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## Two new weeds in Morocco: *Ambrosia psilostachya* (Asteraceae) and *Datura ferox* (Solanaceae)

### Abstract

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As a result of field surveys with special emphasis on weeds occurring in Moroccan farmlands, two recently introduced weed species (*Ambrosia psilostachya* and *Datura ferox*) have been found in several locations. *A. psilostachya* (Asteraceae) has been discovered in 2000 growing along roadsides. It is a perennial species that survives essentially through rhizomes and rootstocks, resulting in the establishment of clonal populations that form dense colonies on roadsides. It has been observed in March 2023 in 16 sites along national roads and highways. *Datura ferox* (Solanaceae) has been found in irrigated corn fields in 2022 and in a carrot field in 2023. Both species are unpalatable to livestock and will probably spread to other areas of Morocco. They are considered new naturalized weeds, which indicate that the country needs more botanical explorations. Herbarium specimens of both species were deposited at the national herbarium of the Institut Scientifique in Rabat.

*Key words:* xenophyte, weed survey, new record, flora, North Africa.

### Introduction

There have been several contributions on the exotic alien plant species in Morocco (see e.g. Tanji & Taleb 1997; Fennane & al. 1999, 2007, 2014; Chambouleyron & Benrahmoune Idrissi 2017; Tanji 2020; Khamar & al. 2021; Pils 2022; Verloove & al. 2022; Sukhorukov & al. 2023; Tanji 2023). There are nearly 200 introduced weed taxa, involuntarily brought by humans or by other means such as rivers, winds, and birds (Fennane & al. 2023). Some of these exotics are becoming naturalized or even invasive. They threaten biodiversity and pose a huge global threat to sustainable agriculture, food security, and human livelihoods. Their spread and impact are growing due to climate change, globalisation, trade, and tourism (e. g. Lake & Leichman 2004; Lambdon & al. 2008; Early & al. 2016; Gervilla & al. 2019; Arianoutsou & al. 2021; Di Gristina & al. 2021; Cordero & al. 2023; Karrer & al. 2023).

I present here the distribution and status of two naturalized plant species in Morocco (*Ambrosia psilostachya* DC. and *Datura ferox* L.) that are expanding in the country. Photos, descriptions, and impacts of these newly introduced species are provided in the present note.

***Ambrosia psilostachya* DC.**

= *Ambrosia coronopifolia* Torr. & A. Gray

English name: Western ragweed.

French names: Ambroisie vivace, ambroisie à épis grêles, ambroisie à épis lisses, ambroisie à épis glabres.

The author collected western ragweed plants for the first time in the country in 2000 in the roadside of Settat-Casablanca national road and Pr. Ibn Tattou confirmed the identification of *Ambrosia psilostachya* as a new exotic species in Morocco (Tanji 2005; Tanji & Taleb 2010). In March 2023, 16 clamps have been observed along roadsides and highways in Settat, Berrechid, Casablanca, Rabat, Salé, Kénitra, Sidi Yahya, and Sidi Slimane (Fig. 1, Table 1). However, *A. psilostachya* has not been cited yet in various floras of Morocco (Dobignard & Chatelain 2011; Fennane & al. 2014; Pils 2022; efloramaghreb 2023; flora-maroccana 2023; Peltier 2023).

In Morocco, Western ragweed plants survive and expand primarily from horizontal and vertical rootstocks (Fig. 1). Since western ragweed is not palatable to livestock, some colonies prospered in sandy soils producing sometimes more than 100 stems m<sup>-2</sup> and growing up to 1,40 m tall. Machines used for road construction and management certainly contributed a lot to rhizome dispersal.

From field observations, growth of new shoots occurs from November to April when minimal temperatures at night are 5 to 15 C, maximal temperatures in the day are 15 to 25 C, and the photoperiod is 10 to 12 hours. Stem growth and colony formation occur from January to May when minimal temperatures at night are 5 to 20 C, maximal temperatures in the day are 15 to 30 C, and the photoperiod is 10 to 13 hours. The flowering period is essentially from May to December. Panicles are predominantly formed with many male flowers at the top of the inflorescence, and only few female flowers at the base of the inflorescence. Seeds and seedlings have never been observed. Western ragweed is therefore considered, under local climatic conditions, a perennial weed in Morocco.

