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Importance of Medicinal and Aromatic Plants as an Alternative Crop in the Rural Development of Turkey

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Abstract

In terms of biodiversity, Turkey is one of the richest countries in the world and over 10,000 plant species and ferns grow naturally. Moreover, Turkey is a major fruit and vegetable producer and exporter and agriculture is still very important. It represented about 7.4% of GDP and 21% of employment in 2014. In Turkey, 500 plant species used for medicinal purpose of which 200 have export potential. The world oregano trade volume is roughly 12-15 thousand tons and Turkey provides 80% of this amount. Similarly, some export-oriented plants (peppermint, salvia, lavender, laurel, fennel, etc.) are supported by governments and provide and income to people living in rural areas. In this review, the main aim is to show the importance of medicinal and aromatic plants (MAPs) in rural development as an alternative crop.

Key words: agriculture, rural development, oregano, rose, laurel, peppermint, anise, cumin

1.0 Introduction

In the past, large cities attracted the attention of people living in rural areas. These people gradually migrated to cities for various reasons. This uncontrolled movement has brought some problems to the cities. The most important problem of the cities was sacrificing the productive agricultural land for the sake of industry and urbanization as a result of uncontrolled expansion of the cities. For instance, in Bursa, settlement that established on the 1st and the 2nd class agricultural lands was 8.6 ha, in 1960. This amount increased swiftly and reached 3,054.1 hectares in 1976 and 4,092 hectares in 1995 (Samet & Çıkılı, 2011).

In 1950, 70.4% of the world's population was living in rural areas (see Table 1). During the 2000's, rural population was calculated as 53.4%. In 2050, the estimated ratio of people living in rural areas will be 33.6%. Similarly, in 1950, 75.2% of Turkey's population was living in rural areas. In 2000, this fell to almost half (35.3%). In 2015, the rural population decreased dramatically in the world and in Turkey and has been calculated as 46% and 26.6%, respectively. According to estimates, in 2050 16.3% of the total population of Turkey will live in villages (see Table 1). 'The rural' try to survive due to changing wants and needs of society, increased mobility, environmental changes, or changing population structure (Ramsey, Abraham, Clark, and Evans, 2013).

Table 1. *The Distribution of the Total Population by Years*

Years	Population of World (%)		Population of Turkey (%)	
	Urban	**Rural**	**Urban**	**Rural**
1950	29.6	70.4	24.8	75.2
1975	37.7	62.3	41.6	58.4
2000	46.6	53.4	64.7	35.3
2015	**54.0**	**46.0**	**73.4**	**26.6**
2025	58.2	41.8	77.7	22.3
2050	66.4	33.6	83.7	16.3

Source: Anonymous, 2015a.

Plants are the most important part of biodiversity and are a significant resource for human food and animal feed. Also, they used for folk medicine, clothing and provide raw material for industry. Their use in folk medicine is extremely important in Anatolia. 118 medicinal and aromatic plants (MAPs) from 50 families in Edremit Gulf, Western Anatolia (Polat & Satıl, 2012); 88 MAPs from 41 families in Elazig, Middle Anatolia (Cakilcioglu, Khatun, Turkoglu, and Hayta, 2011), 37 MAPs from 17 families in Alasehir, Western Anatolia (Ugulu, 2011); and 72 MAPs from 41 families in Trabzon, Northern Anatolia (Akbulut & Bayramoglu, 2014) were used for various purposes in these regions.

The main aims of this study are (a) to increase the diversity of agricultural products, (b) to use MAPs in rural production as an alternative crop, (c) to raise the standard of living of people in rural areas and to prevent migration out of rural areas, (d) to protect MAPs in nature from wild (or over) collection.

2.0 Geographical Wealth of Turkey

Anatolian soils hosted many species during the Ice Age which occurred in the last two million years like a shelter. For this reason, Turkey, in terms of biodiversity, is one of the richest countries all over the world. Today, it is possible to find European species in the Black Sea and Western Anatolia regions; Mediterranean and African species in the Mediterranean and South-Eastern Anatolia regions; and Asian species in Central Anatolia, Eastern Anatolia and South-Eastern Anatolia regions. Having three different geographical regions, rich soils and appropriate climatic conditions is a significant advantage for rich biodiversity.

