



Wild fruits sold in the public bazaars of Edremit Gulf (Balıkesir) and their medicinal uses

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Abstract

In this study, wild fruits sold in public bazaars in the Edremit Gulf and medicinal uses of these fruits were investigated. During research, ethnobotanical studies were conducted in 12 public bazaars established in Edremit, Burhaniye, Gömeç and Ayvalık districts. In the study were interviewed with 75 informant who sell and the gathered wild fruits naturally from the mountains. Later, ethnobotanical questions were asked to them about the medicinal uses of fruits. As a result of the study, it was determined that 33 taxa belonging to 13 families were collected by villagers and sold for commercial purposes in bazaar markets. The most common families were Rosaceae (16 taxa) and Moraceae (3 taxa). As a result of both the questions directed to the sellers and the data based on the literature, it has been determined that wild fruits were used as a food supplement in the treatment of 35 different diseases. Most of the wild fruits; it has been seen to be used in diabetes, kidney stone, cholesterol, constipation, blood pressure diseases, diarrhea and upper respiratory tract infection.

Key words: Edremit Gulf, Rosaceae, ethnobotany, public bazaars, medicinal uses

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Edremit Körfezi (Balıkesir) semt pazarlarında satılan yabancı meyveler ve tıbbi kullanımları

Özet

Bu çalışmada Edremit Körfezi'ndeki halk pazarlarında satılan yabancı meyveler ve bu meyvelerin tıbbi kullanımları araştırılmıştır. Çalışma süresince; Edremit, Burhaniye, Gömeç ve Ayvalık ilçelerinde kurulan 12 semt pazarında etnobotanik incelemeler yapılmıştır. Çalışmada, dağlardan doğal olarak topladıkları meyveleri satan ya da toplayıp kullanan 75 kişi ile görüşme yapılmış ve meyvelerin tıbbi kullanımları hakkında etnobotanik sorular yöneltilmiştir. Çalışma sonucunda, 13 familyaya ait 33 taksonun köylüler tarafından toplandığı ve semt pazarlarında ticari amaçlarla satıldığı tespit edilmiştir. En fazla kullanımı olan familyalar; Rosaceae (16 takson) ve Moraceae (3 takson)' dir. Hem satıcılara yöneltilen sorular hem de literatüre dayalı veriler sonucunda yabancı meyvelerin, 35 farklı hastalığın tedavisinde gıda takviyesi olarak kullanıldığı tespit edilmiştir. Yabancı meyvelerin en fazla; diyabet hastalıkları, böbrek taşı, kolesterol, kabızlık, tansiyon, ishal ve üst solunum yolları enfeksiyonlarında kullanıldığı görülmüştür.

Anahtar kelimeler: Edremit Körfezi, Rosaceae, etnobotanik, halk pazarları, tıbbi kullanımlar

1. Introduction

Since its existence, humans have met their needs from plants and animals. According to the data obtained from the archaeological findings of those periods, people first applied to the plants in the elimination of nutrition and health problems. Throughout history, plants have been indispensable for humans. This information obtained by trial and error throughout history has been affected by the way people live [1,2].

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BioDiCon. 806-0119

Please cite this article in press as: Aladi et al., (2019). Wild fruits sold in the public bazaars of Edremit Gulf (Balıkesir) and their medicinal uses, Biological Diversity and Conservation, 12(1), 89-99. <http://dx.doi.org/10.5505/biodicon.2019.25733>

For centuries, wild plants have been evaluated by humans as food, dye, ornamental plant, fuel, amulet, handicrafts and spices; however, the drugs obtained from organs such as root, stem, leaf, flower, fruit and seeds are used for medicinal purposes in human and animal health [3]. Wild fruits are used as a direct food for all living things in the forest, in addition to are a healthy source of nutrients for humans. Fruits have healing properties due to the secondary metabolites they contain are widely used in the pharmaceutical and cosmetic industries [1,4].

Balıkesir is one of the important areas of our country in terms of fruit production. Edremit Gulf, located in the west of Balıkesir province, is an important settlement in the northern part of the Aegean Region, including the Kazdağ [5]. Within the boundaries of Kazdağı (Mount Ida) National Park, where approximately 800 plant taxa are spread, 78 endemic plant taxa, 32 of which are specific to the National Park, have been identified [6-8]. Bazaar locations in Edremit gulf at a location easily accessible to the public or to a primary school place of one or a few days of the week are in the open bazaar. Villagers usually sell for income fruits and vegetables gathered from the Mount Ida in the spring and autumn at public bazaars. Mount Ida also contains many wild fruits in this rich biodiversity. According to a study conducted on this subject, the ethnobotanical properties of wild fruits in Balıkesir region were investigated [1]. In addition, various ethnobotanical studies have been carried out in the Edremit Gulf on the ethnobotanical use of medicinal plants [4, 8-11]. However, no studies have been found regarding the medicinal uses of wild fruits.

In this study were identified wild fruits sold in the bazaars in the Edremit Gulf and the medicinal uses of these fruits were determined as a result of both the questions directed to the sellers and the data based on the literature.

2. Materials and methods

2.1 Study area

The Edremit Gulf which located in between Mount Ida and Madra mountains the west of Balıkesir (Turkey) province and coastline of Aegean Sea had been among the most important olive producer centers of Anatolia date from ancient ages. The study area is included in the Mediterranean and European – Siberian phytogeographic regions within the B1 grid square according to the Grid classification system used in the Flora of Turkey [12]. Edremit Gulf is located between 39° 16' - 39° 36' north latitudes and 26° 04' - 27° 06' east longitudes and it is surrounded by Edremit, Havran, Gömeç and Ayvalık districts respectively. The region has a rich flora on account of its climatic properties, geological structure and location [1,7]. Geographical location of the study area is presented in Figure 1.



