

Mimosa splendida Barneby (Mimosoideae, Leguminosae) rediscovered in Central Brazil: preliminary studies for conservation of a rare species

MARCELO F. SIMON^{1,2,3} and MARINA F. AMARAL¹

(received: October 24, 2001; accepted: January 2, 2003)

ABSTRACT – (*Mimosa splendida* Barneby (Mimosoideae, Leguminosae) rediscovered in Central Brazil: preliminary studies for conservation of a rare species). The poorly known *Mimosa splendida* Barneby has been rediscovered in the Chapada dos Veadeiros, Brazil, 105 years after its single record in 1895. Data on its habitat description, demography, reproductive parameters, and geographic range are presented. Preliminary results suggest that the rarity of *M. splendida* in herbarium collections is associated with a narrow geographic range, and a specialized habitat preference on rocky slopes.

Key words - Cerrado, “Chapada dos Veadeiros”, demography, endemism, life history

RESUMO – (*Mimosa splendida* Barneby (Mimosoideae, Leguminosae) reencontrada no Brasil Central: estudos preliminares para conservação de uma espécie rara). *Mimosa splendida* Barneby, uma espécie pouco conhecida é redescoberta na Chapada dos Veadeiros, Brasil, 105 anos após seu único registro em 1895. São apresentados a descrição do habitat, demografia, parâmetros reprodutivos e distribuição geográfica dessa espécie. Resultados preliminares sugerem que a escassez de *M. splendida* em herbários está associada a uma distribuição geográfica restrita e à ocorrência em encostas pedregosas.

Palavras-chave - Cerrado, Chapada dos Veadeiros, ciclo de vida, demografia, endemismo

Introduction

The “Chapada dos Veadeiros”, a highlands complex located in the State of Goiás, Central Brazil (ca. 14° S and 47° W), is notable for its rich and endemic flora, especially in Leguminosae, Eriocaulaceae, Lythraceae, Compositae, Gramineae, Melastomataceae, and Velloziaceae (Munhoz & Proença 1998). The region is one of the most important centers of diversity and endemism for the genus *Mimosa*, with more than 40 species and approximately 20 endemics (Simon & Proença 2000).

The altitude in this region ranges from 550 to 1,700 m and sandstone lithosol is the predominant soil. Climate is Aw based on the Köppen (1936) system, with mean annual rainfall of about 1,500 mm and a dry season from May to September. The mean annual temperature is 20 °C. The area includes several kinds of phytophysionomies, such as grassland (“campo limpo”), wet grassland (“vereda”), gallery forest, savanna (“cerrado”), savanna woodland (“cerradão”), and upland rocky grassland (“campo rupestre”). This latter kind occurs in the highlands and is strongly associated with

endemism (Giulietti & Pirani 1988, Alves & Kolbek 1994, Harley 1995, Simon & Proença 2000). In a preliminary checklist, Munhoz & Proença (1998) recorded 1,310 species for the “Chapada dos Veadeiros”, but this number is certainly underestimated. The “Chapada dos Veadeiros” is a relatively well-collected site in Central Brazil, with more than 3,600 specimens collected between 1965 and 1972 by H.S. Irwin and W.R. Anderson, and many others collections in more recent botanical surveys. The total number of exsiccatae so far collected in this region might easily be 5,000.

Glaziou collected *Mimosa splendida* in 1895, and published a list of his collections (Glaziou 1906) in which the specimen *Glaziou 21088* was cited as *M. pyrrhopila* Harms ex Glaziou (nomen nudum). The location of the collection was given as Rio dos Couros, a small river in the south of the Chapada dos Veadeiros. Later, Barneby (1991) described this species based only upon Glaziou’s collection, and cited *M. splendida* as a poorly-known species that botanists were urged to rediscover before its habitat was destroyed. In a recent survey of *Mimosa* in Central Brazil (Simon & Proença 2000), over 3,000 recent specimens of *Mimosa* from the most representative Central Brazilian herbaria were examined, but no collections of *M. splendida* were found. In this paper we report the discovery of a population of *M. splendida* in the Chapada dos Veadeiros, exactly 105 years after the original Glaziou collection.

