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First report of a well-established *Ambrosia* (*Asteraceae*) to the non-native African flora

Abstract

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Ambrosia confertiflora a perennial herb native to North America and Caribbean has been recorded as a new alien to the vascular flora of African continent, second report to the Mediterranean area. In Tunisia, *A. confertiflora* is reported naturalized from few localities in the centre of the country where the species has established small and extended populations in surrounding ruderal disturbed habitats. A short morphological description as well as its distribution and habitat in Tunisia with color photos are presented. Moreover, a key to the *Ambrosia* species in the African continent is here firstly provided.

Key words: *Asterales*, alien plants, *Compositae*, floristic data, new record, Tunisia.

Introduction

Since few decades a tendency for invasion of foreign plant species into the southern Mediterranean flora becomes ever more prominent (see e.g. Vêla & al. 2013; Meddour & El Mokni 2016; Sukhorukov & al. 2018, 2019; El Mokni & Iamonico 2019; El Mokni & Verloove 2019; El Mokni & Domina 2020; El Mokni & al. 2020; Verloove & al. 2020) where the *Asteraceae* remains one of the largest families of flowering plants and contains major globally naturalized flora (see e.g. El Mokni & El Aouni 2011; Hamel & Azzouz 2018; El Mokni & Iamonico 2018a, 2018b; El Mokni & Domina 2018a, 2018b; El Mokni & Vêla 2018; Miara & al. 2018; Verloove & al. 2020; Sakhraoui 2021; El Mokni & al. 2022). *Ambrosiinae* Less is a subtribe of the *Heliantheae* Cassini tribe (*Asterales*, *Asteraceae*), including almost eight genera among which *Ambrosia* L. and *Xanthium* L. are widely spreading in Africa. The genus *Ambrosia* counts more than 50 species, with ragweed or bursage as the commonly known member. *Ambrosia* is naturally occurring in the new world, mainly in North America (Leon de la Luz & Rebman 2019; WFO 2023). It is distributed mostly in the southwestern United States and the nearby North Mexico with an apparent centre of origin and diversity in the Sonoran Desert, but a few species can be

found in Central America and South America (Payne 1966). In Africa, the genus includes almost five casual to naturalized species (APD 2023).

During field work at the centre of Tunisia (N-Africa), an extended population of one *Ambrosia* that looks new to the African continent, has been found. Details about the identity of this new established *Ambrosia* in continental Africa and its habitats are presented. Moreover, a key to the *Ambrosia* species in Africa is here proposed.

Material and methods

Several botanical expeditions were carried through different regions of centre of Tunisia since 2015 to make updates about its wild/non-native flora, especially the undocumented ones. Data on the plant populations and the habitats of the recoded taxa were also collected. For the identification of the species, relevant literature (see e.g. Keil 2012; Flora of North America 2017; EPPO 2019) and examination of specimens preserved at some accessible herbaria were used (MPU, NYBG and P, acronyms follow Thiers 2023 [continuously update]). Collected specimens are deposited at the personal herbarium of the author (Herb. R. El Mokni) housed in the Herbarium of Monastir University (not listed in *Index Herbariorum*).

Results

As stated in the introduction, the unknown species proved to be *Ambrosia confertiflora* DC., a species with native range restricted to the North America (mainly Mexico, Villaseñor Ríos 2016) and Caribbean (Puerto Rico, EPPO 2019 :50), not known yet in the African continent and second report for the Mediterranean area (CABI 2023). All discovered population and subpopulations from different sites of centre Tunisia seem to be well established, suggesting that the species is naturalized and could be more widespread within surroundings if not in other parts of Tunisia and N-Africa. The given morphological description is based in part from material collected in this study.

Ambrosia confertiflora DC., Prodrromus Systematis Naturalis Regni Vegetabilis 5: 526. 1836.

≡ *Franseria confertiflora* (DC.) Rydb., N. Amer. Fl. 33: 28. 1922.

