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Short Communication

Found but lost? The short-lived success of *Crataegus coccinea* L. (Rosales: Rosaceae) in north-eastern Sicily (Italy)

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Abstract - Two *exsiccata* sampled at the end of the 19th century and wrongly identified as *Pyrus torminalis* or *Sorbus torminalis* in the herbarium of Francesco Tornabene at Catania belonged to a woody species never reported to occur in Sicily, *Crataegus coccinea*. This hawthorn, native to eastern north America, grew in two different sites located on the foothills of Mt. Etna. These records are of interest because they represent the first and only ones concerning the occurrence of this species outside botanic gardens in southern Europe. Never observed by the botanists who explored Sicily over the following 130 years, *C. coccinea* has probably experienced a short period of success as an ornamental plant cultivated in public and private gardens. The available information does not allow us to establish with certainty whether this species was fully naturalised in the Etnean territory in the past or not. *C. coccinea* should therefore be regarded as a dubious alien plant for Sicily. In the following decades, this hawthorn was unable to become established, probably because of the severe constraints of fully Mediterranean climatic conditions.

Key words: alien flora, hawthorn, herbaria, history of gardening, non-native trees.

Riassunto - Trovata ma perduta? Il breve successo di *Crataegus coccinea* nella Sicilia nord-orientale (Italia).

Due *exsiccata* raccolti alla fine del XIX secolo, ed erroneamente identificati come *Pyrus torminalis* o *Sorbus torminalis* nell'erbario di Francesco Tornabene a Catania, appartengono ad una specie legnosa mai segnalata in Sicilia, *Crataegus coccinea*. Questo biancospino, originario del Nord America orientale, cresceva in due diversi siti ubicati ai piedi dell'Etna. Si tratta di segnalazioni di un certo interesse perché rappresentano le prime ed uniche riguardanti la presenza di questa specie al di fuori degli orti botanici in Europa meridionale. Mai osservata dai botanici che esplorarono la Sicilia nei successivi 130 anni, *C. coccinea* ha probabilmente conosciuto un breve periodo di successo come pianta ornamentale coltivata nei giardini pubblici e privati dell'isola. Le informazioni disponibili non ci permettono di stabilire con certezza se questa specie fosse completamente naturalizzata nel territorio etneo in passato. *C. coccinea* deve quindi essere considerata una pianta aliena dubbia per la Sicilia. Nei decenni successivi questo biancospino non è riuscito ad affermarsi, probabilmente a causa dei severi limiti imposti dalle condizioni climatiche prettamente mediterranee.

Parole chiave: alberi alloctoni, biancospino, erbari, flora aliena, storia del giardinaggio.

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INTRODUCTION

As part of ongoing investigations focused on the forest trees of Sicily, a systematic review of the *exsiccata* related to the woody species growing on the island was initiated. The study of the plant material stored in the herbarium of the University of Catania allowed us to notice that two specimens stored in the "Erbario Tornabene" under the names *Sorbus torminalis* (L.) Crantz and *Pyrus torminalis* (L.) Ehrh. (Rosaceae) were misidentified. Differently, they belong to the genus *Crataegus* L., as suggested by the fruits, bearing persistent sepals, and the twigs, bearing robust shiny thorns. In this paper, we illustrate the process that allowed us to correctly identify the specimens. We also tried to trace the history of the introduction and disappearance of this non-native plant species, never noticed neither before nor thereafter to occur on the island.

MATERIALS AND METHODS

The identification of the hawthorn specimens was based on the keys of Stace (2010) and Pignatti *et al.* (2019). We also consulted some of the most authoritative and updated papers concerning the north American species of *Crataegus* (Phipps, 1997, 2012, 2015). However, it was hard to use these keys because most of the main characters (e.g., stamens, flowering versus non-flowering shoots) were missing in the available dry specimens. The codes referring to the herbaria cited in the text follow Index Herbariorum (2023 onwards).

RESULTS AND DISCUSSION

Remarks on the location of the two records

The specimens were stored in the herbarium Tornabene, kept at the University of Catania (CAT), and were long overlooked, probably because they were misplaced under "*Sorbus torminalis*" and "*Pyrus torminalis*". Based on the

handwriting, the first specimen (CAT004998, Fig. 1a) comes from "Nunziatella", where it was collected by an anonymous botanist. This locality may correspond to a small church bearing this name, located at 240-250 m a.s.l., still present in the locality Nunziata, a hamlet of the municipality of Mascali (Catania province). This town has been completely wiped out by the destructive lava flows of the eruption that took place in 1928 (Branca & Del Carlo, 2005).

