

## MEDICINAL AND AROMATIC PLANTS (TURKEY)

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### Summary

Turkey is one of the countries with richest plant diversity in the Mediterranean. A number of human races and tribes have settled here during different periods bringing in different cultures and customs. As a result of this we come across a great accumulation of knowledge of traditional medicine in the country. Within these lands that many ancient civilizations flourished, domestication of many food and medicinal plants started. Dioscorides (1st century A.D.) from Anazarba or Asia minor; the Mediterranean part of Turkey; used the healing properties of different plants from Anatolia thus establishing it as a science. In 78 A.D. he wrote the monumental volumes of “*Materia Medica*” which included 950 drugs out of which 600 were of plant origin. A recent survey of traditional and folk medicine in Turkey has revealed that most of these plants are still in use by the local inhabitants. Therefore, *Materia Medica* may be assumed to be the oldest comprehensive document on Anatolian folk medicine. This knowledge is surviving until now and an array of herb shops are found in the markets of the modern cities. The number of flowering plant taxa distributed in the country is estimated to lie around 10,000. These taxa are distributed in different phytogeographical regions and include nearly 3.300 endemics. Global sales worldwide on plant-based medicines, spices, beverages, and cosmetic products have been estimated to lie around 65 billion US dollars/year and it is expected to grow. The share of Turkey is extremely low inspite of the rich plant diversity in the country.

Nearly 2000 taxa of plants are evaluated for medicinal and aromatic purposes, and approximately 500-1000 plant taxa are used in the traditional medicine. Nearly 350 taxa of higher plants and pteridophytes are sold at the shops of Attar's, the traditional herbal drug dealers. The plants presented in table 1(a-e) include 290 taxa belonging to 170 genera and 70 families. These are the most widely used plants in Turkey. The families with the highest number of taxa are Lamiaceae (18), Asteraceae (18), Apiaceae (11), Liliaceae (9), Rosaceae (8), Ranunculaceae (7) and Fabaceae (6). The genera with maximum number of species used are *Sideritis* (10), *Helichrysum* (8), *Rumex* (6), *Astragalus* (5), *Euphorbia* (5), *Gypsophila* (5), *Juniperus* (5), *Anthemis* (5), *Artemisia* (5), *Orchis* (4), and *Colchicum* (4). Out of these 73 are used externally and 168 internally for the treatment purposes. Tea, liquorice and several other plants found in Turkey are routinely used as beverage. Tea is now most commonly consumed plant and cultivated as a crop in the black sea region of Turkey. Herbal based teas like mint, sage, apple, orange, *Tilia* are derived from many parts of plants with medicinal values and are now very popular in the country. We find large sales of thyme, olive, onion, garlic, pepper, rosemary, coriander, cumin, bay laurel, oil seed crops like rapeseed and mustard, anise, dill, fennel, saffron, artichoke, caraway, chrysanthemum, citrus peel, hibiscus, lemon, St. John's wort (*Hypericum perforatum*), basil, on the shops of herb dealers as well as local markets. Many are used as spice, for flavor and taste but contain many medicinal compounds. We find many plant based recipes used for such treatments as; anthelmintic, anti-anemic, anti-diabetic, anti-depressant, anti-diarrheal, anti-emetic, anti-tussive, anypnea, cardiotoxic, carminative, diaphoretic, diuretic, expectorant, halitosis, hordeolum, headache, indigestion, orexigenic, purgative, sedative, toothache and tonic. In this chapter an attempt is made to present the scattered information on the medicinal and aromatic plants from our studies together with other published records of Turkey for its availability to the researchers in different fields related to herbal drugs.

## 1. Introduction

*“Nature has cared for the plant life on our earth, saved them from thousands of abiotic interferences, however nobody can save them from fools.”*

Human beings from all cultures of the world; priests, shamans, herbalists, spiritual leaders and medicine men/women; have selected the medicinal and aromatic plants through trial and error since times immemorial. The earliest documented record dates from Paleolithic age (50,000 B.C.) which was found in the grave of a Neanderthal man in the southern part of Hakkari (far southeast edge of Turkey) (Baytop, 1984, 1999). A number of plant remedies have been described on the clay tablets that have survived from the Mesopotamian civilizations like Sumerians, Assyrians and Akkadians, and Hittites. In fact the study of medicinal botany has begun when plants were classified according to their uses; such as pain and illness healing plants and poisonous ones (Ozturk and Ozcelik, 1991; Lewis and Elvin-Lewis, 2003; Ozturk et al. 2008 a,b; Mert et al. 2008). Progressive evolution by selection from the wild plants created domestication of many plants all of which have medicinal properties. Merinelli (2005) has estimated 422,000 plant species worldwide. This includes 50,000 to 80,000 flowering plants being used medicinally (Duke, 2009). These plants are potentially rich sources of medicinal compounds curing everything from the common cold to cancer

and even HIV/AIDS, and are known as nature's pharmacy (Kaefer and Milner, 2008; Cunningham, 2009; Liang et al 2009).

