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# *Dianthus pseudocrinitus* (Caryophyllaceae), a new species from Northeast of Iran identified by morphological and molecular data

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## Abstract

A new species from southwest of Bojnord, NE of Iran is described and illustrated here as *Dianthus pseudocrinitus* (Caryophyllaceae). This species is morphologically similar to *D. crinitus* subsp. *turcomanicus*, but can be distinguished from the latter by bract number, width of lower and upper leaves, margin of thickness of outermost bracts, length of calyx, length and width of anther, branches of stem, type of sheath of lower leaf, and tip shape of petal fimbria. The new species is also similar to *D. orientalis* subsp. *stenocalyx* in terms of floral characters, but they differ by several non-overlapping morphological characters. Results obtained from the morphological data are consistent with those obtained from the molecular phylogenetic trees based on sequences of the two copies of DFR1 gene, confirming phylogenetic affinity of the new species to *D. crinitus* subsp. *turcomanicus*.

**Key words:** Caryophyllaceae, *Dianthus*, morphology, NE of Iran, phylogenetic analysis, species delimitation

## Introduction

The genus *Dianthus* Linnaeus (1753: 409) (Caryophyllaceae) with more than 300 species consists of a group of annual or perennial taxa. The genus is widespread in Eurasia and Africa, but the Mediterranean area acts as a diversity center for the whole genus (Constantinidis 1999, Valente *et al.* 2010).

The taxonomy of *Dianthus* is notoriously problematic due to, in particular, highly morphological diversity making species delimitation to be difficult (Tutin & Walters 1993, Balao *et al.* 2010). In addition, low molecular variation together with morphological diversity is characteristic of rapid species diversification (Hughes & Eastwood 2006, Meudt & Simpson 2006, Balao *et al.* 2010, Valente *et al.* 2010). The last process is a consequence of the evolutionary radiation which is commonly occurred in *Dianthus* (Balao *et al.* 2010, Valente *et al.* 2010). On the other hand, many researchers showed that polyploidy is a common phenomenon in *Dianthus* (Balao *et al.* 2009 and the references therein). This evolutionary force along with speciation often takes place via hybridization and genome duplication (Weiss *et al.* 2002).

The plant identification in recently evolved taxa such as *Dianthus* has become an important controversial issue in plant taxonomy (Rieseberg *et al.* 2006, Fazekas *et al.* 2009, Yan *et al.* 2011, Valente *et al.* 2010). The recognition of a new species in *Dianthus* still relies on overall similarities of certain morphological traits (Yilmaz *et al.* 2011, Shaulo & Erst 2012, Ilçim *et al.* 2013). Nowadays, the use of an high number of morphological characters in a multivariate morphometric approach in combination with other techniques such as cytological, anatomical, and molecular criteria could provide valuable insights into the exact taxonomic status of an unknown taxon (Johnson *et al.* 2012, Qiu *et al.* 2012).

The Irano-Turanian floristic region comprises a large area of SW and Central Asia and it is connected to the Mediterranean, Euro-Siberian (boreal) and Saharo-Sindian regions. This area is an important center of diversity for plants, as highlighted by the high numebr of endemisms (see e.g. Takhtajan 1986, Zohary 1973). Several biogeographical units can be distinguished. One of them is the Khorassan-Kopetdagh floristic province that is

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100 km$^2$ (calculated 53 km$^2$ using GeoCAT tool; Bachman *et al.* 2011) with severely fragmented populations. The habitats on the mountain steppes of the area are threatened mainly by overgrazing. Thus, an urgent planning is required for conservation of the fragile ecosystem and the threatened species.

**Etymology**:—Refers to the vegetative similarity to *D. crinitus* subsp. *turcomanicus* (Latin, pseudocrinitus = apparently similar to crinitus).

Key to three similar *Dianthus* species occurring in NE of Iran

1. Stems slander; petal limb fimbriate to one-third, rarely dentate, pink; calyx 20–25 mm long, shape of dent tip mucronate . ..... *D. orientalis* subsp. *stenocalyx*
- Stems strong; petal limb fimbriate from the middle to base, white to pale pink; calyx 20–32 mm long, shape of dent tip acute or acuminate ..... 2
2. Petal limb fimbriate for 1/2 its length; bracteoles 4(–6), broad-membranous at margin; calyx 20–22 mm long ..... ..... *D. pseudocrinitus*
- Petal limb fimbriate for more than 1/2 its length; bracteoles (4–)6–8(–10), narrowed-membranous at margin; calyx 25–32 mm long..... *D. crinitus* subsp. *turcomanicus*


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