The second specimen (CAT005000, Fig. 1b) was collected by Pasquale Baccarini in June 1892, i.e., during his stay at Catania as chair of the Institute of Botany, and comes from Misterbianco, whose municipality currently ranges from 21 m to 329 m a.s.l. Fig. 2 shows the location of both sampling sites. Tornabene did not mention the presence of *S. torminalis* on Mount Etna; this leads us to assume that also the first sample was collected after the publication of his main works (Tornabene, 1887, 1890). As with Baccarini, he did not mention them in any of his publications, probably because he was unsure about their identification.

Species identification

Both specimens, CAT004998 and CAT005000, belong to the same species. In the first instance, there might have been some doubt between the identification as *Crataegus submollis* Sarg. or as *C. coccinea* L., but in *C. submollis,* the flower peduncles, and the leaves are hairy during flowering time, whilst in *C. coccinea,* the leaves are subglabrous. Observation under the stereomicroscope of the material kept at CAT allowed us to observe that the petioles and the lower leaf blades of both specimens were almost glabrous, hence they were identified as belonging to *C. coccinea*, a species not listed among the casual or naturalised alien plants of Sicily (Giardina *et al.*, 2007) and previously reported only for northern Italy (Galasso *et al.*, 2018, 2024).

Introduction and spread of north American hawthorns in Europe and Italy: a brief historical sketch

Several NE-American hawthorns have been introduced in the botanic gardens and arboreta of central and northern

Fig. 1 – Scanned images of the herbarium sheets holding the specimens. / Scansioni dei fogli d'erbario con gli esemplari. a) CAT004998 (Erbario Tornabene, https://www.parcokentie.it/herbarium/foto/06/004998.jpg); b) CAT005000 (Erbario Tornabene, https://www.parcokentie.it/herbarium/foto/06/005000.jpg).

Europe as fruit plants; they have also been used by private owners to make thorny hedges and/or for ornamental purposes (Amaral do Franco, 1968). Most of these species were brought to Italy and Europe at the beginning of the 20th century (Maniero, 2015). For example, virtual search on several herbaria allowed us to find specimens documenting the early introduction of some hawthorns, like "*C. mollis*" in Silesia (Poland) in 1902 (P02568904; https://science.mnhn.fr/institution/mnhn/collection/p/item/p02568904) and *C. submollis* in Scotland (E00921092; https://data.rbge.org.uk/herb/E00921092). However, *C. flabellata* (Bosc ex Spach) K.Koch, the fanleaf hawthorn, was introduced in Finland and Sweden as early as the 18th century for fencing, and is currently cultivated in Poland and Slovakia as well (Kurtto, 2009). Also, *C. coccinea* has experienced a rather early introduction to Europe. In fact, the first records of its occurrence in our continent date back to 1780, when it was cultivated in Venice at Santa Maria di Sala in the private estate of abbot Farsetti (Saccardo, 1909), as well as in the Royal Botanic Gardens at Kew in 1789 (Aiton, 1789). Its introduction in Sicily is one of the oldest in Europe, dating back to the end of the eighteenth century (Tineo, 1799). In the following years, this species was cultivated in many other Italian botanic gardens, including Padua in 1801 (Saccardo, 1909), the Bourbons Royal Palace of Caserta in 1803 (Graefer, 1803), Turin in 1804 (Balbis, 1804), Florence in 1806 (Saccardo, 1909), Naples in 1807 (Tenore, 1807), the botanic garden "Clelia Durazzo Grimaldi" in Genoa in 1812 (Anonymous, 1812) and Monza (Anonymous, 1813). During the last centuries, the north-eastern American hawthorns seemed to have had contrasting fates across Europe. Their use has been totally dismissed in the Mediterranean countries, while they are still cultivated under cooler climatic conditions, where some of them were also able to escape from gardens and grow wild under the most suitable conditions.

