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Review article

Ethnobotanical Uses of Liliaceae s.s. and Colchicaceae Taxa in Turkey

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Abstract

The relationship between plants and humans is as old as human history. The branch of science that studies this relationship between humans and plants is called ethnobotany. People have been used plants in various ways, including food, medicine, clothing, goods, and firewood. Geophyte is a name given to herbaceous plants with special subsoil stems, such as bulbs, rhizomes, and tubers. In the Flora of Turkey, monocotyl geophytes are represented by 688 species, of which 244 are endemic. The rate of endemism is 35.5%. They belong mostly to the families Liliaceae *s.l.*, Amaryllidaceae, Iridaceae, Araceae, and Orchidaceae. There are many reports on the ethnomedicinal effects of Liliaceae *s.s.* and Colchicaceae families. This review reports on the findings of an ethnobotanical survey of Liliaceae and Colchicaceae families used in Turkey. As a result of the study, we listed that four *Gagea*, four *Tulipa*, three *Fritillaria*, and two *Lilium* taxa from the Liliaceae *s.s.*, and three *Colchicum* taxa from the Colchicaceae were used ethnobotanically by local people in Turkey. It was also apparent from the results of the study, Liliaceae s.s. and Colchicaceae families are mostly used by local people for ornamental plant. The genus Tulipa has the greatest number of ethnobotanical uses. The most commonly used plant parts are whole plants, bulbs, and flowers.

Keywords: Liliaceae, Colchicaceae, *Gagea*, *Tulipa*, *Fritillaria*, *Lilium*, *Colchicum*, Ethnobotanical Uses in Turkey.

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INTRODUCTION

Turkey, consisting of two parts namely Anatolia and Europe. It is a large peninsula geographically divided into seven regions. Anatolia is bounded on the north and south by steep mountain ranges that rise regularly to the east and contain numerous plateaus. The mountain ranges, which are quite high in the eastern part of Northern Anatolia, are uninterrupted and close to the sea, making one of the highest peaks in the Tatos Mountains northeast of Rize and rising above 3000 meters at many points. In Western Anatolia, the mountains are ranked in the direction of east and west, while the rivers form wide plains between these mountain ranges. In Southern Anatolia, Central Anatolia, Eastern Anatolia, and other geographic parts, mountain ranges, plains, plateaus, and streams form quite different and various topographic structures (Davis, 1965).

In addition to being at the intersection of Euro-Siberian, Irano-Turanian, and Mediterranean Floristic regions of the Holarctic Flora realm in terms of plant geography, Turkey is also a bridge between Southeast Europe and Southwest Asia flora. Also, recent geographical studies show that, contrary to what was thought, glaciation in Turkey prevails for a longer period and different climatic conditions follow each other in this process (Erinç, 1969).

Turkey has a rich flora of approximately 11707 taxa, 3649 of which are endemic. It is also very rich in terms of the use of these plants (Davis, 1965-1985; Davis et al., 1988; Özhatay et al., 1994; Özhatay et al., 1999; Güner et al., 2000; Özhatay and Kültür, 2006; Özhatay et al., 2009; Güner et al., 2012; Özhatay et al., 2015). It is understood that the flora of Turkey is richer than the flora of Europe, which has a total number of taxa of about 12,000 (Tutin et al., 1964; Tutin et al., 1968-1980). About 85000 of the 250000 vascular plant species in the world have medicinal properties (Jitin, 2013). It has been reported that 500 out of 12000 plant taxa in Turkey have medicinal and aromatic properties, while 200 of them have export potential (Baytop, 1999; Ekim et al., 2000; Aydın, 2004).

Throughout history, people have made use of plants for food, shelter, treatment, and in later periods for other purposes such as fuel, construction materials, paint, amulet, and ornaments. Turkish people also benefited from plants for these purposes. In Turkey, there is a great knowledge about the uses of plants (Baytop, 1999).

