



## Bicarpellate gynoecium in two species of *Senna* (Fabaceae, Caesalpinioideae, Cassiinae)

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### ABSTRACT

Flowers of species of *Senna* are very morphologically diverse, however, nothing has been reported regarding variation in the presence of a unicarpellate gynoecium, which is characteristic of the group. This study reports the occurrence of a bicarpellate gynoecium in two enantiostylous species of *Senna* in an area of dry forest (Caatinga) in NE Brazil. Observations of floral morphology and estimates of the proportions of floral morphs in the populations were performed. The species produce three floral types: left (L), right (R) and bicarpellate (B). The proportion of these floral morphs were similar in the populations of *Senna macranthera* var. *micans*, but the number of B flowers in populations of *S. trachypus* was lower than that recorded for L and R flowers. The occurrence of this morphological variation may be related to enhancing pollen capture in both species; in *S. trachypus*, this variation may also be related to reducing florivory by caterpillars that were observed eating sexual elements of the flowers.

**Keywords:** Leguminosae flower, pluricarpellate Fabaceae, reproductive fitness, *Senna macranthera* var. *micans*, *Senna trachypus*

Enantiostylous flowers (Carvalho & Oliveira 2003; Laporta 2005) with a unicarpellate gynoecium (Queiroz 2009) are very common among species of the genus *Senna* Mill. (Caesalpinioideae – Cassiinae). Patterns of enantiostyly vary, and seem to enhance reproductive ability (Almeida *et al.* 2013). Although enantiostylous flowers with a pluricarpellate gynoecium are not common within Fabaceae, their occurrence is interpreted as a strategy to maximize pollen capture by the stigma, thereby increasing reproductive success (Prenner 2004; Endress & Doyle 2009;

Paulino *et al.* 2013).

Pluricarpellate gynoecia have been recorded in *Bauhinia* L., *Ceratonia* L., *Caesalpinia* L. and *Cassia* L. (Tucker 1988; 1992; Stergios & Aymard 2008), but not in *Senna*. This study reports the occurrence of bicarpellate gynoecia in two enantiostylous species of *Senna* in an area of dry forest (Caatinga) in NE Brazil.

Flowers of *Senna macranthera* var. *micans* (Nees) H.S. Irwin & Barneby (five individuals, two populations) and of *S. trachypus* (Mart. ex Benth.) H.S. Irwin & Barneby

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(eleven individuals, one population) were collected in the municipalities of Mauriti and Brejo Santo (Ceará State, NE Brazil) and preserved in 70% alcohol. The number of left, right and bicarpellate flowers was recorded for each species, and their proportions compared using the Chi-square test (software BioEstat 5.0, Ayres *et al.* 2007). Samples of both species were deposited in the HVASF (Vale do São Francisco Herbarium; 21488 for *S. macranthera* var. *micans* and 16792 for *S. trachypus*).

The three floral morphs of *S. macranthera* var. *micans* occurred in similar proportions (Tab. 1; Fig. 1A-C), as did those of right and left flowers of *Senna trachypus*; the proportion of bicarpellate flowers in this latter species was much smaller (Tab. 1; Fig. 1D-F). Similarities in the proportions of floral morphs had already been reported

