



Stemodia diplohyptoides (Plantaginaceae, Gratiolae): a new diploid species from South America

MARÍA DE LAS MERCEDES SOSA & MASSIMILIANO DEMATTEIS

Instituto de Botánica del Nordeste (UNNE-CONICET), Casilla de Correo 209, W3400CBL Corrientes, Argentina. FACENA- UNNE, Av. Libertad 5460, 3400, Corrientes, Argentina.

E-mail: mdlmsvg@yahoo.com.ar; mdematteis@agr.unne.edu.ar

Abstract

Stemodia diplohyptoides (Plantaginaceae), a new species from Gratiolae tribe is described and illustrated. This taxon is found in northeastern Argentina, at the edge of the Parana River that surrounds the north and center of Misiones province (Argentina). It is a diploid that has been traditionally treated under *Stemodia hyptoides*, which is here re-circumscribed to include only autopolyploid plants (tetraploid and hexaploid). The diploid specimens may be distinguished from the polyploid *S. hyptoides* by several morphological features such as shape, pubescence and margin of the leaves, corolla length and corolla tube pubescence. In addition, scanning electron microphotographs of seeds, chromosomes numbers, a distribution map and a key to distinguish the related species are also provided. On the basis of morphological, cytological and geographical data, some evolutionary considerations are inferred.

Key words: Autopolyploid, Plantaginaceae, speciation, *Stemodia*

Introduction

The genus *Stemodia* Linnaeus (1759: 1118) comprises about fifty-six species distributed in America, Africa, Asia and Australia (Turner & Cowan 1993, 1994, Rahmzadeh *et al.* 2005, Souza & Giulietti 2009). Thirty species have been recognized in the Americas, twenty of them growing in South America. In Argentina, nine species are distributed from the north to south of the Patagonia area, in Rio Negro province (Sosa 2012; Sosa & Dematteis 2013). *Stemodia* species are annual or perennial herbs, shrublets or small scrambling shrubs up to 3 m high with opposite subpinnately or pinnately veined leaves; flowers axillary, arranged along a terminal spiciform inflorescence; calyx with equal sepals, almost separate at the base, linear-lanceolate. The corollas are mostly lavender or purple-colored, zygomorphic, having well developed tube, anther thecae glabrous, divergent, with swollen connectives, or shortly stalked, styles 2–4 times longer than the stigmatic area; stigmatic area enlarged and usually curved, bifid; capsule mostly loculicidally 4-valvate, ovoid to orbicular; seeds, ellipsoid to subpyramidal (Turner & Cowan 1994).

Turner & Cowan (1994) indicated that some species restricted to the southern extreme part of South America exhibit a great morphological variation; this variability has been observed in the field and in some cases makes the correct identification difficult. Particular cases are *S. stricta* Chamisso & Schlechtendal (1828: 10), *S. hyptoides* Chamisso & Schlechtendal (1828: 8) and *S. lanceolata* Bentham (1846: 384) which are partially sympatric species distributed in northern Argentina. Moreover, the reports of different ploidy levels within some *Stemodia* species (Sosa & Seijo 2002, Sosa *et al.* 2009, 2011) suggest that the morphological variation found between and within species could be, at least in part, the result of the polyploidization process.

Stemodia hyptoides is currently recognized as a single taxonomic entity having diploid ($2n=22$), tetraploid ($2n=44$) and hexaploid ($2n=66$) populations (Sosa & Seijo, 2002; Sosa *et al.* 2009).

In many plants, examples of multiple cytotypes within a species have been shown to represent autopolyploids (or are presumed autopolyploids). However, only rarely an autopolyploid has been formally named and considered to represent a different species from its diploid progenitor (Judd *et al.* 2007). According to Soltis *et al.* (2007), it is clear that some cytotypes represent distinct evolutionary lineages that should be formally recognized as distinct species, providing names for them. In *Stemodia hyptoides*, the diploid and polyploid populations were considered up to the moment as a single taxonomic species.

a great variation of types, with the reticulate type predominant, and within the tribe, *Stemodia* was the single genus showing three types of seeds: granulate, reticulate and longitudinal-furrowed. The morphological analysis of the seeds of *S. diplohyptoides* and *S. hyptoides* is presented for the first time. These species have small seeds, all less than 1 mm long, very numerous (between 300 and 350 per capsule), with cells more or less irregularly reticulate. The shape of the seeds can also be ellipsoid to ovoid, with reticulate exotesta and salient edges. *Stemodia diplohyptoides* and *S. hyptoides* contain reticulate seeds, which is the most frequent type in Gratiolae tribe and the genus *Stemodia* (Ichaso, 1978). However, these species closely differ from related taxa such as *S. stricta* and *S. lanceolata*, and according to Ichaso (1978) contain granulate seeds.

The most significant morphological features that separate *Stemodia hyptoides* from the new species are leaf size, shape and pubescence; corolla length and pubescence. We consider that the characters given above, when used in conjunction with geographical range result in satisfactory identification of specimens. The morphological features of the polyploid specimens are subsumed under those of the type of *S. hyptoides*. However, the diploid specimens differ in several characters of the type material, and consequently should be considered as a different species.

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