Measuring relative flower size in *Anthurium* (Araceae)

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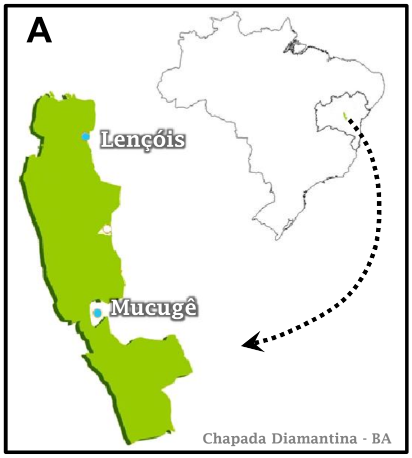
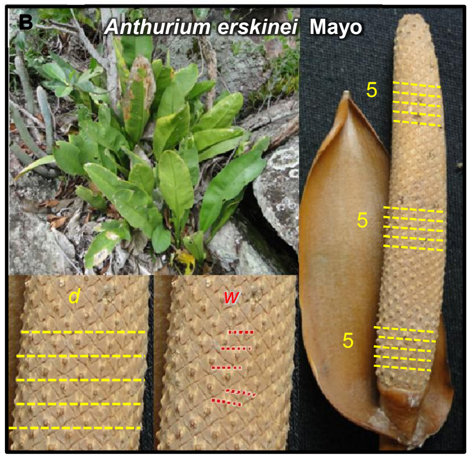
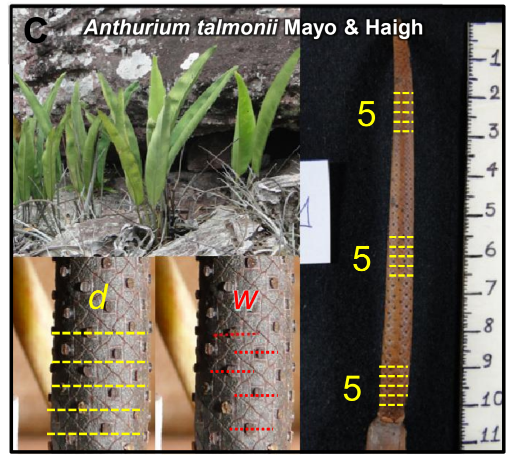
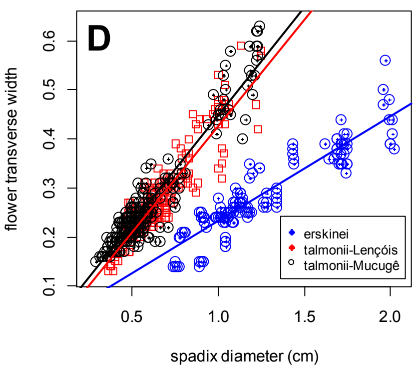
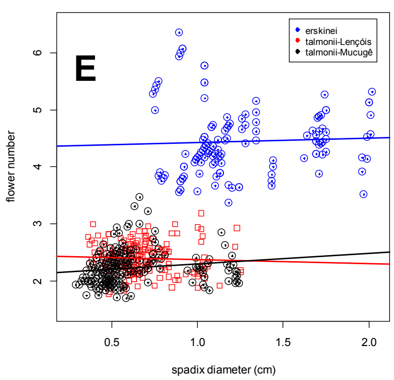










This study is part of a taxonomic investigation of endemic rupicolous species of *Anthurium* in Central Bahia state, Brazil, using morphometric and genetic markers. Relative flower size (as number of flowers visible laterally along the phyllotactic spirals) is a character used in taxonomic descriptions of *Anthurium* species (1, 2).

Measuring flower and spadix dimensions using digital images is a practical way to gather data on flower size. Our aim was to sample these measurements and evaluate statistically the usefulness of relative flower size for discriminating both species and populations of the same species.

