Seed Micromorphological Investigations On 7 New Taxa Of Crocus Chrysanthus (Herbert) Herbert From Turkey

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Abstract

This Investigation is made to determine seed micromorphological properties of four subspecies and tree varieties of Crocus chrysanthus have been distinguished:Crocus chrysanthus (Herbert) Herbert subsp. chrysanthus with 3 varieties (var. chrysanthus, var. bicoloroceus F. Candan & N. Özhatay, and var. atrovioloceus F. Candan & N. Özhatay), Crocus chrysanthus (Herbert) Herbert subsp. punctatus F. Candan & N. Özhatay, Crocus chrysanthus (Herbert) Herbert subsp. kesercioglui F. Candan & N. Özhatay and Crocus chrysanthus (Herbert) Herbert subsp. sipyleus F. Candan & N. Özhatay. Scanning electron microscope was used to determine micromorphological features as regards mature seeds of all taxa.

Keywords: Crocus chrysanthus (Herbert) Herbert, seed micromorphology.

1.INTRODUCTION

Among the Angiosperm members, Iridaceae family is an invincible family with its attractive flowers. The taxa that belongs Iridaceae family are herbs with rhizomes, corms and bulbs (Mathew, 1984).

Iridaceae family is resembled with 6 genus in Turkey. These are Iris L., Hermodactylus Miller, Gynandriris Parl., Crocus L., Romulea Maratti and Gladiolus L. (Mathew, 1984). Crocus species are perennial plants, adopted to overcome a dry dormant period in the form of an underground corm, in many ways resembling Colchicum L. (Mathew, 1982; Bowles 1924, 1952).

The genus Crocus L. (Iridaceae) presently consists of 90 species, mainly in the Mediterranean Region and the drier floristic areas of the Irano-Turanien Region. The majority of species are restricted to Turkey and the Balkans. Turkey is an especially rich country in terms of Crocus species, with 31 species recorded in the Flora of Turkey (Mathew, 1984). The thirty-second species mentioned in Flora of Turkey is C. boissieri Maw. This plant collected in Turkey by Tchihotcheff in 1853 and then it has not been refound (Mathew, 2001). Since, the Flora of Turkey was written, five new taxa were described as C. biflorus Mill. subsp. albocoronatus Kerndorff, C. biflorus Mill. subsp. fibroannulatus Kerndorff, C. wattiorum (Mathew) Mathew, C. paschei Kerndorff, C. kerndorffiorum Pasche (Güner et al., 2000). In recent years, most of Turkey's native taxa were identified and classified by significant Crocus experts Brian Mathew, Eric Pasche and Helmuth Kerndorff. According to Kerndorff and Pasche (2004a) southwestern Turkey is the current center of diversity of the genus with 40 species and 70 taxa of which 40 are endemics (Maw 1886; Mathew 1982, 1984, 1998, 2000, 2002; Kerndorff and Pasche 2004a, 2004b, 2006, 2011; Yüzbaşıoğlu and Varol 2004; Erol et al. 2010, 2011).

C. chrysanthus was described by W. Herbert in 1837, collected by Frivaldsky in Rumelia. It is distributed in the Balkans and E. Romania. C. chrysanthus belongs to Series Biflori of genus Crocus. Mathew (1982) described C. chrysanthus in his famous work 'The Crocus'. This species is the much-loved yellow spring Crocus which has given rise to a whole colorful range of excellent garden plants, some of which are selections within the species while others are hybrids between it and Crocus biflorus. It is exceedingly variable, both in its morphology and cytology, but presents great problems in that the phenotypic variation does not correlate with such formation as distribution, habitat or chromosome number.

flower colors. Since the publication Flora of Turkey, (Mathew 1984) a number of ecological, anatomical, cytological, palynological studies concerning Crocus taxa have been carried out (Işık and Oybak Dönmez 2006; Candan and Kesercioğlu 2007; Candan et al. 2009a, 2009b; Kandemir 2009; Şık and Candan 2009; Coşkun et al. 2010). Otherwise, a number of investigations into Crocus species genetics have been made (Şık et al. 2008; Petersen et al. 2008).

Author (Feyza Candan) of this paper wrote a phD thesis (2007) titled 'Morphological, anatomical, cytological and palinological investigations on the Turkish Crocus taxa:C. ancyrencis, C. sieheanus, C. chrysanthus and C. flavus'. In her thesis she determined three cytotypes as 2n=8, 12, 20+2B and described the morphological differentiation of some populations of C. chrysanthus. After she completed her thesis, she examined more

populations of C. chrysanthus. The results of these detailed studies including morphology, anatomy, cytology, palynology and seed micromorphology, provide evidence that phenotypic variation does correlate with anther and flower colors, chromosome numbers, pollen and seed characteristics. An identification key for Crocus chrysanthus (Herbert) Herbert s.l. is suggested (article is in press). In this study, seeds as regards 7 new taxa of C. chrysanthus are investigated in terms of micromorphological peculiarities.

