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First records of  
*Utricularia tenuissima* Tutin and *U. nigrescens* Sylvén  
(Lentibulariaceae) in north-eastern Brazil

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**ABSTRACT:** (First records of *Utricularia tenuissima* Tutin and *U. nigrescens* Sylvén (Lentibulariaceae) in north-eastern Brazil). In Brazil, there are records of *Utricularia tenuissima* Tutin and *U. nigrescens* Sylvén from some states in the north, south-east, central west and south. This work reveals the first records of these two species in the northeast region of Brazil. These species were found on the Reserva Biológica Guaribas, a protected remnant of Atlantic Forest in Paraíba state, and also in an area of sugar cane cultivation at the limit of the Reserve. The habitats are characterised by wetlands, surrounded by natural springs and partially shaded by herbaceous vegetation. In addition to the expansion in the distribution of these species, there are changes in the range of morphometric variation in different structures when compared with the measures presented in the original species descriptions.

**Keywords:** carnivorous plants, geographic distribution, morphological characters, Rebio Guaribas, Paraíba.

**RESUMO:** (Primeiros registros de *Utricularia tenuissima* Tutin e *U. nigrescens* Sylvén (Lentibulariaceae) para o nordeste do Brasil). No Brasil, há registros de *Utricularia tenuissima* Tutin e *U. nigrescens* Sylvén em alguns estados do Norte, Sudeste, Centro-Oeste e Sul. Este trabalho revela os primeiros registros dessas duas espécies na Região Nordeste do Brasil. As espécies foram encontradas na Reserva Biológica Guaribas, um remanescente protegido de Mata Atlântica no estado da Paraíba, e em uma área particular de plantação de cana-de-açúcar em fronteira com a Reserva. Os habitats são caracterizados por áreas úmidas, cercado por nascentes naturais e parcialmente sombreado por herbáceas. Além da expansão da área de ocorrência das espécies, também há complementos de variações morfométricas em diferentes estruturas quando comparadas às medidas apresentadas nas descrições originais das espécies.

**Palavras-chave:** plantas carnívoras, distribuição geográfica, caracteres morfológicos, Rebio Guaribas, Paraíba.

## INTRODUCTION

A large number of endemic and restricted carnivorous plant species have been recorded in Cerrado areas and remnants of the Atlantic Forest, mainly in the states of Bahia, Minas Gerais and Goiás. Some species of Lentibulariaceae were considered to be restricted to the south-eastern part of the Atlantic Forest (Miranda *et al.* 2014a, Miranda *et al.* 2014b) and to areas of Cerrado in Central Brazil (Bove & Souza 2009, Souza & Bove 2011). However, new species of *Genlisea* A.St.-Hil. (Fleischmann 2012) and *Utricularia* L. (Carregosa & Costa 2014) have recently been found in the north-eastern part of Brazil, which is drier and lower in altitude. The genus *Utricularia* is mostly comprised of species that grow as terrestrials in wet habitats (seasonally or perennially) or as aquatics. These carnivorous plants capture and digest their prey — usually algae and microscopic animals (Peroutka *et al.* 2008) — inside digestive vesicles called utricles, or traps (Taylor 1989). There are about 65 species distributed throughout Brazil (45 occurring in the north, 38 in the central western region, 33 in the north-east, 33 in the south-east and 12 in the south), and 20 species are endemic. As for the phytogeographical domain, the highest species diversity is concentrated in the Cerrado (47), followed by the Amazon Forest (43), Atlantic Forest (29), Caatinga (15), Pantanal (9) and Pampas (1) (Forzza *et al.*

2010, Miranda *et al.* 2014c).

*Utricularia tenuissima* Tutin is a rare but widespread species, occurring throughout northern South America (Venezuela, Colombia, Guyana, Surinam, French Guiana and Brazil) as well as in the Caribbean (Trinidad) (Taylor 1989; Delprete 2014). In Brazil, there are records of *U. tenuissima* for the states of Amazonas, Pará, Minas Gerais, Goiás and Mato Grosso (Taylor 1989, Miranda *et al.* 2014a).

*Utricularia nigrescens* Sylvén is an endemic species of Brazil, recorded in the states of Roraima, Pará, Amazonas, Tocantins, Mato Grosso, Goiás, Paraná, Minas Gerais (Miranda *et al.* 2014b) and São Paulo (Taylor 1989).

There is no reference in the scientific literature, or in any collection integrated into Species Link (<http://www.splink.org.br>), of the occurrence of *Utricularia tenuissima* or *U. nigrescens* in the states that comprise north-eastern Brazil. There are few studies of Lentibulariaceae in Brazil and few specialists; consequently, information about the species distribution is limited. Some of the main studies on *Utricularia* and Lentibulariaceae in regional Brazilian floras include Fromm-Trinta (1989) and Souza & Bove (2012), respectively. The aim of this note is to report an expansion of the known geographical distribution of *U. tenuissima* and *U. nigrescens*, and to report the first record of these plants in north-eastern Brazil, in the state of Paraíba.

