

Balıkesir’de Yetişen *Crocus* L. (Iridaceae) Türlerinin Morfolojik Özellikleri ve Tehlike Kategorileri

Selami Selvi^{1,*}, Fatih Satil²

¹Department of Medical and Aromatic Plants, Altınoluk Vocational School, Balıkesir University, Balıkesir

²Department of Biology, Faculty of Arts and Sciences, Balıkesir University, Balıkesir

Özet

Bu çalışmada, Balıkesirde yayılış gösteren *Crocus* L. (Iridaceae) türlerinin morfolojik özellikleri ve tehlike kategorileri incelenmiştir. Arazi çalışmaları sonucunda, Balıkesir il sınırları içerisinde 9 *Crocus* türünün yayılış gösterdiği tespit edilmiştir (*C. gargaricus* Herbert subsp. *gargaricus*, *C. chrysanthus* (Herbert) Herbert, *C. biflorus* Mill. subsp. *nubigena* (Herbert) Mathew, *C. flavus* Weston subsp. *dissectus* T. Baytop & Mathew, *C. olivieri* Gay subsp. *istanbulensis* Mathew, *C. candidus* E.D. Clarke, *C. pallasii* Goldb. subsp. *pallasii*, *C. cancellatus* Herbert subsp. *mazziaricus* (Herbert) Mathew and *C. pulchellus* Herbert). *C. fleischeri*, *C. gargaricus* subsp. *gargaricus*, *C. biflorus* subsp. *nubigena*, *C. flavus* subsp. *dissectus*, *C. olivieri* subsp. *istanbulensis* ve *C. candidus* Türkiye'nin endemik türleridir. *C. olivieri* subsp. *istanbulensis* B1 karesi için, *C. pallasii* subsp. *pallasii* ise Balıkesir ili için yeni kayıttır. Ayrıca, Balıkesir ili için yeni kayıt olan *C. chrysanthus* türünün yayılış gösterdiği yeni lokaliteler bulunmuştur. Morfolojik çalışmalarda; türlerin ayrıntılı deskripsiyonları verilmiştir. Ayrıca, türlerin korm tiplerinin fotoğrafları ve genel görünüş ile stillus tiplerinin çizimleri ilave edilmiştir. Türkiye Florası deskripsiyonundaki eksiklikler bu çalışmayla giderilmiştir. Taksonlar arasındaki morfolojik karakterler, Türkiye Florası'na göre birbirleriyle karşılaştırmalı olarak sunulmuştur. Çalışma sonucunda; *C. olivieri* subsp. *istanbulensis* B1 karesi için, *C. pallasii* subsp. *pallasii* ise Balıkesir ili için yeni kayıttır. Ayrıca, Balıkesir ili için yeni kayıt olan *C. chrysanthus* türünün yayılış gösterdiği yeni lokaliteler bulunmuştur. Türkiye Bitkileri Kırmızı Kitabı'ndaki IUCN tehlike kategorilerine göre Balıkesir ilinde yayılış gösteren endemik taksonlar sırasıyla, *C. olivieri* subsp. *istanbulensis* (EN), *C. biflorus* subsp. *nubigena* (LC), *C. flavus* subsp. *dissectus* (VU), *C. gargaricus* subsp. *gargaricus* (NT) and *C. candidus* (NT) kategorisinde yer almaktadır.

Anahtar Kelimeler: Balıkesir, *Crocus*, iridaceae, morfoloji, tehlike kategorileri

Morphological Features and Threat Categories of *Crocus* L. (Iridaceae) Species Growing in Balıkesir

Abstract

In this study were investigated on the morphological structure and threat categories of *Crocus* L. (Iridaceae) taxa growing in Balıkesir (Turkey). As a result of the field study, it was determined that 9 species *Crocus* distribute in Balıkesir (*C. gargaricus* Herbert subsp. *gargaricus*, *C. chrysanthus* (Herbert) Herbert, *C. biflorus* Mill. subsp. *nubigena* (Herbert) Mathew, *C. flavus* Weston subsp. *dissectus* T. Baytop & Mathew, *C. olivieri* Gay subsp. *istanbulensis* Mathew, *C. candidus* E.D. Clarke, *C. pallasii* Goldb. subsp. *pallasii*, *C. cancellatus* Herbert subsp. *mazziaricus* (Herbert) Mathew and *C. pulchellus* Herbert). *C. gargaricus* subsp. *gargaricus*, *C. biflorus* subsp. *nubigena*, *C. flavus* subsp. *dissectus*, *C. olivieri* subsp. *istanbulensis* and *C. candidus* are an endemic species of Turkey. In morphologic studies, the detailed descriptions of species have been given. Also, drawing of general views and stylus types and photos of corm types of

