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Potential of Medicinal and Aromatic Plants in the Central Anatolian Steppe Rangeland and the Necessities

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ABSRACT

The plant formation destroyed by giving way difficult conditions resulted from high evaporation, lack of rainfall in summer season developing depending on spring precipitation is known as steppe. The tree with short plant height or the bush species are run across more or less amount with these steppe sometimes. The steppe of the Turkey have got marvelous biodiversity. But also the areas to have the most genetic erosion and ecocide are these steppe rangelands. These rangelands are worthful and rich areas in terms of medicinal and aromatic plants like *Astragalus* sp., *Thymus* sp., *Salvia* sp., etc. It's have an importance about particularly the preservation of the steppe areas had local endemic plants. The secondary metabolite of medicinal and aromatic plants which are grown in these areas can be have various and richer content. There are a large number of medicinal and aromatic plants within plants which are determined in the vegetation survey. It's reported that the drug cost in depression treatment are decreased with using *Hypericum* genus which are abound in the Central Anatolian steppe rangelands instead of using antidepressant drug. Exportation of *Thymus* have share at 18% in medicinal plant export of Turkey. According to TUIK, the cultivation area of *Salvia*, which are abound (i.e. 15 Salvia genus included subspecies) in the Central Anatolian steppes following thymus export, was about 4 thousand da in 2017. These areas are failed to satisfy when considered to earn the Turkey economy of *Salvia.* For this reason, these steppe rangeland should be prevented, and the medicinal and aromatic plants in there should be agricultural production.

1. Introduction

The result of the palynological research carried out in the Tuz Lake was determined that the central Anatolian steppe had approximately Mediterranean forest vegetation such as Brazil, Birch, Boxwood, Elm, Fraxinus, European hornbeam, Hazelnut, Walnut, etc. in humid region and very few Cedar, Abies, Taxus, Fagus, Juniperus, etc. and widely Pinus and Oak species beside herbaceous species about four thousand years ago (Inceoglu, 1987). These tree species were majorly damaged by different civilizations led to destruction in this region in time, and the steppe origin Iran-Turan settles down instead of these species in these areas (Akman et al., 2014). Nowadays, it's caused to lost present genres as in the past by leading to damage of natural flora such problems as urban sprawl, increasing agricultural applications for meeting food needs of the rapidly increasing population, illegal cut of trees, overgrazing and climate change in last 50 years, etc. (Akman et al., 2014).

The plant formation, which disappeared by not enduring to severe conditions led to high evaporation with a lock of rainfall in the summertime, and based particularly on spring precipitation in the region where it hasn't sufficiently precipitation for tree growth is gone by the name of the steppe (Avci, 2013). The plant formation is represented steppe for especially the central Anatolian region of the Turkey. The annual precipitation of the steppe areas has mostly 250- 300 mm (Avci, 2013). But, a few of place in the central Anatolian steppe rangeland's annual precipitation have more than 350 mm.

Biodiversity presents the base of life in a specific area and over the world as well (Kahraman et al., 2012). In the Turkey, steppe rangeland is a matter of splendid biodiversity (Avci, 2005).

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Even if it's hard entirely the determinate of the floristic balance-sheet of the central Anatolian steppe, according to approximate calculation from Flora of Turkey, the number of species in there are more than two thousand. Also, the central Anatolian steppe rangeland hasn't only floristic richness, but have also endemism by having about 30 percent of endemic species. Phryna (Caryophyllaceae), Cyathobasis, Kalidiopsis (Chenopodiaceae), Tchihatchewia (Cruciferae), Sartoria (Leguminosae) and Crenasciadium (Umbelliferae) are taken into account between endemic genera. Mostly endemic species are belonging some genus. About 61 percent of Astragalus genus, 41 percent of Acantholimon genus, 58 percent of Gypsophila genus and 54 percent of Achillea genus are endemic (Akman et al., 2014).