Samuelsson, G., and L. Bohlin. 2010. *Drugs of natural origin: A treatise of pharmacognosy*. Sixth ed. Stockholm: Swedish Pharm. Press.

Botany, pharmacy, chemistry, archeology, and other disciplines have contributed a lot towards the searching of new drug plants (Drews, 2000). The field of chemical basis of medicinal and aromatic plants developed during 19<sup>th</sup> century, when the science of phytochemistry was established. Presently nearly 80 percent of the population in Asia and Africa depend on traditional medicine, and in some developed countries 70-80 percent of the population is using some form of herbal drug. Presently more than 20,000 plant taxa are used as herbal drugs on global scale. Out of these more than 120 compounds from 90 plants are available as prescription drugs (Calixto, 2005; Ariyawardana et al. 2009; Samuelsson and Bohlin, 2010).

Turkey is one of the countries with richest plant diversity in the Mediterranean (Davis 1965-1986; Davis et al. 1988; Guner et al. 2001). A number of human races and tribes have settled here during different periods bringing in different cultures and customs. As a result of this we come across a great accumulation of knowledge of traditional medicine in the country. Within these lands that many ancient civilizations flourished, domestication of many food and medicinal plants started (Baytop, 1984; Zohary and Hopf, 1994). Dioscorides (1st century A.D.) from Anazarba or Asia minor; the Mediterranean part of Turkey; used the healing properties of different plants from Anatolia thus establishing it as a science. In 78 A.D. he wrote the monumental volumes of "*Materia Medica*" which included 950 drugs out of which 600 were of plant origin (Beck, 2005). A recent survey of traditional and folk medicine in Turkey has revealed that most of these plants are still in use by the local inhabitants (Yesilada and Sezik, 2003). Therefore, *Materia Medica* may be assumed to be the oldest comprehensive document on Anatolian folk medicine. This knowledge is surviving until now and an array of herb shops are found in the markets of the modern cities. Other works in this connection are Baytop (1984), Yesilada et al. (1993, 1995); Tabata et al. (1994), Sayar et al. (1995), Surmeli et al. (2000) and Everest and Ozturk (2005). The number of flowering plant taxa distributed in the country is estimated to lie around 10,000 (Davis et al. 1965-1985; 1988; Guner et al., 2001; Guvensen et al., 2006). These taxa are distributed in different phytogeographical regions and include nearly 3,300 endemics (Ozgokce and Ozcelik, 2004; Simsek et al. 2004). In this chapter an attempt is made to bring together the scattered information on the medicinal and aromatic plants from our studies together with other published records of Turkey for its availability to the researchers in different fields related to herbal drugs.

## 2. Historical Perspective of the Traditional Medicine

The knowledge about traditional medicine developed separately in countries like India, China, Middle East, Africa, Europe, Australia and Americas, and information in this connection can be taken from the ancient texts like Vedas, Chinese texts, the Bible, and the Quran (Chin and Keng, 1992; Bisset and Wichtl, 2001; Bhattacharjee, 2001; Halioua and Ziskind, 2005; Chapman and Chomchalow, 2005; Busia, 2005; Li, 2006; Duke et

al. 2008; Ahmed et al. 2009). The practice of traditional medicine has been adopted in different countries or continents since ancient times without the knowledge of others (Singh, 2010). Traditional medicine is defined as combination of knowledge, skills and practices based on the theories, beliefs and experiences indigenous to different cultures that are used to maintain health, as well as to prevent, diagnose, improve or treat physical and mental illnesses (Ozturk et al. 2008 a).

Ayurveda native to India originated around 2,000 BC and is still being used in combination with the modern medicine for health care (Kapoor, 1990). Other treatment systems related to it are Unani, and Homeopathy. Chinese system of medicine originated in about 3,000 BC. More than 50 medicinal plant species are described in the China's ancient poem collections. Presently records on plant-based medicines can be seen in more than 400 books (Singh, 2010). This system together with Indian one was followed by South East Asian countries. On the Australian continent aboriginal communities have the longest continuous heritage of any human culture on the planet (Craker and Gardner, 2007).

The use of medicinal plants by the Sumerians in southern Mesopotamia (Iraq) goes back to 3,000 BC. Traditional Unani medicine practiced in many Middle Eastern (Ghazanfar and Al-Sabahi, 1994) and Asian countries has originated in ancient Greece around 400 BC. Hippocrates; the founder of allopathic medicine; is considered to be the first Unani physician. European traditional medicine has its roots in the writings of Hippocrates and Dioscorides, as well as later in the works of the Romans, such as Galen (Baytop, 1999). African traditional medicine started in 1,500 BC. It is based on plants and holistic belief systems, and society for combating various ailments. Native American tribes have used medicinal plants for nearly 10,000 years, which are linked to philosophy, religion, and spirituality, and treatments aim to balance the physical, emotional, mental and spiritual components of a person (De Montellano, 1990; De Smet, 1999; Moerman, 2009).

