

Morphological Investigations on a New and Endemic Saffron (*Crocus chrysanthus* subsp. *sipyleus*) from Turkey

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Abstract

Crocus chrysanthus subsp. *sipyleus* Candan & Özhatay is an endemic taxon distributed only on Spil Mountain in Manisa city of Turkey in the world. Its significant morphological differences made it as a new taxon. However, this taxon can be distinguished with its colorful flowers with purple or brown lines on tepals and the anthers with black or lines. In this study, it is aimed to compare morphology of the new taxon *Crocus chrysanthus* subsp. *sipyleus* Candan & Özhatay as regards mature plants with its colorful photographs in a detailed way.

Keywords

Morphology, *Crocus chrysanthus* subsp. *sipyleus*

1. Introduction

The *Crocus* (Saffron) genus is one of the members of the family Iridaceae. This plant's stylus is present among the world's most costly spices by weight. On the other hand, this genus has a commercially agricultural importance in the world in the point of its delicate view for gardens, parks and rituel places (Mathew 1982; Mathew 2000).

Iridaceae family has 92 genera and 1800 species and mainly distributed in the Southern hemisphere continents as herbs with rhizomes, corms or bulbs (Mathew 1984, 1998, 2002).

Turkey especially Anatolia is the gene centre for the genus. *Crocus* is represented by 133 taxa, of which 109 are endemic to the country (Yüzbaşıoğlu 2012; Candan & Özhatay 2013; Harpke et al. 2013; Kerndorff et al. 2013a, 2013b, 2013c; Rukšāns 2013; Schneider 2014; Yüzbaşıoğlu & Özhatay 2014; Yüzbaşıoğlu et al. 2015).

Different *Crocus* species have received attention on some ecological, anatomical, cytological, palynological and molecular studies (Kerndorff and Pasche 2004, 2006, 2011; Yüzbaşıoğlu and Varol 2004; Işık and Oybak Dönmez 2006; Candan 2007, 2015a, 2015b; Candan et al. 2009a, 2009b; Candan and Özhatay 2013, Kandemir 2009; Şık et al. 2008; Şık and Candan 2009; Coşkun et al. 2010, Erol 2010, 2011;

Yüzbaşıoğlu and Özhatay, 2014). There are also some investigations made about some *Crocus* taxa distributed all over the World (Collins 1937; Karasawa 1942; Shorina 1975; Rudall 1990, 1992; Rudall and Mathew 1990). In these studies, especially according to Rudall and Mathew (1990), characteristic features and general importance of leaf blade cross sections were determined.

As is seen, there isn't any detailed study on the species *Crocus chrysanthus*. However, the author studied about *Crocus chrysanthus* at her doctorate thesis that she found different forms of *Crocus chrysanthus* and completed her study in 2007. The author continued her studies between 2007-2011 after her doctorate thesis and the article about 7 new taxa of *Crocus chrysanthus* was published (Candan & Özhatay, 2013). It is mentioned that, *Crocus chrysanthus* subsp. *sipyleus* Candan & Özhatay can be found only at Spil Mountain of Manisa city in Turkey in the world. Therefore, the initial objective of this study was to investigate the morphology of new and endemic taxon *Crocus chrysanthus* subsp. *sipyleus* in a detailed way with photographs.

2. Material and Method

C. chrysanthus subsp. *sipyleus* material was collected from natural populations in flowering time. The populations of the plants examined are given below with the locality they

deploy. The expression B1 is located before the locality is given according to grid square system used in Flora of Turkey (Mathew 1984).

Holotype: B1 Manisa, Spil Mountain, Horse Place. 1250 m. (ISTE)

Plant material was collected from natural populations in flowering time. The specimens were deposited in the herbarium ISTE (Istanbul Univ. Pharmacy Faculty Herbarium). Taxonomical description of the plant taxon followed Flora of Turkey (Mathew 1984; Mathew 2000) and Candan and Özhatay (2013). All the examinations were based on living and herbarium materials.

3. Results

Morphological peculiarities of *C. chrysanthus* subsp. *sipyleus* are given below.