Figure 1. Geographical location of the study area (Edremit Gulf)

2.2 Bazaar research

During the autumn and spring seasons, the products sold by the villagers were determined and of the purchased products photographs were taken (Figure 2). During the study at Edremit (7) Burhaniye (2) Havran (1), Gömeç (1) and Ayvalık (1) a total of 12 local bazaars including are visited at regular intervals. The samples taken from the bazaar were given a number and the local name, intended use and medicinal uses of the product were recorded as a result of the questions directed to the sellers and users. As a result, 75 people, 60 women and 15 men, were interviewed. As informant in the study; especially women and men over the middle age were preferred. In the interviews with informant's, the following questions were asked to them.

- Where did you gather wild fruits (garden, field, forest, etc.)?
- What are the wild fruits you sell at the beginning of autumn, spring and summer?
- Are there any medicinal uses of the fruits sold?
- What is the consumption / use of wild fruits (food, spices, medicinal etc.)?
- What parts of wild fruits are used?



Figure 2. Some wild fruits sold in bazaars in the Edremit Gulf 1) *Amygdalus communis* (Badem), 2) *Myrtus communis* (Yaban mersini), 3) *Corylus avellana* (Yabani findık), 4) *Cornus domestica* (Üvez), 5) *Mespilus germanica* (Muşmula), 6) *Diospyros lotus* (Hırnik), 7) *Arbutus unedo* (Dağ çileği), 8) *Pyrus elaeagnifolia* subsp. *elaeagnifolia* (Ahlat)

2.3 Plant Collection and Diagnosis

In the bazaars accompanied by the people selling wild fruits, plant samples were taken by going in flowering times (March-May) to the areas where these plants were collected and then they were dried according to standard herbarium techniques and turned into herbarium samples. Plants were identified with the help of the related literature [12,13]. Later, identified plants were compared with the specimens in Balıkesir University Altınoluk Vocational School Botanic Laboratory in Turkey. The localities and voucher numbers of the species collected from the field are alphabetically given in Table 1.

Table 1. Localities and voucher numbers of wild fruits determined in Edremit Gulf

| N | Scientific name | Localities and voucher numbers |
|----|---|--|
| 1 | <i>Amygdalus communis</i> L. | B1 Balıkesir: Havran-Dereören, 39° 34.942N, 027° 13.418E, 159 m, 20.05.2018, (HIA, 120) |
| 2 | <i>Arbutus unedo</i> L. | B1 Balıkesir: Havran - Sarnıç neighborhood, 39° 35.420N, 027° 11.647E, 178 m, 20.03.2018, (HIA, 95) |
| 3 | <i>Capparis sicula</i> subsp. <i>sicula</i> Veill | B1 Balıkesir: Edremit-Kazdağları, woodland, 39°39'49''N, 026°50'52''E, 1153 m, 18.06.2018 (HIA, 132) |
| 4 | <i>Castanea sativa</i> Mill. | B1 Balıkesir: Burhaniye, Karadere- Tayöldü location, woodland, 39° 26.139N, 026° 05 094E, 255 m, 17.03.2018 (HIA, 90) |
| 5 | <i>Cerasus avium</i> (L.) Moench | B1 Balıkesir: Edremit, Yaşyer Neighborhood, gardens, 39°39'48''N, 027°03'19''E, 278 m, 18.03.2018, (HIA, 91) |
| 6 | <i>Cerasus vulgaris</i> Mill. | B1 Balıkesir: Edremit, Yaşyer, woodland, garden 39°39'48''N, 027°03'19''E, 278 m, 14.04.2018 (HIA, 110) |
| 7 | <i>Ceratonia siliqua</i> L. | B1 Balıkesir: Burhaniye-Pelitköy, woodland, 39° 27.686N, 026° 53.881E, 15 m, 14.04.2018 (HIA, 112) |
| 8 | <i>Cicer arietinum</i> L. | B1 Balıkesir: Burhaniye, Karadere Neighborhood, 39° 26.244N, 026° 04.981E, 151 m, 02.06.2018, (HIA, 129) |
| 9 | <i>Cornus domestica</i> (L.) Spach | B1 Balıkesir: Edremit, Yaşyer, woodland, 39°39'48''N, 027°03'19''E, 278 m, 25.10.2018, (HIA, 155) |
| 10 | <i>Cornus mas</i> L. | B1 Balıkesir: Havran-Karaoğlanlar Neighborhood, woodland, 39° 31.804N, 027° 12.415E, 467 m, 19.03.2018, (HIA, 92) |
| 11 | <i>Corylus avellana</i> L. | B1 Balıkesir: Edremit-Kazdağları, woodland, 39°39'49''N, 026°50'52''E, 1153 m, 23.06.2018 (HIA, 137) |
| 12 | <i>Crataegus monogyna</i> var. <i>monogyna</i> | B1 Balıkesir: Havran-Çakırdere Neighborhood, woodland, 39° 29'178''N, 027° 09'612''E, 399 m, 16.03.2018 (HIA, 88) |
| 13 | <i>Crataegus orientalis</i> Pall. ex M.Bieb. subsp. <i>orientalis</i> | B1 Balıkesir: Edremit, Yaşyer Neighborhood, olive groves, woodland, 39°39'48''N, 027°03'19''E, 278 m, 16.03.2018 (HIA, 85) |
| 14 | <i>Diospyros lotus</i> L. | B1 Balıkesir: Edremit-Cennetayağı Neighborhood, olive groves, 39°35.52N, 027°01.04E, 29 m, 16.11.2018, (HIA, 173) |
| 15 | <i>Elaeagnus angustifolia</i> L. | B1 Balıkesir: Burhaniye stream, 39° 29.972N, 026° 58.412E, 17 m, 23.06.2018 (HIA, 138) |
| 16 | <i>Eriolobus trilobatus</i> (Labill. ex Poir.) M.Roem. | B1 Balıkesir: Edremit, Yaşyer neighborhood, woodland, 39°39'48''N, 027°03'19''E, 278 m, 5.11.2018, (HIA, 160) |
| 17 | <i>Ficus carica</i> L. | B1 Balıkesir: Burhaniye, Pelitköy Neighborhood, 39° 27.686N, 026° 53.881E, 15 m, 22.06.2018 (HIA, 134) |
| 18 | <i>Fragaria vesca</i> L. | B1 Balıkesir: Edremit- Yaşyer Neighborhood, gardens, 39°39'48''N, 027°03'19''E, 278 m, 19.03.2018 (HIA, 93) |
| 19 | <i>Juglans regia</i> L. | B1 Balıkesir: Burhaniye-Kızıklı Neighborhood, garden 39° 28.627N, 026° 59.577E, 47 m, 25.03.2018 (HIA, 102) |
| 20 | <i>Malus sylvestris</i> (L.) Mill. | B1 Balıkesir: Burhaniye-Bahadınlı Neighborhood, garden, 39° 27.255N, 026° 00.753E, 20.06.2018, 97 m, (HIA, 132) |
| 21 | <i>Mespilus germanica</i> L. | B1 Balıkesir: Burhaniye, Pelitköy Neighborhood, 39° 27.686N, 026° 53.881E, 15 m, 15.11.2018, (HIA, 173) |
| 22 | <i>Morus alba</i> L. | B1 Balıkesir: Havran- İnönü Neighborhood, woodland, 39° 34.865N, 027° 09.293E, 235 m, 22.05.2018, (HIA, 124) |
| 23 | <i>Morus nigra</i> L. | B1 Balıkesir: Burhaniye, Pelitköy Neighborhood, 39° 27.686N, 026° 53.881E, 15 m, 23.05.2018 (HIA, 127) |
| 24 | <i>Myrtus communis</i> L. subsp. <i>communis</i> | B1 Balıkesir: Edremit, Kazdağları, woodland, 39°39'49''N, 026°50'52''E, 1153 m, 28.9.2018 (HIA, 150) |
| 25 | <i>Pistacia terebinthus</i> subsp. <i>terebinthus</i> L. | B1 Balıkesir: Havran-Çakırdere Neighborhood, woodland, 39° 29'178 N, 027° 09'612''E, 399 m, 11.08.2018 , (HIA, 142) |
| 26 | <i>Prunus divaricata</i> Ledeb | B1 Balıkesir: Havran-Musluk-Gelinderesi mevkii, 39° 34.033N, 027° 17.230E, 595 m, 12.04.2018 , (HIA, 109) |