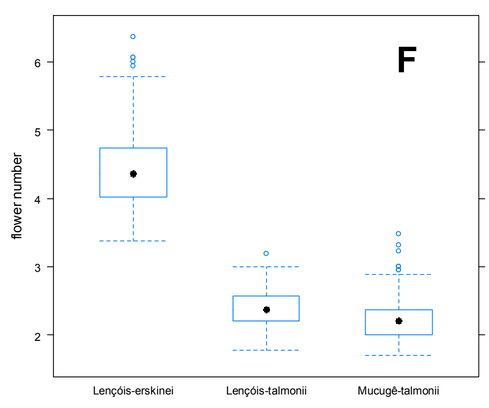
Two species endemic to the Chapada Diamantina montane region of central Bahia state (Fig. A) were selected for comparison – *Anthurium erskinei* Mayo and *A. talmonii* Mayo & Haigh (3, 4, 5 – Figs. B, C); *A. erskinei* is represented by a single population at Lençóis (7 individuals, 135 flowers) and *A. talmonii* by populations at Lençóis (12 individuals, 195 flowers) and Mucugê (15 individuals, 235 flowers). Five measurements of spadix diameter (*d*) and flower transverse width (*w*) (i.e. perpendicular to major spadix axis) were made in the basal, middle and apical zones of each spadix, making a total of 30 measurements (15 spadix diameter, 15 flower width) for each individual sampled. The measurements were made with standardized photos using the ImageJ Program (6). Analyses were carried out with the R statistical system (7).

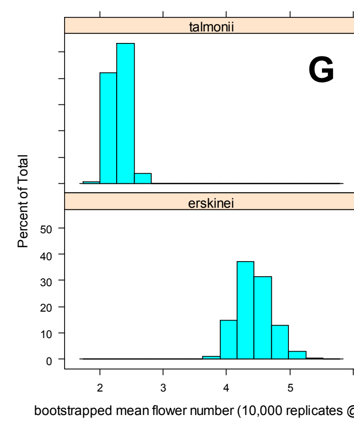
Linear regression showed significant covariation between flower transverse width (*w*) and corresponding spadix diameter (*d*) (*erskinei*: adjusted R^2=0.8316, $p < 0.0001$; *talmonii-Lençóis*: adjusted R^2=0.8399, $p < 0.0001$; *talmonii-Mucugê*: adjusted R^2=0.8983, $p < 0.0001$) (Fig. D). This relationship was converted into the more useful character "flower number" [*d/w*], which is approximately constant for each group (*erskinei*: adjusted R^2= -0.0054, p = 0.5978; *talmonii-Lençóis*: adjusted R^2= -0.0029, p = 0.5053; *talmonii-Mucugê*: adjusted R^2= 0.0170, p = 0.0255) (Fig. E).

Flower number for each species is distinct (Fig. F, data non-normal for both species, variances unequal; Wilcoxon rank-sum W=58409, $p < 0.0001$); the mean flower numbers of the two populations of *A. talmonii* are also significantly different (Fig. F, data normal for Lençóis population, non-normal for Mucugê population, variances equal; Wilcoxon rank-sum W=31544.5, $p < 0.0001$). Bootstrap simulation showed that measuring five flower widths and five corresponding spadix diameters in each spadix would be a sufficient sample to distinguish these two species by flower number (Fig. G).

Conclusions.

Flower width relative to spadix diameter, expressed as flower number across the corresponding spadix diameter, has potential as a quantitative taxonomic character at both species and population levels, and data can easily be acquired, either by hand measurements in fresh material or from digital images.





References. **(1)** Croat, T.B. & Bunting, G.S. 1979. Standardization of Anthurium descriptions. Aroideana 2(1): 15-25. **(2)** Carlsen, M.M. & Croat, T.B. (2007). Taxonomic revision of Anthurium Section *Semaeophyllium* Schott (Araceae). *Harvard Papers in Botany* 12: 173-234. **(3)** Haigh, A., Mayo, S.J. & Nadruz Coelho,M.A. 2011. Four new species of *Anthurium* (Araceae) from Bahia, Brazil. *Kew Bull.* 66: 1-12. **(4)** *eMonocot: an online resource for monocot plants* http://e-monocot.org/; **(5)** Coelho, M.A.N.; Sakuragui, C.M.; Mayo, S.; Soares, M.L.; Temponi, L.G.; Calazans, L.S.B.; Gonçalves, E.G.; Andrade, I.M. de 2013. *Araceae* in *Lista de Espécies da Flora do Brasil.* Jardim Botânico do Rio de Janeiro; http://floradobrasil.jbrj.gov.br/jabot/floradobrasil/. **(6)** Rasband 2010. ImageJ: http://rsb.info.nih.gov/ij,1997-2009. **(7)** R Development Core Team. 2012. *R: a language and environment for statistical computing*. Version 2.15.0. Vienna: R Foundation for Statistical Computing.