



Usage and the economic potential of the medicinal plants in Eastern Black Sea Region of Turkey

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Abstract: Medically used plant species in Eastern Black Sea Region of Turkey was determined in this study. Totally 50 species within 24 families have been designated in 25 research points, using the face polling method with the herbs sellers and purchasers. 14 species of studied plants are endemic and pointed out as endangered species according to the IUCN list (The World Conservation Union). In which health problem the medicinal plants are used, their usage art, area and the used parts have been determined too. The research results show that 12.58 % of the species are used in intestinal problems and 8.60 % for diuretic. Evaluating from this point of view the region includes very rich species could be used in different health problems. The results shows that average annual income of the medically used plant selling companies is about 33,333 \$. Increasingly demands for the medically used plants have been raised the medically used plant companies about 60 % in the last decade. The relevance of Ethnopharmacologically used plants is increasing in Turkey and in the World. Important is to meet the demand without endanger the rich plant species resources.

Key words: Herbal market, Medicinal plants, Ethnopharmacology, Turkey
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Introduction

Wild plants have always been an important component of healthcare throughout human history. Since time immemorial, people have gathered plant and animal resources for their needs from nature (Schippmann *et al.*, 2002). Medicinal plants still continue to make important contributions to healthcare and livelihoods (Mulliken, 2000). Nearly 80% of the world population use traditional medicine, mainly medicinal plants, to cure illnesses and ailments (UICN *et al.*, 1993). The percentage of the people using alternative therapies once a year, has reached about 48.5% in Australia (Mac Lennan *et al.*, 1996), 33% in Finland (Vaskilampi *et al.*, 1993), 10% in Denmark (Rasmussen, 1990) and 17% in Canada (Wayne, 2001).

It is important to be aware of alternative therapies popularity throughout the industrialized world (Goldbeck *et al.*, 1996). In 2000, nearly 16% of US women took at least 1 herbal supplement (Yu *et al.*, 2004). Similarly, Kaufmann *et al.* (2002) reported that 81% of the population had used at least one medication (prescription or over-the-counter drug, vitamin/mineral, or herbal supplement) during the preceding week. According to Klesper *et al.* (2000) the herbs users generally believe that herbs are safe and they can improve their health. The global turnover of the industry is impossible to assess with precision although there is evidence that it would exceed billions of dollars (Wijesekera, 1991).

Since 1962, foreign trade figures of presently almost 180 countries have been compiled in the COMTRADE (commodity trade

statistics) database by the United Nations Statistics Division, New York (Lange, 2006). UNCTAD COMTRADE data in this report are based on SITC.3 292.4 "pharmaceutical plants" which equates to HS 1211 "plants and parts of plants (including seeds and fruits), of a kind used primarily in perfumery, in pharmacy or for insecticidal, fungicidal or similar purposes, fresh or dried, whether or not cut, crushed or powdered". Between the years 1999-2003, totally 5 352 319.78 \$ exportation have been realized around the world. Sequentially; China, USA and Singapore are the first three exporting (298 650 000, 114 500 000 and 59 850 000 \$) countries in this area (Dagmar, 2002). Turkey is with 27,533,291 \$ exportation value in the range 27. However, according to the data collected from public foundations and companies, between 1999 and 2003 totally 302,170,000 \$ Ethnopharmacologically used plant exportation realized in Turkey (Ozguven *et al.*, 2005). This report indicates that Turkey hold the 6th place after Germany. Another report arranges Turkey in the 18th place in the world and in the 5th place in east and south east Europe (Lange, 2002). Wild collection plays still a vital role in the trade of medicinal and aromatic plants in Turkey (Coskun and Ozkan, 2005). These collected plants are usually exported as raw and half produced material because of the undeveloped pharmacological plants industry. This causes important losses in the export incomes in Turkey (Toksoy *et al.*, 2003).