According to botanists, the earth's surface is divided into 37 herbal geographic regions. Turkey is located at the point of intersection of three of these geographical regions and with this richness it can be examined as a small continent. Turkey hosts 12,000 flowering plants and fern species of which 3,000 are endemic (the rate of endemism is 30%) (Avcı, 2005). This number increases to 10,765 with sub-species, varieties and hybrids. The richness of plant species in Turkey offers an opportunity to people living in rural and urban areas as well as in the world.

3.0 Agriculture in Rural Development

Agriculture has a key importance in Turkey, both in social and economic terms. Agricultural exports were valued 16 billion dollars in 2013 (Anonymous, 2015b). Turkey's total area is 77.9 million hectares. About 28 million hectares—36% of total land—is devoted to agriculture but only 10,800 thousand hectares—1.4% of total land—are Class I and Class II (see Table 2).

Table 2. *Land Presence of Turkey (x1000 ha)*

Usage Form	**Land Capability Class**								**Total**
	I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	
Cultivable Lands	4,825	6,041	6,036	4,877	8	3,965	2,301	-	**28,053**
Meadow and Pasture	149	444	738	1,64	90	4,163	14,280	-	**21,505**
Forest and Woodland	13	179	420	846	28	2,624	19,118	-	**23,228**
Non-Agricultural Lands	98	109	89	61	2	73	138	4,543	**5,113**
Total Land	**5,085**	**6,773**	**7,283**	**7,425**	**128**	**10,825**	**35,837**	**4,543**	**77,899**

Source: Samet & Çıkılı, 2011.

Turkey (TR) is the world's seventh largest agricultural producer and agriculture is the largest employer (25%), and contributes 8% of the country's economic activity, according to data of Organization for Economic Co-operation and Development (OECD, 2015). In cereal and oilseeds production, Turkey's share in European Union (EU) countries is about 12%, in every three years. While sugar beet production in Turkey was 17.5% in 2010, it declined to about 13% in last four years. In 2014, Turkey's tomato production was close to EU countries' total production and represented 70.5% of the total production (see Table 3).

Table 3. *Comparison of Some Agricultural Production Amounts (million tons)*

Agricultural Products	**2010**		**2011**		**2012**		**2013**		**2014**	
	EU	**TR**	**EU**	**TR**	**EU**	**TR**	**EU**	**TR**	**EU**	**TR**
Cereals (including rice)	279.8	32.8	287.4	35.2	279.7	33.0	305.7	37.1	334.2	32.4
Sugar beet (no seed)	102.7	17.9	122.8	16.1	113.0	15.0	109.0	16.5	127.8	16.6
Oilseeds	23.1	2.8	24.6	3.1	22.1	3.0	22.5	3.1	-	-
Tomatoes	16.1	10.1	15.9	11.0	15.0	11.4	15.0	11.8	16.8	11.9

Source: Anonymous, 2015c.

Also, Turkey is the largest producer of some dried fruits. It produces 68% of the world's hazelnuts (Anonymous 2014), 60-70% of world's total production of figs (Anonymous, 2015d), and 70% of the world's total production of apricots (Anonymous 2015e).

Table 4 shows the trends in vegetable production over the period 2010 to 2014. Total vegetable production gradually increased over this period and was quantified at 28.6 million tons in 2014 with a small increase (0.4%), compared to previous year.

Table 4. *Total Production of Vegetables by the Years*

Years	Total Production (x1000 tons)	Change (%)
2010	25,997.2	---
2011	27,547.5	+ 6.0
2012	27,752.7	+ 0.7
2013	28,448.2	+ 2.5
2014	28,569.8	+ 0.4

Source: Turkish Statistical Institute (Turkstat), 2015a.

