

Evaluation of the Opportunities of Medical Plants in the Treatment of Diseases

Fuat Lule

University of Adiyaman, Faculty of Technology,
Department of Energy Systems Engineering, 02040, Adiyaman, Turkey

flule@adiyaman.edu.tr

Abstract—People have had close relations with plants since they are in the world. Plants cover quite a large area in human life. The first peoples benefited from plants on nutrition, protection, housing, heating and health. Inscriptions, paintings and tablets in the old temple and grave walls it shows that in the 3000s, the first peoples has benefited from the medicinal and aromatic plants consciously or accidentally. It is understood that they used to heal some diseases using these plants. In spite of the innovations made of modern medicine, alternative medicine is seen as the preferred treatment method in the field. Turkey has a special geographical location, climate, agricultural potential for the cultivation of medicinal plants, thanks to its large surface area and high plant diversity has an important position. Turkey has average of 174 gene families is central location of many plant species in 1251 and more than 12,000 species are known to have sub-types and varieties in its flora. Plants are used for food and health in the field. Nowadays, it is used in many kinds of alternative medicine and physiotherapy applications which are considered as herbal medicine of health in the field. In this study, used for the treatment of diseases and popular medicinal and aromatic plants was evaluated in the health sector in Turkey.

Keywords— *Medicinal plants, health, alternative medicine, treatment*

I. INTRODUCTION.

Plants using in the treatment of various diseases is as old as the mankind history. According to the ancient fossil record, human beings have been using medicinal plants 60 thousand years ago [1]. These plants were used by the Sumerians and Assyrians. BC 3000 - 5000. Greeks, Egyptians and Hittites have been using as many as 250 different medicinal plant species. Findings from archaeological studies have shown that plants are used for treatment purposes and moreover, prescriptions including various methods and methods of use have been found. Black caviar, almond, myrtle, liquorice, saffron, garlic, cedar, cuttlefish, mustard, poppy, henbane, wheat, laurel, apricot, fir, henbane, cypress onion, grape, hawthorn, sycophagus, barley thuja. In addition to olive, plants such as ebony, myrrha, Mecca pelesengi, seytan tersi are also found in drugs. According to the definition of

World Health Organization; The herbal drugs and their mixtures used for treatment and protection from diseases are named as an Herbal Medicine treatment. According to World Health Organization (WHO) data, it is known that around 21,000 plant species in the world are used for medical treatment [2]. Although chemical drugs developed with modern medical applications have replaced herbal medicines with time, the side effects caused by these synthetic drugs, helplessness and insecurity in chemicals have directed people back to herbal treatment methods. Approximately 25% of the drugs currently used are of herbal origin, and some studies have shown that phytotherapy applications may sometimes be equivalent or even superior to conventional medical methods. According to the United Nations, Food and Agriculture Organization Biodiversity Handbook, medicinal and aromatic plants are medicines that provide medicine to humans in order to protect health, prevent diseases and treat disorders [3]. It is stated that the number of medicinal and aromatic plants cultivated around the world is about 900 [4]. Cultivation of medicinal and aromatic plants picked widely from the natural flora in Turkey and considered as alternative to the field crops especially in dry farming lands has become prominent [5, 6]. In this review, it has been tried to give information about the effects of several medicinal plants that have been known and popular in medicine on human health in our country.

Classification of Medical Plants

The purpose of classifying plants is to gather plants grown in the world together in families and groups by making use of their similarities and differences. In the early days, people classified plants that could be eaten according to the way they used the plants around them, poisonous plants, and those that were suitable for incineration. As time went by, diversity increased the number of plants to be recognized and therefore the need to classify the medicinal plants scientifically. Medical plants are important for us in terms of medicinal plants to be classified pharmacologically and pharmacologically.

Pharmacological Classification: The classification of plants according to the mechanism of action on living organisms.

Chemical classification: According to the pharmacological effects of plant drugs are divided into subgroups according to the chemical effects of the

main groups. Apart from the water content within the plant is called dry matter. Dry matter is divided into groups of glycosides, alkaloids, lipids, essential oils, resins, mucilages, latex, organic acids, gums, pectins, carbohydrates, tars, vitamins.