The central Anatolian steppe rangelands don't show only diversity with regards to forage crops (Cetik, 1985). We are of opinion these steppes are also significant gene pool regarding medicinal and aromatic plants. It's expressed that the medicinal and aromatic plant grown in these steppe rangelands have higher quality due to excess seconder metabolites produced from these plants in such stress factors as drought, salinity, etc. (Edreva, 1998, Koç and Acar, 2017; 2018) while there is a big concern on sustainable production systems over the world (Kahraman, 2017).

2. The Medicinal Plants in The Central Anatolian Steppe Rangeland

Living organisms have big demand for several minerals to survive. Most of the medical plants are directly collected from nature (Kahraman and Onder, 2018). Nowadays, the medicinal and aromatic plants are collected mostly from the Southeast Anatolian region, the East the Black Sea area, The Mediterranean Region, Marmara Region and Aegean region (Bayram et al., 2010). But, we are of opinion the central Anatolian region with having plant diversity and endemic plants by 300 above have high potential about medicinal and aromatic plants. Thus, this review was typed for the purpose of emphasize on importance of these plants cultivation and assist to plant breeder whose studied high yield and quality in plant due to having gene resource of medicinal and aromatic plants had importance as economic and found in the Central Anatolian steppe rangelands. It's given in separate title list of medicinal plants which have importance commercially and grow naturally in the central Anatolian steppe rangelands and their located places.

2.1. Helichrysum (Helichrysum sp.)

Helichrysum genus having 600 species in the world (Anonymous, 2017a) is used traditionally to heal wounds, infections and respiratory ill (Lourens et al., 2004). The central Anatolian steppe rangelands in the Turkey have five *Helichrysum* genus included subspecies. *Helichrysum noeanum* is an endemic species in these steppe rangelands (Table 1).

2.2. .St. John's worth (Hypericum sp.)

A quarter of Hypericum genus having 484 species in the world is grown naturally in the Turkey (Akgoz, 2013). The Turkey is great gene pool with regards of St. John's worth (Hypericum L.) [Satana and Arslan, 2012). The Hypericum genus has economic value and critical all over the world owing to contain seconder metabolites (Yaylaci et al., 2013). But, animals fed Hypericum species, particularly sheep's are happened photosensitive, and are caused skin deformation and skin inflammation in parts which are exposure to light of animals due to Hypericine having in leave, stem, and flowers of the plant (Balabanli et al., 2006). For this reason, this genus is important regarding medicinal but is described as the poisoned plant for rangelands (Tokluoglu, 1986). The central Anatolian steppe rangelands have 15 Hypericum genus included subspecies, and 8 of them are endemic species (Table 2).

2.3. Sage (Salvia sp.)

Having approximate 900 species belonging to Salvia genus in the world are shown to distribute mostly in America and Southwest Asia. It's stated that Salvia genus is located in Europe having 36 species, Iran having 70 species and former Soviet Union having 75 species. In the Turkey have 97 species, four subspecies and eight variety. 51 of them are endemic, and this genus has high endemism rate by 52.5% (Ipek and Gurbuz, 2010). The central Anatolian steppe rangelands have 15 Salvia genus included subspecies (Table 3). 9 of them are endemic species. There are Salvia cryptantha and S. tomentosa which are tradable sort in Turkey among all present case (Ipek and Gurbuz, 2010).

Table 1
The Species and Subspecies Belonging to *Helichrysum* Genus in the Central Anatolian Steppe Rangeland (Akman et al., 2014).

Name of Species/Subspecies	Endemic	Altitude (m)	Location
Helichrysum arenariumsubsp. aucheri		1000-1400	Memlik village, Sarılar village, between Sürsefa and Bağlum (North of Ankara)
		950-1400	Sarılar village, between Sürsefa and Bağlum (North of Ankara)
		1450-1850	Yapraklı mountains (Northeast of Çankırı)
H. arenarium subsp. *armenum*		1600-1750	Eldivan mountain (Çankırı)
		500-700	Nallıhan Sarıyer Dam, Aladağ valley
		600-1600	Beypazarı- Çayırhan- Nallıhan and Karaşar Regions
H.noeanum	+	1200-1650	Between Sivas and Erzincan, Tecer mountains
		1200-1650	Region of Kapadokya
		1200-2550	Hasan Mountain (Aksaray- Taşpınar)
		1800-2500	Akdağ, Beydağları and Tahtalı mountains
H. plicatum subsp. *plicatum*		1450-1850	Yapraklı mountains (Northeast of Çankırı)
		1000-1600	Region of Ereğli -Karaman
		2000-2350	Region of Kazım Karabekir (Konya) Hacıbaba (Özyurt)

Table 2

The Species and Subspecies Belonging to *Hypericum* Genus in the Central Anatolian Steppe Rangeland (Akman et al., 2014; Anonymous, 2017b).