4.0 Usage of Medicinal and Aromatic Plants in Rural Development

Archeological evidence shows that some MAPs have been known from ancient times. In Mediterranean basin especially, some genera from the *Lamiaceae* family (*Thymus, Salvia, Sideritis, Mentha,* etc.) were collected from nature and used for medicinal purposes. The poppy plant was cultivated by ancient civilizations of Persia, Egypt, Mesopotamia, and Anatolia.

About 13,000 plant species have been used for traditional medicine by various cultures around the world (Tyler, 1993). However, there is a significant lack of research data in this field (World Health Organization (WHO), 2009). In Europe, especially Germany, herbal medicine is more popular than in North America. Today, the amount of herbal products sold in Germany is about 67,000 (Foster, 1995).

Owing to optimal climatic and ecological conditions, over 10,000 plant species are growing naturally in Turkey and nearly one in third of them are endemic. In this rich biodiversity, MAPs have an important place both in usage and export. It is estimated that, in Turkey, about 500 plant species are used for medicinal purposes of which 200 have export potential (Baytop, 1999; Ekim et al., 2000). About 347 plant species are harvested from nature in Turkey. Some of them are grown commercially and they all have export potential (Özhatay & Koyuncu, 1998). MAPs have been included supporting by official and local institutions since 2015 in the scope of Good Agricultural Practices (GAP) project (Ananymous, 2015f). And, most of these plant species—oregano, mint, rose, cumin, aniseed, fennel, coriander, black cumin, etc.—are very suitable and profitable for rural agricultural production.

The *Lamiaceae* family, which includes important plant genera such as *Thymus, Origanum, Salvia, Mentha,* etc., grows naturally in Turkey and it can be used successfully for alternative crops in rural development. Turkey is an important genetic center of this family which has 45 genera and 546 species—with subspecies included this number reaches 731 (Başer, 1993).

4.1 Oregano (Origanum sp., Thymus sp., Satureja sp.)

The volume of oregano traded in the world is around 13-15 thousand tones. Oregano is widely used for pharmaceuticals; spices; cosmetics; and food and baby-care products, etc. Turkey is the largest oregano exporter and almost provides the 80% of the world oregano needs. Its most important markets are EU-countries—especially Germany and France—and the USA.

Origanum onites, known as 'Turkish oregano', is the most popular traded species and consists of over 80% of all the oregano exports of Turkey (Başer, 2002). In 2014, oregano production area reached its highest point—9.3 thousand hectares— when its production was calculated at 11,752 tons.

In the 2000's, starting with official agricultural support—free seed, diesel, fertilizer etc.—and agricultural extension, oregano cultivation has been adopted rapidly. Especially in Denizli province, tobacco farmers have headed for MAPs cultivation. As per the data 2014, oregano production, in Denizli, accounted for approximately %90 of Turkey's oregano production and usually reached 10,500 tons (see Table 5).

Table 5. *The Place of Denizli in Turkey's Oregano Production*

Year	Turkey*		Denizli	
	Sown Area (ha)	Production (tons)	Sown Area (ha)	Production (tons)
2010	8,535	11,190	7,839	9,309**
2011	7,771	10,953	7,150	9,320**
2012	9,428	10,598	7,198	10,016**
2013	8,914	13,658	8,345	12,183***
2014	9,296	11,752	-	-

Sources: *Turkstat, 2015b; **Kapluhan, 2013; ***Turkstat, 2015d.

Among the MAPs, oregano is the most important alternative crop for rural producers. Because, its annual yield per hectare is 12.5 to 20 kg in dry farming and 40 to 50 kg in irrigated agriculture. Also, it remains in economic yield for long time (more than 12 years). Şafak & Okan (2004) reported 2-fold more profit to producer in a family business (with their own land and their own employees).

*4.2 Peppermint (*Mentha sp.)

From of old, peppermint (*Mentha* sp.), belonging to the *Lamiaceae* family, originated in the Mediterranean basin, especially in Anatolia and Egypt. It was cultivated commercially in many countries and its essential oils, in particular, were used for folk medicine as an antimicrobial, antiseptic, antispasmodic and carminative. It was also used for pharmaceuticals, food and cosmetics (Özgüven & Kırıcı, 1999). Peppermint oil was in second place after citrus oil in the world's essential oil trade (Başer, 1993).

