

Full Length Research Paper

Medicinal plants used in Dalaman (Muğla), Turkey

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In the present paper, 95 traditional medicinal plants from Dalaman district have been reported. The 95 species belonged to 42 families and among them 64 species were wild and 31 species were cultivated plants. The informant consensus factor (F_{ic}) and the fidelity level (FL) of the species were calculated. The category that had the highest F_{ic} value was cold and flu (0.85) followed by stomach ailments (0.83); the category with the lowest F_{ic} value was intestinal ailments (0.39). *Allium sativum*, *Citrus limonum*, *Olea europaea* var. *europaea* and *Vitis vinifera* had the highest fidelity level and *Nerium oleander* had the lowest. The traditional medicinal plants were mostly used for the treatment of stomach ailments (31.6%), intestinal ailments (27.4%), wounds, burns and cough (13.7%), cold, flu (12.6%), and diabetes (10.5%). The most frequently used families were Lamiaceae, Rosaceae, Fabaceae, Liliaceae and Apiaceae.

Key words: Ethnobotany, informant consensus factor (F_{ic}), fidelity level (FL), Dalaman, Turkey.

INTRODUCTION

The World Health Organization (WHO) reported that nearly 4 billion people (80% of the world population) initially use herbal remedies to resolve their health related issues. Additionally, 25% of the prescription drugs sold in developed countries comprised active ingredients of herbal origin (such as vinblastine, reserpine, quinine, aspirin) (Farnsworth et al., 1985). The identification of novel areas of use for the medicinal and aromatic plants and the associated increase in demand for the natural products has in turn increased the public volume of this type of plants. The present capacity of the medicinal plant market is estimated to be nearly 60 billion dollars (Kumar, 2009) and this is poised to grow to 5 trillion dollars by the year 2050 (WHO, 2002).

The use of wild plants in medicine by the Anatolian people goes back to the ancient times. The records of plant names in prescription recipes in Hittitian medical tablets would be presented as a proof of this concept. Additionally, it was known that several drugs prepared in Anatolia were exported to other countries during the

Hittite and Byzantian periods (Baytop, 1999). Turkey is one of the richest countries in the world in terms of plant diversity. To date, approximately 10,500 plant species have been identified within her borders and 30% of these are endemic (Davis, 1965-1988; Guner et al., 2001).

Between 50,000 and 70,000 plant species are known to be used in traditional and modern medicinal systems throughout the world (Schippmann et al., 2006). More than 500 plant species are used in Turkey in treatment of diseases (Baytop, 1984). Treatment using herbal remedies relies on the presence of a particular type of culture and tradition. The research on medicinal plants that have been used by the people was reported to be of particular significance specifically because of this reason (Gurhan and Ezer, 2004).

Turkish people are quite interested in wild plants, due to the high proportion of people living in rural areas, and also for economic reasons (Cakılcıoğlu et al., 2010). In recent years, the plants used traditionally for curative purposes have attracted attention of the researchers

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(Sezik et al., 1991, 1997; Ertuğ, 2000, 2003, 2004; Tuzlaci and Tolon, 2000; Özgen et al., 2004; Özgokce and Ozcelik, 2004; Simsek et al., 2004; Uzun et al., 2004; Everest and Öztürk, 2005; Özkan and Koyuncu, 2005; Cansaran et al., 2007; Akgül, 2008; Koyuncu et al., 2009; Yesil and Akalin, 2009; Yapıcı et al., 2009; Cansaran and Kaya, 2010; Cakılcıoğlu and Turkoglu, 2010; Polat and Satıl, 2010, 2012; Tuzlaci et al., 2010; Bulut, 2011; Cakılcıoğlu et al., 2010, 2011; Günes and Özhatay, 2011; Öztürk and Ölcücü, 2011).

The use of plant species that are naturally available in the flora as food, teas, spices, dyes, insecticides, resin or gum, for medicinal purposes and treating animal diseases, using their essential oils, or using them in beverage or cosmetics industry has been a part of the traditional and cultural prosperity in Turkey as well as in other parts of the world (Faydaoğlu and Sürücüoğlu, 2011). However, this concept is sinking into oblivion in parallel to an increase in urbanization. The present study aims to identify the details regarding the past and present use of medicinal plants in and around Dalaman (Mugla).

MATERIALS AND METHODS

The area of study

Dalaman is situated in between the 37°-36° N latitudes and 28°-29° E longitudes. Dalaman is surrounded by Fethiye in the east, Koycegiz and Ortaca in the west, Denizli-Cameli in the north and the Mediterranean Sea in the south. It is the 6th largest district in Mugla with 853 km² surface area (<http://www.dalaman.bel.tr/dalaman/cografya-iklim.html>, 25 October 2012) (Figure 1).

The climate in the Dalaman district is typical of the Mediterranean (Akman, 1990). In accordance with the characteristics of the climate, the district is warm and receives precipitation in the winter whereas it is dry and hot during the summer season. The mean annual precipitation level is 1044.5 mm. The highest temperature recorded in Dalaman in 1973, which was 48.5°C was the 3rd highest in all time records in Turkey following Kahramanmaraş (48.8°C) and Sırnak Cizre (48.6°C) (<http://www.dalaman.bel.tr/dalaman/cografya-iklim.html>, 25 October 2012).

A total number of 16 villages are present in the Dalaman district. Additionally, 9 settlements affiliated with the central municipality are present. A list of these villages and settlements in Dalaman are presented in Table 5.

Data collection

The study was conducted in 25 visits to the area during the period of 2010 to 2011. The related information and documentation was compiled and samples of the plants in public use were collected simultaneously. Research was carried out in 10 villages and 9 settlements that are listed in Table 5 in order to achieve this purpose.

Interviews were conducted with 203 people in the district with a knowhow of the subject and information was collected. The local names, areas of use and methods of use of the plants growing in the district were inquired from these interviewees. The information on the plants was thus compiled following these interviews conducted in the local market where the villagers sold their

produce.

"Flora of Turkey and the East Aegean Islands" (Davis, 1965-1985; Davis et al., 1988; Guner et al., 2001) was used as reference in the identification of the plant samples. The collected specimens were processed as herbarium vouchers and are currently stored in Sakarya University Herbarium.