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## MATERIALS AND METHODS

The Guaribas Biological Reserve (Reserva Biológica Guaribas, hereafter referred to as Rebio Guaribas), is a Conservation Unit containing remnants of Atlantic Forest comprising 4,051.62 ha, according to ICMBio (<http://www.icmbio.gov.br>), and located in the municipalities of Mamanguape and Rio Tinto (Fig. 1), around 60 km to the north of João Pessoa, Paraíba state. It is subdivided into three areas: Sema 1 and Sema 2 in Mamanguape, and Sema 3 in Rio Tinto (Fig. 1). Urban areas, sugar cane plantations, highways and small communities make up the landscape surrounding the biological reserve.

In the course of this study, 14 carnivorous plants species were found growing at Rebio Guaribas, most of which grow in “tabuleiro” areas, a transitional phytophysognomy between the Cerrado and Atlantic Forest (Prates *et al.* 1981, Salgado *et al.* 1981). “Tabuleiros” are relatively flat areas characterised by habitats with seasonal seepages in sandy and clayey soils, partially shaded by vegetation ranging between semi-deciduous forest and savanna (Barbosa *et al.* 2011).

*Utricularia tenuissima* and *U. nigrescens* were discovered during a study of the microhabitat preferences

of Lentibulariaceae and Droseraceae species in Rebio Guaribas that involved monthly fieldwork between March 2012 and March 2013. The two *Utricularia* species were identified following Taylor (1989), based on the height of the inflorescence and the size of the rhizoids, stolons, leaves, traps, calyx, corolla, ovary and seeds. Measurements were made using electronic calipers (accuracy 0.01 mm) in nine individuals of *U. tenuissima* and eight individuals of *U. nigrescens* and compared to the description of each species in Taylor (1989). All material collected was deposited in the Herbarium Lauro Pires Xavier (JPB), in Universidade Federal da Paraíba (UFPB).

## RESULTS AND DISCUSSION

We report here new records of *Utricularia tenuissima* (6° 42' 6" S and 35° 7' 25" W) and *U. nigrescens* (6° 44' 37" S and 35° 9' 4" W) from Mamanguape, Paraíba, Brazil, based on nine plants collected on August 8<sup>th</sup> 2012 and eight plants collected on August 20<sup>th</sup> 2012, respectively. These are the first records of both species in the northeast of Brazil. For the identification of these species, a botanical key based on Taylor (1989) and the diagnostic characters of other related species is presented below.

### Key for *Utricularia tenuissima* and *Utricularia nigrescens* and morphologically related species following Taylor (1989)

- |  |                         |
|--|-------------------------|
| 1. Corolla violet/lilac/white .....  | 2                       |
| 2. Leaves with rounded apex. Presence of lacianate scales .....            | <i>U. lacianata</i>     |
| 2'. Leaves with acute apex. Absence of lacianate scales .....              | 3                       |
| 3. Inflorescence simple, 7–22 cm. Calyx denticulate .....                  | <i>U. parthenopipes</i> |
| 3'. Inflorescence solitary, 1–3 cm. Calyx entire .....                     | 1. <i>U. tenuissima</i> |
| 1'. Corolla yellow .....   | 4                       |
| 4. Inflorescence filiform. Stolons capillary .....                         | <i>U. subulata</i>      |
| 4'. Inflorescence erect with presence of mucilage. Stolons filiform .....  | 5                       |
| 5. Calcar rarely curved downward, longer than the corolla by 1/3–1/2 ..... | <i>U. pusilla</i>       |
| 5'. Calcar curved downward longer than the corolla by 1/2–2 .....          | 2. <i>U. nigrescens</i> |

In the present study *Utricularia tenuissima* and *U. nigrescens* presented morphological aspects and measures similar to those described by Taylor (1989). However, five of the nine morphological parameters measured (inflorescence, rhizoids, stolons and leaves) for *U. tenuissima* and three parameters (inflorescence, stolons and leaves) for *U. nigrescens* were expanded (Table 1).

1. *Utricularia tenuissima* Tutin, *J. Bot.*, 72: 334, 1934. (Fig. 2A).