Table 1. Continued

| | | |
|----|--|---|
| 27 | <i>Prunus spinosa</i> L. | B1 Balıkesir: Havran-Musluk-Gelinderesi location, garden 39° 34.033N, 027° 17.230E, 595 m, 21.03.2018, (HIA, 98) |
| 28 | <i>Pyrus elaeagnifolia</i> Pall.subsp. <i>elaegnifolia</i> | B1 Balıkesir: Edremit, Yaşyer Neighborhood, olive groves, woodland, 39°39'48''N, 027°03'19''E, 278 m. 15. 11.2018, (HIA, 172) |
| 29 | <i>Rhus coriaria</i> L. | B1 Balıkesir: Havran-Çakırdere Neighborhood, woodland, 39° 29.178N, 027° 09.612E, 399 m, 21.05.2018, (HIA, 122) |
| 30 | <i>Rosa canina</i> L. | B1 Balıkesir: Havran-Eseler Neighborhood, 39° 32.605N, 027° 12.226E, 415m, 12.11.2018, (HIA, 167) |
| 31 | <i>Rubus canescens</i> var. <i>canescens</i> DC. | B1 Balıkesir: Edremit- Yaşyer Neighborhood, woodland, 39°39'48''N, 027°03'19''E, 278 m, 18.06.2018 , (HIA, 132) |
| 32 | <i>Rubus sanctus</i> Schreb. | B1 Balıkesir: Havran-Tepeoba-Eybek Mountain, 39° 37.938N, 027° 06.168E, 346 m, 18.06.2018 (HIA, 130) |
| 33 | <i>Vaccinium myrtillus</i> L. | B1 Balıkesir: Edremit-Kazdağları, woodland, 39°39'49''N, 026°50'52''E, 1153 m, 18.05.2018, (HIA, 118) |

3. Results

In the study, 75 source people selling herbal products in the district bazaars were interviewed. As a result of the interview; It was determined that 33 taxa belonging to 13 families were sold in the bazaars as wild fruit. The family, scientific / Turkish names and medicinal uses of the identified fruits are listed in alphabetic order and presented in Table 2. By the informant in bazaars were found to sell in the autumn season, Ahlat (*Pyrus elaeagnifolia* subsp. *elaegnifolia*), dağ çileği (*Arbutus unedo*), üz (*Cornus domestica*), kuşburnu (*Rosa canina*), muşmula (*Mespilus germanica*), keçiboynuzu (*Ceratonia siliqua*) kestane (*Castanea sativa*), ceviz (*Juglans regia*), yabancı fındık (*Corylus avellana*), yaban mersini (*Myrtus communis*), ayıüzümü (*Vaccinium myrtillus*), hırnik (*Diospyros lotus*), menengiç (*Pistacia terebinthus* subsp. *terebinthus*), iğde (*Elaeagnus angustifolia*), Badem (*Amygdalus communis*); in the spring season; Kiraz (*Cerasus avium*), Çilek (*Fragaria vesca*), kapari (*Capparis sicula* subsp. *sicula*) in May and in early summer; akdut (*Morus alba*), karadut (*Morus nigra*), nohut (*Cicer arietinum*), yemişen (*Crataegus monogyna* var. *monogyna*), alıç (*C. orientalis* subsp. *orientalis*), kiraz (*Cerasus vulgaris*), yabancı elması (*Malus sylvestris*), wild apricot (*Armeniaca vulgaris* Lam), fig (*Ficus carica* L.) geyikeması (*Eriolobus trilobatus*), yunuseriği (*Prunus divaricata* Ledeb.) in late August, böğürtlen (*Rubus sanctus*), çobankösteği (*R. canescens* var. *canescens*), çakaleriği (*Prunus spinosa*), sumak (*Rhus coriaria*), kızılıçık (*Cornus mas*) fruits.