In this study, the current situations of the medically used plants selling companies have been determined. At most searched and sold medically used plant species and their most used parts have also been determined. Medical usage area and the gathering area of the medically used plants have been determined too. Another

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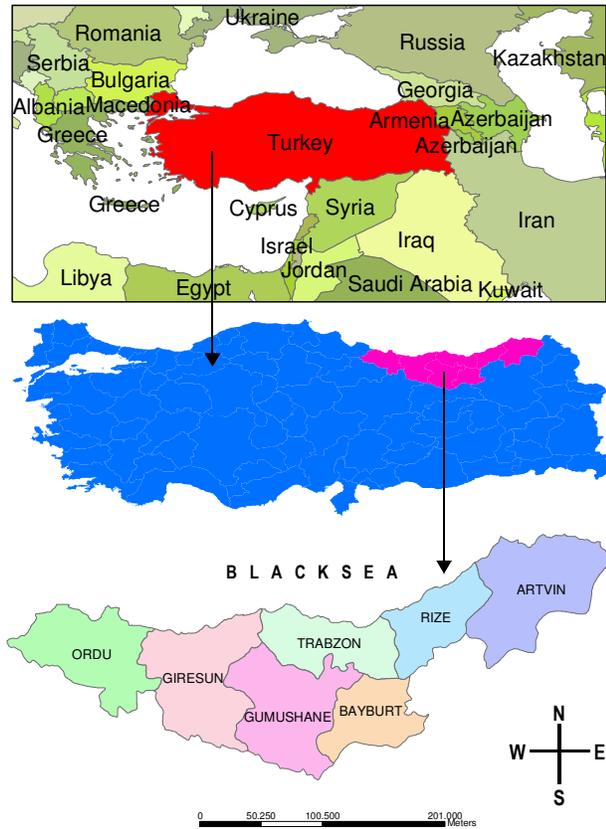


Fig. 1: The research area

aim of this research was to determine the annual selling incomes of the medicinal plant seller companies.

Materials and Methods

The study has been carried out in the North Eastern part of Turkey named as "Blacksea region" (Fig. 1). The research cities in the region are; Trabzon, Giresun, Ordu, Rize, Artvin, Gumushane and Bayburt. The topography in the region is mountainous and the highly rainy (in some places average annual rainfall is about 2500 mm). The main economical activities are fishery and farming. Tea, hazelnut and maize are the dominant agricultural products. According to the data of ATO \$ (Ankara Chamber of Commerce), the average annual income per person in the region is about 1375 (ATO, 2003). Population of the region is about 3,473,787. The total area of the region is 40892 km² (5.02% of Turkey). The research region contains 25% of the Turkish flora and 23% of them are endemic species of Turkey (Ansin, 1980).

The research is divided into two parts. In the first part, seven cities with 25 herbalists and 170 customers have been studied. The study has been conducted in the period of November 2006 to January 2007. Snow ball sampling method have been used to determine the places of the herbalists, because of absence of the information sources like commercial chambers or any other organs about herbalist. Many questions like; which medicinal plants they have sold, from where

the plants come or collected, for which health problem the customers the medicinal plants demands, from where they have learned the information and usage area about the herbs, their annually income, etc., have been asked to the herbalists. Also to the customers have been asked; which medicinal plants for which health problem they are used and why they preferred the medicinal plants.

In this study, the medicinal plant species which are sold in the area, their local names, used health problems, used plant parts and usage art have been determined. The results have been compared especially with the other ethno pharmacological and medicinal plant research results (Baytop, 1999; Tuzlaci and Erol, 1999; Tuzlaci and Tolon, 2000; Tuzlaci and Aymaz, 2001; Ozcelik, 2009) in Turkey and in the world (Gupta et al., 2005; Libman et al., 2006; Pieroni et al., 2005; Cavender, 2006; Ansin et al., 2002; Ozhatay et al., 1997; Palmese et al., 2001; Ballero et al., 2001; Pattanaik et al., 2008). The local and the scientific names of the plants, medicinal used plant parts, usage art, used health problems, endemism, produce form, the IUCN classification and if it is in the exported plants list of Turkey are also given (Table 3).

