

# *Trichocline maxima* (Compositae, Mutisieae) a rare Pampean daisy rediscovered after 70 years in Uruguay

Eduardo Pasini<sup>1,\*</sup> , José M. Bonifacino<sup>2</sup> , Fábio P. Torchelsen<sup>1</sup> 

<sup>1</sup> Programa de Pós-Graduação em Botânica, Universidade Federal do Rio Grande do Sul, Av. Bento Gonçalves, 9500, Porto Alegre, Rio Grande do Sul, 91501-970, Brazil.

<sup>2</sup> Laboratorio de Botánica, Facultad de Agronomía, Universidad de la República, Casilla de Correos 1238, Montevideo, Uruguay.

\* Corresponding author: eddpasini@gmail.com

Recebido em 15.VIII.2019

Aceito em 20.VII.2020

DOI 10.21826/2446-82312021v76e2021006

**ABSTRACT** – *Trichocline maxima* was considered probably extinct but has been rediscovered in northern Uruguay after almost 70 years since its last record in this country. We provide an updated description of the species, an indication of a lectotype and we discuss morphology, taxonomy, nomenclature, geographical distribution, and conservation status of the species. An identification key for the species of the genus in Uruguay and Brazil is also presented.

**Keywords:** Asteraceae, critically endangered, grassland, Pampa.

**RESUMO** – *Trichocline maxima* (Compositae, Mutisieae) redescoberta: Taxonomia, lectotipificação, e estado de conservação de uma Asteraceae rara e endêmica do Pampa. *Trichocline maxima* era considerada como provavelmente extinta, mas foi redescoberta no norte do Uruguai após quase 70 anos desde sua última coleta neste país. Neste trabalho são fornecidas descrição atualizada da espécie, a indicação de um lectótipo e discussão sobre aspectos morfológicos, taxonômicos, nomenclaturais, de distribuição geográfica e estado de conservação. Também é apresentada uma chave de identificação para as espécies do gênero no Uruguai e no Brasil.

**Palavras-chave:** Asteraceae, criticamente ameaçada, campos, Pampa.

## INTRODUCTION

*Trichocline* Cass. (Compositae, Mutisieae) is a South American endemic genus, with approximately 24 herbaceous species, which are distributed in the northern and central Andes, Patagonia, south Brazil and Uruguay. The genus can be distinguished by caulescent to herbaceous habit, a well-developed xylopodium, pistillate bilabiate ray florets with the presence of staminodes, bisexual bilabiate disc florets, with cypsela truncate at the apex and fully covered with twin hairs (Katinas *et al.* 2008).

The species can be found in the high elevation of wide-open areas in the Northern and Central Andes, from the South Brazilian Plateau and to the Uruguayan coastal plane, growing in rocky or sandy soils. Most of them are rare and narrowly distributed, and several species have subpopulations that occur in no more than four or five locations (for the definition of subpopulation and location, see IUCN 2011).

In Brazil, some species occur throughout threatened ecosystems, such as the high altitude tropical grasslands in the Atlantic Rain Forest in South Brazil or the lowland subtropical/temperate grasslands of the Pampa in the State

of Rio Grande do Sul, Brazil, Uruguay, and southeastern Argentina (the concepts of these two phytogeographic provinces follow Cabrera & Willink 1973).

While some specimens can be found inside protected areas like National and Regional Parks in Brazil (Parque Estadual do Espinilho, Parque Estadual de Vila Velha and Parque Nacional de São Joaquim) and Argentina (Reserva de Biosfera Laguna Blanca and Reserva Natural Estricta El Leoncito), many of them thrive in places that had suffered from human impacts, such as deforestation, mining, intensive silviculture and monoculture and uncontrolled use of intensive grazing (Cordeiro & Hasenack 2009).

*Trichocline maxima* Less. is endemic to the Pampean phytogeographic province, which ranges from the state of Rio Grande do Sul, Brazil, Uruguay, and the Buenos Aires, La Pampa, Entre Rios and Corrientes political provinces in Argentina (Zardini 1975). In the present work, we report the rediscovery of the species after almost 70 years of its latest record in Paso Ataques, northern Uruguay, department of Tacuarembó. We believe these results could support future projects on phylogeography, population genetics and ecology, leading to the conservation of a threatened species and many others related to the Pampean region.