In the study, Rosaceae (16 taxa) and Moraceae (3 taxa), were the most used families and followed by the families of Anacardiaceae, Ericaceae and Fabaceae with 2 taxa (Figure 3).

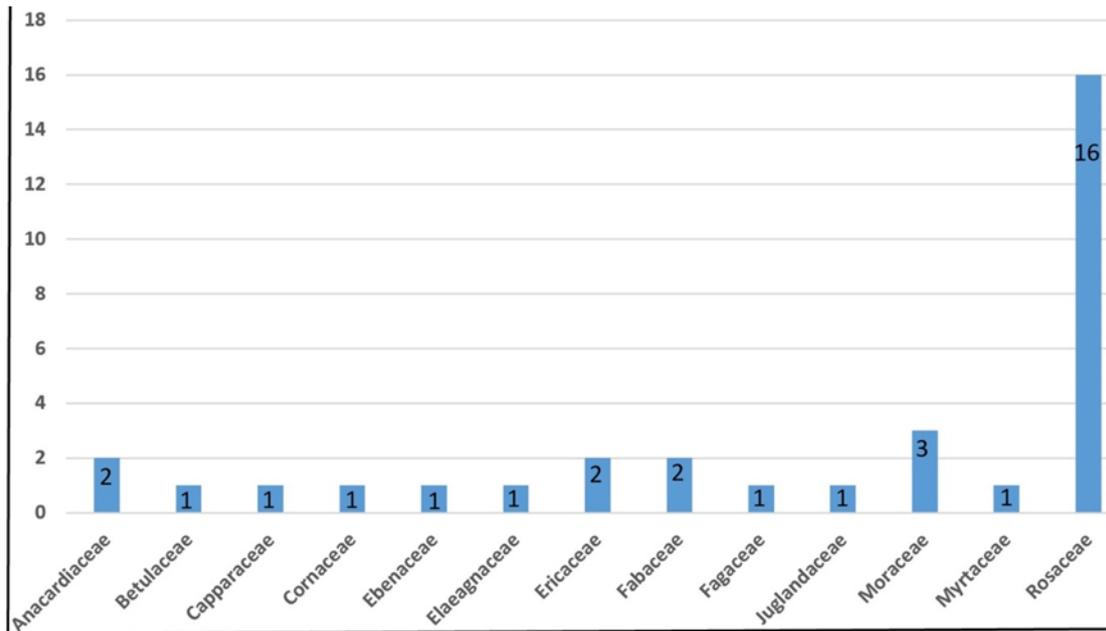


Figure 3. Taxa numbers and families wild fruits sold in the Edremit Gulf.

Table 2. Wild fruits sold in the Edremit Gulf and their effects on the human body

| Family | Scientific name | Vernacular name | Effects on the human body | |
|---------------|--|-----------------|---|---|
| | | | According to Informant's | According to literatures |
| Anacardiaceae | <i>Pistacia terebinthus</i> L. subsp. <i>terebinthus</i> | Menengiç | Asthma, stomach ache | Stomach ache [14] |
| Anacardiaceae | <i>Rhus coriaria</i> L. | Sumak | Ulcers | Diuretic [4,15] |
| Betulaceae | <i>Corylus avellana</i> L. | Yabani Fındık | High cholesterol | Antioxidant, cardiac diseases [16] |
| Capparaceae | <i>Capparis sicula</i> subsp. <i>sicula</i> Veill. | Kapari | Wounds, cuts | Antioxidant, gastritis [17] |
| Cornaceae | <i>Cornus mas</i> L. | Kızılcık | Nephritis, cardiac diseases, diarrhea, cough, cold, flu, antihypertensive | Antimicrobial, Antidiabetic [18] |
| Ebenaceae | <i>Diospyros lotus</i> L. | Hırnık | Antidiabetic, diarrhea, nutritive | Sedative, astringent, antiseptic [19] |
| Elaeagnaceae | <i>Elaeagnus angustifolia</i> L. | İğde | Kidney stones, diarrhea | Diarrhea, kidney Stones [20] |
| Ericaceae | <i>Arbutus unedo</i> L. | Dağ çileği | Laxative, kidney stones, hemorrhoids | Galactagogue, antiinflammatory [21] |
| Ericaceae | <i>Vaccinium myrtillus</i> L. | Ayüzümü | Anticarcinogens, lung diseases, antiseptic, strengthening, diabetes | Antioxidant [22], Antimicrobial [23] |
| Fabaceae | <i>Ceratonia siliqua</i> L. | Keçiboynuzu | Cold, anemia, hepatic, intestinal parasites, digestive system, anti-diarrheal, embolism | Lung diseases [24]; diabetes [21] |
| Fabaceae | <i>Cicer arietinum</i> L. | Nohut | Dyspepsia, constipation | Astringent, bronchitis, catarrh, cholera, constipation [25] |
| Fagaceae | <i>Castanea sativa</i> Mill. | Kestane | Antihypertensive, cough | Cardiovascular health, dyspnea [26] |
| Juglandaceae | <i>Juglans regia</i> L. | Ceviz | Hemorrhoids, wrinkles, cholesterol lowering, tonic | Antiinflammatory, antiseptic [27] |
| Moraceae | <i>Ficus carica</i> L. | İncir | Laxative, eczema, hemorrhoids | Hepatoprotective, intestinal diseases [21] |
| Moraceae | <i>Morus alba</i> L. | Akdut | Sore throat, antirheumatic | Antidiabetic, digestive ulcer [27] |
| Moraceae | <i>Morus nigra</i> L. | Karadut | Kidney diseases, mouth diseases, cholesterol, hepatitis | Asthma [14]; mouth diseases [21] |

