

***PHILCOXIA TUBEROSA* (PLANTAGINACEAE), A NEW SPECIES FROM BAHIA, BRAZIL**

M.L.S. CARVALHO¹ & L.P. QUEIROZ²

¹Universidade Federal da Bahia, Departamento de Biologia Geral, Programa de Pós-Graduação em Genética e Biodiversidade, Rua Barão de Geremoabo s.n., Ondina, 40170-290, Salvador, Bahia, Brazil

²Universidade Estadual de Feira de Santana, Departamento de Ciências Biológicas, Programa de Pós-Graduação em Botânica, Avenida Transnordestina s.n., Novo Horizonte, 44036-900, Feira de Santana, Bahia, Brazil.

ABSTRACT

Philcoxia tuberosa is proposed as a new species of Plantaginaceae from Bahia (Northeastern Brazil). It can be differentiated from the remaining three species of the genus by the presence of tubers in the branches, smaller flowers, pedicel and sepals sparsely glandular, bicolor corolla with purple tube and white limb, and longer sepals and filaments. This new species has a narrow geographical range in Morro do Chapéu municipality, on the Northern slopes of the Chapada Diamantina mountain range. It occurs in white sand dunes within a patch of Seasonally Dry Tropical Forest.

Philcoxia P. Taylor & V.C. Souza (Plantaginaceae) is a genus from Central and Eastern Brazil. The genus was described by Taylor et al. (2000) containing three species, all described in the same work. Each of these species has a restricted range in to three neighboring Brazilian states: Bahia (*P. bahiensis* V.C. Souza & Harley), Goiás (*P. goiasensis* P. Taylor) and Minas Gerais (*P. minensis* V.C. Souza & Giul.).

The genus is characterized by underground stems, leaves with underground petioles and a peltate, viscid blade presented at the soil level or also underground, inflorescence a helicoid cyme, corolla pale blue to lilac with a weakly two-lipped limb expanded from a tubular base (Taylor et al. 2000).

All species occur in similar habitats, growing at elevations between 800 and 1,500 m on mountain areas in well lit and low-nutrient white sands and strongly seasonal rainfall.

Studies of feeding mechanism carried out in *P. minensis* demonstrated that their underground leaves covered with sticky glands

are able to trap and digest nematodes, a unique capturing strategy amongst carnivorous plants (Pereira et al. 2011). Considering that herbarium specimens of other species of *Philcoxia* also have nematodes attached to the leaves, this feeding mechanism is likely to be widespread in the genus.

A new species of *Philcoxia* is described from the mountains of Morro do Chapéu in Central-Northern Bahia. This plant has been known to occur in the same area for the last ten years and was tentatively identified in herbaria as *P. bahiensis* or *P. minensis*, but it should be treated as a different species as demonstrated by the data and identification key provided in this work.

MATERIAL AND METHODS

Description of the new species was based on the analysis of herbarium sheets deposited at HUEFS (acronym according to Thiers 2012) collected under the project “Flora de Morro do Chapéu”. Morphological terminology was based mostly on Taylor et al. (2000) and Souza & Giulietti (2009).

Arcmap (ESRI 2008) was used to prepare the distribution map for the genus.

Philcoxia tuberosa M.L.S.Carvalho & L.P.Queiroz, *sp. nov.* Type: BRAZIL, Bahia, Morro do Chapéu, c. 21 km oeste de Morro do Chapéu, estrada para Irecê, 11°29'52"S, 41°19'50"W, 955 m a.s.l., 10 Mar 2003, fl., fr., *L.P.Queiroz 7723* (holotype HUEFS; isotype ESA) (Fig. 1–2).

Philcoxia tuberosa differs from all other described species of the genus by the presence of tubers in the branches, inflorescence shorter (6–9 cm long), more ramified and with shorter internodes, pedicel sparsely glandular, and bicolor corolla with dark purple tube and white limb.

Herbs with underground stems and leaves, above ground inflorescences 6–9 cm tall; stems glabrous or sparsely pubescent, orange-yellowish, profusely ramified and entangled in a net fashion underground, irregularly interrupted by globose or ellipsoid tubers from which sprout the leaves. **Leaves** simple; petiole 15–18.8 mm long, glabrous; blade entire, peltate, orbicular, 1.2–2.5 mm diam., glabrous, upper surface and margin provided with capitate viscid glands. **Inflorescence** 6–9 cm long, cymose, helicoid, congested branched, the main axis fractiflex, glabrous or sparsely glandular at the apex; bracts 0.5–1.8 × 0.2–0.6 mm, ovate or deltoid, glabrous; pedicel c. 14 mm long, sparsely glandular. **Flowers** bisexual; sepals 0.9–1.6 × 0.5–1.0 mm, ovate-oblong, acute, outer surface sparsely glandular; corolla weakly bilabiate, tube 2–5 mm long, dark purple, limb 5-lobed, white with veins dark purple at the base, upper and lateral lobes c. 1.2 mm long, glabrous, entire or slightly emarginate, lower lobe 1.5–2.1 mm long, pubescent, bilobed; stamens 2, highly adnate to the corolla tube, free portion of the filaments 0.6–0.9 mm long; gynoecium