It cannot be ruled out that *C. coccinea* reached Mt. Etna at the hands of the manager and designer of the Caserta gardens, John Graefer. In fact, in 1799 he was commissioned to look after Admiral Horatio Nelson's estate in Bronte (Bojano, 2021). Having already grown this species in the gardens around the Bourbon royal palace (Graefer, 1803), he could also have introduced it to the foothills of Mt. Etna. Moreover, it should be remembered that the lowlands of the Etna region have long been, and still are, characterised by intense floricultural activity. This area was also home to several remarkably rich private plant collections, like the botanical gardens owned in the early 19th century by two apothecaries, Salvatore Portal in Biancavilla (Portal, 1826) and Giuseppe Riggio in Acireale (Raimondo & Mazzola, 2007), hosting more than 2,000 and more than 1,000 plant species, respectively. The specimens of *C. coccinea* collected at the end of the 19th century almost certainly derive from cultivated individuals, but it cannot be ruled out that this hawthorn was also able to thrive spontaneously in the wild. For this reason, in our opinion, it should be listed among the dubious exotic plants in the region.

As a matter of fact, *C. coccinea* is not cultivated anymore in Sicily, probably for a long time, as it does not feature in the list of ornamental plants cultivated in the Sicilian historical gardens (Bazan *et al.*, 2005), nor it occurs in any of the numerous private and public gardens of Catania (Guglielmo *et al.*, 2006), the main city closest to both specimens' sampling sites. *C. coccinea* was cultivated in Autun (department of Saône-et-Loire, region Bourgogne-Franche-Comté, central-eastern France; P00684070, https://science.mnhn.fr/institution/mnhn/collection/p/item/p00684070) in 1909, in the Downs region (southern England) in 1936 (BM000536151, https://data.nhm.ac.uk/dataset/collection-specimens/resource/05ff2255-c38a-40c9-b657-4ccb55ab2feb/record/2694900/1705363200000), and had

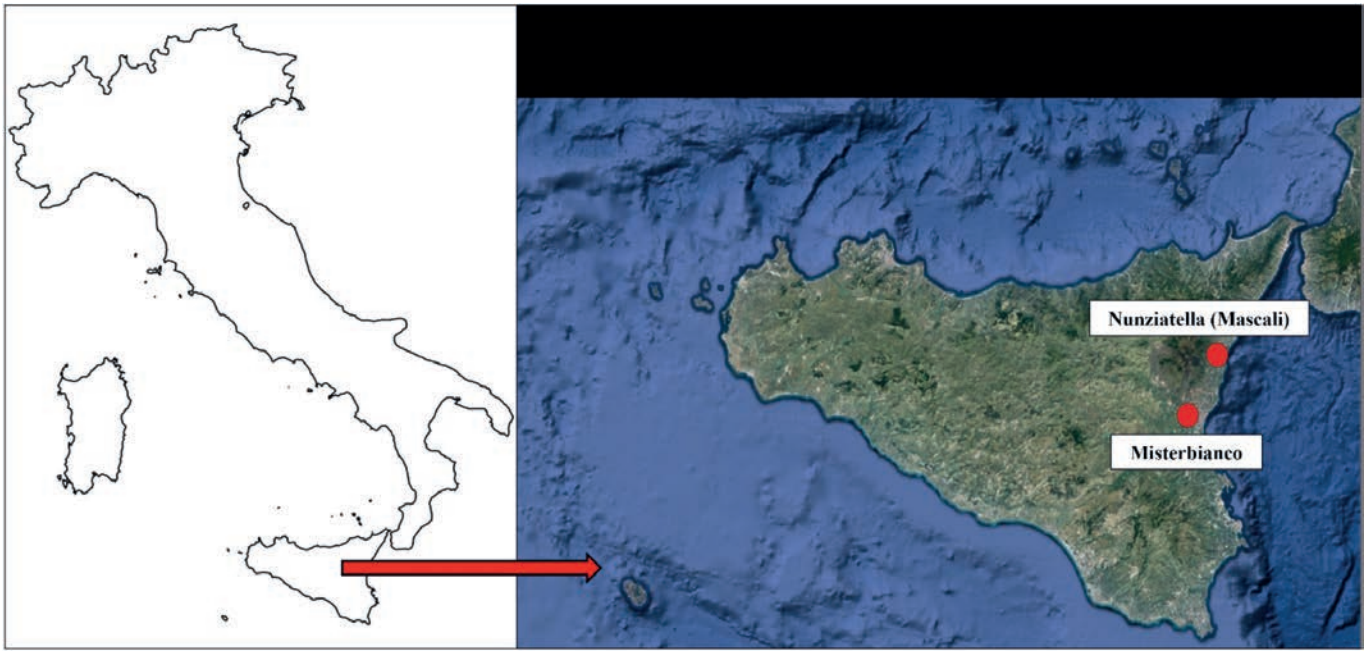

Fig. 2 – Location of the two sampling sites on the foothills of Mt. Etna. / Posizione dei due siti di raccolta situati alle pendici del Monte Etna.