The obtained results are evaluated statistically with the computer software SPSS 11.0 in the second part of the study. Frequency tables are also created with this computer program. The distribution of the herbalists and customers according to the cities in the research area are given in Table 1.

The demographic specifications of the customers are given in Table 2.

Results and Discussion

26 herbalists have been identified in the research area. But 25 of them are attended in this research. Trabzon city is in major position in the herbal medicine market in the research area, because of their historical antecedents.

The ages of the customers changes between 18-67. The average age of the customers in the research area is 37.8 and the middle age group (45.88%) is dominant. 65.3% of the customers are men and 34.7% are woman (Table 2). 5 customers have not defined their ages. The average education levels of the customers are secondary school.

94.7% of the customers buy the herbs from the herb sellers less than 10 years ago. The side effects of the medicines, inclining

Table - 1: The cities and the herbalists in the research area

Cities	Herbal shops	Number of customers
Artvin	1	5
Giresun	1	5
Gumushane	3	24
Bayburt	2	11
Rize	4	35
Ordu	3	15
Trabzon	12	75
Total	26	170

Table - 2: Demographic characteristics of survey sample (N=170)

Variables	Sample (%)	Number of customers
Age, year		
18 – 32	34.12	58
33 – 47	45.88	78
48 – 60	11.24	31
> 60	1.76	3
Sex		
Male	65.3	111
Female	34.7	59
Education		
Primary education	38.2	65
High School	44.1	75
University	14.7	25
Household income in \$ (Yearly)		
≤ 2500	8.8	15
2501 – 7500	61.2	104
7501 – 12500	8.2	14
>12500	2.4	4

Table - 3: Medicinal plants and their ethnopharmacological usage

Botanical taxon	Botanical family	Vernacular name	Status	Part used	Preparation	Medicinal use
<i>Acorus calamus</i>	Araceae	Hazanbel	---	Rh	Infusion/ Powder	Carminative/Antispasmodic Sweaty/ Anti-rheumatism
<i>Capsella bursa-pastoris</i>	Brassicaceae (Cruciferae)	Cobancantasi	---	F	Fresh juice	Constipation/Diuretic
<i>Anthemis</i> ssp.	Asteraceae (Compositae)	Papatya	LR(Ic)*	F,O	Infusion	Dysmenorrhea/ Carminative/ Hair reinforce
<i>Achillea schischkini</i>		Civanperçem	LR(Ic)*	F,L	Infusion	Hemorrhoid pains
<i>Artemisia dracunculus</i>		Tarhun	---	L	Infusion/ Powder	Constipation /Orexigonic/ Carminative /Vermifuge
<i>Equisetum arvense</i> **	Equisetaceae	Atkuyrugu	---	F,L	Infusion	Diuretic /Kidney stone/ to stop internal bleeding
<i>Ribes nigrum</i>	Grossulariaceae	Kusuzumu	---	Fr	Chewing	Stomach/Orexigonic
<i>Hypericum fissurale</i>	Clusiaceae (Guttiferae)	Kantaron	CR*	F,L	Infusion/ Powder	Orexigonic
<i>Juglans regia</i>	Juglandaceae	Ceviz ^c	---	L,Fr	Infusion/ Decocion	Diuretic /Glycemia/Skin disease/ Tonic/Anti- rheumatism/Hair reinforce/Dyspepsia/Arthritis/ Orexigonic
<i>Mentha pulegium</i> **	Lamiaceae (Labiatae)	Nane	---	L, O	Infusion	Smell donor/ Diuretic
<i>Salvia divaricata</i>		Adacayi	LR(Ic)*	L	Infusion	Constipation / Stomach /Calmatine
<i>Salvia huberi</i>		„	LR(cd)*	L	Infusion	
<i>Salvia rosifolia</i>		„	LR(Ic)*	L	Infusion	
<i>Thymbra spicata</i>		Kekik	---	L	Infusion	Antiseptic/Stimulant
<i>Melissa officinalis</i> **		Ogul otu	---	L	Infusion	Antiseptic/Calmatine/ Stomach / Carminative /Ear aches/Brain stimulant/Common cold
<i>Lavandula stoechos</i>		Karabasotu	---	F	Infusion	Antiseptic/Pain killer/ Calmatine
<i>Stachys</i> ssp.		Sehzade cayi	CR*	F,L	Infusion	Stimulant/ Carminative
<i>Ocimum basilicum</i>		Reyhan	---	F,L	Infusion	Calmatine / Carminative / Diuretic/ Constipation/Stomach and Intestine ache
<i>Lavandula angustifolia</i> .		Lavanta cicegi	---	F	Infusion	Diuretic /Anti- rheumatism
<i>Cerationa siliqua</i> **	Fabaceae (Leguminosae)	Kecibonuz	---	Fr	Decocion	Laxative/ Diuretic/Intestine parasite/ Expectorant/Toothache