c. 3 mm long, ovary 1.0–1.3 mm long, subglobose, style 1.3–2.1 mm long. **Fruit** capsule, globose, 1.9–2.3 mm diam. **Seeds** 0.4–0.5 mm diam., ovoid, subglobose, blackish.

PARATYPES. BRAZIL, Bahia, Morro do Chapéu: rodovia Morro do Chapéu-Irecê, ca. 25 km de Morro do Chapéu, à esquerda, dunas próximo às Lages, 11°29'53" S, 41°19'53" W, 933 m a.s.l., 26 Sept 2004, fl., *E.L.Borba et al. 2045* (ESA, HUEFS); entrada das Dunas, 11°29'22" S, 41°20'01" W, 921 m a.s.l., 5 May 2007, fl., *A.L.Côrtes et al. 4* (HUEFS); Lages, c. 23 km de Morro do Chapéu na Estrada do Feijão (BA 052) sentido Irecê, 11°29'52" S, 41°19'52" W, 910-956 m a.s.l., 30 Jan 2003, fl., *F.França et al. 4088* (HUEFS); ca. 20 km da cidade na direção de Irecê, Parque Estadual de Morro do Chapéu, 11°29'53" S, 41°19'52" W, 891 m a.s.l., 2 July 2002, fl., fr., *A.M.Giulietti et al. 2162* (ESA, HUEFS); Dunas, 11°40' S, 40°47' W, 4 Dec 2002, fl., *M.E.Junqueira et al. 164* (HUEFS); ca. 20 km W de Morro do Chapéu na estrada para Irecê, 11°29'53" S, 41°19'58" W, 930 m a.s.l., 21 Apr 2001, fl., *E.Melo et al. 3420* (ESA, HUEFS, RB, UB); Lages, ca. 10 km W de Morro do Chapéu na estrada para Irecê, 11°29'52" S, 41°19'52" W, 9 Mar 2006, fl., *L.P.Queiroz 12133* (HUEFS); Lajes, ca. 20 km W de Morro do Chapéu na estrada do feijão, 11°37' S, 40°59' W, 6 Oct 2007, fl., *L.P.Queiroz 13178* (HUEFS).

ETYMOLOGY. The specific epithet alludes to the tuberous portions of the branches, found in the new species.

DISTRIBUTION, HABITAT AND CONSERVATION STATUS. *Philcoxia tuberosa* is known only from a small area near the Morro do Chapéu town in Central-Northern Bahia. It occurs between 890 and 956 m a.s.l. in a white sand dune surrounded by a patch of Seasonally Dry Forest locally