## MATERIAL AND METHODS

This study was based on field observations and herbarium material revision. Specimens from the following herbaria were analyzed (acronyms according to Thiers 2014): CRI, CTES, ESA, FLOR, FURB, HAS, HB, HBR, HUEFS, HUFU, HURG, ICN, LP, M, MBM, MO, MPUC, MVFA, MVJB, MVM, NY, PACA, SALLE, SMDB, SPF, SI e US. In addition, we consulted digitalized material available on the websites of the following herbaria: B, F, GH, GOET, HAL, LINN, K and P. All the information about the species presented here was based on the analysis of herbarium specimens, pointed field observations and relevant information taken from the literature (Zardini 1975). We assessed the conservation status of *Trichocline maxima* according to the guidelines available in IUCN (2011).

## RESULTS

### Taxonomic treatment

*Trichocline maxima* Less., *Linnaea* 5: 290. 1830.

**Type:** BRAZIL. “*Brasília meridionalis*. s.l., s.d., Sellow s.n.”. (Lectotype, designated here K-504286 [image!]; Isolectotypes G-308259 [image!], HAL-113007 [image!], P-703278 [image!]). Figs. 1, 2.

Perennial, scapose herbs with rosulate leaves, up to 85 cm high. Xylopodium up to 12.5 cm long, more or less cylindrical. Leaves petiolate; petiole 2–7 cm long, blade 20–30 × 3–4 cm, obovate or oblanceolate, base attenuated to cuneate, apex acute or obtuse, margin entire or lobate, lobes (when present) 3–5-paired, 0.5–3 cm long, rounded, glabrous, papyraceous. Floral scape 45–80 cm long, erect, ebracteate, glabrescent to glabrous. Involucres 2–3 × 1.5–2.5 cm, hemispheric, phyllaries 5–8-seriate, adaxial surface tomentose; outer 6–7 × 5–7 mm, ovate, apex obtuse to acute, adaxial surface woolly; middle ovate-lanceolate, 9–12 × 4–6 mm, apex obtuse, tomentose on the adaxial surface; inner 13–16.5 × 4–6.5 mm, ovate-lanceolate, apex acute, glabrous. Florets dimorphic; ray florets female, uniseriate, yellow, outer conspicuous, spreading, apices very short 3-toothed, inner of two long linear spiraled lobes, ca. 25, corolla bilabiate-liguliform, yellow, tube 7–10 mm long, abaxial lip 10–21 × 2.5–3 mm, linear to lanceolate, tomentose, adaxial lip ca. 4.5 mm long, staminodes 5, 3–4 mm long, apex acute, base attenuate or sagittate; style 8–12 mm long, style branches ca. 1 mm long; disc florets bisexual, corolla bilabiate-tubulose yellow, tube 11.7–14.5 mm long, abaxial lip 3-toothed, 3–4 mm long, recurvate, adaxial lip 2-toothed, 3–3.5 mm long, anthers 9.4–12 mm long, basal appendages papillose, style 17.5–19 mm long, style branches ca. 1 mm long. Achenes ca. 1 cm long, cylindrical or ovoid; twin hairs densely set; pappus uniseriate, 13–15.7 mm long, bristles barbellate.