In Turkey, peppermint grows naturally in all regions. Some of the common varieties were Curly mint (*M. spicata*), Apple mint (*M. suaveolens*), Pennyroyal mint (*M. pulegium*), Water mint (*M. aquatica*), Hairy mint (*M. longstifolia*), and Japanese mint (*M. arvensis*). Peppermint (*M. piperita*), has high essential oil content (0.5-5.0 %) (Snigdha & Thakur, 2013), and was a natural hybrid of *M. aquatica* x *M. spicata*. Ellialtıoğlu, Sevengör, and Sezik (2007) focused on this hybrid variety for diversity of agricultural product in rural areas. Also, Franz, Hölzl, Ceylan, and Vömel (1984) found the fresh herbal yield was 14.2-31.5 tons ha^{-1} in Germany, as opposed to 6.7-13.5 tons ha^{-1} in Turkey. On the other hand, Japanese mint provided a large part of the world's menthol needs and should be recommended for rural development because of its ability to grow in different

ecological conditions, be harvested twice a year and it's higher essential oil content (Özgüven & Kırıcı, 1999).

4.3 Lavender (Lavandula sp.), *Salvia* (Salvia sp.), *Black Cumin* (Nigella sativa), *Fennel* (Foeniculum vulgare)

Data for lavender, salvia, black cumin and fennel have been compiled since 2012. Lavender planting area and production showed a three-fold increase in 2014 compared with the previous year (see Table 6). It could be cultivated easily in the Lake District, especially in the Kuyucak Valley of the Isparta province where production of lavender was quantified at 240 tons in the 2014 season and this production accounted for over 90% of total production in Turkey (Anonymous, 2015g).

As seen on the Table 6, while black cumin and fennel production decreased in 2014, salvia production reached 19 tons. It is a welcome development for rural people that to promote cultivation of new export-oriented crops indicates an increasing trend in economic importance.

Table 6. *Planting Area and Production of Some MAPs in Turkey*

Years	Lavender*		Black Cumin**		Salvia**		Fennel**	
	Area (ha)	Production (tons)	Area (ha)	Production (tons)	Area (ha)	Production (tons)	Area (ha)	Production (tons)
2012	509	123	0.23	161	5.4	7	1,577	1,862
2013	709	105	0.33	352	3	4	1,385	1,994
2014	2,189	297	0.17	140	13	19	1,585	2,289

Sources: *Turkstat, 2015c.; **Turkstat, 2015b.

4.4 Rose (Rosa damascena L.) *Cultivation and Rose Oil*

Rose oil production in Turkey totaled 10.8 thousand tons in 2014. With this figure, Turkey accounted for nearly 65% of world total production. Rose planting area reached the highest amount in 2012 with 3,083 ha under cultivation. But rose production reached its peak in 2014 when 10,831 tons were produced. In Turkey, Isparta province alone met more than 77%—8,332 tons—of the total production of 10,831 tons in 2014 (see Table 7). Rose farming plays an important role in Isparta's economy. Currently, more than 10,000 families make their living from rose and rose oil production.

Table 7. *Planting Area and Production of Rose in Turkey*

Years	Sown Area (ha)	Production (tons)	Yield (ton ha^{-1})
2010	1,600	6,000	3.75
2011	1,800	6,000	3.33
2012	3,083	10,225	3.32
2013	2,801	10,769	3.84
2014	2,836	10,831	3.82

Source: Turkstat, 2015c.

*4.5 Anise (***Pimpinella anisium L.***) and Cumin (***Cuminum cyminum L.***)*

Anise, belonging to the *Apiaceae* family, is an important annual spice and medicinal plant, which originated in the Mediterranean region. It is mostly grown in transitional climates where it is classified as an industrial plant (Çetin, 2008). Turkey is dominated by three different climatic zones and has very convenient anise production areas. Western Mediterranean Region (Antalya, Isparta, and especially Burdur province) performs approximately 64% of a total anise production (Kara, 2015). With 14,879 tons yield, total anise production in Turkey reached to maximum quantity in 2011. But, it declined to 9,309 tons in 2014 (see Table 8).

