Acta Bot. Croat. 83 (2), 115-118, 2024
DOI 10.37427/botcro-2024-019

CODEN: ABCRA 25
ISSN 0365-0588
eISSN 1847-8476

First record of the woody *Melaleuca williamsii* s.l. (Myrtaceae) out of its native range

Duilio Iamonico[1]*, Gianluca Nicolella[2]

[1] University of Rome Sapienza, Department of Environmental Biology, Piazzale Aldo Moro 5, I-00185 Rome, Italy

[2] Via del Gran Paradiso, I-00139 Rome, Italy

Abstract – *Melaleuca williamsii* subsp. *synoriensis* (Myrtaceae) has been found in Rome (central Italy) along the banks of the river Tevere, representing the first discovery outside its native range (E-Australia). Description, distribution in Italy, phenology, and original photographs are provided.

Keywords: Europe, exotic species, *Melaleuca*, morphology, original material

Introduction

During the last decade, there has been increasing evidence of the negative impacts of alien species on the environment, the economy, and human well-being in all parts of the world (see e.g. Vilà et al. 2011, Rumlerová et al. 2016, Sohrabi et al. 2023). Provision of data about the distribution and status of the naturalization of alien plants is useful in preventing or reducing these impacts (see e.g. Gallardo et al. 2019, Pyšek et al. 2020,).

In this context, a recent investigation of the genus *Melaleuca* L. by ter Huurne et al. (2023) showed how several species (widely planted around the world mainly for ornamental and pharmaceutical uses) spread rapidly and have significant ecological impacts on autochthonous flora.

Melaleuca (Myrtaceae Juss.) is a genus that has been accepted without controversy for over 200 years, but was recently shown to be polyphyletic (Ladiges et al. 1999, Brown et al. 2001, Edwards et al. 2010). Edwards et al. (2010) demonstrated that eight out of the nine genera of the tribe Melaleuceae recognized by Wilson et al. (2005) fall within *Melaleuca* which was accepted as a single species-rich genus including 330–350 taxa (106 nomenclatural changes were proposed by Craven et al. 2014). According to POWO (2024) *Melaleuca* is native to Australia, while some taxa are aliens in Africa, Asia, the Americas and as far as Europe is concerned, only in the former Yugoslavia.

As part of an ongoing study on the alien flora of Italy and the Mediterranean area (see e.g. Iamonico 2010, 2022, Iamonico et al. 2014, Iamonico and Sánchez Del Pino 2016, Sukhorukov et al. 2016, Iamonico and El Mokni 2017, El Mokni and Iamonico 2018), we found in Rome (central Italy) the woody *Melaleuca williamsii* Craven subsp. *synoriensis* Craven, which represents the first records of the taxon out of its native range. Because of the difficulty we had in the identification of the species of taxon, and with the aim of helping European botanists in understanding this complicated genus, we examined in depth the species found and similar ones by studying also their protologues and associated types and original material.

Material and methods

The work is based on field surveys, analysis of relevant literature (protologues are included), and examination of specimens preserved in the following herbaria: CANB, GOET, K, MEL, NWS, P, and RO (acronyms according to Thiers 2024+).

The articles cited throughout the text are referred to the Shenzhen Code (hereafter reported as "ICN"; Turland et al. 2018).

Results

Melaleuca williamsii Craven subsp. ***synoriensis*** Craven, Novon 19: 452–453. 2009 ≡ *Callistemon pungens* subsp. *synoriensis* (Craven) Udovicic & R.D.Spencer, Muelleria 30: 24 (2012)

* Corresponding author e-mail: duilio.iamonico@uniroma1.it

Fig. 1. *Melaleuca williamsii*. A – habitat along the Tevere River (Rome, Italy), B – leaf, C – fruiting branch, D – inflorescence, E – flower (Photo: G. Nicolella).

Holotype: Australia, New South Wales, Ca. 200 NE Tom Cabin, NE part of New England Natl. Park, ca. 12 km SE of Ebor, 04 December 1993, P. J. Lepschi & J. Mowatt 1411 (CANB467657!, image of the holotype available at https://plants.jstor.org/stable/viewer/10.5555/al.ap.specimen.canb467657); isotypes: BRI (*non vidi fide* Craven 2009: 452), MEL2456739! (https://plants.jstor.org/stable/viewer/10.5555/al.ap.specimen.mel2456739), NE (*non vidi fide* Craven 2009: 452), NSW (*non vidi fide* Craven 2009: 452).

Native distribution area: Eastern Australia, from Queensland to New South Wales (Craven 2006, POWO 2024).

Occurrence in Italy: the plants found in Italy (February 2023) grow among the cracks in the quay along the right bank of the river Tevere in Rome (Latium region, central Italy) (Fig. 1).

Flowering and fruiting times: late winter to late spring (February–June). The discovery is not only the first one for Italy and Europe, but also the first out of the native range of the species (see Craven 2006, Uotila 2011, POWO 2024 and literature therein). We consider *Melaleuca williamsii* subsp. *synoriensis* as casual alien in Italy.

Notes: currently, three subspecies are accepted for *Melaleuca williamsii*, i.e. subsp. *williamsii*, subsp. *fletcheri* Craven, and subsp. *synoriensis* Craven (POWO 2024, WFO 2024). These subspecies can be distinguished from each other based on the bark texture, hairiness of leaves and hypanthium, color of filaments, and shape of cotyledons (Craven 2009). The Roman plants are identifiable as *M. williamsii* subsp. *synoriensis*, having leaves and hypanthium pubescent and staminal filament red [no data about the bark was reported by Craven (2009) for subsp. *synoriensis*, whereas the author distinguished subsp. *williamsii* and subsp. *fletcheri* in having barks with, respectively, papery and fibrous texture], whereas the other two subspecies display leaves lanuginose (subsp. *williamsii*) and filaments white, pink, or mauve (subsp. *fletcheri*).

