PHENOLOGY OF *PITYROCARPA MONILIFORMIS* (LEGUMINOSAE, MIMOSOIDEAE): A FOUR - YEAR STUDY

Luciano Paganucci de Queiroz

Marcio Harrison dos S. Ferreira

Luciano Paganucci de Queiroz - Departamento de Ciências Biológicas, Universidade Estadual de Feira de Santana (UEFS), Feira de Santana, BA. (luciano.paganucci@gmail.com).
Marcio Harrison dos S. Ferreira - Programa de Pós - graduação em Botânica (PPGBot - UEFS), UEFS, Feira de Santana, BA.

INTRODUÇÃO

Phenology is the study of seasonal biological events. Recurring life cycle events are also known as phenophases. In plants, this includes budbreak, flowering, and leaf drop (Forrest & Miller - Rushing, 2010). Phenological records of different individuals within a single species occurring in the same habitat may help to understand the possible factors regulating the phenophases at the species level (*e.g.* Forrest & Miller - Rushing, 2010; Goulart *et al.*, 1995). Flowering and fruiting phenology may have an important impact on reproductive success (*e.g.*, influencing the attraction of pollinators and seed dispersers, and/or reproductive synchrony among potential mates). Moreover, vegetative phenology is important as cycles of flushing and leaf - fall are intimately linked to processes such as plant water status, growth, and gas exchange (Forrest & Miller - Rushing, 2010; and references cited therein).
Phenological information about Mimosoideae species is somewhat fragmentary, restricted to a few species, and commonly recorded in community studies including a few number of individuals sampled (*e.g.*, Griz & Machado, 2001; Bulhão & Figueiredo, 2002). Additionally, phenological multiyear studies are virtually absent in Caatinga, a biome exclusive of NE Brazil and one of the major area of seasonally dry neotropical forest. In this biome, Mimosoideae are very diverse, occurring 99 species and 23 genus (Queiroz, 2009). *Pityrocarpa moniliformis* (Benth.) Luckow & R. W. Jobson is a mimosoid legume widespread in dry forests of Northeastern Brazil (Caatinga) and Venezuela (Queiroz, 2009). The present study is the first long - term record of phenology of a Mimosoideae species on Caatinga.

OBJETIVOS

The objective of this study was to investigate whether the vegetative and reproductive phenology of *Pityrocarpa moniliformis* was influenced by climatic conditions.

MATERIAL E MÉTODOS

The study was conducted on the Campus of UEFS ($12^o12'10"$S, $38^o58'15"$W; about 243 m a.s.l.), Feira de Santana, BA, Brazil, between Feb/2007 and Abr/2011. Site comprises fragments of Caatinga, and anthropized areas in diverse successional stages. The climate is semi - arid according to the Köppen classification, and the total annual rainfall ranges between 444 and 1595 mm, with mean annual temperature around 23.5°C (Bahia, 1995). Twenty - six individuals were observed monthly. Flushing and leaf - fall (first recorded in Aug/2007), flowering (buds and anthesis) and fruiting (young and ripened fruits), were evaluated by the visual percentage of areas occupied by the crown. The percentage of individuals in a specific phenophase (activity index), and the percentage of phenophase intensity (Fournier index), were evaluated as described by Bencke & Morellato (2002, and references cited therein), using a scale of five categories (0 - 4 with intervals of 25%). Phenological patterns were based on frequency, regularity,

and phenophase duration (Newstrom *et al.*, em¿ 1994). Meteorological data (rainfall, air temperature, solar radiation, and relative humidity) were obtained from Sonabra/INMET Meteorological Station at Feira de Santana, BA. Numerical data were submitted to Spearman correlation (r_s) using StatSoft STATISTICA 6.0 software.

RESULTADOS

The vegetative and reproductive phenophases of *P. moniliformis* exhibit a continuous flushing and leaf - fall, flowering (buds and anthesis) and fruiting (young and ripened fruits) (*sensu* Newstron *et al.*, 994), but with intensity peaks (Oct/Nov leaf - fall, Feb/Mai flowering, and Sep/Oct mature fruits). Flushing, floral buds, and anthesis were positively mutually correlated (all $r_s$values are statistically significant, P ¡ 0.05). Leaf flushing and flowering were positively correlated to temperature and solar radiation (all, P ¡ 0.05).