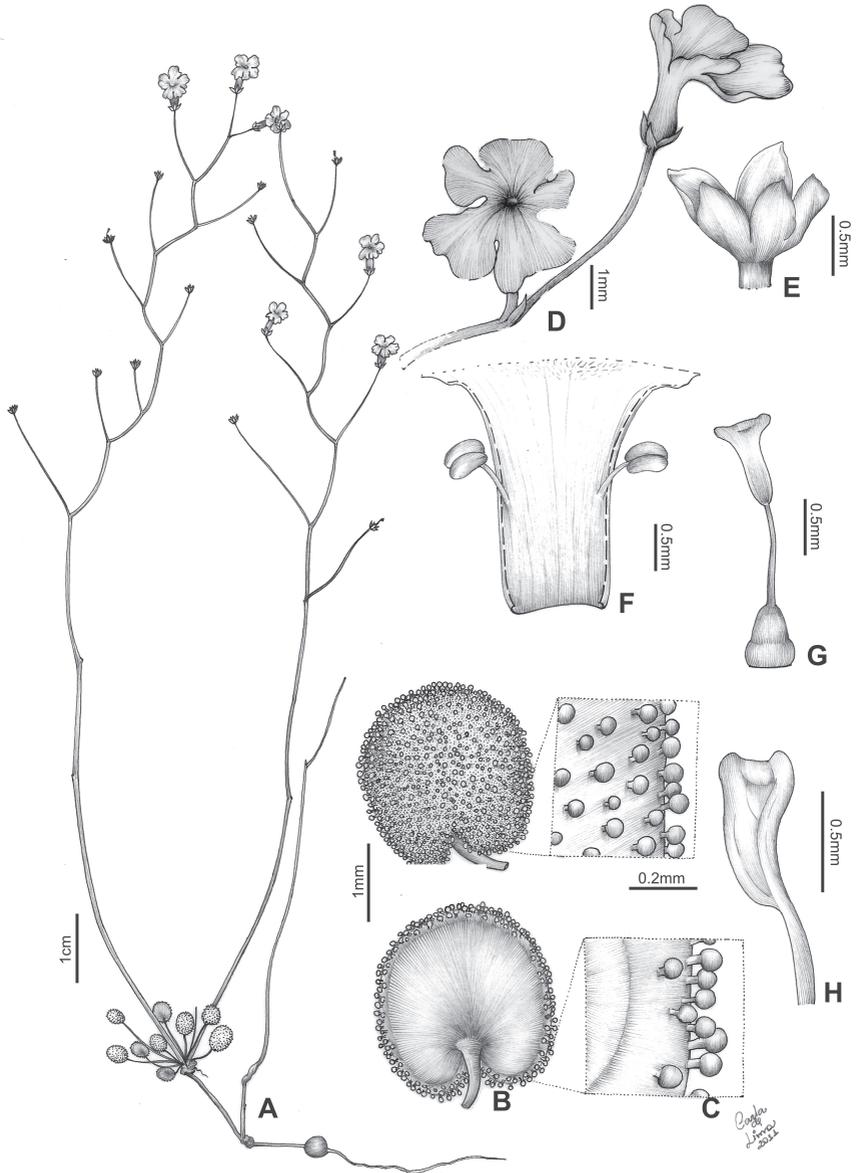


Figure 1. *Philcoxia tuberosa*: A. Habit. B. Leaf from the upper surface (above) and from the lower surface (below). C. Detail of the upper and lower leaf surfaces near the margin. D. Tip of the inflorescence showing flowers from side (below) and front (above) views. E. Detail of the calyx. F. Open corolla tube showing adnate stamens. G. Gynoecium. H. Detail of the stigma. Drawn by Carla de Lima from L.P. Queiroz 12133 (HUEFS).

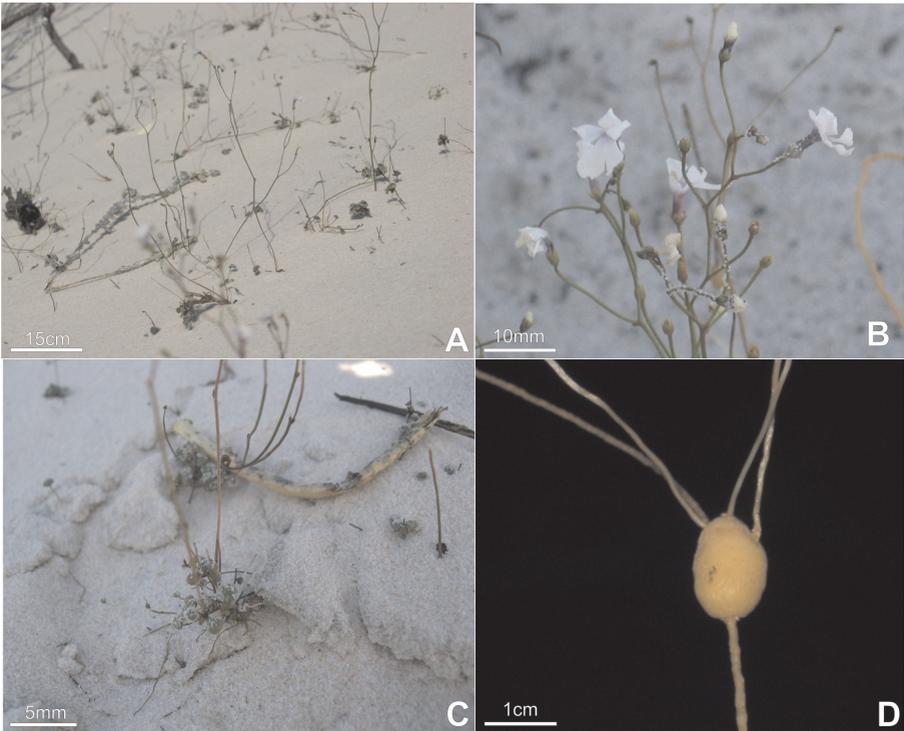


Figure 2. *Philcoxia tuberosa*: A. Plants at the natural habitat. B. Tip of the inflorescence. C. Underground tubers. D. Detail of an underground tuber.

called as Caatinga. It flowers and set fruits all year long.