Some Important Medicinal Plants Used In Medicine in Our Country

In our country, some of the medicinal and aromatic plants with high economic value have been cultivated. Averages of 200 natural medicinal plant species are sold in the transfers selling local products. The number of natural medicinal plant species collected from nature by farmers and sold abroad is about 100. The numbers of plant species collected from nature sold in domestic and foreign markets for commercial purposes in Turkey are given as 347 in one study. The number of endemic species among them is 35. In other words, approximately 11% of the traded species are endemic. Medicinal plants used in the treatment of diseases in our country vary between regions. Despite these differences are used for the treatment of various numbers of medicinal plants in Turkey (Table 1)

Medical used parts of medicinal plants

All of the medicinal plants or parts are used in the treatment of diseases. Herba refers to the whole plant. Radix-root portion, Rhizome-underground body part, Tuber-tuber body part, Bulbus-onion, Cortex-shell part, refers to Folia-leaf, Flos-flower, Fructus-fruit part, Semen-seed, Stilus and Stigma parts are used. Some parts of plants that are obtained through various processes are also used in alternative medicine. Some of them, gummi-gum, resin-balsam, can only be used as galenic preparations such as menthol, tincture, syrup, extract, extract. Some of the most common medicinal plants are given below.

Black seed (*Nigelle Sativa* L.)

The cumin from the plants used in our country for treatment purposes attract attention with the health research done in recent years. In terms of plant characteristics; The leaves are single-year plants with very finely divided; The fruit is a capsule formed by the partial association of 5 follicles (Fig. 1). In our country, the culture is made in Central and Western Anatolia, and the flowers are light blue. Thanks to Timokinon in its content, it is a bit medicinal plant that has become popular in medicine in recent years. Timokinon is the main active phenolic compound obtained from essential oil of black seed (*Nigella Sativa* L.) and is widely used in many diseases due to its high antioxidant properties.

Table.1 Some Medicinal Plants Using in Turkey [2]

Some Important Medicinal Plants and Their Uses	
<i>Nigelle Sativa</i> (Çörekotu)	Antimicrobial, antioxidant, antiinflammatory, gastroprotective, antidiabetic, antitumor, hepatoprotective, strengthening the immune system
<i>Echinacea purpurea</i> (Ekinezya)	Cold and flu
<i>Ephedra sinica</i> (Deniz üzümü)	Weakness and asthma
<i>Aloe vera</i> (Sarı sabır otu)	Skin and digestion
<i>Gentiana lutea</i> (Centiyan)	Anemia and loss of appetite
<i>Chincona officinalis</i> (Kına kına)	Treatment of malaria
<i>Zingiber officinale</i> (Zencefil)	Abuse and dizziness
<i>Digitalis lanata</i> (Yüksük otu)	Heart diseases
<i>Allium sativum</i> (Sarımsak)	Blood pressure and cholesterol
<i>Calendula officinalis</i> (Aynısafa)	Blood diseases and varicose veins
<i>Catharanthus roseus</i> (Rozet çiçeği)	Cancer treatment
<i>Ginkgo biloba</i> (Mabet ağacı)	Loss of memory
<i>Glycyrrhiza glabra</i> (Meyan kökü)	Cough and digestion
<i>Passiflora incarnata</i> (Tutku çiçeği)	Insomnia and worry
<i>Plantago asiatica</i> (Sinirli ot)	Constipation and cholesterol
<i>Urtica dioica</i> (Isırgan)	Prostate and rheumatism
<i>Vaccinium myrtillus</i> (Yaban mersini)	Visual disturbances
<i>Hypericum perforatum</i> (Kantaron)	Depression and immunity
<i>Mandragora officinarum</i> (Adamotu)	Insomnia and insomnia
<i>Silybum marianum</i> (Deve diken)	Cirrhosis, liver, hepatitis
<i>Tanacetum parthenium</i> (Gümüş düğme)	Migraine and headaches
<i>Taxus brevifolia</i> (Porsuk ağacı)	Cancer and immunity
<i>Panax ginseng</i> (Ginseng)	Fatigue and exhaustion
<i>Papaver somniferum</i> (Haşhaş)	Pain, anxiety and anxiety
<i>Valeriana officinalis</i> (Kedi otu)	Insomnia and anxiety
<i>Datura stramonium</i> (Şeytan elması)	Worry and sweating



Fig.1 Nigella Flower Plant Parts

Pharmacological Effects of Thymoquinone

Thymoquinone has a protective effect in many cases of destructive and damaging effects such as infection, inflammation, allergies and cancer in the human body.