*e-mail: sselvi2000@yahoo.com

species have been added. The lack of descriptions on Turkish Flora have been dealt with this study. The morphological characters between the taxa have been presented with charts according to Turkish Flora and comparatively among each other, as well. At the end of this study, *C. olivieri* subsp. *istanbulensis* is a new record for B1 grid system. As for *C. pallasii* subsp. *pallasii*, it is a new record for Balıkesir. Besides, new localities in which *C. chrysanthus*, a new record for Balıkesir, is common have been found. According to the threat categories assigned by IUCN in Red Data Book of Turkish Plants, endemic taxa distributed in Balıkesir province are categorized as *C. olivieri* subsp. *istanbulensis* (EN), *C. biflorus* subsp. *nubigena* (LC), *C. flavus* subsp. *dissectus* (VU), *C. gargaricus* subsp. *gargaricus* (NT) and *C. candidus* (NT) respectively.

Keywords: Balıkesir, *Crocus*, iridaceae, morphology, threat categories

1. Introduction

The petaloid monocotil family Iridaceae is a large and diverse family of about 92 genera and about 1800 species mainly distributed in the southern hemisphere [1,2]. *Crocus* L., which has elegant and stylish flowers, is a genus of the Iridaceae family [3]. The genus *Crocus* includes 88 species distributed from southwestern Europe, through central Europe to Turkey, North Africa and temperate Asia, and is especially well represented in arid countries of south-eastern Europe and Western and Central Asia [3, 4-6]. *Crocus* is represented by 36 species in 71 taxa in Turkey. Thirty-five of these are endemic to Turkey [7-9]. Due to taxon diversity, Turkey might be considered as the homeland of *Crocus* [10].

The *Crocus* is regarded as an ornamental plant as they grow like tulipa and flower in different colours. Because of these properties the *Crocus* species can sustain their life forms when they are cultivated in parks and gardens [11]. Recently, some researchers have reported that the extract of *Crocus* spp. has antitumor, antimutagenic and cytotoxic activities and inhibits nucleic acid synthesis in human malignant cells [12]. The most comprehensive morphological studies relating to *Crocus* species have been presented by Mathew [7-9, 13]. In Turkey, investigations on the morphology of them have been increasing in recent years [3, 11, 12, 14, 15].

The aim of this study was to present the morphological features and threat categories of nine *Crocus* species growing in Balıkesir which is a province in western of Turkey. With this study, we think that will provide useful information about morphology of nine taxa would be beneficial to botanists who will morphological and revision studies in the future.

2. Materials and Methods

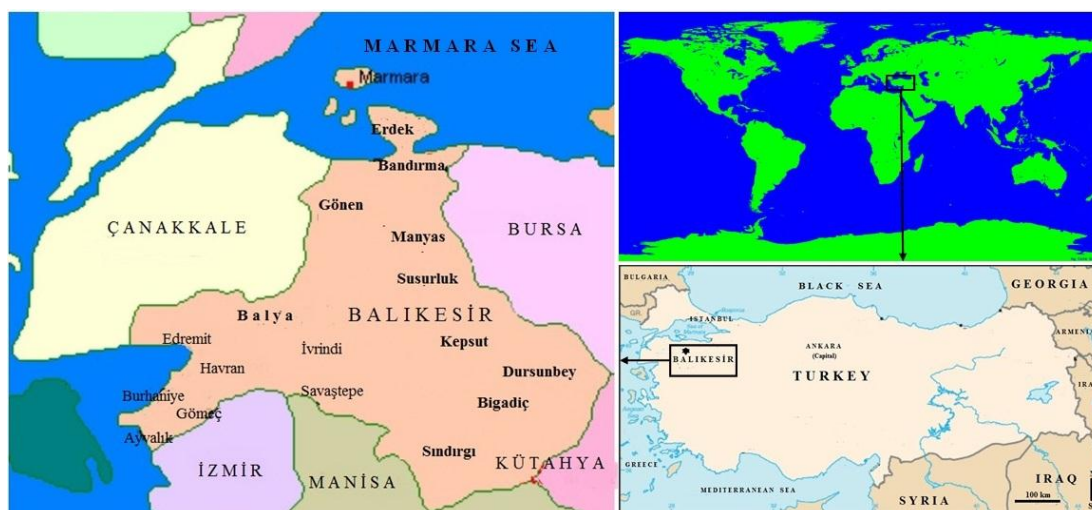
Crocus specimens were collected from Balıkesir between 2004 and 2006 (Figure1). Species collected were examined in the laboratory and were determined using the relevant literature [7-9, 13]. Fresh samples were used in each case for experimental analysis and measurements. The specimens were dried according to standard herbarium techniques and stored in the Herbarium of Necatibey Education Faculty, Balıkesir University, Turkey. Information about the plant material is given in Table 1.

