et al., 2008)
28	<i>Artemisia annua</i> L.	Asteraceae	Dermaneh Koohi	Artemisinin, β -selinene, caryophyllene, caryophyllene oxide, germacrene D	Stomach tonic, jaundice, dermal disorders	Aerial parts with flower	(Roadi et al., 2008)
29	<i>Artemisia aucheri</i> Boiss.	Asteraceae	Dermaneh Koohi	Artemisinin, thymol, linalool, geraniol, camphor, 1,8-cineole, davana ether, <i>cis</i> -davanone, decane, <i>p</i> -cymene, linalool, <i>p</i> -mentha-8-ol, triene, borneol, lavandulol, bornyl acetate, chrysanthenyl acetate, dehydro aromadenderene, caryophyllene oxide	Antiseptic, anthelmintic, cough, headache, antifungal, antimicrobial, anesthetic, swelling treatment, antiflatulent, bronchial opening	Aerial parts with flower	Naderi 1626 (DU000349); Elahiye 2002 (DU000743); Robati 2004 (DU000745); Alemi 2006 (DU000747); Alemi 2003 (DU000744); Tohidifar 2005 (DU000746)
30	<i>Artemisia scoparia</i> Waldst. & Kitam.	Asteraceae	Dermaneh Sharghi	Artemisinin, diacetylenes 1-phenyl-2,4-pentadiyne and capillene, β -pinene, methyl eugenol, α -pinene, myrcene, limonene, (<i>E</i>)- β -ocimene	Purgative, burns, ear disease treatment	not exactly known	(Assadi et al., 1988-2018); (Rechinger, 1963-2015)
31	<i>Calendula officinalis</i> L.	Asteraceae	Hamishe Bahar	T-Murolol, α -thujene, δ -cadinene, 1,8-cineole, γ -terpinene, β -pinene	Aborticide, antimicrobial, anthelmintic, antifebrile, antiviral, antitumor, heart tonic, purgative, diaphoretic, diuretic, emmenagogue, antifungal, antihypertensive, stomach tonic, etc.	Fruit	Zohrevand 2014 (DU000755)
32	<i>Carthamus oxyacantha</i> M. Bieb.	Asteraceae	Golrang-e Zard	Linoleic oil, palmitic acid, stearic acid, oleic acid, linoleic acid	Itch, chronic wound bandage	Seed	Bandari 2057 (DU000800)
33	<i>Centaurea depressa</i> M.Bieb.	Asteraceae	Gol-e Gandom	Piperitone, elemol, thymol, spathulenol, germacrene D, pentadecadiene-1-ol, Z-7-hexadecene germacrene B, spathulenol, eudesms-4(15)-7-diene-1- β -ol, tetradecanal, caryophyllene oxide, Z-7-hexadecene	Nerve tonic	Whole organs	Salamat 2017 (DU000759); Amiriyan 2016 (DU000758); Lasjerdy 2018 (DU000760); Ehsani and Taghribiyan 2019 (DU000761); Motahrinejad and Mohammadi 2015 (DU000757)

Table 1 Continued

No	Scientific name	Family	Vernacular name	Some bioactive compounds	Medicinal properties	Organ used	Voucher specimens/citations
34	<i>Cichorium intybus</i> L.	Asteraceae	Kasni	Carvacrol, thymol, cinnamic aldehyde, camphor, carvone, linalool, α -terpineol, chicoric acid, caffeic acid, chlorogenic acid, ferulic acid	Stomach tonic, diuretic, laxative, antifebrile, appetizing, jaundice, hematuria, liver disorders, blood purification, hysteria	Whole organs	Motaharnejad and Mohammadi 2021 (DU000763); Sharifi 2029 (DU000771); Amirahmadi 2022 (DU000764); Bashiriayn 2023 (DU000765); Kazem Zadeh 2020 (DU000762)
35	<i>Cirsium arvense</i> (L.) Scop.	Asteraceae	Kangar Harz	Nonadecane, β -citronellol, camphor, heneicosane, phytol	Rabies, diuretic, appetizing, dermal disorders, hematuria	Root	(Assadi et al., 1988-2018)
36	<i>Conyza canadensis</i> (L.) Cronquist	Asteraceae	Pir Baharak Canadai	(4Z)-Lachnophyllum lactone, (4Z,8Z)-matricaria lactone, limonene, trans- α -bergamotene	Astringent, hemostatic, diuretic, lung secretions, bladder inflammation, dysentery	Whole organs	Shiriyani 2001 (DU000742); Fatalian and Shadkam 2000 (DU000741); Alemi 2008 (DU000749); Zanganeh 2009 (DU000750); Talebi 2010 (DU000751)
37	<i>Cynara scolymus</i> L.	Asteraceae	Kangar Farangi	<i>cis</i> -Piperito, geranyl formate, limonene aldehyde, (Z)-damascone, cyclosativene, 4-(E)-octene, myrtenol, isocitronellene, <i>n</i> -hexano, myrtenal, fenchone, 1,3-di-O-caffeoylquinic acid, luteolin	Cholagogue, diuretic, appetizing, hyperlipidemia, antifebrile, improve blood flow, anemia, dermal disorders, diabetic, liver tonic, rheumatism	Whole organs	It is seen in the campus of Damghan University
38	<i>Echinops ritrodes</i> Bunge.	Asteraceae	Shekar Tighal Mashhadi	Thiophenes, terpenes, flavonoids, phenolic compounds, alkaloids, lipids, phenylpropanoids	Diuretic, diaphoretic	Whole organs except fruit	(Goudarzi, 2016); (Rechinger, 1963-2015)
39	<i>Helianthus annuus</i> L.	Asteraceae	Aftabgardoon	Linoleic acid, oleic acid, α -pinene, sabinene	Antifebrile, bronchial opening, respiratory disease (e.g. pulmonary gangrene, pleurisy), expectorant	Flower, seed, leaf and stem	It is seen in Semnan province
40	<i>Lactuca serriola</i> L.	Asteraceae	Kahoye Khardar	Heneicosane, (E)- β -ionone, hexadecanoic acid, hexahydrofarnesyl acetone, tricosane, heptacosane, phytol, pentacosane	Anticonvulsant, emollient, asthma, cough, bronchitis, hypnotic, tachycardia	Whole organs	Naderi 2240 (DU000997)
41	<i>Lapsana communis</i> L.	Asteraceae	Gole-Khorshidi	Acetofenone, nonanal, ethyl-3-hydroxymandelic acid ester, decanal, heptadecane	Laxative, wound healing	Whole organs	(Assadi et al., 1988-2018)
42	<i>Onopordum acanthium</i> L.	Asteraceae	Khar Panbeh	Pentacosane, hexacosane, β -eudesmol, heptacosane, tetracosane, tricosane, 1-hexanol, 3-hexen-1-ol, nonanal, nonacosane, hentriacontane, dotriacontane	Diuretic, stomach tonic, appetizing, wound healing, hairloss	Root, leaf	(Assadi et al., 1988-2018)
43	<i>Senecio vulgaris</i> L.	Asteraceae	Pir-Giyah	α -Humulene, (E)- β -caryophyllene, terpinolene, ar-curcumen, geranyl linalool	Emmenagogue, laxative, hemostatic, hemoptysis, epilepsy, kidney stones, jaundice, rheumatism, gout, bleeding	Whole organs	Ghorbani and Nasaie 2007 (DU000748)
44	<i>Sonchus asper</i> (L.) Hill	Asteraceae	Shir-Tighak	Benzoic acid, 4-hydroxy-3-methoxy-, methyl ester, 13-cis-retinoic acid; pyridine, 2-pentyl-; 9-octadecenamide, (Z)-and L-proline	Asthma, earache, wound healing, thorax disorders	Whole organs	Robati 2011 (DU000752); Yarahmadi 2012 (DU000735)
45	<i>Tanacetum parthenium</i> (L.) Sch.Bip.	Asteraceae	Babooneh-Gavi	Chlorogenic acid, parthenolide, camphor, (Z)- chrysanthenyl acetate, α -farnesene, spathulenol	Stomach tonic, anticonvulsant, diarrhea, emmenagogue, antifebrile, anthelmintic	Aerial parts with flower	(Assadi et al., 1988-2018); (Rechinger, 1963-2015)
46	<i>Tanacetum polycephalum</i> Sch. Bip. subsp. duderanum (Boiss.) Podlech	Asteraceae	Mina-ye Porkappeh Dodarrei	Chlorogenic acid, parthenolide, camphene, 1,8-cineole, chrysanthenone, camphor, borneol	antimicrobial	Flower	Naderi 1597 (DU000317); Naderi 1595 (DU000315)
47	<i>Tragopogon graminifolius</i> DC.	Asteraceae	Sheng	<i>n</i> -Hexadecanoic acid, β -caryophyllene, heneicosane, nonana	Medicinal properties are unknown. This species is used either raw or cooked vegetable	Leaf	It is seen in Semnan province
48	<i>Tussilago farfara</i> L.	Asteraceae	Pay-Khar	Ferulic, <i>p</i> -hydroxybenzoic, caffeic, caffeotartaric acids, quercetin, kaempferol	Cough, abscess, erysipelas, dermal disorders, antimicrobial, anticancer, heart tonic, diuretic, laxative, expectorant, hypotension, immune system stimulation, thorax disorder, anti-adhesion of platelets	Whole organs	Gisorie 2024 (DU000766); Rezaie and Ghorbani 2025 (DU000767); Alemi 2028 (DU000770); Aghayan 2026 (DU000768); Heydari 2027 (DU000769)
49	<i>Xanthium spinosum</i> L.	Asteraceae	Zardineh Khardar	2-Heptene, 5-methyl,4-heptanone, eudesma-4(14),7-dien-1 β -ol, germacrene D, cadalene	Diuretic, scrofula, astringent	Whole organs	(Assadi et al., 1988-2018)

Table 1 Continued

No	Scientific name	Family	Vernacular name	Some bioactive compounds	Medicinal properties	Organ used	Voucher specimens/citations
50	<i>Xanthium strumarium</i> L.	Asteraceae	Zardineh	Bornyl acetate, limonene, β -selinene, thiazides, anthraquinones, naphthoquinones	Anthelmintic, laxative, appetizing, anticancer, sedative, blood purification, dermal acne, abscess, wounds	Whole organs	Motaharnejad and Ghomi 2031 (DU000773); Seyfi 2013 (DU000754); Tohidifar and Mohammadifar 2030 (DU000772); Naderi and Amirahmadi 2242 (DU000999)
51	<i>Berberis integerrima</i> Bunge	Berberidaceae	Zereshk Zarafshani	β -Sitosterol, campesterol, stigmasterol cholesterol, sitostanol, δ 5-avenasterol, δ 7-avenasterol, clerosterol, α -tocopherol, γ -tocopherol, inolenic, linoleic and oleic acids, berberis	Antimicrobial, anticancer, anticonvulsant, antifebrile, spasmolytic, astringent, cholagogue, diaphoretic, diuretic, expectorant, antifungal, liver tonic, etc.	Fruit, leaf, root and bark	Motaharnejad and Mohammadi 1861 (DU000603); Alayi 1857 (DU000599); Samsami 1860 (DU000602); Soleymani and AbAsian 1856 (DU000598); Esmaili and Ghomi 1858 (DU000600); Naderi 2041 (DU000784); Naderi 2042 (DU000785)
52	<i>Berberis vulgaris</i> L.	Berberidaceae	Zereshk	Tetracosanoic acid, methyl ester, phthalic acid, diisooctyl ester, 1,2-bis(trimethylsiloxy) ethane, 1,2-benzendicarboxylic acid, diisononyl ester, berberis	Purgative, antibilious, diuretic, antiseptic, chronic dysentery, water retention, antiscorbutic	Whole organs	(Goudarzi, 2016)
53	<i>Betula pendula</i> Roth	Betulaceae	Ghan	α -Copaene, germacrene D, δ -cadinene	Diuretic, blood purification, anthelmintic, antifebrile, wound healing, rheumatism	Leaf, bark and sap	(Assadi et al., 1988-2018)
54	<i>Anchusa italica</i> Retz.	Boraginaceae	Gol-e Gavzaban	Diisobutyl phthalate, dibutyl phthalate, hexahydrofarnesylacetone, (E)-2-hexanal, acetylacetone, (E)-geranylacetone	Emollient	Leaf	(Assadi et al., 1988-2018)
55	<i>Asperugo procumbens</i> L.	Boraginaceae	Alaf-e Chasbak	Omega-3 fatty acids- stearidonic acid (SDA), α -linolenic acid (ALA), omega-6 fatty acid- γ -linolenic acid	Sedative, liver tonic, diaphoretic, blood purification, expectorant	Root	Naderi 1672 (DU000405)
56	<i>Echium amoenum</i> Fish. & C.A. Mey.	Boraginaceae	Golgavzaban Irani	Octadecane, heptadecane, viridiflorol, linoleic, oleic, palmitic, gadoleic and steric acid	Diaphoretic, cold	Flower	Ghorbani and Nasaei 1869 (DU000610)
57	<i>Brassica rapa</i> L.	Brassicaceae	Shalgham	Palmitic, stearic, linoleic, eicosanoic and erucic acids	Itch, antimicrobial, antifungal, rheumatism and neck spasms, bronchitis, digestive system tonic, abscess	Seed, root and leaf	It is frequently seen in Semnan province
58	<i>Capsella bursa-pastoris</i> (L.) Medik.	Brassicaceae	Kise Keshish	1,1-Dimethylcyclopentane, ethyl linoleate, palmitic acid, phytane	Hemostatic, hemoptysis, abnormal uterine bleeding, dermal inflammation	Whole organs	Rajabbeigi 1779 (DU000521); Naderi 1559 (DU000275)
59	<i>Cardaria draba</i> (L.) Desv.	Brassicaceae	Azmak	6,10,14-Trimethylpentadecan-2-one, dibutyl phthalate, farnesyl acetone, glucosinolate, glucoerucin	Diuretic	Fruit and leaf	Rajabbeigi 1780 (DU000522); Motaharnejad and Mohammadi 1779 (DU000519); Naderi 1556 (DU000272); Naderi 2232 (DU000985)
60	<i>Descurainia sophia</i> (L.) Webb ex Prantl	Brassicaceae	Khak-e-Shir Irani	<i>cis</i> - β -Ocimene, menthol, neoisomenthyl acetate	Wound healing, diarrhea, hemoptysis, antifebrile, anthelmintic, kidney inflammation	Fruit	Darvishi 1775 (DU000518); Alemi 1774 (DU000517); Naderi 1670 (DU000288); 1460 (DU000127); 2236 (DU000990; DU000991)
61	<i>Eruca sativa</i> Mill.	Brassicaceae	Mandab	Palmitic acid, azelaic acid, <i>trans</i> -vaccenic acid, palmitoleic acid	Aphrodisiac, digestive system tonic, diuretic, antiscorbutic	Whole organs	(Rechinger, 1963-2015); (Assadi et al., 1988-2018)
62	<i>Lepidium perfoliatum</i> L.	Brassicaceae	Tartizak	Delphinidin 3-O-rutinoside, cyanidin 3-O-rutinoside, pelargonidin 3-O-rutinoside, β -cryptoxanthin, β -carotene	Antiscorbutic	Whole organs	Charmhini 1778 (DU000520)
63	<i>Lepidium sativum</i> L.	Brassicaceae	Shahi	Tetradecanoic acid, 9-hexadecenoic acid, 9,12,15-octadecatrienoic, acid, eicosanoic acid, docosanoic acid, tetracosanoic acid	Asthma, cough, diuretic, purgative, sedative, carminative, emmenagogue, appetizing, aphrodisiac, hemorrhoids, galactagogue, secondary syphilis	Leaf, shoot and seed	Alemi 1773 (DU000516); Goudarzi 1772 (DU000515)
64	<i>Nasturtium officinale</i> R. Br.	Brassicaceae	Alaf-e Cheshmeh	Myristicin α -terpinolene, limonene, caryophyllene oxide, <i>p</i> -cymene-8-ol, α -terpinolene	Diuretic, expectorant, appetizing, antiscorbutic, blood purification, tuberculosis, stomach diseases, jaundice	Whole organs	Alemi 2061 (DU000804)