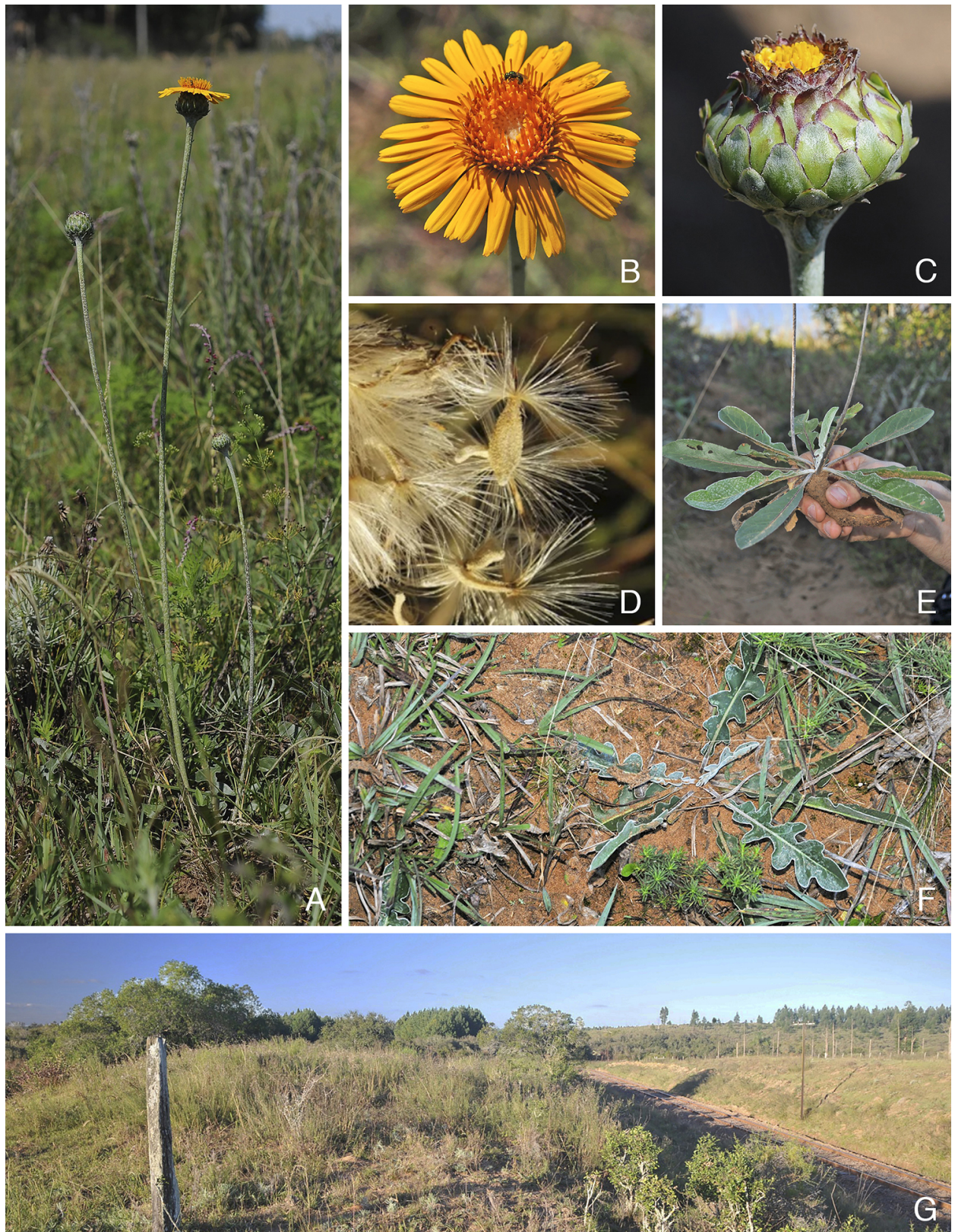
**Distribution and ecology:** South Brazil (Rio Grande do Sul State) and Uruguay (Fig. 3). The species inhabits rocky outcrops and sandy soiled grasslands at low elevation areas of the Pampean phytogeographic province (Cabrera & Willink 1973). Previous studies indicated that the species was probably extinct in Brazil (Zardini 1975; Pasini & Ritter 2012), and in fact, the only three records in this country were made almost 190 years ago; one of them is the type specimen that was indicated by Lessing (1830), and is located at K, G, HAL and P. The other two collections were cited by Malme (1931) as follows: “*Inter Rio Pardo et Bagé (F. Sellow 1831); etiam ab Isabelle lecta, loco non indicato (A. Isabelle 1835)*”, of which we were not able to find. The species records in Uruguay are also scarce and are restricted to the northern region of the country (Departments of Rivera and Tacuarembó), which shares the same floristic characteristics with the southern extreme of Brazil (State of Rio Grande do Sul). Prior to our rediscovery, the latest record was almost 70 years ago (*Osorio s.n.* MVM 13902). We could track the species habitat, following the information of its records from Uruguay, and locate it in the department of Tacuarembó, Paso Ataques. The subpopulation was found in shrubby grassland with rocky outcrops and sandy soil. The species habitat is extremely endangered due to human impact, like intensive silviculture and uncontrolled use of grazing. In fact, the whole population was surrounded by *Eucalyptus* sp. plantation.

