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Note

Senecio angulatus L.f. (Asteraceae) a new addition to the Moroccan flora

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Abstract

Senecio angulatus L.f. (Asteraceae), native to South Africa, is reported here as a new non-native plant to the vascular flora of Morocco for the first time. The species' diagnostic morphological characters, photographic illustration, data on geographic distribution and ecology, and probable invasion pathway are provided and commented.

Key Words: exotic flora, chorlogy, new record, Morocco.

Resumen

Senecio angulatus L.f. (Asteraceae), especie nativa del sur de África, es citada por primera vez como especie alóctona de la flora vascular de Marruecos. Se muestran y comentan caracteres morfológicos diagnósticos de especie, fotografías, datos de distribución geográfica, ecológicos y de probable vía de invasión.

Key Works: flora exótica, corología, nueva cita, Marruecos.

Senecio L. (Asteraceae, Senecioneae) is a cosmopolitan genus with about 1250 species, including trees, shrubs, lianas, and herbs (Lotfi *et al.,* 2010; Angiosperm Phylogeny Group (APG-IV), 2016; Eftekharian *et al,.* 2018; POWO 2024). In the North African region, this genus has been reported to have 33 accepted taxa (31 spontaneous and 1 naturalized, 1 cultivated) (Dobignard & Chatelain, 2011). In the most recent reference of the flora of Morocco, 19 *Senecio* taxa have been recorded, 6 of which are endemic (Ibn Tattou & Fennane, 2008; Fennane *et al.,* 2014).

In the continuation of our field investigation of the phytogeographic region of the Moroccan North Atlantic (Man-3 in this study, Figure 1) (Khamar *et al.,* 2021, 2022, 2023; Khamar, 2022a, 2022b), we came across an unknown species of *Senecio*. After a comprehensive review of the relevant literature (e.g., Foden & Potter, 2005; Delucchi *et al.,* 2016; CABI [Centre for Agriculture and Bioscience International], 2023) and type materials (for lectotype specimens, see Iamonico (2017)), as well as analyzing true specimens based on the JSTOR database (https://plants.jstor.org), the plant was identified as *S. angulatus*, a native plant of South Africa. Based on the current floristic references for Morocco (Valdés *et al.,* 2002; Dobignard & Chatelain, 2011; Fennane *et al.,* 2014), it has been determined that this species has not been previously documented in the country. The details of this finding are provided below.