to the natural products and increased conscious of the people have increased the demand to herbs. This request increased the herb shops about 60% within 10 years. Although 95.3% of the customers prefers the hospitals at first and then the traditional medical methods. 22.9% of the customers take the herbal medicines as a support.

67.6% of the herbalists are getting the medicinal plants from the seller firms, only 5.4% are getting them directly from the nature. 52.4% of the herbalists have been learned the information about the herbs from books, 30.9% from the internet, 14.3% from the seller firms and 2.4% from the own families seniors.

The laws about the herbal marketing and selling are not exists in Turkey. This causes desultory activities in this field. The herbs are selling from non expertise persons in different sized shops. Laws in Turkey prohibit mixing the herbs and making medicines from them without any scientific or pharmacological infrastructure. 40% of the herb sellers are making their mixes and sells them to their customers. This indicates to inspection problems or debility in this area (Bayramoglu *et al.*, 2006). The annual income of the herb

<i>Fructus sennae</i>		Sinameki	—	Fr,S	Infusion	Laxative/Slimming
<i>Glycyrrhiza glabra</i> **		Meyan Koku	—	F,Fr,Rt	Powder/ Infusion/ Decocion	Diuretic /Arthritis/Expectorant/ Skin disease/Kidney disease/ Common cold
<i>Linum flavum</i> subsp. <i>scabrinerve</i>	Linaceae	Keten tohumu	LR(lc)*	S	Infusion	Slimming/Digestive system inflammation
<i>Linum obsutatum</i>		"	LR(lc)*	S	Infusion	
<i>Linum unguiculatum</i>		"	LR(lc)*	S	Infusion	
<i>Cinnamomum cassiae</i>	Lauraceae	Tarcin Kabugu	—	St	Powder/ Infusion/ Tablet	Antiseptic/ Constipation / Carminative
<i>Cinnamomum zeylanici</i>		"	—	St	Powder/ Infusion/ Tablet	
<i>Cinnamomum camphora</i>		Kafir Otu	—	L,St	Powder	Antiseptic/Pain killer/Respiratory/ Heart stimulant
<i>Laurus nobilis</i> **		Defne yapragi ^c	—	L	Infusion	Antiseptic/Sweaty/Skin disease/ Enteritis/ Calmatine /Indigestion
<i>Myristica fragrans</i>	Myristicaceae	Hindistancevizi	—	S	Powder/ Decocion	Carminative / Diuretic /Antiseptic/ Indigestion/Aphrodisiac/
<i>Althaea officinalis</i> **	Malvaceae	Hatmi	—	F	Infusion	Respiratory
<i>Piper nigrum</i>	Piperaceae	Karabiber	—	Fr	Powder	Orexigonic /Spice/Indigestion/ Tonic/Pain killer
<i>Plantago major</i>	Plantaginaceae	Damarotu	—	L	Infusion	Hypertension/Common cold/ Kidney stone/Blood purification
<i>Sesamum indicum</i>	Pedaliaceae	Susam	—	O	Oil/Laxative	Constipation / Diuretic /Tonic
<i>Rosa canina</i> **	Rosaceae	Kusburnu ^c	—	Fr,L	Infusion/ Powder	Constipation /Tonic/Glycemia Constipation / Diuretic /Tonic
