



Opuntia delafuentiana (Cactaceae: Opuntioideae), a new *xoconostle* from central Mexico

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Abstract

We describe a new species of a wild Mexican *Opuntia* producer of edible acidic prickly pears (*xoconostles*), locally known as “*xoconostle de cerro blanco*” (white hillside *xoconostle*), based on external morphology and micromorphology attributes (mainly characters of the spines). This species is morphologically compared with another four species of wild *xoconostles* distributed in the same region: *O. joconostle*, *O. leiascheinvariana*, *O. oligacantha* and *O. matudae*. A taxonomic key for the *xoconostles* of the area is provided. Based on the phylogenetic analysis of one chloroplast gene, one plastid intergenic spacer and one nuclear molecular marker, the new species was recognized as a monophyletic group within *Opuntia s.s. sensu* Majure *et al.*

Key words: endemism, ITS, *matK*, micromorphology, phylogenetic relationships, *trnL-trnF*

Introduction

Mexico is considered the most important center of diversity for the American cacti (Bravo-Hollis 1978; Bravo-Hollis & Sánchez-Mejorada 1991, Hunt 1999, Anderson 2001). In Mexico the Querétaro-Hidalgo zone is an arid and small discontinuous area in the south of the Chihuahuan Desert, which flora includes several endemic cactus species, many of them categorized as threatened or endangered (Hernández *et al.* 2004, Sánchez-Martínez *et al.* 2006, Hernández-Oria *et al.* 2007).

Opuntia Miller (1754: without pagination) is one of the seven genera in the tribe Opuntieae DC. and several species of this genus have distribution in the country. The group has been recovered as monophyletic in recent phylogenetic analyzes using morphology and DNA sequences (Majure *et al.* 2012, Majure & Puente 2014).

There is no agreement regarding the number of species of *Opuntia* occurring in Mexico [58 species according with Britton & Rose (1919), 66 by Bravo-Hollis (1937), 76 by Guzmán *et al.* (2003), 93 by Hunt (1999)]. The species delimitation is particularly difficult in this genera because of: 1) the high amounts of hybridization documented (Segura *et al.* 2007), 2) the lack of chromosomic counts, and 3) the lack of phylogenetic studies, among many other reasons (Majure & Puente 2014). Species belonging to *Opuntia* may have a particularly high level of hybridization, and subsequent speciation via polyploidy, but further studies are needed.

The *Opuntia* species are characterized by having fruits with little pulp and thick and acid peel, known in Mexico as *xoconostles* (Nahuatl: *xoco* = sour; *noxtle* = prickly pear) (see Bravo-Hollis 1978, Reyes-Agüero *et al.* 2006). The fleshy and acidic mesocarp of *xoconostles* is used in Mexico as food and in folk medicine (cholesterol, obesity and hypoglycemic control). Species producing *xoconostles* are not a monophyletic group, but most of them are included in *Opuntia* (Reyes-Agüero *et al.* 2006).

Wild *xoconostles* are frequent in the semiarid highlands of Central Mexico, tolerating scanty rainfall and poor soils (Gallegos-Vázquez *et al.* 2012). As well as in *Opuntia*, there is no agreement regarding the number of species that produce *xoconostles* [e.g. Olivares-Orozco *et al.* (2005) recognized 9 species, García *et al.* (2005) 8 species, Scheinvar