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Revision of the *Lactuca* species (*Asteraceae*) occurring in the Maltese Islands

Abstract

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An investigation on the species of *Lactuca* occurring in the Maltese Islands was carried out on 105 populations in natural habitats and 15 herbarium specimens. The main aim was to revise the four *Lactuca* species reported in historical literature of which the occurrence of *L. virosa* was doubtful, whereas *L. saligna* has not been reported for the last 30 years or more. Results confirmed the presence of three species: the agricultural cultivated crop *Lactuca sativa*; the frequently occurring *L. serriola* (both f. *serriola* and f. *integrifolia*) and the rediscovery of *L. saligna* from Gozo. *L. virosa* was not confirmed in this study and is considered as a past misidentification that persisted till present date derived from the misconception that the leaves of *L. virosa* are entire, whereas those of *L. serriola* are lobed. Achenes morphology and leaf characters were used for the determination of the species, and consequently, magnified images of the achenes and their morpho-metric assessment are given. The variation and infraspecific taxa of *L. serriola* are also discussed based on field findings. A brief account on the history of *Lactuca* species in Malta, a distributional map and an identification key are also given.

Key words: *Compositae*, Crop Wild Relatives, flora.

Introduction

Lactuca L. is a fairly large genus in the family *Asteraceae* which comprises some 100 species distributed throughout most regions of the world. Member species occur naturally in Europe, Tropical and Temperate Asia, Africa and North America (Lebeda & al. 2004) with some species introduced in Australia and many countries in South America (POWO 2019). The most representative or well-known species of the genus is the vegetable *Lactuca sativa* L. – the garden lettuce, with a production of 26.87 million tons in 2017 (FAO 2017). Seventeen species occur in Europe according to Lebeda & al. (2004) and from the neighbouring countries to Malta, ten are recorded in Italy (Euro+Med 2019), six in Sicily (Giardina & al. 2007; Euro+Med 2019) and four in Tunisia (Le Floc'h & al. 2010).

From preliminary studies and ad-hoc examinations of *Lactuca* species from numerous surveys we conducted in Malta since the year 2002, *L. sativa* (as a crop), *L. ser-*

riola have been confirmed, but *L. virosa* could not be substantiated. This contradicted with the historical and current literature stating that *L. virosa* is a frequent wild lettuce in Malta, with some old reports indicating that is is more common than *L. serriola* (Lanfranco 1995, 2001; Bonett & Attard 2005), or even that only *L. virosa* occurs in the Maltese Islands (Lanfranco 1969). Confused by the two opposing scenarios, a study on the wild species of *Lactuca* occurring in the Maltese Islands was conducted between 2018 and 2019. Its aim was to confirm or not the current presence, distribution and ecology of *L. virosa* and perhaps other *Lactuca* species which occur in Sicily or Tunisia and highlight differences in their ecological and habitat preference. In addition, the study was also aimed to find populations of *L. saligna* which appears to have become extirpated. Reference to herbarium specimens collected from Malta was also taken into account as this gives important evidence of what was the concept of plants reported as *L. virosa* in the late nineteenth and early twentieth century.

In addition, this study stemmed up from the well-documented confusion in historical literature were *L. virosa* was widely confused with *L. serriola,* where apparently, there was a misconception that plants with unlobed leaves were treated as *L. virosa* whereas plants with runcinate-lobed leaves were identified as *L. serriola* (Prince & Carter 1977; Oswald 2000). For example Prince & Carter (1977) stated that up to the early 20th century, unlobed-leaved plants of *Lactuca* were assigned as *L. virosa* by British botanists and old British Floras specifically referring as an example to Bentham (1865): "*The name of L. scariola is often limited to the varieties with more erect leaves, with deeper and narrower lobes ; and those with broader leaves, toothed only, and not so glaucous, have been considered as a distinct species, under the name of L. virosa*". The same treatment was indeed expressed by Maltese botanists namely Borg (1927) where he mentioned that *L. scariola* var. *silvestris* (L.) Moris (= *L. serriola*) has runcinate and pinnatifid leaves while in his account for *L. virosa* he wrote: "[Leaves] *usually individed, or rarely slightly lobed and with reddish sport* [spots].". Prince & Carter (1977) were aware about this confusion and to stop this saga, they reorganised the taxonomic concepts between *L. virosa* and *L. serriola*, stating that both species can have pinnatifid or entire leaves and assigned the unlobed-leaf form of *L. serriola* into a new combination - *L. serriola* f. *integrifolia* (S. F. Gray) S. D. Prince & R. N. Carter. This misconception had probably influenced Maltese botanists in their floristic work till the present date, although it does not exclude the possibility that both species existed and may still occur in Malta. This investigation should hence bring new knowledge to settle this uncertain situation.