Name of Species/Subspecies	Endemic	Altitude (m)	Location
Hypericum aviculariifolium	+	1100-1250	Region of Ankara- Polatlı- Haymana and Sivrihisar
		1450-1850	Yapraklı mountains (Northeast of Çankırı)
		1600-1750	Region of Ermenek- Oyukludağı
H. avicularıifolium subsp. *avicularıifolium* var. *depilatum*	+	1500-2100	Sultandağları (Akşehir)
H. avicularıifolium subsp. depilatum var. depilatum	+	1000-1400	Meşeli village, Hacılar village, Kazan- Çubuk (Aydos)
		1050-1750	Çubuk- Karagöl surroundings Aydos mountains (Ankara)
		1500-2100	Sultandağları (Akşehir)
H. avicularıifolium subsp. depilatum	+	600-900	Çayırhan- Beypazarı- Kırbaşı
		600-800	Regions of Beypazarı- Çayırhan and Nallıhan
H. heterophyllum	+	1250-1635	Ankara- Kızılcahamam Soğuksu National Park

Cont. Table 2

Name of Species/Subspecies	Endemic	Altitude (m)	Location
Hypericum heterophyllum	+	1050-1750	Çubuk- Karagöl surroundings Aydos mountains (North of Ankara)
		1100-1200	Ayaş mountains - Kurtboğan surroundings
		1500-2100	Sultandağları (Akşehir)
H. lazicum		1900-2320	The north and northwest side of Hasan mountain

Cont. Table 2

H. linarioides		1450-1850	Yapraklı mountains (Northeast of Çankırı)
		1600-1750	Eldivan mountains (Çankırı)
		1270-1635	Ankara- Kızılcahamam Soğuksu National Park
		1350-1550	Beypazarının Karagöl- Nuh hoca ve köst surroundings
		600-1600	Regions of Beypazarı- Çayırhan -Nallıhan and Karaşar
H. lydium		1150	Beynam forest (Ankara)
		1500-2100	Sultandağları (Akşehir)
H. origanifolium		1500-2100	Sultandağları (Akşehir)
H. pallens		1600-1750	Region of Ermenek- Oyukludağı
H. pseudolaeve	+	1250-1500	Göreme National Park (Nevşehir)
H. salsugineum	+	900	Tuz Lake –Konya
H. scabrum		1000	Beynam forest Ankara Bolu road
		1500-2000	Region of Ermenek- Oyukludağı
H. thymopsis	+	1500	Between Sivas and Kangal
		1200-1650	Region of Kapadokya

Table 3

The Species and Subspecies Belonging to *Salvia* Genus in the Central Anatolian Steppe Rangeland (Akman et al., 2014; Cetik, 1985; Anonymous, 2017b].

Name Of Species/Subspecies	Endemic	Altitude (m)	Location
Salvia acetabulosa		1100-1400	Ayaş mountains, Abdülselam mountain
S. aethiopsis		850-1200	Sivrihisar, Temelli, Polatlı, Ayaş mountains
S. albimaculata	+	1500-2000	Pasture in the region of Ermenek- Oyukludağı
S. aytachii	+	700-1000	Beypazarı Zevye vineyards Elmalı Beli Kuyucaklı village and region of Çayırhan
		600-1600	Regions of Beypazarı-Çayırhan- Nallıhan and Karaşar
S. bracteade		950-1400	North of Ankara Bağlum Sürsefa and Sarılar villoge
S. cadmica	+	1150-1400	Beynam forest (Kuyrukçu mountain)
		2200-2350	Hacıbabadağı Kazımkarabekir (Konya)
S.cryptantha	+	650-1150	Ankara-Polatlı Haymana and Sivrihisar
		950-1400	North of Ankara Bağlum Sürsefa and Sarılar villoge
		600-800	Çankırı surroundings
		1600-1750	Eldivan mountain (Çankırı)
		800-1100	Ayaşbeli
		1100-1400	Ayaş mountain

