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Notes and Comments

Occurrence of aborted seeds in the cleistogamous flowers of *Janusia guaranitica* (A.St.-Hil.) A.Juss. (Malpighiaceae)

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(With 1 figure)

Malpighiaceae contains approximately 1300 species in 75 genera, which are predominantly distributed in the neotropics (Anderson, 2013). These genera are distributed among 14 mostly well-supported clades, among them the aspicarpoid clade, comprising *Aspicarpa* Rich., *Camarea* A.St.-Hil., *Cottsia* Dubard. & Dop., *Gaudichaudia* Kunth and *Janusia* A.Juss. (Davis & Anderson, 2010). This clade is characterized by the presence of cleistogamous flowers in some species, in addition to chasmogamous flowers. According to Anderson (1980), the anther of a cleistogamous flower does not open to release pollen grains; instead, a pollen tube grows down through the filament and into the receptacle of the flower, penetrating the ovule and causing fertilization. The cleistogamous flowers produce viable seeds and are responsible for most of the seed production per specimen (Anderson, 1980).

Janusia guaranitica (A.St.-Hil.) A.Juss. has cleistogamous flowers with only one stamen and two carpels, which are produced before the chasmogamous flowers and often in great numbers. According to Lorenzo (1981), the ovules of both types of flowers in *J. guaranitica* are identical.

Three specimens of *J. guaranitica* found on public streets in Araras, in the state of São Paulo, Brazil, were transplanted into a Garden on the Universidade Federal de São Carlos, campus Araras (Figure 1A), locaded in an area with remnants of Semidecidual Seasonal Forest. This Garden is close to the portion which constitutes the Forest Reserve of the campus, with an approximate altitude of 650m, soil red dystrophic latossolic, clayey to very clayey texture, grades of sands between 32.9 and 35.1% (mass), grades of clay between 48.86 and 49.56% (mass) and organic matter concentration between 26.8 and 32.2 g dm^{-3} (Yoshida & Stolf, 2016). The specimens were transplanted into a more shaded and humid garden area, compared to the public streets where they were initially found. The specimens were not irrigated, being exposed to the rainfall regime of the area. Before transplanting, the reproductive structures were preserved in 70% alcohol, and vouchers were collected using standard protocols for the collection and preparation of botanical material. Voucher specimens were deposited in the herbarium of the Centro de Ciências Agrárias (CCA) at the Universidade Federal de São Carlos (UFSCar, HARA herbarium).

Between December 2013 and December 2014, the specimens in the garden were monitored, and the fruits produced were analyzed. During this period, the transplanted specimens exhibited vigorous vegetative growth, producing only cleistogamous flowers (Figure 1B) that formed fruits morphologically similar to fruits formed by the chasmogamous flowers of this species (Figure 1A). We analyzed approximately 100 fruits for the presence of seeds; the hand-cut specimens were viewed under a stereomicroscope. Despite the perfect external condition of the fruits, seeds had not developed (Figure 1D). However, when we opened the fruits formed by the cleistogamous flowers from the same specimens before transplantation, we found well-formed seeds (Figure 1C). This is the first occurrence of seed abortion in a native species of Malpighiaceae following transplanting.

According Lloyd (1980), fruit and seeds require minimal amounts of nutrients to prevent abortion. Thus, the determination of the investment in seeds can be considered as an adaptive response of *J. guaranitica* to the limits imposed by available resources. Several authors have reported that damage caused by adverse environmental conditions is one of the main extrinsic causes of ovule and seed abortion (Monaco, 1960; Lloyd, 1980; Avítia-Garcia & Mark-Engleman, 1998; Teixeira et al., 2006).

The *J. guaranitica* specimens produced well-formed fruits from cleistogamous flowers before transplanting. We believe that the general conditions of the garden to which the specimens were transplanted probably did not influenced seed abortion, since they coincide with the conditions reported by Sebastiani (2010) for the occurrence of *J. guaranitica*, that is occurrence in several phytophysiognomies, including Semideciduous Seasonal Forest and disturbed areas, in rocky, sandy or clayey soils, at altitudes between 150 and 1.700m. Thus, our results suggest that the transplantation of these specimens, as well as the prolonged absence of rain that occurred in the State of São Paulo during the period when fruits are produced after transplantation, influenced the abortion of the seeds in *J. guaranitica* fruits.

