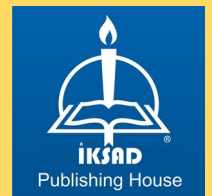




Medicinal and Aromatic Plants in Mariginal Areas

PhD. Banu KADIOĞLU & PhD. Sibel KADIOĞLU

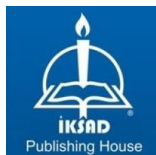


MEDICINAL AND AROMATIC PLANTS OF MARGINAL AREAS

PhD. Banu KADIOĞLU

PhD. Sibel KADIOĞLU

DOI: <https://dx.doi.org/10.5281/zenodo.10450797>



Copyright © 2023 by iksad publishing house
All rights reserved. No part of this publication may be reproduced, distributed or transmitted in any form or by any means, including photocopying, recording or other electronic or mechanical methods, without the prior written permission of the publisher, except in the case of brief quotations embodied in critical reviews and certain other noncommercial uses permitted by copyright law. Institution of Economic Development and Social Researches Publications®

(The Licence Number of Publicator: 2014/31220)

TÜRKİYE TR: +90 342 606 06 75

USA: +1 631 685 0 853

E mail: iksadyayinevi@gmail.com

www.iksadyayinevi.com

It is responsibility of the author to abide by the publishing ethics rules.
Iksad Publications – 2023©

ISBN: 978-625-367-580-6

Cover Design: Banuz KADIOĞLU

December / 2023

Ankara / Türkiye

Size = 16x24 cm

PhD. Banu KADIOĞLU

Eastern Anatolia Agricultural Research Institute Directorate, TÜRKİYE

E Mail: banu250@hotmail.com

ORCID NO: 0000-0002-9041-5992

PhD. Sibel KADIOĞLU

Eastern Anatolia Agricultural Research Institute Directorate, TÜRKİYE

E Mail: sibel.kadioglu@hotmail.com

ORCID: 0000-0002-9121-1705

Preface

Marginal agricultural lands; These are lands opened to agriculture due to local importance or local needs, other than absolute agricultural lands, special crop lands and planted agricultural lands. These lands have many soil and topographical limitations and their agricultural production potential is quite low. Land slope, rainfall; It is more than 8% in places where it is below 574 mm, and more than 12% in places where it is 574 mm or above, and the soil depth is less than 50 cm. Marginal lands have attracted widespread attention due to their potential to enhance food security and support bioenergy production. Marginal lands, which are often fragile, sensitive and at environmental risk, have low productivity and low economic returns. There are many factors limiting its usability in agricultural production.

In the face of limited arable land resources, there is an increasing interest in the use of marginal lands for bioenergy-biomass production. However, despite the increasing interest, many concerns such as environmental impacts, ecosystem services and sustainability of marginal lands such as erosion, land degradation, biodiversity and climate change mitigation are also increasing. For these reasons, marginal land use should be addressed with food security, bioenergy production and an environmentally friendly approach.

Our aim in publishing this book is to optimize marginal land use, to ensure that these plants, which improve environmental risks and ecosystem within the scope of the availability of some medicinal and aromatic plants in marginal land use to maintain agricultural

productivity, are considered in the evaluation of marginal areas, is to define and evaluate it as a whole. Our country has a serious economic potential in terms of medicinal and aromatic plants collected and cultured from nature, with its different climate and ecological conditions and rich plant genetic resources. It is thought that marginal areas, which have an important potential for use in the culture of these plants, especially with their limiting factors, will be utilized, the increase in cultivation area and production will further increase. It is also thought that it will increase the production and trade of natural medicines.

Our aim in publishing this book is to optimize marginal land use, to ensure that these plants, which improve environmental risks and ecosystem within the scope of the availability of some medicinal and aromatic plants in marginal land use to maintain agricultural productivity, are considered in the evaluation of marginal areas, is to define and evaluate it as a whole.

7 chapters in the book were written by 2 authors. We believe that all of the works that emerged as a result of a meticulous research process are individually valuable and will contribute to the field. We would like to thank Seyithan SEYDOŐOĐLU and IKSAD publishing house who contributed to the printing process of the book.

PhD. Banu KADIOĐLU & PhD. Sibel KADIOĐLU

Our book;

We dedicate it to our Mother and Father, who observe the law, who raise their children with this motto, without stepping on anyone's back or slipping their feet, and earning their bread with the sweat of their

brow.

With Mercy and Gratitude....

CONTENTS

CONTENTS	5
MILKVETCH GUM-TRAGACANTH- GEVEN	9
<i>Astragalus</i> L.	9
INTRODUCTION	11
1. ORIGIN AND MORPHOLOGY	12
2. CLIMATE AND LAND REQUEST	16
2.1. <i>Astragalus</i> in Marginal Areas	16
3. USAGE AREAS	18
3.1. Alternative Medicine and Its Use in Medicine	18
3.2. Factors Limiting Its Use	20
3.3. Different Areas of Use.....	21
4. CULTIVATION	22
5. CONCLUSION AND RECOMMENDATIONS	23
REFERENCES	25
CAPERS-KAPARİ	28
<i>Capparis</i> L.	28
INTRODUCTION	30
1. ORIGIN AND MORPHOLOGY	31
2. SOIL AND CLIMATE REQUEST	33
2.1. Capers in Erosion Control.....	34
3. USAGE AREAS	35
3.1. Alternative Medicine and Its Use in Medicine	36
3.2. Use as Food	40
3.3. Different Areas of Use.....	41
4. CULTIVATION	41
5.CONCLUSION AND RECOMMENDATIONS	43

REFERENCES	44
LICORICE –MEYAN KÖKÜ	47
<i>Glycyrrhiza glabra</i> L.	47
INTRODUCTION	49
1. ORIGIN AND MORPHOLOGY	49
2. CLIMATE AND LAND REQUIREMENTS	53
3. AREAS OF USE	54
3.1. Licorice in Turkish Folk Medicine	54
3.2. Factors Limiting Its Use	55
3.3. Licorice in Human Health	55
3.4. Different Areas of Use.....	56
4. CULTIVATION	58
5. CONCLUSION AND RECOMMENDATIONS	59
REFERENCES	61
HOREHOUND - BOZOT	62
<i>Marrubium</i> L.	62
INTRODUCTION	64
1. ORIGIN AND MORPHOLOGY	66
2. CLIMATE AND LAND REQUEST	69
3. AREAS OF USE	70
3.1. Alternative Medicine and Its Use in Medicine	70
3.2. Factors Limiting Its Use	74
3.3. Different Areas of Use.....	74
4. CULTIVATION	75
5. CONCLUSION AND RECOMMENDATIONS	76
REFERENCES	77
RHUBARB – RAVENT- İŞGIN	80

<i>Rheum ribes</i> L.	80
INTRODUCTION	82
1. ORIGIN AND MORPHOLOGY	84
2. CLIMATE AND LAND REQUEST	86
3. USAGE AREAS	88
3.1. Alternative Medicine and Use in Medicine.....	88
3.2. Use as Food	91
3.3. Different Areas of Use.....	92
4. CULTIVATION	92
5. CONCLUSION AND RECOMMENDATIONS	93
REFERENCES	94
ROSEHIP-KUŞBURNU	97
<i>Rosa canina</i> L.	97
INTRODUCTION	99
1. ORIGIN AND MORPHOLOGY	102
2. CLIMATE AND LAND REQUEST	104
2.1. Rosehip in Assessment of Mariginal Areas	104
3. USAGE AREAS	106
3.1. Alternative Medicine and Its Use in Medicine	106
3.2. Use as Food	110
3.3. Different Areas of Use.....	111
4. CULTIVATION	112
5. CONCLUSION AND RECOMMENDATIONS	113
REFERENCES	114
THYME- ORİGANUM- KEKİK	116
<i>Thymus</i> L.....	116
INTRODUCTION	118

1. ORIGIN AND MORPHOLOGY	119
2. SOIL AND CLIMATE REQUEST	120
3. USAGE AREAS	121
3.1. Alternative Medicine and Its Use in Medicine	121
3.2. Different Areas of Use.....	123
4. CULTIVATION	127
5. CONCLUSION AND RECOMMENDATIONS	130
REFERENCES	131

MILKVETCH GUM-TRAGACANTH- GEVEN

Astragalus L.



Sarı olur (aman) üst yakanın geveni

Ben bilemedim (aman da) peşim sıra geleni

Şehit derler (aman) yar yoluna öleni

Sökemedim şu kevenin kökünü

Allı gelin nerde biçen ekini

Allı gelin senin kocan kötü mü?

At başından allı gelin belayı

Anonymous, 2023

INTRODUCTION

Legumes constitute the most important protein source for human and animal nutrition. They enrich the soil with organic matter and improve the soil structure, and these properties increase their priority and importance in the ecosystem. In addition, their symbiotic life with rhizobiums, fixing nitrogen in the soil and providing nitrogen to both the soil and the plant, further activate the role of legumes in terms of environmental rehabilitation and ensuring sustainability in agriculture (Dita et al., 2006). *Astragalus* is a genus of the Fabaceae family that is very rich in terms of number of species (Podlech and Zarre, 2013). The species richness of the *Astragalus* genus stems from its easy adaptation to many different habitats, especially steppes. *Astragalus* species are found in natural vegetation such as meadows and pastures, and some *Astragalus* taxa are even seen distributed in marginal areas where no plants can grow. *Astragalus* species are used in animal nutrition, industry, beekeeping, and in the prevention and treatment of diseases. The most important uses of *Astragalus* are medicine and soil protection. Even if they are not used in any way, the "soil" is protected by *Astragalus* that hold on tightly to the vegetation along with different plant species in areas where *Astragalus* grows. The most negative way of using it is that, even today, its roots are removed and fed to animals in the last days of winter, when feed decreases, and the above-ground parts continue to be used as fuel (Kadıoğlu et al., 2008).

1. ORIGIN AND MORPHOLOGY

The genus *Astragalus* is a genus officially described by Carl Linnaeus in 1753 in his work "Species Plantarum" (Anonymous, 2023a). *Astragalus*, called "milkvetch" in Greek, received this name due to its positive contribution to goat milk production. Some commonly used names are "astragale, milkvetch, locoweed, goat's-thorn, gum-tragacanth." In our country, it is known by names such as geven, keven, göni. Many species of astragalus, depending on their characteristics or where they are found, are classified as garip geven, süs geveni, kılıç geveni, mis geven, az geven Sarıkamış geveni, Uşak geveni, killı geven, melek geven, arsız geven, Mardin geveni, Zara geveni Anadolu kitresi, sarı ponpon, civciv otu etc. named by names Since the time of Linnaeus (1753) until today, 1175 new taxa have been added to the genus *Astragalus*. It is the genus with the highest number of species in the world. Today *Astragalus* L. includes 746 taxa (294 species) in the New World and approximately 2748 taxa (144 subspecies) in the Old World, for a total of 3494 taxa (Frodin, 2004). The genus *Astragalus* is widely distributed throughout the ancient world, from southern to northern hemisphere, from temperate to cold climates, from lowland to high altitude, and from subnival to nival zone. (Anonymous, 2023b).

In our country, the *Astragalus* genus has the most species among vascular plants. It is represented by 439 species, 216 of which are endemic, so approximately 50% of these species are endemic (Vural et al., 2017). The number of genres has reached 490 with new genre and

new recording publications. (Aytaç et al., 2020). Its high rate of endemism highlights its importance and that it is a breed that needs to be protected. The region with the most taxa is the Central Anatolia region (Başbağ et al., 2018). Species used especially in tragacanth production; *A. gummifer*, *A. microcephalus*, *A. kurdicus* variety *kurdicus*, *A. kurdicus* variety *muschianus*. These species are found and used commercially in the provinces of Muğla, Burdur, Isparta, Antalya, Afyonkarahisar, Eskişehir, Ankara, Niğde, Kayseri, Erzincan, Elazığ, Bingöl, Muş, Bitlis, Siirt and Urfa (Figure 1). *A. kurdicus* variety *muschianus* is an endemic species. These species, from which tragacanth gum is obtained, are in shrub form and are common in forests, pastures, hills and rocky slopes, and in areas with an altitude of 850-2900 m. Apart from these four species, tragacanth gum infiltration was also recorded from other *Astragalus* species (*A. amblelepis*, *A. plumosus* var *akardaghius* and *A. brachycalyx*) (Baytop and Gözler, 1971).

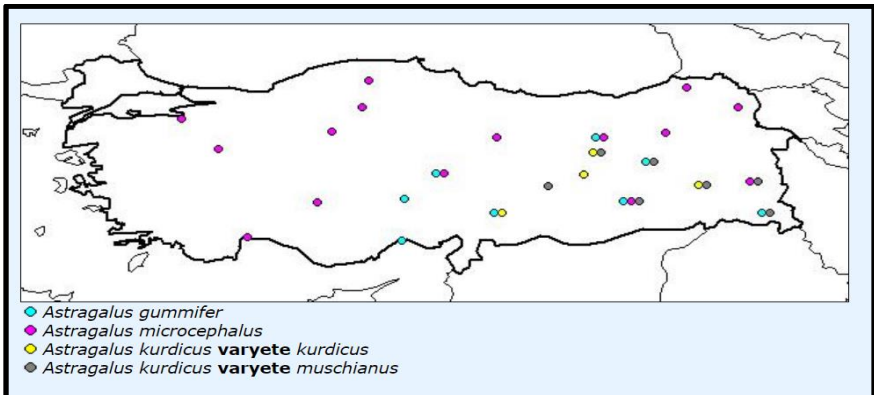


Figure 1. Geographical distribution of *Astragalus* species from which Tragacanth gum is obtained in Türkiye (TÜBİVES, 2023)

Astragaluses have compound pinnate leaves that are often covered with hairs. Different species produce different colored flowers. Flowers are purple, lavender, pink, blue, white, cream or yellow. The seeds grow in pods that resemble pea pods. In some species, these pods are covered with woolly hairs, while in other species they are smooth. Many *Astragalus* species are difficult to distinguish. One of these species is *A. utahensis* (pink lady slipper).

A. gummifer has a bush form with small branches and a short woody gray trunk surrounded by thorns. Compound leaves are composed of elliptical leaflets (pinnae) borne in opposite pairs. The rachis (hairy stem) of the leaf grows into a sharp thorn. Produces hermaphroditic flowers (containing male and female parts) that are pollinated by bees and *Lepidoptera* (Figure 2).



Figure 2. *Astragalus gummifer* (Anonymous, 2023c)

Astragalus microcephalus is a very thorny, densely branched shrub growing up to 40 cm tall. It is common in W. Asia – Türkiye, Caucasus, Iraq, Iran, Turkmenistan. This kind; is one of the main producers of gum tragacanth, a substance with many pharmaceutical, food additive and industrial uses (Figure 3).



Figure 3. *Astragalus microcephalus* (Anonymous, 2023d)

Astragalus cicer (chickpea milkvetch), stipules are easily visible and green in color. The flowers have 5 lobes and the calyx is hairy. Leaves are compound and alternate. Flowers and fruits are in cluster form. There are between 15-60 flowers in a cluster. The flowers of *Astragalus cicer* are pale yellow and 15-16 cm long. Leaves are compound and alternate (USDA, 2023; Figure 4).



Figure 4. *Astragalus cicer* (Anonymous, 2023e)

2. CLIMATE AND LAND REQUEST

Astragalus generally grows on dry, gravelly slopes, and forests, pastures, steppe, hill slopes and rocky slopes are the habitats of their distribution. They are also seen on roadsides. They are also distributed in areas with altitudes between 850-2900 m. In general, *Astragalus* is a plant that can adapt to very different soil and climate conditions. Although it can grow in clay and sandy soils, it prefers calcareous soils. It does not like excessively salty soil. It can grow in places with annual rainfall of more than 400 mm. It is resistant to cold, but not resistant to shade and waterlogging. It survives perfectly in places where the ground water level approaches 1 m and in nutrient-poor or degraded soils. It is drought tolerant.

2.1. *Astragalus* in Marginal Areas

The *Astragalus* genus includes perennial herbaceous-shrub-like plants that spread over large areas. Many species are unimportant for cultivation, but *Astragaluses*, which surround the soil with their deep

roots and branches, protect the soil and preserve it in place (Fig. 5). *A. chinensis* is used as a green manure plant in rice fields in Japan and China, and *A. cicer* is grown in North America. It has been stated that the species that are useful in combating erosion in the USA are *A. arrectus*, *a. cicer*, *A. davaricus*, *A. mortoni*, *A. rusbyi*, *A. verus*.

Astragalus, which is not cultivated in our country, is widely found in natural vegetation, especially in the steppes. *A. microcephalus* Willd. It is a very common species, with its deep-rooted roots and typical pillow-shaped xeric leaves, which are resistant to drought. This naturally occurring species has been stated as a species that can be used effectively in areas exposed to erosion. It is also a type of astragalus that can be used artificially and gives effective results. Seeds planted between and inside terraces germinate at a rate of 50-60% and show positive performance in the following years. It is stated that Astragalus can be used against erosion, especially in steep areas with high soil loss, due to its perennial nature, rhizome and deep roots (Daşdemir et al., 1996).

It is possible to prevent the soil from being washed away by establishing fences, to prevent erosion, to reduce and prevent landslides and flood disasters, and to prevent pastures weakened by overgrazing and treeless, bare and washed away lands. Astragalus communities will also be able to pioneer the afforestation of dry areas. Astragalus, which spreads in all kinds of soil conditions and covers the soil with its strong roots, has a very important feature in terms of soil protection and

erosion due to its ability to hold and cover the soil. *Astragalus* and its species protect the soil.



Figure 5. Root structure of *Astragalus* (Okur, 2010)

3. USAGE AREAS

3.1. Alternative Medicine and Its Use in Medicine

Astragalus is a widely recommended herb in medicine in general and traditional Chinese medicine in particular. *Astragalus* species can show antioxidant, anti-inflammatory, antimicrobial, antidiabetic, antiaging and antiviral effects due to the phenolic compounds and saponins they contain. Other active ingredients found in *Astragalus* species: flavonoids, polysaccharides, trace elements (Se, Cu, Zn, Fe) and volatile fatty acids (Fu et al., 2014).

In studies conducted with *A. gummifer*; It is stated that the gum obtained from the roots and stem of the plant can be used in the

treatment of burns, cancer treatment, and chronic degenerative diseases (Verbeken, 2003). It was also determined that plant extracts of *Astragalus plumosus* and *A. microcephalus* provided alpha glucosidase enzyme inhibition and hemolysis inhibition, and the oxidative damage caused in the serum was eliminated by plant extracts. It is predicted that these astragalus species can be used as food and medicine in the treatment of diseases caused by biotechnology and oxidative damage (Arslan, 2019).

In materia medica, *Astragalus* (*Astragalus membranaceus*, *Astragalus hoangtchy*, *Astragalus mongolicus*) can be used in general to increase vitality, produce blood, balance hormones or improve circulation. It has been used in TCM for centuries as a restorative tonic for the elderly and infirm. *Astragalus* is also known for its ability to stimulate the immune system. *Astragalus membranaceus* = *Astragalus propinquus*, Chinese herb Huang-qi, Huang qi Wei qi increases vital energy and protects against disease. As a plant that can prevent tumor growth; It protects the bone marrow in those whose immune systems are suppressed due to chemotherapy, radiotherapy, toxins or viruses by increasing the production of T cells, macrophages and interferons, which are the main players of the immune system. Other diseases for which astragalus may be beneficial include AIDS, blood loss (healing), bone marrow depression, frequent colds, diabetes, edema, fatigue, hepatitis, hypertension, weakened immunity, lung weakness, night sweats, and slow-healing wounds.

The best way to use astragalus is to take some every day as a tonic to continually strengthen the immune system. It is also used to sip every day or to cook other dishes such as homemade soups and stews, and by adding it to homemade bone broth. Astragalus is often used together with ginseng, angelica, licorice and other medicinal herbs to make many traditional Chinese tonics and is also consumed in the form of tea. During the Ottoman period, it was stated that the medicine (habb-ı garikun) made by adding 5 dirhams of *Astragalus sarcocolla* to other plants was good for cough and expectoration (Tanrıku, 2019). In our country, it is traditionally used by the public for throat diseases and inflammations, and in pharmacy for the production of suspensions, lozenges and tablets. In addition, it is known that tragacanth gum, which is used in the pharmaceutical industry to make pills, tablets and some drugs, is a mucilage and emulsifier. Gum tragacanth consists of 20-30% tragacanthin, 60-70% bassorin, tragacanth acid, D-galacturonic acid, D-xylose, L-fructose, D-galactose and other sugars. Other situations in which astragalus is used can be listed as follows. When astragalus is boiled, sweetened with honey and drunk, it relieves stomach and intestinal inflammation. It increases breast milk, regulates blood pressure, is good for sciatica and acts as a pain reliever. Astragalus poultice relieves swelling when applied to swollen areas.

3.2. Factors Limiting Its Use

Many species of *Astragalus* have an unpleasant taste. Toxic species: a) Glycoside-containing species

b) Species that grow in soils with high Se content and accumulate Se (*A. bisulcatus*, *A. gummifer*)

c) They are classified as species containing the Swainsonine alkaloid.

These species, which have poisonous effects, cause locoisme (vertigo) disease. Many are addictive and poisonous to livestock and cause incurable insanity. They are called “locoweed/loco weeds,” from the Spanish word meaning “crazy.” Several species growing in the United States cause locoweed poisoning in animals due to their content of the neurotoxin swainsonine (Plumlee, 2004). The results of some studies conducted on animals also indicate that *Astragalus* may be toxic to the mother and fetus (Scott and Jacobson, 2005).