Cont. Table 3

Name Of Species/Subspecies	Endemic	Altitude (m)	Location
S.cryptantha	+	600-800	Region of Beypazarı-Çayırhan and Nallıhan
		1250-1500	Göreme National Park (Nevşahir)
		1200-1650	Region of Kapadokya
		1150-1200	Karaman surroundings
		1000	Karapınar- Ereğli (Konya)
S. cyanescens	+	1250-1500	Göreme National Park
S. ermenekensis		1500-2000	Region of Ermenek- Oyukludağı
S. halophila	+	950-1000	Tuz Lake-Konya- Niğde
S. spergulifolia		1500-2000	Region of Ermenek- Oyukludağı
S. tchihatcheffii	+	800-1200	Haymana surroundings
		1600-1750	Eldivan mountain (Çankırı)
		1200-1300	Ayaş mountain
S. tomentosa		1200-1400	Karadağ (Isparta)
S. vermifolia	+	1450	Sivas
S. wiedemannii	+	950-1000	Polatlı- Sivrihisar- Gömü- Afyon
		850-1000	Sürsefa- Bağlum- Sarılarköyü surroundings (Ankara)
		650-950	Ayaş- Oltan and Beypazarı - Gürağaç
		600-800	Beypazarı -Çayırhan- Nallıhan

2.4. Siderites (Sideritis sp.)

Siderites occupy a prominent place in medicinal and aromatic plants. Some siderites species are used as fixing cold, the painkiller for stomach, promoter digestion, diuretic, relaxant, tonic, anti-inflammatory and appetizer in Turkey. *Sideritis* genus is represented by 46 species and 54 taxa in the Turkey. 40 of *Sideritis* taxon are endemic (Ucar and Turgut, 2009). The central Anatolian steppe rangelands have 6 *Sideritis* genus, and 5 of them are endemic species (Table 4).

2.5. Tanacetum (Tanacetum sp.)

Tanacetum species which are mostly endemic in Turkey contain terpene, coumarin, and flavonoid from seconder metabolite (Goren et al., 2002). *Tanacetum parthenium* (L.) Schultz Bip included as major flavonoid tanetin is used to treatment of a migraine and arthritis (Williams et al., 1999). But, Goren (2003) stated that *Tanacetum* species was used to aim pest control in agricultural by being perfused to the wall after dried plants were pulverized by among Anatolian folks. The central Anatolian steppe rangelands have 5 *Tanacetum* genus which both has potential pest control in organic farming and is the raw material in medicinal (Alkan and Gokce, 2012). *Tanacetum argenteum subsp. flabellifolium* and *T. cadmeum* are endemic species (Table 5).

2.6. Thyme (Thymus sp. and Origanum sp.)

Thyme genus (Thymus sp.) occupied the prominent place in medicinal plant trade of Turkey have 350 species in the world (Anonymous, 2012; Anonymous, 2017c). Having *Origanum majorana* (Marjoram) from *Origanum* sp. more than essential oil obtains from Thymus species is preferred (Anonymous, 2017c). For this reason, these two genera are investigated in the central Anatolian steppe rangelands, and these steppe rangelands are determined to have an endemic *Origanum leptocladum*, and 13 Thymus genus included subspecies (Table 6).

In addition to medicinal plant given tables as mentioned above, other medicinal plants in the central Anatolian steppe rangelands are *Achillea* (12 species), *Allium* (13 species), *Artemisia* (3 species), *Limonum* (3 species), *Pimpinella* (4 species included subspecies). *Verbascum* genus ranked as large endemism genus with 175 species in the world. Celen, (1999) is found 12 species included subspecies in the central Anatolian steppe rangelands. Moreover, these steppe rangelands have 31 species included subspecies *Centaurea* genus shown distribution to the different region of Turkey (Celen, 1999).