1. Universidade de Brasília, Departamento de Ecologia, 70919-970 Brasília, DF, Brazil.
2. Present address: Embrapa, Secretaria de Administração Estratégica, PqEB, W3 Norte (final), 70770-901 Brasília, DF, Brazil.
3. Corresponding author: marcelo.simon@embrapa.br

Material and methods

We studied the demography of *M. splendida* at the end of the reproductive period (June 2001) at Fazenda São Bento (14°10' S and 47°35' W, 1,200 m altitude), which belongs to the Rio dos Couros basin, and is probably close to its first collection. The population was sampled with ten randomly placed 2 × 50 m plots. In each plot we counted all individuals, measured their height and stem circumference at 10 cm (or at the plant base in small individuals), and verified if the plant was a reproductive individual, present or past, based on the presence of reproductive structures. We also collected mature pods that were still closed, and analyzed them in the laboratory to assess seed set and seed predation.

Voucher specimens of *M. splendida* (Simon & Amaral 316 and 430) were deposited at Universidade de Brasília

Herbarium (UB), with duplicates sent to CEN, HUEFS, HUFG, and SPF (acronyms according to Holmgren *et al.* 1990).

Results and Discussion

Mimosa splendida, a candelabriform treelet, is illustrated in figure 1. Remarkable features are the crowded leaves on the top of branches, the stem densely covered by persistent stipules, a very slender setose indumentum clothing leafstalks, peduncles and stipules, and the valvate pod typical of series *Pachycarpae*. *Mimosa splendida* grows on rocky slopes with well-drained and shallow lithosols (sandstone derived), in “campo rupestre” or “cerrado rupestre”