Table 1 Continued

No	Scientific name	Family	Vernacular name	Some bioactive compounds	Medicinal properties	Organ used	Voucher specimens/citations
65	<i>Raphanus sativus</i> L.	Brassicaceae	Torobcheh	Oleic acid, <i>n</i> -hexadecanoic acid, octadecanoic acid, erucic acid, docosanoic acid, octadecanoic acid, ethyl ester, tocopherol, cholesterol, ergosta, campesterol, stigmasterol, 22,23-dihydro	Appetizing, antiscorbutic, expectorant, diuretic, jaundice, gall stones, pertussis, kidney and bladder diseases, etc.	Whole organs (specially root)	Naderi 2457 (DU001006)
66	<i>Sisymbrium irio</i> L.	Brassicaceae	Khakeshir-e Landani	Sitosteryl-6'- <i>O</i> -undecanoate- β -D-glucoside (1), (Z)-8,11,12-trihydroxyoctadec-9-enoic acid	Expectorant, antifebrile, chest and throat diseases, poultice	Seed, leaf	Seyfi 2648 (DU)
67	<i>Cercis siliquastrum</i> L.	Caesalpiniaceae	Arghavan	<i>n</i> -Hexadecanoic acid, 9,12-Octadecadienoic acid (Z,Z)-, 2,3-dihydroxypropyl ester, heneicosane, octadecane, phenyl-1,2-diamine,N,4,5-trimethyl, 9-octadecyne, 9,17 octadecadienal,(Z),(E)-11-hexadecenal	Astringent	Bark and leaf	Darvishi 1763(DU000505); Naderi 2237 (DU000992; DU000993)
68	<i>Cannabis sativa</i> L.	Cannabaceae	Shahdane	Tricyclen, α -thujene, camphene, sabinene, α -phellandrene, car-3-ene, α -terpinene, (z)- β -ocimene, γ -elemene, α -pinene, myrcene, <i>trans</i> - β -ocimene, γ -terpinolene, (E)-caryophyllene, α -humulene	Aborticide, asthma, antimicrobial, anticonvulsant, antiemetic, cough, antiviral, astringent, diuretic, purgative, sedative, bronchial opening, CNS tonic	Aerial parts with flower or fruit	Alemi 1852 (DU000594)
69	<i>Capparis spinosa</i> L.	Capparaceae	Alaf-e Mar	Glucocapparin, quercetin, kaempferol, glycosides, epicatechin, proanthocyanidins	Diuretic, astringent, anemia, gout, laxative, anthelmintic, emmenagogue, expectorant, antifebrile, dermal disorder, appetizing, liver and spleen diseases, water retention, antiscorbutic	Fruit and root	Yarahmadi 1853 (DU000595); Ehsani 1854 (DU000596)
70	<i>Cleome coluteoides</i> Boiss.	Capparaceae	Alaf-e Mar Badkonaki	Piperitone, decanal, elemol	Nauseant	Leaf, flower and fruit	Naderi 2040 (DU000793)
71	<i>Lonicera caprifolium</i> L.	Caprifoliaceae	Pich-e Aminod-dole	Gallic acid, protocatechuic acid, phydroxybenzoic acid, vanillic acid	Heart tonic, cough, diuretic, gout, kidney stones, liver disorders, astringent, sore throat	Leaf and flower	Farhangnejad 1809 (DU000551); Eghbali and Nosrati 1808 (DU000550); Khani 1810 (DU000552); Ghodosi Firozabad 1812 (DU000554)
72	<i>Sambucus ebulus</i> L.	Caprifoliaceae	Aghti	Iridoid, glycosides, cardiac glycosides, derivatives of caffeic acid, chlorogenic acid, ursolic acid	Diaphoretic, diuretic, laxative, nauseant, antiseptic, wound healing	Bark, root, flower, fruit and seed	(Assadi et al., 1988-2018). This is species mainly is distributed in Hyrcanian district
73	<i>Viburnum lantana</i> L.	Caprifoliaceae	Haftcool	Methyl pentanoate, 3Z-hexen-1-ol, 2-heptanone, <i>n</i> -heptanal, benzaldehyde, 1-octen-3-ol, 6-methyl-5-hepten-2-one	Astringent, dysentery, diarrhea	Leaf, fruit and bark	(Assadi et al., 1988-2018)
74	<i>Viburnum opulus</i> L.	Caprifoliaceae	Bodagh Jangali	Methyl pentanoate, 3Z-hexen-1-ol, 2-heptanone, <i>n</i> -heptanal, benzaldehyde, 1-octen-3-ol, 6-methyl-5-hepten-2-one, rutin, quercetin, procyanidin B2, procyanidin trimer	Anticonvulsant, astringent, diuretic, dysmenorrhea, diarrhea, premature birth	Fruit, leaf, stem and skin of root	Iri 1811 (DU000553)
75	<i>Stellaria media</i> (L.) Vill.	Caryophyllaceae	Daneh Ghanari	α -Pinene, limonene, camphor, geraniol, <i>n</i> -hexanol, <i>cis</i> -3-hexen-1-ol, 1-octen-3-ol, benzyl alcohol glucodichotomine B, dichotomoside A	Diuretic, astringent, hemoptysis, coolant, sedative, hematemesis, kidney and bladder inflammations, hemorrhoids, tachycardia, bone fracture and swelling bandage	Whole organs	Naderi and Amirahmadi 2649 (DU001018; DU001019; DU001020)
76	<i>Vaccaria hispanica</i> (Mill.) Rauschert (Syn: <i>V. grandiflora</i> (Fisch. ex DC.) Jaub. & Spach; <i>V. pyramidata</i> Medicus)	Caryophyllaceae	Saboonak	Saponins, segetalin A	Diuretic, diaphoretic, blood purification, rheumatism, gout, urinary tract diseases, dermal disease, anemia	Whole organs	Somayeie 2644 (DU001011)
77	<i>Anabasis aphylla</i> L.	Chenopodiaceae	Asemani-e Bibarg	<i>p</i> -Acetyl-phenol 1- <i>O</i> - β -D-xylopyranosyl-(1->2)- β -D-glucopyranoside, piceine, isorhamnetin, quercetin, rutin, isorhamnetin-3-rutinoside, aphylline, aphyllidine, lupinine	Used to produce aquafortis raisins, antimicrobial	Aerial parts	Yarahmadi 1976 (DU000718); Bashiri 1984 (DU000726); Alemi 1981 (DU000723)
78	<i>Beta vulgaris</i> L.	Chenopodiaceae	Choghondar	γ -Irone, α -cadinol, T-cadinol, bicyclogermacrene, δ -cadinene	Laxative, urinary tract inflammation, blister, trauma bandage	Leaf and root	It is frequently seen in Semnan province
79	<i>Camphorosma monspeliaca</i> L.	Chenopodiaceae	Kafoori	α -Pinene, citronellyl pentanoateendo-bourbonanol, α -fenchene, <i>trans</i> -pinocarveol, limonene, pinocarvone, camphene	Asthma, diarrhea, rheumatism, water retention, dysentery, pertussis, hypomenorrhea, bladder infection	Aerial parts with flower	Ghasempour 2013 (DU000720); Masoumi et al. 1975 (DU000717)
80	<i>Chenopodium album</i> L.	Chenopodiaceae	Salmetare	Limonene, linalool, linalyl acetate, α -pinene, ascaridole, pinane-2-ol, β -pinene, α -terpineol	Laxative, anthelmintic, indigestion, hemorrhoids, pharyngitis, diuretic, hairloss, liver disease, intestinal wounds, eyes disorders, aphrodisiac, splenomegaly	Whole organs	Alemi 1974 (DU000716); Esmaili and Ghomi 1980 (DU000722)

Table 1 Continued

No	Scientific name	Family	Vernacular name	Some bioactive compounds	Medicinal properties	Organ used	Voucher specimens/citations
81	<i>Chenopodium ambrosioides</i> L.	Chenopodiaceae	Salmak	α -Terpinene, <i>p</i> -cymene, <i>trans</i> -ascaridol	Laxative, anthelmintic, sedative, liver disorders, antiparasite, splenomegaly	Aerial parts	Salamat (DU000715); Robati 1979 (DU000721)
82	<i>Chenopodium botrys</i> L.	Chenopodiaceae	Salmak Orshalimi	α -Terpinene, isoscaridole, ascaridole, <i>p</i> -cymene	Expectorant, anticonvulsant, asthma	Aerial parts	Naderi 2049 (DU000792)
83	<i>Kochia scoparia</i> (L.) Schrad.	Chenopodiaceae	Jaroy-e Ghazvini	α -Thujaplicin, phytone, dictamnol, butylated hydroxytoluene, phytol, camphenolone	Urinary tract disorders, itch, antifungal	Leaf	Alemi 1982 (DU000724)
84	<i>Salsola kali</i> L.	Chenopodiaceae	Shour-e Khardar	Salsoline, fraxidin, resorcinol, luteolin 7-O-glucoside, hyperoside	Laxative, diuretic, antiscorbutic	Aerial parts	Naderi 2050 (DU000793); Bashiri 1983 (DU000725); Shams-Aldini 1977 (DU000719)
85	<i>Spinacia oleracea</i> L.	Chenopodiaceae	Esfenaj	Durohydroquinone, α -terpineol, linalool, cineole, caffeoyltartaric acid, phyllyrin, interiotherin A	Anemia, stomach tonic, intestine and pancreas tonic, cholagogue, vitamins deficiency	Leaf	It is seen in some parts of Semnan province
86	<i>Convolvulus arvensis</i> L.	Convolvulaceae	Pichak Sahrai	Palmitic, stearic, oleic, linoleic, linolenic, arachidic, behenic acid	Antiscorbutic, diuretic, antifebrile, irritant, purgative, anthelmintic	Aerial parts	Alemi 1863 (DU000605); Hendor 1864 (DU000606); Rahmati 1866 (DU000607); Yarahmadi 1867 (DU000608)
87	<i>Cressa cretica</i> L.	Convolvulaceae	Alafe Moorche	Quercetin, kampferol, rutin, syringaresinol- β -D-glucoside, scopoletin, 3,5-dicaffeoylquinic acid, cretican, cressatetracosanoate, cressatetriacontanonic acid, cressatriacantanone, cressanaphthacenone	Stomach tonic, aphrodisiac, expectorant,	Whole organs	(Assadi et al., 1988-2018)
88	<i>Ipomoea purpurea</i> (L.) Roth	Convolvulaceae	Nilofar	Phenolic compounds, alkaloids	Purgative	Root	Yaghobkazemi and Emai 2060 (DU000803); Ardekaniyan et al. 2059 (DU000802)
89	<i>Cornus mas</i> L.	Cornaceae	Zoghal Akhte	Quercetin, cyanidin 3-O-glucoside, procyanidin B1, gallic acid, loganic acid, ursolic acid, limonene, malic acid, linoleic acid, (13Z)+(1'3'Z)-lutein, (9Z)+(9'Z)-lutein	Antifebrile	Fruit and bark	Mesbahi 1775 (DU000500)
90	<i>Citrullus colocynthis</i> (L.) Schrad.	Cucurbitaceae	Hendewane Aboujahl	Linoleic acid, palmitic acid, stearic acid	Purgative, emmenagogue, liver diseases, water retention, bowel tonic, cerebral palsy (gastrointestinal disorders)	Fruit	(Goudarzi, 2016)
91	<i>Cucumis melo</i> L. var. <i>flexuosus</i> (L.) Naudin	Cucurbitaceae	Khiyar Chamber	γ -Tocopherol, δ -tocopherol, gallic acid, catechin, eugenol	Diuretic, laxative, anthelmintic, cough, antifebrile, burns, wound healing, skin (cooling, cleansing, moisturizing)	Fruit, flower and seed	Bandari 1795 (DU000536)
92	<i>Cucumis melo</i> L. var. <i>reticulatus</i> Ser.	Cucurbitaceae	Talebi	γ -Tocopherol, δ -tocopherol, gallic acid, catechin, eugenol	Diuretic, laxative, anthelmintic, cough, antifebrile, burns, wound healing, skin (cooling, cleansing, moisturizing)	Fruit, flower and seed	Bandari 1791 (DU000532)
93	<i>Cucumis sativus</i> L.	Cucurbitaceae	Khiyar	Isovitexin, saponarin, acylated C-glycosides, cucurbitacin	Diuretic, blood purification, itch, antifebrile, viral gastroenteritis, uric acid and urate anion solvent	Fruit, leaf and seed	Khajezadeh 1794 (DU000535); Bashiri 1793 (DU000534)
94	<i>Juniperus communis</i> L.	Cupressaceae	Piro	α -Pinene, β -myrcene, sabinene, D-limonene	Diaphoretic, blood purification, diuretic, emmenagogue	Fruit	(Assadi et al., 1988-2018)
95	<i>Juniperus sabina</i> L.	Cupressaceae	Maimarz	α -Pinene, β -myrcene, sabinene, D-limonene	Emmenagogue, anticancer, antiviral, aborticide, diuretic, hemostatic, uterine tonic, anthelmintic	Leaf	(Assadi et al., 1988-2018)
96	<i>Cyperus rotundus</i> L.	Cyperaceae	Oyar Salam	α -Copaene, cyperene, valerenal, caryophyllene oxide, <i>trans</i> -pinocarveol, protocathechuic acid, caffeic acid, <i>p</i> -coumaric acid	Astringent, appetizing, stomach tonic, anthelmintic, dysentery, itch, epilepsy, erysipelas, emmenagogue, diaphoretic, urinary tract stones	Root	Salamat 1796 (DU000537); Alemi 1800 (DU000541); 1802 (DU000543); 1799 (DU000540); 1801 (DU000542); 1803 (DU000545); Bashiri 1798 (DU000539)
97	<i>Scabiosa columbaria</i> L.	Dipsacaceae	Toosk Kaftari	Linalool, 4-octadecenal, benzoquinones, ellagic acid, proanthocyanidins	Antifebrile, measles, chicken pox, mumps	Unknown	(Assadi et al., 1988-2018)