3. The Actions To Be Taken For These Plants

These plants in the central Anatolian steppe rangelands, which are determined by us result of the literature review is signalize species in there. So, it should

be discovered the medicinal plants in these steppes with vegetation etude study more comprehensive.

In last decades, it was started in-situ conservation studies with the project in Turkey. It needs similar research "In- Situ Conservation of Genetic Diversity" conducted in the 1993 year. The plan prepared as this project output should be followed. It is important to update if needs. There are also similar searches in a different country of the world. Furthermore, Ex-Situ conservation programs (seed storage, in vitro storage, DNA storage, pollen storage, field Genbank and botanical garden) should be carried out for the preservation of medicinal plants in these rangelands due to gene pool (Karagoz et al., 2010).

It should be investment for industrial related to the use by cultivation.

A lot of grazing crop are used as spices plants (e.g. thyme, sage, and mint) and herbs (e.g. digitalis, St. John's worth, helichrysum) besides having importance as gen source for breeding of cultivated plants (Altin et al., 2011). For this reason, it is critical to grazing in rangelands according to range management rules. Because first of two important keeping always points in the forefront in the range management is conservation of vegetation, soil and other natural resources (Bakir, 1987).

It is necessary non-decreasing the rangeland areas and preservation of rangelands having gene resource besides conservation of natural plant cover in the rangelands. Pasture areas are unfortunately fallen till 14.6 million ha. Genetic resource structure of rangeland should be careful to agistment, pasture improvement or changing an attribute of rangeland for any reason.

To collect the plants in rangeland any reason should be limited and controlled, and it needs the conservation of natural places by doing agriculture of medicinal and aromatic plants which could be grown in the field. If possible, it should be made real as parallel doing agriculture and increasing seconder metabolites of these plants with the breeding program.

Table 4.

The Species and Subspecies Belonging to *Sideritis* Genus in the Central Anatolian Steppe Rangeland (Akman et al., 2014; Çetik, 1985)

Name Of Species/Subspecies	Endemic	Altitude (m)	Location
Sideritis bilgerana	+	1600-1900	Region of Ermenek-Oyuklu
S. galatica	+	1600-1750	Eldivan mountain (Çankırı)
S. germanicopolitana	+	1450-1850	Yapraklı mountain (Çankırı)
		1600-1750	Eldivan mountain (Çankırı)
		1300-1800	Aydos mountain (Çubuk Kızılcahamam)
S. libanoticca	+	1500-2000	Region of Ermenek-Oyuklu
S. montana subsp. *Montana*		600-800	The north side Çankırı
		1250	Karacadağ (Konya)
S. phrygia	+	1200-2200	Doğanhisar- Akşehir- Çay (Sultandağı)
		1600-1900	The north side of Yalvaç and Cankurtaran village

Table 5.

The Species and Subspecies Belonging to *Tanacetum* Genus in the Central Anatolian Steppe Rangeland (Akman et al., 2014).

Name of Species/Subspecies	Endemic	Altitude (m)	Location
Tanacetum argenteum subsp. *flabellifolium*	+	1800	Ermenek Oyuklu mountain- Azı hill
T. armenum		1600-1750	Eldivan mountain (Çankırı)
		1270-1635	Ankara Kızılchamam Soğuksu National Park
		1600-1750	Kibarlar and Hacılar village, the north and northwest of Aydos mountains elveren, Uluağaç upland, Aktepe and aşağı çavundur

Cont. Table 5

Name of Species/Subspecies	Endemic	Altitude (m)	Location
Tanacetum armenum		1050-1750	Aydos mountains Çubuk- Karagöl surroundings (Ankara)
		1800-2300	Sultan dağları, Çay (Afyon) Kızıltepe suroundings- tekke uplands
		1800	Oyuklu mountain -Azı hill (Ermenek)
T.aucheri		1000-2250	Karadağ (Karaman)
T. cadmeum	+	1600-1700	The northeast of Ermenek, Tekeçatı surroundings
		1450-1650	Karaman- Sertavul -Ermenek
		1900-2400	Oyukludağı(Ermenek)
T. flabelliforme		1600-1750	Region of Ermenek and Oyuklu mountain

Table 6.

