



***Gagea* Salisb. (Liliaceae) in Iran: an updated species checklist**

MEHDI ZARREI^{1,2}, PAUL WILKIN¹ & MARK W. CHASE¹

¹Royal Botanic Gardens, Kew, Richmond TW9 3AB, UK.

²Current address: Department of Ecology and Evolutionary Biology, University of Toronto, 25 Willcocks St., Toronto, Ontario M5S 1B1, Canada. E-mail for correspondence: m.zarrei@utoronto.ca

Abstract

An updated checklist of the 29 species of *Gagea sensu lato* in Iran is presented here, with *G. dubia* as a new record for the Flora of Iran. *Gagea kunawurensis* and *G. fragifera* are accepted names for *G. stipitata* and *G. fistulosa*, respectively. *Gagea calcicola* and *G. robusta* are recently described as new species for the Flora of Iran. Species are placed in four sections. A diagnostic key is provided for both sections and species within the genus. Distribution maps in Iran and Afghanistan are provided for each species.

Keywords: Distribution, Afghanistan, identification key, map, elevation

Introduction

A systematic revision of the Iranian representatives of *Gagea* Salisbury (1806: 555) *sensu stricto* has already been published by Zarrei *et al.* (2007). They provided nomenclature and typification of each species with a complete description, citations of species examined and ecological notes and conservation status assessments. The molecular systematics of *Gagea*, including Iranian species, has also been published by Zarrei *et al.* (2009). However, the account of Zarrei *et al.* (2007) is no longer up to date because new species have been described since 2007 (Zarrei *et al.* 2010a, b), and it lacked a subgeneric classification. Extensive studies utilizing ploidy information, sequence data from the low-copy nuclear gene malate synthase (Zarrei *et al.* 2010c), anatomy (Zarrei *et al.* 2010d), and morphometrics (Zarrei *et al.* in preparation) have been undertaken since the publication of Zarrei *et al.* (2007). Moreover, extra specimens have been studied by the first author and more field research undertaken. Thus, it is appropriate to update the systematics of *Gagea* in Iran, which is the purpose of this manuscript.

The subgeneric classification of *Gagea* was revised by Zarrei *et al.* (2009) and has been updated recently (Zarrei *et al.* 2011a). The new classification is applied here for the first time to the Iranian representatives of *Gagea*. The merging of *Lloydia* Salisb. ex Rchb. with *Gagea sensu stricto* (Peruzzi *et al.* 2008; Zarrei *et al.* 2011a) did not have any impact on the number of species in Iran since no taxa formerly placed in *Lloydia* occur there.

Materials and Methods

This treatment is derived from eleven years study of *Gagea*. It used comparative morphological-anatomical, field studies, and molecular methods and employed specimens of *Gagea* deposited in BM, E, GB, IRAN, K, M, MSB, P, TARI, TUH, W, WU (acronyms following Index Herbariorum, <http://sciweb.nybg.org/science2/IndexHerbariorum.asp>) and Shahed University, Tehran (SUTH). More than 1000 specimens were collected in