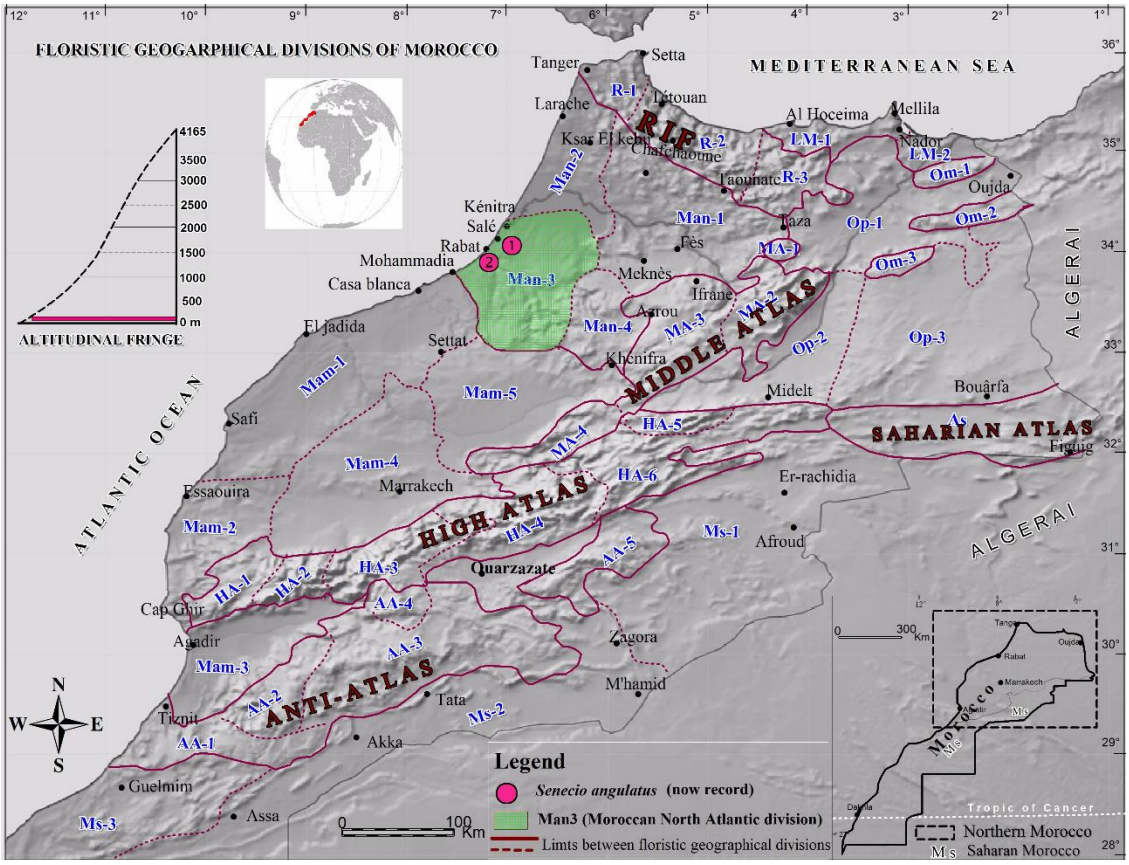

Figure 1. Distribution map of *Senecio angulatus* L.f. in Morocco (red spots), with the sampling sites: Site 1 (Salé), Site 2 (Rabat). Floristic geographical divisions of Morocco modified from Fennane and Ibn Tattou (1998), where HA = High Atlas Mountains, MA = Middle Atlas Mountains, R = Rif mountains; AA = Anti Atlas Mountains, Mam = Middle Atlantic of Morocco; Man = North Atlantic of Morocco, Ms = Saharan Moroccan, LM, Mediterranean Coast, Op = Eastern-lands, Om = Eastern Mountains and As = Saharian Atlas Mountains.

Figura 1. *Mapa de distribución de* Senecio angulatus *L.f. en Marruecos (puntos rojos), con los sitios de muestreo: Sitio 1 (Salé), Sitio 2 (Rabat). Divisiones florísticas geográficas de Marruecos modificadas por Fennane et Ibn Tattou (1998), donde HA = Atlas Alto, MA = Atlas Medio, R = Rif ; AA = Anti Atlas, Mam = Atlántico Medio de Marruecos ; Man = Atlántico Norte de Marruecos, Ms = Marruecos Sahariano, LM= Litoral Mediterráneo, Op = Tierras Orientales de Marruecos, Om = Montes Orientales de Marruecos, As = Atlas Sahariano.*

Collected specimens of *Senecio angulatus* were gathered from Agdal Municipality, Rabat Province, and Bettana, Salé Province, Morocco, between March and October 2023. Data regarding the geographic distribution, habitat, photographs, and phenology of plant specimens were taken at each site during fieldwork. Voucher specimens have been deposited and preserved in the RAB Herbarium (herbarium acronym is according to Thiers (2024)).

Senecio angulatus L.f., Suppl. Pl. 369 (1781) (non *S. angulatus* Vahl, Symb. Bot. 3: 92 (1794))

Lectotype (designated by Iamonico 2017: 284): South Africa, Caput Bonae Spei, Thunberg s.n. (UPS-19537).

= *Cineraria laevis* A. Spreng.; Tent. Suppl. Syst. Veg. L. 23 (1828) ex DC., Prod. 6: 404 (1838)

= *Senecio canalipes* E.Mey.; Zwei Pflanzengeogr. Dokum.: 220 (1843).

= *Senecio macropodus* DC.; Prodr. [A. DC.] 6: 403 (1838).

= *Senecio tredecimsquamosus* Sch.Bip.; Flora 27: 700 (1844).

Morocco: Salé, Bettana district, edge of Ain Haouli Road, 50 m a.s.l., 22 .10. 2023, *H. Khamar* s.n. (RAB114642); Rabat vicinity, Agdal district, 120 m alt., 20.10. 2023, *H. Khamar* s.n. (RAB114643) (Figures 2 and 3).