Data analysis

Trotter and Logan (1986) developed a method based on the "informant consensus" concept for the identification of potentially active medicinal plants. They compared the number of remedies for a particular illness through the declaration of people that were interviewed for each illness. As a conclusion, F_{ic} is a term that relates N_{ur} and N_t . In the F_{ic} (Informant Consensus Factor) equation, N_{ur} indicates the number of used reports at each category and N_t denotes the number of taxons that were used. F_{ic} is calculated as follows (Heinrich, 2000):

$$F_{ic} = (N_{ur} - N_t) / (N_{ur} - 1)$$

The calculated value varies between 0 and 1. The highest value of 1 denotes that relatively few taxa are widely used as a solution and that low values indicate that the reporters do not agree on a consensus remedy for a particular illness (Heinrich, 2000).

Fidelity level (FL) is the percentage of plant specimens that the interviewees claim to use for the same particular purpose. This value is calculated as stated for common illness and disorders:

$$FL (\%) = (N_p / N) \times 100$$

N_p is the number of people who claim to use a set of plant specimens for a particular disease and N is the number of people who use plant remedies for any type of illness (Alexiades, 1996).

RESULTS

One hundred and three people were interviewed in this survey and 137 voucher specimens were collected in the research area. The plants that were used for medicinal purposes in Dalaman are shown in Table 1 in an alphabetical order of their family and botanical names along with the relevant information. As indicated by the results of the identification, 95 taxa were being used for medicinal purposes in Dalaman. Among them, 64 taxa comprised wild species and 31 taxa comprised of cultivated species. As a result of this study, medicinal uses of the 95 taxa against 116 different diseases were recorded.

Informant consensus of medicinal plant usage in Dalaman resulted in informant consensus factor (F_{ic}) values between 0.85 and 0.39 per illness category. The category that had the highest F_{ic} value was cold and flu (0.85) followed by stomach ailments (0.83). The lowest value was recorded for intestinal ailments (0.39) (Table 2). *Citrus limonum*, *Vitis vinifera*, *Olea europaea* var. *europaea* and *Allium sativum* had the highest fidelity level (100%) and *Nerium oleander* (30%) had the lowest (Table 3).

All parts of various plant species were used in the traditional treatment of different diseases, however, the

Table 1. Medicinal plants of the dalaman district.

Family	Botanical name	Local name	Plant part used	Preparation	Ailments treated, therapeutic effect	Route of administration, dosage, duration of treatment
Altingiaceae	<i>Liquidambar orientalis</i> Miller.	Günlük, Sığla	Oil	Fresh	Stomachache,	Eaten one spoon once a day
			Gum	Salve	Wounds	Applied until recovery
				Fresh	Gastric ulcer	Eaten
Anacardiaceae	<i>Rhus coriaria</i> L.	Somak, Sumak	Leaves and Flowers Fruit	Decoction	Diabetes Arteriosclerosis, laxative, diarrhea	Drunk one teacup once a day
Apiaceae	<i>Daucus carota</i> L.	Havuç	Rhizome	Fresh	Source of vitamin A	Eaten
Apiaceae	<i>Falcaria vulgaris</i> Bernh. Syst.	Kayazak	Aerial parts	Fresh	Vasodilator	Eaten
Apiaceae	<i>Foeniculum vulgare</i> Miller.	Rezene, Sıra	Seeds	Infusion	Lactogenic expectorant, menstruation facilitative, Source of vitamin A	Drunk one teacup twice a day after meals
				Decoction	Diuretic, kidney stones	Drunk one teacup twice a day
				Crushed with lemon juice	Weight-loss medicine	Eaten twice a day
Apiaceae	<i>Petroselinum crispum</i> Miller.	Maydanoz	Leaves	Fresh	Eye diseases	Eaten
				Poultice	Cystitis	Sitting on poultice
				Decoction	Hemorrhoids	Drunk one teacup once a day
Apiaceae	<i>Torilis arvensis</i> (Huds.) subsp. <i>elongata</i> Gannon.	Pıtrak	Fruit and leaves	Decoction	Hemorrhoids	Drunk one teacup once a day
Apocynaceae	<i>Nerium oleander</i> L.	Zakkum, Ayacı	Leaves	Decoction and Salve	Urticaria, rheumatism	Cleaning body once a day
			Leaves kept in olive oil		Arthralgia	Massaging once a day
			Latex	Salve	Wart, scorpion sting	Applied
			Flowers kept in olive oil		Urticaria	Applied once a day
Araceae	<i>Dracunculus vulgaris</i> Sahatt x Endl.	Yılan bıçağı, Yılan yastığı	Dried fruit	Fresh	Hemorrhoids	Eaten
			Fruit	Salve	Cracked heels	Applied until recovery
			Roots	Decoction	Eczema	
				Crushed	Stomachache	Eaten one teaspoon before breakfast for 15 days
Aspleniaceae	<i>Ceterach officinarum</i> L.	Altın otu, Böbrek otu	Leaves	Decoction	Kidney stones, diarrhea, metritis	Drunk one teacup twice a day
Asteraceae	<i>Centaurea solstitialis</i> subsp. <i>carneola</i> L.	Peygamber çiçeği	Leaves and flower	Decoction	Foot pain	Drunk one cup once a day
Asteraceae	<i>Cynara scolymus</i> L.	Enginar	Fruit	Fresh	Liver failure Diabetes	Eaten
			Dried leaves	Decoction	Liver failure	
			Stem	Decoction	Diabetes	Drunk one cup once a day
			Roots	Decoction	Kidney stones	
Asteraceae	<i>Helianthus annuus</i> L.	Ayçiçeği	Oil	Salve	Wounds, burns	Applied until recovery
Asteraceae	<i>Inula viscosa</i> L.	Yüdü otu	Shoot	Roasted and crushed	Arthralgia	Wrapping
Brassicaceae	<i>Capsella bursa-pastoris</i> L.	Çoban çantası, Kedi tımağı	Aerial parts	Crushed and Salve	Antihemorrhagic	Applied once a day
Brassicaceae	<i>Lepidium sativum</i> subsp. <i>sativum</i> L.	Tere	Seeds in honey	Fresh	Goitre	Eaten one teaspoon every morning before breakfast

Table 1. Contd.