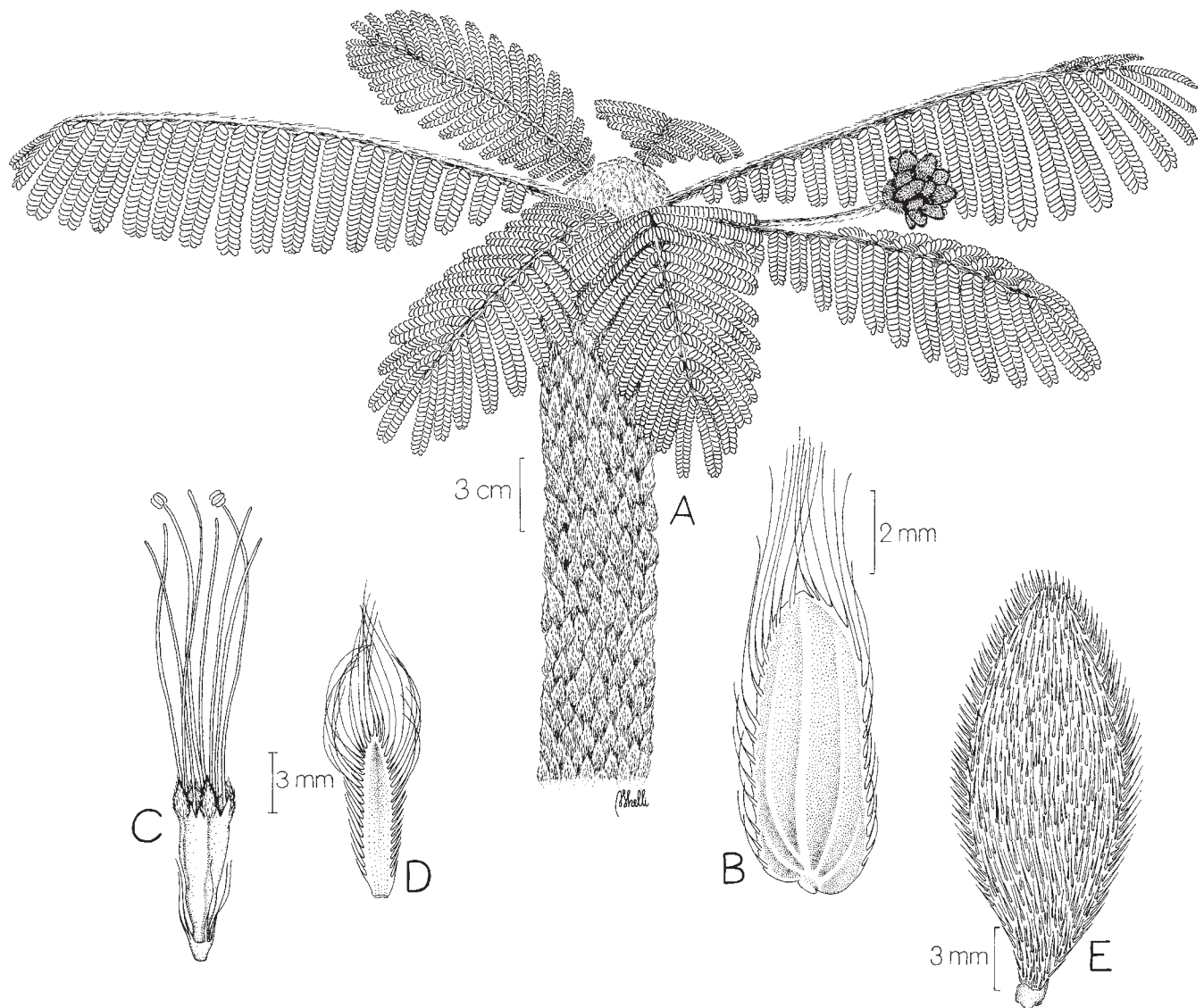


Figure 1. *Mimosa splendida* Barneby. A. Reproductive branch, showing mature fruits. B. Leaflet, dorsal view. C. Flower. D. Floral bract, ventral view. E. Fruit. (Simon & Amaral 430).

(sensu Ribeiro & Walter 1998), and is sympatric with *Mimosa clausenii* Benth., *M. ulei* Taub., *M. venatorum* Barneby, and other sparse trees and shrubs such as *Lychnophora ericoides* Mart., *Vochysia thyrsoidea* Pohl, *V. pumila* A. St.-Hil., *Qualea parviflora* Mart., *Sclerobium paniculatum* Vog., and *Palicourea rigida* Kunth, with a ground layer dominated by Gramineae and Cyperaceae.

Among 102 sampled individuals, 75.5% were non reproductive, with the majority of these in the low height and intermediate circumference categories (figures 2A, B). This suggests that seedlings first allocate resources in lateral growth until they reach approximately 12 cm tall, and subsequently they increase in height, being able to attain more than 3 m (figure 3). Population density was 10.2 ± 3.5 ind./100 m² (mean \pm standard deviation, n = 10). Plants become reproductive when attain approximately 12 cm in circumference and 30 cm in height (figure 3). The mean number of fruits produced per inflorescence was