Table 2. Continued

| | | | | |
|-----------|---|---------------|---|---|
| Myrtaceae | <i>Myrtus communis</i> L. | Yaban mersini | Cardiac weakness, digestive system, prostate ailments | Antiseptic, cancer [21] |
| Rosaceae | <i>Pyrus elaeagnifolia</i> Pall.subsp. <i>elaeagnifolia</i> | Ahlat | Nephritis, diabetes | Depurative, mild laxative [27] |
| Rosaceae | <i>Crataegus orientalis</i> subsp. <i>orientalis</i> | Aliç | Headache, cardiovascular diseases | Cardiac nervous disorders, sedative [27] |
| Rosaceae | <i>Amygdalus communis</i> L. | Badem | High cholesterol Diabetes, wounds, cuts | For urinary, inflammations [27]; Diabetes [21] |
| Rosaceae | <i>Rubus sanctus</i> Schreb. | Böğürtlen | Constipation Stomachache, appetizer, prostatitis | Liver diseases [28]; muscular skeletal disease [29] |
| Rosaceae | <i>Prunus spinosa</i> L. | Çakaleriği | Pneumonia | Against diarrhea [30]; Cardiac diseases [14] |
| Rosaceae | <i>Rubus canescens</i> var. <i>canescens</i> DC. | Çobankösteği | Pneumonia, appetizer, prostatitis | Immunotonic, cold, flu [14] |
| Rosaceae | <i>Fragaria vesca</i> L. | Dağçileği | Diuretic, constipation | Antiseptic, gut, urinary disorders [27] |
| Rosaceae | <i>Prunus divaricata</i> Ledeb | Yunus eriği | Antihypertensive, cold | Diabetes, cold, flu, nephritis [14] |
| Rosaceae | <i>Cerasus avium</i> (L.) Moench | Kiraz | Diuretic, Gallstone | Nephritis, diuretic, gallstone [14] |
| Rosaceae | <i>Rosa canina</i> L. | Kuşburnu | Antiseptic, colds and flu, Diabetes, appetizer | Antiseptic, cardiac disorders [27] |
| Rosaceae | <i>Cornus domestica</i> (L.) Spach. | Üvez | Diabetes, nephritis | Bronchodilator [31]; antiallergic [32] |
| Rosaceae | <i>Cerasus vulgaris</i> Mill. | Vişne | Anti-carcinogenic | Gallstone, diuretic [33] |
| Rosaceae | <i>Malus sylvestris</i> (L.) Mill. | Yaban elması | Earache, diabetes | Immune system strengthening, antihypertensive [30] |
| Rosaceae | <i>Crataegus monogyna</i> Jacq.var. <i>monogyna</i> | Yemişen | Gallstone | Cardiovascular diseases [15] |
| Rosaceae | <i>Mespilus germanica</i> L. | Muşmula | Expectorant, diarrhea | Expectorant [27] |
| Rosaceae | <i>Eriolobus trilobatus</i> (Labill. ex Poir.) M.Roem. | Geyik elması | Antihypertensive, gallstone, diabetes | Cholesterol, hypoglycemic, shortness of breath [34] |

It has been seen that all the wild fruits are used medicinally in response to the question of whether there are any medicinal effects to the informant. As a result of the interviews, it was determined that these plants have a healing effect in 35 different diseases and symptoms (Table 2). Most of these fruits have been used for medicinal purposes in diabetic diseases, gallstone, cholesterol, constipation, blood pressure diseases, diarrhea and upper respiratory tract infection (Figure 4).

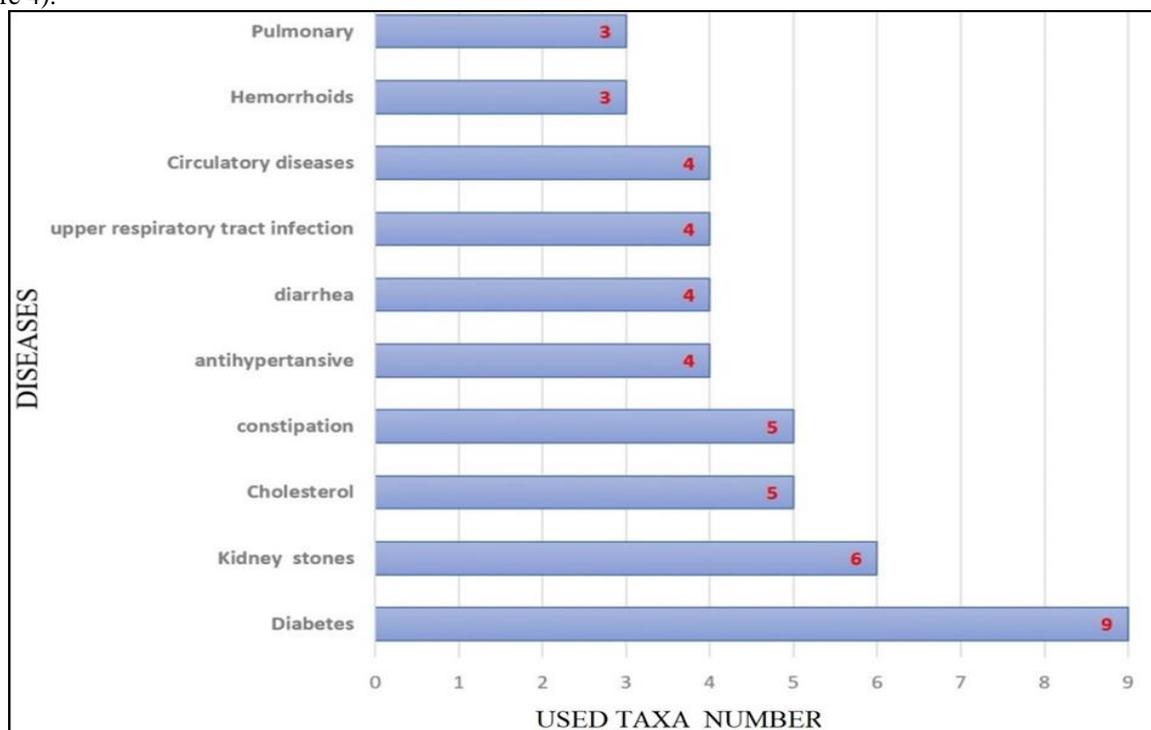


Figure 4. Diseases in which wild fruits are used

It was determined that the medicinal use of 12 of the 33 taxa detected in the field was scientifically proven and included in pharmacopeia and monographs such as ESCOP [35], WHO [36], EMA [37] and PDR [38], especially Commission E (Table 3).