Corm ovoid veya subglobose, 1,4-2,5x0,8-2,1 cm, tunic coriceus. Rings with distinct tooth like projections. Cataphyll creamy-yellow, (3) 4-5. Prophyll absent. Bract ve bracteol nearly equal. Leaves 3-7, synanthous, shorter or longer than flowers in flowering time; green; 0,8-1,2 mm wide; scabrose rarely papillose. Flowers 1-4, yellowish orange, diameter 1,0-3,4 cm. Flowers 1-4(5), throat and perigon tube purplish, brownish or blue speckled, striped or rarely suffused on the exterior, 0,4-0,8 x 1,8-3,2 cm; inner tepals generally pale purplish, brownish or blue veined striate or lined from base sometimes decreasingly to upper parts; 0,4-0,8 x 1,6-2,9 cm. Filaments yellow or yellowish orange, orange; 4,4-6,7 mm. Anthers yellow with greyish black longitudinal lines; 9,8-14 mm. Capsule often purple-tinged; 6-8,5x17-26 mm. Seeds pale reddish brown; (1,5)1,7-2,2 x (2,0)3,0-4,9 mm. Testa finely vesiculate (Figs.1-2).

Flowering time: February-March

Habitat: Under *Pinus nigra*, open grassy area, often with *Sarcopoterium* sp., *Verbascum* sp., *Colchicum* sp., *Muscari* sp. and *Galanthus* sp.

4. Discussion

The *Crocus* genus and especially *biflori* serie are complex and problematic systematic categories. According to Mathew (1982), the new species falls into series *Biflori*. *Crocus*

chrysanthus belongs to this serie (Mathew 1982). On the other hand, there is an important phenotypic variation, is seen on *C. chrysanthus* (Candan 2007; Candan and Özhatay 2013).

Candan (2007) determined three forms of *C. chrysanthus* with different cytotypes (2n=8, 12, 20+2B) during her doctorate thesis field studies. After this study, she continued her investigations as examining more populations. The results of those detailed studies including morphology, anatomy, cytology, palynology and seed micromorphology provide evidence that variation does correlate with anther and flower colors, chromosome numbers, pollen grain features and seed surface micromorphology. After these studies, authors revealed *Crocus chrysanthus* sensu lato with 4 subspecies (*C. chrysanthus* subsp. *chrysanthus*, *C. chrysanthus* subsp. *punctatus*, *C. chrysanthus* subsp. *kesercioglu*, *C. chrysanthus* subsp. *sipyleus*) and 3 varieties (*C. chrysanthus* subsp. *chrysanthus* var. *chrysanthus*, *C. chrysanthus* subsp. *chrysanthus* var. *bicoloreus*, *C. chrysanthus* subsp. *atroviolaceus*) (Candan and Özhatay 2013).

The most detailed measurements were given in the point of *Crocus chrysanthus* with Flora of Turkey (1984). Nevertheless, these knowledge are not clarifying the taxon clearly. More information given about *C. chrysanthus* sensu lato (Candan and Özhatay 2013), but more detailed photographs regarding morphological features of *C. chrysanthus* subsp. *sipyleus* were given with this investigation. This study is the first study gives the information about all the significance characters of *C. chrysanthus* subsp. *sipyleus* with their colorful original photographs (Figs. 1-2). These photographs can be used to separate this taxon from the other *C. chrysanthus* taxa clearly.

However, *C. chrysanthus* subsp. *sipyleus* can be distinguished from the other subspecies of *C. chrysanthus* by its greyish black longitudinal lines at anthers easily. However, the purplish or brownish color on the flowers and perigon tube is also a distinguishable feature that can be used for its description (Figs. 1-2).

As a result, it can be clearly said, morphological characters of flower are very important for *Crocus chrysanthus* subsp. *sipyleus* taxonomy. Especially, the anther, outer tepal and perigon tube color give significant taxonomical separator knowledge in an easy way for *C. chrysanthus* sensu lato.