**Phenology:** The species bloom from late December to March.

**Conservation status:** We consider the species Critically Endangered (CR) by the IUCN’s (2011) categories, according to the following criteria and subcriteria: A4 (c) (e); B2 a: A4. We project that the subpopulations suffered from a drastic size reduction in the last 100 years, due to decline of habitat quality. This could be related to the human impacts along the species range areas. There are vast areas of *Pinus* spp. plantation in northern Uruguay, which for the genus *Trichocline* as a whole, could lead to local extinctions. Besides that, this particular species presents a large floral scape and conspicuous ray florets, and can be easily spotted in nature, a fact that could potentially be related to its exploitation for ornamental purposes; B2 a – the total extent of occurrence of the species was severely fragmented by the agricultural and silvicultural systems. Furthermore, the only register of the species in Brazil is from almost 200 years ago.

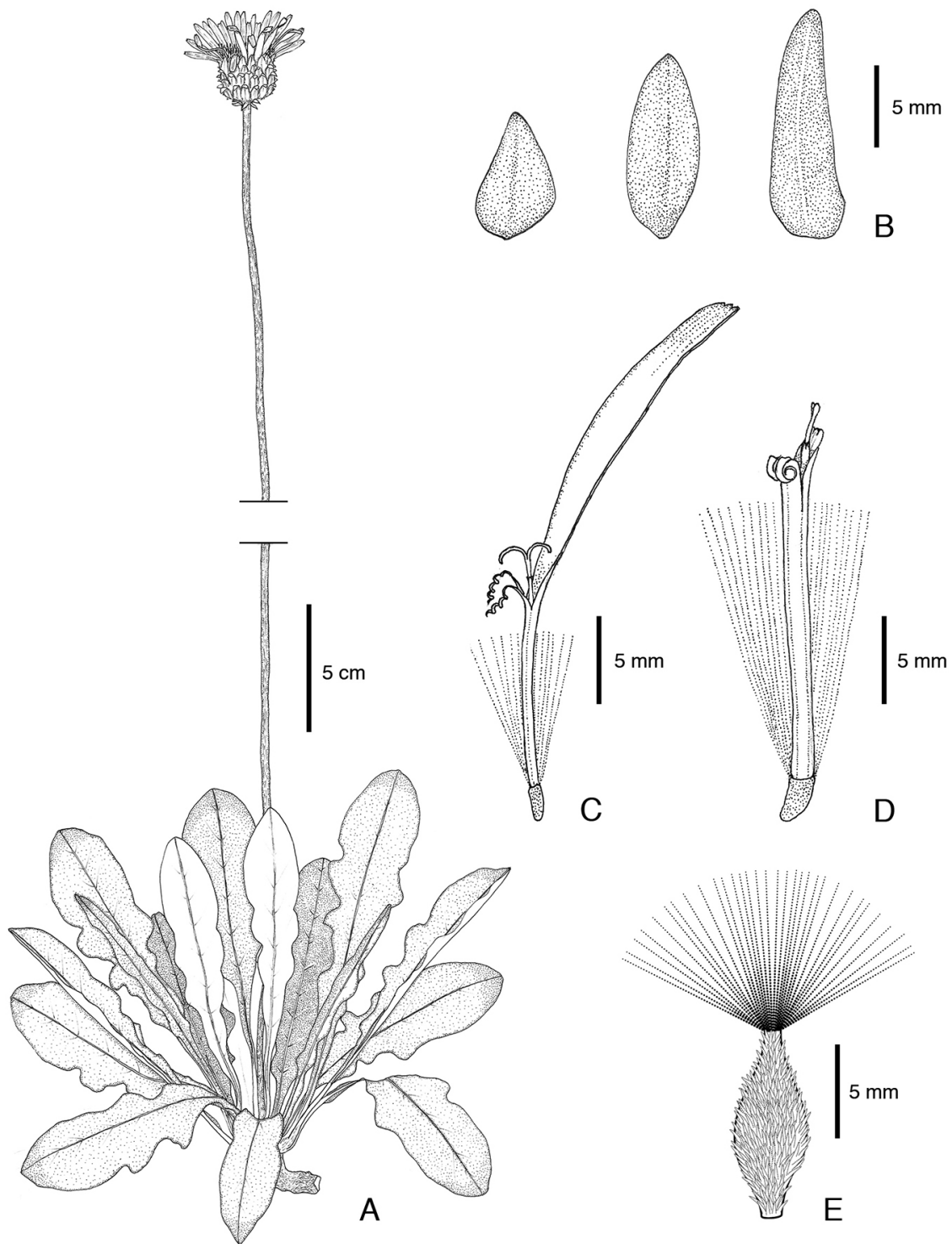
**Taxonomy and lectotypification:** Christian Friedrich Lessing described *Trichocline maxima* in 1830, using a collection of Friedrich Sellow from Brazil. This botanist first collected the species around the year 1820 in the “Plata” region, which today is comprised by the territories of South Brazil (State of Rio Grande do Sul), Uruguay and northeast Argentina. Plenty of information is lacking from some of the species collected by this botanist during his stay in South America, in particular for Brazil.