Table 1 Continued

No	Scientific name	Family	Vernacular name	Some bioactive compounds	Medicinal properties	Organ used	Voucher specimens/citations
98	<i>Elaeagnus angustifolia</i> L.	Elaeagnaceae	Senjed	(E)-Ethyl cinnamate, hexahydrofarnesyl acetone, palmitic acid, β -carboline flavone glycosides, phytol	Astringent, antifebrile	Fruit, leaf and flower	Ghadiri 1841(DU000583); Alemi 1840 (DU000582); Bashiri 1843 (DU000585); Amirahmadi 1842 (DU000584)
99	<i>Ephedra intermedia</i> Schrank et C.A.Mey.	Ephedraceae	Armak miyane	Cardiac glycosides, 2-ethyl-pyrazine, γ -elemene, benzyl acetate, 2-methyl-butyl acetate	Asthma, heart tonic	Stem without leaf	Ghorbani and Nasaie 1869 (DU000610)
100	<i>Ricinus communis</i> L.	Euphorbiaceae	Karchak	α -Thujone, 1,8-cineole, α -pinene, camphor, camphene, ricin, oleic acid	Purgative, laxative	Seed	It is seen in the campus of Damghan University
101	<i>Alhagi persarum</i> Boiss. & Buhse	Fabaceae	Kharshotor	Triterpenoidal glycosides, quercetin, isorhamnetin, rhamnopyranoside	Laxative, diuretic, expectorant, rheumatism	Aerial parts	Alemi 1945 (DU000686)
102	<i>Alhagi pseudoalhagi</i> (M. Bieb.) Desv. ex B. Keller & Shap.	Fabaceae	Kharshotor, Toranjabin	Ferulic acid, β -sitosterol, isorhamnetin, 4-hexyl-2,5-dihydro-2,5-dioxo-3-furanacetic acid, β -damascenone, E-geranyl acetone, actinidiolide	Laxative, diuretic, expectorant, purgative, cholagogue, hemorrhoids, blood purification	Whole organs	(Roadi et al., 2008)
103	<i>Astragalus</i> (sect. <i>Bucerates</i> DC.) <i>hamosus</i> L.	Fabaceae	Gavan	Linoleic acid, linolenic acids, lauric acid, caffeic acid, chlorogenic acid, gentisin, emodin	Carminative, sedative, laxative, emetic, galactagogue	Fruit	(Rechinger, 1963-2015)
104	<i>Astragalus</i> (sect. <i>Sesamei</i> DC.) <i>tribuloides</i> Del.	Fabaceae	Gavan	1-Butanol, 2,3-butanediol 1,3, butanediol, nonanoic acid, tetradecanoic acid, glycerol, tricaprilate, heptacosane	Laxative, sedative	Whole organs	(Rechinger, 1963-2015)
105	<i>Cicer arietinum</i> L.	Fabaceae	Nokhod	Daidzin, biochanin A, genistin, troxerutin, isorhamnetin, astilbin, L-epicatechin, astragalgin, acacetin, hyperoside, myricitrin	Diuretic, emmenagogue, anthelmintic, jaundice, water retention, kidney pain, urolithiasis, wound healing, aphrodisiac, appetizing, joints sprain, bronchitis, stomach tonic, aborticide	Seed and leaf	It is frequently seen in Semnan province
106	<i>Coronilla varia</i> L.	Fabaceae	Yonje Taji	Genistein, naringenin, acacetin, kaempferol, quercetin, xavopyridol	Diuretic, purgative, heart tonic (same effect like Digitoxin)	Leaf	Alayi 1933 (DU000674); Alemi 1949 (DU000690)
107	<i>Glycyrrhiza glabra</i> L.	Fabaceae	Shirin Bayan	Linoleic, oleic, palmitic acids, phenytoin, carvone	Bronchitis, cough, tracheitis, gastritis	Root and rhizome	Motaharnejad and Mohammadi 1948 (DU000689)
108	<i>Lens culinaris</i> Medik.	Fabaceae	Adas	Raffinose, stachyose, verbascose, galactopinitol, ciceritol	Astringent, diuretic, appetizing, antibilious, liver disorders, strangury, diarrhea, heart and eye diseases, emollient, galactagogue, anticancer, anti-inflammatory	Seed	It is frequently seen in Semnan province
109	<i>Lotus corniculatus</i> L.	Fabaceae	Ahoo-Mash-e zard	Quercetin, kaempferol, β -ionone (2E,4E) decadienal, β -pinene, carahanoenone	Anticonvulsant, insomnia, anxiety, vertigo, tachycardia, nerve tonic	Whole organs	Naderi 1644 (DU000371); Beheshti and Mehrban 1929 (DU000670); Esmaili and Ghomi 1930 (DU000671); Lasjerdy 1927 (DU000668); Alayi 1928 (DU000669); Ehsani 1931 (DU000672)
110	<i>Medicago sativa</i> L.	Fabaceae	Yonje	Acetylshikonin, α -methylbutylshikonin, β -hydroxyisovalerylshikonin, isobutylshikonin	Antiscorbutic, skeletal disorders	Leaf	Alemi 1934 (DU000675); Alayi 1955 (DU000696); Naderi 1641 (DU000368)
111	<i>Melilotus officinalis</i> (L.) Pall.	Fabaceae	Yonje Zard	Hexahydrofarnesylacetone, β -eudesmo, di-O-methylmyo-inositol, palmitic acid, linoleic acid	Sedative, diuretic, digestive, insomnia, anxiety, vertigo, kidney and bladder inflammation, indigestion, rheumatism, melancholia, antihypertensive, nerve tonic, migraine, liver pains, anticoagulant, menopausal disorders	Leaf and flower	Hossini 1938 (DU000679); Salamat 1941 (DU000682); Alemi 1937 (DU000678); Yar ahmadi 1940 (DU000681); Zohrevand 1942 (DU000683); Motaharnejad and Mohammadi 1943 (DU000684); Bashiri 1936 (DU000677); Shiri 1939 (DU000680); Rahmati 1944 (DU000685); Naderi 1643 (DU000370)
112	<i>Ononis spinosa</i> L.	Fabaceae	Khaar Khar	Onogenin, sativanone, medicarpin, calycosin D, <i>trans</i> -anethole, carvone, menthol; isoflavones	Diuretic, astringent, diaphoretic, blood purification, cholagogue, sedative (urinary tract)	Root, leaf and flower	Goudarzi (2016), Naderi s.n (DU)

Table 1 Continued

No	Scientific name	Family	Vernacular name	Some bioactive compounds	Medicinal properties	Organ used	Voucher specimens/citations
113	<i>Phaseolus vulgaris</i> L.	Fabaceae	Lobia	Protocatechuic acid, <i>p</i> -hydroxybenzoic acid, <i>p</i> -coumaric acid, ferulic acid, sinapinic acid, catechin, delphinidin 3- <i>O</i> -glucoside, cyanidin 3- <i>O</i> -glucoside	Diuretic, water retention, chronic rheumatism, sciatica, gout, kidney and bladder disease, diabetes, edema (also hydrops fetalis), joints swelling, dermal disorders, typhoid, albuminuria in pregnancy	Fruit and stem	It is frequently seen in Semnan province
114	<i>Robinia pseudoacacia</i> L.	Fabaceae	Aghaghiya-e Ghermez	Robinin (kaempferol-3- <i>O</i> -ramnozylgalactozil-7-ramnozide), acacetin-7- <i>O</i> -rutoside, apigenin, diosmetin, luteolin, secundiflorol, mucronulatol, isomucronulatol, isovestitol	Sedative, astringent, laxative, antibilious, dyspepsia, headache, vomiting	Flower, leaf and bark	Alemi 1926 (DU000667); Naderi 2238 (DU000994; DU000995)
115	<i>Sophora alopecuroides</i> L.	Fabaceae	Talkh-e Bayan	Alopecurone B, alopecurone C, alopecurone F, alopecurone G, kurarinone, sophoraflavanone G, 5,40-di- <i>O</i> -methylsophoraflavanone G, 20- <i>O</i> -methylsophoraflavanone K	Constipation, antimicrobial, anthelmintic, biliousness, toothache, hemorrhoids, intestinal wounds	Leaf, fruit, and aerial parts with flower	Nori 1951 (DU000692); Yarahmadi 1952 (DU000693)
116	<i>Trifolium pratense</i> L.	Fabaceae	Shabdar-Ghermez	Pent-1-en-3-o, 3-methyl-3-buten-2-one, 3-methyl butana, tetradecanoic acid, linalool, α -copaene, <i>cis</i> -3-hexenylacetate, <i>p</i> -vinylguaiaicol	Spasmolytic, sedative, expectorant, asthma, dermal disorders, liver disorders, appetizing, digestive system tonic	Flower	Salamat 1935 (DU000676); Naderi 1639 (DU000366)
117	<i>Trigonella foenum-graecum</i> L.	Fabaceae	Shanbalieleh	Fenugreekine, nicotinic acid, sapogenins, phytic acid, scopoletin, trigonelline, disogenin, gitogenin, neogitogenin, ω -cadinene, α -cadinol, γ -eudesmol, α -bisabolol	Emollient, cough, bronchitis, dermal disease, tracheitis, gastritis	Whole organs (especially seed, rhizome and root)	Alaie 1925 (DU000666)
118	<i>Vicia faba</i> L.	Fabaceae	Baghela	l-3,4-Dihydroxyphenylalanine, kamlin, methionine, vicin, convicine	Diuretic, anticonvulsant, kidney stones, bladder inflammation, rheumatism, gout, abscess, acne, water retention, chronic diarrhea	Seed	It is seen frequently in Semnan province
119	<i>Vigna radiata</i> (L.) R.Wilczek	Fabaceae	Mash	Vitexin, isovitexin, tocopherols, 1,2&2,3-diglycerides, 1,3-diglycerides, linoleic acid, oleic acid	Laxative, aphrodisiac, appetizing, diuretic, asthma, hemorrhoids, diarrhea, cough, bladder inflammation, liver infection, nerve system infection, fever, rheumatism, galactagogue, bone pain, indigestion	Seed and root	It is seen in Semnan province
120	<i>Erodium cicutarium</i> (L.) L'Hér.	Geraniaceae	Nok-Laklaki Harz	Hexadecanoic acid, hexahydrofarnesyl acetone	Astringent, hemostatic, uterine bleeding	Whole organs	Vaziri 1761 (DU000503)
121	<i>Geranium rotundifolium</i> L.	Geraniaceae	Soozan Chopan-e Bargdayerei	Inalool, α -terpineol, geraniol, sesquiterpenoids α -caryophyllene, germacrene D, diterpene phytol acetate	Diuretic, astringent	Stem and Root	Naderi 2045 (DU000788)
122	<i>Hypericum androsaemum</i> L.	Hypericaceae	Matamati	Longifolene, β -gurjunene, γ -gurjunene, 5- <i>O</i> -caffeoylquinic acid, quercetin	Purgative, kidney and bladder disorders, burns, wound healing, hemostatic, hysteria	Fruit and leaf	(Roadi et al., 2008)
123	<i>Hypericum scabrum</i> L.	Hypericaceae	Gole-raie-deyhimi	α -Pinene, <i>n</i> -nonane, thymol, naphthoquinones, proanthocyanidin	Anticancer, antimicrobial, antiseptic, depression	Aerial parts with flower	Naderi 2038 (DU000781)
124	<i>Crocus sativus</i> L.	Iridaceae	Zafaran	3,5,5-Trimethyl-2-cyclohexen-1-one, 3,5,5-trimethyl-2-cyclohexen-1,4-dione, safranal, 2,4,4-trimethyl-6-hydroxy-3-carboxaldehyde-2,5-cyclohexadien-1-one, 3,5,5-trimethyl-1,4-cyclohexandione, 5,5-dimethyl-2-methylene-1-carboxaldehyde-3-cyclohexene, β -ionone	Nerve tonic, emmenagogue, aborticide, digestive system tonic	Stigma	It is frequently seen in Semnan province
125	<i>Juglans regia</i> L.	Juglandaceae	Gerdoo	α -Pinene, β -pinene, β -caryophyllene, germacrene D, limonene	Wound healing, antiseptic, scrofula, anthelmintic, tuberculosis, diabetes, joints swelling, eczema, vaginal discharge, joints pain, tonsillitis, sore throat, osteoporosis	Leaf and fruit	Helaliyan 1817 (DU000559)
126	<i>Ajuga chamaecistus</i> Going. ex Benth.	Lamiaceae	Labdis-e Bottei Perspolisi	β -Pinene, α -pinene, limonene, linalool, eugenol	Diuretic, appetizing, antifebrile, renal and bladder problems	Whole organs	Naderi 1446 (DU000107); Heidari and Mahdavi (DU000498)
127	<i>Ajuga chamaepitys</i> (L.) Schreb.	Lamiaceae	Labdis-e Mangoolei	Limonene, β -pinene, α -pinene,	Diuretic, appetizing, antifebrile, renal and bladder problems	not exactly known	(Goudarzi, 2016)
128	<i>Dracocephalum moldavica</i> L.	Lamiaceae	Bad-Ranjboye	Luteolin, acacetin 7- β -D-glucuronide	Carminative, heart tonic, wound healing, sedative for fevers, digestive system tonic	Aerial parts	Elahi 1753 (DU000497)