3.3. Different Areas of Use

Legume forages, which are rich in crude protein and other nutrients, are very important in ruminant nutrition. In addition to the cultivated legume species such as clover, sainfoin, vetch and pea, *Astragalus*, which is among the legumes found in the natural flora and waiting to be cultivated, is also quite common in our country. *A. arenarius* and *A. falcatus* are grown as forage plants in Western Asia, Russia, France and the USA. There are also species of *Astragalus* that are resistant to grazing and have high regrowth ability and speed. Some of these are *A. cicer*, *A. pectinatus*, *A. bisulcatus* species. (Stroh et al., 1972). *A. cicer* is a delicious forage plant. Being a good pasture plant and being resistant to grazing increases its importance in artificial pastures created alone or with grasses (Bakır et al., 1980). It contains nutrients close to the nutritional value of alfalfa; It is resistant to

grazing, trampling and drought, does not swell, is easily digested, is low in raw cellulose and does not poison. However, when *A. cicer* cultivated areas are grazed, animals may become sensitive to light and burns may occur on the skin (Uzatici, 2019).

The sticky juice obtained from some *Astragalus* roots, called tragacanth gum, has been used in traditional medicine for centuries as a sedative and anti-diarrheal agent. In addition to its use in medicine, this sap is used in dentistry (denture making), textile and food (ice cream making) industries as an adhesive, firming, emulsifying and solidifying agent. Tragacanth, which has a wide range of usage in the pharmaceutical and textile industry, is used in our country as *A. aureus* Willd., *A. gummifer* Lab., *A. kurdicus* Boiss. and *A. microcephalus* Willd. It is obtained from species (Anonymous, 2023f). Tragacanth gum, which is mainly obtained from the root and trunk, has a wide application area. It is used primarily in the textile industry and printing trade. It is used in match making, preparation of plastic materials, making glue, providing brightness in watercolor and ink, as a binding agent in perfumery, pen manufacturing and paper industry, and in cosmetics such as cream, hair gel, lotion, tooth cream, etc. It is used as a nutrient medium (instead of agar) and as fuel in some regions.

4. CULTIVATION

A. arenarius and *A. falcatus* are grown as forage plants in Western Asia, Russia, France and the USA. The cultivated species are grown in dry lands with little depth and in barren areas as broadcast sowing, using 22-28 kg of seeds per hectare. There are 280.000 seeds

in one kilogram of seeds. It is winter resistant and its productivity increases with irrigation. *A. cicer* has high adaptability, is winter-hardy, and adapts to different soil conditions (Lardner et al., 2019) and can grow in arid region conditions (Karakurt, 1999). Although the cultivated *Astragalus membranaceus* species is also resistant to many adverse conditions, it prefers well-drained soil and sunny areas. When planting cultivated *A. microcephalus*, *A. membranaceus* and *A. cicer*; Better emergence can occur if the seeds are put through the cold stratification period. After the seeds are soaked, they should be soaked in hot water (without cooking) one day before planting. Inoculation with an active *Rhizobium leguminosarum* strain can also increase yield. Soil and climate conditions directly affect the competitiveness, nodule formation and fixation capacity of the plant. Soaked and grafted seeds should be planted without waiting too long. The plant germinates in approximately 4-9 weeks.

The soil to be planted must be well prepared and tamped. Depending on climate and soil conditions, a yield of 400-1000 kg/da can be obtained in our country. The hay yield can be 400-500 kg/da in dry conditions and 800-1000 kg/da in irrigated conditions. Seed yield is 50 kg/da.

5. CONCLUSION AND RECOMMENDATIONS

Astragalus, which has an important role in protecting natural habitats and keeping the soil in place due to climate change and global warming, controls erosion by protecting the soil surface against the force of wind, water or raindrops with its strong roots, and reduces

erosion by improving soil quality properties. Astragalus species, which have the capacity to be included in cover cropping systems due to their ability to fix free nitrogen in the air as well as protect the soil, are an important and valuable species for the sustainability of the soil with their role in protecting the soil against erosion and their ability to increase the resistance of soils against ecosystem disorders.

Astragaluses, which are an important genetic wealth of our country, need to be protected or conservation awareness should be developed in order to continue their generation. Additionally, by conducting extensive research on this breed; It is also important to reveal the beneficial properties of species that are not in our country but are used medicinally in other countries, and their relatives in the same genus in our country. It should not be overlooked that these species are important species that can be used in the fight against erosion and in the evaluation of marginal areas.

REFERENCES

- Anonymous, (2023a). <https://en.wikipedia.org/wiki/Astragalus> "Astragalus L." Plants of the World Online. Board of Trustees of the Royal Botanic Gardens, Kew. 2017.
- Anonymous, (2023b). Astragalus of tek World. <https://astragalusofworld.com/about/>
- Anonymous, (2023c). <https://antropocene.it/es/2023/01/25/astagalus-gummifer-3/>
- Anonymous, (2023d). <https://antropocene.it/es/2023/01/25/astagalus-microcephalus-3/>
- Anonymous,(2023e).<https://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:476814-1>
- Anonymous,(2023f).<https://atib.ogm.gov.tr/Sayfalar/T%C4%B1bbi%20ve%20Itri%20Bitkilerimizi%20Tan%C4%B1yal%C4%B1m/Geven.aspx>
- Arslan, A. (2019). Gümüşhane'de bulunan *Astragalus microcephalus* Willd. ve *Astragalus plumosus* Wild. bitkilerinin oksidatif hasara karşı koruyucu ve antidiyabetik etkilerinin incelenmesi. Gümüşhane Üniversitesi, Fen Bilimleri Enstitüsü, Biyoteknoloji Ana Bilim Dalı. 95s.
- Aytaç, Z., Hamzaoğlu, E. & Ertuğrul, K. (2020). *Astragalus* (Fabaceae) cinsi taksonomisine katkılar. *Bağbahçe Bilim Dergisi*. 8(1) 2021: 173-180.
- Bakır,Ö., Ozkaynak, İ. & Eraç, A. (1980). Nohut geveni (*Astragalus cicer* L.) Botanik Özelliği ve Tarımsal Değeri. Merkez İkmal Müdürlüğü Basımevi, Yenimahalle. Ankara.
- Başbağ, M., Kavak, B., Fırat, M., Çaçan, E. & Sayar, M.S. (2018). Türkiye florasında yer alan endemik *astragalus* taksonları. International congress on agriculture and animal sciences, 7-9 november 2018, Alanya-Türkiye.
- Baytop, A. and Gözler, T. (1971). Türk kitle zamkının menşei ve terkibi hakkında. *İstanbul Eczacılık Fakültesi Dergisi*. 7, 56-65.
- Daşdemir, İ., Tetik, M., Güven, M. & Doğukan, H. (1996). Doğu Anadolu Bölgesinde erozyon önlemede kullanılabilir Bitki Türlerinin tesbit ve Bunlarla Yapılacak erozyon Önleme Çalışmaları. Teknik Rapor No: 1, T.C. Orman Bakanlığı, Doğu Anadolu Ormancılık Araştırma Müdürlüğü.

- Dita, M. A., Risipail, N., Prats, E., Rubiales, D. & Singh, K. B. (2006). Biotechnology approaches to overcome biotic and abiotic stress constraints in legumes. *Euphytica*. 147,1-24.
- Frodin, D.G. (2004). History and Concepts of Big Plant Genera. *Taxon*. 53(3), 753–76. doi:10.2307/4135449. JSTOR 4135449.
- Fu, J., Wang, Z., Huang, L., Zheng, S., Wang, D., Chen, S., Zhang, H. & Yang, S. (2014). Review of the botanical characteristics, phytochemistry, and pharmacology of *Astragalus membranaceus* (Huangqi). *Phytother Res*. 28(9), 1275-83.
- Kadiođlu, B., Kadiođlu, S. & Turan Y. (2008). Gevenlerin (*Astragalus* sp.) Farklı Kullanım Alanları ve Önemi). 14 (B), *Alinteri Dergisi*. 17-26.
- Karakurt, E. (1999). Ankara kıraç koşullarında nohut geveni (*Astragalus cicer* L.) hat ve çeşitlerinde ot verimi ile bazı tarımsal özellikler. *Tarla Bitkileri Merkez Araş. Enst. Derg.*, 10(1-2): 75-82.
- Lardner, H., Pearce, L. & Damiran, D. (2019). Evaluation of cicer milkvetch and alfalfa cultivars for nutritive value, anti-quality factors and animal preference. *Sustainable Agriculture Research*. 8(1): 1-10.
- Okur, M. (2010). Tarihsel Orta Anadolu arazi kullanım dokusundaki mera bitkilerinin toprak kalitesine etkileri. *Arkeometri Anabilim Dalı, Çukurova Üniversitesi, Fen Bilimleri Enstitüsü, Yüksek Lisans Tezi, Adana*.
- Plumlee, Konnie H. (2004). *Clinical Veterinary Toxicology*. American Board of Veterinary Toxicology (ABVT). Mosby, St. Louis, Mo., 2004.pp. 447.
- Podlech, D.and Zarre, S. H. (2013). A taxonomic revision of the genus *Astragalus* L. (Leguminosae) in the Old World. vols. 1–3. *Naturhistorisches Museum, Wien*, pp. 2439.
- Scott, C.R. and Jacobson, H. A. (2005). Selection of international nutritional and herbal remedies for breastfeeding concerns. *Midwifery Today Int Midwife*. 75, 38–39.
- Stroh, J., Carleton, A. and Seamands,W. (1972). Management of *Lutana cicer* milkvetch for hay, pasture, seed and conservation uses. *Research Journal*,

Agricultural Experiment Station, University of Wyoming. Laramie, WY. No. 66, 17 pp.

Tanrikulu, N. (2019). Klasik Dönem Osmanlı Tıbbında Bazı İlaç Yapım Usulleri. T.C. Medipol Üniversitesi Sağlık Bilimleri Enstitüsü Tıp Tarihi Ve Etik Ana Bilim Dalı Tıp Tarihi Ve Etik Tezli Yüksek Lisans Programı Ders Ödevi TTEY1110302 Osmanlı Tarihinde Müesseseler.25 s.

TUBIVES, 2023. Turkish Plants Data Service.

Uzaticı, A. (2019). Farklı Olgunlaşma Dönemlerinde Hasat Edilen Nohut Geveni (*A. cicer L.*) otunun Besleme Değerinin Saptanması. Türk Tarım ve Doğa Bilimleri dergisi. 6(4):745-752.

USDA, (2023). United States Department of Agriculture Natural Resources Conservation Service <https://plants.usda.gov/home/plantProfile?symbol=ASC14>

Verbeken, D. (2003). Exudate Gums: occurrence, production, and applications. *Applied Microbiology and Biotechnology* Nov. 63(1), 10-12.

Vural, M., Subaşı, Ü., Ayyıldız, G. & Samancı, İ., (2017). Ankara İli Er Geveni (*Astragalus bozakmanii*) Tür Koruma Eylem Planı. Orman ve Su İşleri Bakanlığı Doğa Koruma ve Milli Parklar Genel Müdürlüğü, IX. Bölge Müdürlüğü-Ankara Şube Müdürlüğü.

CAPERS-KAPARI

Capparis L.



According to the story told among the people in the Southeastern Anatolia region; They encounter a large Lizard and the Snake next to the Caper plant. After each bite of the Lizard, the Lizard runs to the caper plant and bites its leaf, and returns until it moves away from the plant. Finally, the Lizard cannot bite the plant and dies.

Tıbbi Nebevi

”Şehrin üç tarafı kumsaldır; asla çamur olmaz. Havası fazla sıcak olduğundan üzümü lezzetli ve sulu olur. Kumsallığında toprağında ”gebre”adında bir yemiş olur ki sirke turşusu yapılır; gayet faydalıdır. Bu şehirde o turşu meşhur olmuştur.”

Evliyâ Çelebi, Seyahatname

INTRODUCTION

The plant, whose Latin name is *Capparis*, is known as cat's nail, kebere and geyil in Mersin and its surroundings. In other regions, it is also known by names such as kapari, gebre otu, gevil, bubu, şebellah (Yeğenoğlu and Uz, 2011; Till et al., 2011). It grows naturally in places with Mediterranean climate characteristics. Different species and varieties of capercaillie are used almost all over the world for different purposes such as nutrition, treatment, erosion control and ornamental plants. The flower buds, fruit and root bark of the caper plant are diuretic, constipating and strengthening (Yeğenoğlu and Uz, 2011; Anonymous, 2023). The main economic function of capers stems from the use of buds as food. Although the consumption of capers, which is one of the first plants that come to mind in terms of vitamins and minerals in an adequate and balanced diet, is not common in Türkiye, it is much more common in European countries. Capers are also used in pickled form in sauces, pizzas, salads and appetizers (Anonymous, 2023a). Evliya Çelebi discovered the existence of this plant 400 years ago in Osmancık district of Çorum. In his famous Travelogue, he writes: "There is a berry called gebre in the soil of the beach, which can be pickled in vinegar and is very useful." As mentioned in the travelogue, the fact that Goat Island, opposite the Bodrum peninsula, has been called Caper Island for a long time is proof that the history of this plant in Anatolia goes back a long way. Capers are also found in the Ottoman Palace cuisine. In ancient times; During the existence of the Greek Civilization, it is mentioned in the works of scientists that

this plant was used in the treatment of diseases and in cosmetics. Aristotle and Hippocrates (334–322 BC / BC400) write in their works that there are many secrets in the buds of this plant. The benefits of capers are mentioned in Pharaonic tombs in Egypt and in areas from the Renaissance period in Italy. In the Hadith of our Prophet regarding the caper plant: Ibn Abbas (r.a.) said: "I came to the Prophet (peace be upon him) with a pale face." He asked, "O Ibn Abbas, what is this situation?" I said, "I have hemorrhoids. Even though you are young, is it so? You take the flower bud of the Gebere herb, pound it well, then dilute it and drink it." He narrated that he did the same thing and got better (Anonymous, 2023). The medicinal use of this plant can be seen in the ancient Babylonian and Chinese civilizations, as well as in the works of Avicenna and Ibn-ul Baytar.

1. ORIGIN AND MORPHOLOGY

Capers; It is a thorny plant that grows in Asia, the Mediterranean and South Africa. It grows in the Mediterranean and Aegean regions of Türkiye. It is a short plant that grows as seeds. Capers are also called by different names in different regions. Caper thistle, which grows spontaneously in nature, is also known as cat's nail or gober herb (Till et al., 2011; Kapluhan, 2013).

It is a perennial creeping plant with elliptical or oval leaves, the tip of the stipules being curved thorns. The roots of the caper, which is resistant to drought, are very strong and large and can go down to a depth of 40 meters. The flowers of the caper plant are white or slightly

pinkish in color and fragrant, zygomorphic symmetrical or slightly zygomorphic.



Figure 1. *Capparis spinosa* (Illustration by Otto Wilhelm Thomé)

The upper petal may have a long nectarium or a short nectarium depending on the species. Flowering occurs in June and August (Duman and Özcan, 2014). Its fruit is in the shape of a watermelon. When the watermelons ripen and crack, the seeds inside these watermelons are scattered on the ground, allowing the plant to multiply.

2. SOIL AND CLIMATE REQUEST

Caper, known by different names such as geber ot, gebre, snake melon and Keper in different regions of our country, is a bushy, thorny and perennial plant that grows naturally in regions where the Mediterranean climate prevails. Its economic life is on average 25-30 years and it is collected from nature in June-September (Kapluhan, 2013).

The fact that it is not selective in terms of soil requirements, that it can grow in clayey-calcareous-barren desert-like places, in poor and calcareous places, in stony, rocky, lands with low soil amount, and that it is drought-resistant makes the caper a very suitable plant for the economic evaluation of marginal areas that are considered non-agricultural. Roadsides, open areas, field edges, ditches and empty lands are the areas where it spreads more. It is cultivated in mountainous and sloping regions to prevent erosion. It can be cultivated as intercrop in olive and almond areas.

The genus *Capparis* (*Capparaceae*) grows spontaneously in the natural flora of all tropical and subtropical continents around the world. There are approximately 250 species of this genus and only two species

(*C. spinosa* and *C. ovata*) and three varieties of each of these species grow in Türkiye. Generally, *C. spinosa* varieties are naturally distributed in our western and southern coastal regions, and *C. ovata* varieties are naturally distributed in our inner regions, Eastern and Southeastern Anatolia Regions (Anonymous, 2023a).

Caper is a natural plant of the Mediterranean climate and it is possible to see it growing spontaneously in many places up to 1200 altitudes in countries where the climate is dominant. The salt content in the soil should not be high. *Capparis ovata* variety is more common on the coastline. As the altitude increases, *Capparis spinosa* becomes more common. It is possible to come across capers that grow spontaneously, even in barren areas, wherever the Aegean, Mediterranean and Marmara climate prevails in our country. In Central Anatolia, there are naturally existing caper fields as well as cultivated areas in the Osmancık and Dodurga districts of Çorum. It is available in every region in Erzurum İspir, Artvin Yusufeli and all the Southeastern provinces (Anonymous, 2016).

2.1. Capers in Erosion Control

With its features such as drought resistance and spreading and covering the soil surface, it provides great success in the fight against erosion on loose flowing slopes in arid/semi-arid steppe areas. For this reason, capers are also defined as desert plants. In addition, it can be safely planted as a substrate plant covering the soil surface in windbreaks established in areas prone to wind erosion (Coşge et al., 2005). If capers are planted to prevent erosion, they are planted a little

frequently; That is, it should be planted in 2x2 m intervals. Sapling pits should be 30x30x40 cm and 4 saplings should be planted in each pit (1000 saplings per decare). Caper is a slow-burning plant. For this reason, it is a friend of foresters in forest fires. It is used in fire-sensitive areas because it remains green on summer days in the driest season, prevents the development of grass vegetation by covering the soil surface, and cuts wind currents. With caper afforestation, erosion disaster can be prevented and by creating a source of income for the people who collect caper buds, the income level can be increased and migration, which is a big problem, can be prevented (Anonymous, 2016).

3. USAGE AREAS

Different species and varieties of capercaillie are used almost all over the world for different purposes such as nutrition, treatment, erosion control and ornamental plants. In the treatment of various diseases such as rheumatism, blood disorders, paralysis, liver function regulator, multiple sclerosis MS disease, hemorrhoids, diuretic, expectorant, analgesic, analgesic, scurvy, gout, spleen enlargement, hip disorders, menstrual regulator, constipation. The substance obtained by crushing the fruits and buds of the caper, as well as the bark (fresh or dried) and juice of its roots, its pounded roots and leaves, is used directly in the treatment of diseases.

3.1. Alternative Medicine and Its Use in Medicine

The caper plant was mentioned with its beneficial aspects in the tombs of the pharaohs in Ancient Egypt and during the Renaissance in Italy. It has been determined that people in Spain also use the roots of this plant for body care and to make medicine for hemorrhoids (Baydar and Erdal, 2002). It has been observed that the use of vinegar made with capers, which is used to prevent hip disorders, spleen diseases, poisoning, cramps and pain, and to relieve toothaches, dates back to 1544. This plant, which was forgotten for a while, was rediscovered after World War II. It is known that it has been used together with vinegar and mandrake in the cuisine of the Ottomans in Anatolia since the 14th century.

The root bark is the most active part of the plant in terms of the compounds it contains. The flowers, fruits, leaves and roots of this plant, which has medicinal and aromatic properties, have been used as medicine among the public (Duman and Özcan, 2014; Zhou et al., 2011). Studies have shown that this plant has many potentially important therapeutic effects in the treatment of diseases, thanks to the numerous bioactive compounds found in the structure of plant species belonging to the Capparidaceae family (7). Capers are known to have analgesic, anti-inflammatory, antioxidant, antitumoral, diuretic, antidiarrheal, hypoglycemic, expectorant, antibacterial, antiallergic, antihypertensive, antifungal, and antihyperlipidemic effects (Tlili et al., 2010; Huseini et al., 2013). Today, there are many toxic, metabolic, genetic and immune system-related factors that affect the nervous

system. Diseases and disorders caused by these factors on the nervous system are seen as an important problem in today's medicine. Among these, progressive neurodegenerative diseases, such as Multiple Sclerosis (MS), characterized by myelin loss, pose an important problem and there is no complete cure yet (Lassman and Horssen, 2011). It has been reported that plant species belonging to the caper family can be used in the treatment of such diseases and can be considered as a potentially important therapeutic agent.

Today, no fully preventive or curative treatment method for MS is known. Many existing treatments aim to reduce the frequency of attacks, prevent stable disability directly attributed to the attack, alleviate symptoms, prevent disability caused by progression, and prevent continued deterioration (Eraksoy and Akman, 2019). In some studies, it is evaluated as a potentially important therapeutic agent in the treatment of these diseases, thanks to the many bioactive compounds found in the structure of plant species belonging to the caper family. Ozgun et al. They reported that in the experimental multiple sclerosis model created with Experimental Allergic Encephalomyelitis (DAE), the extract obtained from the fruit, bud and flower parts of the *C. ovata* plant significantly suppressed the development of DAE and significantly inhibited the disease activity. They found that this suppression of DAE significantly reduced the expression of some genes involved in inflammatory signaling pathways, while increasing the expression of genes involved in myelination. Accordingly, they showed that caper treatment delayed

and reduced the development of DAE and ameliorated the disorder with persistent clinical findings in mice. In another similar study, it was observed that *C. ovata* extract significantly suppressed the development of DAE and disease activity was completely inhibited when given at the beginning of the immunization for DAE formation, while when applied at the stage when disease symptoms were observed, the maximum score was found to decrease significantly compared to the control DAE group (Özgün et al., 2016).

