



## A new subspecies of *Crocus pestalozzae* (Iridaceae) from Turkey

SIRRI YÜZBAŞIOĞLU<sup>1</sup> & NERİMAN ÖZHATAY<sup>1</sup>

<sup>1</sup>Department of Pharmaceutical Botany, Faculty of Pharmacy, İstanbul University, 34116, İstanbul, Turkey; E-mail: yuzbasis@istanbul.edu.tr

### Abstract

*C. pestalozzae* subsp. *violaceus* is described as a new subspecies from northwest Anatolia. The new taxa differs from subsp. *pestalozzae* by its flower colour, leaf and flower size, karyotype, habitat and growing elevation. Diagnostic characters, a full description, and detailed illustrations are presented. Also photographs of metaphase plate, karyotypes and idiograms of two subsp. of *C. pestalozzae* are given. The geographical distribution of the subspecies is mapped. IUCN threatened category and observations on the population are noted.

**Key words:** *Crocus*, endemic, karyotype, taxonomy, Turkey

### Introduction

The genus *Crocus* Linnaeus (1753: 36) occurs in the Mediterranean region and the drier floristic area to the east of the Mediterranean known as the Irano-Turanian region (Mathew 1982) and consists currently of about 129 recognized species (Erol *et al.* 2012, Harpke *et al.* 2013, Kerndorff *et al.* 2013a, 2013b, 2013c, Peruzzi & Carta 2011, Peruzzi *et al.* 2013, Yıldırım & Erol 2013). Turkey is an especially rich country in terms of *Crocus* species: Mathew (1984) listed 31 species [*C. tournefortii* Gay (1831: 320) is not included] from Turkey. Later, Mathew (1988) added one subspecies. Four more species and two subspecies were added by Mathew (2000), and, as a result of more recent publications, the number of *Crocus* taxa in Turkey reached 119 (73 species) (Erol *et al.* 2012, Yüzbaşıoğlu 2012, Candan & Özhatay 2013, Harpke *et al.* 2013, Kerndorff *et al.* 2013a, 2013b, 2013c, Ruksans 2013, Yıldırım & Erol 2013), of which 97 are endemic to the country.

According to Mathew (1982), *C. pestalozzae* Boissier (1854: 13, 17) exists in two colour forms, white and a clear lavender-blue. The original collection (type locality) from Bolu has white flowers, and the blue form was not discovered until 1929. The lavender-blue form, more commonly encountered in cultivation, from unknown origin, has been called var. *caeruleus* (but this not a formally published name). During our field studies, the blue form was found in an isolated population. In this study, white and blue forms, based on our herbarium and field observations, are treated as distinct subspecies.

Specimens of the taxon described here have been collected several times by the first author since 2001 and observations made concerning population size and phenological features. The specimens were compared with similar material at ISTE, ISTF, K and E. The measurements, colours and other details given in the description are based on both herbarium and living material. Morphological data were obtained from 70 individuals in total. The illustrations of the new subspecies were made from living material using Adobe Photoshop CS4.

Karyological observations were made on mitotic metaphase cells of root-tips obtained from corms that were collected in the type locality and around İstanbul. Root tips were pretreated in  $\alpha$ -monobromonaphthalene at 4 °C for 24 hours and fixed in Carnoy's solution (3:1 absolute ethanol: glacial acetic acid) for a minimum of 1 hour. The root tips were hydrolyzed for 12 minutes in 1N HCl at 60 °C, stained in Feulgen solution and squashed in aceto-orcein. Metaphases were observed using an Olympus BX53 light microscope and photographs were taken with the same. Also measurements of somatic chromosomes were made with the program CAMERAM, they were calculated with formula of the relative variation in chromosome length ( $CV_{CL}$ ) and mean centromeric asymmetry ( $M_{CA}$ ) in Zuo & Yuan (2011) and Peruzzi & Eroğlu (2013). Chromosomes were classified according to the nomenclature of Levan *et al.* (1964).

Indeed, this feature is not detectable in the figures published by this author (Kandemir 2009, Fig. 4a; 2011, Fig. 11). On the other hand, distinct ribs were observed by us in cross sections of the leaf samples of *C. pestalozzae* that were collected around İstanbul. The type specimen of *C. pestalozzae* was collected by Pestalozza from the district of Bolu but without precise details. This species has not been re-collected from the type locality. *Crocus pestalozzae* subsp. *pestalozzae* is now known only from Kırklareli, İstanbul and Kocaeli Provinces (Fig. 2).

## Acknowledgements

We wish to thank Brian Mathew and an anonymous reviewer for their constructive comments on the manuscript. Our thanks also to Tuna Ekim, Adil Güner and Margaret Johnson, for their scientific advice and Research Fund of İstanbul Univ. for financial support.