Table 1 Continued

No	Scientific name	Family	Vernacular name	Some bioactive compounds	Medicinal properties	Organ used	Voucher specimens/citations
129	<i>Hymenocrater elegans</i> Bunge	Lamiaceae	Gol-e Rahi-e Deyhimi	1,8-Cineole, α -pinene, β -pinene	Antimicrobial, antifebrile	Aerial parts with flower	Naderi 1427 (DU000088); Naderi 1428 (DU000089)
130	<i>Hyssopus angustifolius</i> M.Bieb.	Lamiaceae	Zofa	Thymol, β -bisabolol, carvacrol, <i>n</i> -dodecan, caryophyllene, camphor, cuminaldehyde	Expectorant, antiseptic, cough, emollient, diaphoretic, anthelmintic, anticancer, asthma, hay fever, dyspnea, chronic bronchitis, tuberculosis, anorexia, dermal disorders, etc.	Whole organs	(Goudarzi, 2016); (Rechinger, 1963-2015)
131	<i>Lallemantia royleana</i> (Benth.) Benth.	Lamiaceae	Tokhm-e Sharbati	Verbenone, <i>trans</i> -carveol, linoleic acid, oleic acid	Diuretic, sedative, anticonvulsant, mental disease, liver tonic, aphrodisiac, gum bleeding	Seed	(Assadi et al., 1988-2018)
132	<i>Lamium album</i> L.	Lamiaceae	Gazane-Sefid	Chlorogenic acid, caffeic acid, rutin, quercetin-3-O-glucoside	Astringent, blood purification, diuretic, antibilious, diarrhea, hemoptysis, scrofula, anaemia, water retention, pulmonary and spleen diseases, vaginal discharge	Aerial parts with flower	(Assadi et al., 1988-2018); (Rechinger, 1963-2015)
133	<i>Lamium amplexicaule</i> L.var. <i>amplexicaule</i>	Lamiaceae	Gazanesaye Saghe-agoosh	α -Pinene, β -pinene, 1-octen-3-ol, (<i>E</i>)-caryophyllene, germacrene D	Rheumatism, laxative, sedative, diaphoretic, antifebrile	Leaf and flower	Hosseini 1750 (DU000494); Rajabbeigi 1749 (DU000493); Sarafi 1751 (DU000495)
134	<i>Marrubium vulgare</i> L.	Lamiaceae	Frasion	(<i>E</i>)-Caryophyllene, germacrene D, α -humulene, α -copaene	Stomach tonic, diuretic, appetizing, expectorant, antiseptic, antibilious, heart tonic, antifebrile, emmenagogue	Leaf and aerial parts with flower	(Rechinger, 1963-2015); (Assadi et al., 1988-2018)
135	<i>Mentha longifolia</i> (L.) L. var. <i>amphilema</i> Briq. ex Rech.f.	Lamiaceae	Pooneh Yekrang	Pulegone, isomenthone, 1,8-cineole, borneol, piperitenone oxide	Spasmolytic, carminative, antifebrile, headache, detoxification, indigestion, sedative	Aerial parts	Masoumi 1736 (DU000480); Ehsani 1737 (DU000481)
136	<i>Mentha spicata</i> L.	Lamiaceae	Nanah	α -Terpinene, 1,8-cineole, rhamnocitrin, eriodictyol-7-O-glucoside, 2-hydroxyethyl hexadecanoate	Carminative, sedative, muscular spasms, stomach cramps, diarrhea, antimicrobial	Aerial parts	It is frequently seen in Semnan province
137	<i>Nepeta glomerulosa</i> Boiss.	Lamiaceae	PoonehsayeAnbooh-e Kermani	Elemol, 7 α β -nepetalactone, 4 α , 7 α , 7 α β -nepetalactone, pulegone, piperitenone oxide	Itch, pneumonia, dermal disorders	Aerial parts with flower	Esmaili and Ghomi 1738 (DU000482)
138	<i>Ocimum basilicum</i> L.	Lamiaceae	Reyhan	Linalool, geraniol, citral, alcanfor, eugenol, thymol, 1,8-cineole, neryl acetate	Anticonvulsant, emmenagogue, diuretic, digestive system tonic, carminative, vertigo, stomach cramps, cough, pertussis, headache, vaginal discharge, angina, kidney inflammation	Whole organs	Amirahmadi 1752 (DU000496); Lavadar et al. 2273 (DU)
139	<i>Origanum vulgare</i> L.	Lamiaceae	Marzangoosh	γ -Terpinene, α -terpinene-cymene, borneol, thymol, carvacrol, β -caryophyllene, limonene, α -pinene, β -pinene, linalool	Diuretic, stomach tonic, nerve sedative, laxative, emmenagogue, asthma, jaundice, sore throat, cough, water retention	Aerial parts with flower	(Assadi et al., 1988-2018)
140	<i>Perovskia abrotanoides</i> Kar.	Lamiaceae	Barazambal	Camphor, 1,8-cineole, α -bisabolol, α -pinene, δ -3-carene	Coolant, antiseptic, leishmaniasis	Flower and leaf	Naderi and Mirtadzdini 1435 (DU000096)
141	<i>Prunella vulgaris</i> L.	Lamiaceae	Nana-e Chamani	Ursolic acid, β -amyryn, quercetin, quercetin-3-O- β -D-galactoside, α -spinasterol, stigmasterol, β -sitosterol, daucosterol	Stomatitis, sore throat, hemorrhoids, eye wash	Whole organs	(Assadi et al., 1988-2018)
142	<i>Rosmarinus officinalis</i> L.	Lamiaceae	Rozmari	7-O-Glucoside, hispidulin, diosmin, hesperidin, genkwanin, isoscutellarein 7-O-glucoside	Heart tonic, hypotension, stomach tonic, lung antiseptic, cough, diarrhea, antifatulent, rheumatism, nerve sedative, gout, adrenal glands tonic	Leaf	Naderi 2234 (DU000987); (DU000988)
143	<i>Salvia sclarea</i> L.	Lamiaceae	Maryam-Goli	Linalool, α -terpineol, linalyl acetate, germacrene D (7-57%) carotenoids, α -linolenic acid	Anticonvulsant, pertussis, emmenagogue, antiseptic	Leaf and aerial parts with flower	Amiri 1741 (DU000485); Hosseini 1742 (DU000486)
144	<i>Scutellaria pinnatifida</i> A.Ham. subsp. <i>alpina</i> (Boiss.) Rech.f.	Lamiaceae	Boshghabi Sonbolei	Germacrene D, β -caryophyllene, farnesene, bicyclgermacrene	Parkinson's disease	Flower and leaf	Naderi 1430 (DU000091)
145	<i>Stachys lavandulifolia</i> Vahl	Lamiaceae	Sonbolei-e Ziba	(-)- α -Bisabolol, bicyclgermacrene, δ -cadinene, spathulenol	Stomach pains, digestive system tonic	Inflorescence	Naderi 1443 (DU000104); Sarafi 1755 (DU000499)
146	<i>Teucrium chamaedrys</i> L.	Lamiaceae	Maryam Nokhodi-e Tannaz	Benzyl salicylate, (<i>E,Z</i>)-farnesol, 1-eicosene, <i>cis</i> -3-hexenyl benzoate, (<i>E</i>)- α -farnesene, (<i>E</i>)- β -caryophyllene, <i>n</i> -heptadecane, (<i>Z</i>)- β -farnesene, α -cadinene, α -murolene, β -caryophyllene, α -humulene, α -selinene	Stomach tonic, diuretic, scrofula, antifebrile, anthelmintic, antiseptic, chronic bronchitis, diarrhea	Aerial parts with flower	(Rechinger, 1963-2015); (Assadi et al., 1988-2018)

Table 1 Continued

No	Scientific name	Family	Vernacular name	Some bioactive compounds	Medicinal properties	Organ used	Voucher specimens/citations
147	<i>Teucrium polium</i> L.	Lamiaceae	Kalpooreh	Guaiol, caryophyllene oxide, spathulenol, camphor	Anticonvulsant, headache, genital and urinary disease, metrorrhagia, digestive system tonic	Aerial parts with flower	Naderi and Mirtadzadini 1434 (DU000095); Alemi 1747 (DU000491); Ghodrati and Dostmohammadi 1748 (DU000492)
148	<i>Thymus carmanicus</i> Jalas	Lamiaceae	Avishan-e Kermani	Citronellol, geranyl acetate, geraniol, citronellyl acetate, L-linalool, cis-nerodiol, citronellyl acetate	Digestive system tonic, antiseptic, anticonvulsant, pulmonary diseases, emmenagogue, brachycardia, circulatory system tonic	Aerial parts	Naderi 1424 (DU000086); Naderi 1423 (DU000085); Naderi 1464 (DU000132)
149	<i>Thymus fallax</i> Fisch. & C.A.Mey.	Lamiaceae	Avishan-Anatoli	Carvacrol, geraniol, p-cymene, α -butyl benzyl alcohol, α -pinene	Digestive system tonic, antiseptic, anticonvulsant, emmenagogue, brachycardia, circulatory system tonic, respiratory system tonic	Aerial parts	Naderi 1420 (DU000112)
150	<i>Thymus kotschyanus</i> Boiss. & Hohen.	Lamiaceae	Avishan	Thymol, eugenol, p-cymene, γ -terpinene, germacrene D	Carminative, digestive system tonic	Aerial parts with flower	(Assadi et al., 1988-2018)
151	<i>Vitex negundo</i> L.	Lamiaceae	Panj-Angosht	n-Tritriacontane, n-hentriacontanol, n-hentricontane, n-pentatriacontane, n-nonacosane, β -sitosterol	Female hormones regulator, galactagogue, musculoskeletal disorders, asthma, sedative, spasmolytic, stomachache, eye problems, dyspepsia	Leaf, fruit, stem and root	Rostamian 2260 (DU)
152	<i>Ziziphora clinopodioides</i> Lam.	Lamiaceae	Kakooti Koohi	(+)-Pulegone, 1,8-cineole, limonene, menthol, β -pinene, menthone, piperitenone, piperitone	Sedative, stomach disorders, heart disorders, antifebrile (in typhus)	Aerial parts	Naderi 1420 (DU000074)
153	<i>Ziziphora persica</i> Bunge	Lamiaceae	Kakooti Irani	(+)-Pulegone, limonene, piperitenone	Expectorant, carminative, stomach tonic, dysentery	Aerial parts	Oshnanparvar 1739 (DU000483); Heydari 1740 (DU000484)
154	<i>Ziziphora tenuior</i> L.	Lamiaceae	Kakooti	Luteolin, apigenin, 5-O-methylapigenin, apigenin-7-O-glucoside, ziziphorins A & B, triterpenoid, pulegone	Expectorant, carminative, stomach tonic, dysentery	Aerial parts	Ghahremani 1743 (DU000487); Naderi 1437 (DU000098)
155	<i>Laurus nobilis</i> L.	Lauraceae	Barge-Bo	O-Glycosides, catechin, cinnamtannin B1, 1,8-cineole, α -terpinyl acetate, α -pinene, β -elemene, sabinene, β -phellandrene, bornyl acetate camphene	Carminative, diuretic, anticonvulsant, emmenagogue, flavoring, emetic, stomach tonic	Leaf and fruit	It is rarely cultivated as an ornamental
156	<i>Allium akaka</i> S.G.Gmel. ex Schult. & Schult.f.	Liliaceae	Valak	Exact compounds are unknown. The compounds in other species are: Diallyl trisulfide, diallyl disulfide, methyl allyl trisulfide, methyl allyl disulfide and diallyl sulfide	Blood purification, dyspepsia, respiratory problems, arteriosclerosis, dermal disorders	Bulb and leaf	(Roadi et al., 2008); (Goudarzi, 2016)
157	<i>Allium cepa</i> L.	Liliaceae	Piyaz	Allicin, quercetin, fisetin, diallyl disulphide, diallyl trisulphide.	Increasing acidity, respiratory system, stomach cramps, diuretic, appetizing, reducing blood sugar	Bulb and leaf	It is seen in Semnan province
158	<i>Yucca filamentosa</i> L.	Liliaceae	Zangole Nakhdar	(E)-4,8-Dimethylnona-1,3,7-triene, glycone, saponigenin, phenolic compounds	Wound healing, dermal disorders, sprain	Root	Ghoddosi 1868 (DU000609)
159	<i>Loranthus europaeus</i> Jacq.	Loranthaceae	Mokhor	β -Sitosterol	Epilepsy	Whole organs	Ahmadi 1815 (DU000557); Masoumi 1816 (DU000558)
160	<i>Viscum album</i> L.	Loranthaceae	Darvash	Syringin, syringenin-4'-O-apiosylglucoside, quercetin	Hypertension, arteriosclerosis	Whole organs	(Assadi et al., 1988-2018)
161	<i>Gossypium herbaceum</i> L.	Malvaceae	Panbe	α -Copaene, caryophyllene, humulene, cadina-1(10),4-dien, lauric acid, 5-methyltridecane, γ -sitosterol, α -amyrin	Galactagogue, antifebrile, emollient, emmenagogue, uterine bleeding	Seed, leaf, root and flower	It is seen in Semnan province
162	<i>Malva neglecta</i> wallr.	Malvaceae	Panirak-Mamoli	L-Linalool, α -tocopherol, α -terpineol, δ -elemene, β -damascenone, β -elemene, germacrene D, (E)-nerolide, viridifloro, 6,10,14-trimethyl-2-pentadecanone	Vaginal inflammation, aphthous, stomatitis	Leaf, flower and root	(Rechinger 1963-2015); (Assadi et al., 1988-2018)
163	<i>Malva sylvestris</i> L.	Malvaceae	Panirak-e Ghermez	Malvidin, malvin, delphinidin, apigenin, quercetin, kaempferol, genistein	Sedative, laxative, expectorant, diuretic, cough, cold, bladder inflammation, bronchitis, hemoptysis, antiemetic, anti-inflammatory (urinary tract, respiratory tract, digestive system)	Leaf and flower	Darvishi 1786 (DU000528); Godarzi 1784 (DU000526); Jokar 1787 (DU000529); Mohammadi 1782 (DU000524); Zohrevand 1783 (DU000525); Charmhini 1785 (DU000527); Shokohinia 1788 (DU000530); Talebi 1781 (DU000523); Talebi 1813 (DU000555); Arab 1789 (DU000531)

