



Review Article

## Wild Plants Consumed as Food and Medicine in Elazığ and Malatya

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**ABSTRACT:** This study investigated the vitamin contents and health benefits of nine wild plants consumed as food, medicine, or animal feed in and around Elazığ and Malatya, Turkey. The study introduced *Rheum ribes*, *Gundelia tournefortii*, *Tragopogon reticulatus*, *Urtica dioica*, *Asphodelus aestivus*, *Medicago sativa*, *Nasturtium officinale*, *Mentha pulegium*, and *Capsella pastoris*. The results showed that the nine wild plants were common ingredients in Turkish cuisine and had numerous health benefits

**Keywords:** Wild plants, Turkish cuisine, Food, Vitamins, Medicine

### 1. INTRODUCTION

Nature offers self-grown medicinal plants. Wild plants grow by themselves wherever conditions permit. People use wild plants for cooking vegetable dishes [1]. Environmental conditions are constantly changing, and the world's population is overgrowing. Therefore, more and more people turn to wild plants to meet their nutritional needs. Dishes made from edible wild plants have become a significant part of Turkish culinary culture. Turkish people consume edible wild plants, either raw or cooked. They sometimes bring wild plants to a boil and then sieve and add bulghur or rice to them. Some people eat wild plants with eggs, yogurt with garlic, or as stuffed dishes [2].

There are about 800,000 plant species worldwide and more than 9,000 in Turkey [3]. Throughout history, humans have been consuming plants for nutritional and medicinal purposes and using them to make dyes, resin, gum, or soft drinks. Plants are also used in the cosmetic and ornamental plants industries [4, 5]. Plants have been used to treat diseases for thousands of years. Humans have passed down that knowledge over successive generations [6]. Today, more and more people turn to natural products for various reasons. First, people have become more and more concerned with their health. Second, some synthetic drugs fail to be effective or show serious side effects. Many medicines are made of natural herbs and plant extractions [7, 8].

People living in the Eastern Anatolia Region of Turkey commonly consume wild plants as food [6]. Particularly those living in Van, Hakkari, Ağrı, and Bitlis widely use wild plants as food [9]. The local people of Elazığ and Malatya use wild plants as raw or cooked vegetables in salads and jams or as spices when fruits and vegetables are expensive or scarce [10]. Wild plants are rich in vitamins, minerals, fiber, protein, and antioxidants [2].

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Although wild plants have been a part of our local food system for centuries, urbanization has led people to adopt more sedentary lifestyles and consume more processed foods. We must register plant species to preserve our cultural heritage and pass it on to future generations. This study focused on nine wild plants [*ışkın* (*Rheum ribes*), *kenger* (*Gundelia tournefortii*), *yemlik* (*Tragopogon reticulatus*), *ısırgan* (*Urtica dioica*), *çiriş* (*Asphodelus aestivus* l), *yonca* (*Medicago sativa*), *su teresi - acice* (*Nasturtium officinale*), *su yarpuzu* (*Mentha pulegium*), *kuşekmeği* (*Capsella pastoris*)] consumed by the local people of Elazığ and Malatya. The study investigated how and why they consumed those plants.

## 2. WILD PLANTS AS FOOD

This section introduced the nine wild plants consumed by the local people of Elazığ and Malatya.

### *Işkın* (Syrian rhubarb; *Rheum ribes*)

*Işkın* (Syrian rhubarb; *Rheum ribes*) is a perennial herbaceous plant that grows in mountainous regions. It grows by itself in the spring in the area [11]. It is a member of the family of *Polygonaceae* [12]. It is the only *rheum* species that grows between 1800 and 2800 altitude in rocky meadows in Turkey. It can grow as tall as 40 cm. It has leaves attached and parallels the ground in the lower parts. It has a leafless stem extending as a middle rod [13]. At the top of it are spike-shaped yellow-green flowers. There are hairs on the outer surface of the stems (Fig 1).



**Fig. 1** *Işkın* (Syrian rhubarb; *rheum ribes*)

*Işkın* contains vitamins A, B1, B2, C, D, E, and K. It is also used as a laxative in rural areas because it contains fiber [14]. It tastes bitter and sour. Experts recommend that it not be consumed too much because it is rich in oxalic acid [15]. It should be collected before the bud stage. People peel the hairy bark of its stems and shoots, salt it, consume it raw, or cook it with minced meat or eggs. It is put in cakes and muffins in some countries (Germany, England, Sweden, etc.). It is also used to make compote and jam [16]. It contains high levels of vitamin C. When cooked and eaten, it prevents the spread of infections to other tissues and helps enlarged tonsils get smaller. It is suitable for runny nose, headache, and fatigue. It also increases the body's resistance to winter diseases.