The dispersal strategy appears similar in all observed sites along roadsides and highways. In the first year, the individual plant does not appear to produce additional shoots from its root system. In the second year, new shoots emerge from the rootstocks, thus establishing a dense clone which can cover up to 1 or 2 m<sup>2</sup>. Through its spreading rhizomes, a clamp can be formed or even an area can be colonized within few years. Dense colonies may raise questions about possible impact of western ragweed, through competition and allelopathy, on the local flora.

***Chorology***

Western ragweed is native of North and South America (Bassett & Crompton 1975; CABI 2023; POWO 2023). It is found in the 5 continents, and is usually distributed in roadsides, fields, and pastures (CABI 2023; POWO 2023; WFO 2023). In the Mediterranean region and surrounding areas, it was reported in Algeria, Italy, France, and Spain (Dobignard & Chatelain 2011; Tison & de Foucault 2014; Fried & al. 2015; Domina & al. 2018; APD 2023; CABI 2023; EPPO 2023; POWO 2023; efloramaghreb 2023).

***Notes***

Western ragweed is a perennial *Asteraceae* that survives primarily through rhizomes and rootstocks, resulting in the establishment of clonal populations that can cover rapidly



Fig. 1. *Ambrosia psilostachya*: a) dense colony on the roadside; b) general habit, c) leaves, d) horizontal rhizomes, e) inflorescence with male capitula; f) distribution in Morocco. Photos by the author.

Table 1. *Ambrosia psilostachya* in 16 sites along national roads and highways from Settat to Sidi Slimane in Morocco in March 2023.

Site no.	Locality	GPS latitude	GPS longitude	GPS altitude in m
1	Settat	33° 2' 58" N	7° 37' 32" W	300
2	Sidi El Aidi	33° 3' 1" N	7° 37' 33" W	280
3	Berrechid	33° 20' 17" N	7° 36' 40" W	200
4	Bouskoura	33° 26' 6" N	7° 37' 42" W	170
5	Médiouna	33° 28' 58" N	7° 30' 38" W	160
6	Skhirate	33° 51' 10" N	7° 3' 41" W	40
7	Rabat	33° 54' 12" N	6° 59' 26" W	20
8	Salé	33° 59' 16" N	6° 43' 42" W	140
9	Salé	34° 1' 47" N	6° 42' 42" W	120
10	kénitra	34° 5' 28" N	6° 41' 17" W	90
11	kénitra	34° 17' 37" N	6° 25' 46" W	10
12	Kénitra	34° 18' 2" N	6° 29' 32" W	10
13	Sidi Yahya	34° 18' 7" N	6° 16' 51" W	20
14	Sidi Yahya	34° 17' 24" N	6° 14' 4" W	30
15	Sidi Slimane	34° 16' 27" N	6° 5' 8" W	40
16	Sidi Slimane	34° 16' 3" N	5° 59' 23" W	30

large areas (Basset & Crompton 1975; Fried & al. 2015). It is an invasive weed in Australia (CABI 2023), in the USA (Vermeire & Gillen 2000), in France (Fried & al. 2015), in Iran (Saberri & al. 2022), and several other countries (GBIF 2023). It is considered one of the most common weeds in pastures and rangeland in the southern Great Plains region of the USA (Funderburg & al. 2014). It is an aggressive competitor with crops and is generally considered unpalatable to cattle (Vermeire & Gillen 2000). Leaf and rhizome extracts inhibited germination and early seedling growth in a range of *Poaceae* including wheat, oats and rye (Dalrymple & Rogers 1983).

Western ragweed is primarily anemophilous (wind-pollinated). It does shed large quantities of air-borne pollen that causes hay fever symptoms (Basset & Crompton 1975). However, the pollen produced could potentially contribute to allergies by prolonging the presence of pollen in the air, and its effects on health might be aggravated by climate change (Wan & al. 2002; Fried & al. 2015).

### *Datura ferox* L.

English names: fierce thornapple, long spined thorn apple, Angel's-trumpets.

French names: La stramoine féroce, la stramoine épineuse.

*Datura ferox* belongs to the *Solanaceae* family that includes in Morocco 16 genera and 46 taxa, while the genus *Datura* contains 4 species: *Datura innoxia* Mill., *D. metel* L., *D. stramonium* L., and *D. wrightii* Regel (Fennane & al. 2007, Dobignard & Chatelain 2013, Pils 2022, efloramaghreb 2023, Peltier 2023). None of these references confirmed the presence of *D. ferox* in Morocco, and it is therefore considered an exotic weed species recently introduced into the country.