Morphological description – (Fig 1). Perennial herb (hemicryptophyte), rhizome-like roots, monoecious; *stems* 60–80(–250) cm erect reddish at the base; *leaves* aromatic, 40–85(–150) mm long and 20–35(–55) mm wide, opposite at the base, mostly alternating higher up, petioles 10–35 mm, blades lanceolate to ovate, 40–85(–150) × 20–35(–55) mm overall, laciniately 2–4-pinnately lobed (lobes more or less lanceolate), bases cuneate to truncate, ultimate margins entire, abaxial and adaxial faces strigillose to sericeous (often grayish) and gland-dotted; *inflorescence* with *pistillate* (female) *florets* lacking petals clustered in distal leaf axils, proximal to staminate, 1(–2)-flowered, style branches long and linear, exserted from involucre and numerous small *staminate* (male) *florets* born on erect



Fig. 1. *Ambrosia confertiflora* in Tunisia : a) habit of the plant and ruderal habitat within roadsides; b) detail of the inflorescence. Photographs by R. El Mokni.

clusters with peduncles 0.5–2.0 mm, involucre cup-shaped, ca. 1.5–3.0 mm in diameter, strigillose, 5–9(–20)-flowered; *fruits* in spiny burs, 1.0–2.0(–5) mm long, 1.5–5.0 mm in diameter, ovoid, more or less tapered at base, pyramidal to pyriform, strigillose to pilosulous, bearing hooked spines, and each one includes a single seed, tips uncinata; *spines* (1–)5–12(–20), mostly distal, stoutly conic to subulate, 0.5–1.0 mm, puberulent and minutely gland-dotted; *seeds* are brown with a diameter of 3.0–4.0 mm.

Phenology in Tunisia – Flowering and fruiting times October to December (sometimes up to January).

Geographical distribution and rate of invasiveness (Fig. 2) – Native to northern Mexico and south-western USA, *Ambrosia confertiflora* has been reported as introduced and naturalized in Australia (New South Wales, South Australia and Queensland) by Watt (1987) and Council of Heads of Australasian Herbaria (2019) and also Palestinian occupied territory including the West Bank (Yair & al. 2017) where it can form very dense stands and outcompetes other plants. Among several other *Ambrosia* species that have proved to be invasive after being introduced to areas outside of their native ranges (*A. artemisiifolia* L., *A. psilostachya* DC., and *A. trifida* L.), *A. confertiflora* spreads very fast, reproducing from seeds and through vegetative propagation, and is considered to have the fastest rate of spread among land invasive alien plants in the Palestinian occupied territory where low winter temperatures in the Mediterranean basin do not seem to affect survival. The numerous spiny burs stick to the fur of mammals but also spread in flowing water, particularly during floods (EPP0 2019).

Distribution and habitat in Tunisia – *Ambrosia confertiflora* grows mainly in moist localities along the roadsides, in waste places and edges of cultivated fields, more rarely in human-made habitats on loamy and sandy substrates within ruderal vegetation (mainly *Opuntia ficus-indica* (L.) Mill.) and abandoned rocky soils from 85 to 165 m a.s.l. At the

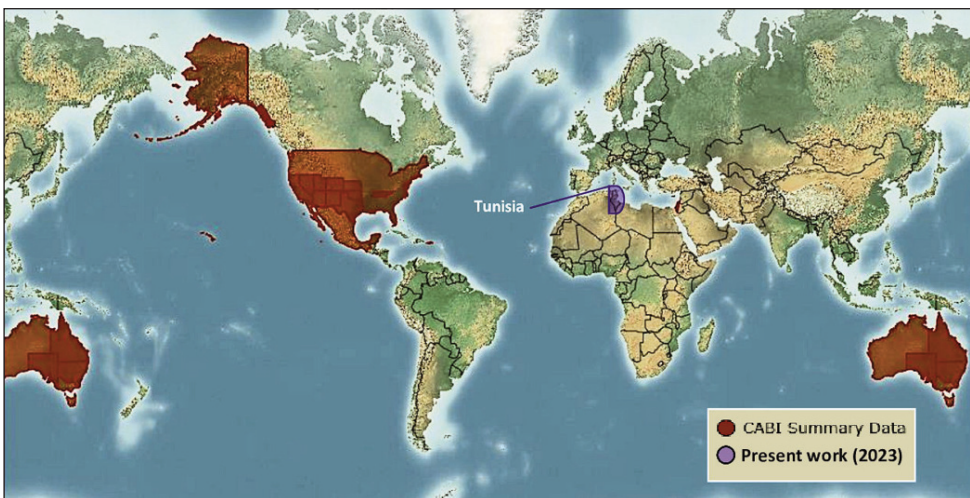


Fig. 2. Actual worldwide distribution area of *Ambrosia confertiflora* red color for CABI summary data and purple color (Tunisia, African continent) for the present work.