Regarding Alzheimer's disease, another neurodegenerative disease of the brain, Goel et al. reported that in the D-galactose-induced experimental Alzheimer's disease model, methanol extract of the *C. spinosa* plant reduced learning disorders in mice and significantly increased memory retention time. There are molecules and structures with different bioactive effects in the caper plant. It has been shown that it contains alkaloids and phytosterols, flavonoids, phenolic acids, glucosinolates, antioxidants, quarterner ammonium compounds and vitamins (Gull et al., 2015). In terms of alkaloid content, the spermidine alkaloid found in its structure has been shown to be a molecule with many biological functions and potential therapeutic effects. For example, it has been reported that spermidine alkaloid plays important roles in reproduction, development, growth and proliferation in cells (Fu et al., 2008). It has also been shown that the polyamine alkaloids it contains have antioxidant, antiallergenic, arteriosclerosis-preventing, healthy hair growth-promoting, and anti-inflammatory effects (Özcan, 2004). Studies have shown that the leaves and buds of the caper plant

are very rich in phenolic compounds. These compounds have biological effects and free radical scavenging properties, and the phenolic compounds they contain constitute an important phytochemical antioxidant group (Tlili et al., 2010). *C. spinosa* contains significant amounts of rutin and quercetin, making it an important commercial source. Rutin, also known as vitamin P, is a phenolic compound of plant origin. In addition to its antioxidant, anti-inflammatory and anticarcinogenic effects, this substance prevents the deterioration of the vascular structure (Ao et al., 2007). Caper plant is also rich in tocopherol and carotenoids, which are vitamins of group E. These vitamins are known to reduce the risk of chronic and degenerative diseases such as cancer, cardiovascular disorders and atherosclerosis. Capers also contain a significant amount of vitamin C, which has important roles in the organism such as iron absorption, preventing nitrosamine formation and strengthening the immune system (Tlili et al., 2010).

It has been shown that different types of capers have antidiabetic, immunomodulatory, diuretic, antiallergic, antidiarrheal, antiviral, liver-protective, anti-atherosclerotic, antifungal, antihypertensive, anthelmintic, antidepressant, diuretic and hypolipidemic effects (Singh, 2011; Argentieri et al., 2012). It has been determined that the extract obtained from *C. spinosa* fruits has an antihyperglycemic effect in Type 2 diabetic patients, and statistically significantly reduces the fasting blood glucose level and glycated hemoglobin level compared to patients who have not received caper

application. It has also been determined that caper application reduces blood triglyceride levels statistically significantly in patients. Although the antidiabetic and hypolipidemic effect mechanism of caper has not been fully determined, it has been suggested that these effects may be due to the antioxidant compounds found in caper and Rutin and lectin, which are known to have positive effects on glucose and insulin mechanisms (Huseini et al., 2013). In a study conducted on rats, it was determined that the aqueous extract of *C. spinosa* had a potent lipid-lowering effect in normal and severely hyperglycemic rats.



Figure 2. Flowers and fruits of capers (Anonymous, 2023c)

3.2. Use as Food

Caper, an aromatic plant, is used as a spice. Its buds, leafy shoots and fruits are used for making pickles, jams and marmalade (Figure 2). The export of capers, which are used in the food, cosmetics and

pharmaceutical industries, is generally in the form of brine. Canned capers can be consumed as a side dish with pickles, salads, pizza toppings, fish and game (Anonymous, 2023). The flower buds of capers, which are one of the first plants that come to mind in terms of vitamins and minerals in an adequate and balanced diet, are very rich in minerals. 100 g of edible dry matter contains: 67 mg calcium, 65 mg phosphorus, 9 mg iron, 24.01 g protein.

3.3. Different Areas of Use

Capers are used in the pharmaceutical and cosmetic industry. It has medicinal properties such as strengthening and diuretic; It has cosmetic properties that revitalize and normalize the skin. Its leaves, hardened branches and roots are used in the pharmaceutical, dye and cosmetic industries.

4. CULTIVATION

Capers are grown from seedlings. Sapling production is done with seeds collected from nature. Caper seeds; It is collected from caper fruits, which continue to ripen in the summer months (July, August, September) and are popularly called watermelons. The fruits that have matured and started to crack are collected before they open, the seeds inside are removed, washed and dried, and the dried seeds are stored in a cloth bag in a cool and dry place until planting time (Sarı and Oğuz, 2023).

The seed is sown on the back of the furrow in tempered soil at a distance of 15-20 cm and at a depth of 10 cm at a rate of 6-9 grams per

m². Irrigation should be done inside the furrow. After planting, regular irrigation and weeding are carried out in the nursery. Caper plants should not be overwhelmed by weeds at first emergence. Then, normal maintenance procedures are applied in the nursery. During the summer, well-developed saplings may produce flowers and even fruit. When the above-ground parts of the caper seedlings, whose maintenance process continues in the summer months, dry out, the dried parts are cut 2-3 cm above the soil level and left in the nursery until the time of dismantling (Coşge et al. 2005; Kapluhan, 2013).

At the time of planting fruit saplings, the dismantled seedlings are planted in pits prepared at a distance of 3x3 m or 4x4 m in the field, with the root part down and the branch part up, after placing some soil on top of some burnt barn manure at the bottom. After the planted seedling is covered with 2-3 cm thick soil, a bowl is made around it and it is arranged to benefit from rainwater. Young caper plants that sprout in spring may need to be watered once or twice in the first year in arid regions, even if it is transport water (Coşge et al., 2005).

In autumn, the dried aboveground parts are removed by cutting them at a height of 10 cm from the soil level, as in the nursery, and the plants are covered with 2-3 cm of soil. Starting from the 2nd year, since it is thought that caper plants whose roots reach a certain depth will not need water in the summer, watering is not done unless necessary; However, maintenance work such as weeding and spraying is applied. Following the transplantation of caper plants into the field, buds and flowers appear in well-developed seedlings from the first year onwards

and bud harvesting can be started; However, the economic product is obtained from the 2nd or 3rd year onwards, depending on development. For this reason, the establishment period in capers should be considered as 2 or 3 years (Sarı and Oğuz, 2023; Anonymous, 2023).

5.CONCLUSION AND RECOMMENDATIONS

Although our country has a significant economic potential in terms of wild and cultivated medicinal and aromatic plants with its rich plant diversity, large surface area and different climates, most of the herbal drugs are still supplied by our pharmaceutical industry through imports. The biggest reason for this is our deficiencies in standardization and classification. This will also increase our chances of gaining a share in the European markets by taking advantage of the right of free entry to the European Union countries.

Continuous collection of these plants from the natural flora not only causes the extinction of many plant species, but also leads to the collection of unintended material. The limited number of cultivars of medicinal and aromatic plants in our country causes our farmers to use population seeds most of the time. As a result, products that are unstable in terms of yield and quality are obtained. In addition to increasing our product range, it is of great economic importance to produce drugs that comply with the standards under hygienic conditions and market them not only as raw drugs but also as extracts and essential oils. For this reason, it is necessary to switch to the cultivation of plants whose demand is increasing, to select plant patterns suitable for the regions, to observe their adaptations and to initiate breeding studies.

REFERENCES

- Anonymous, (2016). www.tarım marketi bitki beslemede uzman kuruluř.com
- Anonymous, (2023). Tıbbi-Nebevi Cilt 1 sf.89 Hadis kaynađı: Ebu Nuaym vr. 81 ab
- Anonymous, (2023a). www.Tarım Marketi Bitki beslemede uzman kuruluř.com
- Anonymous, (2023b). Haber7.com
- Anonymous, (2023c). <https://www.gardenia.net/plant/capparis-spinosa>
- Ao M, Gao Y, Yu L. (2007). Advances in studies on constituents and their pharmacological activities of Capparis spinosa. Chin Tradit Herb Drugs. 38, 463-7.
- Argentieri, M., Macchia, F., Papadia, P., Fanizzi, F.P. & Avato, P. (2012). Bioactive compounds from Capparis spinosa subsp rupestris. Ind Crop Prod. 36(1), 65-9.
- Baydar, H., Erdal, İ. (2002). Bitki Büyüme Düzenleyicilerinin İzmir Kekikinin Yaprak Kalitesi Üzerine Etkileri. Ankara Üniv. Ziraat Fak. Tarım Bilimleri Dergisi. 10, 109-113.
- Coşge, B., Gürbüz, B., Söyler, D. & Şekerođlu, N. (2005). Kebere (Capparis spp.) yetiřtiriciliđi ve önemi. Bitkisel Arařtırma Dergisi. 2, 29-35
- Duman, E., Ozcan, M.M. (2014). Physicochemical properties of seeds of Capparis species growing wild in Türkiye. Environ Monit Assess. 186(4), 2393-2398.
- Eraksoy, M., Akman, G. (2004). Merkez sinir sisteminin miyelin has Kapari bitkisinin bioaktif hastalıkları. E. Ö, editor. İstanbul: Nobel Kitapevi. 505-535 p.
- Fu., X.P., Wu, T., Abdurahim, M., Su, Z., Ho,u X.L. & Aisa, H.A. (2008). New spermidine alkaloids from Capparis spinosa roots. Phytochem Lett. 1(1), 59-62.
- Goel, A., Digvijaya., Garg, A. & Kumar, A. (2016). Effect of Capparis spinosa Linn. extract on lipopolysaccharide-induced cognitive impairment in rats. Indian J Exp. 54(2), 126-32.
- Gull, T., Anwar, F., Sultana, B., Alcaide, M.A.C. & Nouman, W. (2015). Capparis species: A potential source of bioactives and high-value components: A review. Ind Crop Prod. 67, 81-96.

- Huseini, H.F., Hasani-Rnjbar, S., Nayeb,i N., Heshmat, R., Sigaroodi, F.K. & Ahvazi, M. (2013). *Capparis spinosa* L. (Caper) fruit extract in treatment of type 2 diabetic patients: A randomized double-blind placebo-controlled clinical trial. *Complement Ther Med.* 21(5), 447-52.
- Kapluhan, E. (2013). An Example of Alternative Agriculture Activities In The Bekilli (Denizli): Cultivating Of Thyme. *Marmara Coğrafya Dergisi, İstanbul – ISSN:1303-2429 E-ISSN 2147-7825* 28,194-210
- Lassmann, H. and Horssen, J. (2011). The molecular basis of neurodegeneration in multiple sclerosis. *Febs Lett.* 585(23), 3715-23.
- Ozcan, M., Haciseferogullari, H. & Demir, F. (2004). Some physico-mechanic and chemical properties of capers (*Capparis ovata* Desf. var. *canescens* (Coss.) Heywood) flower buds. *J Food Eng.* 65(1), 151-155.
- Ozgun, O., Arslan, S. & Sen, A. (2012). An efficient preparation for potential treatment of multiple sclerosis—*Capparis ovata* extract—MSCov: molecular results. *Turk J Biochem.* 37, 120-121.
- Ozgun-Acar, O., Celik-Turgut, G., Gazioglu, I., Kolak, U., Ozbal, S. & Ergur, B.U. (2016). *Capparis ovata* treatment suppresses inflammatory cytokine expression and ameliorates experimental allergic encephalomyelitis model of multiple sclerosis in C57BL/6 mice. *J Neuroimmunol.* 298,106-16.
- Sarı, A.O. and Oğuz, B. (2023). Kapari tarımı. Tarım ve köyişleri bakanlığı ege tarımsal araştırma enstitüsü müdürlüğü
- Singh, P., Mishra, G., Sangeeta, S. & Jha, K. (2011). Traditional uses, phytochemistry and pharmacological properties of *Capparis decidua*: An Overview. *Pharm Lett.* 3(2), 71-82.
- Tlili, N., Khaldi, A., Triki, S. & Munne-Bosch, S. (2010). Phenolic Compounds and Vitamin Antioxidants of Caper (*Capparis spinosa*). *Plant Food Hum Nutr.* 65(3), 260-5.
- Tlili, N., Elfalleh, W., Saadaoui, E., Khaldi, A., Triki, S. & Nasri, N. (2011). The caper (*Capparis* L.): Ethnopharmacology, phytochemical and pharmacological properties. *Fitoterapia.* 82(2), 93-101.

- Yeğenođlu, S. and Uz, A. (2011).Kebere (Kapari) bitkisi: tıbbi ve tarihsel aıdan nemi caper: its importance from historical and medical perspective. Lokman Hekim Journal 2011; Supplement VII. Lokman Hekim Days 11 - 14 May 2011 Fifth Session.
- Zhou, H.F., Xie, C.H., Jian, R.J., Kang, J., Li, Y. & Zhuang, C.L. (2011). Biflavonoids from Caper (*Capparis spinosa* L.) Fruits and Their Effects in Inhibiting NF-kappa B Activation. *J Agr Food Chem.* 59(7), 3060-3065.

LICORICE –MEYAN KÖKÜ

Glycyrrhiza glabra L.



“Rumdan gelir. Dibeklerde dövülüp bir gece su içinde yatırılır. Daha sonra at torbalarının içinde süzülerek kırmızı suyu katre katre akarak kabarcık oluşturur bu çıkan suyu keyifle nuş(içmek) ederler. Bu kökün suyu soğuk olarak içildiği gibi kaynatılarak da içilirdi. Hakîn Davud, Tezkere-i Dâvûd’da, bu bitkinin yetmiş kadar faydasının olduğunu yazmıştır. Vücut-ı insanda olan harareti def eder. Cümleden hassa-i kübrası mesaneyi gayet pak edip idrar söktürür. Ve cümle balgamı yerinden kal’ edip çıkarır. Hakikatte Mısır’ın Nil Nehri balgamidir. Cümle Mısır halkında öksürük mukarrerdir. Bu nedenle çevre diyarlarda evlad-ı Arab’a “ohhu ohhu” diyerek latife ederler”.

Evliya Çelebi, Seyahatname, X., s. 189-266

INTRODUCTION

Licorice plant (*Glycyrrhiza glabra* L.) is known as sweet root or sweet herb. B.C. It is an important plant used for medicinal and industrial purposes since 400 BC. The roots of the licorice plant are known and used as licorice root. It contains starch, sugars, sterols, saponin, flavonoids, amino acids, gum, resin, glabridin and glycyrrhizin (glycyrrhizic acid). The main substance of the root is glycyrrhizin glycoside. Glycyrrhizin (glycyrrhizic acid), one of the most important bioactive components of licorice root, is a water-soluble pentacyclic triterpene glycoside with 50 times more sweetness than sucrose, also known as tea sugar. *G. glabra*, which is found in extreme conditions and topography in nature, is an important medicinal plant of marginal areas. It shows anti-inflammatory, anti-ulcer, anti-allergenic and anti-viral properties (Hennel et al., 2008). It is also a plant genetic resource that is used in many industries and can also be used in the evaluation of marginal areas.

1. ORIGIN AND MORPHOLOGY

Licorice (*Glycyrrhiza glabra* L.), a member of the Fabaceae family, is a perennial shrub that can grow up to approximately 1.5 m. Its homeland is Russia and China. It grows in Mediterranean countries, southeastern Europe and parts of Asia. It is represented by 12 species in the world. Six species are seen in Turkey, one of their homelands (Akan and Balos, 2008; Şerbetçi and Gülçin, 2010; Table 1).

Table 1. *Glycyrrhiza* taxa found in Türkiye (Bizim bitkiler, 2023)

Scientific name	Turkish name
<i>Glycyrrhiza aspera</i> Pall.	küçük meyan
<i>Glycyrrhiza asymmetrica</i> Hub.-Mor.	türk meyanı (endemic)
<i>Glycyrrhiza echinata</i> L.	pıtırak meyan
<i>Glycyrrhiza flavescens</i> Boiss.	sarı meyan (endemic)
<i>Glycyrrhiza flavescens</i> subsp. <i>antalyensis</i> Sümbül, Ö.Tufan, O.D.Düşen & R.S.Göktürk	antalya meyanı (endemic)
<i>Glycyrrhiza flavescens</i> subsp. <i>flavescens</i> Boiss.	sarı meyan (endemic)
<i>Glycyrrhiza glabra</i> L.	meyan
<i>Glycyrrhiza glabra</i> var. <i>glabra</i> L.	meyan
<i>Glycyrrhiza glabra</i> var. <i>glandulifera</i> (Waldst. & Kit.) Regel & Herder	
<i>Glycyrrhiza iconica</i> Hub.-Mor.	konya meyanı (endemic)

G. glabra in our country; It grows throughout Anatolia, especially along river banks, except Thrace, the Marmara region and the Black Sea coast. Mostly; It grows abundantly in Muş, Bingöl, Kars, Siirt, Diyarbakır, Urfa, Şanlıurfa, Gaziantep, Antakya and the banks of the Euphrates River (Figure 1).

To distinguish them from other plants named licorice, those of the *Glycyrrhiza* genus are also called sweet licorice. The name bitter licorice is used for plants of the genus *Sophora*. The name bitter pyan, which is the local dialect form of the same name, is used for yellow licorice (*Thermopsis turcica*). In Türkiye, it is called "Mayan, Biyam, Biyan, Boyam, Piyam, Aşlama, Süs, Tatlıkök" with different names that

vary from region to region. It is called Licorice, Reglisse in Europe, ganco in China, Yashimadhu in India, and Kanzo in Japan. This genus was named *Glycyrrhiza* because Dioscorides mentioned licorice as sweet (glucos) and root (rhiza) in his work "Materia Medica"(Başer, 2006).

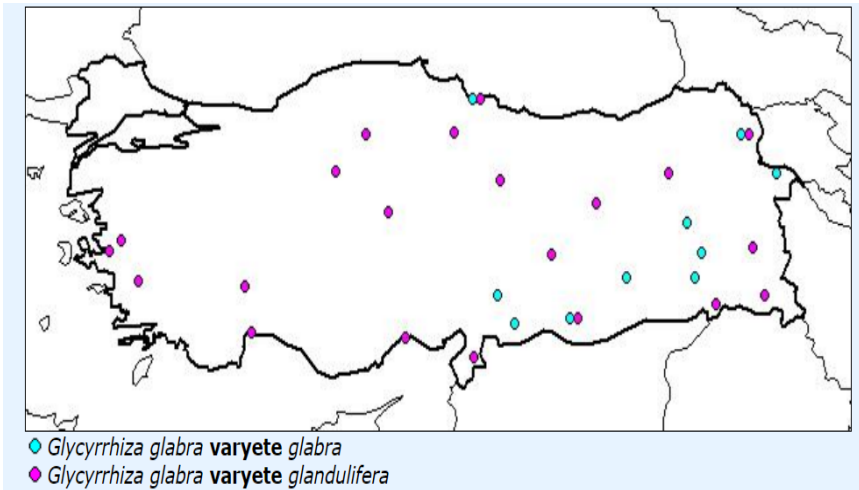


Figure 1. Geographic distribution of some licorice species in Türkiye (TÜBİVES, 2023)

Licorice is a perennial herbaceous plant with 9-17 leaflets, thin long leaves of approximately 7-15 centimeters, reaching 1 meter in length. Its small, bluish, purple flowers are 0.8–1.2 cm tall. It has loose clusters and colors ranging from dark purple to pale whitish blue. Its flowers have a butterfly or spike appearance and can reach up to 15 cm.

Its fruits are blackish red and bean-shaped, containing a few seeds. The fruit has the shape of an oblong shell, 20-30 millimeters long, with several seeds. It has a root structure underground that reaches 1 meter in length. Its roots are branch-shaped (stoloniferous). Roots in

pile form are gray, black, red and brown in color. Glycyrrhiza species have finger-thick, cylindrical, long, yellow inner surface and fibrous roots and rhizomes underground (Figure 2).



Figure 2. Morphological structure of licorice plant (*G. glabra*)
(Anonymous, 2023a)

2. CLIMATE AND LAND REQUIREMENTS

It grows in cultivated fields, alluvial river valleys, and sand dunes at altitudes of 0-1800 meters. It usually blooms in June and July. *“Licorice grows in the Mediterranean basin and adjacent provinces such as Aydın (especially along the Büyük and Küçük Menderes rivers), Adana, Konya, Aleppo, Antep, Urfa (along the Tigris and Euphrates rivers), Syria, Beirut, Cebel and Baghdad, as well as in the Caucasus. Its root is a plant with a sweet black sap that grows in the form of acacia flanders throughout the land by releasing finger-thick roots up to two or three meters deep in wetlands and sandy lands and around river swamps.*



Figure 3. Licorice harvesting in Ağrı and Muş (Anonymous, 2023b)

It takes at least three years for licorice to mature. In the first year, its roots are small and milky, in the second year it turns yellow and becomes a little thicker, but this state is not resistant to sun and cold weather, but it fully matures in the third year. This plant was extracted by peasants and unemployed farmers, especially during the winter season, by digging deep pits and ditches on any land, pastures, water swamps, field ditches and river banks. Licorice roots were harvested from the beginning of August to the end of February. "The villagers were collecting licorice root especially in the rainy months of September, October and November, as the soil softened further in these months." (Evliya Çelebi- Seyahatname, 2005).