Fierce thornapple plants were found by the author in irrigated corn fields in Oualidia near the Atlantic Ocean (33° 2' 23" N, 8° 41' 30" W, altitude 10 m) and Khémis Mtouh (32° 51' 4" N, 8° 8' 55" W, altitude 160 m) in October 2020 (fall season) and in an irrigated carrot

field in Berrechid (33° 17' 41" N, 7° 25' 26" W, altitude 240 m) in May 2023 (early summer season). Pr. Ibn Tattou confirmed the identification of *Datura ferox* as a new exotic species in Morocco. Collected plants were at the flowering and fruiting stages (Fig. 2), and were growing in areas where daily temperatures in summer (June, July, August) usually exceed 30 C, nightly temperatures are around 20 C, and the photoperiod is 14 hours. *D. ferox* is therefore considered, under local climatic conditions, a summer annual weed in Morocco.

### Chorology

Fierce thornapple is native to southern North America (CABI 2023; POWO 2023). It is located in roadsides, waste places, and cultivated lands. It is an annual plant that has become a significant weed of summer crops in many subtropical and warm temperate parts of the world. It is found in the 5 continents. In the Mediterranean region and surrounding areas, it was reported in the Canary Islands, Algeria, Israel, Greece, Italy, France, and

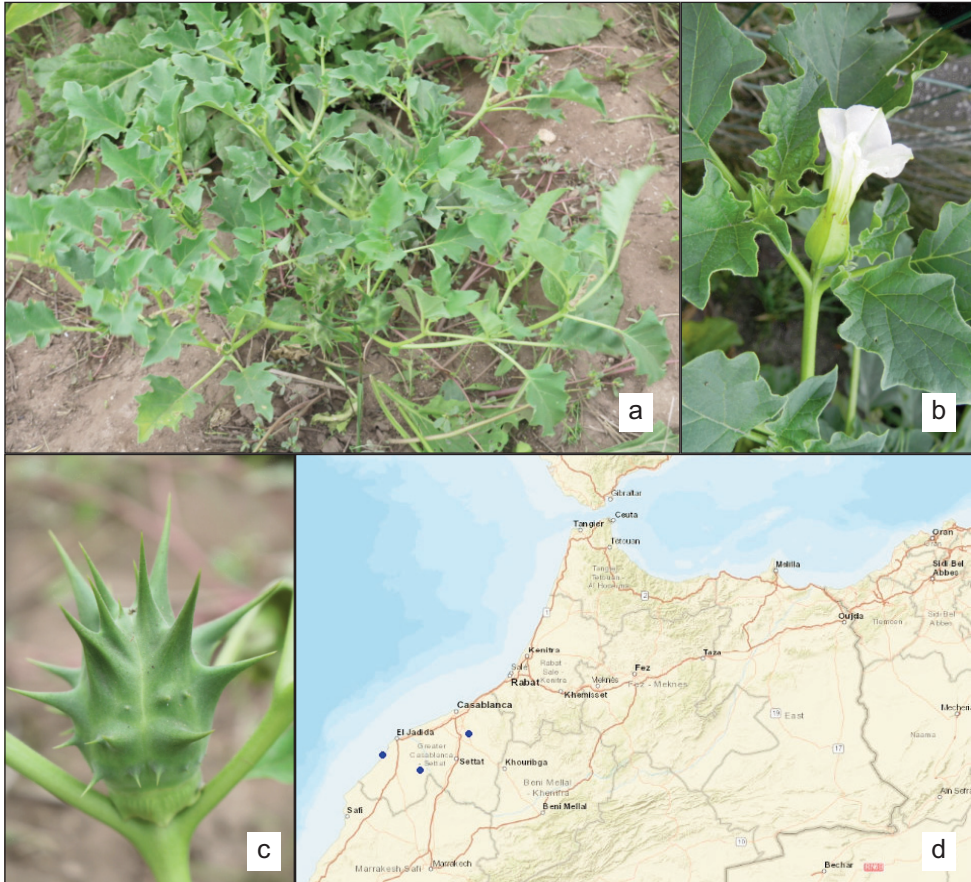


Fig. 2. *Datura ferox*: a) general habit, b) leaves and flower, c) capsule, d) distribution in the map of Morocco. Photos by the author.