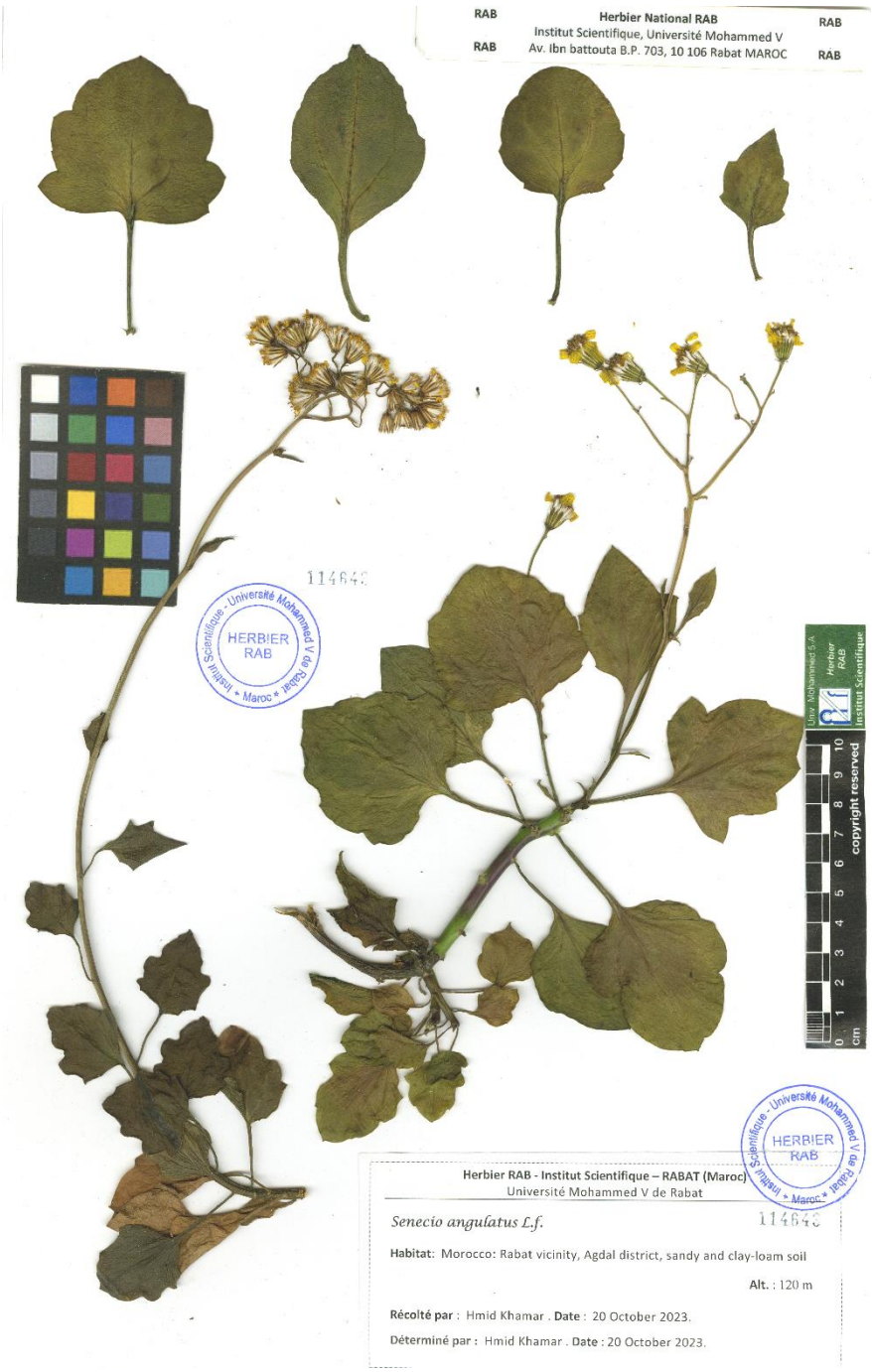

Figure 2. Exemplar of Herbarium sheet (RAB114643) of *S. angulatus* stored at the National Herbarium of Rabat.
Figura 2*. Ejemplar de pliego de herbario (RAB 114643) de* S. angulatus *conservado en el Herbario Nacional de Rabat.*

Senecio angulatus is easily distinguished from all other Moroccan *Senecio* species by a combination of the following characters: glabrous scandent perennial herb, occasionally prostrate, 2–10 m long or high; stems wiry to woody, sparingly branched; leaves 3–7 × (1–)2–6 cm, alternate, petiolate, blade ovate to deltoid, thick, slightly fleshy, base notably cuneate, margin roughly toothed, teeth 1–3 per side; petioles 1–4 cm. Radiated glabrous capitula 1–2.5 cm in diameter, peduncles 6–25 mm long, arranged in apical corymbiform cymes; involucral bracts (phyllaries) 8–11, oblong, 5–6 mm long. Marginal flowers 4, pistillate,

ray, yellow, ligule elliptical, 3-toothed. Disc flowers, bisexual, tubeulous, yellow in the upper half and greenish in the lower half; styles with truncated branches, penicillated. Achenes 2.5–4 mm long, cylindrical, slightly wider towards the apex, markedly ribbed, hispidulous; pappus 5–6 mm long (see also Webb *et al.*, 1988; Delucchi *et al.*, 2016). 2n = ca. 182 (Lawrence, 1980).