Table 1. Localities and threaten categories of *Crocus* taxa collected from Balıkesir in Turkey

Taxa	Locality	Threat categories
* <i>C. gargaricus</i> subsp. <i>gargaricus</i>	Turkey; B1 Balıkesir: Edremit, Kazdağı, Kartalçimen, 1700 m, 07.04.2005, F. Satil (FS 1382).	NT
<i>C. chrysanthus</i>	Turkey; B1 Balıkesir: Çağış village, ca. 350 m, 20.02.2005, S.Selvi (SV 1020); Küçükbostancı village, Bayırlık station, 140 m, 07.03.2005, S.Selvi (SV 1027)	-
* <i>C. biflorus</i> subsp. <i>nubigena</i>	Turkey; B1 Balıkesir: Edremit, Kazdağı, 1400 m, 15.02.2005, F.Satıl (F.S. 1384); İvrindi, Gökçeyazı, roadsides, 140 m 14.02.2005, S.Selvi (SV 1009).	LC
* <i>C. flavus</i> subsp. <i>dissectus</i>	Turkey; A1 Balıkesir: Manyas, Akçaova village, ca. 140 m, 15.03.2004, S.Selvi (SV 1034); Gönen, Armutlu village, mezarlık hill, ca. 140 m, 21.03.2004, S.Selvi (SV 1039); A2 Balıkesir: Bandırma, Dedeoba village, field sides, ca. 145 m, 17.03.2004 S.Selvi (SV 1037). B1 Balıkesir: Çağış village, 240 m, 16.03.2006, S.Selvi (SV 1119); B2 Balıkesir: Dursunbey Hacı Ömerler village 145 m, 24.03.2005; S.Selvi (SV 1044).	VU
* <i>C. olivieri</i> subsp. <i>istanbulensis</i>	Turkey; B1 Balıkesir: Değirmen boğazı, 180 m, 04.03.2005, S.Selvi (SV 1024).	EN
* <i>C. candidus</i>	Turkey; B1 Balıkesir: Edremit, Ortaoba vilage, Roadsides, 350 m, 28.02.2005; 25. km from Ortaoba to Edremit roadsides, 300 m, 25.03.2005, S.Selvi (SV 1043).	NT
<i>C. pallasii</i> subsp. <i>pallasii</i>	Turkey; B1 Balıkesir: Savaştepe, Kozören village, 500 m, 14.12.2004, S.Selvi (SV 1006).	-
<i>C. cancellatus</i> subsp. <i>mazziaricus</i>	Turkey; B1 Balıkesir: Savaştepe, Kozören village, 500 m, 14.12.2004, S.Selvi (SV 1007).	-
<i>C. pulchellus</i>	Turkey; B1 Balıkesir: Edremit, Kazdağı, 1400 m, 14.11.2004; S.Selvi (SV 1005); Savaştepe, Çukurhüseyin village, 200 m, 12.11.2006, S.Selvi (S.V. 1196).	-

* Endemic taxon

EN: Endangered, LC: Least Concern, VU: Vulnerable, NT: Near threatened

**Figure 1.** Map of distribution of *Crocus* taxa growing in Balıkesir

3. Results and Discussion

In this study, the morphological characters of nine taxa of *Crocus* growing in Balıkesir were investigated with a view to evaluate their taxonomic value. The structure of corm tunic, the style, the color of perianth tube, perianth segments, anther color and anter basal lobe were considered to be useful for the purpose. Morphological properties of the above mentioned characters are shown Table 2 as comparative. In addition to, General drawing of taxa growing in Balıkesir are given in Figure 2.



Figure 2. General drawing of *Crocus* taxa growing in Balikesir. 1. *Crocus gargaricus*, 2. *C. chrysanthus* 3. *C. biflorus* subsp. *nubigena* 4. *C. flavus* subsp. *dissectus* 5. *C. candidus* 6. *C. pallasii* subsp. *pallasii* 7. *C. cancellatus* subsp. *mazziaricus* 8. *C. pulchellus* 9. *C. olivieri* subsp. *istanbulensis* (Scale bar: 1 cm)

Table 2. The morphological features of some parts of *Crocus* taxa growing in Balikesir.