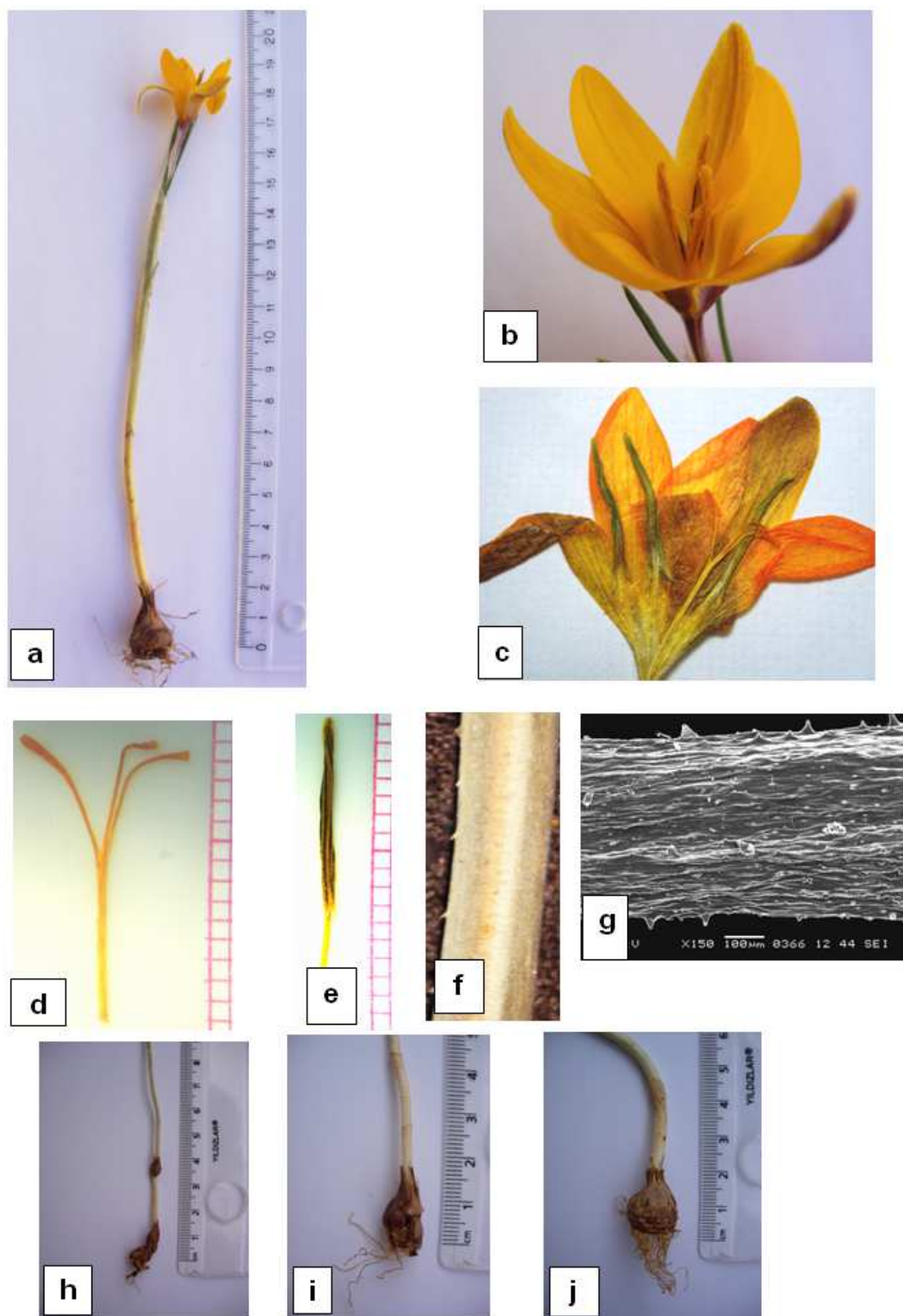


Figure 1. a. General view of *C. chrysanthus* subsp. *sipyleus*, b-c. Close view of flower; d. Close view of styleus, e. Close view anther; f. Close view of leaf, g. Close view of leaf (Scanning electron microscope photograph) h-i-j) Close view of corms.

