MEDICINAL AND AROMATIC PLANTS (TURKEY)

Müniir ÖZTÜRK
Botany Department, Science Faculty, Ege University, 35100-Bornova, Izmir-Turkey.

Ernaz ALTUNDAĞ
Dept. of Biology, Faculty of Arts & Sciences, Duzce University, Duzce, TURKEY.

Salih GÜCEL
Near East University, Institute of Environmental Sciences, Nicosia, Cyprus.

Keywords: Turkey, herbals, history, ethnobotany, treatments, recipes.

Contents

1. Introduction
2. Historical perspective of the traditional medicine
3. Gene pools, germplasm enhancement and biopiracy
4. Turkish medicinal and aromatic plants
5. Recipes
6. Conclusion
Acknowledgement
Glossary
Bibliography
Biographical Sketches

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, anypnia, cardiotonic, 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).


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 19th 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 Chomchallow, 2005; Busia, 2005; Li, 2006; Duke et
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).
Bibliography

Aguilar-Støen M., Moe S. R. (2007). Medicinal plant conservation and management: distribution of wild and cultivated species in eight countries. Biodiversity Conservation 16, 1973–1981. [This paper reviews studies on the medicinal plants from eight countries in four regions. Most plants are found wild (40.5%) or naturalized (33.9%), while only 3.3% are cultivated].

Ahmad M., Khan M A., Marwat S. K., Zafar,M., Khan,M.S., Hassan, T.U., Sultana,S. (2009). Useful medicinal flora enlisted in Holy Quran and Ahadith. Amer.-Eurasian J. Agric. Environm. Sci. 5:1: 126-140. [The paper presents a check list of 32 medicinal plants species and their uses enlisted in Holy Quran, Ahadith and Islamic literature. The main aim of this study is to establish how the different parts or aspects of plant based Islamic medicines such as use of medicinal plants, health principle, hygiene, practice, thought and culture].

Altundag E. (2009). The public use of plants growing in nature in the Igdir province of Turkey. Ph.D. Thesis submitted to the Istanbul University Institute of Health Sciences, Istanbul, Turkey. [This 420 pages thesis presents a detailed study on 1170 plant taxa with local names, parts used, methods of preparations, applications together with 324 photographs and 13 tables].


Bisset N. G., Wichtl M. (eds.) (2001). Herbal drugs and phytopharmaceuticals. Second ed.Boca, Raton, FL: CRC Press. [Gives information on 181 medicinal herbs common in pharmaceutical practice with many photographs or drawings to aid the process of authentication and quality assurance. It also presents references to pharmacopoeial monographs, sources, synonyms, constituents, indications, side effects,
commercially available phytomedicines, authentication using macro-microscopical, and chromatographic techniques together with quantitative studies, likely adulterations, and storage requirements].

Busia K. (2005). Medical provision in Africa-past and present. Phytotherapy Res. 19:919-923. [This paper provides an overview of traditional African medicine, highlighting its benefits and drawbacks of orthodox medicine. It also explains the reasons for the rise in interest in herbal medicine on the continent].

Calixto J. B. (2005). Twenty-five years of research on medicinal plants in Latin America a personal view. Journal of Ethnopharmacology 100, 131-134. [In this article the progress of Latin American scientific papers in the field of plants over the last 25 years has been summarised and a discussion presented related to the relevance of medicinal plants for the development of standardized phytomedicines].

Chapman K., Chomchalow N. (2005) Production of medicinal plants in Asia. Acta Hort.679:45-59. [The paper enlightens the significant role played by the medicinal plants in ancient traditional systems of medication (Ayurvedic, Unanic-India, the Chinese traditional medicine), in most Asian countries as well as their collection in the past and the situation at present. It is characterized by 3 different criteria and advantages of commercial cultivation are presented along with the constraints envisaged, because large-scale cultivation of promising species has recently been attempted in several countries].


Chung G., Singh R. J. (2008). Broadening the genetic base of soybean: a multidisciplinary approach. Critical Reviews in Plant Sciences 27, 295-341. [Paper presents data on the economically important legume soybean in particular its cyogenetic knowledge as well as methodology for producing fertile lines. Data includes information on molecular linkage maps because genetic base of modern soybean cultivars is narrow].

Craker L E., Gardner Z. E. (2007). Medicinal Plants and tomorrow’s pharmacy. In Medicinal and Aromatic Plants, ed. R. J. Bogers, L. E.Craker and D. Lange, 29-41. Dordrecht: Springer Netherlands. [This chapter discusses the past and present situation of medicinal plants in USA, their first pharmaceutical use in America and latter developments due to restrictions. It also gives concerns about current safety and efficacy issues with medicinal plant products. The future of American pharmacies is also discussed].