2.Material and Methot

Author made extensive field studies between 2001-2010 in south and west Anatolia about C. chrysanthus. She observed many different populations of C. chrysanthus while collecting. The specimens themselves have been deposited in the Herbarium of the Faculty of Pharmacy, Istanbul University (ISTE). Other samples examined are deposited at the following herbaria AEF (Ankara University, Pharmacy Faculty Herbarium), ANK (Ankara University, Science Faculty Herbarium), GAZI (Gazi University, Science Faculty Herbarium), HUB (Hacettepe University, Science Faculty Herbarium), EGE (Ege University, Science Faculty Herbarium).

For scanning electron microscopy, dried mature seeds of C. chrysanthus taxa were mounted on stubs using double-sided adhesive type. Samples were coated with 12,5-15 nm of gold. Coated seeds were examined and photographed with a JEOL JSM-6060 model scanning electron microscope (SEM).

Seed surface structue terminology is made according to Barthlott, (1984), Bojˇnanský and Fargašová (2007), Stearn (1983).

3.Results

Seed shape in relation to new taxa of C. chrysanthus were observed as ellipsoid. Raphe and caruncle are present. Seed diameters of the species are about 1,4-2,4x2,0-5,1 mm. Micromorphological peculiarties as regards 7 new taxa of the species are given below in a detailed way.

Crocus chrysanthus (Herbert) Herbert subsp. chrysanthus var. chrysanthus

Seed diameters are about (1,4)1,6-2,0(2,2)x(2,5)2,8-3,8 mm. Seed coat structure is colliculate-aculeate.

Crocus chrysanthus (Herbert) Herbert subsp. chrysanthus var. bicoloroceus F. Candan & N. Özhatay var. nov.

Seed diameters are about 1,5-2,3x2,5-3,9 mm. Seed coat structure is colliculate-aculeate.

Crocus chrysanthus (Herbert) Herbert subsp. chrysanthus var. atrovioloceus F. Candan & N. Özhatay var. nov.

Seed diamaters are about 1,4-2,2x3,0-4,4 mm. Seed coat structure is irregülar aculeate.

Crocus chrysanthus (Herbert) Herbert subsp. punctatus F. Candan & N. Özhatay subsp. nov.

Seed diameters are about 1,7-2,4x(2,8)3-4,8(5,1) mm. Seed coat structure is regülar aculeate.

Crocus chrysanthus (Herbert) Herbert subsp. kesercioglui F. Candan & N. Özhatay subsp. nov.

Seed diameters are about 1,5-2,4x3,2-4,5 mm. Seed coat structure is colliculate-aculeate.

Crocus chrysanthus (Herbert) Herbert subsp. sipyleus F. Candan &N. Özhatay subsp. nov. Seed diameters are about (1,5)1,7-2,2x(2,0)3,0-4,9 mm. Seed coat structure is finely vesiculate

4.Discussion

Murley made a descriptive and complementary useful key for Cruciferae family and the other families seed description. These knowledge were made a significant contribution to solve important problems for classification of Cruciferae (Murley, 1951).

Few studies have been made of the adaptive significance of seed and fruit coat macromorphology, sculpturing and ornamentation in Scrophulariacea and Asteraceae. The seeds and achenes have no obvious adaptations for animal or bird dispersal, whereas ornamentation might enhance their chances of being dispersed by animals. It was also suggested that such features have selective advantages in dry habitats by reducing water loss (Shetler and Morin, 1986; Aktaş Akcın, 2009).

In the current study, seed micromorphology of 7 new taxa of Crocus chrysanthus (Herbert) Herbert are determined from Turkey. Based on previous researches and the results presented here, it can be concluded that the micromorphological features of the seeds will be a kind of support related to distinguish all taxa of C. chrysanthus between each other. According to all studies of the species C. chrysanthus s.l. as morphology, palinology, cytology and seed micromorphology (Candan 2007; Candan and Kesercioğlu 2007), an identification key of the species was suggested (article is in press). In this study, seed micromorphological features of 7 new taxa of C.chrysanthus are necessary to understand that surface patterns can be confidently utilized to differentiate individual taxa and groupings, as is seen.

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