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***Tolpis santosii* (Asteraceae: Cichorieae), a New Species from La Palma, Canary Islands**

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RESUMEN: Una nueva especie, *Tolpis santosii*, es descrita para las islas Canarias. La nueva especie es reconocible en varias colectas provenientes de una zona húmeda cercana a la costa Norte - Noreste de La Palma. Esta especie se distingue de *T. laciniata* por la combinación de sus caracteres morfológicos, como tallos robustos y hojas glabras, además de varios marcadores moleculares.

Palabras clave: *Tolpis santosii*, nueva especie, islas Canarias.

ABSTRACT: A distinctive new species, *Tolpis santosii*, is described from the Canary Islands. The new species is known from several collections in a humid zone near the coast of north-northeastern La Palma. In addition to morphological characters such as stout stems and glabrous leaves, it is distinguishable from *T. laciniata* by several molecular markers.

Key words: *Tolpis santosii*, new species, Canary Islands.

INTRODUCTION

Tolpis is a small genus of some 12 species (Jarvis 1980), although there appear to be several undescribed species (Crawford et al. 2006, 2009, 2010; Mort et al. 2010). The center of distribution is in the Mediterranean region, with the majority of described species in the Macaronesian archipelagos of the Azores, Madeira, Cape Verde and Canaries (Jarvis 1980). Among the Macaronesian islands, the Canaries harbor the highest number of *Tolpis* species, and likely the greatest number of undescribed species (Crawford et al. 2006, 2009,

2010; Mort et al. 2010), although there is evidence of entities worthy of recognition in the Azores (M. Moura, pers. comm.), Madeira (A. Santos-Gurerra pers. comm.), and Cape Verde (M. Romeiras, pers. comm.)

Field, laboratory, and greenhouse studies in collaboration with Arnaldo Santos-Guerra over the past 15 years have revealed the occurrence of several distinctive morphological forms of *Tolpis*, each of which is of restricted geographic occurrence in the Canaries. These undescribed entities are referable to *T. laciniata* or *T. lagopoda*, two variable species that are difficult to define precisely because of morphological intergradations among populations. In addition, several other described species are variously recognized in some publications and not in others (Jarvis 1980; Bramwell and Bramwell 2001). Here, we describe a distinctive element from this complex as a new species.

MATERIALS AND METHODS

Field studies have facilitated observations of the new species in natural populations. Seed collected from nature was germinated and the resulting plants studied in the greenhouses at the University of Kansas. A total of over 100 plants of the proposed new species was observed to assess the morphological variation within and among populations, and to identify consistent morphological characters or combinations of characters distinguishing the proposed species from other Canarian *Tolpis*.

Allozymes (Crawford et al. 2006), hypervariable inter-simple sequence repeat (ISSR) DNA markers (Archibald et al. 2006), and DNA barcoding sequences from the plastid genome (Mort et al. 2010) have been employed to assess genetic divergence among populations of Canarian *Tolpis*, to identify diagnostic markers for recognized species, and to ascertain whether unnamed morphological forms are distinguishable by molecular markers.

RESULTS

Tolpis santosii D. J. Crawford, M. E. Mort, and J. K. Archibald, sp. nov. Type: Canary Islands: La Palma: Progeny grown in greenhouses at University of Kansas, from seed collected from plants occurring in rocks and ledges just above the coast at Playa de Nogales, N 28° 45.607'; W 17° 44.439' D. J. Crawford, J. K. Archibald, and A. Santos-Guerra 2009. 19 June, 2007. Holotype: KANU; Isotypes: to be distributed.

Additional specimens examined:

La Palma: Progeny from Santos #4, Playa de Nogales, July 5, 2003 (N 28° 45.546', W 17° 44.243') (Paratype: KANU); Progeny from Crawford et al. 1890, common in ledges and rocks above the ocean, El Peñón, 31 May, 2003 (KANU).

Diagnosis: *Tolpis santosii* is most similar to *T. laciniata*, differing in stems invariably stout and erect versus weak, and erect to variously spreading; leaves thin, glabrous and sparsely serrate to entire as opposed to varying from subglabrous to densely white tomentose, den-

tate to pinnatifid, pinnatisect, bitripinnatisect or rarely tripinnatisect; capitulescences with primary branches generally longer than 6.0 cm versus rarely up to 6.0 cm; capitula usually 2.5 cm or less in diameter versus often 2.5 to 3.0 cm.