**Figure 1.** A-G. *Trichocline maxima*. A. General view of the species habit; B. Capitulum; C. Involucre; D. Detail of achene and pappus; E. Detail of rosette leaves, scapes and xylopodium; F. Detail of the rosette and lobate leaves; G. Habitat. Photos credits: A-C, F and G by José M. Bonifacino; D by Fábio P. Torchelsen.





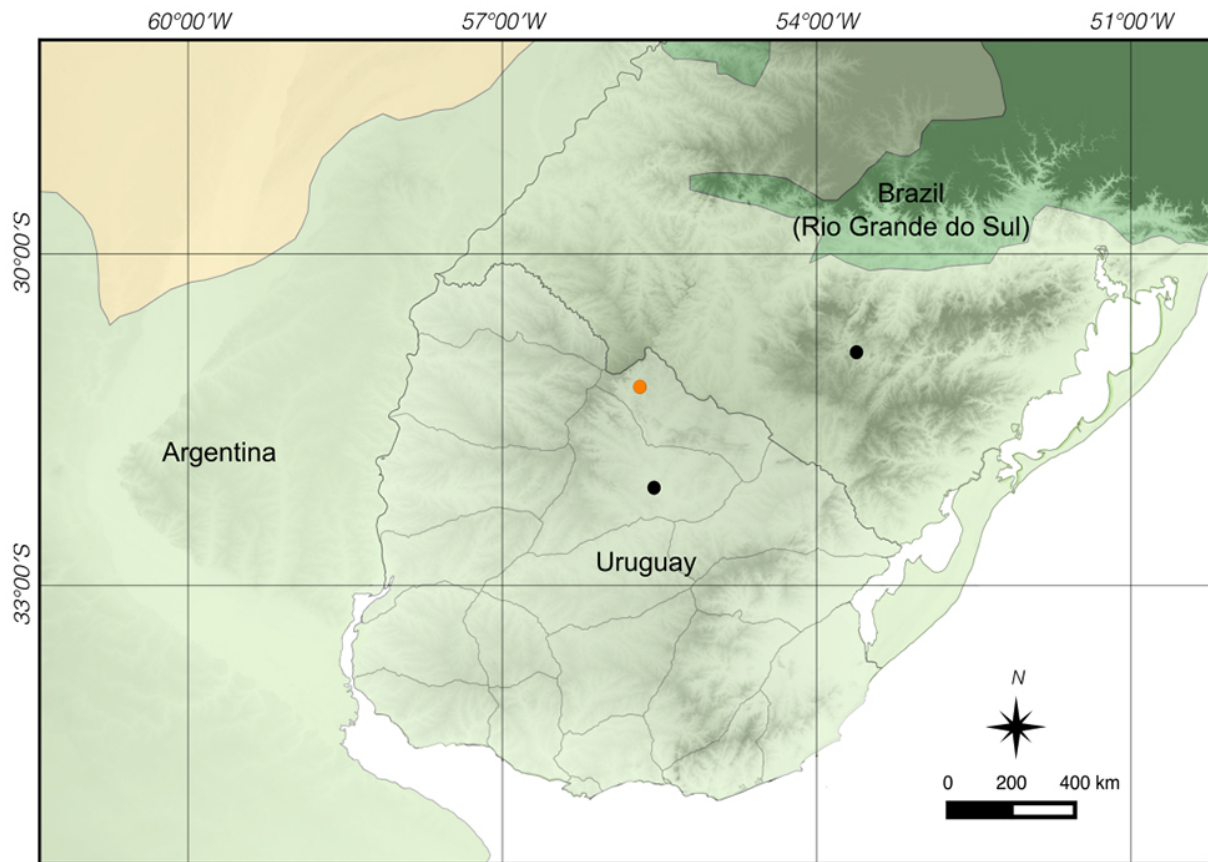
**Figure 2.** A-E. Illustration of *Trichocline maxima*. A. Habit; B. Outer to inner phyllaries; C. Ray florets; D. Disc florets; E. Achene. Illustrations A-E were made by Edson Luis de Carvalho Soares and adapted from Pasini & Ritter (2012). José M. Bonifacino drew the illustration of the achene E.