Capparaceae	<i>Capparis spinosa</i> var. <i>inermis</i> L.	Kapari, Kebere	Fruit	Fresh	Asthma, diabetes, anemia, hemorrhoids	Eaten 3-4 a day
Cucurbitaceae	<i>Citrullus lanatus</i> Matsum.	Karpuz	Seeds		Anticoagulant, blood depurative	Eaten 4-5 a day
			Juice	Fresh	Serum	Drunk one teacup a day
Cucurbitaceae	<i>Cucurbita pepo</i> L.	Süt kabağı	Poultice	Salve	Antiinflammatory	Wrapping
Cupressaceae	<i>Cupressus sempervirens</i> L.	Andız	Roots	Decoction	Cardiac diseases	Drunk one cup once a day
			Seeds	Fresh	Diabetes	Eaten 1-2 fruit a day
Cupressaceae	<i>Juniperus oxycedrus</i> subsp. <i>oxycedrus</i> L.	Ardıç		Decoction	Cough, menstruation facilitative	Drunk one cup once a day
			Gum	Salve	Psoriasis, eczema, variola	Applied with vaseline once a day
			Fruit	Decoction	Asthma, kidney stones, wounds	Drunk one teacup once a day
			Leaves, Seeds	Decoction	Body resistance booster	
			Oil	Drop in water	MS disease, cold, cardiac deficiency, Analgesic	Drunk 3 drops in one teacup twice a day
Cyperaceae	<i>Cyperus glaber</i> L.	Hava otu	Aerial parts	Poultice	Stomachache	Wrapping
Ericaceae	<i>Erica manipulliflora</i> Salisb.	Püren, Funda otu	Leaves and flower	Decoction	Weight-loss medicine diabetes	Drunk one cup twice a day
Euphorbiaceae	<i>Euphorbia rigida</i> L.	Sütleğen	Leaves	Burned	Toothache	Applied
Fabaceae	<i>Ceratonia siliqua</i> L.	Keçiboynuzu, Harnup	Fruit	Fresh	Laxative, diarrhea	Eaten 2-3 a day
				Molasses	Asthma, cough	Eaten 3-4 spoons 3-4 times a day
Fabaceae	<i>Cicer montbretii</i> Joub x Spach in Ann.	Nohut	Fruit	Poultice	Tonsillitis	Wrapping
Fabaceae	<i>Phaseolus vulgaris</i> L.	Fasulye	Seeds	Salve	Antihemorrhagic	Applied half seed until recovery
Fabaceae	<i>Trifolium hybridum</i> L. var. <i>anatolicum</i> Boiss.	Yonca	Aerial parts	Decoction	Stomachache	Drunk one cup once a day
Fabaceae	<i>Vigna anquiculata</i> subsp. <i>anquiculata</i> L.	Kısa börülce	Fruit	Decoction	Anthelmintic	Drunk one teacup once a day
Fabaceae	<i>Vigna anquiculata</i> subsp. <i>sesquipedolis</i> L.	Uzun börülce	Fruit	Decoction	Anthelmintic	Drunk one teacup once a day
Fagaceae	<i>Quercus aucheri</i> Jaub x Spach.	Boz pınar, Pıynar	Stem	Burned	Toothache	Applied
Fagaceae	<i>Quercus pubescens</i> Willd.	Meşe	Fruit	Crushed and salve	Wounds	Applied until recovery
			Aerial parts	Decoction	Stomachache	Drunk one cup once a day after meal
Guttiferae	<i>Hypericum perforatum</i> L.	Kantaron	Dried aerial parts	Kept in olive oil	Analgesic, arthritis	Massaging twice a day
				Decoction	Wounds and burns	Applied twice a day until recovery
Guttiferae	<i>Hypericum trigetifolium</i> Turra, Farsetia Now	Kızılçık	Aerial parts	Decoction and Salve	Gynaecological diseases	Cleaning vaginal area once a day
				Decoction	Menstruation regulating	Drunk one teacup once a day
Juglandaceae	<i>Juglans regia</i> L.	Ceviz	Fruit	Fresh	Cholesterol lowering	Eaten
			Oil	Kept in water	Vasodilator, weight-loss medicine	Drunk one teacup twice a day
				Salve	Rheumatism	Massaging

Table 1. Contd.