### ***Kenger (Gundelia tournefortii)***

*Kenger (Gundelia tournefortii)* belongs to the family of *Asteraceae*. It is found in the temperate regions of Western Asia [17]. It is also used for medicinal purposes in Cyprus, Egypt, Iran, Israel, Turkey, Azerbaijan, and Turkmenistan [18]. It grows in many regions of Turkey. It grows by itself in the mountainous areas and high latitudes in April and May [13].

*Kenger* is perennial, hairy, milky, prickly, and herbaceous. It has a few branches in its trunk. It is short and thick. It has leathery, veined, whitish leaves and purplish-red flowers (Fig 2). Its stem is cut to obtain milk, which is used to make *kenger* gum, which is very expensive. Therefore, it is a precious plant. People bring it to a boil and make a salad from it. It is a delicious plant with numerous health benefits. The heads ripening in the Mediterranean region are roasted and ground to make *kenger* coffee. Its leaves, stem, roots, and seed are consumed as food. Its seed is rich in crude oil, protein, and fiber [17].



**Fig. 2** *Kenger (Gundelia tournefortii)*

Many people consume *kenger* because it possesses therapeutic dynamics against hypertension and diabetes and its other health benefits. It is used to prevent toothaches and gum ailments and to whiten teeth. It helps pass a kidney stone. It is suitable for fatigue and anemia. One of its biggest benefits is allowing the body to produce antibodies, which results in cell regeneration. It has antioxidants that help the body flush out harmful toxins.

### ***Yemlik (Tragopogon reticulatus)***

*Yemlik (Tragopogon reticulatus)* belongs to the family of *Asteraceae*. It is a perennial herbaceous plant [16]. It grows in forage meadows, plateaus, and mountains that develop with spring rains (Fig 3). It starts to leaf out as of April and can be consumed afterward. However, it must be collected and consumed before flowering. It is rich in vitamins (A, B2, B6, C, and E) and minerals (iron, calcium, etc.) [19]. It is collected by hand or by cutting with a knife. It is consumed in salads or with bulgur or rice [16].

*Yemlik* is good for anemia as it is rich in iron. It regulates the digestive system, increases appetite, and prevents weight gain. It also helps strengthen the bones due to its calcium and vitamin A. It is also suitable for eye problems (nyctalopia, etc.) as it is rich in vitamin A.



**Fig. 3** Yemlik (*Tragopogon reticulatus*)

### ***Isırgan* (Common Nettle; *Urtica dioica*)**

*Isırgan* (common nettle; *Urtica dioica*) grows in the mountains, by the walls, and in ruins. It is also known as *dancak otu*, *gidişgen*, *sırgan*, etc. [3]. It has dark green leaves. It is a petiolate plant with an inflammatory effect on the skin (stinging and burning sensation). Its leaves are rich in minerals, chlorophyll, amino acids, lecithin, carotenoids, flavonoids, sterols, tannins, and vitamins. It is consumed locally in meals, soups, and salads (Fig 4).



**Fig. 4** *Isırgan* (Common Nettle; *Urtica dioica*)

It has many health benefits ranging from the digestive to the immune system. *Isırgan* increases blood circulation strengthens the immune system, protects against diabetes, and cleans the blood. It is rich in vitamins A and C. It prevents the formation of free radicals as it contains antioxidants. It is therapeutic for seasonal allergies. It helps slow down the cancer-free growth of the prostate gland in men by affecting hormone levels or interacting with cells in the prostate. It nourishes the scalp and makes the hair look shinier and healthier because it contains silica and sulfur. It ensures that calcium, which is vital for bone development and health, remains in the body. It can prevent or slow down the onset of osteoporosis.

