

# Flower dimorphism and the occurrence of andromonoecy in *Vatairea macrocarpa* (Benth.) Duncke (*Fabaceae* - *Faboideae*)

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**ABSTRACT** – We studied the floral biology of natural populations of *Vatairea macrocarpa* (Benth.) Duncke in an area of the Cerrado (Brazilian savanna) in Chapadinha, Maranhão, Brazil. The flowers of this species are papilionacea-type; however, we observed androgynous flowers with a functional androecium and gynoecium and staminate flowers with an atrophied gynoecium in the same inflorescence. For this reason, *V. macrocarpa* should be considered an andromonoecious species.

Key words: floral biology, floral dimorphism, sexual system

**RESUMO** – **Dimorfismo floral e ocorrência de andromonoecia em *Vatairea macrocarpa* (Benth.) Duncke (*Fabaceae* - *Faboideae*)**. Nós estudamos a biologia floral de populações naturais de *Vatairea macrocarpa* (Benth.) Duncke em uma área de Chapadinha, Maranhão, Brasil. Suas flores são típicas da sub-família *Faboidea*, no entanto, nós constatamos flores andróginas, com androceu e gineceu funcionais e flores estaminadas, com gineceu atrofiado na mesma inflorescência. Por esta razão, *V. macrocarpa* foi considerada uma espécie andromonoica.

Palavras-chave: biologia floral, dimorfismo floral, sistema sexual

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*Vatairea macrocarpa* is a semideciduous heliophytic arboreal species commonly known as “angelim”, “angelim-do-cerrado”, “sucupira” and “amargoso”, which can reach 10 m in height (Lima 1982). It occurs in the Cerrado biome (Lorenzi 2002) from northern to southeastern Brazil, in open fields and savanna landscapes (Silva-Júnior & Santos 2005).

Andromonoecy is a sexual system in which individuals have both hermaphrodite and staminate flowers. This sexual expression is common in species of Fabaceae (Arroyo 1981, Hernández-Conrique *et al.* 2007, Casimiro-Soriguer *et al.* 2013), although it is uncommon in species of Faboideae (Arroyo 1981). There are no previous records of the occurrence of this phenomenon in *V. macrocarpa*.

We conducted this study from January to December 2013 in the northern Brazilian Cerrado,

at Chapadinha, Maranhão State, 03°44'17”S - 043°20'29”W). The local vegetation is Cerrado *sensu lato*, composed of grassland with scattered trees and shrubs.

The floral biology of *V. macrocarpa* was observed under natural conditions, in which buds and flowers were collected and then analyzed in the Laboratory of Structural Botany of the Center for Agrarian Science and Environment, Federal University of Maranhão, Brazil. We used Student's t-test to compare the statistical differences between means, using a 5% level of significance (Pagano & Gauvreau 2004).

The flowers are papilionacea-type with the vexillum subunguiculate, transverse-oblong, deeply emarginate, unguiculate wings, obovate, keels free and elliptical (Lima 1982). The

reproductive structures remain enclosed in the keel and are exposed only during the visit of pollinators (Fig.1A).

The ovary is unicarpellate, unilocular and uniovular. The style is erect and the stigma is wet and papillose. Regarding the gynoecium structure, we found two types of flowers in the same plant: flowers with a normal gynoecium, 16.81 mm in length ( $\pm 2.20$ ,  $N=25$ ); and flowers with an atrophied gynoecium, 6.62 mm in length ( $\pm 1.34$ ,  $N=25$ ) (Fig.1B). These values are significantly different ( $t_{\text{obs}} = 2.06 < t_{\text{teo}} = 16.43$ ). The ovules from normal gynoecia were 1.14 mm long ( $\pm 0.074$ ,  $N=25$ ) and 0.74 mm wide ( $\pm 0.051$ ,  $N=25$ ) (Fig. 1C), whereas ovules from atrophied gynoecia were 0.74 mm long ( $\pm 0.14$ ,  $N=25$ ) and 0.49 mm wide ( $\pm 0.11$ ,  $N=25$ ) (Fig.1D). These values are also significantly different ( $t_{\text{obs}} = 2.06$ ,  $t_{\text{teo}} = 12.05$ ).