			Fruit bark	Burned	Antiinflammatory	Wrapping
				Decoction	Sore throat	As a gargle 3 times a day
			Leaves	Decoction	Cardiac diseases	Drunk one cup once a day
				Decoction and salve	Arthralgia	Applied
Lamiaceae	<i>Coridothymus capitatus</i> L.	Kara kekik	Flower and leaves	Decoction	Tonic	Cleaning body
Lamiaceae	<i>Lavandula stoechas</i> L. var. <i>stoechas</i>	Karağan, Karabaş	Flower and leaves	Decoction	Cardiac diseases, flu, sedative, asthma, vasodilator, anticoagulant, headache, kidney ailments, cystitis	Drunk one cup once a day
				Decoction and salve	Eye pain	Cleaning with cotton once a day
Lamiaceae	<i>Mentha longifolia</i> subsp. <i>typhoides</i> var. <i>calliantha</i> L.	Su narpızı	Leaves	Crushed	Burns	Wrapping
Lamiaceae	<i>Mentha piperita</i> L.	Nane	Leaves	Decoction with lemon	Catarrh, flu	Drunk one cup 3 times a day
				Decoction	Stomachache, antisudofiric, digestive, upper respiratory tract disorders	Drunk one cup once a day
				Poultice	Panicula	Applied until recovery
			Oil	Salve	Depilatory, anti-snoring	Applied
Lamiaceae	<i>Mentha pulegium</i> L.	Narpız, Narpuz	Leaves and flower	Decoction	Diuretic, stomachache, flu, dyspnoea	Drunk one cup twice a day
				Poultice	Headache	Wrapping
Lamiaceae	<i>Ocimum basilicum</i> L.	Festiken, Fesleğen	Leaves	Decoction	Stomachache, digestive, sedative	Drunk one cup once a day
Lamiaceae	<i>Origanum hypericifolium</i> O. Schwarz x P. H. Dawis in Kew Bull.	Mercan köşkü, Çökelek kekiği	Leaves and flower	Decoction	Breast cancer	Drunk one cup once a day
Lamiaceae	<i>Origanum majorana</i> L.	Mercan köşkü	Leaves and shoot	Decoction	Stomachache	Drunk one cup once a day
Lamiaceae	<i>Origanum onites</i> L.	Kekik	Aerial parts	Decoction	Stomachache, bronchitis, antiinflammatory, immunogenic, antiemetic, carminative, expectorant, cough, antihypertensive	Drunk one cup twice a day
				Decoction and salve	Eczema	Applied once a day until recovery
			Oil	Drop	Toothache	Dropped tooth 1-2 drop(s)
Lamiaceae	<i>Origanum vulgare</i> subsp. <i>hirtum</i> L.	Taş kekiği, Yayla kekiği	Leaves and flower	Decoction	Stomachache, rheumatism	Drunk one cup once a day
Lamiaceae	<i>Phlomis bourgaei</i> Boiss.	Kara çalba	Leaves	Roasted and crushed	Analgesic	Wrapping
Lamiaceae	<i>Rosmarinus officinalis</i> L.	Biberiye	Leaves	Decoction	Weight-loss medicine, stomachache, menstruation regulating, sedative, vasodilator, headache, liver diseases	Drunk one cup 3 times a day
Lamiaceae	<i>Salvia fruticosa</i> Miller.	Elmalı adaçayı, Çalba	Leaves	Decoction	Stomachache, tonsillitis, antisudofiric, catarrh, flu, sinusitis	Drunk one cup once a day
				Salve	Carminative	Applied
			Oil	Fresh	Asthma, bronchitis, diuretic, menstruation regulating	Drunk 1 drop in one teacup water once a day
Lamiaceae	<i>Sideritis leptoclada</i> O. Schwarz x P. H. Dawis in Kew Bull.	Bozlan çayı	Leaves and shoot	Decoction	Catarrh, Flu	Drunk one cup twice a day
Lamiaceae	<i>Teucrium polium</i> L.	Yabarca tavşanı	Leaves and shoot	Roasted and crushed	Stomachache	Wrapping

Table 1. Contd.

				Decoction	Stomachache	Drunk one teacup once a day	
Lamiaceae	<i>Thymbra spicata</i> var. <i>spicata</i> L.	Kara kekik	Leaves and flower	Decoction	Anthelmintic, gastrointestinal disorders	Drunk one cup once a day	
Larantaceae	<i>Viscum album</i> L.	Ökse otu, Purç	Leaves	Keeped in water	Antihypertensive	Drunk one cup once a day	
				Decoction	Diabetes		
Lauraceae	<i>Laurus nobilis</i> L.	Tenel, Defne		Seeds	Decoction	Brain tumour	
				Oil	Salve	Analgesic	
				Oil+ Cologne	Salve	Heel spur	Massaging
				Seeds	Decoction	Stomachache, rheumatism	
				Leaves	Decoction	Laxative, anticoagulant	Drunk one cup once a day
				Root barks	Decoction	Headache	
				Flower	Decoction	Cough	
Liliaceae	<i>Allium cepa</i> L.	Soğan	Leaves	Seeds	Crushed	Rheumatism	Wrapping
				Burned	Panicula	Wrapping	
				Fresh	Epilepsy	Snuffing	
				Decoction	Menstruation regulating, metritis, prostate, infertility, flu, carminative	Drunk one cup twice a day	
Liliaceae	<i>Allium sativum</i> L.	Sarımsak	Leaves	Fresh	Antihypertensive, cancer, anthelmintic, kidney stones, arteriosclerosis	Eaten	
Liliaceae	<i>Asparagus acutifolius</i> L.	Dilkimen	Fruit	Fresh	Immunogenic, cancer	Eaten	
				Burned	Urticaria	Fume applied until recovery	
Liliaceae	<i>Smilax aspera</i> L.	Silcan	Shoot	Cooking	Synovial fluid booster	Eaten	
Liliaceae	<i>Urginea maritima</i> L.	Kabartlan	Rhizome	Crushed	Arthralgia	Wrapping	
Malvaceae	<i>Hibiscus esculentus</i> L.	Bamya	Fruit	Cooking	Laxative, cough, sore throat and hoarseness	Eaten	
Malvaceae	<i>Malva sylvestris</i> L.	Ebegümeci	Leaves	Cooking	Laxative, stomachache	Eaten	
Moraceae	<i>Ficus carica</i> subsp. <i>carica</i> L.	İncir, Balart, Yemiş	Fruit	Latex	Salve	Wart	Applied
				Fresh	Laxative	Eaten	
Moraceae	<i>Morus alba</i> L.	Dut	Leaves	Decoction	Asthma	Drunk one cup once a day	
				Fresh	Anemia	Drunk one cup once a day	
Myrtaceae	<i>Myrtus communis</i> L.	Mersin		Fruit	Fresh	Anemia, laxative, diuretic, mouth ulcers	Eaten
				Leaves	Decoction	Cholesterol lowering, diabetes	Drunk one cup once a day
				Shoot	Keeped in olive oil and salve	Analgesic	Applied until recovery
				Leaves and Flower	Decoction	Diuretic	Drunk one cup twice a day
Oleaceae	<i>Olea europaea</i> var. <i>europaea</i> L.	Zeytin	Oil	Fresh	Diabetes, hemorrhoids, stomachache	Drunk one drops in one teacup water 3 times a day	
				Salve	Analgesic, wounds, burns, antihemorrhagic	Massaging or applied until recovery	
				Salve	Hemorrhoids	Applied until recovery	

Table 1. Contd.