Antioxidant Effect

Free radicals formed in our body can cause many diseases such as cardiovascular diseases and cancer, together with oxidative DNA damages in our biological structure. The active ingredient of sativa, Thymoquinone, is known to inhibit oxidative damage by metabolizing the hydroxyl radical, the anion of which is a strong oxidant [7, 8]. In one study, they prevented lung damage due to high oxidative stress in rats after hyperbaric oxygen exposure by oral thymoquinone treatment [9].

Effects on Liver

Thymoquinone has provided significant benefit to liver toxicity caused by carbon tetrachloride [10]. In this study, 100 mg / kg thymoquinone was administered. Thymoquinone, which used the same dose orally, provided rapid regeneration which was needed in liver transplantation in one study [11].

Effect on the stomach intestine

Thymoquinone there are many evidence showing protective effects against stomach lesions. With the treatment of thymoquinone, gastric acid structure was controlled and proton pump and pepsin production decreased significantly. The gastric mucosal barrier integrity was preserved as a result of this metabolic control [12]. In another study, it has been shown that thymoquinone administered orally with hyperbaric oxygen treatment in blunt duodenal trauma accelerates healing [13].



Fig.2 Seed of Black Seed

In addition, this important plant has a reducing effect of diabetes stress and hydroxyproline levels. Wounds in diabetic individuals are healing power. This plant helps to improve this condition. In addition, it has hypoglycemic and antidiabetic effect. Thymoquinone has an antihyperglycemic effect and improves blood glucose levels in gestational diabetes. In hamsters treated with thymoquinone, glucose production was found to be significantly lower. It has been suggested that thymoquinone has beneficial effects such as antiinflammatory, antimicrobial and anticancer in many studies. It has been shown that thymoquinone may have protective effects on kidney, liver, heart, lung and stomach against oxidative damage [14]. Diabetes is an important problem in our country and the world [15]. It is an important health problem especially with its complications. The most important cause of diabetic patients hospitalized in diabetic patients [16]. A multidisciplinary approach is essential for these wounds [17]. Besides medical treatment, medicinal aromatic plants can also be used. Especially in the case of wound infection, herbal products are not tested on the wound, but oral therapy can accelerate healing by increasing collagen production and epithelization. There are many studies on the plants that accelerate the healing of wounds of diabetic foot. The plants whose effects on infectious wounds are investigated are given below.

Table 2 Antibacterial activity of medicinal plants against diabetic foot ulcer pathogens

Plants	Organisms				
	<i>Enterobacter aerogenes</i>	<i>Pseudomonas aeruginosa</i>	<i>Proteus vulgaris</i>	<i>Escherichia coli</i>	<i>Staphylococcus aureus</i>
<i>Ocimum Sanctum</i>	-	-	+	-	+
<i>Azadirachta indica</i>	+	-	++	-	-
<i>Acalypha indica</i>	-	++	-	+++	-
<i>Cyanodon dactylon</i>	+	-	-	+++	-
<i>Calotropis gigantean</i>	-	+	-	-	+
<i>Leucas aspera</i>	+	-	++	+++	-
<i>Tragia involucrata</i>	-	-	-	-	-
<i>Psidium guajava</i>	-	-	+	-	++
<i>Thymus vulgaris</i>	++	+	-	-	-
<i>Triadax procumbens</i>	-	+	++	-	+++

- below 13 mm resistant, + below 3.5 mm intermediate, ++ below 2 mm sensitive, +++ below 0.5 mm highly sensitive

[18]

Black cumin, Ranunculaceae family, is the botanical name of *Nigella sativa* L. which is a valuable drug and spice plant for more than 2000 years. Seed, oil and seed components - especially thymoquinone are used because of their potential therapeutic properties in traditional medicine. There are benefits antimicrobial, antioxidant, anti-inflammatory, gastro protective, antidiabetic, antitumor, hepatoprotective, immune system enhancer and so on. It has a significant effect on the essential fatty acids, vitamins, minerals and volatile components. Due to its nutritious, flavoring and ornamental properties, black seed is widely consumed throughout the world as food and spices. In addition, appetite enhancer, milk enhancer, expectorant, jaundice relieving, degassing, diuretic properties, headache, colds, asthma, rheumatism and inflammatory diseases etc. disease is now widely used in medicine and pharmacy due to its healing properties [19].