Material and methods

Based on the morphological accounts and keys by Ferakova (1976), Prince & Carter (1977), Rich & Jermy (1998), Tison & al. (2015) and Pignatti (2018), the agricultural crop *L. sativa* is well distinguished from the other species occurring in the Maltese archipelago by its broad cauline leaves, whereas *L. saligna* has characteristic narrow leaves with pointed auricles. Prince & Carter (1977) studied well the distinction between the closely related *L. virosa* and *L. serriola* (and also *L. saligna*), where

besides giving several morphological differences in foliar and floral characters they emphasised that the best distinguishing characters are present in the achenes. A dichotomous identification key was adopted from the floristic accounts cited above and used to determine the Maltese material. As expected, the key depended heavily on the characters of the achenes and inferred that fruit-collection is instrumental in the planning of the methodology.

The methodology incorporated the examination of leaves *in situ* and more importantly the collection and examination of achenes of *Lactuca* plants from different habitats throughout the Maltese Islands. About 30 achenes from at least three fruiting heads were collected from a single plant (hereafter referred to as a *specimen*) between the end of June and the end of August of years 2018 and 2019. Observations on the habitat, population, ecology and digital photographs were also taken in situ.

A total of 105 specimens were examined, 23 from Gozo and 82 from mainland Malta and achenes were collected from each specimen. Two short visits in Comino (30th August and 14th September 2019) did not result in any findings of *Lactuca* spp. The fruits were stored in a labelled paper sachet and were examined under a stereo microscope during September 2019. The collected specimens are tabulated in the Electronic Supplementary File 1 (ESF 1, table 2).

Moreover, herbarium specimens of *Lactuca* from the private collection of Edwin Lanfranco and Michael Briffa as well as voucher specimens deposited at the Argotti Botanical Gardens [ARG] were also examined of which information about these specimens are given in the Electronic Supplementary File 1 (ESF 1, table 3).

We had also received voucher specimens of *Lactuca serriola* and *Lactuca virosa* collected from Montpellier, France by Prof. Erol Vela on June 2019. These, and achenes of *L. sativa* collected from open fields in Xagħra Gozo (10-July-2019) and of *L. saligna* from Xewkija, Gozo (13-Sep-2019) were used as reference material to compare the fruits of specimens collected from the wild with fruits of known or reference *Lactuca* species.

The achenes were examined under a stereomicroscope using a magnification of 16× and digital images of five fruits for each specimen were taken. The colour, mottling and texture including the presence of bristles were noted. Images were also taken against an eyepiece graticule scale by which the length and width of the achenes were measured using the software Piximeter V5.9 by Alain Henriot. The width was measured along the widest part of the fruit. The length included the beak, here denoted as the coloured part above the apex of the achene just below the white shaft of the pappus. The location of each specimen was plotted on a digital map using Google Earth Pro (Fig. 1).

Results

Distinction and an identification key to Lactuca spp. recorded in Malta

The most important distinctive characters were found to be present in the achenes and leaves (lamina and auricles) and these were the main morphological components to construct an identification key (see below). The morphological findings of the achenes of the four *Lactuca* species published or collected from the Maltese Islands are summarised in Table 1.

Fig. 1. Map showing location of collected specimens.

Table 1. Comparison of morphological characters of achenes from reference *Lactuca* species: *L. serriola* (Montpellier), *L. virosa* (Montpellier). *L. saligna* (Xewkija, Gozo) and cultivated *L. sativa* (Xewkija Gozo).