Cunningham N. (2008). Hallucinogenic plants of abuse. Emergency Medicine Australasia 20, 167-174. [This article deals with the use of hallucinogenic plants, their characteristics and role in ritualistic and spiritual traditions. A review of the more common hallucinogenic plants and fungi is discussed with reference to historical, pharmacological and clinical aspects of these intoxications].

Davis P.H. (1965-1985). Flora of Turkey and the East Aegean Islands, vol.1-9 Edinburgh Univ. Press, Edinburgh. [Includes a taxonomic treatment of Turkey’s Flora. It also presents the richness and diversity of Turkish flora in 9 volumes (1966-85), & supplements. A major contribution to the floristic study of Sout West Asia and the eastern Mediterranean region].

Davis P. H., Mill R. R., Tan K. (1988). Flora of Turkey and the East Aegean Islands, vol 10 (supplement 1). Edinburgh Univ. Press, Edinburgh. [Includes a taxonomic treatment of Turkey’s Flora. The supplement also presents the richness and diversity of Turkish flora. A major contribution to the floristic study of Sout West Asia and the eastern Mediterranean region].

De Montellano B. R. O. (1990). Aztec medicine, health, and nutrition. New Brunswick, NJ: Rutgers Univ. Press. [This 308 pages ethnoinformal study presents information on Aztec medicine, health, illness, and cures. It gives a credible view of pre-Columbian Aztec medicine including a hot and cold disease classification and dismisses Aztec cannibalism of sacrificial victims as a response to protein deficiency].


of molecular biology combined with genome sciences, and bioinformatic tools in increasing the number of treatment options as well as the biotech industry has been presented.


Duke J. A. (2009). Duke’s Handbook of Medicinal Plants of Latin America. CRC Press, Taylor & Francis Group. Boca Raton, FL. [This informative book provides basic information on 500 species of medicinal plants from Latin America with binomial scientific name, authority, family, synonyms and common names, and a code that relates to the safety of the species].

Everest A., Ozturk E. (2005). Focusing on the ethnobotanical uses of plants in Mersin and Adana provinces (Turkey). Journal of Ethnobiology and Ethnomedicine 1:6, 1-6. [This paper presents the result of a study on the herbal drugs belonging to 107 species and sold in the herbal markets in Mersin and Adana provinces of Turkey, their local and latin names, the parts used, and the preparations].


Guner A., Ozhatay N., Ekim T. (2001). Flora of Turkey and the East Aegean Islands, Volume 11. Edinburgh University Press, Edinburgh, UK. [This supplementary volume gives information on 400 new flowering plant species, either new to science or new records from Turkey. New information about the richness of the Turkish flora and its importance as a centre of diversity has been given].

Guvensen A., Gork G., Ozturk M. (2006). An overview of the halophytes in Turkey. In: Sabkha Ecosystems Vol. II, West & Central Asia, ed. Khan et al., Springer, The Netherlands, pp: 9-30. [In this paper plant diversity of saline habitats is presented which include 300 halophytic taxa. Information on their conservation status is also given together with their uses for different purposes, in particular Salicornia europaea salad. The great potential in the halophytic plant cover for consumption has been evaluated].

Halioua B., Ziskind B. (2005). Medicine in the days of the pharaohs. Transl. M. B. DeBevoise. Cambridge: Beknap Press. [This well researched, accessible, and impressive book presents information on the pharaonic medicine from ancient Egyptian healers, practice of medicine, including its role in society, medical training, the process of mummification, health along the pharaonic Nile with evidence from tomb painting, mummies, bones, medical literature on papyri and ostraca, residues of liquids found in jars, labels on jars, tattoos and inscriptions left in tombs of physicians and laymen. Authors have synthesized our existing knowledge and ideas on the subject of Pharaonic medicine].

Harnischfeger G. (2000). Proposed guidelines for commercial collection of medicinal plants. J. Herbs Spices Med. Pl. 7(1):43-50. [The paper describes the fact that wildcrafting, if unsupervised and unguided, can pose a threat to the sustainability of ecosystems and biodiversity. A proposed guideline, entitled good harvesting practice has been discussed which can meet various demands of regulatory and other agencies dealing with registration of herbal medicinal products].