The plant is locally common at the lower slopes of the dunes (Fig. 2A). However, it is known only from one very small area, estimated in c. 0.25 km², near the Morro do Chapéu town. Thus, it could be considered as Critically Endangered (CR) according to the geographical criterion D2 of the IUCN (2001).

COMMENTS. *Philcoxia tuberosa* is the only species of the genus with recorded stem tubers and mostly white flowers (Fig. 2). It is also diagnosed by the more ramified inflorescence with shorter internodes rendering a more crowded fashion than presented in any other species of *Philcoxia*. An extensive comparison between all described species of

the genus is presented in Table 1.

Philcoxia bahiensis is the only other species occurring in the state of Bahia (Fig. 3). However, they do not occur sympatrically as this species is known only from Southern slopes of the Chapada Diamantina mountain range, near Piatã town, almost 200 km away from the area of occurrence of *P. tuberosa*. This species has a corolla 4-lobed (vs. 5-lobed), flowers twice as large as those of *P. tuberosa* (c. 10 vs. c. 5 mm long) and a uniformly colored lilac corolla (vs. bicolored corolla with a dark purple tube and white limb).

Philcoxia goiasensis is known only by the type collection from the vicinity of Posse, in the Eastern Goiás (Fig. 3; Taylor et al., 2000). This species is differentiated from *P. tuberosa* mostly by the petiole length (c. 4

Table 1. Morphological comparison between *Philcoxia tuberosa* and all other species of the genus.

Character/Species	<i>P. tuberosa</i>	<i>P. bahiensis</i>	<i>P. goiasensis</i>	<i>P. minensis</i>
Leaf blade diameter (mm)	1.2–2.5	1.5–3.0	1.8–2.0	1.5
Petiole length (mm)	15.0–18.8	10–17	4	14–24
Inflorescence ramification	congested branched	simple	simple or sparsely branched	sparsely branched
Inflorescence length (cm)	6–9	14–25	10–15	17–21
Bracts size (mm)	0.5–1.8 × 0.2–0.6	1.0–1.5 × 0.5	≤0.5	1.5 × 0.5
Pedicels length (mm)	14	9–11	15–25	11–27
Pedicels glandular indument	sparse	dense	dense	dense
Sepals length (mm)	0.9–1.6 × 0.5–1.0	1.2–2.0 × 0.5	0.7 × 0.3	1.0–1.5 × 0.5
Sepals glandular indument	sparse	dense	dense	sparse
Corolla color	bicolor, dark purple tube and white limb	uniform, lilac	bicolor, yellow tube and white to lavender limb	uniform, pale blue
Corolla tube length (mm)	2.1–4.5	3–4	4	4
Number of corolla lobes	5	4	5	3
Upper lobe length (mm)	1.2	2	2	2
Lower lobe length (mm)	1.5–2.1	3–4	1.5–1.8	3
Stamens filaments length (mm)	0.6–0.9	0.5	0.25	0.6–0.7
Ovary length (mm)	1.0–1.3	1.5	0.5	0.8
Style length (mm)	1.3–2.1	1.5	0.5	2
Fruits diameter (mm)	1.9–2.3	2.0–2.5	1.5	2.0–2.5
Seed diameter (mm)	0.4–0.5	unknown	0.3	unknown

mm long in *P. goiasensis* vs. 15–18 mm long in *P. tuberosa*), pedicel and sepals densely glandular, sepals length (c. 0.7 × 0.3 vs. 0.9–1.6 × 0.5–1.0 mm), corolla lobes apex (2-lobed vs. entire or slightly emarginated), color of the corolla tube (yellow vs. dark purple), length of stamen filament (c. 0.25 vs. 0.6–0.9 mm long), ovary length (c. 0.5 vs. c.1 mm long) and style length (c. 0.5 vs. 1.3–2 mm long).

Philcoxia minensis occurs in Serra do Cabral, in the Central portion of Minas Gerais state (Fig. 3; Taylor et al., 2000). *Philcoxia tuberosa* differs from this species by the ramification on the inflorescence (congested in *P. tuberosa* vs. sparse on *P. minensis*), size of the inflorescence (6–9 vs. 17–21 cm long), corolla 3-lobed (vs. 5-lobed), color of the corolla (bicolor with a dark purple tube and white limb vs. uniformly pale blue colored) and size of lower lobe of the corolla (1.5–2.1 vs. c. 3 mm long).