Meryemana Dikeni, medicinal plant; Nutraceutical contains scientifically proven, non-toxic bioactive and chemical components that have many benefits in the treatment or prevention of diseases. Sunflower, sesame, black cumin, safflower, flaxseed, oil seeds such as mustard seeds, cumin, coriander, pepper, fenugreek, ginkgo biloba, ginseng, medicinally used spices, such as soybean, velvet bean, tamarind, some legumes and steak grass, grape seed Examples are nutraceutical plants, such as, pumpkin seeds, chinese onions, elderberry meal, josta grapes, wild sturgeon, noni (indian berry). Virgin Mary Thorn (*Silybum marianum* L.) Cardus marianum, thistle, Milk thistle, Holy thistle) is a plant used for nutraceutical purposes [20].

Aloe Vera, The plant contains more than 75 active ingredients such as vitamins A, C and E, and minerals, including folic acid, choline, saccharides, amino acids, anthraquinones, enzymes, lignin, saponin, and salicylic acid components. Aloe vera, a tropical plant that grows easily in hot and humid climates, has been used for many years in the treatment of burns. Aloe vera, used in various forms, was found to shorten the duration of treatment of the first and second degree burns, accelerated recovery and accelerated epithelial formation. Aloe vera gel extracts have been reported to provide vascularization in burned tissues. It has been shown that topical use of aloe vera products (cream, petrolatum) is safe and no serious side effects have been found. Calcium is useful for bone development. Copper plays an active role in the regeneration of body tissue. Selenium is a very important element for various heart diseases and is used to reduce the side effects of chemotherapy in cancer treatment. The chrome allows the blood sugar level to be fixed. Manganese is an important factor in protein synthesis, digestion and energy production. Magnesium is very important for heart and brain cells. Potassium is necessary for the body to work properly. Sodium mineral protects nerve and muscle functions. Zinc is a very important resource for the immune system. Herbal extracts have been used in wound healing for centuries, and this is still the case today. Therefore, it is useful to know some plants and biological activities used in wound healing [21].

Sarimsak, has been used in the treatment of diseases for thousands of years in the world. B.C. It is known that Hippocrates used it for various diseases and diseases in 460-370. Nowadays lung cancer is used for breast cancer prostate cancer stomach cancer and colon cancer. In addition, garlic garlic transferred between the generations of information and scientific studies as a result of the studies done in cardiovascular diseases, blood pressure, blood sugar and cholesterol lowering, bacterial, viral, fungal and parasitic and effective against infections, immune system enhancer, antitumor and antioxidant property it is reported to be a medicinal plant [22]. Garlic, cinnamon, curry, mustard, basil, ginger and some other plants are shown to show antimicrobial properties [23].

Fesleğen, It is beneficial against the wounds in the mouth, which relaxes the body with its calming features, energizing, appetizing, indigestion, cutting cough and dizziness. It is reducing the effect of poison in bee sting. If basil tea is made and it is drunk, it can be used to remove intestinal gases and relieves the skin. If you massage the scalp with basil-prepared lotions, it strengthens the hair follicles. Basil oil has the property of reducing cellulite complaints. It also relieves bloating, stomach cramp, colic and digestive problems. This medicinal plant is sputum is a gas and diuretic, stimulant and spasm solvent. Mint, laurel, fennel and cumin essential oils of some of the disease caused by bacteria stating that blocking bacteria [24].



Figure. 3 Basil Plant [25]

Thyme, there are varieties taken in natural culture in our country. It has a strong antimicrobial effect against diseases. It is known that it is good for throat infections and mouth sores. It is consumed by infusing tea.



Figure. 4 Thyme Plants [26]

Thyme and headaches are known to be good for the thyme in the form of oregano juice in the form of blood cholesterol and blood sugar levels in the reduction of ant diabetic, digestive and respiratory system diseases, gastro-intestinal disorders are used in the treatment.

Sage, many species in our country naturally grows. Dry leaves are considered as tea and spices. Sage oil has an antiseptic and antibiotic effect and is involved in throat infections, dental inflammations and oral wounds.



Figure. 5 Sage Plant [27]

Rosemary, fresh or dried leaves are used in fragrance and food, essential oil is evaluated in perfumes, cosmetics and aromatherapy. Lotion and skin care creams are obtained from rosemary essential oil. Relaxing, calming and muscle relaxants are used to remove cellulite and abdominal cracks, and are used extensively with breathing and halitosis.



Figure. 6 Rosemary Plant [25]

Daphne, fruit and leaves as spices and in traditional medicine the drug is considered to be protective and curative. Teas made from bark and leaves are used in kidney and respiratory disorders, laurel oil and laurel water distilled from their leaves and fruits are used in stomach pains and digestive diseases.