Table 1 Continued

No	Scientific name	Family	Vernacular name	Some bioactive compounds	Medicinal properties	Organ used	Voucher specimens/citations
164	<i>Melia azedarach</i> L.	Meliaceae	Ziytone-Talkh	15 β -Epoxy meliac-1,5-diene, 15 β -epoxy meliac-1,5-diene-3-O- β -D-glucopyranoside, azecin-1, <i>trans</i> -nerolidol, 1,4-dimethoxybenzene, 2-phenylacetaldehyde, phenyl ethyl alcohol	Astringent, antiscorbutic, anthelmintic, fever	Leaf, stem and root skin	Shokohinia 1760 (DU000502); Asadipour 1759 (DU000501)
165	<i>Albizia julibrissin</i> Durazz.	Mimosaceae	Shab Khosb	Linoleic acid, palmitic acid, oleic acid, stearic acid	Anthelmintic, dermal disorders, itch, hemorrhoids, anti-inflammatory, erysipelas, asthma, nerve tonic, abscess, dental and gum problems	Bark, root and leaf	Jafari 1762 (DU000504)
166	<i>Ficus carica</i> L.	Moraceae	Anjir-Khoraki	Benzyl aldehyde, benzyl alcohol, furanoid, linalool, trans-pyranoic, cinnamic aldehyde, indole, cinnamic alcohol, eugenol	Purgative, water retention, pertussis, bronchitis, pneumonia, dyspepsia, stomatitis	Sap, leaf and fruit	Ardekaniyan 1878 (DU000619); Amirahmadi 1875 (DU000616); Shiri 1877 (DU000618)
167	<i>Morus alba</i> L.	Moraceae	Toot-e Sefid	Quercetin, morin, kuwanon G, sanggenon C, morusin, mulberroside A, rutin	Diuretic, antifebrile, laxative, thoracic disease	Skin of root, leaf and fruit	Ardakaniyan 1878 (DU000619); Amirahmadi 1875 (DU000616)
168	<i>Morus nigra</i> L.	Moraceae	Toot-e Siyah	1-Deoxyojirimycin, eucronon, albufuran C, mulberofuran L	Anthelmintic, astringent, laxative, sore throat, stomatitis	Root, leaf and fruit	Shiri 1877 (DU000618)
169	<i>Fraxinus excelsior</i> L.	Oleaceae	Van, Zaban Gonjeshk	(<i>Z,Z,Z</i>)- <i>n</i> -Tetra triacont-3,5,15-triene, <i>n</i> -hexatriacontane, (<i>Z,Z,Z</i>)- <i>n</i> -octatriacont-11,13,20-triene, phytanic acid (3,7,11,15-tetramethylhexadecanoic acid), 26-hydroxystigmasterol-18- <i>oic</i> acid	Astringent, antifebrile, expectorant, laxative, purgative, rheumatism, gout, diuretic, diaphoretic	Bark, fruit and leaf	Khaliliyan 1971 (DU000713); Bashiri 1972 (DU000714); Naderi 2233 (DU000986)
170	<i>Ligustrum vulgare</i> L.	Oleaceae	Barge-no	Olivil glucoside, hydroxytyrosol glucoside, oleoside, p-coumaroyl glucarate, secoiridoid derivative, oleoside-11-methylester, 10-hydroxyoleuropein, apigenin 7-O-glucoside, ligustroflavone, nylpropanoid, echinacoside	Astringent, sore throat, antifebrile, stomatitis, tonsillitis, gum inflammation, uvulitis	Leaf and flower	Eghbali and Nosrati 1957 (DU000698); Alemi 1962 (DU000703); Jokar 1964 (DU000705); Dashbani 1965 (DU000706); Farhangnejad 1966 (DU000707); Azimipour 1967 (DU000709); Ziraki 1968 (DU000710)
171	<i>Olea europaea</i> L.	Oleaceae	Zeytoon Khoraki	Oleuropein, elenolic acid, hydroxytyrosil-elenolate, secologanose, secologanin, 10-hydroxy-10-methyl oleuropein aglycone, jaspolyoside, dialdehydic elenolic acid decarboxymethyl, berchemol	Emollient, laxative, antibilious, gall stones, chronic constipation, diuretic, astringent, antifebrile, hypertension, nephritis, plumbism	Fruit, leaf and bark	Dashtbani 1961 (DU000702); Shamesedini 1960 (DU000701); Ghorbaniyan 1959 (DU000700); Kazemzadeh 1956 (DU000697); Arab 1958 (DU000699)
172	<i>Syringa persica</i> L.	Oleaceae	Yas Banafsh-e Irani	Quercetin, caffeic acid, lilcoside, rutin, β -daucosterol, lauric acid, oleanolic acid, ursolic acid, naringenin, palmitic acid, quercetin-3-O- β -D-glucoside	Antifebrile	Fruit and bark	Alemi 1969 (DU000711); Arab 1970 (DU000712)
173	<i>Epilobium hirsutum</i> L.	Onagraceae	Bidalafi Korki	Epicatechin, kaempferol, quercetin, benzoic acid, quinic acid, gallic acid, ellagic acid, sterol, (<i>E</i>)-phytol, oleanolic acid, ursolic acid	Wart	Unknown (probably sap extracted from aerial parts)	(Assadi et al., 1988-2018); Roadi et al. (2008)
174	<i>Hypecoum pendulum</i> L.	Papaveraceae	Shah-Tarehie	Alkaloids, leptocarpine B, corydamine acid	Coolant, diuretic	Leaf	Falahi 1771 (DU000514); Amirahmadi 2645 (DU001013); Hosseini 1768 (DU000511); Naderi and Fouladian 2646 (DU001012); Shiri 1767 (DU000510)
175	<i>Papaver argemone</i> L.	Papaveraceae	Khashkhash Biyabani	Stearic acid, protopine, corytuberine, flavylum, isocorydine, rhoeadine, cryptopine, papaverrubine	Laxative, dermal disorders	Seed and leaf	Mahdavi 1770 (DU000513); Ghodrati and Dostmohammadi 1769 (DU000512)
176	<i>Plantago lanceolata</i> L.	Plantaginaceae	Barhang-e Sarneyzei	α -Pinene, δ -3-carene, <i>p</i> -cymene, limonene, dimethylfulvene, 1,3-diisopropyl naphthalene, tetradecane, bornyl acetate, capric acid, 2-hexanol, heptanal	Astringent, emollient, blood purification, sedative, diarrhea, toothache, earache, stomatitis, asthma, bronchitis, urinary tract discharge	Leaf, seed and root	Nori 1828 (DU000570); Naderi 2027 (DU000780); Mohammadian 1827 (DU000569)
177	<i>Plantago major</i> L.	Plantaginaceae	Barhang	Acetoin, hexadecanoic acid, benzimidazo[2,1- <i>a</i>]isoquinoline, lupeol, β -sitosterol, β -amyrin, diglycerol, hexadecanoic acid, ethyl ester	Astringent, emollient, blood purification, sedative, diarrhea, toothache, earache, stomatitis, asthma, bronchitis, urinary tract discharge	Leaf, seed and root	Tohidifar 1830 (DU000572); Seyfi 1829 (DU000571); Sarfi 1831 (DU000573); Bashiri 1832 (DU000574)

Table 1 Continued

No	Scientific name	Family	Vernacular name	Some bioactive compounds	Medicinal properties	Organ used	Voucher specimens/citations
178	<i>Platanus orientalis</i> L.	Platanaceae	Chenar	(Z)-3-Hexenol, thymol, carvacrol, camphor, decane, dodecane, hexadecane	Freckles removing, laryngospasm, snake bite, throat disorders	Fruit, seed and root	Khaliliani 1872 (DU000613); Norizadeh 1870 (DU000611); Ardekaniyan 1871 (DU000612)
179	<i>Arundo donax</i> L.	Poaceae	Ghamish	2,3-Butanediol (CAS) butane-2,3-diol, heptane, 2,4-dimethyl-, octane, 5-ethyl-2-methyl-, undecane, 3,7-dimethyl-, phenol, 2-methoxy-, decane	Diuretic, antigalactic, hairloss	Whole organs	Bashirian 1895 (DU000636); Bashiri 1892 (DU000633); Arab and Ghods 1893 (DU000634)
180	<i>Avena sativa</i> L.	Poaceae	Yolaf	<i>p</i> -Coumaric acid, sinapinic acid, vanillic acid	Diuretic, laxative, sedative, wound healing, gout, kidney and bladder pains, itch, insomnia, cough, water retention, anuria, larynx and throat swelling, hemoptysis, digestive system inflammation	Whole organs	Nori 1906 (DU000647); Dashtbani 1899 (DU000640); Alemi 1903 (DU000644); Vaziri 1905 (DU000646); Kiafirouzkhohi 1904 (DU000645); Alayi 1907 (DU000648)
181	<i>Cymbopogon jwarancusa</i> (Jones) Schult. subsp. <i>olivieri</i> (Boiss.) Soenarko	Poaceae	Chaman Moatar	Geraninal, neral, eugenol, limonene, eugenol methylether, geraniol, geranyl acetate, citronellal, elemicin, nerol, camphene	Appetizing, stomach tonic (specially children), dermatol disorders, emmenagogue, blood purification, antiflatulent	Stem, leaf and root	Beheshti and Mehrban 1902 (DU000643); Royayi 2032 (DU000774)
182	<i>Cynodon dactylon</i> (L.) Pers.	Poaceae	Margh	Palmitic acid, linoleic acid, ethyl palmitate, ethyl linoleate, ethyl oleate, dihydro- γ -linoleic acid, 5-hydroxymethylfurfural, maltol, retinol, phytol	Epilepsy, epistaxis, wound healing, expectorant, diuretic, gall stones, antiemetic, anti-inflammatory, biliary disease, stomatitis, dermal disorders	Whole organs	Ghodrati and Dostmohammadi 1897 (DU000638); Alemi 1898 (DU000639); Bashiri 1896 (DU000637); Naderi 2235 (DU000989)
183	<i>Hordeum vulgare</i> L.	Poaceae	Jo	Hexanal, methyl hexanoate, (<i>E</i>)-hex-2-enal, 2-pentylfuran, pentan-1-ol, (<i>Z</i>)-2-(pentenyl)-furan, (<i>Z</i>)-pent-2-en-1-ol, hexan-1-ol, (<i>Z</i>)-hex-3-en-1-ol, (<i>E</i>)-hex-2-en-1-ol, oct-1-en-3-ol, 2-ethylhexan-1-ol	Emollient, diuretic, anti-inflammatory, fever, liver tonic, diarrhea, bladder stones	Fruit	It is seen in some parts of Semnan province
184	<i>Phragmites australis</i> (Cav.) Trin. ex Steud.	Poaceae	Ney	Alkaloids, phranisines A-B, N- <i>p</i> -Coumaroyl serotonin, N- <i>p</i> -coumaroyl-tryptamine	Oliguria, diaphoretic, liver, urinary and heart diseases, erysipelas, hyperuricemia, gout, aphrodisiac, fever, uterine pain	Rhizome and root	Talebi 1900 (DU000641)
185	<i>Triticum aestivum</i> L.	Poaceae	Gandom	Ferulic acid, alpha tocopherol, lutein, 5-heptadecylresorcinol, 2,4-dihydroxy-1,4-benzoxazin-3-one, secoisolaricresinol, sitosterol, campesterol ferulate	Anti-inflammatory, erysipelas, antialcohol, jaundice, purgative, aphrodisiac, sedative, stomach tonic, antifebrile, appetizing, dermal diseases, hyperlipidemia, weight gain, polydipsia	Seed	Bandari 1889 (DU000630); Dostmohammadi et al. 1888 (DU000629); Arab 1890 (DU000631); Dashtbani 1891 (DU000632)
186	<i>Atraphaxis spinosa</i> L.	Polygonaceae	Karevankosh	N-trans- <i>p</i> -Coumaroyl-3',4'-dihydroxyphenylethylamine, N-trans-feruloyl-3',4'-dihydroxyphenylethylamine, (-)-fisetinidol, (-)-catechin, butin, quercetin, quercetin-3-methyl ether	Purgative, laxative, cough, sedative for heart, liver and stomach tonic, emollient for throat and chest	Aerial parts with flower	Naderi 1651 (DU000379); Naderi 1650 (DU0001650)
187	<i>Polygonum aviculare</i> L.	Polygonaceae	Alaf-e Haftband	Quercitrin hydrate, caffeic acid, rutin, dodecanal, (<i>E</i>)- β -farnesene, β -caryophyllene, α -terpineol	Astringent, diuretic, diarrhea, dysentery, abnormal uterine bleeding, epistaxis, asthma, bronchitis, tuberculosis	Whole organs	Alemi 1914 (DU000655); Motaharnejad and Mohammadi 1915 (DU000656); Robati 1919 (DU000660); Esmaili and Ghomi 1917 (DU000658); Naderi 1647 (DU000375); Shokatiniya 1913 (DU000654); Amrovani 1916 (DU000657)
188	<i>Polygonum lapathifolium</i> L.	Polygonaceae	Haftband-e Bargbidi	Alkaloids, phytosterols, triterpines, flavonoids, saponin, catechin, (-)-epicatechin, hyperin, isoquercitrin, isorhamnetin, kaempferol, quercetin	Blood purification, diaphoretic, astringent, wound healing, kidney stones	Whole parts	(Roadi et al., 2008)
189	<i>Rumex crispus</i> L.	Polygonaceae	Torshak-e Mavaj	Kaempferols, sitosterols, quercetin-3-O- α -L-rhamnopyranoside, gallic acid	Anemia, appetizing, diuretic, astringent	Root	Godarzi 1912 (DU000653); Vaziri 1908 (DU000649); Alemi 1910 (DU000651); Jokar 1911 (DU000652); Esmaili and Ghomi 1909 (DU000650)