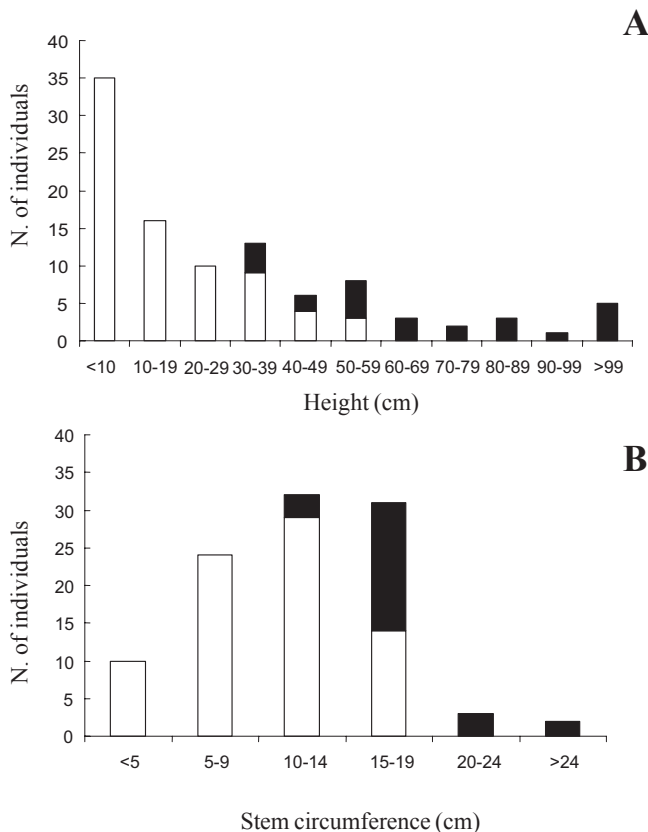


Figure 2. Number of individuals of *Mimosa splendida* sampled in ten 100 m² plots according to height (A), and stem circumference categories (B), at Chapada dos Veadeiros. (□ = non-reproductive plants; ■ = reproductive plants).

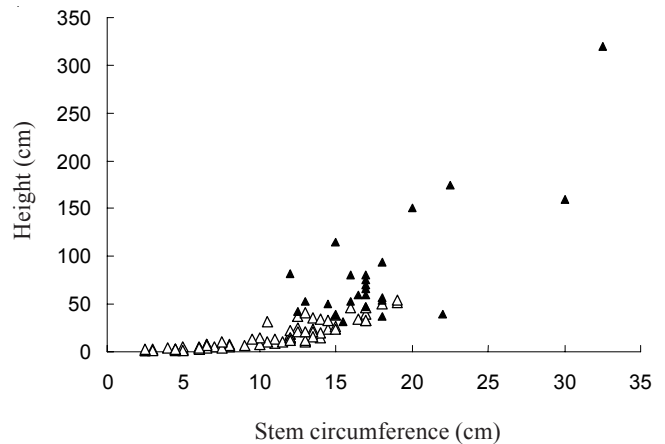


Figure 3. Relationship between stem circumference and height in 102 individuals of *Mimosa splendida* sampled at Chapada dos Veadeiros. (△ = non-reproductive plants; ▲ = reproductive plants).

10.4 ± 7.2 (n = 46). Pods produce 1 to 4 seeds (1.9 ± 0.9 , n = 145), but mature pods which lack seeds also occur. We examined seeds of 145 mature pods collected from more than 20 individuals, and found that 63.6% of seeds were intact, 25.5% were aborted or undeveloped, and 10.9% were predated or attacked by fungus. The main pre-dispersal seed predators were larvae of Bruchidae beetles, which also attack other *Mimosa* species in Central Brazil (Simon 2001). We found no evidence of vegetative reproduction in exhumed seedlings, which indicates that seed production is probably the only mechanism of population increase. These demographic and reproductive features are also found in other species of *Mimosa* (ser. *Pachycarpae*) that occur in the Central Brazilian highlands (Simon 2001). A parallel population structure was found for *M. clausenii* Benth., a common species with similar growth habit in which young individuals also first invest in lateral growth and thereafter in height (Simon 2001). This growth strategy may be related to avoidance of fire damage, because cerrado plants with thicker stems have higher survival rates after fire (Sato & Miranda 1996). The percentage of intact seeds recorded in *M. splendida* was near to those found in the endemics *M. decorticans* Barneby, *M. setosissima* Taub., and *M. heringeri* Barneby, which range from 66 to 80% (Simon 2001).

The geographic range of *M. splendida* is still unknown but in this preliminary survey we recorded its occurrence in three patches, all of them on mountain slopes with the same habitat as described above. The two closest patches were located on the Fazenda São

Bento and are 2.2 km from each other, the third patch is about 5.8 and 3.5 km from the other two.

Although the region where *M. splendida* grows has been reasonably well collected, this species has been recorded for a second time only 105 years after its first collection by Glaziou in 1895. This suggests that the species has a very narrow geographic range, and despite its conspicuous habit and relatively high local density, it has been rarely encountered.