Table 3. Plants used in Edremit Gulf with pharmacopeia and monographs published by International Agencies

| Plant name | English name /Turkish name | Monograph | Effects |
|---|----------------------------|-------------------------------|--|
| <i>Castanea sativa</i> Mill. | Spanish Chestnut / Kestane | PDR | Respiratory tract, such as bronchitis and whooping cough, leg pain, circulation and diarrhea, and sore throats. |
| <i>Ceratonia siliqua</i> L. | Carob / Keçiyoynuzu | PDR | Secretion and activity of digestive enzymes, secretion of gastrointestinal hormones; hypoglycaemic and hypolipidaemic effect |
| <i>Cornus domestica</i> (L.) Spach. | Sorb apple / Üvez | PDR | Astringent, anti-inflammatory and pain-relieving |
| <i>Crataegus monogyna</i> Jacq.var. <i>monogyna</i> | Hawthorn / Yemişen | WHO, ESCOP, EMA | Cardiac and circulatory functions |
| <i>Ficus carica</i> L. | Fig / İncir | PDR | Laxative |
| <i>Fragaria vesca</i> L. | Strawberry / Dağçileği | PDR | Astringent, diuretic |
| <i>Juglans regia</i> L. | Walnut / Ceviz | Commission E, PDR, EMA | Astringent and fungistatic |
| <i>Morus nigra</i> L. | Black Mulberry / Kara Dut | PDR | Laxative and respiratory system treatment |
| <i>Myrtus communis</i> L. | Myrtle / Yaban Mersini | PDR | Antiademic, hypoglycemic |
| <i>Prunus spinosa</i> L. | Sloe / Çakaleriği | Commission E, PDR | Astringent |
| <i>Rosa canina</i> L. | Dog rose / Kuşburnu | ESCOP | Antirheumatic, Astringent |
| <i>Vaccinium myrtillus</i> L. | Bilberry / Ayı üzümü | ESCOP, WHO, PDR, Commission E | Diarrhea, inflammation of the mouth and pharynx |

4. Conclusions and discussion

It is seen that the data obtained from the informant's are compatible with the literature studies. *Crataegus monogyna* var. *monogyna* is known as cardiotoxic plant. It is used as a traditional medicine to improve diseases such as heart failure due to its antioxidant substances [39]. Local plums (*Prunus spinosa* and *P. divaricata*) grown in the region are widely sold in the bazaars. Besides being consumed as fresh fruit by the people, it is also used in dry fruit, jam, marmalade and composte. Yaşar et al. [40] have found that reduce the intestinal parasites when boiled plum juice were given to animals.

Amygdalus communis are sold in autumn as dry almond, at the spring as unripe almond in the bazaars. Sweet almonds consumed as food increases breast milk, good for cough and sore throat. Bitter almonds are toxic, they are not consumed as food. But it is get rid of worms (4-6 seeds can be eaten according to the age and body of the person), it is diuretic and has been used in cancer treatment in recent years. Bitter almond oil lowers blood sugar. Fruit peel is used among the public against sore throat [15,38].

Rubus canescens and *R. sanctus* are usually sold in September in the bazaars. The roots of this plant are used in diabetics, gallstone and as sand reducer due to diuretic effect. In the Far East, Europe and North American countries root, leaves and fruits of the plant, tonic, gall-stone, spasm solvent, menstrual and labor pains, wound healing, blood purifier, in alcoholism, bacterial dysentery, diarrhea, tonsillitis, hepatitis, renal insufficiency, allergic rhinitis, burn wounds, gum disease, male infertility and malaria are used in the treatment [41].

Rosa canina are sold both fresh and dry fruits in bazaars. Usually is used in jam and marmalade making and also is made tea. Fruit of this species is consumed for purposes such as increasing body resistance, protecting against colds. Leaves and petals soften the skin, it is scratches and helps to heal the skin, it is used in the treatment of skin diseases [42].

One of the fruits sold in the bazaars *Cornus domestica* is sold in one or several looms according to the size of the bazaar. Often fresh fruit is eaten and used in vinegar making. *Cerasus avium* is sold in summer. Besides being consumed as fresh fruits, it is mostly used in making fruit juice, compote and jam.

According to an ethnobotanical study, the most grown fruit trees in gardens, vineyards among wild and cultural fruits; olive, apple, plum, medlar, mandarin, spindle, jujube, cherry, pear, quince, walnut, grape, fig, pomegranate, white and black mulberry. Four local plum (*Prunus* spp.) varieties were found to be common in Havran, including Dairy plum, Şam plum, Sobe plum and Bekiroğlu plum. In Dereli village are consumed as food of the fruits *Celtis australis*. *Prunus* spp. are dried and are added in Gumbos soup cooking in winter season, while *Pyrus amygdaliformis* is thrown into pickles. *Eriolobus trilobatus* and *Rubus sanctus* are sold in bazaars in September. The edges of olive fields in the region are surrounded by almond trees. The northern part of the national park is close to the Çanakkale border. Especially chestnuts collected by Ortaoba and Yaşyer villagers which had been district borders of Edremit were sold in the bazaars [8].

