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Some Medicinal Plants Cultivated in Iran

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ABSTRACT

Medicinal plants contain plant materials such as leaf, root, flower and seed using for producing drugs. Essential oils and extracts of various species of edible and medicinal plants, herbs, and spices constitute of very potent natural biologically active agents. Iran with 1.64 million km² areas has 7500-8000 plant species. Iran is an ancient country in usage of herbal plants. The ancient Persians soon became familiar with various medicinal plants. Several medicinal species are cultivated in Iran. This review focuses on some of these plants such as *Ziziphora*, *Stachys*, *Satureja*, *Thymus*, *Scrophularia*, *Thymbra*, *Tanacetum*, *Ocimum* and *Crocus*.

Keywords: Iran, secondary metabolites, natural drugs, medicinal plants.

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INTRODUCTION

Since ancient times, plants have been one of the first and most available resources usable for treating illnesses. There has always been a close relationship between man and plants, and the medicinal effects of plants and their uses have been known by everybody (UNESCO, 1996). Medicinal plants contain plant materials such as leaf, root, flower and seed using in the form of their extracts and chemical compounds to produce human drugs or veterinary medicine (Nikbakht and Kafi, 2004). Properties of medicinal plants are due to the presence of various complex chemical substances from different composition which named secondary metabolites. They are categorized as alkaloids, glycosides, flavonoids, saponins, tannins, carbohydrate and essential oils. Medicinal and aromatic plants form a large group of economically important plants that provide the basic raw materials for indigenous pharmaceuticals, perfumery, flavor and cosmetic industries (Najafi *et al.*, 2010). Essential oils and extracts of various species of edible and medicinal plants, herbs, and spices constitute of very potent natural biologically active agents. Use of essential oils as antimicrobial agents in food systems may be considered as an additional intrinsic determinant to increase the safety and shelf life of foods (Nejad Ebrahimi *et al.*, 2008). Chemical medicines, because of their harmful and irreversible effects on people, are slowly being replaced by active substances of plants (Banerjee, 2002). Many infectious diseases are known to be treated with herbal remedies throughout the history of mankind. Today, plant materials continue to play a major role in primary health care as therapeutic remedies in many developing countries (Nezhadali and Zarrabi Shirvan, 2010). Medicinal plants are so important that pharmaceutical experts search among plants to find medicines of the 21st century for overcoming medical problems of the future. Use of traditional and medicinal plants in developing countries is a main basis for maintaining health (Nazir *et al.*, 2010). Recently, medicinal and aromatic plants have received much attention in several fields such as agroalimentary, perfumes, pharmaceutical industries and natural cosmetic products (Khorasaninejad *et al.*, 2010).

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More than 422000 species of flowering plants have been reported from all over the world which 5000 species among them are used for medicinal purposes. (Mozaffarian, 2005). A green plant is a reservoir of effective substances and can provide valuable sources of natural pesticides (Cowan, 1999; Newman *et al.*, 2000; Gibbons, 2005). According to international statistics, the value of trade in herbal medicines has a yearly growth of 12-15% (de Silva, 1997). More than 80% of the world's population depends upon traditional medicines for various skin diseases. Recently, the traditional use of plants for wound healing has received attention by the scientific community (Ghasemi Pirbalouti *et al.*, 2010). In Germany, a big center of chemical drugs production, herbal medicines are increasingly used by patients and recommended by doctors (Pande *et al.*, 2004). Reports reveal the use of active substances from higher plants instead of chemical fungicides, that are non-phytotoxic, more systemic and easily biodegradable (Gottlieb *et al.*, 2002). The preservative effect of many plant spices and herbs suggests the presence of antioxidative and antimicrobial constituents in their tissues. Many medicinal plants contain large amounts of antioxidants other than vitamin C, vitamin E, and carotenoids (Javanmardi *et al.*, 2003). Since plants produce a variety of compounds with antimicrobial properties, it is expected that screening programs for some under-represented targets, such as antifungal activity, may yield candidate compounds for developing new antimicrobial drugs (Ghasemi Pirbalouti *et al.*, 2009). Secondary metabolites of plants show antibacterial activity against important pathogens, (Kiran and Raveesha, 2006; Raghavendra *et al.*, 2006). Researchers are interested in biologically active compounds isolated from plant species for the eradication of pathogenic microorganisms because of the resistance that microorganisms have acquired against antibiotics (Yousefzadi *et al.*, 2011). So, identification and preservation of these valuable resources are necessary (Hamilton, 2003).