Spain (Houmani & al. 1999; Dobignard & Chatelain 2013; Domina & al. 2018; Danin & Fragman-Sapir 2023; Sauerbier & al. 2023; CABI 2023; POWO 2023).

### Notes

*Datura ferox* is a noxious weed in warm and hot regions of the world where its control could be problematic. It is a competitive weed in Spain (San Martín & al. 2015), in Australia (Charles & al. 1998), in Argentina (Torres & al. 2013), in the United Arab Emirates (Shahid & Rao 2014), and several other countries (GBIF 2023). It is toxic to animals and humans, because all plant parts and seeds contain toxic alkaloids. Cases of livestock poisoning do occur, especially if animal feed is contaminated with *D. ferox* seeds (CABI 2023; POWO 2023).

### Conclusion

*Ambrosia coronopifolia* and *Datura ferox* are new exotic weeds naturalized in Morocco. They are unpalatable to livestock and can be invasive in agricultural systems and uncropped areas. Both plant species were introduced into Morocco with human activities, which indicate that the country needs more thorough botanical explorations.

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### References

- APD 2023 onwards: African Plant Database (version 4.0.0) – <http://africanplantdatabase.ch> [accessed 12/5/2023]
- Arianoutsou, M., Bazos, I., Christopoulou, A., Kokkoris, Y., Zikos, A., Zervou, S., Delipetrou, P., Cardoso, A. C., Deriu, I., Gervasini, E. & Tsiamis, K. 2021: Alien plants of Europe: introduction pathways, gateways and time trends. – *PeerJ* **9**: e11270. <https://doi.org/10.7717/peerj.11270>
- Bassett, I. J. & Crompton, C. W. 1975: The biology of Canadian weeds. *Ambrosia artemisiifolia* L. and *A. psilostachya* DC. – *Canad. J. Pl. Sci.* **55(2)**: 463-476. <https://doi.org/10.4141/cjps75-072>
- CABI 2023 onwards: Invasive Species Compendium. – <https://www.cabi.org/isc>. [accessed 12/5/2023]
- Chambouleyron, M. & Benrahmoune Idrissi, Z. 2017: Note sur quelques plantes vasculaires nouvelles ou peu citées dans l'Anti-Atlas occidental (Maroc). – *Acta Bot. Malac.* **42(2)**: 301-304. <http://dx.doi.org/10.24310/abm.v42i2.3087>
- Charles, G. W., Murison, R. D. & Harden, S. 1998: Competition of noogoora burr (*Xanthium occidentale*) and fierce thornapple (*Datura ferox*) with cotton (*Gossypium hirsutum*). – *Weed Sci.* **46(4)**: 442-446. <https://doi.org/10.1017/S0043174500090871>
- Cordero, S., Gálvez, F. & Fontúrbel, F. E. 2023: Ecological impacts of exotic species on native seed dispersal systems: A systematic review. – *Plants* **12(2)**: 261. <https://doi.org/10.3390/plants12020261>