Arbutus unedo sold in autumn in the region is known by the region people as the Arbutus and Davulgu. This fruit, which is still available in the stalls in January, is known as the force-giver. Fruits of boiled water is effective in measles, diuretic, cough and to bronchitis is comforting, reduces high blood pressure, removes hardening of the arteries, rheumatism and joint inflammation good income, lowers fever, gives the skin freshness and beauty [21]. *Morus nigra*, one of the most common fruits in the Gulf region, is used both as fresh and as a syrup. It is sold almost everywhere as a summer drink both on the bazaars and on the roadside. It is used for diseases such as sore throat and mouth sores by people. It is especially applied against the thrush in babies [14,21]. Leaves of *Morus alba* have effects such as hemorrhagic, antipyretic, diuretic and diaphoretic. In addition, fresh leaves are buffered in wounds to stop bleeding [14].

Diospyros lotus, which is grown in gardens in Edremit and sold in markets, is known as a small fruit Trabzon hurması or hırnik. This species, which can be consumed fresh or dry, is used for making molasses. In addition to having high antioxidant activity, it is also used in health field because it contains different vitamins, minerals, antioxidants and flavonoids on the leaves [43].

As mentioned above, wild fruits being sold in public bazaars in the Edremit Gulf are cured with various vitamins, minerals and many secondary compounds they contain, and can cure many diseases such as cancer, diabetes, obesity, and heart diseases, and more importantly, they reduce the likelihood of developing these diseases. These naturally grown fruits are used both as a food and income source for humans and as a food for wild animals, thus ensuring the continuity of the ecosystem.

References

- [1] Duran, A., Satil, F., & Tümen, G. (2001). Wild fruits and ethnobotanical properties in Balıkesir region. *Ot Sistematiği Botanik*, 8, 87-94.
- [2] Doğan, Y. (2012). Traditionally used wild edible greens in the Aegean Region of Turkey. *Acta Societatis Botanicorum Poloniae*, 81 (4), 329-342.
- [3] Güner, Ö., & Selvi, S. (2016). Wild medicinal plants sold in Balıkesir/Turkey herbal markets and their using properties. *Biological Diversity and Conservation*, 9(2);96-101.

- [4] Selvi, S., Dağdelen, A., & Kara, S. (2013). Medicinal and aromatic plants consumed as herbal tea and collected from Ida Mountains (Balıkesir-Edremit), *Journal of Tekirdağ Agricultural Faculty*, 10(2), 26-33.
- [5] Mutluer, M. (1995). Affecting factors of geographical distribution of rural settlements and population size in Edremit Region. *Aegean Geographical Journal*, 8, 207-224.
- [6] Özhatay, N., Byfield, A., & Atay, S. (2003). Important Plant areas of Turkey. Turkey WWF (World Wildlife Foundation), Istanbul, Turkey.
- [7] Satıl, F., Dirmenci, T., & Tümen, G. (2006). Classification of priority conservation areas in Kazdağ National Park and their important plants. *Kazdağları II. National Symposium*, 391-401, Çanakkale.
- [8] Satıl, F., Tümen, G., Dirmenci, T., Çelik, A., Arı, Y., & Malyer, H. (2007). Ethnobotanical inventory study in Kazdağı National Park and surrounding area (Balıkesir). *TUBA Culture Inventory Journal*, 5, 171-203.
- [9] Paşa, C., & Selvi, S., (2011). Kazdağları'nda (Balıkesir-Edremit) yöre halkı tarafından toplanan ve ticareti yapılan tıbbi bitkiler üzerine bir araştırma. IX. Tarla Bitkileri Kongresi, 12-15 Eylül 2011, Bursa, 1409-1412.
- [10] Polat, R., & Satıl, F. (2012). An Ethnobotanical survey of medicinal plants in Edremit Gulf (Balıkesir - Turkey). *Journal of Ethnopharmacology*, 139, 626-641.
- [11] Ahiskalı, M., Arı, Ç.S., & Selvi, S. (2012). Edible wild plants and their consumption during winter in a rural village on Mount Ida (Kazdağı). *Bocconea*, 195-198.
- [12] Davis, P. H. (1965–1985). *Flora of Turkey and the East Aegean Islands*. Vol. I-IX, Edinburgh Univ. Press, Edinburgh.
- [13] Davis, P.H., Mill, R.R., & Tan, K. (Eds.), (1988). *Flora of Turkey and the East Aegean Islands*, vol. 10. Edinburgh University Press, Edinburgh.
- [14] Kultur, S. (2007). Medicinal plants used, in Kırklareli Province (Turkey). *Journal of Ethnopharmacology* 111, 341–364.
- [15] Baytop, T. (1999). Türkiye'de bitkiler ile tedavi, geçmişte ve bugün. Nobel Tıp Kitabevleri, II. Baskı ISBN: 975-420-021-1. İstanbul, 480s.
- [16] Alasalvar, C., Karamac, M., Amarowicz, R., & Shahidi, F. (2006). Antioxidant activities in extracts of defatted hazelnut (*Corylus avellana* L.) and its green shell cover. *Journal of Agricultural and Food Chemistry*, 54, 4826–4832.
- [17] Sher, H., & Al-Yemeni, M. (2010). Ethnobotanical and pharmaceutical evaluation of *Capparis spinosa* L., validity of local folk and Unani system of medicine. *Journal of Medicinal Plant Research*, 4(17), 1751-1756.
- [18] Perova, I.B., Zhogova, A.A., Poliakova, A.V., Eller K.I., Ramenskaia, G.V., & Samylina, I.A. (2014). Biologically active substances of cornelian cherry fruits (*Cornus mas* L.). *Voprosy Pitaniia*, 83(5), 86-94.
- [19] Loizzo, M., Tundis, R., Hawas, U.W., Rashed, K., Menichini, F., & Frega, N.G. (2009). Antioxidant and antiproliferative activity of *Diospyros lotus* L. extract and isolated compounds. *Plant Foods for Human Nutrition*, 64, 264- 70.
- [20] Tetik, F., Civelek, S., & Cakiloglu, U. (2013). Traditional uses of some medicinal plants in Malatya (Turkey). *Journal of Ethnopharmacology*, 146, 331–346.
- [21] Gürdal, B., & Kültür, S. (2013). An ethnobotanical study of medicinal plants in Marmaris (Muğla, Turkey). *Journal of Ethnopharmacology*, 146, 113–126.
- [22] Çelik, H. (2006). Karadeniz Bölgesi için yeni bir meyve türü yabanmersini (Likapa). II. Ulusal Üzümsü Meyveler Sempozyumu, 14-16 Eylül, Tokat .124-128.
- [23] Ceylan, S., Saral, O., Özcan, M., & Harsit, B. (2017). Determination of antioxidant and antimicrobial activity of blueberries (*Vaccinium myrtillus* L.) in different solvent extracts. *Artvin Coruh University Journal of Forestry Faculty*, 18(1), 21-27.
- [24] Ugurlu, I., Baslar, S., Yorek, N., & Dogan, Y. (2009). The investigation and quantitative ethnobotanical evaluation of medicinal plants used around Izmir province, Turkey. *Journal of Medicinal Plants Research*, 3 (5), 345–367.
- [25] Al Snafi, A.E. (2016). The medical Importance of *Cicer arietinum* - A review. *IOSR Journal of Pharmacy*, 6(3), 29-40.
- [26] Sağıroğlu, M., Arslantürk, A., Akdemir, Z.K., & Turna, M. (2012). An ethnobotanical survey from Hayrat (Trabzon) and Kalkandere (Rize/Turkey). *Biological Diversity and Conservation*, 5(1), 31-43.
- [27] Cakilcioğlu, U., Khatun, S., Turkoglu, I., & Hayta, S. (2011). Ethnopharmacological survey of medicinal plants in Maden (Elazığ-Turkey). *Journal of Ethnopharmacology*, 137, 469– 486.
- [28] Genc, E., G., & Ozhatay, N. (2006). An ethnobotanical study in Çatalca (European part Istanbul) II. *Turkish Journal of Pharmaceutical Sciences*, 3(2), 73–89.
- [29] Kocyigit, M., & Ozhatay, N. (2006). Wild plants used as medicinal purpose in Yalova (Northwest Turkey). *Turkish Journal of Pharmaceutical Sciences* 3(2), 91–103.
- [30] Zlatković, B.K., Bogosavljević, S.S., Radivojević, A. R. and Pavlović, M. A. (2014). Traditional use of the native medicinal plant resource of Mt. Rtanj (Eastern Serbia): Ethnobotanical evaluation and comparison. *Journal of Ethnopharmacology*, 151, 704–713.
- [31] Olsewska, M. A., Roj, J. M. (2011). Phenolic constituents of the inflorescences of *Sorbus torminalis* (L.) Crantz. *Phytochemistry Letters*, 4(2), 151-157.