Table 1 Continued

No	Scientific name	Family	Vernacular name	Some bioactive compounds	Medicinal properties	Organ used	Voucher specimens/citations
190	<i>Rumex patientia</i> L.	Polygonaceae	Torshak-e Shafa Dahandeh	Chrysophanol, chrysophanol-8-O- β -D-glucopyranoside, physcion, emodin, emodin-8-O- β -D-glucopyranoside, maackiain, maackiain-3-O-beta-D-glucopyranoside	Laxative, dermal diseases, digestive system tonic, chronic rheumatism, water retention, diarrhea, uterine bleeding, hemorrhoids, eczema, erysipelas, cholagogue, sensory processing disorder, abscess	Leaf and root	Naderi 1652 (DU000380)
191	<i>Rumex scutatus</i> L.	Polygonaceae	Torshak-e Varizeie	Antraquinones, flavonoids, naphthalenes, stilbenes, diterpene alkaloids, terpenes, lignans, tannins	Astringent, diarrhea, antiscorbutic, backache, hemorrhoids, dermal diseases, urinary system disorders, gingivitis, anorexia	Seed and root	(Rechinger 1963-2015)
192	<i>Portulaca oleracea</i> L.	Portulacaceae	Khorfeh	Caffeoylglucaric acid, sinapic acid-O-hexoside, epicatechin, quercetin-O-hexoside isomer, citric acid, hydroxytyrosol hexoside, melatonin, luteolin, lupeol, palmitic acid	Diuretic, antiscorbutic, antifebrile, blood purification, polydipsia, hemoptysis, cough, insomnia, digestive system and urinary system inflammations, metrorrhagia	Whole organs	Mohammadi 1814 (DU000556)
193	<i>Anagallis arvensis</i> L.	Primulaceae	Anaghali	Flavonoids, saponins, tannins, steroids, glycosides, alkaloids, anthraquinones, cucurmitacin, B, D, E, I and L, sterols, β -amyrin, rutin, n-hexacosane, lacceric acid	Expectorant, diuretic, cough, sedative, diaphoretic, jaundice, hemorrhoids, kidney and dermal inflammation, epilepsy, urinary tract stones, mental disorders	Aerial parts	Naderi 2044 (DU000787)
194	<i>Punica granatum</i> L.	Punicaceae	Anar	Punicic acid, ellagic acid, catechin, punicalagins, rutin, quercetin, flavones, flavonones, flavonols, anthocyanidins, chlorogenic acid, epicatechin, gallic acid, caffeic acid	Astringent, anthelmintic, stomach tonic, anorexia, anemia, diuretic, urinary tract diseases, vaginal discharge, bleeding, tonsillitis, antinausea, migraine, chronic diarrhea	Flower, leaf, bark, root, fruit and sap	Ardakaniyan 1766 (DU000508)
195	<i>Adonis aestivalis</i> L.	Ranunculaceae	Cheshm Khoros-e Tabestane	β -Carotene, 4-hydroxyechinenone, 3-hydroxyechinenone, astaxanthin diester, lutein, adonixanthin, astaxanthin	Diuretic, heart tonic, laxative, kidney stones	Whole organs	Naderi and Afsharian (DU001014)
196	<i>Clematis ispanica</i> Boiss.	Ranunculaceae	Clematis Esfahani	Exact compounds are unknown. The compounds <i>C. orientalis</i> L.: Vitalboside F or songaroside B, orientaloid F, H, I, K	Antimicrobial	Aerial parts	Naderi 2051 (DU000794)
197	<i>Ficaria kochii</i> (Ledeb.) Iranshahr & Rech.f.	Ranunculaceae	Allale Barfzi	Phytol, farnesol, methyl linoleate, α -farnesene	Hemorrhoids	Aerial parts	Salavatian 1821 (DU000563); Ghorbani and Nasaie 1820 (DU000562)
198	<i>Nigella arvensis</i> L.	Ranunculaceae	Siyahdane-Harz	Carvacrol methyl ether, β -pinene, <i>n</i> -undecane, α -pinene	Emmenagogue, anthelmintic, purgative, galactagogue, lung secretions, carminative	Seed	(Roadi et al., 2008)
199	<i>Ranunculus arvensis</i> L.	Ranunculaceae	Alaleh	l-Perillaldehyde, biosol, carvacrol, 1,8-cineol, terpinyl acetate, 1,2,3,6,7,7 α -hexahydro-5H-inden-5-one	Asthma, gout, antifebrile	Flower	(Roadi et al., 2008)
200	<i>Reseda luteola</i> L.	Resedaceae	Varas	12-Octadecadienoic acid methyl ester, 9-octadecenoic acid methyl ester, hexadecanoic acid methyl ester, <i>n</i> -decane	Appetizing, anthelmintic, diuretic, stomach tonic	Root and aerial parts with flower	Naderi 2046 (DU000789); Naderi 2047 (DU000790)
201	<i>Rhamnus cathartica</i> L.	Rhamnaceae	SiyahTangras-eTebbi	Chrysophanol, physcion, bianthrone arabinol, dihydroxynaphthalene torachryson, fatty alcohol 1-docosanol, anthrone chrysarobin, piperidine alkaloid piperine, dibenzoxepin pacharin	Purgative, water retention, improving cerebral circulation	Fruit	(Assadi et al., 1988-2018)
202	<i>Agrimonia eupatoria</i> L.	Rosaceae	Ghafes	Gallic and ellagic acids, galloocatechin, epigallocatechin, catechin, epicatechin, epicatechin gallate, hydroxyphenylacetate, caffeic, syringic, <i>p</i> -coumaric, ferulic, sinapic, quercetin-3-D-glucoside, neohesperidin, naringenin	Astringent, emmenagogue, anthelmintic	Whole organs	(Roadi et al., 2008)
203	<i>Cotoneaster nummularioides</i> Pojark.	Rosaceae	Shirkhesht	Methylcyclopentane, cyclohexane, <i>n</i> -octane, camphene, eucalyptol, camphor, dihydrocarveol, borneol, terpinene-4-ol, α -terpineol	Purgative, laxative, expectorant, liver tonic, stomach tonic, cough, antifebrile, children jaundice, sore throat, thorax pain	Whole organs	Naderi 1696 (DU000432); Naderi 1697 (DU000433)
204	<i>Cydonia oblonga</i> Mill.	Rosaceae	Beh Jangali	Phenolic compounds, caffeoylquinic acids (3- <i>A</i> - and 5- <i>O</i> -caffeoylquinic acids, 3,5-dicaffeoylquinic acid), quercetin glycoside, rutin	Stomach tonic, antisialagogue, diarrhea, dysentery, hemoptysis, antiemetic, uterine bleeding, hemorrhoids, intestinal inflammatory, vaginal discharge	Seed and leaf	Malekjafarian 1986 (DU000728)
205	<i>Fragaria vesca</i> L.	Rosaceae	Tootfarangi Vahshi	β -Linalool, <i>n</i> -nonanal, tetradecanal, nerolidol, α -bisabolol, phytol, <i>m/p</i> -xylene, isodecene, methyleugenol, α -cedrene, α -murolene, nerolidol, α -cedrol, α -bisabolol	Diuretic, astringent, kidney and urinary tract stones, hemorrhoids, gout, rheumatism, water retention, stomach tonic, breathing difficulties, nerve tonic, dermal disorders	Rhizome, leaf and fruit	(Goudarzi 2016); (Rechinger 1963-2015)



Table 1 Continued

No	Scientific name	Family	Vernacular name	Some bioactive compounds	Medicinal properties	Organ used	Voucher specimens/citations
206	<i>Geum urbanum</i> L.	Rosaceae	Alaf-Mobarak	Hexose polymer, saccharide, saccharide, galloyl-hexoside, casuarinin, 5,6-dihydroxy-30,40,7-trimethoxyflavone, (+)-epipinosin-40-ohexoside, triterpene acid-O-hexoside, gallic acid, caffeic acid, eugenol	Astringent, digestive system tonic, chronic diarrhea, pertussis, uterine discharge and bleeding	Rhizome	(Assadi et al. 1988-2018); Reching (1963-2015)
207	<i>Malus domestica</i> Borkh.	Rosaceae	Sib	Eucalyptol, phytol, α -farnesene, pentacosane, linalool, 4-terpineol, β -damascenone, <i>trans</i> -caryophyllene, 6,10,14-trimethyl-2-pentadecanone, hyperoside, isoquercitrin, avicularin, rutin, quercitrin	Anti-constipation, diarrhea, anticancer, antidiabetic, antifebrile, heart disorders, cough, hypoglycemic, antiseptic, arteriosclerosis, cholera, antiscorbutic, hyperuricemia	Fruit	Alemi 1990 (DU000732)
208	<i>Malus orientalis</i> Uglitzk.et Juz.	Rosaceae	Sib-e Jangali	Eucalyptol, phytol, α -farnesene, pentacosane	Anti-constipation, antifebrile, diuretic, kidney and bladder inflammation, laxative, antidiarrhea, sedative, arteriosclerosis, gout, rheumatism, eczema, hemorrhoids, dermal disorders	Bark, leaf, root and fruit	Norizadeh 1992 (DU000734)
209	<i>Potentilla reptans</i> L.	Rosaceae	Panjeberg-e Ravandeh	Flavonoids, kaempferol, quercetin, ellagic acid, <i>p</i> -coumaric acid, caffeic acid, ferulic acid	Astringent, digestive system tonic	Rhizome, root and leaf	(Assadi et al. 1988-2018); Reching (1963-2015)
210	<i>Prunus armeniaca</i> L. (syn: <i>Armeniaca vulgaris</i> Lam.)	Rosaceae	Zard-Alu	Polyphenolic, chlorogenic acid, benzoic acid, vanillic acid, caffeic acid, benzaldehyde, mandelonitrile	Astringent, diarrhea, blood purification, laxative, anemia, rickets	Fruit	Khani 2056 (DU000799); Mesbahi 2055 (DU000798)
211	<i>Prunus cerasus</i> L. (syn: <i>Cerasus vulgaris</i> Mill.)	Rosaceae	Albalu	Phenolic acids, 3-caffeoylquinic acid, 5-caffeoylquinic acid, <i>p</i> -coumaric acid, Flavanols, catechin, epicatechin, flavonols, quercetin, kaempferol	Diuretic, urinary system diseases, arthritism	Whole organs	Alemi 1996 (DU000738); Mesbahi 1998 (DU000739)
212	<i>Prunus divaricata</i> Ledeb.	Rosaceae	Alucheh	Pyrogallo, quinol, gallic acid, catechol, <i>p</i> -hydroxy benzoic acid, caffeine, chlorogenic acid, vanillic acid, vanillin, <i>p</i> -coumaric acid, ferulic acid, ellagic acid, rosmarinic acid	Hypertension, anticancer, digestive system diseases, cardiovascular diseases, blood sugar regulation, fat loss	Fruit	Mesbahi 2054 (DU000797)
213	<i>Prunus dulcis</i> (Mill.) D.A. Webb. (syn: <i>Amygdalus dulcis</i> Mill.; <i>Amygdalus communis</i> L.)	Rosaceae	Badam	(<i>epi</i>) Catechin, chlorogenic acid, kaempferol, isorhamnetin, ursolic acid, amygdalactone, benzoic acid derivatives, <i>n</i> -butanol	Purgative, anthelmintic, sore throat, cough, pertussis, emollient, antibilious, respiratory tract inflammation	Flower and fruit	Bashiri 1988 (DU000730); Shams Al-Edin 1989 (DU000731)
214	<i>Prunus persica</i> (L.) Batsch. (syn: <i>Persica vulgaris</i> Mill.)	Rosaceae	Holu	Oleic acid, linoleic acid, epicatechin gallate, hydrocinnamic acid, sinopinic acid, dithiothreitol, caffeic acid	Diuretic, sedative, purgative, antifebrile, urinary tract diseases, liver pains, kidney stones, pertussis, bladder inflammation, nephritis, spasms	Leaf and fruit	Alemi 1995 (DU000737); Norizadeh 1987 (DU000729)
215	<i>Rosa canina</i> L.	Rosaceae	Nastaran-e Vahshi	Vitispiran, -5-methyl-3-hexanone, 2-heptanone, hexadecanoic acid - α -(<i>E</i>)-acardial, β -ionone, dodecanoic acid, linolic acid, -6-methyl-5-hepten-2-one	Antiscorbutic, astringent, diuretic, diarrhea, hemoptysis, stomach cramps, nephritis	Leaf and flower	Ehsani 1991 (DU000733)
216	<i>Rubus caesius</i> L.	Rosaceae	Tameshk-e Kabood	Exact compounds are unknown. The major compounds in other species are: ellagic acid; ellagitannin; α -linolenic acid; linoleic acid	Astringent, hemostatic, antidiabetic, blood purification, diarrhea, dysentery, uterine bleeding, hemoptysis, hematuria, anemia, water retention, dermal diseases, laryngospasam	Leaf and root	(Assadi et al. 1988-2018)
217	<i>Sanguisorba minor</i> Scop.	Rosaceae	Toot Robahi-e Abeleroy	Farnesyl acetate, docosane, linalool, nonanal, dodecane, (<i>E</i>)- α -damascenone, tetradecane, β -caryophyllene, caryophyllene oxide, (<i>E,E</i>)-farnesyl acetate, eicosane, hencosane	Appetizing, diuretic, astringent, hemostatic, diarrhea (children), dysentery, kidney stones, digestive system tonic, uterine bleeding, antigalactic, antifatulent, wound healing, intestinal inflammatory, hemothroax	Whole organs	Naderi 1698 (DU000434); Lasjerdy 1994 (DU000736); Ehsani and Taghribiyan 1985 (DU000727); Esmaili and Ghomi 1993 (DU000735)
218	<i>Galium aparine</i> L.	Rubiaceae	Bitirakh	Asperulosidic acid, 10-deacetylasperulosidic acid, asperuloside, monotropein, aucubin, alkaloids, caffeine, flavonoids, coumarins	Diuretic, diaphoretic, blood purification, water retention, kidney stones, gout, jaundice, prostatitis	Whole organs	Abolhasani 1846 (DU000588); Alemi 1847 (DU000589); Motaharnejad and Mohammadi 1850 (DU000592); Amirahmadi 2053 (DU000796); Hosseini 1848 (DU000590)
219	<i>Galium verum</i> L. subsp. <i>glabrescens</i> Ehrend.	Rubiaceae	Shir-Panir	Sesquiterpenes, β -caryophyllene, <i>trans</i> -muurola-4,5-diene phenylpropanoids, benzyl alcohol, phenylacetaldehyde	Sedative, diuretic, astringent, anticonvulsant, liver disorders, water retention, goiter, scurvy, kidney stones	Aerial parts	Naderi 2036 (DU000779)