Today, licorice roots are extracted from channels opened at a depth of approximately one meter in the autumn months and marketed. It is the main source of income for workers or migrant workers who cannot find work, especially during these months (Figure 3).

3. AREAS OF USE

3.1. Licorice in Turkish Folk Medicine

It is widely believed that licorice obtained from the roots of the plant and licorice sherbet obtained from the extraction of the roots with water are good for passing kidney stones. It is also consumed as hot tea. The roots, which are pounded into powder, are also used as a bulking agent in the preparation of pills.

In some ethnobotanical studies, it is recorded that it relieves pain caused by inflammation and is anti-edema, toxic and anti-constipation.

It is stated that licorice root is good for sore throats and cuts cough when consumed as hot tea (Akan and Balos, 2008). It was determined that the extract obtained from licorice root had a nephrotoxic effect and significantly eliminated and treated the kidney damage caused by gentamicin (Doğan, 2004), and in a study conducted on mice, *G. glabra* was found to have memory enhancing properties (Dhingra et al., 2004).

3.2. Factors Limiting Its Use

Although it is stated that drinks containing licorice juice do not harm health unless consumed excessively, consumption of more than 100 mg to 200 mg of licorice per day is not recommended. Warnings have been made that when used excessively, potassium levels in the body may decrease in some people, there may be irregular heart rhythms, high blood pressure, edema, and heart failure (FDA, 2023). One of the most commonly reported side effects of licorice supplements is high blood pressure. This is thought to be due to licorice's effect on the renin-angiotensin-aldosterone system. In addition to hypertension, patients may also experience hypokalemia (potassium loss) and sodium retention (Lino et al., 2001).

3.3. Licorice in Human Health

It is a plant that grows in Egypt and other countries of the world. It is stated in the records that the dried rhizome and root of the plant were used medicinally by the Egyptians, and were also used as an expectorant and carminative in Chinese, Greek, Indian and Roman civilizations. In Japan, it is stated that it is useful in the treatment of chronic hepatitis, immunodeficiency virus (HIV) and various types of

ulcers, and tropical licorice preparations are used to soothe and heal skin rashes such as psoriasis and herpetic lesions.

Its roots have some nutritional values and medicinal properties. It is used in the preparation and sweetening of some pharmaceutical preparations such as licorice syrup and pills, which are commonly used in colds (Fenwick et al., 1990). Licorice, which is stated to have been used both as a medicine and therapeutic in the ancient medical history of Ayurveda, is a very sweet, moist, soothing and powerful anti-inflammatory that detoxifies and protects the liver. It is also used for various conditions such as arthritis and mouth ulcers. *Glycyrrhiza glabra* root extract; It contains saponin triterpenes (glycyrrhizin, glycyrrhetic acid and liquiritic acid), flavonoids (liquiritin, isoflavonoids and formononetin), coumarins, sugars, amino acids, tannins, starch choline, phytosterols (Arystanova et al., 2001).

3.4. Different Areas of Use

The roots and underground stem (rhizome) of the licorice plant are used as spices. It has a sweet, harsh and salty taste and a pleasant odor. The honey obtained by boiling the roots with water and evaporating the water is shaped into sticks. This honey is used in making desserts, cakes, confectionery and chocolate. Licorice can also be used as a flavoring agent for tobacco or added to cigarette rolling papers. It is also common in Scandinavian countries, especially Denmark and Finland, where liquorice-flavored alcohols are available. In Italy, Spain and France, licorice is loved in its natural form. The root

of the plant is extracted, washed, dried and chewed like gum as a mouth freshener.



Figure 4. *G. glabra* roots, candies, şerbet (Anonymous, 2023c)

The root of the plant is known as "licorice" and is widely used in medicine. The root is delicious and is extracted and used to make cola, licorice candy and licorice sherbet. Licorice sherbet is brewed with licorice root in Gaziantep and Diyarbakır in Syria, Egypt and Turkey, and is consumed as the indispensable drink of the summer months and sold by street vendors. Sherbets are an important legacy of the Ottoman Palace cuisine and Turkish culinary culture. It is a remarkable product in sociology and gastronomy tourism.

Licorice honey and ammoniacal Glycyrrhizin are also used in soft drink production, cocoa, gelatin, pudding and meat products, in

addition to the sugar industry (Ercan, 1978). Glycrrhizinic acid is also used in the production of bleach and hair waving medicine, paint and shoe polish, fire extinguisher in oil fires, foam and paper and sheets are made from root fibers (Kojima, 1980).

4. CULTIVATION

The production area of medicinal and aromatic plants, which are cultivated and traded, has reached 860,000 decares in our country. Licorice root grows in well-drained soils in marginal areas around the world and in our country, especially in deep valleys with full sun. It can be harvested in the fall, two or three years after planting. Licorice root, which grows naturally, is also among the plants that are cultivated and produced. Cultivation and breeding studies are carried out especially in the Eastern Anatolia and Southeastern Anatolia regions. In this context, natural licorice with wild character makes good use of marginal areas in semi-arid regions. However, recently, excessive or uncontrolled harvesting of wild licorice may cause land degradation and/or desertification. For this reason, in order to grow wild licorice in semi-arid regions, it is necessary to ensure effective water management and prevent land degradation. Due to its deep root system, licorice root can adapt well to salty and arid soils. For this reason, licorice root is a plant that can be used to restore soil fertility by increasing the organic matter and biological activity of the soil (Figure 5).



Figure 5. Licorice, naturally distributed in nature (Muş)

5. CONCLUSION AND RECOMMENDATIONS

It is known that the use of marginal agricultural lands, where traditional agriculture is carried out but are not suitable for the use of modern agricultural techniques, and their contribution to ensuring sustainability in production are limited to the plant species to be grown and the contributions of these plants.

In order to meet the increasing food demand, marginal agricultural lands should also be included in the production process and these areas should be evaluated. In this context, licorice root, which is cultivated

and has an important place in foreign trade, is one of our very valuable genetic resources that can utilize marginal areas, is environmentally friendly and will ensure usability and sustainability with the added value it will create.

REFERENCES

- Akan, H. and Balos, M.M. (2008). GAP bölgesi'nden toplanan meyan kökü (glycyrrhiza glabra l.) taksonunun ihracat durumu, etnobotanik özellikleri ve tıbbi önemi. Fırat Üniv. Fen ve Müh. Bil. Dergisi. 20, 233-24.
- Anonymous, (2023a). (Medicinal-Plants - Koehler) Glycyrrhiza_glabra_-_Köhler-s_Medizinal-Pflanzen-207
- Anonymous,(2023b).<https://www.google.com/search?q=meyan+%C5%9Fferbet&tbm=isch&ved=2ahUKEwiBut6pj6CDAX6l0HHUZFDFAQ2->
- Anonymous, (2023c). <https://www.gazetepusula.net/meyan-koku-bolgenin-gecim-kaynagi-oldu/331724/> <http://www.dogubayazitgazetesi.com/haber/meyan-koku-siginmacilarin-gecim-kaynagi-oldu-18650.html>
- Arystanova, T., Irismetov, M. & Sophekova, A. (2001). Chromatographic determination of glycyrrhizic acid in Glycyrrhiza glabra preparation. Chem. Nat. Com. 37, 89-91.
- Başer, K.H.C. (2006). Meyan (Glycyrrhiza glabra L.) Bağbahçe Dergisii. 1(1), 20-21. Bizimbitkiler, 2023. <https://bizimbitkiler.org.tr/yeni/demos/technical/>
- Bozan, B. (1980). Meyan kökünün özütlenmesi ve saflaştırılması işlemleri. Anadolu Üni. Fen Bilimleri Fak. Yüksek lisans tezi, Eskişehir. 91 s.
- Dhingra, D., Parle, M. & Kulkarni, S. K. (2004). Memory enhancing activity of G. glabra in mice. Journal of Ethnopharmacology. 91(2-3), 361-365.
- Doğan, Y. (2004). Ratlarda meyan kökünün oksidatif-antioksidatif sistem üzerine etkileri. Harran Üniv. Sağlık Bil. Enst.Biyokimya, Yüksek lisans tezi.
- Ercan, A. S. (1978). Meyan kökü ve mamülleri ihracatının geliştirilmesi hakkında rapor. IGEME, no:52.
- Evliyâ Çelebi, (2005). Derviş Mehmed Zillî, Evliya Çelebi Seyahatnamesi, (Haz. Yücel DağlıSeyit Ali Kahraman-Robert Dankoff), C. X., Yapı Kredi Yayınları, İstanbul 2005.
- Fenwick, G. R., Lutomski, J. & Nieman, C. (1990). Licorice, Glycyrrhiza glabra L.-composition, uses and analysis. Food Chemistry. 38(2), 119-143.
- FDA, (2023). U.S. Food and Drug Administration <https://www.fda.gov/>
- Hennell., J.R., Lee, S., Khoo, C.S., Gray, M.J. & Bensoussan, A. (2008). The determination of glycyrrhizic acid in glycyrrhiza uralensis fisch. ex dc. (zhi gan cao) root and the dried aqueous extract by LC–DAD. Journal of Pharmaceutical and Biomedical Analysis.47, 494–500.
- Kojima, K. (1980). Natural sweeteners. Azabu Univ. Japan. Shokunu Kagaku. 56, 40-3.
- Lino S, Tango, T. & Matsushima, T. (2001). Therapeutic effects of stronger neominophagen C at different doses on chronic hepatitis and liver cirrhosis. Hepatol Res. 19, 31-40.
- Şerbetci, H. and Gulcin. İ. (2010). Antioxidant and radical scavenging activity of aerial parts and roots of Turkish Licorice (Glycyrrhiza glabra L.). International Journal of Food Properties, 13: 657–671.
- TÜBİVES,(2023). Turkish Plants Data Service. <http://tubives/index.php?sayfa=karsilastir>

HOREHOUND- BOZOT

Marrubium L.



White horehound has been mentioned in conjunction with use as a folk medicine dating at least back to the 1st century BC, where it appeared as a remedy for respiratory ailments in the treatise *De Medicina* by Roman encyclopaedist Aulus Cornelius Celsus.

INTRODUCTION

Marginal areas are among the areas where the soil needs to be protected due to their extreme conditions. Soil conservation strategies aim to establish a good cover on the land and ensure its sustainability. Establishing a good vegetation cover is possible by identifying plants that can grow quickly and provide approximately 50% cover under the current climate and soil conditions. Fast-growing and broad-leaved plants can create longer-lasting and denser cover. Fast-growing crops are species that protect the soil more. For this reason, *Marrubium*, which is one of the plant species suitable for versatile evaluations that are technically, socially and economically beneficial, is a leading plant species in bringing marginal areas into the economy. *Marrubium* genus, one of the leading genera of the Lamiaceae family; It includes herbaceous annual or perennial species that grow on roadsides, calcareous slopes, steppes, eroded hills and places with direct sunlight, at altitudes up to 1400 meters above sea level, and shed their leaves in winter.

The *Marrubium* genus includes approximately 400 species growing in Anatolia, Asia, the Mediterranean Region, Central and Southeastern Europe (Rigano et al., 2007).

In our country, the *Marrubium* genus is distributed in the Eastern, Southeastern, Mediterranean and Aegean regions with 23 species. *Marrubium* species in our country are popularly known as kara derme, sarı derme, ak derme, yayla dermesi, yabancı derme, Van dermesi, Ağrı dermesi, yoksul derme, boz ot, küllü boz otu, başlı boz

otu, köşeli boz otu, it sineği, köpek otu, ak köpek otu, mayasıl otu, kukas otu, köpek ayası, dağ çayı, yay otu, mor yayotu, koca yayotu, boz yayotu, boz kaşık, ak kaşık, bozca boğum, el kurtaran, tuzca boğum, kalar topu, çalba, şalba. The use of *Marrubium* species dates back to ancient times. It is also known by the Latin names "vulgare" meaning simple "album" meaning white and "lanatum" meaning hairy. The plant called (Horehound in English / Bozot in Turkish) is known as very bitter fruit juice because in Hebrew marrob means amaro, mar means bitter and rob means very bitter, and the plant representing this bitter herb is thought to be *Marrubium*.

AD in history. In the 100th year, *Marrubium* was found to be effective against tumors and tuberculosis and BC. In the 500s, it was claimed by Hippocrates to be effective against bronchial and digestive disorders. It is used in urinary tract infections, diabetes, as an antitussive, antipyretic, antispasmodic, neurosedative and anti-inflammatory among indigenous people in Europe and the Middle East (Rigano et al., 2007). It is known that *Marrubium* species are used in the treatment of respiratory diseases, and it is stated that some species of *Marrubium* are used as a carminative in our country (Baytop, 1999) and the Marrubin essential oil it contains has antimicrobial, antioxidant, antibacterial and anticancer properties (Acimovic et al., 2020).

1. ORIGIN AND MORPHOLOGY

Marrubium L. genus is widely distributed throughout the world in North Africa, Asia and Europe (Özhatay et al., 2017). In Türkiye, the *Marrubium* genus, distributed in Eastern Anatolia, Southeastern Anatolia, Aegean, Mediterranean and Black Sea regions, consists of 23 species. 16 of these taxa are endemic (Bizim Bitkiler, 2023). *Marrubium vulgare* is a plant native to European countries bordering the Mediterranean Sea, from Sweden to Great Britain and Portugal, from Türkiye and the Caucasus to Central Asia, Western China, and then in North Africa - Macaronesia, Morocco. *M.vulgare*, which is found in Eurasia from 1900 to 1999, is a common species in Italy, except for the Po valley.

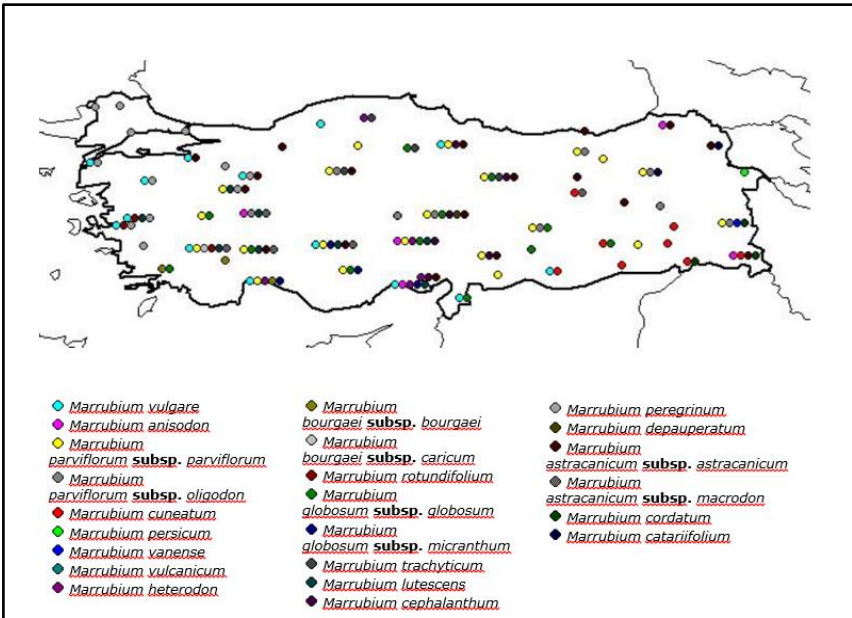


Figure 1. Geographic distribution of some *Marrubium* species in Türkiye (TÜBİVES, 2023)

Marrubium parviflorum Fisch. & C.A.Mey. It is the plant of Türkiye, Iran and Caucasus. *M. vulgare* and *M. parviflorum* are commonly found in our country. The geographical distribution of *Marrubium* species distributed throughout our country is given in Figure 1.

The *Marrubium* genus has annual or perennial herbaceous plants. Its leaves are very hairy. Its calyx is in reverse conical shape, narrow and toothed. The number of teeth is generally 5, in some species it varies between 5-7, and there are species with 10 or more teeth. Its corolla is yellow, white or purple in color and has 2 lips. Stamens (4) are inside the corolla. They generally have star-like plumage. While the main branch is very long, the side branches are quite short. Therefore, if the indumentum is very dense, the feathers can be perceived as simple feathers. In most species, simple hairs are found on the upper surface of the leaves.

Marrubium vulgare; It is a perennial herbaceous plant with gray leaves and can reach 60 cm in height. Its 2-5 cm long, heart-shaped, wrinkled leaves on the trunk and stems have toothed edges and the leaf tips are covered with wooly hairs. Its flowers are white and are in clusters on the upper part of the main stem. The petals are whitish, white, cream colored and the sepals and petals are covered with star-like hairs. (Davis, 1982; Figure 2).



Figure 2. *Marrubium vulgare* (Anonymous, 2023a)

M. parviflorum is a perennial, herbaceous, usually sparsely or very branched, with rather thick and light brown roots. The body length is 13-28 cm and the stem and leaves are hairy. The crown structure is cylindrical. Flowers are yellow or yellowish white (Davis, 1982; Figure 3).



Figure 3. *Marrubium parviflorum* (Anonymous, 2023b)

2. CLIMATE AND LAND REQUEST

Marrubiums are early plants of eroded fields, roadsides, canal banks, sheep camps, rabbit warrens and other degraded abandoned areas. Marrubiums prefer acidic or neutral sandy dry soils and enjoy full sun. In general, Marrubium species are distributed in roadsides, chalky coastal edges, steppes, eroded hills, rocks, creeks, calcareous meadows and slopes, and arid fallow fields.

Marrubium vulgare likes sunny, alkaline and dry soils away from cold breezes. It lives in regions where the ambient temperature is above -15°C . It prefers permeable and moist soil. The habitat of *Marrubium vulgare* is deserted places and roadsides, uncultivated lands, ruins, and arid grasslands. The areas where they grow are alkaline,

calcareous, dry and rich in organic matter and minerals. Altitude distribution is up to 1200 m above sea level. It can grow in areas with annual rainfall below 200 mm and is quite tolerant to drought and frost. Not resistant to floods (Weiss and Sagliocco, 2012). In general, they are common *Astragalus*, *Thymus*, *Artemisia*, *Daphne*, *Marrubium*, *Euphorbia*, *Verbascum* types of steppe vegetation. Vegetation may have been destroyed or completely destroyed in pastures due to reasons such as overgrazing, use of some plants as fuel, wrong land use, wrong tillage, opening of pastures to different uses, wrong cultivation techniques. One of the plants that can survive in these areas is *Marrubium parviflorum*. *Marrubium* is often found in unfavorable and overgrazed areas. *M. parviflorum* is distributed in steppes, rocky slopes, fields and roadsides at altitudes reaching 450-2350 meters. It is extremely unpleasant for farm animals. *Marrubium* is an important plant that should be utilized both in these areas and brought into the economy with its versatile usage opportunities.

3. AREAS OF USE

3.1. Alternative Medicine and Its Use in Medicine

Marrubium genus is a medicinal and aromatic plant used in both traditional and modern medicine. It is stated that *Marrubium* was used as a folk medicine, especially in the treatment of respiratory diseases, in ancient times dating back to the 1st century BC (Aulus Cornelius Celsus- De Medicina). While some *Marrubium* species have antioxidant, vasorelaxant and hypotensive effects, some species have anticancer, anti-microbial, analgesic, anti-inflammatory or antidiabetic

effects. Components of *Marrubium* species are labdane diterpenes, phenylethanoid glycosides, flavonoids and sesquiterpenes. (Argyropoulou and Skaltsa, 2012). *M. vulgare* produces a structurally diverse group of secondary metabolites and is a source of bioactive compounds and preparations with health-promoting effects. For this reason, its antioxidant, hepatoprotective, antiproliferative, anti-inflammatory, antidiabetic and antimicrobial properties constitute the focus of research. The effects of *M. vulgare* extracts, essential oil, marrubiin, flavan and flavonol type flavonoids and phenylethyl esters are being investigated. *M. vulgare* is part of traditional medicine systems worldwide and is generally considered safe. (Acimovic et al., 2020)

They have traditionally been used as analgesics to treat a variety of diseases and relieve pain, including asthma, pulmonary infections, inflammation, and hypotension. *M. vulgare*, which can also be used in chronic cough and cold, various disorders related to the immune system, skin, liver, stomach, heart and other organs, has therapeutic potential in the treatment of inflammatory conditions. However, to further investigate the clinical efficacy, toxicity and therapeutic effect of *M. vulgare*, it is necessary to investigate its secondary metabolites such as diterpenes, phenylpropanoid and phenylethanoid glycosides (Lodhi et al., 2017). The for *Marrubium*'s active ingredients: Diterpene lactones (marrubiin and premarrubiin), diterpene alcohols (marruciol, marrubenol, sclareol, peregrinin, dihydroperegrinin), essential oil (α-pinene, sabin, limonene, camphene, p-cymol, α-terpinolene), flavonoids

(apigenin, luteolin, quercetin), alkaloids, tannins, phytosterols and alkanes.

Marrubium vulgare is a plant with high bioactive potential. This genus contains marrubiin (labdan diterpene). This species is also known to be used in Chinese medicine. Marrubiin (30.0 $\mu\text{mol/kg}$, i.p.), isolated from *Marrubium vulgare*, has a strong antinociceptive effect in relieving abdominal pain. It has been determined that the pharmacological effect of Marrubiin may involve a peripheral mechanism (Tao et al., 2016).