Achene character	*L. serriola*	*L. virosa*	*L. saligna*	*L. sativa*
Colour	Light to medium olive brown	Dark maroon-brown, reddish when still immature	Medium to dull bronze-brown	Silvery-grey with golden tones towards the apex
Outline shape	Oblanceolate	Elliptical	Oblanceolate	Obovate
Broadest part	Upper part	Middle part	Upper part	Upper part
Apex (beak not included)	Blunt, rarely acute	Blunt	Acute	Rounded-obtuse
No. of ribs	6-7	8-9	7-8	7-10
Beak	Long	Moderately long	Short	Very short, mucronate
Mottling	Sometimes present	Not mottled	Not mottled	Not mottled
Bristles	Long and distinct on the face and sides of the achene's apex	Absent or sparse and very short only on the faces	Subnil, sparse and very short at the apex when present	Short, indistinct on the face and sides of the achene's apex
Length (mm)	2.9–3.2	4.3–4.6	3.4–3.8	3.3–3.7
Width (mm)	0.8–1.0	1.4–1.6	0.8–1.0	1.1–1.3

Key to the* Lactuca *taxa reported in the Maltese Islands

1 Vegetable crop; leaves bright green, >10 cm wide, all without spinulose margin. . ***L. sativa***
- Wild plants; leaves dull green, < 8cm wide, sometimes with spinulose margin. **2**
2 Adult plants never reaching 100 cm of height; leaves <12 mm wide (usually 4–8 mm) without rigid spinules at the margin or midrib; cauline leaves linear-oblong with a sagittate base made of long narrow lobes. ..... ***L. saligna***
- Adult plants usually more than 100 cm high (up to 200 cm); leaves > 15 mm wide lined with rigid spinules on the margin and the main veins; cauline leaves broad oblong-obovate with a cordate base made of broad lobes. **3**
3 Leaves pointing in a different direction; leaf lobes wide and distinctly clasping the stem; achenes dark, maroon, ca. 4.5 mm long, glabrous at the sides, sometimes with short, indistinct bristles on the face. ..... ***L. virosa***
- Leaves twisted and pointing at one vertical plane; leaf lobes acute and small; achenes light (rarely medium-dark) olive brown or peanut colour, ca. 3.0 mm long, distinctly bristly on both the face and the sides at the apical part of the achene. .... ***L. serriola* (4)**
4 Leaves distinctly lobed, runcinate-pinnatifid ..... ***L. serriola* f. *serriola***
- Leaves entire and unlobed or shallowly lobed ..... ***L. serriola* f. *integrifolia***

Literature records of* Lactuca *species from the Maltese Islands.

1. *Lactuca saligna* L. This species is first reported from Cottonera by Gavino Gulia (1858-59) and then (1869) at Corradino. Sommier & Caruana Gatto (1915) report it from fields and herbaceous places as a "*not common*" plant in Malta at Gnien il-Kbir and Buskett, and list the earlier records of Gulia. Borg (1927) meanwhile records this species as frequent here and there in Malta (often common around Attard), and besides *L. saligna* s.s., he lists also the *L. saligna* f. *wallrothii* Spreng., and *L. saligna* var. *virgata* Trusch. It is then reported by Vella & Penza (1938) who consider it as a native plant. Lanfranco (1969) states that it is not frequent and present mostly beside walls. Haslam & al. (1977) report the older records and give a new record by Gauci from Villa Rundle, Victoria in Gozo. Casha (2013) just mentions that it is found in our islands without providing any personal records. The last sighting was from Victoria in the eighties (pers. comm., Michael Briffa & Edwin Lanfranco May-2019).

2. *Lactuca sativa* L. First listed by Zerafa (1827) as a cultivated plant followed by Gulia (1855-1856). Borg (1927) listed this species as *L. scariola* var. *sativa* (L.) Moris, and that many forms are cultivated in Malta as a vegetable. Several authors also consider it as a cultivated plant: Haslam & al. (1977), Lanfranco (1993), Camilleri (2004), Casha (2013) and Weber & Kendzior (2006). According to Camilleri (2004), at least *L. sativa* 'Capitata' and *L. sativa* 'Romana' are frequently harvested for the local market. Weber & Kendzior (2006) are the first to record it as a rare naturalised plant at Ta' Gajdore, Ramla Valley, Xagħra, Gozo.