Cumin is a plant that has fewer water and nutrient demands and has a short growth period —averaging 100-110 days. For farmers living in rural areas, it is an important alternative crop and can be grown in the fallow field in Central Anatolia. Moreover, it is not affected by low humidity conditions during flowering and fruit set, because of its tropical characteristics (Kızıl, Aslan, and İpek, 2003). More than 90% of current production is in Konya, Ankara and Eskisehir (Polat & Kan, 2006). Cumin cultivation area gradually increased and reached 22,442 hectares (see Table 8).

Table 8. *Planting Area and Production Values of Anise and Cumin*

Year	Anise		Cumin	
	Sown Area (ha)	**Production (tons)**	**Sown Area (ha)**	**Production (tons)**
2010	1,864	13,992	17,124	12,587
2011	2,115	14,879	20,012	13,193
2012	1,943	11,023	22,629	13,900
2013	1,524	10,046	24,705	17,050
2014	1,405	9,309	22,442	15,570

Source: Turkstat, 2015b.

4.6 Laurel **(Laurus nobilis L.)**

Reserves of laurel, a Mediterranean plant which naturally grows along the coastline, were estimated to be 42 thousand tons in Turkey. Although laurel production shows variations between 15-20 thousand tons according to annual climatic conditions, Turkey ranks as the world's largest laurel supplier (95%). In 2013, Turkey exported 15 thousand tons of dried laurel leaf and provided 30 million dollars in revenue. Moreover, villagers had 8.8 million dollars additional income from this activity (Anonymous, 2015i).

5.0 Conclusion

Almost all people living in rural areas are engaged in agriculture which plays a key role in rural development. For this reason, arrangements in crop planning and marketing and sales are extremely important. While making arrangements, the regional priorities and the climatic data should be considered and alternative agricultural crops must be recommended. Additionally, agricultural production and quality should be ameliorated and the living standards of people living in rural areas should be improved by using new agricultural production techniques.

The EU's Common Agricultural Policy (CAP) (Anonymous, 2015j) would be the most effective external factor over trading, production and rural development in Turkish agriculture. The main objectives of CAP may be summarized as (a) promotion of sustainable rural development throughout the Union (The scope of concept of sustainability should include the threefold sense commonly accepted: economic sustainability, environmental sustainability, and social sustainability), (b) contribution to the development of a Union agricultural sector that is more territorially and environmentally balanced, climate-friendly and resilient and competitive and innovative, (c) contribution to the development of rural territories (Llombart, 2015). With the support of the EU, the main priority of Turkey should be to restructure and modernize the agricultural sector and to create alternative employment in rural areas. Otherwise, we could face some serious problems such as migration from rural to urban areas, unplanned urbanization, regional disparities in the cities, and poverty etc.

Consequently, rural development strategy should be determined by agricultural organizations, universities and Non-Governmental Organizations. MAPs should be taken into a plant production program. Priority should be given to MAPs that have a high export and import capacity. The processing methods of MAPs should be investigated and provided high added valued products such as essential oil, active matter (alkaloids, glycosides etc.) instead of raw product. Also, establishment of reference laboratories should be supported by central or local actors for production of international market-oriented products.

To sum up, to offer opportunity to the people living in their own regions will reduce the migration to cities from rural areas. For this purpose, the central or regional administrators should generate attractive policies and develop social and cultural projects for rural areas. While performing the projects, it is necessary to increase the diversification of produce and production.

References

Akbulut, S., & Bayramoglu, M. M. (2014). Reflections of socio-economic and demographic structure of urban and rural on the use of medicinal and aromatic plants: The sample of Trabzon Province. *Studies Ethno Medicines*, *8*(1), 89-100.