Standardization of the *M. vulgare* strain according to European Pharmacopoeia criteria is defined by its marrubiin content. This species is declared a food additive in the USA and is one of the ingredients of the Ricola throat lozenge, where it is described in the monographs of the German commission E as a cold treatment, digestive and choleric. (Villanueva and Esteban, 2016). It is generally used as a cough suppressant, in the treatment of rabid dog bites, as an expectorant, in sore throats, respiratory system diseases, and in the treatment of disorders such as loss of appetite and indigestion. (Farzaneh et al., 2005; Blumenthal and Goldberg, 2000).

Used in traditional medicine in Morocco, Thujanone, Eugenol, Topanol, Menthone, etc. It has been stated that it is very rich in bioactive compounds such as and can be used as an alternative to other chemicals as a natural antioxidant and antifungal agent (Zaër region-Morocco) (Rached et al., 2022).

Marrubium parviflorum subsp. *oligodon* is a perennial herbaceous plant endemic to Türkiye and grows mainly in Central Anatolia. The plant, locally known as mountain tea, is used in the Eastern Anatolia region as a cold and antipyretic (Altundağ and Öztürk, 2011).

Tea prepared from the aerial parts of *M. parviflorum* is a diuretic and chest compress in Türkiye (Koyuncu et al., 2010). *M. parviflorum* has a rich content in flavonoids, phenylethanoid glycosides and caffeoylquinic acid derivatives. As is known, these compounds have antioxidant and analgesic activities. With these activities, *M. parviflorum* is a plant with medicinal potential. (Delnavazi ve ark., 2017). In the lakes region, its leaves, shoots and flowers; It is used as a pain reliever, diuretic and breast softener (Doğanoğlu et al. 2006); It is stated that the *Marrubium cuneatum* plant is used in Adıyaman Besni for kidney stones and swelling by boiling 200-300 grams of dried bozot in 5 liters of water until the water is reduced by half, cooling it and drinking a glass of it every day before going to bed (Gültaş, 2009). In Malatya, herbal tea (infusion) prepared with the leaves of the same species and tea prepared with the leaves and flowers of another species (*Marrubium astracanicum* subsp. *astracanicum*) are consumed for abdominal pain (Tetik, 2011).

In an ethnobotanical study conducted in Nevşehir, *Marrubium parviflorum* subsp. It is reported that oligodone is used in making tea prepared as herbal mixtures. The dried aboveground parts of the plant

are consumed internally as tea prepared with thyme and quince leaves. (Şenkardes and Tuzlacı, 2016).

3.2. Factors Limiting Its Use

It is a species that animals, especially small ruminants, will not graze on when there are plants that they may enjoy and prefer as a priority. Animal husbandry people consume *Marrubium* species when sheep cannot find grass, and the sheep that consume this plant; It is stated that its milk, meat, liver and tripe are very bitter and lose their flavor. (Öztürk ve Görhan, 2012).

3.3. Different Areas of Use

Marrubium and other members of the Lamiaceae family are densely nectar-rich, aromatic and fragrant, with dense glandular hairs and are used in industry, beekeeping, as food and tea, in cosmetics, as ornamental plants and in the pharmaceutical industry as medicinal plants. Since many of the members of this family have a wide range of uses, they are cultivated such as mint and thyme and are also collected from nature (Metcalf and Chalk, 1950). Some species of the *Marrubium* genus, whose medical use and importance are at the forefront, are used for different purposes in the world and in Türkiye. In addition, the intense nectar content of some species increases the interest in this family in beekeeping (Komarov, 1964). *Marrubium* is the primary plant for bee pollination. (Farzaneh et al., 2005; Blumenthal and Goldberg, 2000). *Marrubium* species are also used as food plants (hosts) on which the larvae of some *Lepidoptera* species, including *Coleophora lineolea*, feed (Anonymous, 2023c). Some species of the

Marrubium genus (such as *M. vulgare*) are also grown in gardens for ornamental purposes with their thin white flowers. It is used as an ornamental plant, especially due to its feathery leaves that secrete fragrant essential oils, and is cultivated for this purpose. Leaves are used as spice and tea (Bilir et al., 2009). It is also reported that *Marrubium*, whose herbal extracts are used in soft drinks, frozen milk desserts, puddings and chewing gum, is also used in children's games in our country (Oymak, 2018).



Figure 3. *Marrubium* herbs and candies (Anonymous, 2023d)

4. CULTIVATION

It grows spontaneously in marginal areas around the world and in our country, especially in sunny soils up to an altitude of 600 meters. It is possible to produce it with seeds and cuttings.

5. CONCLUSION AND RECOMMENDATIONS

In bare areas devoid of vegetation, it is inevitable for the soil to be exposed to water and wind erosion and, naturally, to have high soil losses. For this reason, the fertile upper part of the soil is removed by erosion, leaving behind a soil cover poor in organic matter and other nutrients. In order to prevent erosion, plants that grow naturally in areas devoid of vegetation are gaining importance. Marginal agricultural land; Absolute agricultural lands are lands on which only traditional tillage agriculture is carried out due to soil and topographical limitations, excluding special crop lands and planted agricultural lands. Due to reasons arising from the extreme climate and soil structure, the plants that can be grown in these areas should be plants that are adapted to these areas or are easy to adapt to prevent erosion and strengthen the vegetation. *Marrubium* species, which have different areas of use, especially stand out with their medicinal use, are valuable plants that can be used in the evaluation of marginal areas.

REFERENCES

- Acimovic, M., Jeremic, K., Salaj, N., Gavaric, N., Kiprovski, B., Sikora, V. & Zeremski, T. (2020). *Marrubium vulgare* L.: A Phytochemical and Pharmacological Overview. *Molecules*. 25(11), 2898.
- Altundag, E. and Ozturk, M. (2011). Ethnomedicinal studies on the plant resources of east Anatolia, Türkiye. *Procedia-Sosial and Behavioral Sciences*. Volume 19, pp.756-777.
- Anonymous, (2023a). *Marrubium vulgare* 9, Malrove, Saxifraga-Ed Stikvoort <http://www.freenatureimages.eu/plants/Flora%20Marrubium%20vulgare%20White%20Horehoundindex.html#Marrubium%2520vulgare%252009%2520Malrove%2520Saxifraga-Ed%2520Stikv>.
- Anonymous, (2023b). *Marrubium parviflorum* 2, Saxifraga-Ed Stikvoort <http://www.freenatureimages.eu/plants/Flora%20Marrubium%20parviflorumindex.html#Marrubium%2520parviflorum%252002%2520Saxifraga-Ed%2520Stikvoort.jpg>
- Anonymous, (2023c). *Marrubium vulgare*. <https://en.wikipedia.org/wiki/marrubium-vulgare>
- Anonymous, (2023d). *Marrubium* <https://www.dreamstime.com/photos-images/horehound.html>
- Argyropoulou, C. and Skaltsa, H. (2011). Identification of essential oil components of *Marrubium thessalum* Boiss. & Heldr, growing wild in Greece. *Natural Product Research*. 2011, 1–7, iFirst
- Baytop, T. (1999). Türkiye’de Bitkiler ile Tedavi, Geçmişte ve Bugün. İstanbul Üniversitesi Eczacılık Fakültesi Yayınları, İstanbul. 550s.
- Bilir, P., Akgül, G., Kuyumcu, S., Güler, Ş. & Çelik, H. (2009). *Marrubium* L. (Lamiaceae) türlerinin etnobotanik özellikleri. XVI. Ulusal Biyoloji Öğrenci Kongresi, Bildiri, 1-4 Temmuz, Niğde Üniversitesi Fen Edebiyat Fakültesi Biyoloji Bölümü, Niğde.
- BİZİM BİTKİLER (2023). Türkiye Bitkileri Listesi, Nezahat Gökyiğit botanik Bahçesi. <https://bizimbitkiler.org.tr/list.html>

- Blumenthal M., Goldberg A. Brinckmann. herbal medicine: expanded commission e monographs, copyright american botanical council. Publ. Integrative Medicine Communications. 130-133.
- Davis, P.H. (1982). *Marrubium vulgare* L. Flora of Turkey and the East Aegean Islands, Vol: 1-9 and Supplements, (1965 - 1988). Edinburgh University Press. Edinburgh, U.K.
- Delnavazi, M.R., Yassa, N., Shakeri, A. & Rostamiasrabadi, P. (2017). *Marrubium parviflorum* Fisch.&C.A.Mey.; phytochemical constituents and antioxidant activity, Research Journal of Pharmacognosy. 4, 79.
- Dođanođlu, Ö.,Gezer, A. & Yücedađ, C. (2006). Göller bölgesi-yeniřarbademli yöresi'nin önemli bazı tıbbi ve aromatik bitki taksonları üzerine arařtırmalar. Süleyman Demirel Üniversitesi Fen Bilimleri Enstitüsü Dergisi. 10(1),66-73.
- Farzaneh F., Mosaddegh M., Motamed S. M. & Abdolbaset, G. (2005). Lamiaceae in folk medicine in Iran: from ethnobotany to pharmacology, Iranian Journal of Pharmautical Research. 2, 63-79.
- Güldař, N. (2009). Adıyaman İlinde Etnobotanik Deđeri Olan Bazı Bitkilerin Kullanım Alanlarının Tespiti. Yüksek Lisans Tezi, Biyoloji Anabilim Dalı, 53 sayfa.
- Koyuncu, O., Yaylacı, O.K., Ozturk, D., Potoglu Erkara, I., Savaroglu, F., Akcoskun, O. & Ardic, M. (2010). Risk categories and ethnobotanical features of the Lamiaceae taxa growing naturally in Osmaneli (Bilecik/Türkiye) and environs. Biological Diversity and Conservation, 3(3), 31-45.
- Komarov V.L. (1964). Flora of U.S.S.R, Vol. XIV, p. 155-165. Jerusalem/ Israel Program for Scientific Translations.
- Lodhi, S., Prakash Vadrere, G., Kant Sharma, V. & Usman, Md. R. (2017). *Marrubium vulgare* L.: A review on phytochemical and pharmacological aspects. J. Intercult Ethnopharmacol, Vol 6, Issue 4.
- Metcalf C. R. and Chalk, L. (1950). Anatomy of Dicotyledons, Oxford University Press.1950.

- Oymak, E., (2018). Bozova (Şanlıurfa) Halkının Kullandığı Doğal Bitkilerin Etnobotanik Özellikleri T.C. Harran Üniversitesi Fen Bilimleri Enstitüsü Yüksek Lisans Tezi, 2018 Şanlıurfa, 119 sayfa.
- Öztürk, F. and Görhan, K. Ö., (2021). Marrubium türlerinin mersin arıcılığındaki yeri ve önemi. MAS Journal of Applied Sciences. 6(3), 502–507.
- Özhatay, N., Kültür, Ş. & Gürdal, B. (2017). Check-list of additional Taxa to the supplement flora of Türkiye VII. Istanbul Journal of Pharmacy. 47(1), 30-44.
- Rached, S., Imatara, H., Habsaoui, A., Mzioud, K., Haida, S., Saleh, A., Al Kamaly, O., Alahdab, A., Parvez, M. K., Ourras, S., & El Fartah, S. (2022). Characterization, chemical compounds and biological activities of Marrubium vulgare L. Essential Oil. Processes 2022, 10, 2110. <https://doi.org/10.3390/pr10102110> <https://www.mdpi.com/journal/processes>
- Rigano, D., Forminaso, C., Basile, A., Lavitola, A., Senatore, F., Rosselli, S., Bruno, M. (2007). Antibacterial Activity of Flavonoids and Phenylepropanoids from Marrubium globosum ssp. libanoticum. Phytoter. Res. 21(1), 395-397.
- Senkardes, İ. and Tuzlacı, E. (2016). Wild edible plants of southern part of Nevşehir. Marmara Pharmaceutical Journal. 20, 34-43.
- Tao, Liu., Ning, Wang., Li, Zhang., Linda, Zhong. (2016). Chinese herbal medicine for functional abdominal pain syndrome: from clinical findings to basic understandings. hindawi publishing corporation evidence-based. Complementary and Alternative Medicine. Volume 2016, Article ID 8652523, 9 pages <http://dx.doi.org/10.1155/2016/8652523>
- Tetik, F. (2011). Malatya ilinin etnobotanik değeri olan bitkileri üzerine bir araştırma. T. C. Fırat Üniversitesi Fen Bilimleri Enstitüsü, Yüksek Lisans Tezi (yayınlanmamış). 128 s.
- TÜBİVES, (2023). Turkish Plants Data Service. <https://www.tubives/index.php>
- Villanueva R. J. and Esteban, M. J. (2016). An Insight into a Blockbuster Phytomedicine; Marrubium vulgare L. Herb. More of a Myth than a Reality? Phytotherapy Research (Review). 30(10), 1551–1558.
- Weiss, J. and Sagliocco, J.L. (2012). Marrubium vulgare L.–horehound Biological Control of Weeds in Australia, 2012 - books.google.com

RHUBARB – RAVENT- İŞGIN

Rheum ribes L.



“Bu dağda bütün hekimlerin ilaçları olur. Tutya çiçeklerinin kokusundan insanın dimağı kokulanır. Ve reybas, ışkın, sütlüce, cacıh, kiji, tere, râvend, cedvar, yebruhu's-sanem (adamotu), şahtere ve nice bin çeşit şifalı otlar bu dağda mevcuttur. Çeşit çeşit yergülü, kengeri, evşesi (şebnemi), râvendi, yebrûhu's-sanemi (abdüsselâm, kankurutan otu) ve sünbül-i ve usfûri ve nergisi, kısacası bütün hekimlere layık ağaçları ve otları olur ki hesabını Cenâb-ı Barî bilir.”

Evliyâ Çelebi, Seyahatname

INTRODUCTION

Benefiting from nature and using natural vegetation in different areas and needs reveals the plant-human communication that has been going on for centuries in the world and in our country. The use of plants found in nature for food and health purposes is increasing day by day. Türkiye, which is rich in flora and fauna in three phytogeographic zones, has a very important place in terms of natural plants collected from nature and used for food and health purposes with its different climate and ecological conditions.

In the statements made by WHO, it is stated that the number of medicinal and aromatic plants used in the world is around 20 thousand and 4 thousand of them are widely used. In a previous study, it was determined that the use of natural medicinal and aromatic plants in Erzurum and Bayburt was for food and health purposes, and that the leaves and fruit parts of the plants were mostly used (Kadioğlu et al., 2021).

Known as ışgın or Eşgın in Erzurum, the variations of ışgın in the colloquial language are ışkın, ışgın, ıçkın, uçkun, uşgun, uşgun, uşkun, aşgın, Akşam, Eşkin, Eşgi. In Divânu Lügati't-Türk, rhubarb is defined as "a herb with red flowers whose syrup is good for smallpox". The name Işgın is also used in a broad sense in Turkish as the genus name of rhubarb. The name Anatolian rhubarb or Anatolian rhubarb (Özgen et al., 2016) is also used as *Rheum ribes* in Turkish sources. The Latin species name *Rheum ribes* literally means blackcurrant rhubarb, and its epithet (*ribes*) comes from the Arabic genus name of blackcurrant

(*Ribes*) (Taji, 1998). It is used in English as warty-leaved rhubarb (warty-leaved rhubarb or warty-leaved rhubarb (Anonymous, 2022)). The rhubarb stem, which resembles a kiwi with a tart taste, is easily peeled and eaten like a banana, so it is called plateau banana (Gürhan and Ezer, 2005; Güneş and Özhatay). , 2015; Konak and Aktar, 2009), mountain banana (Özgen et al., 2012; Gençay, 2007) or eastern banana.

In 100 g edible part of the plant; it contains 20.4 mg ascorbic acid, 2.25 g protein, 0.24 g fat, 1.15 g ash, 25.1 mg phosphorus, 114.4 mg potassium, 60.3 mg calcium, 24.6 mg sodium (Alan and Padem, 1989).

Uşkun, 5.59% dry matter, 0.63% total ash, 1.3% protein, 3.75 µg/g iron, 1.13 µg/g zinc, 0.5 µg/g copper and 0.423 µg/g manganese (Andiç et al., 2009), 0.255 µg It contains /g vitamin A, 0.614 µg/g vitamin E and 98.6 µg/g selenium (Munzuroglu et al., 2000).

Although it varies depending on the region, rhubarb, which is collected and sold at the end of spring and the beginning of summer in Türkiye (such as late April, May, early June), can be consumed raw or cooked. Unfortunately, rhubarb, which is important as a medicinal plant with different areas of use, is in danger of extinction because it is collected unconsciously and with inappropriate methods. Therefore, necessary precautions should be taken to protect these species.

1. ORIGIN AND MORPHOLOGY

Rhubarb, which grows in the Iran-Turan phytogeography, is distributed in Türkiye, Syria, Israel, Palestine, Jordan, Lebanon, Armenia, Azerbaijan, Iraq, Iran, Afghanistan and Pakistan. The places where it grows most densely are Eastern and Southern Anatolia, Northern Iraq and Northwest Iran, and it is the only *Rheum* species that grows at altitudes of 1800 to 2800 meters (Türmen et al., 2005).

It is the only rhubarb (*Rheum*) species that grows wild in Türkiye and is found in the eastern provinces (Ağrı, Muş, Bitlis, Bingöl, Elazığ, Erzincan, Malatya, Tunceli, Hakkâri, Van, Erzurum, Iğdır, Kars, Sivas, Adıyaman, Kahramanmaraş and Hatay). (Mount Amanos) spreads at altitudes of 1800 - 2800 m. Although it is not currently endangered in Türkiye, excessive collection for commercial purposes is one of the main factors that threaten the future of the species (Anonymous, 2022a).

The plant, which spreads only in the Nakhchivan Autonomous Republic in Azerbaijan, has been included in the Azerbaijan Red Book since 1989 and is in the category of almost threatened species (NT). It can be seen on stony slopes in Duzdağ, Valıdağ, Gışlag, Darıdağ and Nohudağ regions (Ibadullayeva et al., 2011).

It is one of the four species of the genus *Rheum* in Iran. Other species are *Rheum turkestanicum*, which is also seen in Turkmenistan and Uzbekistan, and *Rheum persicum*, which is endemic to Iran. The fourth and final species is *Rheum khorasanicum*, discovered in Razavi

Khorasan Province in Northeastern Iran in 2012, and is morphologically very similar to and confused with the *Rheum ribes* species. All species in Iran are classified in the nominate section. It is one of the seven *Rheum* species (*Rheum australe*, *Rheum moorcroftianum*, *Rheum ribes*, *Rheum spiciforme*, *Rheum tibeticum*, *Rheum webbianum*, *Rheum wittrockii*) in Pakistan and is found in dunite rocks, stony and hilly terrain at altitudes of 1800 m in Balochistan province (between Shogot and Lutkho) (Ibadullayeva et al., 2011; Jafari et al., 2012))

It is the only *Rheum* species in Lebanon and occurs in mountainous areas at an altitude of 1500 m. It is one of two *Rheum* species (*Rheum ribes*, *Rheum palaestinum*) in Syria and Jordan. One of the two species of the genus *Rheum* in Israel is *Rheum ribes*, which grows on Mount Hermon, which is part of the Golan Heights, which it annexed in 1981 when it was Syrian territory; The other species is *Rheum palaestinum* (desert rhubarb) species seen in the Negev Desert (82). *Rh. palaestinum* species is endemic to Israel and is on the red list, while *Rh. ribes* species is not on the red list (Jafari et al., 2012).

Rhubarb (*Rheum ribes*), belonging to the Polygonaceae family, one of the medicinal and aromatic plants scientifically proven to be a panacea, growing naturally in the eastern regions of our country, especially in Erzurum province, is pollinated by the wind and creates its own hybrid species. Rhubarb, a hardy and herbaceous plant (Andiç et al., 2009), grows on rocky and gravelly slopes at altitudes of 1800-

2800, 2300-2700 or 1000-4000 meters and grows up to 40-50 cm (Baytop, 1997).

Rhubarb, which is a perennial with elephant-ear-like leaves and fragrant yellowish-white flowers in May-June (Baytop, 1997), is one of the 103 *Rheum* species described. Its reddish and brown broad-winged fruit has a three-cornered structure. Rhubarb, a perennial herbaceous plant with tap roots, is the only rhubarb species that grows wild in Türkiye (Baytop, 1984). It spreads at an altitude of 1800-2800 m on the Amanos Mountain in Ağrı, Muş, Bitlis, Bingöl, Elazığ, Erzincan, Malatya, Tunceli, Hakkari, Van, Erzurum, Iğdır, Kars, Sivas, Adıyaman, Kahramanmaraş, and Hatay (Meral, 2017).



Figure 1. Rhubarb leaf, flower and seed shape (Anonymous, 2023)

2. CLIMATE AND LAND REQUEST

Uskun plant, which is widely used throughout Türkiye and used for medicinal purposes, grows in marginal areas such as stony, rocky, high altitude and gravel slopes (Munzuroğlu et al., 2000).



Figure 2. General view of rhubarb growing area (Anonymous, 2023)

Rhubarb, a temperate climate plant, is also resistant to cold climate conditions. Rhubarb germinates at 10 - 12 °C and shows optimum development at 18 - 20 °C. Rhubarb is damaged at temperatures above 25 °C and its stems weaken, become loose and lose their color in extreme temperatures. Sensitive to sudden temperature changes, rhubarb likes sunny and humid environments, and light darkens the color of the plant. The ideal humidity rate is 70% (Anonymous, 2022).