3. *Lactuca serriola* L. First recorded by Borg (1927) as *L. scariola* var. *silvestris* Lam. as a rather rare plant found at Girgenti and possibly elsewhere and which is easily mistaken for *L. virosa* L. Penza (1969) mentions it as its synonym of *L. scariola* L., and recounts that he found it at Għajn il-Kbira. Haslam (1977) only mentions Borg's record without giving any new locations. Lanfranco (1995) reported it under the Maltese name of Ħass tal-Pizzi and stated that it is frequent and increasing in numbers. Sultana (2006) lists it as fre-

quent in disturbed localities throughout the Maltese Islands. Weber & Kendzior (2006) also states that it is a frequent-common and gives it the Maltese name Ħassa Salvaġġa tal-Pizzi. Casha (2013) records it as common in disturbed habitats including roadsides, paths, fields and gardens and is the first to show a photograph of the achenes. It is also reported by Lanfranco & Bonett (2015) as a frequent species.

4. *Lactuca virosa* L. Recorded first by Zerafa (1827) who states that this species grows 'in agerribus' (on fortifications) and flowers in June. Grech Delicata (1853) mentions that it occurs in the same habitat but is in flowers from May. He is the first author to coin the name 'Ħass Selvaġġ' to a wild *Lactuca* species. This species was then recorded from Cottonera (Gulia 1855-56, 1869) and from Corradino (Gulia G. 1889-90) both as indigenous and indicating that it is common in our islands. Sommier & Caruana Gatto (1915) state that it occurs here and there in some localities in Malta in fields and uncultivated places, and only cites previously recorded sites. In the catalogues of plants found in the Argotti Botanical Gardens, Borg & Penza (1924) and later, Vella & Penza (1938) gives this species as a native plant. Borg (1927) states that *L. virosa* was rather frequent in fields and gardens in Malta, and was rather rare in Gozo. Lanfranco (1960, 1969) consider it as a frequent plant and later gives its medicinal properties (Lanfranco 1975, 1993). It is reported by Penza (1969), Haslam & al. (1977), Lanfranco (1995) and Bonett & Attard (2005) as a frequent species in agricultural and suburban sites and ascribes the Maltese name of Ħass Xewwieki. Weber & Kendzior (2006), Casha (2013) and Lanfranco & Bonett (2015) just states that *L. virosa* also occurs in our islands but they do not show photographs in their work.

Distribution, habitat and chorology

Specimens have been found in two types of habitats in Malta. About 75% of the specimens were collected from agricultural areas, namely fallow or neglected fields, field margins or less often inside harvested fields (grains are usually harvested in May-June in Malta), sides of rubble walls and footpaths or lanes near fields (refer to ESF 1, Table 2). The minor portion of specimens were located in semi-urban to urban areas such as roadsides, footpaths, curbs, public gardens and parks, paved ground, traffic islands, waste-ground (soil heaps) and rarely from old walls. Nevertheless, many of the urban-located specimens were up to 300 m away from agricultural land. No plants of *Lactuca* were found in Comino during two surveys carried out in August and September of 2019. Similarly, *Lactuca* was not reported from Selmunett (Mifsud & al. 2016) or satellite islets in the Maltese archipelago (Sciberras & Sciberras 2010). A map showing the sites where the 105 specimens were collected is shown in Fig. 1.

Specimens were uncommon or often absent in agricultural or derelict areas near the coast such as at l-Aħrax tal-Mellieħa, Marfa, Ħal-Far, Kalkara (Malta) as well at Xlendi, Ta' Cenc, Sanap and Marsalforn in Gozo, albeit vast agricultural areas are present in these localities. On contrast, specimens were locally frequent inland. As a result, it can be inferred that wild *Lactuca* species do not prefer coastal areas. In addition, many of the *Lactuca* specimens were found in clayey soil. While the incidence of clayey soil in fields is higher compared to fields with reddish (terrarossa) soil, there seems to be an ecological correlation that *Lactuca* species prefer clayey soils, possibly because this has more residual moisture during the arid and warm months of June and July when the plants are fully mature.

With regards the chorology of the specimens examined *in situ*, plants undergo a daily cycle where flowers blossom for only about three hours, opening at dawn, (ca. 6 a.m.) and close back at about 9 a.m. Then the fruiting heads open to expose their achenes at about 10 a.m. and remain open indefinitely. The flowering period is from end of June till the beginning of September with few plants persisting till the mid-September depending on the onset of rainy autumn climate.