<i>Alchemilla</i> ssp.**		Findikotu	VU*	Rt,L		
<i>Crataegus tanacetifolia</i> **		Alic ^c	LR(lc)*	Fr	Infusion/ Powder	Tension/Spazm / Calmatine / Diuretic
<i>Cerasus mahaleb</i>		Mahlep	—	S	Powder	Tonic/Aphrodisiac/Prostate/Dyspnea
<i>Rubus fruticosus</i>		Bogurtien	—	L,Fr	Infusion/ Decoction	Constipation /Tonic/Amygdale inflammation
<i>Armenica vulgaris</i>		Kayisi ^c	—	Fr	Chewing	Skin care
<i>Coffeae arabica</i>	Rubiaceae	Kahve	—	S	Infusion	Alkaloid intoxication/Headache
<i>Nigella sativa</i>	Ranunculaceae	Corek otu	—	S	Infusion	Diuretic / to redouble foremilk/ Orexigonic
<i>Capsicum annum</i>	Solanaceae	Pul biber ^c	—	Fr	Powder/ Tablet	Spice /Blood purification/Arthritis/ Anti- rheumatism/Heart stimulant
<i>Tilia argentea</i>	Tiliaceae	Ihlamur ^c	—	F	Infusion	Sweaty/ Calmatine /Hypnotic
<i>Foeniculum vulgare</i>	Apiaceae (Umbelliferae)	Rezene	—	Fr,L,Rt	Powder /Tablet/ Infusion	Stomach/ Carminative / to redouble foremilk
<i>Pimpinella anthriscoides var. cruciata</i>		Anason	LR(nt)*	Fr	Infusion/ Powder	Hypnotic / Carminative
<i>Pimpinella cappadocica var. cappadocica</i>		"	LR(lc)*	Fr	Infusion/ Powder	
<i>Cuminum cyminum</i>		Kimyon	—	Fr	Infusion/Powder	Stomach/ Carminative / Sweaty/Stimulant
<i>Urtica dioica</i> **	Urticaceae	Isirgan	—	L,Rt	Infusion/Decoction	Anti-rheumatism/Orexigonic Blood purification
<i>Zingiber officinale</i>	Zingiberaceae	Zencefil	—	Rh	Infusion/Powder	Spice/ Calmatine / Carminative /Indigestion/ Common cold

CR - Critically endangered, EN - Endangered, VU - Vulnerable, LR - Lower risk, cd - Conservation dependent, nt - Near Threatened, lc - Least concern, * - Endemic taxa in east Black sea area, ** - Exported taxa, F - Flower, Fr - Fruit, O - Oil, Rh - Rhizom, S - Seed, Rt - Root, St - Stem, L - Leaf, C - Cultivation

sellers in the research area is about 33,333 \$ yr⁻¹. It is estimated that annually totally 833,325 \$ income provides the herb selling activities in the region.

As a result of the research, 50 species within 24 families have been determined in the research area. Among them 44 species are wild and 6 species are cultivated plants. *Laurus nobilis*, a widespread species in the coastal places of Turkey, is accepted as a cultivated plant because no wild sample has been found until now, although some people claimed its presence. Also the local names, endangering situation according to IUCN, exportation possibilities, economic potential, endemism, scientific names, used parts, used health problems of the herbs was collected and shown in alphabetical row in the Table 3.

The most herb species are reported from *Labiataceae* (10 taxa), *Rosaceae* (6 taxa) and *Lauraceae* (4 taxa).