### **3. Gene Pools, Germplasm Enhancement and Biopiracy**

Medicinal plants grow widely in nature in different regions of the world. These are herbs, shrubs, or trees; annuals, biennials or perennials, cultivated or wild. Centers of their origin have been established by Vavilov (Singh, 2010). It is not possible to establish the gene pool concept for the medicinal plants, due to limitations related to the study of hybridization. An improvement of varieties through selection, hybridization, induced mutation, polyploidy, and biotechnology is a routine in tea, coffee, mint, poppy, ginger, and turmeric, but it still lags far behind that of cereal crops although molecular linkage maps of some of these have been established (Chung and Singh, 2008). Genetic transformation in these is in progress.

At present fluorescence and genomic in situ hybridization are also used in some of these species. In spite of all the advancements biopiracy is a big problem faced by the people in countries of centers of diversity as well as in the areas where indigenous people continue to live even today. The big companies from developed world take genetic resources and traditional knowledge from these places to create products for commercialization. Some countries have however started now signing bilateral agreements on Intellectual Property Rights to save traditional knowledge (Singh, 2010).

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Ozturk M., Gucel S., Altundag E., Gork C., Mert T., Gork G., Akcicek E. (2011 a). An Overview of the Medicinal Plants of Turkey. In: Genetic Resources, Chromosome Engineering and Crop Improvement: Medicinal Crops, Chapter 7, Vol. 6, CRC Press, LLC, Taylor & Francis, Ram Singh, Editor. (In Press). [This manuscript contains detailed information on the uses of 53 herbal teas, 75 plant taxa used in the treatment of different diseases. Data on the wild mints and possibilities for their evaluation has been given under separate heading].

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Yesilada E., Honda G., Sezik E., Tabata M., Goto K., Ikeshiro Y. (1993). Traditional medicine in Turkey IV. Folk medicine in the Mediterranean subdivision. *Journal of Ethnopharmacology* **39**, 31–38. [8 page manuscript describes traditional utilization of plants as medicine in the Mediterranean region of Turkey in particular the Taurus Mountains. Sixty-nine medicinal plants have been identified, which are listed with the vernacular names, the parts used, the methods of preparing the drugs and their traditional usages].

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## Biographical Sketches

**Prof. Dr. Münir Öztürk** - Born in 1943 in Kashmir. Currently retired Professor with scientific interests in Ecology & Environmental Sciences, Ethnobotany and Conservation Biology. 35 years experience in teaching & 48 years in research. Number of publications over 370 , which include 27 books- 2 by Birkhauser Verlag, 1 by Cambridge Scholars and 4 by Springer. Acted as guest editor in 4 international journals (The Malaysian Forester"-2008; Environmental Geology-Springer-Verlag-2009; Journal of Environmental Biology –2010; Journal of Environmental Biology-GEOMED-2011). Published 59 papers on Ethnobotany, out of these 9 are book chapters in internationally reputed publishers. Served as Chairman Botany (1985 -1988) Ege University, Turkey; Director Centre for Environmental Studies (1990 -1998) Ege University and Chairman Biology (1999 -2002) Fatih University, Turkey". Fellow Islamic Academy of Science; Member Interdisciplinary Committee of the World Cultural Council-Albert Einstein Award of Science; Member of Honour Russian Ecological Academy, Moscow; Member Editorial Board, Pakistan Journal of Botany.

**Dr. Ernaz Altundağ** - Graduated from Istanbul University, Department of Biology in 2002, M.Sc. degree in 2005 from Istanbul University, Institute of Natural and Applied Science, Department of Botany and Ph. D. degree in 2009 from Istanbul University, Institute of Health Sciences, Department of Pharmaceutical Botany. Ph.D. thesis covered the topic on "Medicinal Plants of IĞDIR State- East Antolia". Presently lecturer at Duzce University, Faculty of Arts & Sciences, Department of Biology, Duzce, Turkey.

**Dr. Salih Gücel** - got my bachelor degree in Biology and had my master in plant taxonomy. My PhD thesis covered Conservation Biology and I studied conservation biology of two endemic plant species. I have a background of 12 years of active involvement in research and nature conservation in Turkey and Cyprus. Since 2005, I am the Director of the Earth, Ocean, Atmosphere and Environmental Sciences Institute. As part of my work responsibilities, I am involved in setting-up and organising bi-communal environmental and cultural projects in cooperation with NGO's, academia, public and private bodies from both (Turkish and Greek Cypriot) communities in Cyprus.