## References

- Boissier, E. (1854) *Diagnoses plantarum orientalium novarum* 1(13). Leipzig, 74 pp.
- Brighton, A.C., Mathew, B. & Marchant, C.J. (1973) Chromosome counts in the genus *Crocus* (Iridaceae). *Kew Bulletin*: 451–464.  
<http://dx.doi.org/10.2307/4108890>
- Candan, F. & Özhatay, N. (2013) *Crocus chrysanthus* s. lato (Iridaceae) in Turkey. *Annales Botanici Fennici* 50: 423–430.  
<http://dx.doi.org/10.5735/085.050.0610>
- Erol, O., Can, L. & Şık, L. (2012) *Crocus demirizianus* sp. nov. from northwestern Turkey. *Nordic Journal of Botany* 30: 665–667.  
<http://dx.doi.org/10.1111/j.1756-1051.2012.01684.x>
- Gay, J. (1831) Nouvelles espèces de *Crocus*. *Bulletin des Sciences Naturelles et de Geologie* 25: 319–321.
- Harpke, D., Meng, S., Rutten, T., Kerndorff, H. & Blattner, F.R. (2013) Phylogeny of *Crocus* (Iridaceae) based on one chloroplast and two nuclear loci: ancient hybridization and chromosome number evolution. *Molecular Phylogenetics and Evolution* 66: 617–627.  
<http://dx.doi.org/10.1016/j.ympev.2012.10.007>
- IUCN Species Survival Commission. (2001) IUCN Red List Categories and Criteria. Approved by the 51st Meeting of the IUCN Council, Version 3.1. Gland: IUCN.
- Kandemir, N. (2009) Morphology, anatomy and ecology of critically endangered endemic *Crocus pestalozzae* Boiss. (Iridaceae) in northwest Turkey. *Bangladesh Journal of Botany* 38: 127–132.  
<http://dx.doi.org/10.3329/bjb.v38i2.5136>
- Kandemir, N. (2011) Comparative leaf anatomy of some endemic *Crocus* L. taxa from Turkey. *Bangladesh Journal of Botany* 40: 155–162.  
<http://dx.doi.org/10.3329/bjb.v40i2.9771>
- Kerndorff, H., Pasche, E., Blattner, F.R. & Harpke, D. (2013a) Fourteen new species of *Crocus* (Liliiflorae, Iridaceae) from west, south-west and south-central Turkey. *Stapfia* 99: 145–158.
- Kerndorff, H., Pasche, E., Blattner, F.R. & Harpke, D. (2013b) A new species of *Crocus* (Liliiflorae, Iridaceae) from Turkey. *Stapfia* 99: 141–144.
- Kerndorff, H., Pasche, E., Blattner, F.R. & Harpke, D. (2013c) *Crocus biflorus* Miller (Liliiflorae, Iridaceae) in Anatolia – Part IV. *Stapfia* 99: 159–186.
- Levan, A., Fredga, K. & Sandberg, A.A. (1964) Nomenclature for centromeric position on chromosomes. *Hereditas* 52: 201–220.  
<http://dx.doi.org/10.1111/j.1601-5223.1964.tb01953.x>
- Linnaeus, C. (1753) *Species plantarum*. Laurentii, Stockholm. 560 pp.
- Mathew, B. (1982) *The Crocus. A revision of the genus Crocus*. Batsford, London, 127 pp.
- Mathew, B. (1984) *Crocus* L. In: Davis, P.H. (Ed.) *Flora of Turkey and the east Aegean islands* 8. Edinburgh University Press, Edinburgh, pp. 413–438.
- Mathew, B. (1988) *Crocus* L. In: Davis, P.H. (Ed.) *Flora of Turkey and the east Aegean islands* 10, suppl. Edinburgh University Press, Edinburgh, p. 288.
- Mathew, B. (2000) *Crocus* L. In: Güner, A., Özhatay, N., Ekim, T. & Canbaşer, K.H. (Eds.) *Flora of Turkey and the east Aegean islands* 11, suppl. Edinburgh University Press, Edinburgh, pp. 271–274.
- Peruzzi, L. & Carta, A. (2011) *Crocus ilvensis* sp. nov. (sect. *Crocus*, Iridaceae), endemic to Elba Island (Tuscan Archipelago, Italy). *Nordic Journal of Botany* 29: 6–13.

<http://dx.doi.org/10.1111/j.1756-1051.2010.01023.x>

Peruzzi, L., Carta, A. & Garbari, F. (2013) Lectotypification of the name *Crocus sativus* var. *vernus* L. (Iridaceae) and its consequences within the ser. *Verni*. *Taxon* 62: 1037–1040.

<http://dx.doi.org/10.12705/625.7>

Peruzzi, L. & Erođlu, H.E. (2013). Karyotype asymmetry: again, how to measure and what to measure? *Comparative Cytogenetics* 7: 1–9.

<http://dx.doi.org/10.3897/compcytogen.v7i1.4431>

Ruksans, J. (2013) Seven new crocuses from the Balkans and Turkey. *The alpine garden society* 1–27.

Yıldırım, H. & Erol, O. (2013) *Crocus yakarianus* sp. nov. from eastern Turkey. *Nordic Journal of Botany* 31: 426–429.

<http://dx.doi.org/10.1111/j.1756-1051.2012.01786.x>

Yüzbaşıođlu, S. (2012) *Crocus* L. In: Güner, A., Aslan, S., Ekim, T., Vural, M. & Babaç, M.T. (Eds.) *Türkiye Bitkileri Listesi (Damarlı Bitkiler)*. Nezahat Gökyiđit Botanik Bahçesi ve Flora Arařtırmaları Derneđi Yayını, İstanbul, pp. 530–535.

Zuo, L. & Yuan, Q. (2011) The difference between the heterogeneity of the centromeric index and intrachromosomal asymmetry. *Plant Systematics and Evolution* 297: 141–145.

<http://dx.doi.org/10.1007/s00606-011-0528-x>