Based on our field observation, flowering occurs from early March to September and can extend into late autumn, with peak blooming in summer.

Figure 3. *Senecio angulatus* L.f. in Morocco. A) Aspect and port; B) Leaf shapes; C) Part of inflorescence; D) Capitulum; E) Marginal flower; F) Flower of the disc; G) Disc flower style.
Figura 3. Senecio angulatus *L.f. en Marruecos. A) Aspecto y porte; B) Hojas; C) Inflorescencia; D) Capítulo; E) Flor ligulada; F) Flor flosculosa; G) Estilo de flor flosculosa.*

In Morocco, *S. angulatus* is found near dwellings, in wasteland, at the edge of gardens, scrubland, and along roadside cuttings and forest margins. At the places explored, it grows at an altitude ranging from 50 to 120 m a.s.l. on sandy and clay-loam soil.

Angular ragwort (*S. angulatus*) is a plant native to south Africa, particularly from the Cape Peninsula (Foden & Potter, 2005). It has been introduced in various regions globally as an ornamental plant (POWO, 2024). This plant has been documented as naturalized in various regions, including the northern Mediterranean shore (Brunel & Tison, 2005; Stierstorfer & Von Gaisberg, 2006; Buján, 2007; Pyšek, 2008; Bacchetta & García-Berlanga, 2009; Milović *et al.* 2010; Barina *et al.,* 2011; Otto & Verloove, 2016; Iamonico, 2017; Galasso *et al.,* 2018), Australia (Randall, 2007), New Zealand (Newton, 1996), Tasmania (Baker & Duretto, 2013), Argentina (Delucchi *et al.,* 2016), and Chile (Castro & Muñoz-Schick, 2006).

In North Africa, *S. angulatus* is an introduction (Dobignard & Chatelain, 2011; APD [African Plant Database], 2024), known since the 1980s from Libya (Alavi, 1983), and more recently it has been documented from Algeria (Miara *et al.,* 2018). Nevertheless, to our knowledge, this species has not been reported before in Morocco. Hence, it is reported here for the first time as a new addition to the non-native vascular flora of the country.

Within its secondary distribution range, *S. angulatus* is categorized as a useless weed and an invasive plant (POWO, 2024). As pointed out by (Cottaz *et al.,* 2017), the plant grows rapidly and competes fiercely with native plants. Thus, it can be found in a wide variety of settings, including cities, highways, vacant lots, walls, fences, overgrown vegetation, riverbanks, abandoned farms, and coastal dunes (Delucchi *et al.,* 2016). Research undertaken in different areas where this plant has been introduced has revealed the impacts of its presence in natural habitats. Indeed, the ecological implications of this plant come from its rapid regeneration through runners and the creation of many suckers and small fragments that can

germinate and grow (Bergin, 2006; González Costales, 2007; Milović *et al.,* 2010). These reproductive mechanisms enable it to swiftly establish dense populations in open or and closed environments, often creating extensive thickets that decrease or even inhibit the regeneration of native species (Newton, 1996; Mehelis *et al.,* 2015; Delucchi *et al.,* 2016; Cottaz *et al.,* 2017; Miara *et al.,* 2018)

The path and vector of angular ragwort in Morocco are not exactly known. Nevertheless, it is believed that its introduction was likely through its common cultivation for ornamental purposes in certain villa gardens (Khamar, pers. obs.). Furthermore, due to the rapid and facile regrowth of *S. angulatus*, garden waste can also significantly contribute (Bergin, 2006; Cottaz *et al.,* 2017) to its spread and the colonization of new regions throughout the country.

In conclusion, although this finding enhances the floristic list of the vascular flora of Morocco on the one hand, it may also have various ecological and economic implications that are occasionally concerning. Indeed, very dense populations of *S. angulatus* form canopies that completely cover the ground. Thus, it has the ability to smother native plants, causing their populations to disappear from their natural habitat. Given its impact on local ecosystems in various introduction areas (e.g., see Mehelis *et al.* (2015); Delucchi *et al.* (2016); Cottaz *et al.* (2017)), it is crucial to monitor the spread of this invasive plant on a national scale. This will help mitigate the significant threat it poses to natural ecosystems throughout the country, particularly in disturbed places like urban areas and related environments that may be less appealing to researchers. Thus, the effect assessment will be important in developing strategies to reduce its impact on the surrounding environment.

Conflict of interest

None.

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