Discussion

Although several taxonomic issues on *Melaleuca* were solved, some others, concerning the species rank, still need to be addressed. Indeed, we had difficulties in identifying the *Melaleuca* plants found in Rome even when we referred to the important diagnostic key to Australian *Melaleuca* taxa prepared by Craven et al. (2016). Issues arise for the leaf features, i.e. shape (some statements are reported in both the key phrases of step no. 5 of Australian *Melaleuca*'s key) and width. Roman plants have leaves 0.3–0.6 cm wide, a range that overlaps the choice of the step no. 5 in diagnostic key of Australian *Melaleuca* ("Leaves less than 4 mm wide" *vs.* "Leaves 4 mm or more wide"). By choosing both the phrases of step no. 5, we reached the following candidates: *M. linearis*, *M. subulata*, and *M. williamsii*. However, to attain a certain identification, we decided to examine carefully these three species, especially by studying the protologues, types, and original material.

The results follow:

1) *Melaleuca linearis* [described by Wendland and Schrader 1796: 19, Tab. XI" (image available at http://www.plantillustrations.org/illustration.php?id_illustration=246556); lectotype designated by Dowe et al. (2019) on a specimen preserved at GOET]: leaf blade has a ratio length/width of at least 10 (up to 15).

2) *Melaleuca subulata* [≡ *Callistemon subulatus* (described by Cheel 1925: 259); holotype: NSW139989 (image available at https://plants.jstor.org/stable/viewer/10.5555/al.ap.specimen.nsw139989?loggedin=true); a further Cheel's specimen (not isotype, found by us) at K (barcode K000793339, image available at https://plants.jstor.org/stable/viewer/10.5555/al.ap.specimen.k000793339): ratio length/width of the leaf blade ranging from 10 to 16.

3) *Melaleuca williamsii* [proposed by Craven (2006: 474) as *nomen novum pro Callistemon pungens* Lumley & R.D.Spencer *non Melaleuca pungens* Schauer (see Arts. 6.9 and 53.1 of ICN); holotype at MEL; isotypes at K (found by us), NE, NWS, and CANB; a good illustration by Lumley and Spencer (1990: 254, Fig. 1)]: ratio length/width of the leaf blade ranges from 3 to 7.

Based on the ratio length/width of the leaf blade, the Roman plants (ratio 5.5–10.0) overlap *Melaleuca williamsii* (3–7), whereas *M. linearis* and *M. subulata* have higher ratios (10–15 and 10–20, respectively).

In addition to the spontaneous Australian species, we also considered the *Melaleuca* species that are currently used as ornamentals in Italy (personal observations made in plant nurseries), i.e. *M. citrina* (native to E-Australia and alien in India, Kenya and Tanzania, former Yugoslavia, U.S.A., and Mexico; POWO 2024) and *M. viminalis* (native to E-Australia and alien in India, Kenya and Tanzania, U.S.A., and Mexico; POWO 2024):

1) *Melaleuca viminalis*: it has stamens fused (*vs.* free and inserted just in a ring on the hypanthium rim in the Roman plants) and hypanthium glabrous (*vs.* pubescent) (Craven et al. 2016).

2) *Melaleuca citrina*: this species cannot be ascribed to Roman plants (based on Craven et al. 2016) because of the length of the longest stamens [up to 25 mm long (range 17–25 mm) in *M. citrina vs.* up to 20 mm long (range 13–20 mm) in our plants] and the width of the inflorescences (45–70 mm in *M. citrina vs.* 38–47 mm wide). Concerning the ratio length/width of the blades, we studied the protologue of *M. citrina* and examined the original material. Curtis (1794: [260] validly published the name *Metrosideros citrina* (basionym of *Melaleuca citrina*) also providing a coloured illustration (Plate no. 260, original material). Curtis' Botanical Magazine is an illustrated publication (first issue published on 1 February 1787), the longest-running botanical magazine (currently referred to as the journal Curtis's Botanical Magazine) and including drawings of ornamental and exotic plants cultivated at Kew Gardens. According to the HUH-Index of Botanists (2013), Curtis' herbarium is unknown. No specimen useful for lectotypification was traced. Therefore, Curtis' Plate no. 260 is the only extant original material for *Metrosideros citrina* and the ratio length/width of the blades ranges from 2 to 6 (*vs.* 5.5–10.0 in our plants). Since the length of the stamens and the width of the inflorescence cannot be measured on Curtis' Plate no. 260 (a scale bar is lacking), we examined specimens collected by L. A. Craven and/or B. J. Lepschi (the experts in the genus *Melaleuca* and authors of the Australian key) and verifying that longer stamens are 21–23 mm long (*vs.* up to 20 mm long), whereas inflorescence are 53–55 mm wide (*vs.* 38–47 mm).

Acknowledgments

Thanks are due to Directors and Curators of all quoted Herbaria for their support during our visits, loan of specimens/photograph or requests.

Project funded under the National Recovery and Resilience Plan (NRRP), Mission 4 Component 2 Investment 1.4 - Call for tender No. 3138 of 16 December 2021, rectified by Decree n.3175 of 18 December 2021 of Italian Ministry of University and Research funded by the European Union – NextGenerationEU. Project code CN_00000033, Concession Decree No. 1034 of 17 June 2022 adopted by the Italian Ministry of University and Research, CUP B83C22002950007, Project title "National Biodiversity Future Center - NBFC".

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