Key to the species of *Philcoxia* (modified from Taylor et al. 2000)

1. Petioles c. 4 mm long; sepals c. 0.7 × 0.3 mm; corolla lobes with 2-lobed apex. Central Brazilian Plateau, Goiás.....*P. goiasensis*
- 1' Petioles 10–24 mm long; sepals 1–2 × 0.5–1 mm; corolla lobes entire or slightly emarginate. Espinhaço range, Minas Gerais and Bahia.....2
2. Corolla bicolor with dark purple tube and white limb; underground stem branches interrupted by conspicuous tubers....*P. tuberosa*
- 2'. Corolla with uniform lilac or pale-blue color; tubers absent.....3
3. Leaves with blade 2.5–3 mm diam.; pedicels glandular throughout; corolla lilac; style narrowed at base, widening abruptly towards apex. Bahia.....*P. bahiensis*
- 3'. Leaves with blade c. 1.5 mm diam.; pedicels sparsely glandular at apex only; corolla pale blue; style obconic. Minas Gerais....*P. minensis*

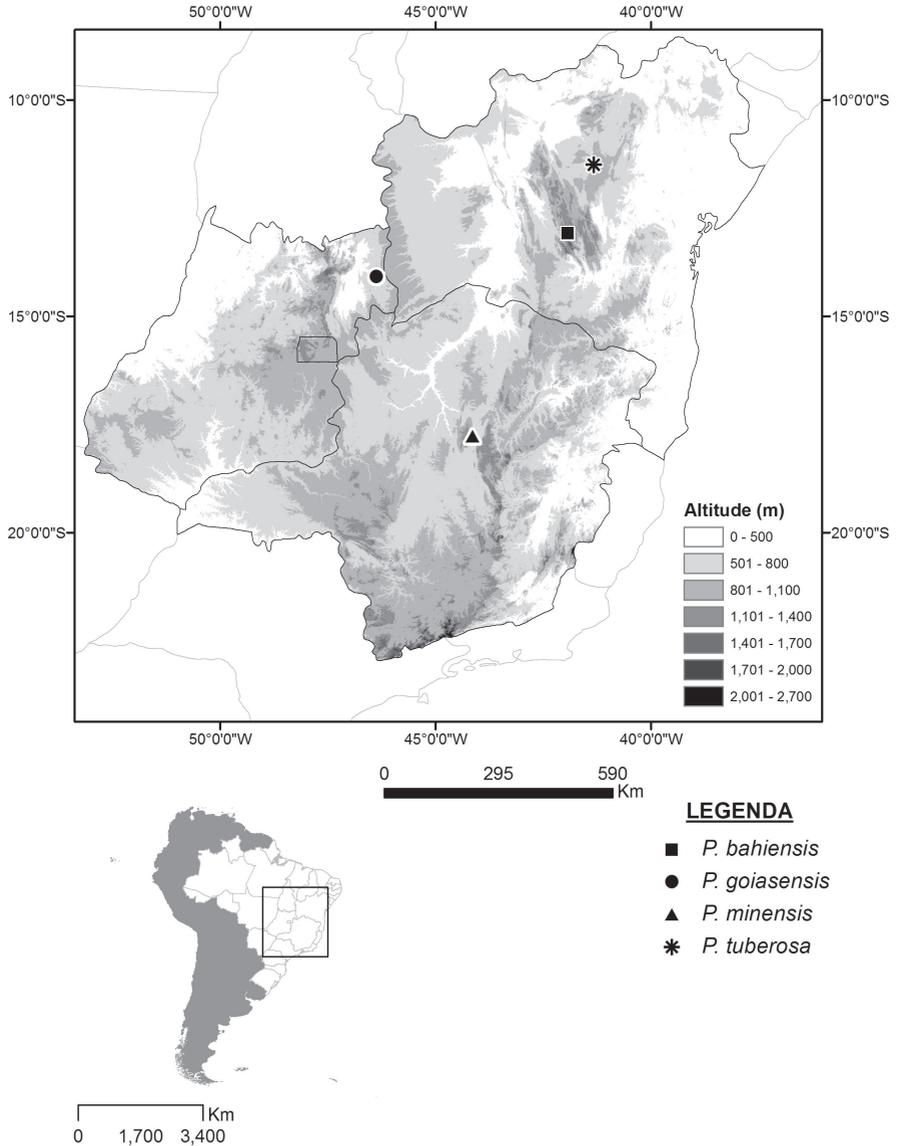


Figure 3 – Map of South America highlighting the states of Bahia (BA), Minas Gerais (MG) and Goiás (GO) and the recorded distribution map of the species of *Philcoxia* (inset).

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