Figure. 7 Daphne Plant [27]

Cumin, as well as use as a spice, digestion facilitator, gas expectorant, antispasmodic, urine and bile enhancer, expectorant, cold and relieving upper respiratory tract infections are considered as.

Mint, is one of the most widely used spices in food. In the field of health, thanks to the menthol that it contains, antiseptic, anesthetic, refreshing, soothing, gas expectorant, nausea and anti-diarrhea drugs and peppermint oil are used against stomach pain and nausea.



Figure. 8 Mint Plant [25]

Camomile, the oil of this plant is very valuable in terms of medicinal and aromatic. Infusions obtained from chamomile flowers are sedative and easy to digest and are added to cosmetic products.

RESULTS AND RECOMMENDATIONS

For centuries, medicinal and aromatic plants have been used in the treatment and improvement of various diseases. The importance of medicinal and aromatic plants is not known very much and cannot see the value it deserves today. Thanks to its location and flora, our country has a variety and variety of medicinal and aromatic plants. Our country does not have a large area of cultivation in agriculture, production areas should be expanded with agricultural supports. In order to contribute to the economy, this variety of medicinal plants should be preserved and sustained. Those living in modern life do not know the existence of these plants and are deprived of their benefits for health. Local people recognize a large number of these plants and use them for healing. Care must be taken when collecting medicinal plants from nature, and should be transferred to the next generations without damage by grazing. Consumption should be made consciously. Necessary trainings should be taken in the collection, evaluation and sales section. Health benefits should be prevented so that people can be harmed with chemicals. The use of medicinal plants for protection and recovery from diseases should be measured and continued use under the supervision of trained persons. Therapeutic properties of medicinal plants are known to improve diseases, especially wounds

REFERENCES

- [1] Fabrican S.D. and Farnsworth R. N. 2001. Environmental Health Perspectives Supplements, 109 (1): 69-75.
- [2] Kıncı, S. 2015. Türkiye'de Tıbbi ve Aromatik Bitkilerin Genel Durumu. TÜRKTOB, Temmuz-Eylül 2015, Yıl:1, Sayı 15. (In Turkish)
- [3] Marshall, E., 2011. Health and Wealth from Medicinal Aromatic Plants. FAO Diversification Booklet 17. Rural Infrastructure and Agro-Industries Division Food and Agriculture Organization of the United Nations, Rome 2011. ISSN 1810-0775. Web

Site:

<http://www.fao.org/docrep/015/i2473e/i2473e00.pdf> ,
Erişim Tarihi: 03.11.2015

[4] Arslan, N., Baydar, H., Kızıl, S., Karık, Ü., Şekeroğlu, N., Gümüşçü, A. 2015. Tıbbi ve Aromatik Bitkiler Üretiminde Değişimler ve Yeni Arayışlar. VII. Türkiye Ziraat Mühendisliği Teknik Kong. S:483-507. (In Turkish)

[5] Celik, A., Sakin, E., 2017. Comparing surface carbon concentrations and some soil parameters of the soils on which medicinal and aromatic plants grow. *Applied Ecology and Env. Res.*, 15 (3):747-758.

[6] Yıldız, G., Şekeroğlu, N. 2013. The Importance of Medical and Aromatic Plants in Global Climate Change - *Turkish Journal of Scientific Reviews* 6 (1): 85-88.

[7] Darakhshan S, Bidmeshki Pour A, Hosseinzadeh Colagar A, Sisakhtnezhad S. 2015. Thymoquinone and its therapeutic potentials. *Pharmacol Res* 2015;95-96:138-58.

[8] Mollazadeh H, Hosseinzadeh H. 2014. The protective effect of *Nigella sativa* against liver injury: a review. *Iran J Basic Med Sci* 2014;17(12): 958-66.

[9] Güneş A.E., Gözeneli O, Akal A.A., Güldür M.E., Savik E. 2017a. Reduction of side effects of hyperbaric oxygen therapy with thymoquinone treatment in rats. *Undersea Hyperb Med.* 2017 Jul-Aug;44(4):337-343.

[10] Nagi M.N., Almakki H.A. 2009. Thymoquinone supplementation induces quinone reductase and glutathione transferase in mice liver: possible role in protection against chemical carcinogenesis and toxicity. *Phytother Res* 2009;23(9):1295-8.