Herbs perennial, to 30 cm. **Stems** stout, erect, highly branched, woody with age, approaching 3.0 cm diam.; branches glabrous, secondary and higher order branches overtopping primary branches (cincinnate), first order branches to 6.0 cm long, higher order branches progressively shorter. **Leaves** thin, glabrous, oblanceolate, basal to 9.0 x 2.5 cm, progressively smaller distally on stem, bases long-tapering to a winged petiole, mostly less than 2.0 cm long; margins entire or sparsely serrate, apices narrowly to broadly acute. **Peduncles** glabrous; peduncular bracts oblanceolate to linear, glabrous, those of first order branches to 3.0 cm long, those of higher order branches progressively reduced. **Calyculi** immediately subtending involucre or on distal 1.0-2.0 mm of peduncles and intergrading with peduncular bracts, green, ovate, ca. 1.5 mm long, glabrous. **Capitula** to 30, in compound cymose capitulescences at end of leafy stems, to 3.0 cm in diameter when fully open. **Involucral** bracts mostly 3-16, in 2 or 3 obscure series, all +/- equal, glabrous or sparsely farinose, lanceolate, to 6.0 mm long, margins scarious with small white hairs, apices narrowly acuminate. **Florets** to 60, yellow. **Achenes** black at maturity, subcylindrical, (1.0) 1.1-1.2 (1.4) mm, glabrous, pappi mostly persistent as (0-) 4-6 (-7) whitish setae, interspersed with whitish scales.

Distribution: The new species is known only from several localities in a humid zone near sea level, scattered among rocks on the north-northeastern coast of La Palma (Fig. 1A, B).

Etymology: The new species is named in honor of Dr. Arnaldo Santos-Guerra, unrivaled authority on the flora of the Canary Islands, on the occasion of his formal retirement. He first called our attention to this novelty during field studies in the Canaries. For several decades, his encyclopedic knowledge of the Canarian flora and his generosity in sharing that knowledge, both orally and in his published work, has facilitated and served as a framework for many important studies by scores of workers from many countries on the origin, biogeography, phylogeny, conservation, and reproductive biology of the plants of the Canaries. The naming of this species is a small token of our gratitude to Dr. Santos for his professional collaborations, is a reflection of our admiration for him as a scientist, and is an expression of our delight in having him as a dear friend. It is especially fitting that the novelty occurs on his beloved home island of La Palma. We look forward to many more years of productive collaborations.

DISCUSSION

Tolpis santosii is a member of a morphologically variable, non-monophyletic (Gruenstaeudl et al. 2013) complex of perennial herbs-subshrubs in the so-called *Tolpis laciniata*-*T. lagopoda* complex (Crawford et al. 2008, 2009, 2010; Mort et al. 2010). Phylogenetic relationships and taxonomic delimitations have not been fully elucidated among Canarian *Tolpis* (Jarvis 1980; Gruenstaeudl et al. 2012), but *T. santosii* is arguably the most distinc-

tive species within the complex, and is easily distinguished by a combination of characters, including the strong, erect, stems (Fig. 2A), thin, glabrous, entire or sparsely serrate leaves (Fig. 1B), and the relatively few large capitula (Fig. 2C) disposed in capitulescences with short branches (Fig. 2D). The species is distinguishable with plastid DNA (barcoding) sequences (Mort et al. 2010), and all individuals sampled from the type locality are resolved as a group by ISSR molecular markers (Archibald et al. 2006).

Tolpis santosii is also of interest in considerations of the distribution and evolution of breeding systems in Canarian *Tolpis*. While it is basically self-incompatible, there is also variation in the levels of self seed set (pseudo-self-compatibility, PSC, Levin 1996) among progeny of plants from natural populations of the new species (Crawford et al. 2008), and molecular markers document that mixed mating occurs in the population from which the type has been designated (Crawford et al. 2010).

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Fig. 1.- **A.** Type locality for *Tolpis santosii* at Playa de Nogales, looking down from mountains above beach; **B.** *Tolpis santosii* growing at type locality just above beach at Playa de Nogales.



Fig. 2.- A. Plant of *Tolpis santosii* at type locality. Note the diagnostic features of simple, sparsely serrate leaves and few, large, capitula on short branches; B. Glabrous, entire to sparsely-toothed leaves of *T. santosii*. Line = ca 3.0 cm; C. Fully open (3 cm diameter) capitulum with floral visitor; D. Portion of capitulescence showing the few, large capitula on short branches, and the secondary and higher order branches overtopping the primary branches.