Anonymous. (2014). *Turkey-EU cooperation scheme on Hazelnuts. Annual Consultations*. Retrieved November, 2015 from: www.economy.gov.tr/

Anonymous. (2015a). United Nations, Department of Economic and Social Affairs. Population Division, World Urbanization Prospects, The 2014 revision. Retrieved November, 2015, from: http://esa.un.org/unup/wup (Data in excel files/Urban and rural populations/WUP2014-F02-Proportion_Urban.xls)

Anonymous. (2015b). USDA. Foreign Agricultural Service. Retrieved November, 2015 from: http://www.fas.usda.gov/data/turkish-agricultural-exports-continue-surge

Anonymous. (2015c). European Commission Eurostat. Retrieved November, 2015 from: http://epp.eurostat.ec.europa.eu/portal/page/portal/agriculture/data/main_tables/

Anonymous. (2015d). Fruits of Turkey. Retrieved November, 2015 from: http://www.fruitsofturkey.com/products/dried-fruits/dried-fig/

Anonymous. (2015e). Malatya Governorship. Retrieved November, 2015 from: http://www.malatya.gov.tr/ [Malatya hakkında/Malatya kayısısı/kayısı-hasadı-kurutulması-ve-pazarlaması]

Anonymous. (2015f). Ministry of Food, Agriculture & Livestock.Retrieved November, 2015, from: http://www.tarim.gov.tr/Konular/Good-Agricultural-Practices

Anonymous. (2015g). Milliyet News. Retrieved November, 2015, from: http://www.milliyet.com.tr/isparta-lavanta-kokacak-isparta-yerelhaber-811988.

Anonymous. (2015i). Directorate General Press and Information. Retrieved November, 2015, from: http://www.byegm.gov.tr/turkce/haber/odun-disi-orman-urunleri-koylunun-gelir-kapisi-oldu/

Anonymous. (2015j). European Commission, Agriculture and Rural Development. Retrieved November, 2015, from: http://ec.europa.eu/agriculture/cap-post-2013/

Avcı, M. (2005). Diversity and Endemizm in Turkey's Vegetation (in Turkish). *Coğrafya Dergisi, 13,* 27-55.

Başer, K.H.C. (1993). Trade of Essential Oil in the World (in Turkish). *Tıbbi ve Aromatik Bitkiler Bülteni, 9,* 15-17.

Başer, K.H.C. (2002). The Turkish origanum species. In S. E. Kintzios (Ed.), *Oregano: The Genera Origanum and Lippia,* (pp. 109-126). London: Taylor & Francis.

Baytop, T. (1999). *Treatment with plants in Turkey, 'In the past and today'* (in Turkish). Istanbul, Turkey: Nobel Tıp Kitabevi, 2nd Press.

Cakilcioglu, U., Khatun, S., Turkoglu, I., & Hayta, S. (2011). Ethnopharmacological survey of medicinal plants in Maden (Elazig-Turkey). *Journal of Ethnopharmacology*, *137*(1), 469-486.

Çetin, B. (2008). Geographical features of anise plantation in Burdur Province (in Turkish). *Doğu Coğrafya Dergisi*, *13*(20), 195-214.

Ekim, T., Koyuncu, M., Vural, M., Duman, H. Aytaç, Z., & Adıgüzel, N. (2000). Red Data Book of Turkish Plants (*Pteridophyta* and *Spermatophyta*) (in Turkish). Ankara.

Ellialtıoğlu, Ş., Sevengör, Ş., & Sezik, E. (2007). Studies on development of peppermint cultivation in Sanlıurfa. Unpublished seminar notes (in Turkish).

Foster, S. (1995). Europe - medicinal plant use in the modern world. *The Herbarist, 61,* 33-39.

Franz, C., Hölzl, C., Ceylan, A., & Vömel. A. (1984). Influence of the growing site on the quality of *Menthapiperita*-L.-oil. *Acta Horticulture, 144,* 145-150.

Kapluhan, E. (2013). An Example of Alternative Activities in the Bekilli (Denizli): Cultivating of Thyme (in Turkish). Marmara Geographical Review, *28,* 194-210.