Some of his informations written on the herbarium sheets are difficult to decipher, and different localities are often informed in the same syntypes material. All of this is because the botanist had a tragic and early death in Brazil and therefore could not complete the information for each collection made by him. During the revision of the digitalized material of the genus *Trichocline*, we could identify three syntypes of this species, one in K, one in G and another in P, all collected by Sellow. In the labels of some of them, the indicated locality is simply *Brasilia* (Brazil) (e.g. G-308259), which is in accordance with the protologue of the species in Lessing (1830), however in some other specimens the locality *Brasilia meridionalis* is cited (e.g. K-504286). We do not believe this is a significant difference that indicates that the syntypes were collected in different places and times, and therefore we consider they all belong to the same collection. In addition to that, by the time Sellow collected the species, the borders between Uruguay and Brazil were not the same as today, therefore it could have been first collected in Uruguay.

Since the author did not specified which specimen is the holotype, we chose the one deposited in K as the lectotype (K-504286). This specimen is the one that is most informative and well preserved.

*Trichocline maxima* is a conspicuous scapose herb that can be easily distinguished from the other species of the genus by its smooth and glabrous 55–80 cm long floral scape, ovate phyllaries and glabrous leaves. During the vegetative stage, *T. maxima* can be misidentified by *Trichocline cisplatina* E. Pasini & Ritter, another Uruguayan species that also presents glabrous leaves with lobate margin and rounded lobes, however the second one has lobes bending backwards and form secondary lobes. The epithet *T. maxima* refers to the species large scape.

**Additional examined material:** BRAZIL. RIO GRANDE DO SUL: s.l., 1835, *A. Isabelle s.n.* (K, n.s.). URUGUAY. RIVERA: Paso Ataques, I.1944, *J. Chebataroff 9112* (LP); XII.1945, *A. Lombardo 4570* (MVJB); 22.IV.2014, *E. Pasini, J.M. Bonifacino, F.P. Torchelsen 1019* (ICN 178180); Rincón de La Laguna, 14.II.1947, *H. Osorio s.n.* (MVM 13902).



**Figure 3.** Distribution map of *Trichocline maxima*. The orange dot represents the latest record of the species that is reported in this work. The black dot in Uruguay is from collections cited in the additional examined material section. The black dot in Brazil represents the possible location of Malme's (1931) citation of a Sellow's collection: Inter Rio Pardo et Bagé.