Table 1 Continued

No	Scientific name	Family	Vernacular name	Some bioactive compounds	Medicinal properties	Organ used	Voucher specimens/citations
220	<i>Populus nigra</i> L.	Salicaceae	Tabrizi, Shalak	Caffeic acid, ferulic acid, chrysin, eugenol, α -bisabolol, α -cadinol, 7- <i>epi</i> - α -cedrene, benzyl 3-methylbutyrate	Diuretic, diaphoretic, digestive system tonic, astringent, antiseptic, kidney diseases, bladder and urinary tract diseases, gout, sciatica, rheumatism, dermal diseases	Leaf buds and bark	It is seen at the margin of farms in Damghan
221	<i>Salix excelsa</i> S.G.Gmel.	Salicaceae	Siyah-Beed, Fuka	Flavonols, flavones, flavanones, isoflavones, flavan-3-ols, catechins, procyanidins, chalcones, dihydrochalcone, anthocyanins, dihydroflavonols	Antifebrile, anticonvulsant, dysmenorrhea, nerve sedative, genital system sedative	Bark	Naderi s.n. (DU)
222	<i>Scrophularia striata</i> Boiss.	Scrophulariaceae	Gole-Meymoni-Sazoie	Caryophyllene oxide, spathulenol, α -cadinol, docosane	Anticancer, wound healing	Unknown	Rechinger (1963-2015); (Assadi et al. 1988-2018)
223	<i>Verbascum thapsus</i> L.	Scrophulariaceae	Gol Mahoor-e Orapayi	Flavonoids, phenylethanoid, neolignan glycosides, saponins	Emollient, anticonvulsant, diaphoretic, diuretic, antifungal, sedative, cough, expectorant, asthma, cold, astringent, aphrodisiac	Flower and leaf	Naderi 2033 (DU000776); Naderi 2034 (DU000777)
224	<i>Veronica anagalis-aquatica</i> L.	Scrophulariaceae	Sizab Abi	Aucubin, geniposidic acid, musaenoside, catalposide, verposide, amphicoside	Astringent, diuretic	Aerial parts	Naderi 2035 (DU000778); Khan-Mohammadi 1887 (DU000628)
225	<i>Veronica hederifolia</i> L.	Scrophulariaceae	Sizab Abi-Ashgheyi	<i>p</i> -Coumaric acid, ferulic acid, luteolin, apigenin	Astringent, stomach tonic, diuretic, diaphoretic, sedative, asthma, bronchitis, expectorant	Aerial parts	Esmaili and Ghomi 1886 (DU000627); Fathalian and Shadkam 1884 (DU000625); Alemi 1883 (DU000624); Ghorbaniand Nesai 1885 (DU000626)
226	<i>Ailanthus altissima</i> (Mill.) Swingle	Simaroubaceae	Ar-ar	Lignans, coumarins, chalcone	Ascaricide, antidiarrhea	Bark and skin of root	Alemi 1872 (DU000614)
227	<i>Capsicum annuum</i> L.	Solanaceae	Felfel	Capsaicin, dihydrocapsaicin, capsiate, capsidiol	Appetizing, diuretic, digestive system tonic, antacid, diarrhea, hemorrhoids, rheumatism, pertussis, cough, pneumonia, abnormal uterine bleeding, stomach cramps, etc.	Fruit	It is frequently seen in Semnan province
228	<i>Datura innoxia</i> Mill.	Solanaceae	Dature Gol dasht	β -Sitosterol, scopolamine, fastusine, daturanolone, daturadiol	Anodyne, sedative, anaesthetic, poisonous	Root	Ghanepour and Hossenipour 1804 (DU000546); Charmhini 1805 (DU000547); Alemi 1807 (DU000549); Ghodosi 1806 (DU000548)
229	<i>Hyoscyamus niger</i> L.	Solanaceae	Bazrolbanj	1-Pentanol, 3-hexanone, 2-hexanone, 3-hexanol, hexanal, 1-hexanol, heptanal, undecanone, octanal, nonanal, 2,4-decadienal, (<i>E,E</i>)-tetradecanal, hexahydrofarnesyl acetone, farnesyl acetone, phytol	Anticonvulsant, lenitive, pertussis, tuberculosis, chronic bronchitis, rheumatism, gout, epilepsy, insomnia, intestinal inflammatory, hypnotic, cough, stomachache, poisonous	Leaf and seed	Naderi 2043 (DU000786)
230	<i>Lycopersicon esculentum</i> Miller	Solanaceae	Goje Farangi	α -Pinene, γ -terpinene, β -pinene, betaer-13-ene, β -phellandrene, δ -2-carene, hexenal, (<i>E</i>)-2-hexenal	Rheumatism, gout, kidney stones, arteriosclerosis, chronic poisoning, hyperviscosity, hyperuricemia, antibilious, anti-constipation, intestinal inflammatory	Fruit and seed	It is frequently seen in Semnan province
231	<i>Nicotiana tabacum</i> L.	Solanaceae	Tanbako	α -Terpineol, thymol, biosol, solanone, damascenone, β -caryophyllene, pentadecanal, cyclodecanone, nicotine, pyridine	Infected wounds, anti-lice	Leaf and seed	It is seen in Semnan province
232	<i>Solanum dulcamara</i> L.	Solanaceae	Tajrizi Irani	Egalactotigonin, atroposide E, soladulcosides A, soladulcosides B, solanine, soladul-cine A, soladulcine B	Laxative, diuretic, diaphoretic, blood purification, itch, eczema, dermal diseases, herpes	Fruit and stem	Roadi et al. (2008)
233	<i>Solanum melongena</i> L.	Solanaceae	Bademjan	<i>n-trans-p</i> -Coumaroyltyramine, <i>n-trans-p</i> -coumaroyloctopamine, <i>n-trans-p</i> -coumaroylnoradrenline, <i>n-trans</i> -feruloyloctopamine, phenylpropanoid neochlorogenic acid	Appetizing, diuretic, emollient, anemia, anti-inflammatory, poultice, burns, abscess, hemorrhoids, spasmolytic, otitis	Fruit, seed, leaf and root	Amirahmadi 2293 (DU001122)
234	<i>Solanum nigrum</i> L.	Solanaceae	Tajrizi	Epicatechin, dillapiole, α -cadinol, para-cymene, α -phellandrene, β -pinene, α -bisabolol acetate, (<i>Z,E</i>)-4,6,8-megastigmatriene, phytol, linalyl butanoate	Sedative, indigestion, pertussis	Leaf and aerial parts with flower	(Assadi et al. 1988-2018)

Table 1 Continued

No	Scientific name	Family	Vernacular name	Some bioactive compounds	Medicinal properties	Organ used	Voucher specimens/citations
235	<i>Solanum tuberosum</i> L.	Solanaceae	Sib-Zamini	Solanidine, demissidine, α -demissidine, α -solanine, patatin, tuberonic α -glucosidase, β -carotene, cryptoxanthin, lutein, zeaxanthin, tuberonic α -glucosidase	Sedative, rheumatism, chronic lung secretions, cough, diarrhea, emollient, antiscorbutic, burns	Leaf and rhizome	It is seen in some parts of Semnan province
236	<i>Myricaria germanica</i> (L.) Desv.	Tamaricaceae	Shebhe Gaz	<i>cis</i> -Decahydronaphthalene, <i>cis</i> -4-caranone, 2 <i>E</i> ,4 <i>E</i> -decadienal, dodecanal, neryl acetone, dodecanoic acid, 6,10,14-trimethyl-2-pentadecanone, neryl acetone	Astringent, diuretic, appetizing, hemostatic	Sap and bark	Esmaili and Ghomi 1819 (DU000561)
237	<i>Taxus baccata</i> L.	Taxaceae	Sorkhdar	Lutein, β -carotene, rhodoxanthin, <i>p</i> -coumaric acid-glucoside, protocatechuic acid, hydroxy-caffeic acid, caffeic acid, catechin-glucoside	anticancer	Flower	Afsharian 2214 (DU000961)
238	<i>Typha domingensis</i> Pers.	Typhaceae	Loyi	Ethylbenzene, <i>p</i> -xylene, benzene, dodecane, tetradecane, pentadecane, benzylethyl-m-toluidine, 2-tetradecene	Astringent, diuretic, burns, wounds, anthelmintic, diarrhea, ears infections, dermal disorders	Leaf and rhizome	Lasjerdy 1764 (DU000506)
239	<i>Urtica dioica</i> L.	Urticaceae	Gazaneh-Dopayeh	Benzene dicarboxylic acid, β -linalool, phytol, menthol, borneol, 3-eicosene, 1,8-cineole, camphor	Digestive tonic, diuretic, hemostatic, galactagogue, dermal disorders, purgative, rheumatism, anthelmintic, emmenagogue, diabet	Leaf, root and seed	Tagharobian 1765 (DU000507); Naderi 2039 (DU000782)
240	<i>Phyla nodiflora</i> (L.) Greene.	Verbanaceae	Tot-Payani	2, 7-Dioxatricyclo [4.3.1.0(3, 8)] decan-4-one, azacyclotridecan-2-one, benzoic acid, 4-etoxy-ethyl ester, dodecanoic acid, <i>n</i> -hexadecanoic acid, phytol, stigmasterol	Astringent, stomach tonic, wound healing, diuretic, anthelmintic, aphrodisiac	Leaf, stem and fruit	Nori et al. 1818 (DU000560)
241	<i>Vitis vinifera</i> L.	Vitaceae	Angoor	Geraniol, linalool, terpineol, nerolidol, glucose, fructose, malate, tartrate	Astringent, diuretic, dysentery, gout, jaundice, antiemetic, stomach cramps, varicose	Leaf, fruit and sap	Khaliliyan 1881 (DU000622); Alemi 1882 (DU000623); Ardekaniyan 1879 (DU000620); Motaharnejad and Ghomi 1880 (DU000621)
242	<i>Peganum harmala</i> L. var. <i>harmala</i>	Zygophyllaceae	Espand	α -Pinene, limonene, styrene, α -pinene, <i>trans</i> -verbenole, sabinene	Hypnotic, diaphoretic, anthelmintic, emmenagogue	Usually seed	Naderi 2048 (DU000791); Malihevand 1833 (DU000575); Alemi 1834 (DU000576); Ahmadibedaei 1835 (DU000577)
243	<i>Tribulus terrestris</i> L.	Zygophyllaceae	Kharkhasak	Benzoic acid, methyl ester, cyclohexasiloxane, dodecamethyl, hexadecanoic acid, methyl ester, methyl 9- <i>cis</i> ,11- <i>trans</i> -octadecadienoate	Appetizing, kidney and bladder stones, dermal disorders, hemorrhoids, asthma, blood purification	Root, fruit, seed and leaf	Naderi 2239 (DU000996)
244	<i>Zygophyllum fabago</i> L.	Zygophyllaceae	Ghich-e Lobiyayi	β -Damascenone, β -ionone, megastigmatrienone, hexahydroxyfarnesyl acetone (phytone), phytol	Purgative, anthelmintic	Seed	(Goudarzi 2016)

with our study, which means fruits of Apiaceae are widely used as folk medicine by indigenous people.