Ethnobotany, a combination of the terms ethno and botany, was first used by John William Harshberger in his work “The Purposes of Ethno-botany” (Kendir and Güvenç 2010; Yıldırımlı, 2004). Ethnobotany is defined as a “man-plant relationship” in the word meaning. It can be summarized as “the knowledge of the people living in an area to utilize the plants in their immediate vicinity to meet their various needs, and the effects of these peoples on the plants” (Cotton, 1996). With ethnobotanical studies, it is aimed to determine the plant species used by the local people primarily in the treatment of

diseases and then in food, dye production, cosmetic purposes, animal diseases, and making different tools (Özdemir Nath and Kültür, 2017).

The ethnobotanical studies contain very important and valuable information that records the cultural heritage, natural wealth, traditions, and the lives of the local people in different regions of Turkey. The importance of ethnobotanical studies has increased even more with the migration of the population living in rural areas to the cities and moving away from nature. With the local people moving away from nature, the use of plants in daily life has also begun to be forgotten. For this reason, listening to the valuable information of the elderly and knowledgeable people who continue to live in the villages and recording this information is also important in terms of protecting the very important values of our country. At the same time, recording the information of these plants, which are used in the region, provides a better understanding of their importance and guides future commercial plant production projects (Özdemir Nath and Kültür, 2017).

Turkey, which has been a cradle to many cultures and has a rich culture, as a result, is also very remarkable in terms of benefiting from plants for different purposes. Following the proclamation of the Republic of Turkey, 765 studies were carried out until 1997 to reveal this wealth (Sadıkoğlu and Alpınar, 2004). Studies increased further after this date, and 91 ethnobotanical studies were conducted until 2008 (Kendir and Güvenç, 2010). Both ethnobotanical studies and studies aimed at uncovering the medicinal properties of plants identified in these studies are increasing today (Satıl et al., 2008; Yücel at al., 2008; Uysal et al., 2010; Uysal et al., 2012; Bulut and Tuzlacı, 2015; Güzel et al., 2015; Kökçü et al., 2015; Canlı et al., 2016a; Canlı et al., 2016b; Canli et al., 2016a; Canli et al., 2016b; Canlı et al., 2017a; Canlı et al., 2017b; Canli et al., 2017a; Canli et al., 2017b; Canli et al., 2017c; Güneş et al., 2017; Bozyel and Merdamert, 2018; Güzel and Güzelşemme, 2018; Yetgin et al., 2018; Bozyel et al., 2019a; Bozyel et al.; 2019b; Canlı et al., 2019; Yaşar et al., 2019; Bozyel and Merdamert-Bozyel, 2020a; Bozyel and Merdamert-Bozyel, 2020b; Bozyel et al., 2020a; Bozyel et al., 2020b; Bozyel et al., 2020c; Erarslan et al., 2020).

Geophyte is a name given to herbaceous plants with specialized subsoil bodies such as bulbs, rhizomes, and tubers that spend a large part of the year under the soil, storing materials that are energy raw materials. Geophytes are plants that can reproduce and survive not only with their seeds but also with storage organs under the soil (Raunkiaer, 1934).

In the Flora of Turkey, monocotyl geophytes are represented by 688 species, of which 244 are endemic. The rate of endemism is 35.5%. They belong mostly to the families Liliaceae, Amaryllidaceae, Iridaceae, Araceae, and Orchidaceae (Davis, 1965-1985; Davis et al., 1988; Güner et al., 2000; Özhatay, 2002; Güner et al. 2012).

The Liliaceae Family

The Liliaceae *s.l.* was first introduced to the world of science by Antoine Laurent de Jussieu in 1789. The families identified as Liriaceae, Tulipaceae, Erythroniaceae, and Fritillariaceae are synonyms of Liliaceae (Tamura, 1998; Takhtajan, 2008).