Taxa	Part of plants					
	Corm tunic	Tunic ring	Throat of perianth	Shape of perianth segments	Anther color	Branches number of stylus
<i>C. gargaricus</i>	coarsely reticulate-fibrous	Absent	yellow	obtuse or subacut	yellow	3
<i>C. chrysanthus</i>	membranous and coriaceous	entire or toothed	yellow	subacut	yellow	3
<i>C. biflorus</i> subsp. <i>nubigena</i>	membranous	entire or toothed	pale to deep yellow	subacut	brown or blackish	3
<i>C. flavus</i> subsp. <i>dissectus</i>	membranous	Absent	yellow	subacut, acut	yellow	6
<i>C. olivieri</i> subsp. <i>istanbulensis</i>	membranous	Absent	yellow	subacut, acut	yellow	7
<i>C. candidus</i>	membranous	Absent	yellow	subacut, obtuse	yellow	6
<i>C. pallasii</i> subsp. <i>pallasii</i>	reticulate-fibrous	not toothed	whitish or lilac	acut, acuminate	yellow	3
<i>C. cancellatus</i> subsp. <i>mazziaricus</i>	reticulate-fibrous, usually coarsely	not toothed	yellow	subacut or obtuse	yellow	3
<i>C. pulchellus</i>	membranous or coriaceous	not toothed	yellow	subacut, acuminate	creamy-white	6

Corm tunic of *C. chrysanthus*, *C. biflorus* subsp. *nubigena*, *C. pallasii* subsp. *pallasii*, *C. cancellatus* subsp. *mazziaricus* and *C. pulchellus* are split into rings (entire or toothed) at the base, while others have not corm tunic splitting into rings (Table 2; Figure 3).



Figure 3. Corm types of *Crocus* taxa growing in Balikesir. 1. *Crocus gargaricus*, 2. *C. chrysanthus* 3. *C. biflorus* subsp. *nubigena*, 4. *C. flavus* subsp. *dissectus* 5. *C. olivieri* subsp. *istanbulensis* 6. *C. candidus* 7. *C. pallasii* subsp. *pallasii*, 8. *C. cancellatus* subsp. *mazziaricus* 9. *C. pulchellus* (Scale bar: 1 cm)

Throat of perianth of *C. pallasii* subsp. *pallasii* is colored whitish or lilac, while all other taxa are from pale yellow to yellow color. Again; *C. flavus* subsp. *dissectus*, *C. olivieri* subsp. *istanbulensis*, *C. candidus* and *C. pulchellus* have a style divided into 6-7 expanded branches, while other taxa have a style divided 3 expanded branches (Table 2; Figure 4).

Some morphological characters of this taxa weren't given in Flora of Turkey, such as the height of the plant and corms, perianth tube length, number of flowers, length of stylus and number of cataphyll, These characters are provided in this study. According to Flora of Turkey, 6 taxon of the genus *Crocus* are naturally distributed in Balikesir. These taxa are *C. fleischeri*, *C. gargaricus* subsp. *gargaricus*, *C. flavus* subsp. *dissectus*, *C. candidus*, *C. cancellatus* subsp. *mazziaricus* and *C. pulchellus* [7]. *C. chrysanthus*, *C. biflorus* subsp. *nubigena*, *C. olivieri* subsp. *istanbulensis* and *C. pallasii* subsp. *pallasii* are a new record for B1 grid system and for Balikesir. Also, total of 9 plant taxa, including 5 endemics and 4 non-endemics were evaluated their threat categories according to the threat categories assigned by IUCN in Red Data Book of Turkish Plants [16,17] and are shown in Table 1.

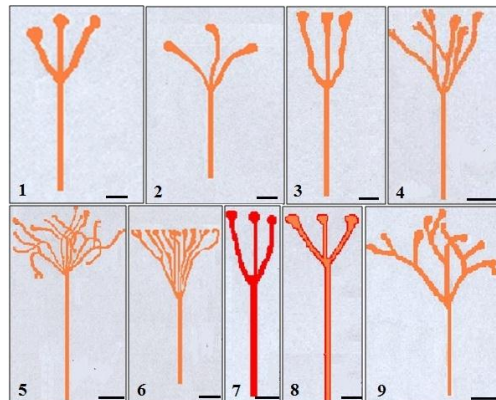


Figure 4. Stylus types of *Crocus* taxa growing in Balikesir. 1. *Crocus gargaricus*, 2. *C. chrysanthus* 3. *C. biflorus* subsp. *nubigena*, 4. *C. flavus* subsp. *dissectus* 5. *C. olivieri* subsp. *istanbulensis* 6. *C. candidus* 7. *C. pallasii* subsp. *pallasii*, 8. *C. cancellatus* subsp. *mazziaricus* 9. *C. pulchellus* (Scale bar: 2 mm)

Endemic taxa distributed in Balıkesir province are categorized as *C. olivieri* subsp. *istanbulensis* (EN), *C. biflorus* subsp. *nubigena* (LC), *C. flavus* subsp. *dissectus* (VU), *C. gargaricus* subsp. *gargaricus* (NT) and *C. candidus* (NT) respectively.

According to Flora of Turkey, Despite *C. fleischeri* located in Balıkesir was distributed only one locality (B1 Balıkesir: Bigadiç), we hadn't reached this taxon at this locality.

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