### ***Çiriş* (*Asphodelus aestivus* L).**

*Çiriş* (*Asphodelus aestivus* L.) grows in Turkey's mountains of East, Southeast, and Central Anatolia. It is widely consumed in those regions [20]. Its leaves are similar to leek leaves but much smaller than a leek. It is also known as *yabani pırasa* (wild leek), *güllük*, *yeling otu*, and *sarı zambak* (yellow lily) [21]. It is widely consumed as it is rich in vitamins, antioxidants, fibers, and minerals and has nutritional properties [22]. Its root, flowering stem, and seeds are

consumed. Its leaves are also used in dishes and canned goods (Fig 5). People consume it in stews, soups, salads, roasts, pilafs, and pastries. It is dried and ground and used in powder form. The most popular dishes made with it are rice with *çiriş* and fried egg with *çiriş*.



**Fig. 5** *Çiriş Otu (Asphodelus aestivus L.)*

*Çiriş* contains vitamins A, C, B1, B2, B3, B6, and B9 [23, 24]. It has numerous health benefits. It treats hemorrhoids, rheumatism, eczema, acne, and ringworm. It is a diuretic plant that also helps with menstruation and milk production. Its roots treat jaundice, liver disorders, stomach irritation, acne, and bone fractures [25].

*Çiriş* is used as an adhesive in bookbinding and shoemaking. It is also used to give hardness and shine to *ehram* fabric in the Erzurum region.

### **Yonca (*Medicago sativa*)**

*Yonca (Medicago sativa)* belongs to the family of *Leguminosae*. It is rich in proteins, minerals (calcium, etc.), and vitamins B, C, D, E, and K. It is consumed as fresh or dried. It has numerous health benefits. However, it is mainly used as animal feed (Fig 6). It is one of the most nutritious forage plants.



**Fig. 6** *Yonca (Medicago sativa)*

Experts recommend that *yonca* be fed to young animals because it plays a vital role in bone development.

*Yonca* is also used for medicinal purposes. It is an appetite-stimulating plant that gives strength and energy and helps the stomach work regularly. It calms the nerves, relieves severe headaches, reduces rheumatic pains, stops diarrhea, and stimulates breast milk production. It is also good for anemia. Local people also argue that it prevents Parkinson's disease.

### ***Su Teresi - Acice (Watercress; Nasturtium officinale)***

*Su teresi - Acice* (watercress; *Nasturtium officinale*) belongs to the family of *Cruciferae*, although it looks like a flowery plant (Fig 7). *Su teresi* is a kind of mint that grows in wet environments. Besides giving flavor to salads, it is perfect for health. *Su teresi*, a member of the Brussels sprout family, has a slightly spicy flavor.



**Fig. 7** *Su Teresi - Acice* (watercress; *Nasturtium officinale*)

*Su teresi* boosts immunity as it is a potent antioxidant rich in vitamin C and folic acid. It prevents the risk of diabetes, cancer, and heart disease. Its most important feature is that it is low in calories. It is very healthy for people with high blood pressure. It helps lower bad cholesterol. It also regulates the liver, increases sexual potency, regulates the menstrual cycle, and prevents bleeding and cardiovascular and eye diseases (cataracts, etc.). It improves brain functions and prevents Alzheimer's-like diseases. It makes the teeth healthier and stimulates bone development as it contains calcium. It also improves vision and cognitive function.

### ***Su yarpuzu (Pennyroyal; Mentha pulegium)***

*Su yarpuzu* (pennyroyal; *Mentha pulegium*) belongs to the family of *Lamiaceae*. It is also known as *filiskin*, *narpuz*, *pülüskün*, *yabani nane* (wild mint), or *su nanesi* (water mint) (Fig 8). It is a refreshing plant like mint. Not only is it tasty, but it also has health benefits. Therefore, it is widely used (dried or fresh) in teas, dishes, salads, and soups. In some regions, people add it to *tarhana*.



**Fig. 8** *Su yarpuzu* (Pennyroyal; *Mentha pulegium*)

*Su yarpuzu* is an antispasmodic and expectorant plant that prevents infections and regulates menstruation. It helps aid breathing and acts as a decongestant. It is good for the heart and stomach. It is also used to treat common colds, sinusitis, cholera, food poisoning, bronchitis, and tuberculosis [26].