The Liliaceae *s.s.* is spread in the Northern Hemisphere and temperate Eurasia with 11 genera and about 550 species (Tamura, 1998). According to Simpson (2006), it is represented by 16 genera and about 600 species. According to recent studies, the Liliaceae family includes the genera *Amana*, *Calochortus*, *Cardiocrinum*, *Clintonia*, *Erythronium*, *Fritillaria*, *Gagea*, *Lilium*, *Medeola*, *Notholirion*, *Prosartes*, *Scoliopus*, *Streptopus*, *Tricyrtis*, and *Tulipa* (WCVP, 2021).

The Liliaceae family has ethnomedicinal uses in Turkey as abdominal pain, abdominal pain in infants, abscess, edema, halitosis, headache, medicinal, menstrual pain, rheumatism, skin firming, toothache, and wounds (Ugurlu & Secmen, 2008; Ugulu et al., 2009; Ugulu, 2011; Saraç et al, 2013; Doğan, 2014; Kökçü et al., 2015; Mükemre et al., 2015; Bağcı et al., 2016; Nadiroğlu et al., 2019).

The Colchicaceae Family

The Colchicaceae family was first described by de Candolle in 1805. Colchicaceae is a family comprising about 250 species (19 genera) of perennial bulbous and rhizomatous plants spread throughout temperate and tropical regions of Africa, Europe, Asia, Australia, and North America (Vinnersten and Reeves, 2003). According to recent studies, the Colchicaceae family includes the genera *Baeometra*, *Burchardia*, *Camptorrhiza*, *Colchicum*, *Disporum*, *Gloriosa*, *Hexacyrtis*, *Iphigenia*, *Kuntheria*, *Ornithoglossum*, *Sandersonia*, *Schelhammera*, *Tripladenia*, *Uvularia*, and *Wurmbea* (WCVP, 2021).

The high frequency of species and the presence of numerous endemic species in Turkey and the Balkans indicate that these regions are the main center of speciation and diversity (Brickell, 1984; Persson, 1993; Nordenstam, 1998; Persson, 2000; Vinnersten and Reeves, 2003; Persson, 2005; Akan and Satıl, 2005; Düşen and Sümbül, 2007; Persson, 2007; Kahraman and Celep, 2010). Colchicaceae are perennial cormose or rhizomatous geophytes that contain nectar at the base of their tepals and therefore have animal-pollinated flowers (Nordenstam, 1998). Turkey harbors 53 taxa of the family Colchicaceae, 22 of which are endemic (Güner et al. 2012).

All members of the Colchicaceae family contain colchicine, an alkaloid traditionally used to treat gout. Also, colchicine is used in cytogenetics as a microtubule polymerization inhibitor (Vinnersten and Larsson, 2010). The Colchicaceae family has ethnomedicinal uses in Turkey as diabetes, diuretic, diaphoretic, laxative, medical, rheumatism, tonic, and wounds (Akgül, 2008; Özaktan, 2009; Akbulut and Bayramoglu, 2013; Akbulut and Özkan, 2014; Nadiroğlu et al., 2019).

In this study, we investigated recent ethnobotanical studies to identify and list various uses of Liliaceae and Colchicaceae families, which are naturally spreading in Turkey, by local people.

RESULTS

As a result of this study, we found that four *Gagea*, four *Tulipa*, three *Fritillaria*, and two *Lilium* taxa of the Liliaceae family and three *Colchicum* taxa of the Colchicaceae family were used ethnobotanically by local people in Turkey. Two of these are endemic: *Gagea goekyigitii* and *Tulipa pulchella* (Table 1).

Table 1. Liliaceae and Colchicaceae taxa were used ethnobotanically by local people in Turkey.