Rhubarb, which is not very picky about soil, grows in almost all soil types. Although the yield and stem quality increase in poorly drained, clayey soils, harvest time is late. It can also grow in sandy-loamy soils with adequate irrigation and fertilization. The ground water level below 1 - 1.5 meters and the pH range of 6 - 7 are ideal for the growth of rhubarb (Anonymous, 2022).

3. USAGE AREAS

3.1. Alternative Medicine and Use in Medicine

Rhubarb, which is fondly consumed with its tart taste and called plateau banana in the east, has been scientifically proven to be a panacea. The plant, colloquially called herb or rhubarb, is considered a natural medicine and is used in the treatment of many serious diseases with the chemicals it contains. Nowadays, the use of natural antioxidants instead of the harmful effects of synthetic antioxidants for health tends to increase day by day.

The fresh shoots of rhubarb, which are thought to be rich in antioxidants and vitamins, are rich in vitamin C, but are poor in vitamins A and E. In terms of nutrition, the amount of selenium is sufficient (Munzuroğlu et al., 2000). In the regions where it grows, rhubarb is used against acne, diarrhea, stomach disorders, hemorrhoid treatment, and diabetes (Baytop, 1984; Özbek et al., 2002; Özgen et al., 2012; Gürhan and Ezer, 2005; Güneş and Özhatay, 2011). It is very popular in pharmacological research due to its potent active ingredients. Extracts from rhubarb are among the subjects of pharmacological research in the treatment of type 2 diabetes in Iran (Oktay et al., 2007; Krishnaiah et al., 2011). The polyphenol content of rhubarb, which began to be studied pharmacologically in the 1940s, increases when cooked (Sayyah et al., 2011).

The antioxidant activity of *Rheum ribes* root and stem extracts is quite high. Extracts obtained from rhubarb contain antimicrobial substances that affect bacterial and fungal growth at different rates

(Kırbağ and Zengin, 2005), and these extracts are also effective against gram-negative bacteria (Bazzaz, 2002). In a study investigating the gastric protective effectiveness for peptic ulcer, methanolic and aqueous extracts obtained from rhubarb leaves were used and found to have a protective effect comparable to the standard ulcer drug cimetidine, which inhibits stomach acid production (Rakesh, 2010).

The extract obtained from rhubarb flower is thought to be an inhibitor that prevents spore germination and growth of fungi that cause diseases in plants (Ghorbany and Salary, 2018). Hypercholesterolemia is the main cause of coronary heart disease (CHD). In a study examining lipid concentrations in hypothyroid rabbits, it was determined that rhubarb extract reduced plasma lipids in rabbits more than niacin. For this reason, rhubarb is thought to be potentially hypolipidemic and can be used in the treatment of hypercholesterolemia and hyperglyceridemia, which are risk factors for coronary heart disease (Hadjzadeh and Jafary, 2004).

In the study, the antiviral effects of ethanol extract obtained from 16 medicinal plants in Türkiye were examined on the herpes simplex (HSV) virus, which causes cold sores, and the sindbis virus (SINV), which causes sinus fever. It was determined that extracts of snowdrop species (Taurus snowdrop, *Galanthus elwesii*) and rhubarb (*Rheum ribes*) had the strongest anti-HSV effect (Hudson et al., 2000).

R.ribes, which is especially useful in the prevention and treatment of leukemia cancer, is also of great importance as it is rich in polyphenols. British scientists stated in their research that rhubarb may

be effective in the fight against cancer and that this plant can prevent the development of cancerous cells (Yıldız, 2014).

It was determined in the study that rhubarb, like red vegetables, is rich in polyphenols, which are cancer-preventing substances. In a study conducted on mice in the USA, the red pigments found in rhubarb were injected into cancerous cells and it was observed that approximately half of the cancerous cells disappeared in a short period of 2 days (Asghar et al., 2018).

Rhubarb (*Rheum ribes* L.), which grows naturally in the east of Türkiye, is used not only for pleasure but also for healing, its young stems and roots are widely used in folk medicine and is also consumed as a vegetable, and is widely used for the treatment of diabetes and hemorrhoids.

Rich in vitamin C, rhubarb also contains vitamins A, B1, B2, E and K. Scientific studies have also determined that light plays an important role in the renewal and development of cells. In a study conducted in Kop Pass between 2013 and 2016, 42 taxa were identified for food + treatment purposes. It was noted that rhubarbs was used as a medicinal plant in the treatment of diabetes and hemorrhoids (Kadioğlu et al., 2021).



Figure 3. Rhubarb consumption overview from KopPass (Kadıoğlu et al., 2021a)

Since rhubarb, which is widely used among the public for health purposes, is rich in tannin content (8-10%), its roots are used as an anti-inflammatory (Özbek et al. 2002; Tosun and Kızılay, 2003). In Van, Bitlis, Erzurum, Kars, Şırnak Cizre, rhubarb roots are used in the treatment of hemorrhoids and to create a hypoglycemic effect in people with diabetes, cholesterol and stomach diseases, and in Jordan for hypertension, diabetes, kidney stones and obesity (Baytop, 1984; Anonymous, 2022). In Erzurum, it is used against excretory system infections, in Iran, the fruit and its petiole are used as a diuretic (diuretic), blood purifier and anti-jaundice (Kadıoğlu et al., 2021a), and in Bingöl, it is also used against acne and blemishes on the face. . Additionally, in the Elazığ region, rhubarb root is boiled and given to animals to drink against foot-and-mouth disease.

3.2. Use as Food

İşgın can be peeled and consumed as fruit or as a salad, as well as sauce, fried egg, kapuska with işgın, syrup, jam, stew, pickles, ice

cream with ıřgın, cakes, pies, etc. It can also be consumed as food (Baytop, 1984; Tatlı et al., 2002; Andıç et al., 2009; Meral, 2017). Rhubarb, which gives a very pleasant taste to baked dishes, is also used in meat dishes.

3.3. Different Areas of Use

While rhubarb roots are used as a dyestuff and as an ornamental plant, they are not used in animal nutrition. While in Hakkari, rhubarb roots are added to wool soaked in water and boiled for 3 hours, a dark beige color is obtained (Öztürk and Özçelik, 1991), while in Bitlis, a blue color is obtained by soaking rhubarb roots in water and then adding wool and boiling it for an hour (Özgökçe and Yılmaz, 2003). In Van province, dyestuff for wool is obtained from rhubarb. Various colors such as mustard color can be obtained without the use of mordant, and brick color, naphtha green, burgundy and canary yellow can be obtained with different mordant substances (Gönen, 2008). In addition, rhubarb can be used in gardening as "ornamental rhubarb" together with another rhubarb species (*Rheum officinale*).

4. CULTIVATION

Ravend is a plant belonging to the buckwheat family. There are species grown as vegetables and ornamental plants. Rhubarb leaves have a very large and wide structure. Growing rhubarb, which can grow in high altitude places, is a little more difficult than other plants. It can be easily grown in high-growing areas, fields and gardens. It is not possible to grow in hot places and close to the sea. It is produced from seeds or plant roots. Seeds are sown in pillows in spring. Seedlings

should be planted at 20 cm intervals. The rhubarb seeds are soaked in warm water for 1 hour and planted in viols or soil at a depth of 1-2 cm. Rot may occur in seeds planted too deeply. The planted seeds are covered with soil. Rhubarb seeds germinate in approximately ten days (Anonymous, 2023).

5. CONCLUSION AND RECOMMENDATIONS

Plants growing in our country are under threat of extinction due to reasons such as unconscious and excessive collection, industrialization, overgrazing, pollution and fire. Plant genetic resources need to be protected for the continuity of our natural wealth and for future research. Anatolian people, who have a rich knowledge of benefiting from medicinal plants, learned what and how to use the plants around them by trial and error method and transferred the knowledge they gained from generation to generation.

In conclusion; the collection of medicinal and aromatic plants from nature should be controlled, species facing the threat of extinction should be protected and data banks containing all the information obtained as a result of the studies should be established.

REFERENCES

- Alan, R. and Padem, H. (1989). Research on wild herbs used as vegetables in the Erzurum region: rhubarb, long manger, knotweed, string beet and mallow. *Food*. 14(5), 281-287.
- Andıç, S., Tunçtürk, Y., Ocak, E. & Köse, S. (2009). Some chemical characteristics of edible wild rhubarb species (*Rheum ribes* L.). *Research Journal of Agriculture and Biological Sciences*. 5(6), 973-977.
- Anonymous, (2022). Investigations into Germanic Mythology Iranian Mythology <http://www.morfingen.com/tarih/tarikatlar-ve-inanclar/zoroastrianizm-zerdustluk-inanci.html>, Erişim tarihi 16.06.2022.
- Anonymous, (2022a). Adaletceviz.net: Harm to Uşgun Children. <http://emri.tums.ac.ir/upfiles/47392858.pdf>, Access date 26.08.2022.
- Anonymous, (2023). tr.wikipedia.org
- Baytop, T. (1984). *Treatment with Plants in Türkiye*. Istanbul University Press, Istanbul.
- Baytop, T. (1997). *Turkish Plant Names Dictionary*. TDK publications, Ankara.
- Bazzaz, B. S. F., Khajehkaramadin, M. & Shokoheizadeh, H. R. (2002), In vitro activity of Rheum ribes extracts against clinical isolates of gram-negative pathogens. XVI International Horticultural Congress, August 11 to 17, Toronto, Canada.
- Evliyâ Çelebi. (2013). *Günümüz Türkçesiyle Evliyâ Çelebi Seyahatnâmesi*. S. A. Kahraman ve Y. Dağlı, (Yay. Haz), (Cilt 1, 1-6. Kitaplar), Ankara: Yapı Kredi Yayınları.
- Ghorbany, M. and Salary, M. (2018), Application of plant products to control some soil born fungal pathogens.
- Gençay, A. (2007). *Ethnobotanical characteristics of Cizre (Şırnak)* (Unpublished master's thesis). Yüzüncü Yıl University Institute of Science and Technology, Van.
- Güneş, F. and Özhatay, N. (2011). An ethnobotanical study from Kars (Eastern Türkiye). *Biological Diversity and Conservation*. 4(1), 30-41.
- Gürhan, G. and Ezer, N. (2005). Plants popularly used in the treatment of hemorrhoids-I. *Hacettepe University Faculty of Pharmacy Journal*. 24(1), 37-55.
- Gönen, B. (2008). *Traditional dyeing process of yarns used in Van rugs with vegetable dyes and color experiments* (Unpublished master's thesis). Yüzüncü Yıl University Social Sciences Institute, Van.
- Hadjzadeh, M. R. and Jafary, G. (2004). The effects of Rheum Ribes on serum lipids

in hyperlipidemic Rabbit. *Koomesh*. 5(1), 22-25.

- Hudson, J. B., Lee, M. K., Sener, B. & Erdemoğlu, N. (2000), Antiviral activities in extracts of Turkish medicinal plants. *Pharmaceutical Biology (Formerly International Journal of Pharmacognosy)*. 38(3), 171-175.
- Ibadullayeva, S. Movsumova, N. Gasymov H. & Mamedli, T. (2011), Protection of some rare and endangered vegetable plants in the flora of the Nakhichevan AR. *International Journal of Biodiversity and Conservation* Vol. 3(6), 224-229.
- Jafari, A., Taheri, G., Baradaran, B. & Behrami, A.R. (2012). *Rheum khoirasanicum* (Polygonaceae), a new species from Iran. *Finnish Zoological and Botanical Publishing Board 2012, Ann. Bot. Fennici* 49: 00-00, Helsinki
- Kadioglu, B., Kadioglu, S. & Tasgin, G. (2021). Determination of the habits of medicinal and aromatic plant consumers in Erzurum province. *Bahçe. Journal of Yalova Atatürk Horticulture Central Research Institute*. 50(1), 7-17.
- Kadioglu, B., Kadioglu, S. & Tasgin, G. (2021a). Evaluation of medicinal and aromatic plant consumption in Erzurum province according to the seasons. *Journal of Muş Alparslan University Agricultural Production and Technologies*. 1(1), 73-83.
- Kırbağ, S., Fikriye Z. (2005). Antimicrobial activities of some medicinal plants in Elazığ region. *Yüzüncü Yıl University Faculty of Agriculture Journal of Agricultural Sciences (J. Agric. Sci.)*. 16(2), 77-80.
- Konak, A. and Aktar, O. (2009). Traditional healing methods in Tunceli / Ovacık within the framework of medical anthropology. *C.U. Journal of Social Sciences*. 35(2), 156-187.
- Krishnaiah, D., Sarbatly, R. & Nithyanandam, R. A. (2011). Review of the antioxidant potential of medicinal plant species. *Food Bioprod. Process*. 89, 217-233.
- Meral, R. (2017). Effect of Different Temperature Degrees on Antioxidant Activity and Phenolic Profile of Uskun Plant. *YYU J Agr Sci*. 27(1), 88-94.
- Munzuroğlu, Ö., Karataş, F. & Gür, N. (2000). Investigation of vitamins A, E, C and selenium levels in rhubarb (*Rheum ribes* L.) plant. *Turk J.Biol*. 24, 397-404.
- Oktay, M., Yildirim, A., Bilaloglu, V. & Gulcin, I. (2007). Antioxidant activity of different parts of Isgin (*Rheum ribes* L.). *Asian J Chem*. 19, 3047-3055.
- Özgökçe, F. and Yılmaz, İ. (2003). Dye plants of East Anatolia Region (Türkiye). *Economic Botany*. 57, (4), 454-460
- Özbek, H., Ceylan, E., Kara, M., Özgökçe, F. & Koyuncu, M. (2002). Hypoglycemic effect of rheum ribes root extract in healthy and diabetic mice. 14th Herbal Pharmaceutical Raw Materials Meeting, Proceedings, 29-31 May, Eskişehir, Eds. K.H.C.Başer and N.Kırimer, date of publication on the web: June 2004

- Özgen, U., Kaya, Y. & Houghton, P. (2012). Folk medicines in the villages of Ilıca District (Erzurum, Türkiye). TÜBİTAK Turk J Biol. 36, 93-106.
- Öztürk, M., Özçelik, M. (1991). Useful Plants of Eastern Anatolia. Semih Ofset Printing Facilities, Ankara.
- Rakesh, K. S., Pradeep K., Jagdeep K., Ashok K. & Sandeep A. (2010), Investigations into the anti-ulcer activity of *Rheum ribes* Linn. leaves extracts. International Journal of Pharmacy and Pharmaceutical Sciences. 2(4), 45-58.
- Sayyah, M., Boostani, H., Malayeri, A. R. & Siahpoosh, A. (2011). Efficacy of hydroalcoholic extract of *Rheum ribes* L. in treatment of obsessive compulsive disorder: A double blind clinical trial. J Pharm Biomed Sci. 1,57-61.
- Tatlı, A., Akan, H., Tel, A. & Kara, C. (2002), The Flora of Upper Ceyhan Valley (Kahramanmaraş/Türkiye). TÜBİTAK Turk J Bot. 26, 259-275.
- Taji, R. (1998). Arabismen im Deutschen: lexikalische Transferenzen vom Arabischen ins Deutsche, Berlin; New York; de Gruyter.
- Türkmen Ö, Çirka M and Şensoy S (2005), Initial Evaluation of a New Edible Wild Rhubarb Species (*Rheum ribes* L.) with a Modified Weighted Scaling Index Method. Pakistan Journal of Biological Sciences. 8 (5): 763-765.
- Tosun, F. and Kizilay, C. A. (2003). Anthraquinones and flavonoids from *Rheum ribes*. J Fac Pharm. 32, 31-35.
- Yıldız, S. (2014). Determination of polyphenones and some metals in kenger (*Gundelia tournefortii* L.), Güllük (*Eremurus spectabilis* M. Bieb.) and Işkın (*Rheum ribes* L.) plants growing in the Upper Euphrates basin (Unpublished high school thesis), Fırat University Institute of Science and Technology, Elazığ.

ROSEHIP-KUŞBURNU

Rosa canina L.



The name rosehip is used in connection with the fact that birds eat this fruit. Birds often come to eat rosehip fruits.

A mother whose son was serving as a Praetorian guard saw in her dream that she was sending a dog rose (cynorrhodos) to her son, and immediately afterwards she wrote a letter and sent the plant to her son in Spain. It is written in the letter that he sent this plant to him because of a divine sign. Interestingly, when the letter was received by the son, he was bitten by a rabid dog. It is said that the soldier's life was saved thanks to the plant sent by his mother.

Anonymous, (2023)

INTRODUCTION

Since medicine was not developed enough in ancient times, sick people were treated by folk medicine people they knew were competent. When all civilizations are examined, from old world civilizations such as Egypt and Mesopotamia to Indian and Chinese civilizations and new world civilizations such as Inca and Astec, it is indisputable that medical science has always been a preferred branch of science. Nowadays, it is seen that the trend towards alternative medicine in health and treatment is increasing in the West. The drugs and different treatment methods used in folk medicine need to be re-examined in the light of modern medicine and the results obtained should be reflected to the society. It is now known that most drugs produced in the pharmaceutical industry are of plant and mineral origin. The point that should be noted here is that modern medicine is a supplement to therapeutic alternative medicine.

According to the World Health Organization (WHO); Finished, labeled products that contain herbal drugs or mixtures as the active part, either as they are or in the form of herbal mixtures, for the purpose of preventing or treating diseases, are called "Herbal Medicines" (Ersöz, 2010). Human beings have been benefiting from plants found in nature since the beginning of their existence. However, since there are no records or documents regarding the use of plants from ancient times, the behavior and practices of societies and communities regarding plant use are estimated through ethnobotanical studies and archaeological findings (Ekim et al., 2000). Human beings have used plants in different

ways over time, first for food purposes, and then instinctively, through trial and error, or by observing the behavior of surrounding animals. The knowledge and experiences gained from nature have been transferred from generation to generation, and useful plants have been used in various ways such as food, beverage, sweetener, preservative, feed, dye, cosmetics, incense, votive, fuel, shelter and insulation material. Natural plants have been used as medicine for medicinal purposes until today. In addition to being used as medicine, medicinal and aromatic plants are also used in the sweetening of foods, the scent of cleaning products, the freshness of outer pastes and chewing gums, the relaxing effect of herbal teas and the naturalness of cosmetics.

B.C. The agricultural and medical prescription information that the Sumerians engraved on clay tablets with cuneiform script around 3,500-3,000 BC can be considered among the first written texts about the uses of plants. The origins of traditional Chinese medicine are claimed to date back to B.C. Information about the medicinal plants and agriculture of the legendary Chinese emperor Shennong, who lived between 3,000 and 2,700 years ago, was written down in the following centuries and brought to the present day. Babylonian king Hammurabi, B.C. In the 1700s, he eternalized an inscription, including medicinal and aromatic plants and health-related laws (codex), by engraving it on a large monumental stone. Approximately B.C. The Ebers papyri, thought to have been written around 1,500 BC and containing information dating back at least 1,000-1,500 years ago, are among the oldest and most important written sources about medicinal and aromatic

plants that have survived to the present day. Likewise, in India, the works called Charaka Samhita and Sushruta Samhita, which are based on thousands of years of tradition regarding the use of medicinal and aromatic plants and contain the teachings of Ayurveda, date back to approximately B.C. Although it was written in 100 BC, its origins date back to B.C. It is thought to date back to 2,000 years ago. During the Hellenistic period, Hippocrates (460-377 BC), who was considered the master of medicine, left information and written works about medicinal plants. Aristotle (384-322 BC) and his student Theophrastus (370-287 BC) made significant contributions to today's plant systematics, and many works were written on the classification of plants (Sezik and Yeşilada, 2001).

Türkiye, located in three phytogeographic zones in terms of flora and fauna; Due to its different climate and ecology, it is very rich in natural plants collected from nature and used for food and health purposes. Human beings have been using plants that grow naturally in nature for food and health purposes for centuries. It is accepted that the number of plant species on earth today is between 250,000-500,000. According to the statements made by WHO, there are around 20 thousand medicinal and aromatic plants, 4 thousand of which are widely used (Bhagirathy, 2003; Toksoy et al., 2003) medicinal and aromatic plants are used for food and health purposes, and the leaves and fruit parts of the plants are consumed the most (Kadioğlu et al., 2017; Kadioğlu et al., 2018; Kadioğlu et al., 2021; Kadioğlu et al., 2021a).

1. ORIGIN AND MORPHOLOGY

Rosehip, whose Latin name is 'Rosa Canina', belongs to the rosacea family. Its homeland is Western Asia and Anatolia. Rosehip (*Rosa canina*) is a type of plant that grows in Europe, northwest Africa and West Asia. In public; Rosehip, also known as it burnu (Anonymous, 2023), yaban gülü, şillan, deli gül, gül burnu, gül elması (Rehder, 1949), is the fruit of plants belonging to the Rosaideae subfamily of the Rosaceae family, and is the rose fruit called Fructus Rosae in Latin. (Ates, 1992). Rosehip, which has 24 taxa in Türkiye and about 100 species in the world, is a shrub-shaped plant that sheds its leaves in winter, has multiple stems that can be thorny or thornless, and can generally grow 1.5-3 m tall. Rosehip has a fringe root structure and a stem with dense or sparse thorns. (Anonymous, 2023a).