- Dalrymple, R. L. & Rogers, J. L. 1983: Allelopathic effects of western ragweed on seed germination and seedling growth of selected plants. – *J. Chem. Ecol.* **9(8)**: 1073-1078. <https://doi.org/10.1007/BF00982212>
- Danin, A. & Fragman-Sapir, O. 2023 onwards: Flora of Israel and adjacent areas. – <https://flora.org.il/en/plants/> [accessed 1/9/2023]
- Di Gristina, E., Barone, G. & Domina, G. 2021: The alien vascular flora of Stromboli and Vulcano (Aeolian Islands, Italy). – *Ital. Bot.* **12**: 63-75. <https://doi.org/10.1038/10.3897/italianbotanist.12.74033>
- Dobignard, A. 2023 onwards: Flore du Maroc. – <https://www.floramarocana.fr> [accessed 12/5/2023]
- & Chatelain, C. 2011: Index synonymique de la flore d’Afrique du nord, **2**. – Genève.
- & — 2013: Index synonymique de la flore d’Afrique du nord, **5**. – Genève.
- Early, R., Bradley, B. A., Dukes, J. S., Lawler, J. J., Olden, J. D., Blumenthal, D. M., Gonzalez, P., Grosholz, E. D., Ibanez, I., Miller, L. P., Sorte, C. J. B. & Tatem, A. J. 2016: Global threats from invasive alien species in the twenty-first century and national response capacities. – *Nat. Commun.* **7**: 12485. <https://doi.org/10.1038/ncomms12485>
- efloramaghreb 2023 onwards: efloramaghreb (version 2). – <http://efloramaghreb.org>. [accessed 12/5/2023]
- EPPO 2023 onwards: EPPO Global Database. – <https://gd.eppo.int> [accessed 12/5/2023]
- Fennane, M., Ibn Tattou, M. & El Oualidi, J. 2014: Flore Pratique du Maroc, **3**. – Rabat.
- , —, Ouyahya, A. & El Oualidi, J. 2007: Flore Pratique du Maroc, **2**. – Rabat.
- , —, Mathez, J., Ouyahya, A. & El Oualidi, J. 1999: Flore Pratique du Maroc, **1**. – Rabat.
- , —, El Oualidi, J., Taleb, M. S., Benkhniq, O., Khamar, H. & Moujahdi, C. 2023: Floristic research in Morocco: achievements and future trends. – *Fl. Medit.* **33**: 5-16. <https://doi.org/10.7320/FIMedit33.005>
- Fried, G., Belaud, A. & Chauvel, B. 2015: Ecology and impact of an emerging invasive species in France: Western ragweed (*Ambrosia psilostachya* DC.). – *Rev. Ecol. (Terre et Vie)* **70(suppl. 12)**: 53-67. <https://doi.org/10.3406/rev.2015.1814>
- Funderburg, E. R., Locke, J. M. & Biermacher, J. T. 2014: Evaluation of aminopyralid applied PRE to control Western ragweed (*Ambrosia psilostachya*) in Oklahoma pastureland. – *Weed Technol.* **28(2)**: 395-400. <https://doi.org/10.1614/WT-D-13-00171.1>
- GBIF (Global Biodiversity Information Facility) 2023 onwards: *Plantae*. – <https://www.gbif.org/species> [accessed 12/5/2023]
- Gervilla, C., Rita, J. & Cursach, J. 2019: Contaminant seeds in imported crop seed lots: a non-negligible human mediated pathway for introduction of plant species to islands. – *Weed Res.* **59(3)**: 245-253. <https://doi.org/10.1111/wre.12362>
- Houmani, Z., Cosson, L. & Houmani, M. 1999: *Datura ferox* L. and *D. quercifolia* Kunth (*Solanaceae*) in Algeria. – *Fl. Medit.* **9**: 57-60. <https://doi.org/10.7320/FIMedit>
- Karrer, G., Hall, R. M., Le Corre, V. & Kropf, M. 2023: Genetic structuring and invasion status of the perennial *Ambrosia psilostachya* (*Asteraceae*) in Europe. – *Sci. Rep.* **13**: 3736. <https://doi.org/10.1038/s41598-023-30377-6>
- Khamar, H., Benkhniq, O. & Zidane, L. 2021: *Euphorbia hirta* (*Euphorbiaceae*): a new naturalized xenophyte in the vascular flora of Morocco. – *Fl. Medit.* **31**: 199-206. <https://doi.org/10.7320/FIMedit31.199>
- Lake, J. C. & Leishman, M. R. 2004: Invasion success of exotic plants in natural ecosystems: the role of disturbance, plant attributes and freedom from herbivores. – *Biol. Conserv.* **117(2)**: 215-226. [https://doi.org/10.1016/S0006-3207\(03\)00294-5](https://doi.org/10.1016/S0006-3207(03)00294-5)
- Lambdon, P. W., Pysek, P., Basnou, C., Hejda, M., Arianoutsou, M., Essl, F., Jarosík, V., Pergl, J., Winter, M., Anastasiu, P., Andriopoulos, P., Bazos, I., Brundu, G., Celesti-Grappo, L.,