			Oil + Semen lini	Fresh	Sore throat, laxative, cancer, kidney stones	Eaten 1-2 spoon
			Leaves	Decoction	Diabetes, antihypertensive	Drunk one teacup once a day
			Seeds	Fresh	Stomachache	for 30 days
			Oil + lemon juice	Fresh	Gall bladder ailments	Drunk one cup 3 times a day
Orchidaceae	<i>Orchis anatolica</i> Boiss.	Salep	Corm	Decoction	Mind developing	Drunk one teacup once a day
Orchidaceae	<i>Orchis coriophora</i> L.	Salep	Corm	Decoction	Mind developing	Drunk one teacup once a day
Papaveraceae	<i>Papaver rhoeas</i> L.	Gelincik, Nünülük	Flower	Decoction and Snuffing	Antihemorrhagic	Dropped into the nostrils 1-2 drop(s)
Pedaliaceae	<i>Sesamum indicum</i> L.	Susam	Oil	Salve	Burns	Applied until recovery
			Gum	Salve	Slipped disc, antifungal, eczema	Wrapping
				Chew	Anthelmintic	
Pinaceae	<i>Cedrus libani</i> A. Rich. In Bory, Dict.	Sedir, Küner	Shoot	Decoction	Tuberculosis, lung spots	Wrapping and waited 1-2 days
			Roots	Decoction	Upper respiratory tract disorders	Eaten one spoon once a day
			Cones	Decoction	Cough	Drunk one teacup twice a day
Pinaceae	<i>Pinus brutia</i> Ten.	Kızılçam, Akçam	Gum	Salve	Wounds	Wrapping until recovery
Pinaceae	<i>Pinus nigra</i> Am.	Karaçam	Cones	Decoction	Diabetes, stomachic ulcer	Drunk one cup once a day
			Gum	Salve	Wounds, burns	Wrapping until recovery
Plantaginaceae	<i>Plantago lagopus</i> L.	Sinirli ot	Leaves	Decoction	Internal bleeding	Drunk one cup once a day
Poaceae	<i>Elymus tauri</i> Boiss x Ball.	Ayrik	Roots	Decoction	Kidney ailments, hemorrhoids, enlargement of the prostate, rheumatism	Drunk one cup once a day
Poaceae	<i>Zea mays</i> subsp. <i>mays</i> L.	Mısır, Darı	Stylus	Decoction	Enlargement of the prostate, asthma, bronchitis	Drunk one cup once a day
Portulacaceae	<i>Portulaca oleraceae</i> L.	Semizotu	Aerial parts	Fresh	Laxative, stomachache, iron deficiency	Eaten
				Decoction	Nephritis, enteritis	Drunk one cup once a day
			Juice	Fresh	Anemia, diabetes, cholesterol lowering, forgetfulness, stomachache	
Punicaceae	<i>Punica granatum</i> L.	Nar	Fruit bark		Diarrhea	Drunk cup once a day
			Roots	Decoction	Anthelmintic	
			Fruit and flower		Cardiac diseases, depression	Drunk one cup twice a day
			Fruit	Fresh	Stomachache, diabetes, cough, vasodilator	Eaten 3-4 twice a day
Rosaceae	<i>Amygdalus communis</i> L.	Çağla, Badem	Oil	Salve	Skin diseases, alopecia, analgesic, cough	Applied twice a day until recovery. Drunk 2-3 drops in one teacup water 3 times a day
				Fresh	Diuretic, diabetes, stress, tonsillitis	Eaten one teaspoon twice a day
			Fruit and seeds		Vasodilator	
Rosaceae	<i>Cretaequs aronica</i> var. <i>aronica</i> Bosc.	Aliç	Fruit and Flower	Decoction	Depression	Drunk one cup once a day
			Flower		Heart valve diseases	
			Leaves	Decoction	Diarrhea	Drunk one cup twice a day
			Fruit	Cooking	Sore throat	Wrapping
Rosaceae	<i>Cydonia oblonga</i> Miller.	Ayva	Fruit	Fresh	Digestive, dyspnoea, cardiac diseases	Eaten
			Vinegar		Immunogenic	Eaten two spoon once a day
			Leaves and Flowers	Decoction	Against miscarriage, uterine cancer	Drunk one teacup twice a day

Table 1. Contd.

Rosaceae	<i>Pyrus communis</i> subsp. <i>communis</i> L.	Armut	Fruit	Fresh	Digestive, catarrh, diarrhea, tonic	Eaten	
Rosaceae	<i>Rosa canina</i> L.	Kuşburnu, Deli gül	Fruit	Infusion	Anemia, mediterranean anemia, flu, cough	Drunk one teacup twice a day	
Rosaceae	<i>Rubus sanctus</i> Schreber Icon.	Böğürtlen	Roots	Decoction	Gynaecological diseases, cancer	Drunk one teacup twice a day	
			Dried leaves		Diuretic	Drunk one teacup once a day	
			Fruit	Fresh	Mouth ulcers, aphta, intestinal diseases, vitamin A deficiency, alopecia	Eaten	
Rutaceae	<i>Citrus limonum</i> L.	Limon, İlimon	Fruit	Oil	Flu, cold, diuretic	Drunk 3 drops in one teacup water once a day	
				Decoction	Acne	Applied once a day until recovery	
Rutaceae	<i>Citrus sinensis</i> L.	Portakal	Fruit	Fresh	Flu	Drunk	
Rutaceae	<i>Citrus sinensis</i> L.	Portakal	Fruit	Fresh	Scurvy	Eaten	
Solanaceae	<i>Physalis alkekengi</i> L.	Altın çilek	Fruit	Fresh	Weight-loss medicine	Eaten 3 once a day	
Solanaceae	<i>Solanum nigrum</i> subsp. <i>nigrum</i> L.	Köpek üzümü	Leaves and fruit	Crushed	Analgesic	Wrapping	
Solanaceae	<i>Solanum tuberosum</i> L.	Patates	Tuber	Poultice	Antipyretic, headache	Wrapping	
Thymelaeaceae	<i>Daphne sericea</i> Vahl.	Ezeltere	Aerial parts	Crushed	Rheumatism	Wrapping	
Ulmaceae	<i>Ulmus minor</i> Miller.	Karaağaç	Stem bark	Salve	Furuncle	Applied until recovery	
				Decoction	Cancer, Kidney ailments	Drunk one cup once a day	
Urticaceae	<i>Urtica dioica</i> L.	Isırgan	Aerial parts	Fresh	Laxative, stomachache, upper respiratory tract disorders, blood depurative, vasodilator	Eaten	
				Poultice	Rheumatism	Wrapping	
				Flower and leaves	Poultice	Stomachache	Wrapping
Verbenaceae	<i>Vitex agnus-castus</i> L.	Hayıt		Seeds	Decoction	Gynaecological diseases	
					Fresh	Weight-loss medicine, diarrhea	Eaten
				Flower	Decoction	Cough	Drunk one cup twice a day
				Latex	Drop	Earache	Dropped into ear 1-2 drop(s)
				Leaves	Decoction	Antifungal	Drunk one cup once a day
Vitaceae	<i>Vitis sylvestris</i> L.	Beyaz üzüm	Fruit	Fresh	Anemia	Eaten	
				Molasses	Fresh	Variola	Eaten half teacup once a day
Vitaceae	<i>Vitis vinifera</i> L.	Siyah üzüm	Fruit	Fresh	Anemia	Eaten	
				Molasses	Fresh	Anemia	Eaten half teacup once a day