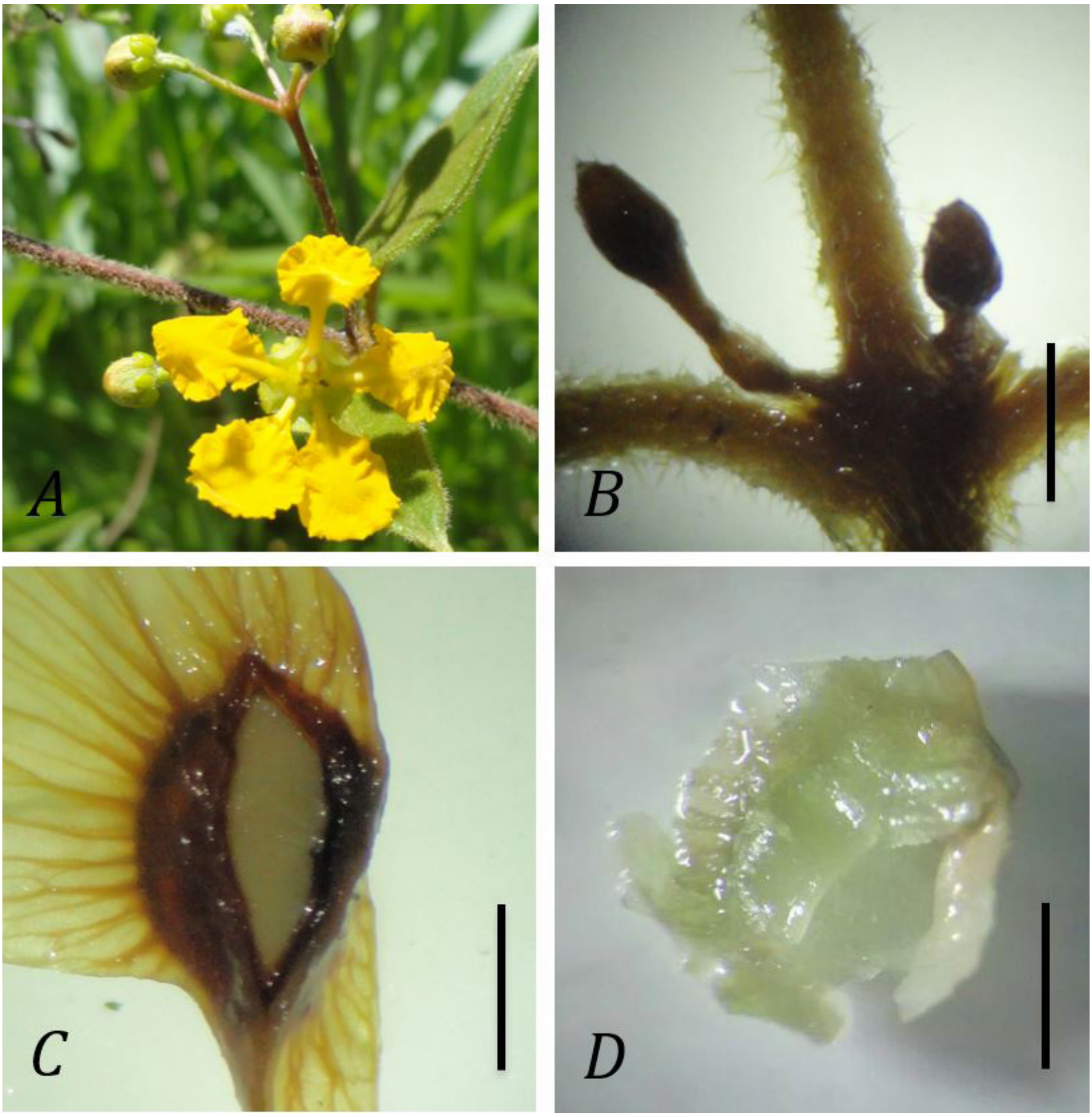

Figure 1. *Janusia guaranitica* (A.St.-Hil.) A.Juss. (A) A chasmogamous flower from a *J. guaranitica* specimen before transplantation, (B) A cleistogamous flower produced after transplantation. Bar: 5 mm, (C) Fruit of a cleistogamous flower produced before transplantation and containing seeds. Bar: 1 mm, (D) Fruit of a cleistogamous flower produced after transplantation, showing that seeds were aborted. Bar: 1 mm.

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