Plant species	Local name*	Parts	Usage form	Intended use	References
Liliaceae					
***Fritillaria imperialis* L.**	Ağlayangelin	Aerial parts	-	Ornamental plant	Gelse, 2012; Furkan, 2016
		Whole plant	-	Ornamental plant	Yeşil, 2007; Güldaş, 2009; Kaval, 2011
***Fritillaria persica* L.**	Kırklale	Aerial parts	-	Ornamental plant	Gelse, 2012; Furkan, 2016
		Whole plant	-	Ornamental plant	Güldaş, 2009
***Fritillaria pinardii* Boiss.**	Mahçuplale	Bulbs	Raw eaten	Food	Korkmaz and Alparslan, 2015
****Gagea goekyigitii* Eker & Tekşen**	Gökyiğityıldızı	Bulbs	-	Food	Bağcı et al., 2016
				Salad	Bağcı et al., 2016
***Gagea luteoides* Stapf**	Altınyıldız	Bulbs	-	Forage (for birds)	Korkut, 2006
***Gagea dubia* A.Terracc.**	Eryıldız	Whole plant	-	Forage	Ertuğ, 2000
***Gagea reticulata* (Pall.) Schult. & Schult.f.**	Ağyıldızı	Bulbs	Raw eaten	Food	Dağlı, 2015
			-	Forage (for birds)	Korkut, 2006
***Lilium candidum* L.**	Akzambak	Whole plant	-	Ornamental plant	Polat, 2010; Tütenocaklı, 2014
		Flowers	-	Scent	Polat, 2010
***Lilium monadelphum* var. *szovitsianum* (Fisch. & Avé-Lall.) Elwes**	Bey zambağı	Flowers	-	Ornamental plant	Akgül, 2008
***Tulipa armena* var. *armena* Boiss.**	Hoşlale	Flowers	-	Ornamental plant	Ertuğ, 2000
****Tulipa pulchella* (Fenzl ex Regel) Baker**	Toros lalesi	Flowers	-	Ornamental plant	Ertuğ, 2000
		Bulbs	-	Food	Bağcı et al., 2016
				Salad	Bağcı et al., 2016
***Tulipa julia* K.Koch**	Yaban lalesi	Aerial parts	-	Ornamental plant	Gençay, 2007; Gelse, 2012
		Whole plant	-	Ornamental plant	Tekin, 2011
***Tulipa sylvestris* L. subsp. *australis* (Link) Pamp.**	Ballı lale	Aerial parts	-	Ornamental plant	Emre Bulut, 2008

Colchicaceae					
***Colchicum bivonae* Guss.**	Öksüzoğlan	Whole plant	-	Ornamental plant	Aktan, 2011
***Colchicum szovitsii* subsp. *szovitsii* Fisch. & C.A.Mey.**	Katır çiğdemi	Flowers	-	Ornamental plant	Altundağ, 2009
		Bulbs	Raw eaten	Food	Akgül, 2008; Güneş and Özhatay, 2011
***Colchicum triphyllum* Kunze**	Öksüzali	Whole plant	-	Forage	Ertuğ, 2000
		Roots	Cooked with milk	Food	Metin, 2009
			Added in Ayran soup	Food	Metin, 2009

"*": Endemic taxon; "-": No information

According to Table 1, the genera have five, six, three, seven, and six ethnobotanical uses. Ethnobotanical uses are ornamental plant, food, feed, salad, and fragrance, respectively.

Conclusions

This review includes four *Gagea*, four *Tulipa*, three *Fritillaria*, and two *Lilium* taxa of the Liliaceae family and three *Colchicum* taxa of the Colchicaceae family. It has been determined that taxa of these families are mostly used by local people for an ornamental plant. Compairing with other genera, *Tulipa* has the greatest number of ethnobotanical uses. The most used plant parts are whole plants, bulbs, and flowers.

As old as history of humanity, the man-plant relationship still exists today in both developing and developed countries. There is a great ethnobotanical consciousness in Turkey. However, continued migration from village to city, especially for economic reasons, leads to the loss of this rich knowledge. In order to prevent this situation from getting worse, ethnobotanical studies should be increased day by day and this rich knowledge should be kept alive.

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