Table 2. Informant consensus factor rates of the medicinal plants used around Dalaman district by diseases.

Diseases category	Number of species (N _t)	All species (%)	Number of use reports (N _{ur})	F _{ic} *
Cold, flu	12	12.6	77	0.85
Stomach ailments	30	31.6	175	0.83
Cough	13	13.7	54	0.77
Diabetes	10	10.5	28	0.67
Wounds, burns	13	13.7	33	0.63
Intestinal ailments	26	27.4	42	0.39

*Informant consensus factor $F_{ic} = (N_{ur} - N_t) / (N_{ur} - 1)$, providing a value between and 1, where "1" indicates the highest rate of informant consensus.

most frequently used parts are the leaves (Table 4). Sometimes, local people also used other ingredients, such as grape molasses, honey, oil, latex to prepare the remedies.

The traditionally accepted medicinal plants were mostly used for the treatment of stomach ailment (31.6%), most frequently used parts are the leaves (Table 4). Sometimes, local people also used other ingredients, such as grape molasses, honey, oil, latex to prepare the remedies.

The traditionally accepted medicinal plants were mostly used for the treatment of stomach ailment (31.6%), intestinal ailments (27.4%), wounds, burns and cough (13.7%), cold, flu (12.6%), and diabetes (10.5%).

Further analysis of the families showed that the Lamiaceae family was represented with the highest number of species (16 species). Rosaceae and Fabaceae were represented by eight and six species, respectively. These were followed by Apiaceae and Liliaceae, each represented by five species. Asteraceae was represented by four, while Pinaceae and Solanaceae were represented by three species each. The remaining families were represented by two species each (11 families) and one species each (23 families).

Among the recorded species, *Juniperus oxycedrus* subsp. *oxycedrus*, *O. europaea* var. *europaea*, *Amygdalus communis*, *Origanum onites*, *Punica granatum*, *Lavandula stoechas* var. *stoechas*, *Salvia fruticosa*, *Laurus nobilis*, *Urtica dioica*, *Juglans regia*, *Mentha piperita*, *Rosmarinus officinalis*, *Vitex agnus-castus*, *Rubus sanctus* and *Cedrus libani* were the most popular plants used in the treatment of many ailments with *J. oxycedrus* subsp. *oxycedrus* used in 15 areas, *O. europaea* var. *europaea* in 13 areas, *A. communis* in 12 areas, and *O. onites* in 11 areas. It manifested itself that some of the plants were collected by the local people for commercial purposes: *Lepidium sativum* subsp. *sativum*, *Hibiscus esculentus*, *Citrus sinensis*, *C. limonum*, *V. vinifera*, *Vitis sylvestris*, *Phaseolus vulgaris*, *Vigna anquiculata* subsp. *anquiculata*, *Vigna anquiculata* subsp. *sesquipedolis*, *Cicer montbretii*, *A. communis*, *Cydonia oblonga*, *Malus sylvestris* subsp. *orientalis* var. *orientalis*,

Pyrus communis subsp. *communis*, *P. granatum*, *Citrullus lanatus*, *Cucurbita pepo*, *Petroselinum crispum*, *Daucus carota*, *Helianthus annuus*, *Cynara scolymus*, *O. europaea* var. *europaea*, *Sesamum indicum*, *Solanum tuberosum*, *Physalis alkekengi*, *Rosmarinus officinalis*, *Mentha piperita*, *Ocimum basilicum*, *Morus alba*, *Ficus carica*, *Juglans regia*, *A. sativum*, *Allium cepa*, and *Zea mays* subsp. *mays* were largely cultivated for harvesting. These plants were known to have great economic significance in Turkey.

DISCUSSION

This study identified a total number of 95 species; 64 of which were wild and 31 were cultivated. Ugurlu and Secmen (2008) identified 54 plant species (41 wild and 13 cultivated) in the ethnobotanical study that they have conducted in Manisa Mount Yunt, Tuzlaci and Aymaz (2001) identified 84 plant species (73 wild and 11 cultivated) in their study in Gonen (Balikesir) and Ugulu et al. (2009) identified 108 plant species (94 wild and 14 cultivated) in the study that they have conducted in Izmir. Plant species that were known as traditional remedies were generally used alone although in some cases they are mixed with or soaked in other materials. For instance the shoots of *Myrtus communis* were reported to be used as an analgesic remedy after they were soaked in olive oil.

The comparison of the FL and F_{ic} values determined in the present study with those that were reported in the study, which was conducted in Izmir by Ugulu et al. (2009) highlighted the following outcomes. The plant species with the highest FL value were *C. limonum*, *V. vinifera*, *O. europaea* var. *europaea* and *A. sativum*, and the species with the lowest FL value was *N. oleander* in the present study whereas *A. cepa* and *U. dioica* scored the highest FL value and *Nigella segetalis* scored the lowest FL value in Ugulu et al. (2009). The evaluation of the F_{ic} data revealed that the highest F_{ic} values were obtained for stomach ailments followed by cold and flu in the present study, whereas cold and influenza scored the

Table 3. Most commonly used medicinal plants and their major uses with their fidelity level, in the Dalaman district, Muğla, Turkey (0= the least, 100= the highest efficiency) (N=203).