Kara, N. (2015). Yield, quality, and growing degree days of anise (Pimpinella anisum L.) under different agronomic practices. *Turkish Journal of Agriculture and Forestry*, *39*, 1014-1022.

Kızıl, S., Arslan, N., & İpek, A. (2003). A research on adaptation of different cumin (*Cuminum cyminum* L.) lines in Diyarbakır ecological conditions (in Turkish). *Tarım Bilimleri Dergisi, 9*(3), 340-343.

Llombart, P.A. (2015). The second pillar of the CAP towards 2020. Mission, objectives and priorities of rural development. Retrieved November 2015, from: http://www.magrama.gob.es/es/ministerio/servicios/informacion/Amat-paris_tcm7-355054.pdf

OECD. (2015). Agricultural policy monitoring and evaluation. Retrieved November, 2015, from: http://www.oecd.org/turkey/evaluationofagriculturalpolicyreformsinturkey.htm

Özgüven, M., & Kırıcı, S. (1999). Research on yield, essential oil, contents and components of mint (mentha) species in different ecologies (in Turkish). *Turkish Journal of Agriculture and Forest, 23*, 465-472.

Özhatay, N., & Koyuncu, M. (1998). Medicinal plant's trade in Turkey (in Turkish). XII. Bitkisel İlaç Hammaddeleri Top. Bildiri Kit., 11-38, Ankara.

Polat, R., & Satıl, F. (2012). An ethnobotanical survey of medicinal plants in Edremit Gulf (Balıkesir–Turkey). *Journal of Ethnopharmacology, 139*(2), 626-641.

Polat, Ü., & Kan, Y. (2006). The effect of different chemical applications on some characters and yield of seed cumin (*Cuminum cyminum* L.) (in Turkish). *Selçuk Üniversitesi Ziraat Fakültesi Dergisi, 20*(40), 65-72.

Ramsey, D., Abrams, J., Clark, J. K., & Evans, N. J. (2013). Rural geography-rural development: An examination of agriculture, policy and planning, and community in rural areas. *Journal of Rural and Community Development, 8*(3), *i-v.*

Samet, H., & Çıkılı, Y. (2011). Erosion, pollution, urbanization, in agricultural lands in Turkey. In M. Ozturk, A. R. Mermut, & A. Celik (Eds.), *Urbanization, Land Use, Land Degradation and Environment* (pp.159-168). New Delhi, India: Daya Publishing House.

Snigdha, C., & Thakur, M. (2013). Overview of mint (*Mentha* L.) as a promising health-promoting herb. *International Journal of Pharmaceutical Research & Development (IJPRD), 5*(6), 73-80.

Şafak, İ., & Okan, T. (2004). Production and marketing of oregano, bay laurel and stone pine (in Turkish), *DOA Dergisi, 10*, 101-129.

Turkstat, (2015a). Turkish Statistical Institute. Retrieved November, 2015 from: http://www.turkstat.gov.tr [Press Release/Crop Production/2014]

Turkstat, (2015b). Turkish Statistical Institute. Retrieved November, 2015 from: http://www.turkstat.gov.tr [Databases/Statistical Table/crop Production Statistics/Species not processed]

Turkstat, (2015c). Turkish Statistical Institute. Retrieved November, 2015 from: http://www.turkstat.gov.tr [Databases/Statistical Table/crop Production Statistics/Plants Used in Perfumery, in Pharmacy or for Similar Purpose and Fodder]

Turkstat, (2015d). Turkish Statistical Institute. Retrieved November, 2015 from: http://www.turkstat.gov.tr/ilGöstergeleri/iller/DENIZLI.pdf

Tyler, V. E. (1993). *The honest herbal: A sensible guide to the use of herbs and related remedies* (3rd ed). Binghamton, NY:Pharmaceutical Products Press.

Ugulu, I. (2011). Traditional ethnobotanical knowledge about medicinal plants used for external therapies in Alasehir, Turkey. *Int. J. Med. Arom. Plants, 1*(2), 101-106.

WHO. (2009). *World Health Organization Monographs on Selected Medicinal Plants, 4*, 1-456.