Preliminary demographic results from Fazenda São Bento shows that *M. splendida* has a “reverse J” shape height distribution (figure 2A), which is characteristic of stable populations (Hutchings 1986). Field observations indicate a strong habitat specialization on rocky mountain slopes, an occasional environment that is patchily distributed over the landscape, which reduces the availability of suitable habitats for this species. Combined high specialization and low habitat availability contribute to enhance the vulnerability of this rare species despite its high local density. Thus it may be classified as “vulnerable” according IUCN threatened categories (Davis *et al.* 1986). Additional studies concerning population viability and the determination of total geographic range are necessary to support conservation measures for this notable species. The regional flora is locally protected within the National Park of the “Chapada dos Veadeiros” (236,570 ha), but *M. splendida* has not yet been found there, which reinforces the importance of protecting areas surrounding the Park.

Acknowledgements – We are indebted to the manager of Fazenda São Bento for permission to work on his property, and to C. Proença for her helpful comments on this manuscript.

References

- ALVES, R.J.V. & KOLBEK, J. 1994. Plant species endemism in savanna vegetation on table mountains (campo-ruprestre) in Brazil. *Vegetatio* 113:125-139.
- BARNEBY, R.C. 1991. *Sensitivae censitae*: a description of the genus *Mimosa* Linnaeus (Mimosaceae) in the New World. *Memoirs of the New York Botanical Garden* 65:1-835.
- DAVIS, S.D., DROOP, S.J.M., GREGERSON, P., HENSON, L., LEON, C.J., VILLA-LOBOS, J.L., SYNGE, H. & ZANTOVSKA, J. 1986. *Plants in danger. What do we know?* International Union for Conservation of Nature and Natural Resources, Cambridge.
- GIULIETTI, A.M. & PIRANI, J.R. 1988. Patterns of geographic distribution of some plant species from the Espinhaço range, Minas Gerais and Bahia, Brazil. *In* Proceedings of a Workshop on Neotropical Biodiversity Distribution Patterns (W.R. Heyer & P.E. Vanzolini, eds.). Academia Brasileira de Ciências, Rio de Janeiro, p.39-69.
- GLAZIOU, A.F.M. 1906. *Mimosa*. *In* Liste des plantes du Brésil central. *Bulletin de la Société Botanique de France* 53(Mém.3b):177-186.
- HARLEY, R.M. 1995. Introduction. *In* Flora of the Pico das Almas, Chapada Diamantina, Brazil (B.L. Stannard, ed.). Royal Botanic Gardens, Kew, p.1-37.
- HOLMGREN, P., HOLMGREN, N. & BARNETT, L. 1990. *Index Herbariorum. Part I: The Herbaria of the World.* International Association for Plant Taxonomy and New York Botanical Garden, New York.
- HUTCHINGS, M.J. 1986. The structure of plant populations. *In* Plant Ecology (M.J. Crowley, ed.). Blackwell Scientific, Oxford, p.97-136.
- KÖPPEN, W. 1936. *Das geographische system der klimate.* *Handbuch der klimatologie.* Gebrüder Borntrager, Berlin.
- MUNHOZ, C. & PROENÇA, C. 1998. Composição florística do Município de Alto Paraíso de Goiás na Chapada dos Veadeiros. *Boletim do Herbário Ezequias Paulo Heringer* 3:102-150.
- RIBEIRO, J. & WALTER, B. 1998. Fitofisionomias do bioma Cerrado. *In* Cerrado: ambiente e flora (S. Sano & S. Almeida, eds.). Embrapa-CPAC, Planaltina, p.89-166.
- SATO, M. & MIRANDA, H. 1996. Mortalidade de plantas lenhosas do cerrado *sensu stricto* submetidas a diferentes regimes de queima. *In* Anais do Simpósio Impacto de Queimadas sobre os Ecossistemas e Mudanças Globais. 3º Congresso de Ecologia do Brasil (H. Miranda, C. Saito & B. Dias, eds.). Universidade de Brasília, Brasília, p.102-111.
- SIMON, M.F. 2001. *Ecologia de quatro espécies de Mimosa (Mimosaceae) no Brasil Central: uma comparação entre espécies raras e comuns.* Dissertação de mestrado, Universidade de Brasília, Brasília.
- SIMON, M.F. & PROENÇA, C. 2000. Phytogeographic patterns of *Mimosa* (Mimosoideae, Leguminosae) in the Cerrado biome of Brazil: an indicator genus of high-altitude centers of endemism? *Biological Conservation* 96:279-296.