Reference material

The morphological findings of the achenes of *L. virosa, L. sativa, L. saligna* and *L. serriola* are reported in table 1 and photographed side by side in Fig. 2. The achene of *L. virosa* is distinct by having a dark maroon colour with an elliptic-fusiform flattened lenticular shape lined by a distinct thick-ribbed margin. It is the largest fruit at an average length of 4.5 mm. *L. serriola* is unique by having a brush of conspicuous hyaline bristles at the apex and a light greyish olive-brown colour. The intensity of the colour varies between different specimens but it is never dark. Achenes of *L. sativa* are quite similar to *L. serriola* but apart from the apical bristles being very reduced, they have a broader obovate shape and a pale silvery-grey colour with a faint amber-golden hue at the apex. Compared to the other achenes, it has a more rounded or obtuse apex. Finally, achenes of *L. saligna* have a medium toned dull bronze-brown colour without, or if present, inconspicuous bristles at the apex.

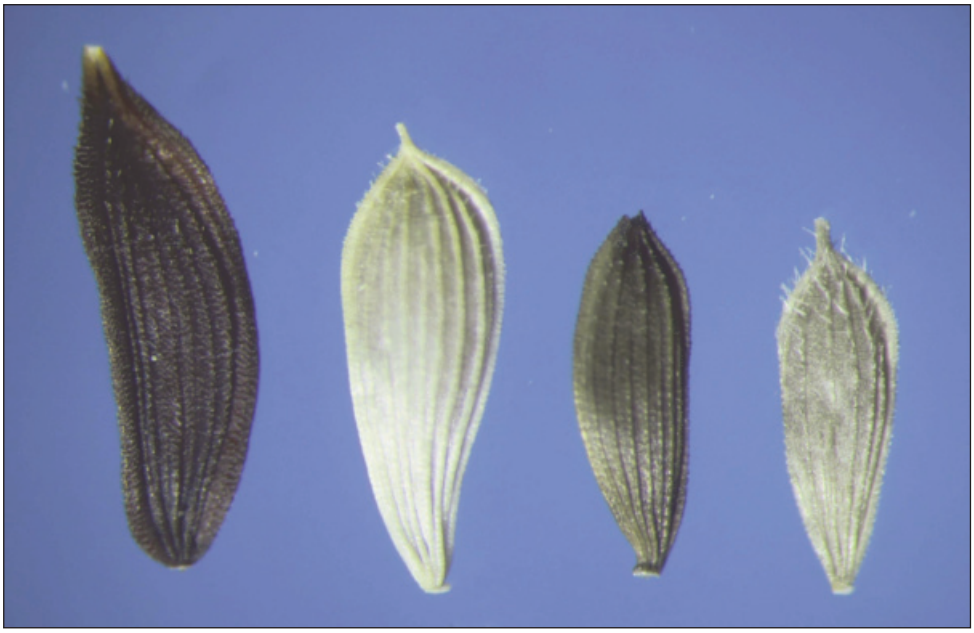

Fig. 2. Comparison of achenes of (left to right): *Lactuca virosa* (Montpellier, France), *L. sativa* (Xewkija, Gozo, Malta), *L. saligna* (Xewkija, Gozo, Malta) and *L. serriola* (Montpellier, France).

Achenes morphology and variation of specimens collected from the Maltese Islands

The characters of the fruits and the outline shape of the leaves of each examined specimen is reported in the ESF 1 (Table 3). The fruits of all specimens had a homologous morphology with some minor and taxonomically insignificant variation in the outline shape, size, amount of mottling and the length of the beak. Images of one achene from each of the 105 specimens are illustrated in Fig. 5a (L01 to L50) and Fig. 5b (L51 to L105) in the ESF 2. A general description of the important characters observed from the examination of the fruits is given below.

Colour: typically light olive brown throughout the whole achene, varying from either being medium dark (but never very dark) to occasionally greyish and discoloured on the other extreme. Some fruits (L03, L06, L10, L22, L42, L44, L62 and L87) had a yellowish hue here referred to as peanut colour.