Johnson C. B., Franz C. (eds.) (2002). Breeding research on aromatic and medicinal plants. New York: Haworth Herbal Press. [In this 435 pages long essential book, researchers have explored recent developments in the selection and breeding of aromatic and medicinal plants. It examines the breeding for resistance and abiotic factors, manipulating natural product accumulation through genetic engineering, biochemical and molecular regulation of essential oil accumulation, economic and legal considerations that breeders will encounter, the ethical aspects of breeding these plants].

Kapoor L. D. (1990). CRC handbook of Ayurvedic medicinal plants. Boca Raton, Fl: CRC Press.[This handbook is filled with over 50 illustrations and descriptions of approximately 250 plants which are used for herbal medicine. Derived from India, "Ayurveda" is the foundation stone of their ancient medical science].


Liang C., McClean M. D., Marsit C., Christensen B., Peters E., Nelson H. H., Kelsey K. T. (2009) A population-based case-control study of marijuana use and head and neck squamous cell carcinoma. Cancer Prevention Research 2, 759-768. [The paper informs us about the cannabinoids, constituents of marijuana smoke, which have been recognized to have potential antitumor properties. It suggests that moderate marijuana use is associated with reduced risk of HNSCC].

Li T. S. C. (2006). Taiwanese native medicinal plants: Phytopharmacology and therapeutic values. Boca Raton, FL: CRC Press. [The 400 pages book presents information critical to assessing the medicinal potential of Taiwanese herbs. A comprehensive review on the major constituents of more than 1000 species, their toxicity, and therapeutic values, the book focuses on documentation of the chemical components present and their therapeutic properties].

Marinelli J. (ed.) (2005). Plant: the ultimate visual reference to plants and flowers of the world. New York: DK Publ. [This 512 pages ground breaking reference book is like a new-generation encyclopedia covering discussions on cultivating plants that are on the international endangered list or already extinct in the wild. It attempts to provide environmental and horticultural information to the gardeners in order to make right decisions about what to grow in their gardens].

Mathé A., Franz C. (1999). Good agricultural practices and the quality of phytomedicines. J. Herbs Spices Med. Pl. 6(3):101-113. [The 13 page manuscript presents a discussion on the demand to comply with well defined quality standards in medicinal and aromatic plants. The introduction of comprehensive, production protocols (Way-Bills) is expected to contribute to the production of quality phytomedicines through good agricultural practices].


Ozkocce F., Ozcelik H. (2004). Ethnobotanical aspects of some taxa in the East Anatolia, Turkey. Economic Botany 58(4), 697-704. [This paper presents a list of medicinal plants distributed in the East Anatolian region of Turkey and provides information about 71 useful plants grown in the region, 20 of which are reported for the first time. In addition to the scientific names, vernacular names and medicinal uses are given for each plant].

©Encyclopedia of Life Support Systems (EOLSS)


Roberson E. (2008). Medicinal plants at risk. Tucson, AZ: Cent. Biol. Diversity. [The book presents information on the treasures inhabiting our wild places i.e., the medicinal species that reside in natural areas and have received scientific and commercial attention. It describes natural remedies, their names, classification and properties together with the information on what knowledge the natives had of medicines as well as increased scientific and commercial attention which is increasing pressure on the wild plant populations from which most medicinal plants are harvested].


on the traditional folk medicine in the Kastamonu province of Turkey. Information includes vernacular names of the 25 plant species, parts used, and methods of preparing the medicines.


Surmeli B., Sakcali S., Ozturk M., Serin M. (2000). Kilis ve Ceversinde Halk Hekimliginde Kullanilan Bitkiler. XIII. Plant Raw Materials Meeting, Istanbul, 211-220. [This 10 pages long paper in Turkish describes 21 plant taxa from Kilis and its environs in Turkey. A table with vernacular names, distribution, parts used, and types of application has been given.]


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].

Yesilada E., Honda G., Sezik E., Tabata M., Fujita T., Tanaka T., Takeda Y., Takaishi Y. (1995). Traditional medicine in Turkey V. Folk medicine in the inner Taurus Mountains. *Journal of Ethnopharmacology* 46, 133–152. [The paper discusses the folk medicine in the inner region of the Taurus Mountains in south Anatolia. It presents 256 remedies prepared from 124 plant and 3 animal species, including vernacular names, the parts used, the methods of preparation of the drugs and the medicinal use.]


©Encyclopedia of Life Support Systems (EOLSS)
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 Birkhäuser 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 Altundag - 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 IGDIR State- East Antolia”. Presently lecturer at Duzce University, Faculty of Arts & Sciences, Department of Biology, Duzce, Turkey.

Dr. Salih Gucel - 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.