Figure 1. General appearance of rosehip (Kadioglu and Kadioglu, 2018)

The leaves are compound, egg or ellipse-shaped, with 5-7 leaflets, their edges are saw-toothed and curved from the central axis. The flowers are usually pink or white, or yellow or purple, and have 5 petals and 5 sepals in a hermaphrodite structure. Fruits may be single or in clusters, ellipse, round or flattened. The fruits turn red, yellow or orange when ripe. There are about 20-30 hairy and hard-shelled seeds inside the fruit. The outer surface of the fruit is generally smooth and

shiny. The sepals usually fall off when the fruit ripens (Anonymous, 2023; Figure 1).

2. CLIMATE AND LAND REQUEST

The rosehip plant grows in a very long area, from sea level to 2,500 meters high. As can be understood from its distribution area, it is a very resistant plant to many different extreme climatic conditions. It is very resistant to cold. Since they bloom in May - June - July, they are not damaged by frosts. As you climb higher, flowering time is delayed and fruit quality increases. It is resistant to drought because its root systems go very deep. It develops best on river banks (Anonymous, 2023; Anonymous, 2023a).

Since their need for cooling in winter is high, they are not often found in the Mediterranean coastal area. Adequate rainfall, especially during the vegetation period, increases fruit size. In open fields, in places where sunlight is high and abundant, in southern diseases, the vitamin C content in the fruit increases along with the color and size of the fruit. They can grow in soils with very different structures. It grows very well in sandy soils. They show best development in loose soils rich in nutrients (Anonymous, 2023).

2.1. Rosehip in Assessment of Marginal Areas

Rosehip, found in nature as wild rose in our country, is a shrub-shaped, thorny plant species belonging to the *Rosa* genus from the Rosaceae family, that sheds its leaves in winter and varies in height between 1-3 m (Yamankaradeniz, 1983). It grows naturally in a wide

geography including Central and Western Asia, the Caucasus, Europe, Northwest Africa, the northern and western parts of Iraq and Iran, the north of Afghanistan, Pakistan, Central Asia and Russia. Rosehip is resistant to low temperatures and drought. Therefore, its distribution area is quite wide. It is found naturally in all regions of our country. Rosehip, which can be easily used in the evaluation of marginal areas due to its high adaptability, supports wildlife as it grows in natural areas, and has an extremely important potential in erosion control as its roots reach quite deep (4m) and is very resistant to drought (Davis, 1977; Yamankaradeniz, 1983). Although rosehip prefers calcareous soils, it grows in all soil types. Since it can grow in all kinds of environmental conditions, it can be seen in valleys, roadsides, garden fences and cemeteries. (Yamankaradeniz, 1983). *Rosa pimpinellifolia*, also known as Gara gushbuni, is a rosehip with upright thorns and 7-11 oval leaflets that grows on limestone or volcanic rocks on arid rocky slopes at an altitude of 1200-2700 meters (Anonymous, 2023). In the study where three different rosehip species were examined in different locations, rosehip soils taken from their natural environments were examined; *Rosa pimpinellifolia* 6.60 -6.88 pH, 1.30 - 0.60 EC mM, 87-96 texture %, 4.39-3.36 OM %, 0.65-2.32 lime %, 0.026-0.028 P %, 0.010-0.014 K %, *Rosa canina* 6.0 -6.70 pH, 1.20 -0.40 EC mM, 110-102 texture %, 2.4-4.2 OM %, 0.52-2 lime %, 0.032-0.032 P %, 0.015-0.019 K % and 6.30 -6.90 pH of the soil structure of *Rosa villigosa* It was determined that it grows in soils with 1.36 -0.70 EC mM, 75-91 texture %, 3.3-3.7 OM %, 0.42-2.5 lime %, 0.020-0.020 P %, 0.016-0.016 K % content (Kadioğlu, 2022).

3. USAGE AREAS

3.1. Alternative Medicine and Its Use in Medicine

Rosehip, known as wild rose, has been used in religious ceremonies, cosmetics, perfume industry and medicine for centuries. Different types were used as medicine by the Greeks, Romans and Persians. M.S. In 77 BC, Pliny recorded 32 different diseases that responded positively to preparations made with roses. *R. gallicia* was used as medicine in the Middle Ages. *officinalis* and *R. damascena* were widely used. The *R. laevigata* species, which is native to the East, was first mentioned in Chinese medical literature in A.D. It was discovered in 470 and transported to Georgia by the "East India Company" in 1759. The rare species *R. rugosa* was first mentioned in "Food as Materia Medica" during the Ming Dynasty (AD 1368-1644). In the 19th century, *R. rugosa* moved from its homeland of Japan and eastern China to Europe, America and Australia. Red rose petals were listed in the "British Pharmacopoeia" as a flavoring and astringent for medicines as far back as the 1930s (Türkben, 2003). B.C. It has found widespread use in Egypt, grown in Mediterranean countries, as a symbol of purity and cleanliness. Romans used red rose flower for stomach aches, Hippocrates used it against inflammations, and in the Middle Ages and later periods, red rose flower was used against blood spitting, gum bleeding, kidney and gall stones, tapeworm, and erysipelas (Baytop, 1984; Baytop, 1999). It is known that rosehip was used thousands of years ago in the treatment of scurvy.

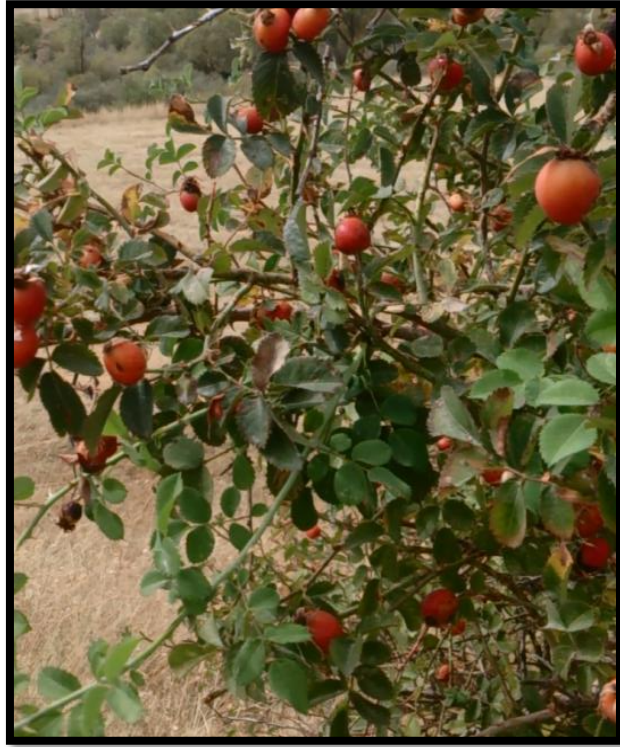


Figure 2. Fruit of rosehip (Kadioglu and Kadioglu, 2018)

Rosehip is a very valuable product with high added value; It is used in sectors such as functional food, herbal drug preparations, health and cosmetics. Rosehip is known all over the world as a good source of vitamin C. rosehip nectar or marmalade is sufficient to meet all of an adult's daily vitamin C needs and a significant portion of other vitamins and minerals (Figure 2 and Figure 3). Since it is extremely nutritious, rosehip intake has very positive effects on some chronic diseases (osteoarthritis, rheumatoid arthritis, cancer, etc.) (Sezik and Yeşilada,

2001). Dried ripe pseudofruits of the *Rosa canina* plant are used. Its fruits contain vitamins C, P, A, B1, B2, E and K, essential fatty acids, polysaccharides, minerals, carotenoids, phenolic compounds, potassium and phosphorus elements (Doğan et al., 2006). Rosehip, containing pectin and organic acid, is effective as a diuretic and laxative. Pharmaceutical forms of rosehip are used to strengthen joints, relieve pain and inflammation, and support movement. Rosehip, whose fruits are pulverized into powder, has no external use. Herbal drug preparations of rosehip; herbal drug, infusion (2%), medicinal tea, tincture, alcoholic extract and fixed oil preparation. The preparations sold in pharmacies in Türkiye and Europe are; Nature made essential balance, VM-2000 multivitamin-mineral, Winter formula, Ester-C-Plus, Litosine (Sezik and Yeşilada, 2001).

It is known that medicinal and aromatic plants, which have an important place in herbal diversity, have been used for therapeutic purposes among the public for centuries. In folk medicine, rosehip is one of the plants most commonly used as a drug in the treatment of different diseases. Among the people, rosehip is used against kidney and bladder stones, diarrhea, bleeding gums, side and chest pain. In the study where Medicinal and Aromatic Plant Consumption was Evaluated According to Seasons in Erzurum Province, it was found that medicinal and aromatic plant consumption is generally consumed for health problems, cold and flu, and in the summer months, where consumption varies according to seasons, the most common ones are Ashot (*Coriandrum sativum*), mint (*Mentha* sp.) and nettle (*Urtica* sp.)

plants are used as spices and sweeteners for digestive system problems, and cinnamon (*Cinnamomum* sp.), linden (*Tilia* sp.) and rosehip (*Rosa* sp.) plants are used to relieve flu and cold, strengthen the immune system and meet the need for vitamins in the winter months. It was stated that it was consumed to meet (Kadioğlu et al., 2021a). In another study in which the habits of medicinal and aromatic plant consumers were determined in Erzurum province, it was determined that rosehip was consumed against colds (Kadioğlu et al., 2020). Rosehip, which is used as a medicine against colds during the winter months, is rich in natural antioxidant compounds and contains high amounts of vitamin C, phenolic compounds and carotenoids. It has been stated by researchers that rosehip plant is an important source of nutrition, is rich in vitamins and minerals, and contains K, Na, Ca, Mg, P, Fe, Mn, Cu, Zn in its structure (Chai and Ding, 1995; Yıldız and Nergiz, 1996; Uggla et al., 2003; Çınar and Çolakoğlu, 2005; Doğan et al., 2006; Kadioğlu, 2022).

Rosa sp., popularly known as "rosehip" and widely used in Türkiye. Its drugs are used against constipation, diabetes, colds, liver diseases and hemorrhoids. It is stated that it was prescribed in medicines for the treatment of diseases during the Ottoman period, and its roots were used against the symptoms of rabies in ancient times (Baytop, 1999). It is thought that it got its name köpek or it gülü for this reason. It is stated that rosehip was used in the Middle Ages for the treatment of bleeding gums, tapeworms, snake disease, kidney and gallstones, in

Egypt for the treatment of scurvy disease, and in Rome for the treatment of abdominal pain. The seeds have a soothing effect (Baytop, 1984).

3.2. Use as Food

The use of naturally growing rosehip as food is quite common in European and Asian countries and in our country. It has a very important place in people's nutrition during the years of poverty during World War I and II. Interest in this product is increasing due to the high amount of vitamin C it contains (the fruit with the highest known vitamin C content). Since the fruits of the plant are used, it is appropriate to collect the fruit on time.



Figure 3. Rosehip and rosehip marmelade (Kadioglu et al.2017)

The fruits of rosehip, which can sometimes be confused with Hibiscus flowers, are consumed as marmalade, jam, molasses, fruit juice, and its flowers and leaves are consumed as herbal tea and used in the production of baby food. The fixed oil obtained from the seeds is also used. Rosehip, prepared by infusion (brewing) method as a medicinal tea, is also used in various dishes and desserts among the public.

Abyssinian (rosehip) dessert, which is very healing, is made with rosehips, sugar, starch and raisins. Rosehip marmalade, made with a mixture of rosehips, sugar and water, is a source of healing. Rosehip, which is a source of vitamins and healing and is also consumed as thyme and sweet soup, is consumed with pleasure.

3.3. Different Areas of Use

Rosehip can also be used as a natural dye in dyeing woolen and cotton fabrics. Rosehip also has an important usage potential for landscaping purposes. It can be widely used because it requires low maintenance and is adaptable to many regions. Although its flowering period is generally short, its flowers in different colors can display extremely beautiful images (Baytop, 1999). During this period, the scent of roses spread around can be easily felt. On the other hand, red fruits that remain on the branch for a long time create different views.

In addition, it constitutes an important food source for birds that take shelter in cities during the winter months and live in parks and gardens. This feature is also extremely important for wildlife in nature. Since it remains fruitful for a long time in autumn and winter, it

provides food support to many wild animals (Doğan et al., 2006). Animals also use rosehip bushes as shelter. Rosehip, which contributes to nature in terms of protecting not only animals but also the soil, is very useful in preventing erosion. If planted frequently in rows around the edges of fields and gardens, they form natural fruit-bearing hedges with their trunks and branches covered with curved, hard thorns. It is very common to use them as rootstocks for roses due to their strong roots that are very resistant to soil diseases and pests. Rosehip oil; It has many benefits such as skin protection, anti-aging, preventing wrinkles especially around the eyes and mouth, protecting against sun and harsh weather effects, healing and thickening injured tissues, and cell regeneration (Baytop, 1999; Doğan et al., 2006).

4. CULTIVATION

Although rose hips are produced by different methods, their main production is through cuttings. The best results are obtained by planting the wood cuttings taken in early autumn in a shaded and cool place. Wood cuttings of the "star" rosehip variety of the *Rosa canina* species root at a rate of 89% without any application. Genotypes belonging to the *Rosa montana* species are more difficult to propagate by cuttings. Its cultivation is done in rows spaced 2-4 m apart. Harvest is carried out in September-November, and a yield of 1-3 tons per decare can be obtained (Anonymous, 2023a).

5. CONCLUSION AND RECOMMENDATIONS

Medicinal and aromatic plants have been used as food and herbal medicine by the public for centuries. The absence of chemical wastes harmful to health further increases the importance of rosehip and it can be easily used in baby foods and foods. At the same time, its use in nutrients without the use of artificial additives improves the nutritional value and taste of many products, its use in food technology and the fact that it grows in many regions of our country increases the economic value of rosehip.

Nowadays, people feel obliged to take some multivitamin-multimineral and herbal nutritional supplements in order to cope with stress and fatigue, even though they need to work harder, eat and rest in order to achieve their fast life rhythm, desires and desires. Nutritional habits are being reconsidered due to many diseases and natural foods are preferred. Plants found in nature and considered useful in alternative medicine invite humanity to rediscover nature and the natural.

When rosehip is examined from this perspective, it is seen that it has numerous benefits. Rosehip, which is a source of herbal drugs, has the characteristics to grow almost everywhere in our country, even in marginal areas. Since per capita national income is low in our country, especially in the Central Anatolia, Black Sea, Eastern and Southeastern Anatolia regions, developing methods to obtain many products from rose hips for nutrition and health purposes in these regions, utilizing marginal areas can contribute to the economy of both the region and the country.

REFERENCES

- Anonymous, (2023). Alternative treatment rosehip. Ecology Environmental Journal. 17, 20-24.
- Anonymous, (2023a). Ministry of Agriculture and Forestry General Directorate of Crop Production. Rosehip Feasibility Report and Investor Guide.
- Ateş, N. (1992). Research on Rosehip Evaluation. Bursa Food Technology Research Institute. 9s
- Baytop, T. (1984). Treatment with Plants in Türkiye. Istanbul University Press, Istanbul.
- Baytop, T. (1999). Treatment with Plants in Türkiye. Nobel Medicine Bookstores Ltd. Ltd. Çapa, Istanbul. Plant Treatment Symposium, 5-6 June 2010 Zeytinburnu, Istanbul.
- Bhagirathy, K.A. (2003). Valuation of Medicinal Plants: Unresolved Issues and Emerging Questions, South Asian Network for Development and Environmental Economics, (Newsletter [online]).
- Chai, JT., Ding, ZH. (1995). Nutrients composition of Rosa loevigeta fruits. Science Technology in Food Industry. 3, 26-29.
- Cınar, I., Colakoglu, A.S. (2005). Potential health benefits of rosehip products, Proceedings of the First International Rose Hip Conference, Acta Hort. pp. 253-257.
- Davis, P.H. (1977). Flora of Turkey and East Aegean Islands. Edinburg University Press. 4 (1977,)106-128.
- Doğan, A., Kazankaya, A., Çelik, F. & Uyak, C. (2006). Kuşburnunun Halk Hekimliğindeki Yeri ve Bünyesindeki Bileşenler Açısından Yararları.II. Ulusal Üzümsü Meyveler Sempozyumu. 14-16 Eylül 2006, Tokat, Türkiye. s.45-53.
- Ekim, T., Koyuncu, M., Vural, M., Duman, H., Aytaç, Z. & Adıgüzel, N. (2000). Red Book of Plants of Türkiye, Ankara (Ferns and Seed Plants). Red Data Book Of Turkish Plants (Pteridophyta And Spermatophyta). 246s, Ankara.
- Kadioglu, S., Tasgın, G., Kadioglu, B., Gezenoğlu, C., Yüksel, S. & Karagöz, K. (2017). Determination of plant genetic resources known and evaluated by the folk (Kop Pass). (TAGEM / TA / 11/06/04/001 / Result Report).
- Kadioglu, B., Kadioglu, S. (2018). Erzurum's Wild Rose (Rose sp.). 4th.International Symposium of Medicinal and Aromatic Plants 2-4 October, 2018 Çeşme-İzmir/Türkiye.
- Kadioglu, B., Kadioglu, S. & Tasgın, G. (2021). Determination of the habits of medicinal and aromatic plant consumers in Erzurum province. Bahçe. Journal of Yalova Atatürk Horticulture Central Research Institute. 50(1), 7-

17.

- Kadioglu, B., Kadioglu, S. & Tasgin, G. (2021a). Evaluation of medicinal and aromatic plant consumption in Erzurum province according to the seasons. *Journal of Muş Alparslan Unniversity Agricultural Production and Techonologies*. 1(1), 73-83.
- Kadioglu, B. (2022). Evaluation of macro and micro plant nutrient contents and soil properties of three different Rosehip (*Rosa spinosissima*, *Rosa canina*, *Rosa villosa* subsp. Mpllis), species in different locations. *Journal of Muş Alparslan Unniversity Agricultural Production and Techonologies*. 2(1), 38-43.
- Rehder, A. (2001). *Manual of cultivated treesand shrubshardy in North America Exclusive of the subtropical and warmer temperateregions 2*, O. Macmillan Co., New York, 996s.
- Sezik, E. and Yeşilada, E. (2001). Use of Plants as Folk Medicine in Türkiye. XIII. Herbal Pharmaceutical Raw Materials Meeting Proceedings Book, Istanbul. 103-112,
- Turkben, C. (2003). *Rosehip*. ISBN: 975–6958–70–7, Bursa. 53s.
- Toksoy, D., Gümüş, C. & Ayyıldız H. (2003). The status of forest resources in Türkiye and an assessment of the trade of medicinal plants. *Journal of Forestry and Economy*. 8, 7-14.
- Uggl, M., Goo, X. & Werlemark, G. (2003). Variation cmengend with in dog rose taxa (*Rosa sect caninae*) in fruit weight pcentages of fruit flesh and dry matter and vitamin C contant. *Acta Agriculture Scandinavica Section B Soil and Plant Science*. 53, 147-155.
- Yamankaradeniz, R. (1983). Rosehip (*Rosa* spp.) evaluation opportunities. *Trakya University Faculty of Agriculture Food Journal*. 8(4), 157-162.
- Yıldiz, H. Nergiz, C. (1996). Rosehip as a food ingredient. *Gümüşhane Rosehip Symposium Proceedings Book, Gümüşhane*. p. 309-31.

THYME- ORİGANUM- KEKİK

Thymus L.



*Bu deva otçuları gayet çoktur. İstanbul içre haftanın 8 gününde 14 pazar durur. Mesela Cumapazarı, Salı Pazarı, Çarşamba ve Cumartesi Pazarı günlerinde bu otçular pazar kurup labada kökü, güneyik kökü, sığırdili kökü, hayyi'l-garikun kökü, meyan kökü, **zater kökü** ve nice bin isimli şifa otlarını toplayıp ispeçer attarlarına bu otları satıp kar ederler.*

Evliyâ Çelebi, Seyahatname

According to legend, this plant was born from the tears of Helen of Troy. Helen returns to her husband. He lives his next life silently and in tears. The Olympian gods present her tears to the earth as a thyme plant.

INTRODUCTION

Medicinal and aromatic plants are plants that have been used for food, spice, medicine and treatment purposes for centuries. Cumin, poppy, anise etc. The cultivation of some plants such as has been continuing since prehistoric centuries. With its centuries-old use and production, the potential for use of medicinal and aromatic plants has increased day by day, as a result of their utilization in different areas of use, especially after the 1990s, and the increase in demand for natural products. One of these areas of use is the evaluation of unusable, marginal areas. In this context, considering the natural distribution areas of medicinal and aromatic plants, the rich variation in terms of biodiversity and genetic resources can be considered as an opportunity for thyme. Both the importance of these plants in export and the fact that they can be grown in marginal areas are gradually increasing their interest and production.

Thyme is one of the important export products of our country. It holds approximately 70% of the world's thyme trade. Although there are many aromatic plant species belonging to the Lamiaceae family defined as "thyme" in Türkiye, species containing essential oils such as carvacrol and thymol are considered "thyme" (*Thymus*, *Origanum*, *Satureja*, *Thymbra* and *Coridothymus* genera). The flowers and leaves of thyme are marketed or processed into products such as thyme oil and thyme juice. Although thyme is mostly used as a spice, it is also used in pharmacy and perfumery industries. Thyme is available and can be produced in small areas, it gives a harvest for 8-12 years after being

planted once, it has many advantages such as olives, etc. It is an economical plant due to its many advantages such as being able to grow under agricultural trees and wide marketing opportunities (Anonymous, 2023).

