



## A seed micromorphology study of *Astragalus* sect. *Caprini* (Leguminosae-Papilionoideae) from NE Iran

MOHAMMAD REZA SAGHI<sup>1</sup>, AZARNOOSH JAFARI<sup>2\*</sup> & ZAHRA YAZDANBAKHS<sup>3</sup>

<sup>1</sup> Department of Biology, Faculty of Sciences, Fars Science and Research Branch, Islamic Azad University, Iran.

<sup>2\*</sup> Department of Biology, Faculty of Sciences, Mashhad Branch, Islamic Azad University, Mashhad, Iran.

<sup>3</sup> Department of Plant Protection, Abarkouh Branch, Islamic Azad University, Abarkouh, Iran.

### Abstract

Seed micromorphology of 14 species of the *Astragalus* sect. *Caprini* from Khorasan Razavi Province (NE Iran) was studied using Scanning Electron Microscopy. Three main seed shapes, ovoid, mitiform and reniform, and four types of seed coat ornamentation, rugulate, reticulate–rugulate, velate and velate–foveolate were found. Seed micromorphology of the studied specimens was found to be variable between species. An identification key is presented based on seed coat characters.

**Key words:** Fabaceae, morphological characteristics, seed coat, seed ornamentation

### Introduction

*Astragalus* L. (1753:755) sect. *Caprini* de Candolle (1825: 301) of the family Leguminosae comprises about 280 species of a total of 2850 in the genus. This section is widely distributed throughout North Eurasia, North Africa, West Europe, and Central Asia (Podlech 1986 a, b, 1988, 1999, Maassoumi 1998, Podlech & Maassoumi 1987a,b, Podlech & Zarre 2013). There are 115 species of sect. *Caprini* in Iran of which 28 species are found in NE Iran (Massoumi 1998). Studies have previously been made of the external seed micromorphology within some sections of *Astragalus* (Ranjbar *et al.* 2007, Vural *et al.* 2008, Bacchetta & Brullo 2010; Nasseh & Joharchi 2012, Dinc *et al.* 2013, El-Sahhar *et al.* 2013, Brullo *et al.* 2013). However, although sect. *Caprini* is one of the largest sections of *Astragalus* in Iran, its seed micromorphology has rarely been reported. An SEM survey of seed micromorphology of 14 species of this section from NE Iran was carried out here for these species for the first time. The present study evaluates the variation in the shape and ornamentation of seeds. An identification key to the species based on seed ornamentation is provided here.

### Materials and Methods

Seeds of 14 species of *Astragalus* sect. *Caprini* from NE Iran from specimens held at FUMH and IAUM herbaria were examined. The specimens examined and their localities are presented in Table 1. The seeds were sputter coated and studied in an SEM XL 30. The seed characteristics of P/E (the ratio of polar axis length to equatorial axis length), shape and ornamentation were evaluated at magnifications 20 and 1000. Terminology used for seed shapes and coats follows Punt *et al.* (2007) and Meyers *et al.* (2013).

### Results

The morphological characteristics of the seeds are summarized in Table 2. Three main seed shapes (ovoid, reniform and mitiform) were observed (Figure 1A–D). Also, based on P/E, the seeds were divided into oblate (P/E 0.5–0.75) and suboblate (P/E 0.75–0.88) (Punt *et al.* 2007). The seed coat ornamentation was rugulate, reticulate–rugulate, velate or velate–foveolate (Punt *et al.* 2007) (Figure 2A–2N).

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