sites where it was discovered (Limaya, Menzel chaker, Sfax, CE of Tunisia), it continued growing through winter, spring, and summer but flowering occurred only from October and no benefits were attributed to the plant for the Limaya’s inhabitants.

Selected specimens examined (new records) – Tunisia. Sidi Bouzid towards Sfax, Limaya, Menzel chaker, Sfax (CE of Tunisia), along roadsides, 10 September 2022, *El Mokni s.n.* (Herb. R. El Mokni), ibidem, 07 November 2022, *El Mokni s.n.* (Herb. R. El Mokni).

Diagnostic key to species of *Ambrosia* in Africa

The key below, based on published literature (see e.g. Strother 2006; Karrer & al. 2021; Jepson Flora Project 2023), can be used to distinguish the six species of *Ambrosia* known from the African continent, so far:

- 1a. Taproots2
- 1b. Bud-bearing creeping roots (stolon-like).....3
- 2a. Shrub..... *A. arborescens* Mill.
- 2b. Annual, biennial, perennial herbs4
- 3a. Leaf blade lanceolate to ovate, laciniately 2–4-pinnately lobed (lobes ± lanceolate); involucre of staminate heads ca. 1.5–3 mm in diameter; bur spines many (up to 13+), subulate, tips usually uncinata*A. confertiflora* DC.
- 3b. Leaf blade different (pinnatifid to bipinnate with rounded to broadened and separated or linear and connected leaf segments); involucre of staminate heads ca. 2–4(–5) mm in diameter; bur spines 0 to few (1 to 6), conic or straight, tips straight5
- 4a. Annual, leaves sparsely hairy (subglabrous), green, spicy smell *A. artemisiifolia* L.
- 4b. Annual to perennial, leaves dark green and pubescent above, grey-green and hairy below, aromatic with a strong smell of thyme *A. maritima* L.
- 5a. Leaves 2(3)–pinnate compound (only the uppermost ones 1-pinnate), with long and wingless petioles; ultimate segments linear, ca. 1 mm wide; pistillate capitula solitary or few in the axils of the upper leaves; lateral teeth of the fruiting involucre 4–6, conical..... *A. tenuifolia* Spreng.
- 5b. Leaves 1-pinnate compound or pinnatifid, subsessile or occasionally on short-winged petioles; ultimate segments wider 2–3 mm; pistillate capitula clustered in the axils of the upper leaves; lateral teeth of the fruiting involucre 1-6, sometimes lacking, blunt *A. psilostachya* DC. (syn. *A. coronopifolia* Torr. & A. Gray.).

Discussion

Ambrosia confertiflora is one more reported taxon for the non-native flora of Africa, second report to the alien *Asteraceae* for the Mediterranean area. Two major established populations/subpopulations were here firstly found in centre Tunisia. The plant produces a large amount of pollen (as with the other *Ambrosia* species) which is considered to be severely allergenic (Yair 2017), causing hay fever and contact dermatitis in susceptible people and classified as noxious (Parsons & Cuthbertson 2001). In the nearer future, all sites of the new alien plant have to be under continuous monitoring to limit its spreading at least via disper-

sal seeds by traffic over very long distances and storm water run-off might along roadsides over short or mid-distances and as a second urgent step and due to its almost not very extended populations, actions for manual eradication (pulling out) must be taken before the flowering period. We strongly discourage the application of herbicides as some of these chemical products have the capacity to move in the environment away from the target area, and to cause damage to non-target plants and animals, besides the ability to cause a loss of vegetation cover and, consequently, an increase in erosion problems.

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