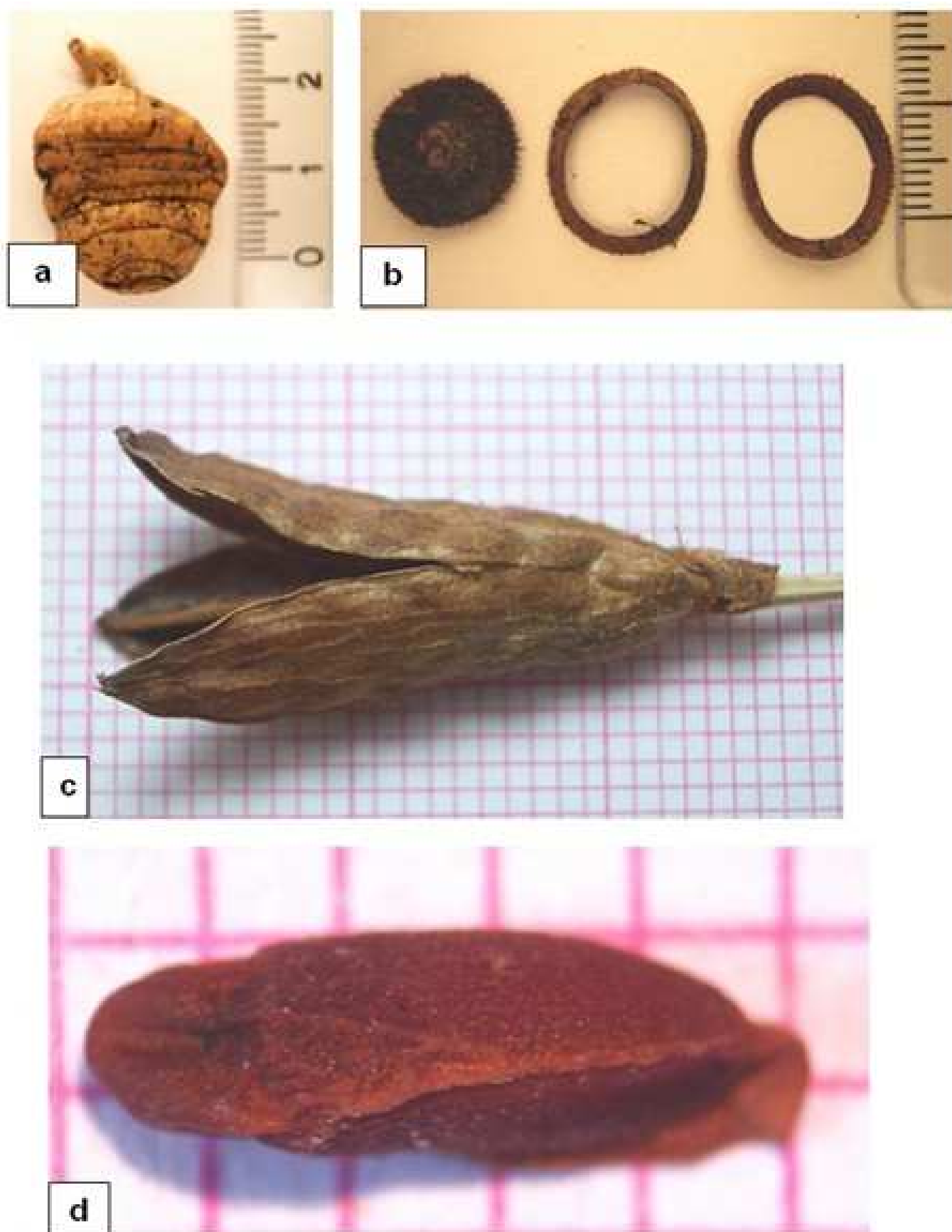


Figure 2. a. Close view of mature corm, b. Close view of rings, c. Close view of fruit, d. Close view of seed.

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