[11] Gözeneli O., Tatlı F., Güneş A.E., Güldür M.E., Taskin A, Bardakci O, Yilmaz M. 2018. Effects of thymoquinone and curcumin on the regeneration of rat livers subject to 70% hepatectomy. *Acta Cir Bras.* 2018 Feb;33(2):110-116. doi: 10.1590/s0102-865020180020000002.

[12] Magdy MA, Hanan el-A, Nabila el-M. 2012. Thymoquinone: novel gastroprotective mechanisms. *Eur. J. Pharmacol.* 2012;697(1-3):126-31.

[13] Güneş A.E., Gözeneli O., Akal A., Taşkın A., Sezen H., Güldür M.E. 2018. Deneysel Künt Duodenum Yaralanmalarında Hiperbarik Oksijen Tedavisi ve Timokinon'un Etkisi. *Konuralp Tıp Dergisi* 2018;10(3):347-353. (In Turkish)

[14] Güzelsoy, P. Aydın, S. And Başaran, N. 2018. Potential Effects of Thymoquinone the Active Constituent of Black Seed (*Nigella Sativa*L.) o Human Health. Review Article. *J Lit. Pharm. Sci.* 2018;7(2):118-35 P:118- 135.

[15] Güneş A.E., Eren M.A., Karakas E.Y., Demir M., Aslan H.K., Sabuncu T. 2017b. Relation With Mean Platelet Volume And Diabetic Foot Ulcers. *Acta Medica Mediterranea.* 2017;33:401-404.

[16] Yazdanpanah, L., Nasiri M., Adarvishi S. 2015. Literature Review on the Management Of Diabetic Foot Ulcer. *World J Diabetes.* 2015 Feb 15; 6(1): 37-53. Doi 10.4239/Wjd.V6.1.37.

[17] Güneş, A.E., Cimsit M. C. 2017. Amputation Be Prevented İn Diabetic Foot? Interdisciplinary Approach To Diabetic Foot: A Case Report. *Undersea Hyperb Med.* 2017 Mar-Apr;44(2):157-160.

[18] Subbu Lakshmi S., Chelladurai G., Suresh B. 2016. In Vitro Studies On Medicinal Plants Used Against Bacterial Diabetic Foot Ulcer (BDFU) And Urinary Tract Infected (UTI) Causing Pathogens. *J Parasit Dis.* 2016 Sep;40(3):667-73. Doi: 10.1007/S12639-014-0555-Y.

[19] Çakmakçı, S., Çakır, Y. 2011. Çörekotu (*Nigella sativa* L.): Bileşimi, Gıda Sanayinde Kullanımı ve Sağlık Üzerine Etkileri. *Academic Food Journal / Akademik GIDA.* May2011, p61-69. 9p. (In Turkish)

[20] Gök, S.B, Erdoğan Y., Kalınkara E.C. 2006. Nutrasötik Bir Bitki: Meryemana Dikeni (*Silybum marianum*). *Ekolji Sempozyumu Namık Kemal Üniversitesi. Bildiriler. Tekirdağ.* (In Turkish)

[21] Özkorkmaz, E. G. ve Özyay Y. 2009 Yara İyileşmesi ve Yara İyileşmesinde Kullanılan Bazı Bitkiler *Türk Bilimsel Derlemeler Dergisi* 2(2): 63-67, 2009 Issn:1308-0040, www.nobel.gen.tr. (In Turkish)

[22] Ayaz, E., Alpsoy, H. C. 2007. Sarımsak (*Allium Sativum*) ve Geleneksel Tedavide Kullanımı. *Türkiye Parazitoloji Dergisi*, 31 (2): 145-149. (In Turkish)

[23] Marino, M., Bersani, C., Comi, G. 1999. Antimicrobial Activity Of The Essential Oils Of *Thymus Vulgaris* L. Measured Using A Bioimpedometric Method. *J. Food Prot.*, 62: 1017-1023.

[24] Mau, J.L., Chen, C.P., Hsieh, P.C. 2001. Antimicrobial Effects of Extracts from Chinese chive, Cinnamon and Corni fructus. *J. Agric. Food Chem.*, 49: 183-188.

[25] Anonymous 2019a. www.apelasyon.gov.tr. Date of access: 20.12.2018

[26] Anonymous 2019b. www.tarimapelasyon.gov.tr. Date of access: 21.12.2018

[27] Anonymous 2019c. www.tarim.gov.tr. Date of access: 21.12.2018