MEDICINAL PLANTS IN IRAN

For a very long time, plants have played an important role in the treatment of many diseases especially in the East region countries (Fallah-Hoseini *et al.*, 2006). Iran is an ancient country in usage of herbal plants and there are documents showing Persians were pioneers in applying plants for medicinal purposes (Nikbakht and Kafi, 2004). Evidence in many European countries show herbal medicine is very popular. In Iran, some continuous projects are being performed to achieve its real position of herbal medicine and herbal plants (Nikbakht *et al.*, 2008). As evidence reveals, prior to the foundation of the two famous medical schools of ancient Greece during the sixth century BC, at Cnidos in Asia Minor and on the nearby Aegean island of Cos, the practice of medicine was common in Mesopotamia, India and Iran (Najmabadi, 2001). Iran with 1.64 million km² areas is located in the Middle East, with 33% of the land cultivable, 14 million km² pasture, 60 million km² steppe and 16 million km² desert. Iran has 11 climates out of 13 world climates. About 25-26% of Iranian G.D.P. is from Agriculture, with 17-30% of people working in this field. Iran has 7500-8000 plant species (Rechinger, 1982). The

ancient Persians who lived in a vast territory with great variations in its climate and vegetation soon became familiar with various medicinal plants. Several medicinal herbs such as basil, chicory, sweet violet, and peppermint are mentioned in Avesta and the names of thirty sacred medicinal plants are cited in Bundahishn (Azizi, 2008). Today, the problems such as pharmacologic high costs, the use of non renewable resources such as fossil resources and environmental pollution by pharmaceutical industry have caused much more attention to medicinal plants. World trade volume of medicinal plants is more than 43 billion dollars and has been predicted to reach to 5 trillion dollars in 2050. The financial circulation of this trade has raise up to 100 billion dollars and about 25% of the world pharmaceutical market in 1996, worth approximately 250 billion dollars is allocated to drugs derived from plants. Iran's share of this market is about 60 million dollars (Noorhosseini Niyaki *et al.*, 2011).

EXAMPLES

The genus *Ziziphora* L. belongs to Labiatae, consists of four species (*Z. clinopodioides* Lam.; *Z. capitata* L., *Z. persica* BUNGE. and *Z. tenuior* L.) that widespread all over Iran. *Z. clinopodioides* Lam. with the common Persian name "kakuti-e kahi" is an endemic species, grows wild in Iran and also Afghanistan, Iraq, and Talish. *Ziziphora clinopodioides* Lam. is an edible medicinal plant and that leaves, flowers and stems are frequently used as wild vegetable or additive in foods to offer aroma and flavor (Verdian-Rivi, 2008). The genus *Stachys* (Lamiaceae) is distributed in the mediterranean regions and southwest Asia. About three hundred *Stachys* species are reported; 34 of them are found in Iran, of which 13 are endemic. Several *Stachys* species are used in Iranian folk medicine as medicinal plants. In addition, pharmacological studies confirmed that extracts or components of plants belonging to the genus *Stachys* exert significant antibacterial, anti-inflammatory, antitoxic and anti-anoxia effects (Rezazadeh *et al.*, 2009). An investigation in north of Iran in Miankaleh indicated that out of a total of 43 families, 125 genera, and 155 species found in the region, 33 families, 52 genera, and 61 species (39% of all the species) belonged to medicinal plants, among which the class Asteraceae with 6 species and the class Chenopodiaceae with 5 species had the most medicinal species. The most used parts of the plants were the leaves with 31%, the whole plants with 19%, and the roots with 15% (Vahedi and Yasari, 2011). An experiment indicated anti-*Candida* activities of extract and essential oil of nine Iranian folklore plants including, *Satureja bachtiarica* Bunge., *Thymus daenensis* Celak., *Scrophularia striata* Boiss., *Thymbra spicata* L., *Tanacetum polycephalum* Schultz., *Artemisia kermanensis* Podl., *Ziziphus spina-christi* (L.) Willd., *Trachyspermum ammi* (L.) Sprague ex Turrill./ *Carum copticum* L. and *Quercus brantii* Lindl. were investigated against of *Candida albicans* by agar disc diffusion assay. The results revealed that essential oils from *Satureja bachtiarica*, *Thymus daenensis*, *Thymbra spicata*, *Tanacetum polycephalum* and *Trachyspermum ammi* had anti-*Candida* activity (Ghasemi Pirbalouti *et al.*, 2009). *Punica granatum* Linn., known