The Species and Subspecies Belonging to *Origanum* and *Thymus* Genus in the Central Anatolian Steppe Rangeland (Akman et al., 2014; Çetik, 1985)

Name of Species/Subspecies	Endemic	Altitude (m)	Location
Origanum leptocladum	+	1500-2000	Region of Ermenek- Oyukludağ
Thymus cappadocicus subsp. *cappadocicus*	+	1200-1650	Region of Kapadokya bölgesi
T.cherlerioides var. *cherlerioides*	+	1450-1650	Ermenek- Tekeçatı and Sertavul
T.hirsutus		1200-2550	Hasan mountain (Aksaray- Taşpınar)
		1500-2000	Region of Ermenek- Oyukludağ
T. leucostomus	+	650-1150	Ankara Polatlı Haymana and Sivrihisar
		950-1400	Bağlum- Sürsefa and Sarılar village (the north of Ankara)
		600-800	Çankırı surroundings
		1000-1750	Çubuk- Karagöl surroundings Aydos mountains (the north of Ankara)
		700-1000	Beypazarı zeyve vineyards Elmalı beli, Kuyucaklı village and Çayırhan surroundings
		500-700	Region of Nallıhan
		600-1600	Regions of Beypazarı - Çayırhan - Nallıhan and Karaşar
		1200-1650	Region of Kapadokya
		1250-1500	The south of Akşehir
		2000-2300	The south of Kazım Karabekir (Konya) Hacıbaba mountain (Özyurt)
T. leucostomus var. argillaceus	+	800-900	Ankara- Sivrihisar- Afyon Emirdağ city surroundings
T.longicaulis var. chauberdi		1300-2000	Akşehir surroundings
		1500-2100	Sultandağları (Akşehir)
T.longicaulis subsp. *longicaulis* var. *subisophyllus*		1950	Yapraklı mountain (Çankırı)
T.longicaulis subsp. *subisophyllus*		1450-1850	The northeast of Çankırı (Yapraklı mountain)

Cont. Table 6

Name of Species/Subspecies	Endemic	Altitude (m)	Location
T.longicaulis subsp. *subisophyllus*		1300-1800	Aydos mountains (Çubuk Karagöl- the north of Ankara)
T. pectinatus	+	1100-2000	Sivas Refahiye- Kangal
		1200-1650	Region of Kapadokya
T. praecox ssp. skopilii		750-1000	Regions of Ankara Polatlı Haymana and Sivrihisar
		850-1000	Beynam village (the north of Ankara)
		1350-1550	The north of Beypazarı, Karagöl -Nuh hoca and Köst surroundings
		600-1600	Region of Beypazarı- Çayırhan - Nallıhan and Karaşar
T. sipyleus subsp. *sipyleus*		1150-1400	Beynam forest (Kuyrukçu mountain)
		1100- 1400	Ayaş mountains
		1900-2000	Şuhut and Barladağ
		1250-1300	Obruk - Karadona Villoge, Akbaş valley surroundings, Zincirli Villoge (Konya)
T. sipyleus subsp. sipyleus var. *sipyleus*		600-1000	The southwest of Beypazarı, Acısu and Macunköy surroundings
		900-1200	Ayaş mountains Ayaşbeli
T.sipyleus subsp. rosulans		1450-1850	Yapraklı mountain (the northeast of Çankırı)
		1000-1750	Eldivan mountain
		1270-1635	Kızılcahamam Soğuksu National Park
		1050- 1750	Çubuk- Karagöl surroundings Aydos mountain (Ankara)
		1250-1500	Göreme National Park (Nevşehir)
		1500-2100	Sultandağları (Akşehir)
		1150-1200	Karaman surroundings
		1000-1600	Region of Ereğli -Karaman
T.sipyleus subsp. rosulans		2000-2350	The south of Kazım Karabekir (Konya), Hacıbaba dağı (Özyurt)
		1400-1450	Karadağ Milzile Hill and Akkaya surroundings
		1000-2250	Karadağ (Karaman)

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