1. ORIGIN AND MORPHOLOGY

Thyme is grown in many different climatic conditions in many countries around the world (Russia, Poland, Switzerland, USA, Spain, France, Italy, Morocco, South Africa, etc.). The plant is grown for its aromatic leaves, which are rich in essential oils and used in cooking. Approximately 1/3 of Türkiye's flora (about 3 000) consists of medicinal and aromatic plants (Başer, 1998; Tan, 2010). Among these, the Lamiaceae (Labiatae: Ballıbabaceae) family, which includes the thyme plant, is one of the largest and most widespread plant families with a worldwide distribution, containing 3,000 species belonging to approximately 200 genera (Heywood, 1978). It is the 6th largest family in terms of genus in our country with 45 genera and the 3rd largest family in terms of species with 550 species (Dönmez et al., 2011). Plants of the Lamiaceae family; The fact that it is the source of many essential oils used in medicine and perfumery and is used both in treatment and for spice purposes shows the importance of this family. There are five genera of the thyme plant in Türkiye, named *Thymus*, *Origanum*, *Satureja*, *Tymbra* and *Coridothymus*, which is one of the most important plants of the Lamiaceae family (Başer et al., 1994; Davis, 1982). The main components of essential oils belonging to these genera (with some exceptions) are usually carvacrol or thymol, or both.

Thymus in the world; The number of species in the genus is about 220, 39 species (58 taxa) in Türkiye, the number of species in the Origanum genus is 43, 23 species (27 taxa) in Türkiye, Satureja genus has about 30 species, 13 species (14 taxa) in Türkiye. taxon), there are about 12 species of the genus Thymbra, 2 species (4 taxa) in Türkiye, the only species belonging to the genus Coridothymus, and this species is also found in Türkiye. In Türkiye, 44.2% of the species belonging to the Lamiaceae family, 65.2% of the species belonging to the Origanum genus, 52.6% of the Thymus genus species and 28% of the Satureja genus species are endemic. This information is an indication of how rich Türkiye is in terms of these breeds and how the gene center of these breeds is (Davis, 1988; Biskup and Saez, 2002; Kintzios, 2002).

2. SOIL AND CLIMATE REQUEST

Thyme is a plant that usually grows in the hot parts of the mountains, on rocks, on forest shores, is green in color and has a pleasant smell, has antimicrobial activity and has been used against many diseases for centuries. Thyme, the general name of the genus Thymus, Thymbra, Origanum, Coridothymus, Satureja, from the Lamiaceae family, is the common name of the plant species seen in lawns, fields, forest shores and meadows, known for its unique smell (Anonymous, 2023a)

Although it is a plant from the Mediterranean region, it is a plant that is quite resistant to cold except for the first year of establishment. However, it should not be cold at the time of planting seedlings. It is recommended to do it on sloping lands. Although Origanums can grow

in all kinds of soils, they grow especially well in loamy-clay alluvial and well-ventilated soils ranging from neutral to alkaline (pH 6-8). But sandy soils are not very suitable. They like direct sun. Excess water causes root rot. Thyme thrives in hot, dry conditions and prefers barren soil. It is a native plant on rocky slopes and dry, calcareous slopes (Bayram, 2003).

3. USAGE AREAS

Thyme is used as a spice in medicine and pharmacy, as a relaxant, as a blood circulation regulator, in anemia, whooping cough, baldness, tooth and stomach aches, scabies, bad breath, lumbago, intestinal, rheumatism and some gynecological diseases, in cough syrups, lozenges and gargle preparations, and in food preservation (natural antioxidant) can be used as a natural antibiotic and anthelmintic (parasite reducer) in feed rations in organic livestock farming, in the control of bee diseases and pests, and in the control of insects and weeds, nematodes and viruses.

3.1. Alternative Medicine and Its Use in Medicine

The main areas of use of thyme are diseases of the bronchi, intestines, digestive system, stomach and lungs (tuberculosis, asthma, bronchitis). Koparal and Zeytinoğlu (2005) determined that Carvakrol, which has a monoterpene structure, stands out as the main component in many essential oils obtained from the *Origanum*, *Satureja*, *Thymbra*, *Thymus* and *Corydorthymus* species. He states that Carvakrol plays an important role as antibacterial, antifungal, anthelmintic, insecticidal,

analgesic and antioxidant. *Thymus vulgaris* L. is a powerful antiseptic and antifungal.

Oregano; It strengthens the body, increases appetite, facilitates digestion, and relieves urination and gas. It kills microbes in the kidneys and intestines. It is useful against skin wounds and insect bites. It helps to reduce intestinal worms and heal intestinal inflammations. It is also good for asthma, bronchitis, flu, cold and cough. It removes phlegm (Ílisulu, 1992).

Thyme oil relieves rheumatism pain and helps break down other fats in the body. It regulates blood circulation and lowers blood sugar. It stops heart palpitations. It is good for stress and sleep disorders. It is effective against stomach, abdominal and headaches. It is gargled against bad breath. It regulates the amount of cholesterol. It is useful against diabetes. It is anti-cram and disinfectant. It can be used against rheumatism and gout diseases. It is useful in nervous system weakness, physical and spiritual depression. It causes menstruation, menstrual bleeding can be balanced, and crampy pains during menstrual periods can be relieved. It is good for gum irritations. Regulates blood circulation and cures anemia (Anonymous, 2023b). Although thyme tea and its spices used in appropriate amounts do not have any harmful effects on the human body, thyme oil should be used carefully and sparingly as it overactivates the thyroid gland. *Thymus vulgaris* L. is used in the treatment of insomnia, migraine, angina, cold, circulatory system disorder, nervous system weakness and dizziness (Anonymous, 2023).

3.2. Different Areas of Use

Although *Thymus* species are used in the field of treatment without being separated from each other; In the regions where they grow, especially *Thymus* or *Origanum* type plants are consumed mostly as tea to benefit from their relaxing effects (Baytop, 1999). It is very common to use it to season grilled and meat dishes and thus facilitate digestion. As a spice (especially *Origanum onites* L., *Origanum sipyleum* L., *Thymus* spp., *Satureja* spp., *Thymbra spicata* L. and *Coridothymus capitatus* L. Reichb. species) in salads, soups, meat, chicken, vegetable dishes, pickle sauces. and in sausages; It is used in soft drinks and liqueurs (especially *Majorana hortensis* Moench., *Origanum onites* L. and *Thymus vulgaris* L.) and in the production of Van herb and other cheeses (especially *Thymus serpyllum* L.) (Işık et al., 1995).

Oregano (*Origanum* sp.); It has been used as a spice in meals, as a medicinal plant for stomach distress and topical wounds, inflammation and cough, and as an ornamental in landscaping and gardens (Anonymous, 2023). It is used as a spice to add flavor to dishes and salads and to facilitate digestion. In the perfumery and cosmetics industry, 'Thymol' is used in the treatment of problem skin. Most of the thyme consumed domestically and exported abroad is collected from the flora of Antalya, Muğla, Aydın, İzmir, Denizli, Çanakkale and other provinces. In the last 5-6 years, thyme cultivation has spread rapidly in the Aegean Region and products that comply with the standards have begun to be produced. The rapid spread of thyme cultivation is due to

its importance as an alternative plant. Thyme is consumed domestically largely as a spice and in small amounts as thyme oil or thyme juice (Anonymous, 2023; Anonymous, 2023a).

While thyme prevents foods from becoming rancid and spoiled with its antioxidant and antimicrobial effects in storing foods and extending their shelf life; They do not have the negative health effects caused by additives. They noted that the increasing demand for natural chemicals (additives) has changed the interest in synthetic antioxidants in favor of natural antioxidants (Dapkevicius et al. 1998). Grown in Lithuania, marjoram (*Majorana hortensis (Origanum majoranal)*), catnip (*Nepeta cataria*), thyme (*Origanum vulgare*), lavender (*Lavandula angustifolia*), thyme (*Thymus vulgaris*), hyssop (*Hyssopus officinalis*) and sage (*Salvia officinalis*).) have been stated to be potential aromatic plants that constitute the source of natural antioxidants. Acetone oil resins of thyme and sage showed high antioxidant activity in tests and were evaluated as the most promising natural antioxidant sources. Sage (*Salvia fruticosa* L.) and Sage (*Salvia fruticosa* L.) at 0.1 and 0.3%. It was observed that the durability of the butter increased as a result of storing the butter to which thyme (*Thymus vulgaris* L.) extracts were added at 20°C for 4 weeks (Ayar et al., 2002).

It has been determined that thyme has an allelopathic effect against various weeds. It has been noted that the essential oils of *Thymbra spicata* (blackhead thyme) and *Mentha spicata* (curly mint) have a high inhibitory effect on the germination and seedling formation of wormwood, lard, clover and various grass seeds (Önen, 2003). It has

been stated that among the 32 plants with aromatic properties in Israel, only the essential oil components of Cyprus white thyme (*Origanum syriacum*), stone mint and lemon grass (*Cymbopogon citratus*) have allelopathic effects against various cultivated plants (wheat) and amaranthus species (Dudai et al., 1999). Qasem and Hassan (2003) reported the development of purslane (*Portulaca oleracea* L.) and mallow (*Malva sylvestris*), caper (*Capparis spinosa*), *Alhagi maurorum*, bitter melon (*Citrullus colocynthis*), English lavender (*Lavandula officinalis* (L. *angustifolia*), Cypriot white thyme). They reported that lactase enzyme and essential oils in the leaves of (*Origanum syriacum*), sumac (*Rhus coriaria*), castor (*Ricinus communis*), rosemary (*Rosmarinus officinalis*) and soursop (*Teucrium polium*) were significantly inhibited. *Artemisia vulgaris* L. (wormwood), *Mentha spicata* L. subsp. collected from Tokat region. *spicata* (mint), *Ocimum basilicum* L. (basil), *Salvia officinalis* L. (medicinal sage) and *Thymbra spicata* L. subsp. *spicata* (black thyme) species in 5 different concentrations, wormwood (*A. vulgaris* L.), piglet (*Xanthium strumarium* L.), clover (*Medicago sativa* L.) and English grass (*Lolium perenne* L.) germination and seedlings. It has been revealed that it has a significant inhibitory (herbicide) effect on development. While *T. spicata* and *M. spicata* essential oils showed an inhibitory effect on seed germination and seedling development, the effect of *S. officinalis* essential oil was found to be at the lowest level (Önen, 2003).

Thyme plant; It is reported that it is used to protect agricultural products stored in France from pests, thanks to its allelopathy feature. Saraç and Tunç (1995), in their study, identified *Satureja thymbra* L., *Pimpinella anisum* L., *Thymbra spicata* var. essential oils of *spicata* L. and *Eucalyptus camaldulensis* Dehnh. They investigated the toxic effects against the adults of *S. oryzae* and *T. Confusum* and the larvae of *Ephestia kuehniella* Zeller. Erler et al. (2009) evaluated the essential oils obtained from *Pimpinella anisum*, *Thymus vulgaris*, *Rosmarinus officinalis* as fumigants against *C. maculatus* in their study and reported that they reached 100% mortality between 15-120 µL/L dose and 24-96 hours. It is used in the control and treatment of bee diseases and pests (İlisulu, 1992; Asımgil, 2001). The harmful effects of excessive use of fertilizers, herbicides and insecticides in traditional and intensive agricultural systems have caused organic agriculture to gain popularity in recent years. In his study, Pavela (2004) found that methanol extracts of eight medicinal plants showed insecticidal effects against Egyptian boll weevil (*Spadoptora littoralis*) larvae; It was concluded that the larval toxicity of extracts from plant species, especially marjoram (*Origanum majarona*), sage (*Salvia officinalis*) and basil (*Ocimum basilicum*), was quite high.

In a study conducted to determine whether feeding thyme supplemented feed can be used as an alternative intestinal health protection (antibacterial) method for vaccinating chickens against bloody diarrhea (coccidiosis); In 48-day-old male chickens (Broiler, n=960), thyme supplemented feed increased live weight but had no

effect on feed intake rate, and was effective against *Clostridium perfringens* (an anaerobic, Gram-positive, spore-forming rod-shaped bacterium) at 31 days of age, but only after 52 days. It has been observed that anticoccidial vaccination is not effective on the number of bacteria (Waldenstedt, 2003). Especially in recent years, the limitation of the use of antibiotics in animal nutrition due to their harmful effects and the increasing preference of organic products by consumers have led scientists to conduct studies on the use of antimicrobial substances. Basil, thyme, sage etc. aromatic plants can be used as antibiotics and anthelmintics (parasite control); It has been noted that the nutritional value of poultry increases with thyme essential oil supplemented feed and that cocoa shell and black cumin supplemented rations increase daily feed intake (Halle et al., 2004).

Synthetic dyes pose serious problems for both human health and the environment due to their carcinogenic effects and low degradability (Bahl and Gupta, 1988; Hartl and Vogl; 2003). For this reason, harmless and environmentally friendly herbal dyes have come to the fore in all areas of life. Yellow, brown, green-gray colors are obtained from *Thymus* species. Some thyme is used as a landscaping plant in parks, gardens and landscaping. Dried flowers are used in making arrangements.

4. CULTIVATION

Thyme cultivation has intensive characteristics. Growing plant seedlings in the greenhouse and transporting them to the culture field

requires a large amount of labor during hoeing, watering, mowing, weeding, drying and primary processing.

Thyme cultivation is done in two ways.

1. Sowing seeds in the field.

2. Production with steel.

Since thyme is a perennial plant, pre-preparation of the culture area and cultivation of the soil are also of great importance. The cultural area is divided into small parcels of a size that will facilitate the use of agricultural tools and equipment. When dividing the field into parcels, topographic features (slope of the land, etc.) are taken into consideration. Thyme is planted either directly in the field or by diversion at certain intervals (usually 30 x 15 cm.) (Anonymous, 2023c). Thyme planted in the culture field can reach the desired size within a few years. After this, ordinary agricultural operations such as hoeing, agricultural control, irrigation and harvesting are carried out in the culture field, which are repeated every year. Harvesting thyme in the culture area is usually done in two cycles. The first of these is between May and June. In this period, the first shoots of the plant are harvested. The second harvest period is in July-August. The yield in this harvest period is also high (Anonymous, 2023).

In some years, the third harvest is also made. This coincides with the months of September and October. Harvested thyme is dried in natural environments and by natural means. For this purpose, a sufficiently large soil area is prepared by cleaning and leveling in

advance. Thyme is spread on this soil area and left to sunbathe. The drying process is completed in approximately 8-10 days. However, this period is slightly longer in the third harvest period, which falls in autumn. During drying, thyme is mixed every day (Ceylan, 2013).



Figure 1. Species of *Thymus* in Kop Pass (Kadioglu et al.2017)

5. CONCLUSION AND RECOMMENDATIONS

The use of medicinal and aromatic plants begins with the first human and continues until today. These plants have become more or less important over time. However, they have never completely lost their importance. As a matter of fact, when we look at the consumption of these plants in the last decade, we see that they have gained importance again. Today, plants are in a very important position as raw materials for medicines. This importance is increasing day by day. The decrease in people's expectations from synthetic drugs increases the tendency towards herbal medicines. Our flora, which is very rich in medicinal and aromatic plants and endemic plants, has recently been destroyed due to reasons such as unconscious collection, destruction of nature and environmental pollution, and many species are in danger of extinction.

REFERENCES

- Anonymous, 2023. [www.nasil Kolay.com](http://www.nasilkolay.com)
- Anonymous, 2023a. <http://tr.wikipedia.org/wiki/Kekik>
- Anonymous, 2023b. [www.nasil kolay.com](http://www.nasilkolay.com), www.aksbim.com.tr
- Anonymous, 2023c. [www.kekik yetiştiriciliği.com](http://www.kekikyetiştiriciliği.com)
- Asımgil, A. (2001). Şifalı bitkiler. Timaş Yayınları 352S. ISBN:975-362-085-3.
- Ayar, A., Özcan, M., & Akgül, A. (2002). Tereyağının mikrobiyolojik kalitesi üzerine kekik ve adaçayı ekstraktlarının etkisi. *Ondokuz Mayıs Üniv. Ziraat Fak. Derg.* 17,(2), 45-49.
- Bahl, D., & Gupta, K.C. (1988). Development of dyeing process of silk with natural dye-cutch. *Colourge.* 22-23.
- Bayram, E.(1995). Geliştirilmiş İzmir kekiği hatlarında bazı agronomik ye kalite özelliklerinin belirlenmesi. *Ege Üniv. Ziraat Fak. Derg.* 3, 41-48.
- Başer, K.H.C. (1998). Tıbbi ve aromatik yabancı bitkilerimiz tehdit altında mı? *TEMA Vakfı Faaliyet Derg.* 1, 44-47.
- Başer, K.H.C., Özek, T., Kürkçüoğlu, M., & Tümen, G. (1994). The essential oil of *origanum vulgare sub. sp. hirtum* of turkish origin, *J. Essent. Oil Res.* 6, 31–36.
- Biskup, S., Saez, E. (Ed.) (2002). *Thyme, The Genus Thymus*. Taylor-Francis. London.
- Dapkevičius, A., Venskutonis, R., Van Beek, T.A., & Linssen, J.P.H. (1998). Antioxidant activity of extracts obtained by different isolation procedures from some aromatic herbs grown in Lithuania. *Journal of the Science of Food and Agriculture.* 77 (1), 140-146.
- Ceylan, M. A. (2013). Salihli’de yeni bir tarım ürünü; Kekik ekimi ve üretimi. *Marmara Coğrafya Dergisi.* (2), 185-196
- Dapkevičius, A., Venskutonis, R., Van Beek, T.A. & Linssen, J.P.H. (1998). Antioxidant activity of extracts obtained by different isolation procedures from some aromatic herbs grown in Lithuania. *Journal of the Science of Food and Agriculture.* 77(1), 140-146. 24 ref.

- Davis, P. H. (Ed.) (1982). Flora of Turkey and The East Aegean Islands, Vol. 7, Univ. Press, Edinburgh, 36-42, 297-313.
- Davis, P.H. (Ed) (1988). Flora of Turkey Vol. 10. Uni. Press. Edinburg.
- Dudai, N., Poljakoff-Mayber, A., Mayer, AM., Putievsky, E., & Lerner, HR. (1999). Essential oils as allelochemicals and their potential use as bioherbicides. Journal-of-Chemical-Ecology. 25(5), 1079-1089.
- Dönmez, M., Kargioğlu, M., & Temel, M. (2011). Afyon Kocatepe University Journal of Science. Volume 11, Issue 2, January 2011, Pages 1 – 9.
- Erler, F., Erdemir, T., Ceylan, F.O. & Toker, C. (2009). Fumigant toxicity of essential oils and their binary and tertiary mixtures against the pulse beetle, *Callasobruchus maculatus* F. (Coleoptera: Bruchidae), Fresenius Environmental Bulletin. 18(6), 975-981.
- Halle, I., Thomann, R., Bauermann, U., Henning, M. & Kohler, P. (2004). Effects of a graded supplementation of herbs and essential oils in broiler feed on growth and carcass traits. Einfluss einer gestaffelten Supplementierung von Krautern oder atherischen Olen auf Wachstum und Schlachtkorpermerkmale beim Broiler. Landbauforschung Volkenrode. 54(4), 219-229.
- Hartl, A., Vogl, C.R. (2003). The potential use of organically grown dye plants in the organic textile industry: experiences and results on cultivation and yields of dyer's chamomile (*Anthemis tinctoria* L.), dyer's knotweed (*Polygonum tinctorium* Ait.), and weld (*Reseda luteola* L.). Journal of Sustainable Agriculture. 23(2), 17-40.
- Heywood, V.D. (1978). Flowering Plants Of The World, Oxford Üniv. Press, London, p. 239.
- Işık, S., Gönüz, A., Arslan, Ü. & Öztürk, M. (1995). Afyon ilindeki bazı türlerin etnobotanik özellikleri. Ot Sistematik Botanik Dergisi. 2(1), 161-166.
- İlisulu, K. (1992). İlaç ve Baharat Bitkileri. Ankara Üniversitesi, Ziraat Fakültesi Yayınları, Yayın No: 1256/360, 302 s., Ankara.
- Kintzios, E.S. (Ed.) (2002). Oregano, The Genus *Origanum* and *Lippia* Taylor-Francis. London.

- Koparal, A.T., & Zeytinođlu, M. (2003). Effects of carvacrol on a human nonsmall cell lung cancer(NSCLC) cell line, A549, Cytotechnology. 43, 149-154.
- Önen, H. (2003). Bazı bitkisel uçucu yağların biyoherbisidal etkileri. Türkiye Herboloji Dergisi. 6(1), 39-47.
- Qasem, J.R., Hassan, A.A. (2003). Herbicidal properties of some medicinal plants against *Malva sylvestris* and *Portulaca oleracea*. Dirasat-Agricultural-Sciences. 30(1), 84-100.
- Pavela, R. (2004). Insecticidal activity of certain medicinal plants. Fitoterapia. 75(7-8), 745-9.
- Tan, A. (2010). Türkiye bitki genetik kaynakları ve muhafazası. Anadolu J. of AARI. 20 (1), 7-25
- Waldenstedt, L. (2003). Effect of vaccination against coccidiosis in combination with an antibacterial oregano (*Origanum vulgare*) compound in organic broiler production. Acta-AgriculturaeScandinavica-Section-A,-Animal-Science. 53(2), 101-109.



ISBN: 978-625-367-580-6