3.3. Medicinal properties

All therapeutic properties of the species in Table 1 were classified into 14 noticeable categories (Fig. 5). The most treated used category was digestive system (20.08%), followed by the metabolic and immune system (15.93%), urological problems (12.12%), respiratory system (9.87%), gynecology (6.73%), dermatological problems (6.28%), etc. Our results are in accordance with other ethnobotanical studies which have shown digestive or gastrointestinal system disorder is the most used

category in some parts of the world particularly by the Iranian people (Ghorbani, 2005; Rajaei and Mohamadi, 2012; Khajoei Nasab and Khosravi, 2014; Sadeghi et al., 2014; Rehman et al., 2015; Sadat-Hosseini et al., 2017; Jahantabet al., 2018; Maleki and Akhiani, 2018; Dolatkahi et al., 2012, 2014; Mosaddegh et al., 2012, 2016). The high worldwide prevalence of gastrointestinal diseases was reported by literature (E3hlin et al., 2003; Chang, 2004; Oshima and Miwa, 2015; Avramidou et al., 2018). This prevalence might be due to the effect of either genetic or environmental factors including low dietary fiber intake, excessive consumption of tobacco, coffee, carbohydrate, fat and animal protein (Smith, 1978), poor dietary condition and unsafe drinking water in some

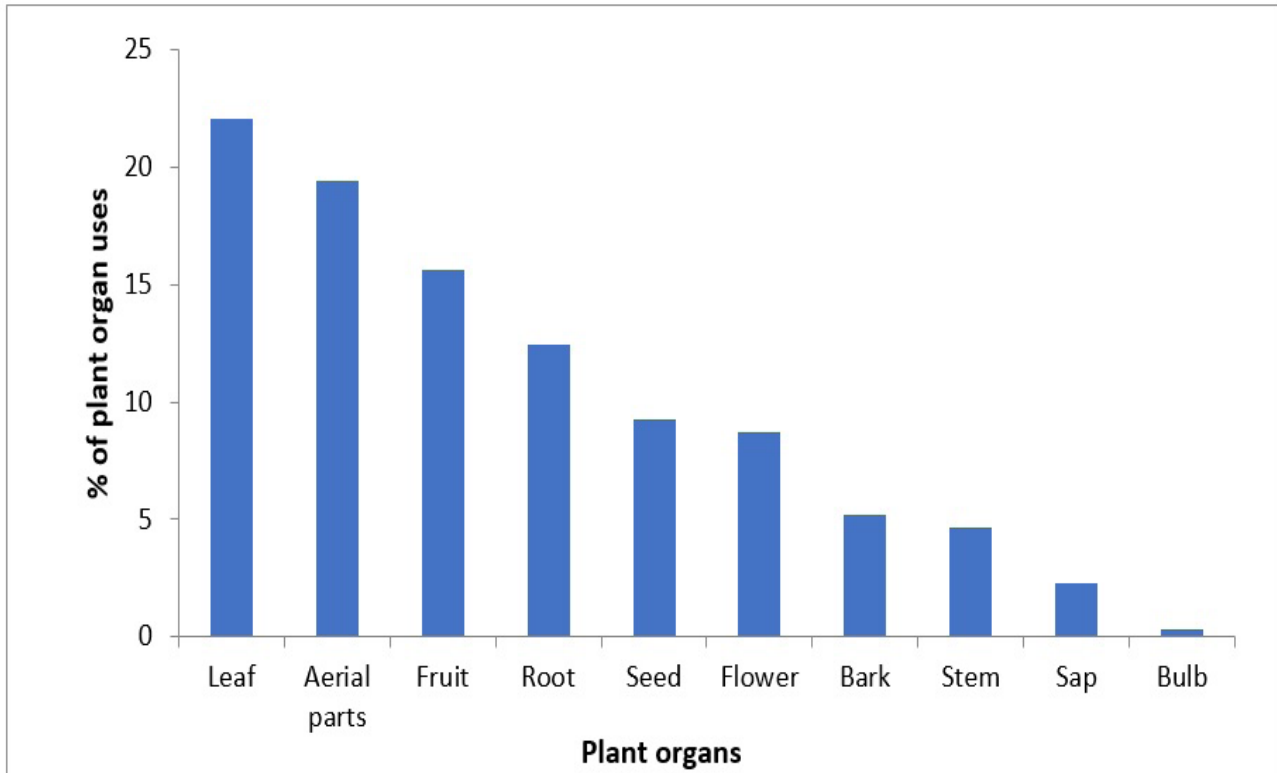


Fig. 4. Percentage of used plant organs.

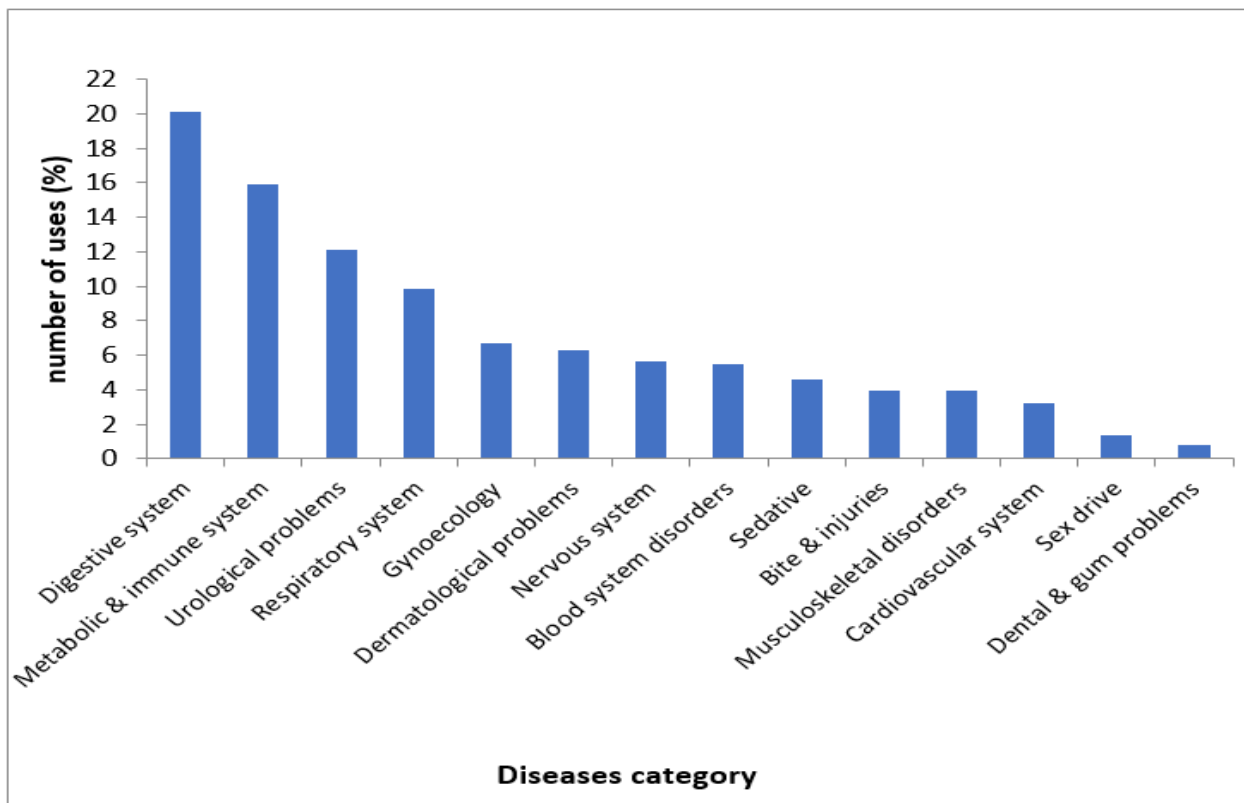


Fig. 5. Percentage of uses in each category.



parts of the world (Khajoei Nasab and Khosravi, 2014). Some examples of lesser known species with outstanding therapeutic effects that are used traditionally to treat common diseases are listed here, few studies have hitherto focused on such therapeutic effects in these species: hypertension (*Viscum album* L.); hypotension (*Tussilago farfara* L.); anticonvulsant (*Galium verum* L., *Hyoscyamus niger* L., *Salix excels* S.G.Gmel., *Verbascum thapsus* L.); galactagogue (*Astragalus hamosus* L., *Vitex negundo* L.); aphrodisiac (*Cressa cretica* L., *Phragmites australis*, *Phylla nodiflora* (L.) Greene); hiccups (*Asplenium adiantum-nigrum*); hemorrhoids (*Alhagi pseudoalhagi* (M. Bieb.) Desv. ex B. Keller & Shap., *Ficaria kochii* (Ledeb.) Iranshahr & Rech.f., *Rumex patientia* L., *R. scutatus* L.); metrorrhagia (*Portulaca oleracea* L., *Rhus coriaria* L., *Teucrium polium* L.); insomnia (*Avena sativa*, *Hyoscyamus niger*, *Lotus corniculatus* L., *Melilotus officinalis* (L.) Pall.); antisialagogue (*Cydonia oblonga*); seasick (*Capsicum annum* L.); herpes (*Solanum dulcamara* L.); varicose (*Vitis vinifera* L.); hairloss (*Arundo donax*, *Onopordum acanthium* L.); epistaxis (*Cynodon dactylon*, *Polygonum aviculare* L.); snake bite (*Platanus orientalis* L.); rabies (*Cirsium arvense* (L.) Scop.); plumbism (*Olea europaea* L.); wound healing, burns or as poultice (*Achillea millefolium* L., *Anthemis tinctoria* L., *Artemisia scoparia*, *Betula pendula* Roth, *Hypericum androsaemum*, *Stellaria media* (L.) Will., *Typha domingensis*, *Xanthium strumarium* L.). The following species are used to treat some noticeable low-frequency diseases: Parkinson (*Scutellaria pinnatifida* A.Ham.); epilepsy (*Achillea millefolium*, *Anagallis arvensis* L., *Coriandrum sativum* L., *Cuminum cyminum* L., *Cynodon dactylon*, *Cyperus rotundus*, *Hyoscyamus niger*, *Loranthus europaeus* Jacq., *Senecio vulgaris* L.); measles (*Arctium lappa* L., *Scabiosa columbaria* L.); mumps (*Scabiosa columbaria*); goiter (*Galium verum*); melancholia (*Melilotus officinalis*), for more details see Table 1. Furthermore, *Cynanchum acutum* L., *Hyoscyamus niger* and *Datura innoxia* are known as poisonous species in Semnan province.

3.4. Endemic species

Five medicinal species of Semnan province are endemic to Iran that includes *Dorema ammoniacum* D.Don, *Ferula assa-foetida* L., *F. persica* Willd., *Nepeta glomerulosa* Boiss., and *Pycnocycla spinosa* Decne. Nonetheless, little is known about the pharmacological effects of the endemic species of Semnan province. For instance, chemical compositions of the essential oil of *F. assa-foetida* from Kermanshah province were studied by us (Bahrami et al., 2013). Notwithstanding the details of scientific nomenclature, a vast range of healing properties for the treatment of diseases especially intestinal parasites infections have been reported for *Ferula* spp. (Boghrati and Iranshahi, 2019). We believe that a wrong identification can affect the next pharmacological research. Moreover, due to incorrect techniques for collecting and preparing herbarium specimens, many specimens for instance in the genus *Ferula* are mistakenly identified. Rezaei et al. (2022) reviewed the gaps which cause negative impacts on the quality and validity of research findings. According to their studies, major gaps in herbal research are the

history of traditional medicine, botanical nomenclature, plant correct identification, chemical extraction procedure, toxicological risk assessment, and biological and pharmacological mechanisms of disease. Thus correct identification of medicinal plants plays an important role in ethnopharmacological research. Goudarzi (2016) recorded *F. assa-foetida* from central and southeast of Semnan province, but no voucher specimen has been documented by him or the Floras (Rechinger, 1963-2015; Assadi et al., 1988-2018), which indicates the confirmation of this species in Semnan province needs further investigation. However, we collected some other species of *Ferula* in some studied areas such as *Ferula foetida* (Bunge) Regel, *F. szovitsiana* DC., *F. pseudalliacea* Rech.f., *F. karkalensis* Korovin and *F. ovina* (Boiss.) Boiss. that vouchers are deposited in our herbarium (DU). The exuded substances of *Ferula* spp. are known as "anghuzeh", "heng", "buganeh" or even "koma" among indigenous people (Bahrami et al., 2013); however, the precise scientific names of those substances have hitherto remained unknown. A great deal of interest has been expressed regarding the antispasmodic and antidiarrheal activities of *Pycnocycla spinosa* (Sadraei et al., 2003a, 2003b, 2009, 2011) along with the antimicrobial and antioxidant activities (Jalali et al., 2007; Mahboubi et al., 2014) and the cardiovascular effect (Sadraei et al., 2006). People of the southern district of Iran use some species of *Pycnocycla* spp. for fumigation (Mozaffarian, 2015) or healing tooth mass, urinary stone and bite (Maleki and Akhiani, 2018), but the exact therapeutic or toxic effects of *P. spinosa* are not fully known. To sum up, further study with the collaboration of all specialists such as taxonomist, ecologist, ethnobotanist and pharmacologist is necessary to identify the possible therapeutic effects of endemic species of this province. Certainly, recognition of the habitat of medicinal plants at the studied province revealed information about coverage of all endemic and endangered medicinal plant species. Therefore, points such as precise identification of collected plants and organized management of medicinal plants are highly necessary and playing an increasingly important role.

4. Concluding remarks

Due to the harmful effects of chemical drugs, many patients have turned to use medicinal plants so that the world expenditure on traditional medicine or complementary and alternative medicine is growing rapidly. According to WHO and the World Bank report, the financial turnover and global trade focused on herbal medicines will reach an amount of US \$ 5 trillion by the year 2050 (Handa et al., 2006). According to the high diversity of vegetation in Semnan province, introducing the medicinal flora of this region provides background information for conducting ethnobotanical-pharmacological research. Identification of collected plants brings up recognition of medicinal plants and endangered species and determines the ecological potentials of a region. We hope that the present results are able to provide an appropriate ground for qualitative and quantitative extraction of bioactive compounds from medicinal

plants as well as the ground for investing on cultivating and industrializing medicinal plants. Many more such investigations need to be carried out to bring out the real picture of medicinal plants in Semnan province.

Conflict of interest

The authors declare that there is no conflict of interest.

Acknowledgement

The authors would like to thank Mrs. Fara and Mr. Sadr for English language editing and constructive criticism of this manuscript. We would like to thank Dr. Lashkarbolouki (Assistant Professor at Damghan University) and Dr. Mirani Nezhad (Postdoctoral Researcher at Damghan University) for their scientific comments on the structures of chemical compounds. A special thanks to the Iran Meteorological Organization which provided data concerning the weather stations.

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