Floral spikes may be found throughout the year, with flowering peak between February to April (¿ 40% in all years, Fournier Index). Flowering (floral buds and anthesis) was positively correlated to leaf flush (P ¡ 0.05), and flushing predominated in the transition of dry to rainy season. This pattern was also recorded in *Parkia platycephala,* and *Plathymenia foliolosa* (Bulhão & Figueiredo, 2002). Flushing reached your peak after intense leaf falling, and was possibly triggered by sparse rains before the wet season, contrary to expected for plants of semi - arid regions (*e.g.*, Bullock e Solís - Magallanes, 1990). Moreover, leaf - fall was not correlated neither with rainfall (r_s = - 0.27, P = 0.41) nor with relative humidity (r_s = - 0.27, P = 0.41).

At the individual level, old leaves (and old leaflets) may be shed more or less continually. In opposition, flushing is often not simultaneous on neighbouring trees of *P. moniliformis* and sometimes not even on different branches in the same crown. Rainfall was positively correlated with young fruit formation (r_s = 0.60, P = 0.03) and negatively correlated with fruit ripening (r_s = - 0.61, P = 0.02), and seed dispersal occurred predominantly in the following dry season. This pattern also was observed in other barochorous mimosoid legumes: *Plathymenia foliolosa*, *Stryphnodendrom coriaceum* (Bulhão & Figueiredo, 2002), *Plathymenia reticulata* (Goulart *et al.*, 2005), *Acacia bahiensis,* and *Anadenanthera colubrina* (Griz & Machado, 2001). However, flushing, flowering, and frutification of tropical trees are complex ecological process that creates irregular patterns not detected in short - term surveys (Newstrom *et al.,* 1994; Bencke & Morellato, 2002), diminishing the predictive power of comparative approaches.

CONCLUSÃO

Our results indicate some discrepancies concerning the phenodynamics of other Mimosoideae species studied in dry tropical forests. A comparative study including another site with great physiognomic difference¡span style="font - size: small;» (Tucano - BA, Ferreira & Queiroz, unpub. data) suggest that these discrepancies possibly reflect the relatively anthropized status of landscape matrix (anthropogenic plus natural edges) surrounding the study site. Future work should focus on eco - physiological aspects of phenodynamics of *P. moniliformis*, thus providing a better understanding of the process that drive its reproduction. (This work is part of the PhD Thesis of Marcio H. S. Ferreira at PPG-Bot - UEFS, and was supported by CNPq scholarship - Process 141580/2009 - 7).

REFERÊNCIAS

Bencke, C.S.C., Morellato, L.P.C. Estudo comparativo da fenologia de nove espécies arbóreas em três tipos de floresta atlântica no sudeste do Brasil. *Revista Brasileira de Botânica* 25: 237 - 248, 2002.

Bulhão, C.F., Figueiredo, P.S. Fenologia de espécies arbóreas em uma área de cerrado marginal no nordeste do Maranhão. *Revista Brasileira de Botânica* 25: 361 - 369, 2002.

Bullock, S.H., Solís - Magallanes, J. Phenology of canopy trees in a tropical deciduous forest in Mexico. *Biotropica* 22: 22 - 35, 1990.

Forrest, J., Miller - Rushing, A.J. Toward a synthetic understanding of the role of phenology in ecology and evolution. *Phil. Trans. R. Soc. B* 365: 31013112, 2010.

Goulart, M.F., Lemos - Filho, J.P., Lovato, M.B. Phenological variation within and among populations of *Plathymenia reticulata* in brazilian Cerrado, the Atlantic Forest and transitional sites. *Annals of Botany* 96: 445 - 455, 2005.

Griz, L.M.S., Machado, I.C.S. Fruiting phenology and seed dispersal syndromes in caatinga, a tropical dry forest in the northeast of Brazil. *Journal of Tropical Ecology* 17: 303 - 321, 2001.

Newstrom, L.E., Frankie, G.W., Baker, H.G. A new classification for plant phenology basead on flowering patterns in lowland tropical rain forest trees at La Selva, Costa Rica. *Biotropica* 26: 141 - 159, 1994.

Queiroz, L.P. *Leguminosas da Caatinga.* UEFS, Feira de Santana, 2009, 467 p.