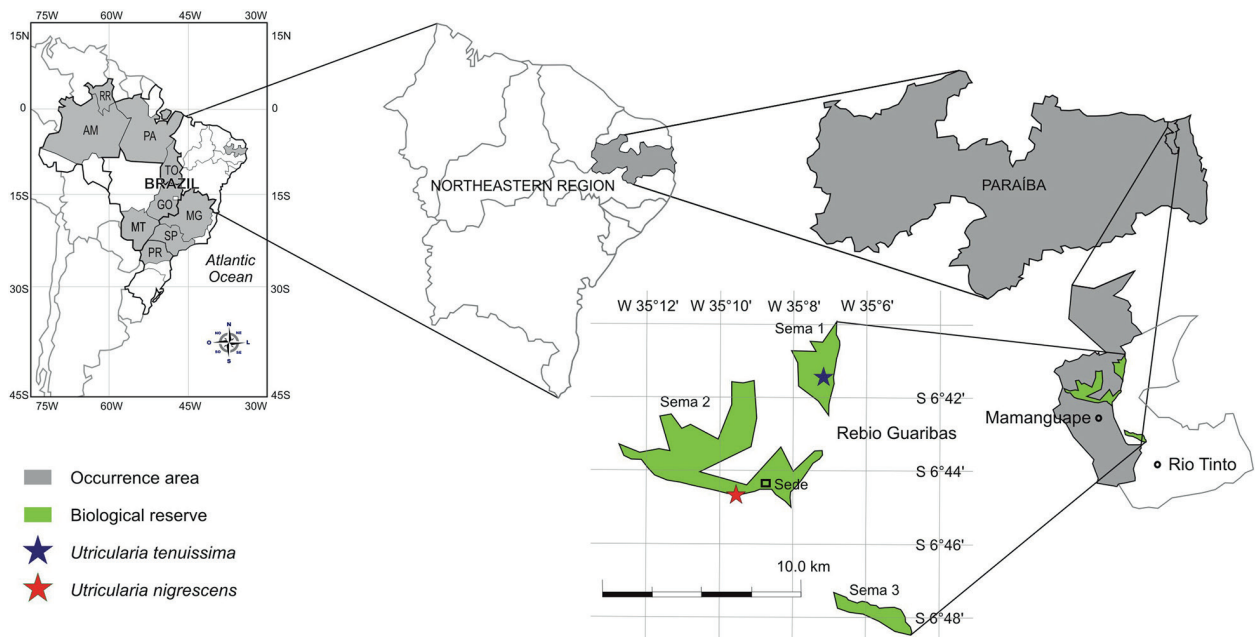
A very small herb, terrestrial (2-3 cm), *Utricularia tenuissima* was found in open areas of tabuleiro, c. 20 km from the coast at an elevation of 150 m, where it grew in wet sandy soil, probably grows as an annual, blooming from July to September with a peak in August. Only one small population containing c. 50 inflorescences was found in the study area. This species has been recorded elsewhere in wet sand, from sea level to 2100 m above

sea level, flowering mostly in September to the north of the Equator, and between December and April in Brazil according to Taylor (1989). *U. tenuissima* is morphologically similar to *U. lacianata* and *U. parthenopipes* and the characters that separate these species are the presence of lacianate scales in *U. lacianata* and the simple inflorescence (7-22 cm) and denticulate calyx in *U. parthenopipes*. The presence of a dehisced capsule with protruding placenta is a well-marked character in *U. tenuissima* (Taylor *l.c.*).

*Material examined:* BRAZIL. PARAÍBA: Reserva Biológica Guaribas, 08.VIII.2012, fl., C.V. Silva11 (JPB).

2. *Utricularia nigrescens* Sylvén, *Arkiv foer Botanik*, 8: 21, 1908. (Fig. 2B).

In Paraíba, this specie was found c. 25 km from the coast at an elevation of 180 m. It can be found from the sea level to 1000 m (Taylor 1989). It is a small terrestrial herb



**Figure 1.** Distribution map of *Utricularia tenuissima* and *U. nigrescens* throughout Brazil and new records in Rebio Guaribas, Mamanguape, Paraíba. Abbreviations: AM, Amazonas; PA, Pará; RR, Roraima; TO, Tocantins; MT, Mato Grosso; GO, Goiás; MG, Minas Gerais; SP, São Paulo; PR, Paraná. (Map by Caio Vinicius da Silva)

(2-6 cm) and usually grows in sandy soils, covered by a thin layer of water that flows from headsprings. This species has some similarities to *U. subulata* and *U. pusilla*, with which it can be confused in identification (Taylor 1989). However, there are some important features that separate them. The size of the corolla of *U. nigrescens* is similar to that of *U. pusilla*, despite it having narrower leaves and there being no sterile bracts in the floral scape (Taylor 1989). *U. nigrescens* usually has its upper lip bent forward, and its calcar curved backward and longer than in *U. pusilla*, which has a lower sepal that expands during fruiting and has narrower leaves. *U. subulata* presents a filiform inflorescence, capillary stolons and an absence

of mucilage. In the study area, *U. nigrescens* grows as an annual, with blooming verified as occurring from July to September, peaking in August. The observed reproductive period differed from the period recorded by Taylor (1989). Previous studies in Brazil have recorded its flowering period as occurring between February and July (Taylor 1989). A single population containing c. 150 inflorescences was found in a particular area of sugar cane crop at the limit of the Reserve.