locally as “Golnar-e-farsi”, is an important medicinal plant in Iran whose flowers are used as astringent, hemostatic, antibacterial, antifungal, antiviral and as a remedy for cut wound, bronchitis, diarrhea, digestive problems, man sex power reconstituent, dermal infected wounds and diabetes in *Unani* medicinal (Iranian Traditional Medicine) literature (Ghasemi Pirbalouti *et al.*, 2010). A study was conducted in Langroud and its environs located in the north of Iran between 37°05′ N and 37°11′ N , 50°00′ and 50°14′. The survey of literature showed that a total of 157 species under 7 families, Asteraceae, Poaceae, Fabaceae, Brassicaceae, Rosaceae, Lamiaceae and Apiaceae are represented in the flora. The investigation for medicinal plant diversity within these seven families revealed that out of these 157 species, 72 are medicinal and many of them are used by local and several tribal people including medicinal healers for the cure ailments (Seighali *et al.*, 2011). Basil (*Ocimum basilicum* L.) is used in traditional medicine, as a culinary herb and a well-known source of flavouring principles. Total antioxidant activity in 23 Iranian basil accessions was determined. Total antioxidant activity varied from 10.8 to 35.7 mM Trolox, and total phenolic content ranged from 22.9 to 65.5 mg gallic acid/g dw. A linear positive relationship existed between the antioxidant activity and total phenolic acids content of the tested basil accessions. Iranian basil possess valuable antioxidant properties for culinary and possible medicinal use (Javanmardi *et al.*, 2003). The genus *Dorema* D. Don. (Apiaceae) is represented in the flora of Iran by seven species, among which two are endemic, *D. ammoniacum* D. Don. and *D. aucheri* Boiss. *D. ammoniacum* is a vulnerable species. It is one of the most important endemic medicinal plants in many arid and semi arid regions of Iran, such as the Yazd, Isfahan and Semnan provinces, which are known by the local Persian names of Kandal, Vasha and Koma-kandal. *D. ammoniacum* produces a medicinal gum resin, commonly known as Ammoniacum gum, which is found in cavities in stems, roots, and petioles. The resin serves as a carminative, diaphoretic, mild diuretic, expectorant, poultice, stimulant, antimicrobial, and vasodilator agent (Yousefzadi *et al.*, 2011). *Achillea kallelensis* Bioss. & Hausskn. a wellknown traditional herb used in tribal medicine of Iran is locally known as “Golberrenjas or Bumadaran-e-Sabzekoh”. The species of *Achillea* spp. have been used as a remedy for edema, burns, wounds, carminative, indigestion, skin infection, gastric ulcer, anti-bacterial, hemorrhage, dysmenorrhoea, enema and diarrhea (Ghasemi Pirbalouti *et al.*, 2010). There are eight *Taxus* species and two hybrids in the world and *Taxus baccata* L. (European yew) is the single representative in Iran. This plant is an evergreen tree commonly known as “Sorkhdar” and distributed mainly in the north of Iran. Constituents of the needles and young stems of *Taxus baccata* L. growing in Iran are two taxoids, 5-Cinnamoyl-10-acetyltaxicin-I and 2-Deacetyltaxinine E (Hadjikhooondi *et al.*, 2009). Essential oils with antifungal activity from some medicinal plants of Iran (nettle (*Urtica dioica* L.), thyme (*Thymus vulgaris* L.), eucalyptus (*Eucalyptus* spp.), Rue (*Ruta graveolens* L.) and common yarrow (*Achillea millefolium* L.)), were used against *Alternaria alternate* on tomato as a model pathosystem. Both the nettle and the thyme oils exhibited