Species and family	Local name	Uses	Fidelity level (FL, %)
<i>Citrus limonum</i> L., Rutaceae	Limon, İlimon	Scurvy	100
<i>Vitis vinifera</i> L., Vitaceae	Siyah üzüm	Anemia	100
<i>Olea europaea</i> var. <i>europaea</i> L., Oleaceae	Zeytin	Analgesic, wounds, burns, antihemorrhagic, hemorrhoids, sore throat, laxative, cancer, kidney stones, diabetes, antihypertensive, stomachache, gall bladder ailments	100
<i>Allium sativum</i> L., Liliaceae	Sarımsak	Antihypertensive, cancer, anthelmintic, kidney stones, arteriosclerosis, epilepsy	100
<i>Liquidambar orientalis</i> Miller., Altingiaceae	Günlük, Sığla	Stomachache, wounds, gastric ulcer	98
<i>Urginea maritima</i> L., Liliaceae	Kabartlan	Arthralgia	96
<i>Juglans regia</i> L., Juglandaceae	Ceviz	Cholesterol lowering, vasodilator, weight-loss medicine, rheumatism, antiinflammatory, sore throat, cardiac diseases, arthralgia	94
<i>Malva sylvestris</i> L., Malvaceae	Ebegümeci	Laxative	92
<i>Cydonia oblonga</i> Miller., Rosaceae	Ayva	Diarrhea, sore throat	92
<i>Allium cepa</i> L., Liliaceae	Soğan	Panicula, epilepsy, menstruation regulating, metritis, prostate, infertility, flu, carminative	92
<i>Ceratonja siliqua</i> L., Fabaceae	Keçiboynuzu, Harnup	Laxative, diarrhea, asthma, cough	90
<i>Malus sylvestris</i> subsp. <i>orientalis</i> var. <i>orientalis</i> Miller., Rosaceae	Alma, Elma	Digestive, dyspnoea, cardiac diseases, immunogenic	90
<i>Phlomis bourgaei</i> Boiss., Lamiaceae	Kara çalba	Analgesic	90
<i>Capparis spinosa</i> var. <i>inermis</i> L., Capparaceae	Kapari, Kebere	Asthma, diabetes, hemorrhoids, anemia	88
<i>Mentha piperita</i> L., Lamiaceae	Nane	Catarrh, flu, stomachache, antisudofiric, digestive, upper respiratory tract disorders, panicula, depilatory, anti-snoring	88
<i>Salvia fruticosa</i> Miller., Lamiaceae	Elmalı adaçayı, Çalba	Stomachache, tonsillitis, antisudofiric, catarrh, flu, sinusitis, carminative, asthma, bronchitis, diuretic, menstruation regulating	86
<i>Capsella bursa-pastoris</i> L., Brassicaceae	Çoban çantası, Kedi tırnağı	Antihemorrhagic	84
<i>İnula viscosa</i> L., Asteraceae	Yündü otu	Arthralgia	80
<i>Teucrium polium</i> L., Lamiaceae	Yabarca tavşanı	Stomachache	80
<i>Daphne sericea</i> Vahl., Thymelaeaceae	Ezeltere	Rheumatism	80
<i>Rosa canina</i> L., Rosaceae	Kuşburnu, Deli gül	Anemia, flu, cough	78
<i>Pinus brutia</i> Ten., Pinaceae	Kızılçam, Akçam	Wounds	76
<i>Hypericum perforatum</i> L., Guttiferae	Kantaron	Stomachache, analgesic, arthritis, wounds and burns, gastrointestinal disorders	76
<i>Petroselinum crispum</i> Miller., Apiaceae	Maydanoz	Diuretic, kidney stones, weight-loss medicine, eye diseases, cystitis	74
<i>Vitis sylvestris</i> L., Vitaceae	Beyaz üzüm	Anemia, variola	72
<i>Juniperus oxycedrus</i> subsp. <i>oxycedrus</i> L., Pinaceae	Ardıç	Diabetes, cough, menstruation facilitative, psoriasis, eczema, variola, asthma, kidney stones, wound, body resistance booster, MS disease, cold, cardiac deficiency, analgesic	70
<i>Pinus nigra</i> Arn., Pinaceae	Karaçam	Diabetes, gastric ulcer, wounds, burns	66
<i>Portulaca oleraceae</i> L., Portulacaceae	Semizotu	Laxative, stomachache, iron deficiency, nephritis, enteritis	64
<i>Morus alba</i> L., Moraceae	Dut	Anemia, laxative, diuretic, mouth ulcers	64

Table 3. Cont'd.