- Chassot, P., Delipetrou, P., Josefsson, M., Kark, S., Klotz, S., Kokkoris, Y., Kühn, I., Marchante, H., Perglová, I., Pino, J., Vila, M., Zikos, A., Roy, D. & Hulme, Ph. 2008: Alien Flora of Europe: species diversity, temporal trends, geographical patterns and research needs. – *Preslia* **80(2)**: 101-149.
- Peltier, J. P. 2023 onwards: Biodiversité végétale du Sud-Oued Marocain. – <https://www.teline.fr> [accessed 12/5/2023]
- Pils, G. 2022: Illustrated Flora of Morocco. – Buchscheiden.
- POWO 2023 onwards: Plants of the World Online. – <http://www.plantsoftheworldonline.org> [accessed 12/5/2023]
- Saberi, H., Yousefi, A. R., Pouryoucef, M., Birbaneh, J. A. & Tokasi, S. 2022: Response of invasive perennial western ragweed (*Ambrosia psilostachya*) to chemical and mechanical control. – *Weed Biol. Manag.* **22(4)**: 79-87. <https://doi.org/10.1111/wbm.12257>
- San Martín, C., Andujar, D., Fernandez-Quintanilla, C. & Dorado, J. 2015: Spatial distribution patterns of weed communities in corn fields of central Spain. – *Weed Sci.* **63(4)**: 936–945. <https://doi.org/10.1614/WS-D-15-00031.1>
- Sauerbier, H., Cabrera Calixto, F. & Muer, T. 2023: Flora Vasculare de Canarias. – Turquesa.
- Shahid, M. & Rao, N. K. 2014: *Datura ferox* and *Oldenlandia corymbosa*: New record to the UAE flora. – *J. New Biol. Rep.* **3(3)**: 170-174.
- Sukhorukov, A. P., Léger, J.-F. & Chambouleyron, M. 2023: Two new species alien to the flora of Morocco: *Amaranthus spinosus* (Amaranthaceae) and *Cardamine occulta* (Brassicaceae). – *Fl. Medit.* **33**: 31-38. <https://doi.org/10.7320/FIMedit33.031>
- Tanji, A. 2005: Adventices du blé et de l'orge au Maroc. – Rabat.
- 2020: Notes about two summer annual grass weeds in Morocco: *Dinebra retroflexa* and *Cenchrus longispinus*. – *Fl. Medit.* **30**: 113-119. <https://doi.org/10.7320/FIMedit30.113>
- 2023: Two new annual weeds in Morocco: *Amaranthus palmeri* and *Chenopodium ficifolium* subsp. *ficifolium* (Amaranthaceae). – *Fl. Medit.* **33**: 91-99. <https://doi.org/10.7320/FIMedit33.091>
- & Taleb, A. 2010: *Ambrosia coronopifolia*: une nouvelle espèce adventice au Maroc. – Pp. 27-36 in: Proc. Sept. Congr. Assoc. Maroc. Prot. Pl. (AMPP). – Rabat.
- & — 1997: New weed species recently introduced into Morocco. – *Weed Res.* **37(1)**: 27-31. <https://doi.org/10.1111/j.1365-3180.1997.tb01819.x>
- Tison, J. M. & de Foucault, B. 2014: Flora Gallica. Flore de France. – Mèze.
- Torres, C., Mimoso, M. & Galetto, L. 2013: Nectar ecology of *Datura ferox* (Solanaceae): an invasive weed with nocturnal flowers in agro-ecosystems from central Argentina. – *Pl. Syst. Evol.*, **299(8)**: 1433-1441. <http://doi.org/10.1007/s00606-013-0805-y>
- Verloove, F., Chambouleyron, M. & Léger, J.-F. 2022: *Rumex chalepensis* (Polygonaceae), a new species for Morocco and Africa. *Mediterr. – Medit. Bot.* **43**: e74654. <https://doi.org/10.5209/mbot.74654>
- Vermeire, L. T. & Gillen, R. L. 2000: Western ragweed effects on herbaceous standing crop in Great Plains grasslands. – *J. Range Manag.* **53(3)**: 335-341. <https://doi.org/10.2307/4003442>
- Wan, S., Yuan, T., Bowdish, S., Wallace, L., Rusell, S. D. & Luo, Y. 2002: Response of an allergenic species, *Ambrosia psilostachya* (Asteraceae), to experimental warming and clipping: implications for public health. – *Amer. J. Bot.* **89(11)**: 1843-1846. <https://doi.org/10.3732/ajb.89.11.1843>
- WFO 2023 onwards: World Flora Online. – <http://www.worldfloraonline.org> [accessed 12/5/2023]

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