### ***Kuşekmeği* (shepherd's purse; *Capsella pastoris*)**

*Kuşekmeği* (shepherd's purse; *Capsella pastoris*) belongs to the family of *Cruciferae*. It is a short plant almost stuck to the ground in the pre-bloom period. It is known for its serrated leaves. Its leaves are edible (Fig 9). As the season progresses, those leaves turn yellow, and a small ball of tiny white flowers appears on the branch that emerges from the middle. It is at most half a meter long. It has heart-shaped mini leaves. It grows in uncultivated fields, gardens, and meadows. It is also known as *kuşkuş otu*, *guşguş*, *acıbici*, *dağ marulu* (mountain lettuce), *kuş mancası*, or *çobançantası* (shepherd's purse).



**Fig. 9** *Kuşekmeği* (shepherd's purse; *Capsella pastoris*)

*Kuşekmeği* can be eaten raw at very young periods but is usually cooked. It is cooked with minced meat, tomato paste, and bulgur. It is also fried in oil. It is included in mixed herb roasts. It can be mixed with vegetables and consumed as a winter soup. It is a kind of gözleme (Turkish stuffed pancake). It is cut into small pieces, placed between thin phyllo dough, and cooked on sheet metal. It is brushed with butter or oil. It is a good source of vitamins.

Tea is made by brewing its fresh and dry leaves and flowers. *Kuşekmeği* tea helps prevent bleeding and drop blood pressure. It is used for heart and circulatory problems and nervous heart complaints. It is good for urinary tract infections and stomach, kidney, and uterus-related ailments. In addition, tea made from its seeds and leaves stops diarrhea and nosebleeds and treats hemorrhoids and dysentery.

### **3. RESULTS AND DISCUSSION**

This study focused on nine wild plants consumed by the local people of Elazığ and Malatya for nutritional or medicinal purposes. We conducted a literature review and interviews with the local people of Elazığ and Malatya to understand how and why they consumed those plants.

*Işkın* is rich in vitamins A, B1, B2, C, D, E, and K. It can be eaten raw or cooked with minced meat or eggs. It treats leukemia, cough, antipyretic, runny nose, headache, and fatigue. However, experts recommend that it not be consumed too much because it is rich in oxalic acid (which may be mildly irritating to the whole body).

*Kenger* is widely consumed for its health benefits and therapeutic properties. It is good for blood pressure and diabetes. It helps pass a kidney stone. It is used to prevent toothaches and

gum ailments and to whiten teeth. It is rich in vitamins A, E, and C. It is consumed raw in salads or cooked. It is also used to produce chewing gum.

*Yemlik* is rich in vitamins (A, C, E, B1, B2, B3, and B6) and minerals (iron, calcium, etc.). It is consumed raw in salads or cooked with bulgur and rice. It is good for anemia, nyctalopia, and the digestive system. It is an appetite-stimulating plant that helps strengthen bones. However, it must be harvested and consumed before blooming due to its pubescence and hardening.

*Isırgan* is rich in vitamins A and C. It is used in dishes, soups, and salads. It prevents the formation of free radicals and boosts immunity as it contains antioxidants. Therefore, it reduces the risk of cancer, heart attack, and stroke. It helps reduce anemia, allergies, prostate disorders, and kidney and gallbladder stones.

*Çiriş* is consumed raw or cooked. It contains vitamins A, C, B1, B2, B3, B6, and B9. It is good for hemorrhoids, rheumatism, ringworm, eczema, jaundice, liver disorders, stomach irritation, acne, and bone fractures. It is used to regulate menstruation. It is also a diuretic.

*Yonca* is rich in protein, minerals (calcium), and vitamins (B, C, D, E, and K). It can be consumed raw in salads or cooked with bulgur and rice. It can also be boiled to make tea. It is one of the most nutritious forage plants. It is an appetite-stimulating plant that helps relieve stomach problems and increase breast milk production. It is good for headaches, rheumatic pain, diarrhea, and anemia.

*Su teresi* can be consumed raw or cooked. It is rich in vitamins A, B6, C, E, and K. It contains antioxidants. Therefore, it reduces the risk of diabetes, cancer, high blood pressure, and heart disease. It prevents bleeding and cataracts. It helps regulate the liver and improve cognitive function.

*Yarpuz* is widely used (dried or fresh) in dishes, salads, and soups. It can also be boiled to make tea. It is rich in vitamins A, B1, B2, B3, B6, C, and E. It is good for common colds, sinusitis, cholera, food poisoning, bronchitis, and tuberculosis. It is an antispasmodic and expectorant plant that prevents infections and regulates menstruation. It helps aid breathing and acts as a decongestant.

