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Pollen diversity in Brazilian species of *Monnina* (Polygalaceae)

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Abstract

Monnina is subordinated to the Polygalaceae family, which consists of 19 genera and approximately 1300 species widely distributed throughout the continents. The current study aims to characterize pollen grains in the genera to provide the basis for their taxonomy. Thus, 13 species were analyzed: subg. *Monninopsis* (*M. insignis* and *M. malmeana*), subg. *Pterocayra* (*M. cardiocarpa*, *M. cuneata*, *M. dictyocarpa*, *M. exalata*, *M. goiana*, *M. itapoanensis*, *M. oblongifolia*, *M. resedoides*, *M. richardiana*, *M. stenophylla, M. tristaniana*). The shape of the species widely varied: *M. insignis* and *M. malmeana* showed prolate pollen grains; *M. cardiocarpa*, *M. resedoides* and *M. richardiana* showed subprolate pollen grains; and *M. itapoanensis*, *M. stenophylla*, and *M. tristaniana* showed oblate spheroidal and prolate spheroidal pollen grains in most of the species. According to data obtained in the current study, it can be concluded that it is possible to differentiate the species based on pollen attributes. Another important feature in the characterization of the species was the number of apertures, which varied from 10 to19 colporate ones.

Key words: *Monnina*, Palynology, Polygalaceae

Introduction

The polycolporate pollen grain is one of the main defining features of Polygalaceae, and such feature is responsible for including some genera in this family, such as: *Diclidanthera* Martius (1827: 139), *Carpolobia* Don (1831: 370) and *Xanthophyllum* Roxburgh (1820:81) (Aguiar *et al.* 2008).

Most pollen studies on the Polygalaceae family were based on representatives of *Polygala* Linnaeus (1753: 701) (Aldridge 1842, Fritzschie 1832, Mohl 1834, 1835, Klotzsch 1861, Welwitsch 1869, Chodat 1891, Nauman 1891, Heubl 1984, Villanueva & Ramos 1986, Paiva 1998, Marques 2003, Aguiar *et al.* 2008). According to these studies, it was possible to discriminate species and even subgenera. Such subgenera were later reclassified as genera by experts on the Polygalaceae family (Pastore 2012, Pastore & Abbott 2012, Pastore 2013). Among the other pollen studies conducted so far, it is worth highlighting that by Banks *et al.* (2008) who analyzed representatives of the entire family. Their study included some genera found in Brazil such as *Monnina* (Ruiz & Pavón 1798: 169–174).

Currently, the Polygalaceae family undergoes a major restructuring. Many subgenera are being reclassified as genera and some genera are being considered subgenera. Given such problems, it is necessary to search for new morphological features that could support this restructuring (Pastore 2012, Pastore & Abbott 2012, Pastore 2013, Pastore 2014).

Monnina stands out among the genera in the Polygalaceae family that deserve special attention and raise many questions about their actual delimitation, since they do not have a concrete definition on their current position. This genus currently comprises ca. 150 species distributed from Southern United States to Patagonia. Fourteen species can be found in Brazil (Grondona 1945, Marques 1989, Ludtke *et al.* 2009, Freire-Fierro & Pastore 2013). Although it is not a relatively large group, it has always shown alternations in its organization. The group has changed since the nineteenth century. Chodat (1896) divided *Monnina* into three subgenera: *Monnina*, *Monninopsis* Chodat (1895:

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