antifungal activity against *A. alternate* (Hadizadeh *et al.*, 2009). The genus *Vaccinium* (Ericaceae) has nearly 200 species. This genus is represented with only one taxon (*Vaccinium arctostaphylos* L.) in Iran. The plant is therapeutically important in Iranian traditional medicine, and the decoction from the berries has been used as an antidiabetic and antihypertensive agent for a long time (Nickavar and Amin, 2004). Some Iranian medicinal plants such as *Acroptilon repens* L., *Biebersteinia multifida* DC., *Calendula officinalis* L., *Chelidonium majus* L. and *Equisetum arvense* L. have alkaloids. The alkaloids represent a group of natural products. Many of these agents have potent physiological effects on mammalian systems as well as other organisms, and as a consequence, some constitute important therapeutic agents. Atropine, morphine, quinine and vincristine are representative of a host of agents used to treat a range of disease conditions that range from malaria to cancer (Shamsa *et al.*, 2008). Barberry (*Berberis vulgaris* L., Var. *asperma* Don, family Berberidaceae) is well known in Iran and has been used extensively as a medicinal plant. The fruits of the plant are used as a food additive. In Iran more than 5,000 tonnes of barberries are produced each year. It has antimicrobial, anti-emetic, antipyretic and anti-pruritic effects and it has been used in some cases like cholecystitis, cholelithiasis, jaundice, dysentery, leishmaniasis, malaria and gall stones (Fathollahzadeh and Rajabipour, 2008). *Satureja khuzistanica* Jamzad (Marzeh Khuzistani in Persian, family of Lamiaceae) is an endemic plant that is widely distributed in the southern parts of Iran. This plant is used as analgesic and antiseptic among the inhabitants of southern parts of Iran. This plant is used to relieve toothache (Matloubi Moghaddam *et al.*, 2007). A group of well known plants which are used as spices and condiments belong to the Umbelliferae family. Seven plants from Iran, wild caraway [*Bunium persicum* (Boiss.) Fedtsch.], coriander (*Coriandrum sativum* L.), cumin (*Cuminum cyminum* L.), fennel (*Foeniculum vulgare* Miller), cow parsnip (*Heracleum persicum* Desf. Ex Fischer), anise (*Pimpinella anisum* L.), bishop’s weed [*Trachyspermum copticum* (L.) Link.] are usually used in order to improved the flavor, taste and make the food more palatable. These plants have a good antioxidant activity (Nickavar and Abolhasani, 2009). The skullcaps, belonging to *Scutellaria* genus, Scutellarioideae tribe, Lamiaceae family, have been distributed in some parts of the world. The Iranian flora contains more than 20 species of *Scutellaria* and one of them is *Scutellaria pinnatifida* A. Hamilt. ssp. *Alpine* (Bornm.) Rech. The Persian name of the plant is “Boshghabi” that means “dish like”. Skullcaps are known as powerful medicinal herbs. These plants have been used for the treatment of hypertension, arteriosclerosis, inflammatory diseases, hepatitis, allergy, cancer and diarrhea and have sedative, antioxidant, antithrombotic, cytotoxic, antispasmodic, antimicrobial and antiviral properties (Ghannadi and Mehregan, 2003). *Zataria multiflora* is a thyme-like plant that grows wild in central and southern Iran. It belongs to Latiatae family. In Iran, *Zataria multiflora* is used in traditional folk remedies for its antiseptic, analgesic (pain-relieving) and carminative (anti-flatulence and intestine-soothing) properties. Saffron (*Crocus*

sativus L.) is currently being cultivated more or less intensively in Iran (Ochiai *et al.*, 2004). Compounds considered pharmacologically active and important are volatile agents (e.g. safranal), bitter principles (e.g. picrocrocin) and dye materials (e.g. crocetin and its glycosidic, crocin) (Rio's *et al.*, 1996).

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