*Kuşekmeği* can be boiled to make soup or cooked with bulgur. It is rich in vitamins B and C. It helps regulate blood pressure and menstruation. It is good for constipation, hemorrhoids, and tooth and throat aches. It is also a diuretic.

#### 4. CONCLUSIONS

The following are the conclusions based on the results:

- ✓ All wild plants in question are traditional plants that have been consumed (raw or cooked) by Turkish people, especially those living in and around Elazığ and Malatya, for hundreds of years.
- ✓ Although wild plants have health benefits, they should not be consumed too much.

✓ All wild plants in question are rich in vitamins B and C. All wild plants but *yonca* and *kuşekmeği* contain vitamin A. All wild plants but *çiriş* and *kuşekmeği* contain vitamin E. *Işkın*, *ısırgan*, *yonca*, and *su teresi* are rich in vitamin K.

✓ *Isırgan*, *işkın*, and *su teresi* boost immunity and help prevent diabetes, cancer, and heart disease.

✓ *Yonca*, *yemlik*, and *kuşekmeği* help regulate the digestive system and relieve headaches, toothaches, and rheumatic pain.

✓ *Işkın*, *su yarpuzu*, and *ısırgan* are good for lung and respiratory ailments.

In conclusion, the local people of the Elazığ-Malatya region have been consuming wild plants for nutritional and medicinal purposes for hundreds of years.

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### Declaration of Competing Interest

The author declares that they have no known competing financial interests or personal relationships that could influence the work reported in this paper.

### Author Contribution

Ayşe Biçer contributed 100% at every stage of the article.

### REFERENCES

- [1] Tuzlacı, E., Türkiye'nin yabani besin bitkileri ve ot yemekleri. 2011. Alfa yayınları, Document Type: Book, ISBN: 9786051063485, İstanbul.
- [2] Yücel, E., Şengün, İ., Çoban, Z., Afyonkarahisar çevresinde gıda olarak tüketilen yabani otlar ve tüketim biçimleri. *Biological Diversity and Conservation*, 2012. 5(2): p. 95-105.
- [3] Baytop, T., Türkiye'de bitkiler ile tedavi (Geçmişte ve Bugün). 1984. İstanbul Üniv. Yayınları No: 3255, Eczacılık Fak. Yayınları No: 40, İstanbul.
- [4] Erdogru, O.T., Ates, A., Antimicrobial activities of various medicinal and commercial plant extracts, *Turkish Journal of Biology*, 2003. 27: p. 157–163.
- [5] Faydaoğlu, E., Surucuoglu, M.S., Geçmişten günümüze tıbbi ve aromatik bitkilerin kullanılması ve ekonomik önemi. *Kastamonu Üniversitesi Orman Fakültesi Dergisi*, 2011. 11(1): p. 52-67.
- [6] Ozturk, M., Ozcelik, H., Useful plants of East Anatolia. 1991. Siirt İlim, Spor, Kültür ve Araştırma Vakfı, Document Type: Book, Ankara.