### Key for the species of *Trichocline* of Brazil and Uruguay

1. Ray florets red to orange; leaves linear to linear-lobate .....2
- 1'. Ray florets yellow to golden yellow; leaves lanceolate to oblanceolate .....3
2. Ray florets red, leaves rarely linear, linear-lobate, pappus bristles undulating in the apex ..... *T. macrocephala*
- 2'. Ray florets orange, leaves always linear, pappus bristles straight in the apex ..... *T. linearifolia*
3. Floral scape and leaves glabrous to glabrescent ..... 4
- 3'. Floral scape and leaves tomentose to lanose .....7
4. Floral scape 55.0–120.0 cm long; leaves 20.0–30.0 cm long .....5
- 4'. Floral scape 2.0–20.0 cm long; leaves 3.0–14.0 cm long ..... 6
5. Leaves oblanceolate-lobate, glabrescent on the abaxial surface, phyllaries ovate with acute apex; floral scape 55.0–80.0 cm long. .... *T. maxima*
- 5'. Leaves lanceolate to oblanceolate, never lobate, tomentose on the abaxial surface; phyllaries lanceolate with apiculate apex; floral scape up to 120.0 cm long ..... *T. speciosa*
6. Leaf margins irregularly pinatissect; phyllaries glabrous, apex and margin reddish brown ..... *T. humilis*
- 6'. Leaf margins crenate, never pinatissect; phyllaries tomentose on the abaxial surface, apex and margin greenish ..... *T. heterophylla*
7. Floral scape ebracteate; leaf blades coriaceous, shiny on the adaxial surface, lobes strongly acute in the apex and undulate in the base; plant with densely woolly indumentum ..... *T. incana*
- 7'. Floral scape with up to 12 bracts; leaf blades membranaceous, opaque on the adaxial surface, lobes obtuse to rounded in the apex; plant with tomentose indumentum .....8
8. Ray florets yellow to orange-yellow; floral scape erect or sinuose; leaf blades oblanceolate, margins entire, sinuate or lobate, with up to 6 pairs of lobes ..... *T. catharinensis*
- 8'. Ray florets golden-yellow, never yellow; floral scape procumbent; leaf blades spatulate, margins strongly pinatissect, with up to 10 pairs of lobes, forming secondary lobes ..... *T. cisplatina*

### ACKNOWLEDGEMENTS

The first and third authors would like to thank Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) for financial support. The second author would like to thank Facultad de Agronomía for support when conducting field trips. We wish to thank Andres Rossado for helping during the field trip and Edson Luis de Carvalho Soares for the illustrations. We thank all the staff of the visited herbaria for their kindness and readiness in assisting.

### REFERENCES

- Cabrera, A.L. & Willink, A. 1973. Biogeografía de América Latina. Colección de Monografías Científicas O.E.A., Washington D.C. 120 p.
- Cordeiro, J.L.P. & Hasenack, H. 2009. Cobertura vegetal atual do Rio Grande do Sul. In Pillar, V.D., Müller, S.C., Castilhos, Z.M.S. & Jacques, A.V.A. (eds). Campos Sulinos: Conservação e Uso Sustentável da Biodiversidade. Brasília, Ministério do Meio Ambiente. p. 285–299.
- International Union for Conservation of Nature (IUCN). 2011. Guidelines for using the IUCN Red List Categories and Criteria. Version 9. Prepared by the Standards and Petitions Subcommittee. Available at: <http://www.iucnredlist.org/documents/RedListGuidelines.pdf>. Accessed on 24 September 2014.
- Katinas, L., Pruski, J.F., Sancho, G. & Telleria, M.C. 2008. The subfamily Mutisioideae (Asteraceae). Botanical Review (Lancaster) 74: 469–716. <http://dx.doi.org/10.1007/s12229-008-9016-6>
- Lessing, C.F. (1830) De synanthereis herbarii regii Berolinensis dissertatio tertia. *Linnaea* 5: 237–298.
- Malme, G.O.A.N. 1931. Die Compositen der zweiten Regnell'schen Reise. I. Rio Grande do Sul. *Arkiv för Botanik* 24: 1–89.
- Pasini, E. & Ritter, M.R. 2012. O gênero *Trichocline* Cass. (Asteraceae, Mutisieae) no Rio Grande do Sul, Brasil. *Revista Brasileira de Biociências* 10: 490–506.
- Thiers, B. 2014. [continuously updated] Index Herbariorum: A global directory of public herbaria and associated staff. – New York Botanical Garden Virtual Herbarium Available at: <http://sweetgum.nybg.org/ih/>. Accessed on 28 July 2015.
- Zardini, E.M. 1975. Revisión del género *Trichocline* (Compositae). *Darwiniana* 19: 618–733.