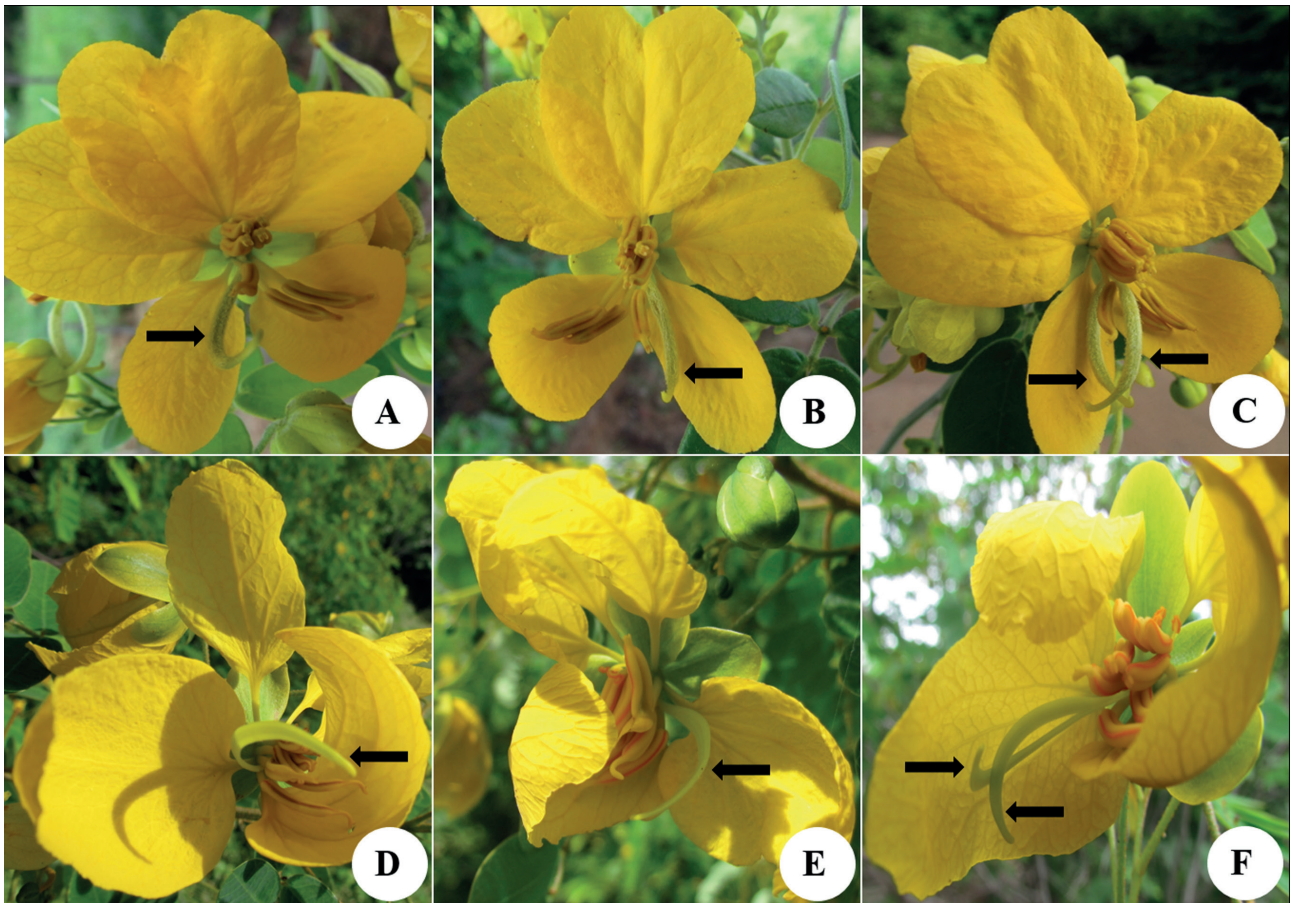
for *Chamaecrista flexuosa* (L.) Greene, which is considered an atypical enantiostylous species (Almeida *et al.* 2013).

The presence of two fruits in *S. macranthera* var. *micans* reinforces the hypothesis that variation in plant reproduction may be the result of selective pressures favoring reproductive success. These data corroborate the study of Paulino *et al.* (2013), which recorded double fruit in the bicarpellate *Swartzia dipetala* Willd. ex Vogel.

The reproductive structures of *Senna trachypus* were consumed by caterpillars, and so the observed production of more pistils by this plant may be interpreted as a strategy to compensate for the losses caused by these herbivores. Additionally, the formation of more pistils may result in satiation of the caterpillars, thereby reducing the chances of attack on other flowers in the population (Coley & Kursar

**Table 1.** Number of right, left and bicarpellate flowers of *Senna trachypus* and *S. macranthera* var. *micans* in an area of Caatinga, NE Brazil. Different letters in the same line indicate significantly different values (Qui-square test).

Species	Floral morph		
	Left	Right	Bicarpellate
<i>Senna trachypus</i> (n=11)	72 <sup>a</sup>	58 <sup>a</sup>	15 <sup>b</sup>
<i>S. macranthera</i> var. <i>micans</i> (n=5)	32 <sup>a</sup>	33 <sup>a</sup>	28 <sup>a</sup>



**Figure 1.** Flowers of *Senna macranthera* var. *micans* and *S. trachypus* bearing bicarpellate gynoecium in an area of Caatinga, NE Brazil. A-C: Left, right and bicarpellate flowers of *Senna macranthera* var. *micans*, respectively; D-F: Left, right and bicarpellate flowers of *S. trachypus*, respectively.

1996). However, studies that measure the impact of florivory upon the reproductive biology of this species are needed to test this hypothesis.

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