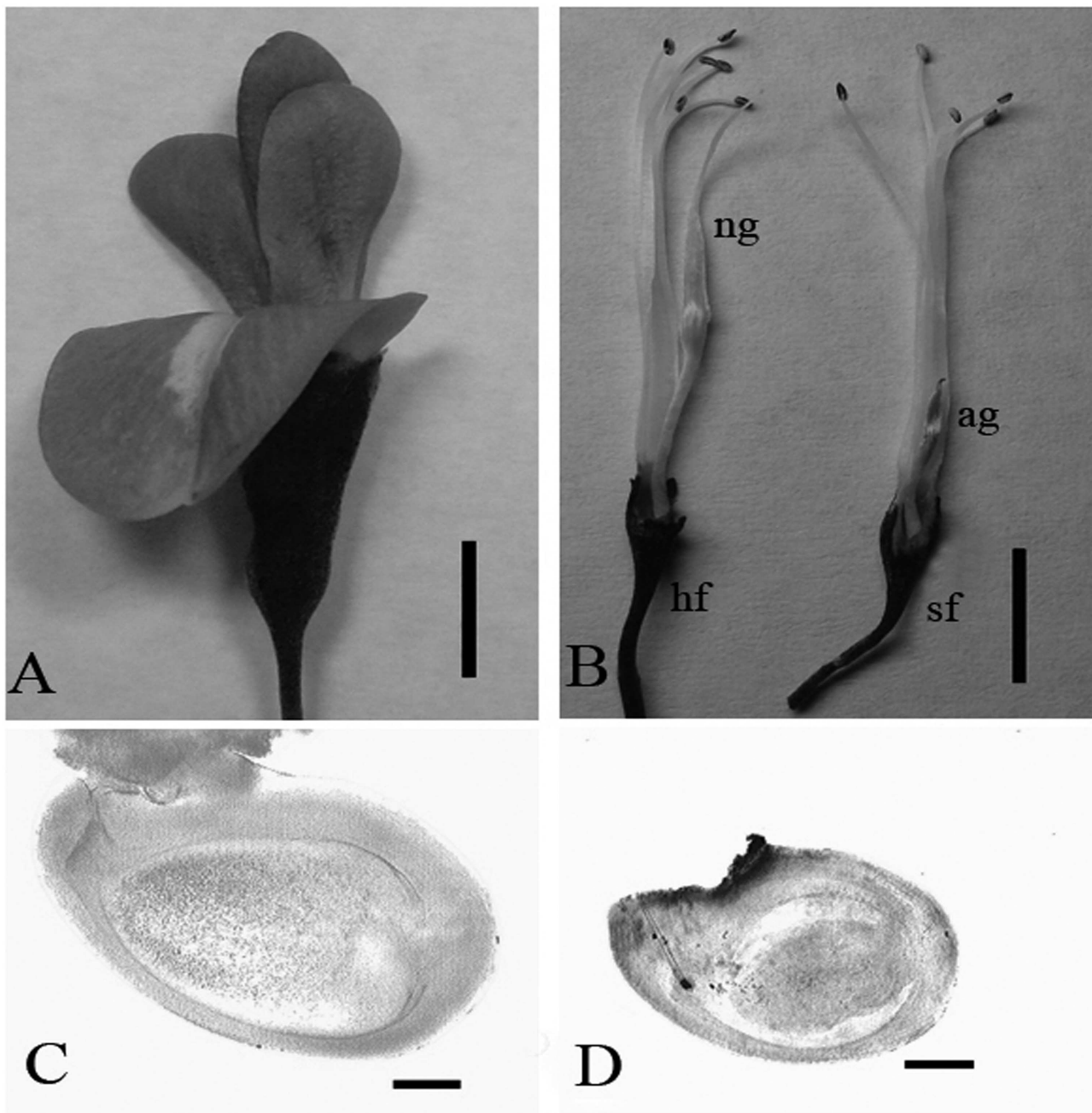
The androecium is diplostemous and formed by ten monadelphous stamens that bear orbicular anthers with rimose dehiscence. Flowers with a normal gynoecium are 18.60 mm long ( $\pm 1.30$ ,  $N=25$ ), and flowers with an atrophied gynoecium are 18.16 mm long ( $\pm 1.88$ ,  $N=25$ ) (Fig.1B). There is no statistical difference between these values ( $t_{\text{obs}} = 2.06$ ,  $t_{\text{teo}} = 1.19$ ). In both flower types, the pollen grains were viable, with a 20% germination rate in both normal gynoecia ( $N = 54$ ) and atrophied gynoecia ( $N=45$ ) in the pollen-tube germination test.

Although the occurrence of andromonoecy has not previously been reported for *Vatairea* (Lima

1982), flowers with an atrophied gynoecium were considered functionally male (staminate flowers) because of their morphological characteristics and because they did not produce fruit in natural conditions ( $N=75$ ). For these reasons, we consider that *V. macrocarpa* is an andromonoecious species.

## REFERENCES

- Arroyo, M.T.K. 1981. Breeding systems and pollination biology in Leguminosae. *In*: Advances in legume systematics II (R.M. Polhill & P.H. Raven, eds.) Royal Botanic Gardens, Kew. p. 723-769.
- Casimiro-Soriguer, R., Herrera, J. & Talave, S. 2013. Andromonoecy in an Old World Papilionoid legume, *Erophaca baetica*. *Plant Biology* 15: 353–359.
- Lima, H.C. 1982. Revisão taxonômica do gênero *Vatairea* Aublet (Leguminosae-Faboideae). *Arquivos do Jardim Botânico do Rio de Janeiro* 26: 173-213.
- Lorenzi, H. 2002. Árvores brasileiras - Manual de identificação e cultivo de plantas arbóreas do Brasil. v. 2, Nova Odessa, São Paulo. 368p.
- Hernández-Conrique, D., Ornelas, J.F., Garcia-Franco, J.G. & Vargas, C.F. 2007. Nectar production of *Calliandra longipedicellata* (Fabaceae; Mimosoidae), an endemic Mexican shrub with multiple potential pollinators. *Biotropica* 39: 459-467.
- Pagano, M. & Gauvreau, K. 2004. Princípios de Bioestatística. Pioneira Thomson Learning, São Paulo. 506p.
- Silva-Júnior, M.C. 2005. 100 Árvores do Cerrado: guia de campo. Editora Rede de Sementes do Cerrado, Brasília. 278p.



**Figs. 1A-D.** Flower of *Vatairea macrocarpa*. **A.** floral appearance; **B.** reproductive structures; **C.** Ovule of hermaphrodite flower; **D.** Ovule of staminate flower. Hf = hermaphrodite flower; sf = staminate flower; ng = normal gynoecium; ag = atrophied gynoecium. Bars: **Figs. A, B** = 0.5 mm; **Figs. C, D** = 0.15 mm.