*Material examined:* BRAZIL. PARAÍBA: **Reserva Biológica Guaribas**, 08.VIII.2012, fl., C.V. Silva13 (JPB).

**Table 1.** Morphological characters of *Utricularia tenuissima* (▲) and *U. nigrescens* (☼) in Mamanguape, Paraíba, Brazil, compared to Taylor, 1989. SD, standard deviation.

| Characters                | sp. | Aspect    | Mean +/- SD | Range   | Taylor (1989) |
|---------------------------|-----|-----------|-------------|---------|---------------|
| <b>Inflorescence</b> (cm) | ▲   | erect     | 2.5 ± 0.37  | 2-3     | 8             |
|                           | ☼   | erect     | 4.78 ± 1.49 | 2-6     | 5-20          |
| <b>Rhizoids</b> (cm)      | ▲   | capillary | 0.39 ± 0.1  | 0.3-0.5 | 1             |
|                           | ☼   | filiform  | 0.81 ± 0.21 | 0.5-1   | 1             |
| <b>Stolons</b> (cm)       | ▲   | capillary | 1.05 ± 0.29 | 0.8-1.5 | 3             |
|                           | ☼   | filiform  | 1.1 ± 0.55  | 0.5-1.7 | not mentioned |
| <b>Leaves</b> (mm)        | ▲   | petiolate | 0.75 ± 0.27 | 0.5-1   | 3-8           |
|                           | ☼   | nerved    | 5.22 ± 2.11 | 2-7     | 10            |
| <b>Traps</b> (mm)         | ▲   | ovoid     | 0.35 ± 0.05 | 0.3-0.4 | 0.3-0.4       |
|                           | ☼   | ovate     | 0.46 ± 0.07 | 0.3-0.5 | 0.3-0.5       |
| <b>Calyx</b> (mm)         | ▲   | glabrous  | 1.25 ± 0.28 | 1-1.5   | 0.8-1.5       |
|                           | ☼   | glabrous  | 1.67 ± 0.5  | 1-2     | 1.5-2         |
| <b>Corolla</b> (cm)       | ▲   | violet    | 0.46 ± 0.17 | 0.3-0.7 | 0.25-0.7      |
|                           | ☼   | yellow    | 1.67 ± 0.5  | 1-2     | 1-1.7         |
| <b>Ovary</b> (mm)         | ▲   | ovoid     | 1.5 ± 0.53  | 1-2     | 1.5-2.5       |
|                           | ☼   | globose   | 1.67 ± 0.5  | 1-2     | 2             |
| <b>Seeds</b> (mm)         | ▲   | ellipsoid | 0.2 ± 0     | 0.2-0.2 | 0.15-0.2      |
|                           | ☼   | ellipsoid | 0.2 ± 0     | 0.2-0.2 | 0.22          |



**Figure 2.** A. *Utricularia tenuissima* in Reserva Biológica Guaribas, Paraíba, Brazil. B. *Utricularia nigrescens* in a private area consisting mostly of sugar cane plantations, bordering the Reserva Biológica Guaribas, Paraíba, Brazil (Photos by Caio Vinicius da Silva).

*Utricularia tenuissima* and *U. nigrescens* share habitat preferences, such as humid environments and sandy soil, and usually occur syntopically with Cyperaceae, Burmanniaceae, Xyridaceae and Eriocaulaceae (non-carnivorous species). The conservation status of *U. nigrescens* in the study region deserves attention, because this species was found only in an unprotected area. The habitat of the whole region is similar and, probably could support the occurrence of this species; however, it is important to emphasise that economic activities (mainly agriculture) promote habitat destruction and have a negative impact on populations of these species. Although *U. nigrescens* was not recorded in the protected area, it probably occurs in that area and more fieldwork is necessary to investigate this. Rebio Guaribas is the largest Atlantic forest fragment in the State of Paraíba, and is an important region for the occurrence of carnivorous plants.

Current knowledge of *Utricularia* in north-eastern Brazil is very limited, due to the small size and seasonality of many species. Finding their habitats often requires specific knowledge and experience. Our results suggest that these two species may occur throughout north-eastern Brazil, with a higher probability of being found in the tropical forest zones, restingas forest, savannas, or the transition areas between these ecosystems (ecotones), such as the tabuleiros. Unfortunately, fieldwork conducted in north-eastern Brazil has been terribly insufficient and needs to be increased in order to understand the species diversity and distribution within this region.

These data are important tools for monitoring programs and for the conservation of these plants.

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