14 endemic species have been determined in the research area and they belong to the endangered list of IUCN. 11 species of them are in low risk list (LR), 2 in the Critically endangered list (CR), 1 in the vulnerable list (VU) (Table 3). 10 species are going to exportation in Turkey. As shown in Table 3, some species belongs to the endangered list of IUCN but although they are collected and exported directly from the nature without any restriction.

As regards the drugs used, the fruits, flowers (24 records) and leafs (21 records) are the most widely used, followed by seeds (8), roots (4), stems (3), oils (3) and rhizomes (2). As regards the modality of intake or administration, the most prevalent form is infusion (20 records), followed by powder (18), decoction (6), Tablet (4), chewing (2), fresh juice (1) and oil/laxative (1).

Table 4, with 151 records, summarizes the claimed relationship between medicinal plants and pathologies for which they are use. The major illness which are treated by the indigenous people by plant products include to intestinal problem (19 records), diuretic (13 records), carminative (12 records), respiration system (10 records), joint disease (9 records), calmativ (8 records), vascular system (7 records), orexigenic (7 records), antiseptic (7 records), digestive system (7 records), tonic (7 records), pain killer (7 records) and other divers diseases (38 records). It is worthy of note that many of the alleged therapeutic indications in folk medicine have already been demonstrated to be such by experimental studies. For example, several plants included in the present survey and reported to be useful in joint disease have been shown to have a Anti-rheumatism effect in experimental studies: *Juglans regia* (Hanlidou *et al.*, 2004), *Urtica dioica* (De Natale and Pollio, 2007), *Capsicum annum* (Pieroni *et al.*, 2004). The digestive disorders plants reported in the present compilation to effects on intestine, *Cerastion siliqua* (El-Hilay *et al.*, 2003), *Ocimum basilicum* (Said *et al.*, 2002) and the respiration system plant *Glycyrrhiza glabra* (Lev and Amar, 2000; Lev and Amar, 2002) have proven to have such properties.

Table - 4: Relationship between medicinal plants and main therapeutic indications

Main therapeutic indications	Number of records	Percentage (%)
Intestinal	19	12.58
Diuretic	13	8.60
Carminative	12	7.94
Respiration system	10	6.62
Joints disease	9	5.96
Calmativ	8	5.29
Vascular system	7	4.63
Orexigenic	7	4.63
Antiseptic	7	4.63
Digestive system	7	4.63
Tonic	7	4.63
Pain killer	7	4.63
Stimulant	6	3.97
Skin diseases	4	2.64
Sweaty	4	2.64
For women uses	3	1.98
Kidney Stone	3	1.98
Spice	3	1.98
Aphrodisiac	2	1.32
Glycemia	2	1.32
Hair care	2	1.32
Slimming	2	1.32
Hypnotic	2	1.32
Alkoloid intoxication	1	0.66
To stop internal bleeding	1	0.66
Smell donor	1	0.66
For brain	1	0.66
Prostate	1	0.66
Total	151	100

The study was envisaged for determining the traditional used herbal medicines, their species, usage art, used parts, usage area *etc.* The results showed that the region contains very rich natural resources. Research results encourage and indicate us to make a detailed ethno pharmacological and botanical research to find out the other herb families and species. There are lots of deficiencies and mistakes in the region in this research subject, waiting for development and correction. Many endemic and endangered species are still collecting and selling. These activities could bring some profits to the local people but also dangers many endemic species and prevents the sustainability. Current political and economical practices could not obstruct the incorrect usage of the natural resources. Some suggestions from determined results are given below, to provide the sustainability and manageability of the natural herb resources.

- i. The herb collecting from the nature, (used domestically or for exportation) must be regularly and sustainable. Institutional and educational studies must be increased.
- ii. Production and marketing activities have to be coordinated with the global markets and needs.

- iii. Blacksea region has very rich natural herb resources, but the people don't have enough information about these resources. This deficiency must be eliminated with right methods, like education activities.
- iv. The need of scientific researches is very high. It is highly recommendable to making botanical and pharmacological researches.

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