- [32] Sohn, E. J., Kang, D. G., Mun, Y. J., Woo, W. H., & Lee, H. S. (2005). Antiatherogenic effects of the methanol extract of *Sorbus* cortex in atherogenic-diet rats. *Biological & Pharmaceutical Bulletin*, 28, 1444-1449.
- [33] Arı, S., Temel, M., Kargioğlu, M., & Konuk, M. (2015). Ethnobotanical survey of plants used in Afyonkarahisar-Turkey. *Journal of Ethnobiology and Ethnomedicine*, 11, 84.
- [34] Yılmaz, M., & Yüksel, M. (2016). Ethnobotanical uses and the seedling Propagation of Deer Apple (*Malus trilobata* C.K. Schneid). *El-Cezerî Journal of Science and Engineering*, 3, 1-8.
- [35] ESCOP, (2003). *Escop Monographs*, 2nd edition, Thieme, New York, 162-168.
- [36] WHO, (1999-2009). *WHO Monographs on selected medicinal plants*. Vols. 1-4. World Health Organization, Geneva.
- [37] EMA (European Medicines Agency), (2015). (<http://www.ema.europa.eu/ema/>).
- [38] PDR, (2001). *For Herbal Medicines*. In Gruenwald, J., Brendler, T. & Jaenke, C. (eds.). Medicinal Economic Company, New York.
- [39] Bahorun, T., Aumjaud, E., Ramphul, H., Rycha, M., Luximon-Ramma, A., Trotin, F., & Aruoma O.I., (2003). Phenolic constituents and antioxidant capacities of *Crataegus monogyna* (Hawthorn) callus extracts. *Food/Nahrung*, 47(3), 191-98.
- [40] Yaşar, A., Sinmez, Ç.Ç., & Aslım, G. (2015). Ruminant parasitic diseases and treatment methods at folklore of Konya area in central Anatolia region. *Kafkas University the Faculty Veterinary Journal*, 21 (1), 1-7.
- [41] Yeşilada, E., Üstün, O., Sezik, E., Takaishi, Y., Ono, Y., & Honha, G. (1997). Inhibitory effects of Turkish Folk Remedies on inflammatory cytokines: Interleukin- 1 α , Interleukin 1 β and tumor necrosis factor- α . *Journal of Ethnopharmacology*, 58, 59-73.
- [42] Nojavan, S., Khalilian, F., Kiaie, F.M., Rahimi, A., Arabanian, A., & Chalavi, S. (2008). Extraction and quantitative determination of ascorbic acid during different maturity stages of *Rosa canina* L. fruit. *Journal of Food Composition and Analysis*, 21, 300-305.
- [43] Rauf, A., Uddin, G., & Siddiqui, B.S.. (2015). In vivo sedative and muscle relaxants activity of *Diospyros lotus* L. *Asian Pacific Journal of Tropical Biomedicine*, 5: 277-280.

(Received for publication 04 February 2019; The date of publication 15 April 2019)