- [7] Yücel, E., Tapırdamaz, A., Yücel Şengün, İ., Yılmaz, G., Ak, A., Determining the usage ways and nutrient contents of some wild plants around Kisecek Town (Karaman/Turkey). *Biological Diversity and Conservation*, 2011. 4(3): p. 71-82.
- [8] Tosun, F., Kızılay, A., Sener, Ç., Vural, B., Palittapongarpim, M., Antimycobacterial activity of some Turkish plants. *Pharmaceutical Biology*, 2004. 42: p. 39- 43.
- [9] Okcu, Z., Kaplan, B., Doğu Anadolu Bölgesinde gıda olarak kullanılan yabancı bitkiler. *Türk Tarım-Gıda Bilim ve Teknolojisi Dergisi*, 2018. 6(3): p. 260-265.
- [10] Siyamoglu, B., Ege Bölgesinde insan beslenmesinde kullanılan bazı yabancı otlar (silcan, karakan, pırzola kekiği ve kudret narı) üzerinde araştırmalar. *Ege Üniversitesi Ziraat Fakültesi Dergisi*, 1984. 21(3): p. 75–88.
- [11] Munzuroglu, O., Karatas, F., Gür, N., Işgın (*Rheum ribes L.*) bitkisindeki A, E ve C vitaminleri ile selenyum düzeylerinin araştırılması. *Turk J Biol* 24, 2000. p. 397–404, TÜBİTAK.
- [12] Shokravi, A., Agha, N.K., Synthesis of 1,2,3,4,5,6,7,8-octahydro-9-ethoxy 10-hydroxy-1-anthracenone (OEHA), *Iranian Journal of Chemistry and Chemical Engineering*, 1997. 16: p. 10–15.
- [13] Yıldız, S., Yukarı Fırat Havzasında yetişen kenger (*gundelia tournefortii L.*), güllük (*eremurus spectabilis m. bieb.*) ve ışkın (*rheum ribes L.*) bitkilerindeki polifenollerin ve bazı metallerin tayini, Yüksek Lisans Tezi, 2014. Fırat Üniversitesi, Fen Bilimleri Enstitüsü.
- [14] Meral, N., The effect of different temperatures on antioxidant activity and phenolic profile of the rheum ribes, *Yüzüncü Yıl Üniversitesi Tarım Bilimleri Dergisi (YYU J AGR SCI)*, 2017. 27(1): p. 88-94.
- [15] Atasoy, N., Van bölgesinde yetişen endemik bitkilerde pro-vitamin A(B-karoten) tayini, *Yüzüncü Yıl Üniversitesi Fen Bilimleri Enstitüsü Dergisi*, 2010. 15(2): p. 134-142.
- [16] Doğan, S., Gevaş (Van) ilçesinde yöresel olarak taze tüketilen bazı yabancı bitkiler ve besin değerlerinin belirlenmesi, Yüksek Lisans Tezi, 2016. Yüzüncü Yıl Üniversitesi Fen Bilimleri Enstitüsü Tarla Bitkileri Anabilim Dalı.
- [17] Nasrollahzadeh, M., Mahamb, M.S., Mohammad, S., Green synthesis of CuO nanoparticles by aqueous extract of *Gundelia tournefortii* and evaluation of their catalytic activity for the synthesis of N-monosubstituted ureas and reduction of 4-nitrophenol. *Journal of Colloid and Interface Science*, 2015. 455: p. 245–253.
- [18] Haghı, G., Hatami, A., Arshi, G., Distribution of caffeic acid derivatives in *gundelia tournefortii L.*, *Food Chemistry*, 2011. 124: p. 1029–1035.
- [19] Çöteli, E., Erden, Y., Karataş, F., Investigation of amounts of malondialdehyde, glutathione and vitamins with total antioxidant capacity in plant *mentha pulegium L.*, *Suleyman Demirel University Journal of Natural and Applied Science*, 2013. 17(2): 4-10.
- [20] Oskay, M., Aktas, K., Sari, D., Azeri, C., A comparative study of antimicrobial activity using well and disk diffusion method on *asphodelus aestivus (liliaceae)*, *Ekoloji*, 2007. 16(62): p. 62-65.
- [21] Gülçin, İ., Oktay, M., Kireççi, E., Küfrevioğlu, Ö.İ., Screening of antioxidant and antimicrobial activities of anise (*pimpinella anisum L.*) seed extracts, *Food Chemistry*, 2003. 83: p. 371-382.
- [22] Badayman, M., Dinçel, E., Alçay, A.Ü., Ciris herb and its use in Turkish cuisine, *Aydın Gastronomy*, 2018. 2(1): p. 51-55.
- [23] Karataş, F., Bektaş, İ., Birişik, A., Aydın, Z., Kurtul, A., Çiriş otu'nda (*asphodelus aestivus l.*) suda çözünen bazı bileşiklerin araştırılması, *SDU Journal of Science*, 2011. 6(1): p. 35-39.

- [24] Peksel, A., Imamoglu, S., Antioxidative properties of extracts from *Asphodelus aestivus* brot (*Liliaceae*), *Annals of Nutrition and Metabolism*, 2009. 55: p. 596 -596.
- [25] Pourfarzad, A., Najafi, M.B.H., Khodaparast, M.H.H., Khayyat, M.H., Malekpour, A., Fractionation of *eremurus spectabilis* fructans by ethanol: Box– Behnken design and principal component analysis, *Carbohydrate Polymers*, 2014. 106: p. 374-383.
- [26] Çöteli, E., Karataş, F., Investigation of amounts of glutathione and vitamins with total antioxidant capacity in leaves of plant *tragopogon reticulatus*, *GÜFBED/GUSTIJ*, 2015. 5(2): p. 78-86