already escaped along an unmanaged trail near a streamside at Auger Saint Vicent (department of Oise, region Hauts-de-France, northern France, P04190776, https://science.mnhn.fr/institution/mnhn/collection/p/item/p04190776) as early as in 1927. According to Sell *et al.* (2014), four species of NE-American hawthorns still occur in the UK, i.e., *C. coccinea* (= *C. pedicellata* Sarg.), *C. coccinioides* Ashe (= *C. dilatata* Sarg.), *C. mollis* (Torr. & A. Gray) Scheele and *C. submollis.* The latter was reported as very common in London by Wurzell (1992) and is widely naturalised according to Stace (1995). *C. coccinea* is cultivated in the Czech Republic, Germany and Poland as well (Kurtto, 2009). In the Czech Republic, it has featured among the casual alien plants for more than 10 years, showing a very low ability to spread in the wild (Pyšek *et al.*, 2012, 2022). Notwithstanding its early introduction and spread across Europe, only very few cases of naturalisation regarding *C. coccinea* have been recorded at the continental scale. This behaviour appears to be true also at the global level, with *C. coccinea* being mentioned in just a few references in the global compendium of weeds (Randall, 2017).

Most of the historical records concerning the occurrence of *C. mollis* in Europe and Italy (Conti *et al.*, 2005; Pignatti *et al.*, 2017) should be referred to two different hawthorn species: *C. coccinea* and *C. submollis* (Galasso *et al.*, 2018, 2024). The former is naturalised in Lombardy (Banfi & Costalonga, 1984; Gariboldi *et al.*, 2007; Costalonga, 2009) and is casual in Veneto (Celesti-Grapow *et al.*, 2009); the latter is naturalised in Lombardy (Banfi & Galasso, 2010) and behaves as a casual species in Piedmont and Veneto (Celesti-Grapow *et al.*, 2009; Galasso *et al.*, 2018, 2024). More in detail (Banfi & Galasso, 2010), the first case of naturalisation of a north American hawthorn in Italy was recorded in 1931 in Veneto by Ugolini (1932), who reported the presence of *C. coccinea* at Strà and Vigonovo (province of Venice), where it was cultivated for its edible fruits and, according to local farmers, had already started to grow wild on the banks of ditches already forty years earlier. In the same region, in the riparian woods of the Belluno area, the presence of *C. submollis* was reported (Soldano, 2000). During the second half of the 20th century, Soldano (2000) also reported the presence of *C. submollis* in the riparian woods of Vercelli province in Piedmont, referring to this taxon also an earlier report for the same area (Soldano, 1977, as *C. champlainensis* Sarg.). Both *C. submollis* and *C. coccinea* are currently naturalised in Lombardy (Galasso *et al.*, 2018, 2024). *C. submollis* is currently planted in Milan as ornamental (MSNM nos. 44062, 44063, 44064 and G. Galasso, *pers. comm*.). The first and only known case of naturalisation of *C. coccinea* was recorded in the Regional Park of Groane (Banfi & Costalonga, 1984, as *C.* cf. *noelensis* Sarg.; Costalonga, 2009).

CONCLUSIONS

In Sicily, the finding of two specimens of *C. coccinea* collected by two different people in two localities approximately 30 km apart from each other suggests that this species experienced an ephemeral horticultural success during the 19th century.

The presence of *C. coccinea* at a latitude of 37° N may appear somewhat surprising. Indeed, fully Mediterranean climatic conditions are apparently unsuitable for its survival. In fact, according to Bazan *et al.* (2015), both the collecting sites fall within the thermo-Mediterranean lower subhumid bioclimatic belt, regularly subject to 3-4 months of summer drought. Yet, the sampled plants grew long enough to be able to produce fruits. To explain such good performance, one could invoke summer irrigation to mitigate water stress, a common practice in private gardens. An alternative explanation could be that *C. coccinea* was grafted on other hawthorn species growing in the Etna region, like the native *C. monogyna* Jacq. or the archaeophyte *C. azarolus* L. It is worth mentioning that the plant was also cultivated in Caserta and Naples in the first decade of the nineteenth century, so it cannot be ruled out that adequate cultural care may have allowed its growth under fully Mediterranean climatic conditions. Considering the drastic land use changes and the urban sprawl that largely affected the territory of Misterbianco during the last half century, the only chance to find some individuals of *C. coccinea* still alive is to look around the chapel of Nunziatella (Mascali).

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