<i>Ficus carica</i> subsp. <i>carica</i> L., Moraceae	İncir, Balart, Yemiř	Wart, laxative, asthma	64
<i>Rhus coriaria</i> L., Anacardiaceae	Somak, Sumak	Diabetes, arteriosclerosis, laxative, diarrhea	62
<i>Daucus carota</i> L., Apiaceae	Havu	Source of vitamin A	60
<i>Erica manipuliflora</i> Salisb., Ericaceae	Püren, Funda otu	Weight-loss medicine, diabetes	60
<i>Solanum tuberosum</i> L., Solanaceae	Patates	Antipyretic, headache	60
<i>Origanum onites</i> L., Lamiaceae	Kekik	Stomachache, bronchitis, antiinflammatory, immunogenic, antiemetic, carminative, expectorant, cough, antihypertensive, eczema, toothache	60
<i>Urtica dioica</i> L., Urticaceae	Isırgan	Cancer, kidney ailments, laxative, stomachache, upper respiratory tract disorders, blood depurative, vasodilator, rheumatizm	60
<i>Rubus sanctus</i> Schreber İcon., Rosaceae	Böğürtlen	Gynaecological diseases, cancer, diuretic, mouth wounds, aphta, intestinal diseases, source of vitamin A, alopecia	54
<i>Hibiscus esculentus</i> L., Malvaceae	Bamya	Laxative, cough, sore throat and oarseness	50
<i>Myrtus communis</i> L., Myrtaceae	Mersin	Cholesterol lowering, diabetes, analgesic, diuretic, hemorrhoids, stomachache	50
<i>Zea mays</i> subsp. <i>mays</i> L., Poaceae	Mısır, Darı	Prostate, asthma, bronchitis	44
<i>Cedrus libani</i> A. Rich. İn Bory, Dict., Pinaceae	Sedir, Küner	Slipped disc, antifungal, eczema, anthelmintic, tuberculosis, lung spots, upper respiratory tract disorders, cough	40
<i>Solanum nigrum</i> subsp. <i>nigrum</i> L., Solanaceae	Köpek üzümü	Analgesic	40
<i>Physalis alkekengi</i> L., Solanaceae	Altın ilek	Weight-loss medicine	40
<i>Amygdalus communis</i> L., Rosaceae	ađla, Badem	Stomachache, diabetes, cough, vasodilator, skin diseases, alopecia, analgesic, cough diuretic, stress, tosilitis	38
<i>Punica granatum</i> L., Punicaceae	Nar	Anemia, diabetes, cholesterol lowering, forgetfulness, stomachache, diarrhea, anthelmintic, cardiac diseases, depression	38
<i>Foeniculum vulgare</i> , Apiaceae	Rezene, Sıra	Lactogenic, expectorant, menstruation, facilitative, source of vitamin A	36
<i>Lepidium sativum</i> subsp. <i>sativum</i> L., Brassicaceae	Tere	Goitre	34
<i>Papaver rhoeas</i> L., Papaveraceae	Gelincik, Nünülük	Antihemorrhagic	33
<i>Citrullus lanatus</i> Matsum., Cucurbitaceae	Karpuz	Anticoagulant, blood depurative, serum	33
<i>Ceterach officinarum</i> L., Aspleniaceae	Altın otu, Böbrek otu	Kidney stones, diarrhea, metritis	32
<i>Rosmarinus officinalis</i> L., Lamiaceae	Biberiye	Weight-loss medicine, stomachache, menstruation regulating, sedative, vasodilator, headache, liver diseases	32
<i>Mentha longifolia</i> subsp. <i>typhoides</i> var. <i>calliantha</i> L., Lamiaceae	Su narpızı	Burns	32
<i>Helianthus annuus</i> L., Asteraceae	Ayieđi	Wounds and burns	31
<i>Mentha pulegium</i> L., Lamiaceae	Narpız, Narpuz	Diuretic, stomachache, flu, dyspnoea, headache	31
<i>Nerium oleander</i> L., Apocynaceae	Zakkum, Ayacı	Urticaria, rheumatism, arthralgia, wart, scorpion sting	30

Table 4. Parts of medicinal plants used to treat human ailments in the Dalaman district, Muğla, Turkey.

Plant parts used	Number of species	Percentage
Root	7	4.32
Aerial parts (stem, leaves, flowers)	11	6.8
Leaf	39	24.07
Fruit	31	19.14
Seed	10	6.17
Flower	17	10.5
Bark	4	2.5
Gum	5	3.09
Shoot	7	4.32
Tuber	1	0.62
Cones	2	1.24
Oil	12	7.41
Latex	3	1.85
Rhizome	4	2.5
Corm	2	1.24
Others	7	4.32

Table 5. Villages and central settlements of Dalaman.

Number	Villages	Settlement
1	Cogmen	Akcatas
2	Serefler	Atakent
3	Kapikargin	Aegean
4	Karginkuru	Karacalı
5	Gurkoy	Sogutluyurt
6	Karacaagac	Altintas
7	Kayadibi	Bezkeke
8	Sabunlu	Hurriyet
9	Kizilkaya	Central
10	Elcik	-
11	Tasbası	-
12	Bozbel	-
13	Gurleyik	-
14	Narli	-
15	Kavacik	-
16	Dariyeri	-

highest F_{ic} value in the study by Ugulu et al. (2009) followed by cough and stomach ailments. Both set of results indicated that medicative plants were mostly used in the treatment of flu, cough and stomach ailments.

Comparison of the results of the present study with those of previously conducted studies revealed several differences in the use of several plants. The following differences were observed between the present study and the study by Tuzlaci and Aymaz (2001) conducted in Gonen (Balikesir). The leaves of *Mentha pulegium* were reported to be decocted to be used as antiemetic and to

heal sunburns in Gonen (Balikesir) whereas the leaves were reported to be used as diuretic and against stomach aches and the poultice was reported to be used against headaches in the present study. The leaves of *Viscum album* were reported to be decocted to be used to treat hemorrhoids whereas in the present study, the whole plant was reported to be decocted to lower blood pressure and blood sugar levels. *J. oxycedrus* subsp. *oxycedrus* was reported to be used to treat hemorrhoids in the study by Ugurlu and Secmen (2008) conducted in Manisa Mount Yunt and it was reported to be used to



Figure 1. Muğla province, Turkey.

treat various disorders including diabetes, cough, psoriasis, eczema, variola, asthma, kidney stones, wounds, cold and cardiac deficiency, or as menstruation facilitative or analgesic in the present study. In the same study, *Liquidambar orientalis* was reported to be masticated to treat enuresis nocturne whereas its essential oil was reported to treat stomach aches and its resin to heal wounds in the present study. *L. nobilis* was reported to be used to treat hemorrhoids in the study conducted by Ugurlu and Secmen (2008) whereas the present study reports its use to treat disorders including heel spur, stomach ache, rheumatism, headache and cough or as an analgesic, laxative or anticoagulant remedy. *U. dioica* was reported to be used to treat rheumatism and urinary tract disorders whereas the present study additionally reports its use as blood depurative, vasodilator or laxative and to treat stomach aches.

The analysis of the data collected from the individuals that were used as informative resources in the present study indicated that elderly people were more knowledgeable on the subject than the youngsters. The local people of the area used the information on these medicative plant species as a means to pass down a particular tradition. The analysis of the results also showed that people generally preferred to utilize wild plants rather than the cultivated plants.

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