Mottling: There was a diverse pattern of mottling in terms of number and distinctness (contrast) of small blobs on the fruit coat. Only seven specimens (L07, L09, L16, L31, L43, L94 and L103) had fruit with a fairly distinct mottling, the remaining having indistinct mottling with few or/and faded blobs, or nothing at all. The only relationship which could be linked was that none of the peanut-coloured fruits where mottled.

Shape: oblanceolate, broadest slightly below the beak, approximately ¾ the length of the achene, then tapering down into a blunt base. Sides linear or rarely vaguely curved. On average, achenes were about three times as long as wide, but some were more elongated with a length/width ratio of up to ×4.

Ribs: Six to seven longitudinal and parallel ribs, one at each margin of the fruit. Some specimens had a slightly flattened or minutely winged margin at the upper part of the achene.

Beak: Distinct and about 0.2 to 0.5 mm long. Elongated achenes had longer beaks.

Texture: Presence of simple but distinct hyaline bristles, located both on the face and the sides at the upper fifth of the fruit. The bristles measured 0.2–0.3 mm on average, then abruptly reduced in size and disappearing towards the lower part of the achene.

Size: Rather constant size of 3.0 ± 0.4 × 1 ± 0.1 mm (2.65–3.41 × 0.88–1.05 mm). Fourteen specimens had achenes longer than 3.5 mm, the longest being 4 mm long usually with long beaks. Three specimens had achenes shorter from 2.6 mm (2.4 mm being the shortest) which were found to be wider than average and had relatively shorter beaks.

The colour, size, shape and more importantly the presence of bristles at the apical part of the achene of all the 105 specimens corresponded to species *Lactuca serriola*. *L. virosa* was not confirmed from the entire collection.

Results from herbarium specimens collected from the Maltese Islands

The voucher specimens loaned from Edwin Lanfranco consisted of two specimens labelled as *L. virosa*, three as *L. serriola* and four as *L. saligna* (ESF, Table 3). Specimens labelled *L. serriola* and *L. saligna* were confirmed but specimen L501, labelled as *L. virosa* (collected by Michael Briffa), was badly preserved and lacked fruits, making its determination impossible. However, L502 (*L. virosa*) was better preserved with its few leaves having an oblong shape with an entire and unlobed margin similar to L501 and seven achenes within the debris. The achenes were identical to that of *L. serriola* and hence L502 has been ascribed to this species.

Five specimens are deposited in [ARG] of which two (L511 & L512 : Table 3) were not collected from the Maltese Islands (pers. comm. Christian Borg at [ARG], Oct 2019) and labelled as *L. perennis* L. (a species not recorded from Malta) and *L. augustana* All., now a synonym of *L. serriola*, but this specimen was clearly *L. saligna* instead.

The voucher specimens L514 (*L. saligna*) and L515 (*L. scariola*) were confirmed to match the labelled species. On the other hand, the specimen L513 collected by Caruana Gatto and labelled as *L. virosa* and consisting of only of ten unlobed cauline leaves (no achenes available) was determined using Prince & Carter (1977: table 2) who provide distinguishing characters on the cauline leaves. In regards, the white midrib (not maroon); the "herring-bone" pattern formed by the midrib and lateral veins; the glaucous colour of the lamina and the non-undulated outline observed in specimen L513 correspond to *L. serriola*. Moreover, the auricles of the leaves of *L. virosa* are wide and distinctly clasping the stem whereas in *L. serriola* the lobes are narrow and acute and clasping the stem less distinctly (Keil & Stebbins, 2012) as was the case for specimen L513.

Discussion

The examination of the 105 specimens of wild species of *Lactuca* and of the herbarium specimens did not confirm the presence of *L. virosa* on the Maltese Islands. From the three herbarium specimens cited as *L. virosa,* L501 and L513 (refer to Table 3) with entire leaves were instead found to correspond to *L. serriola* f. *integrifolia,* while L500 was undetermined due its bad state of preservation. This corroborates the misconception initiated from the historical literature (Zerafa 1831; Grech Delicata 1853; Gulia 1858-59, etc.) and flowing indisputably to the contemporary floristic works where *L. virosa* was determined as the wild lettuce with unlobed leaves, and *L. serriola* with runciform-lobed leaves, as was, for example, the case in Great Britain in the mid-nineties (Prince & Carter 1977). It seems that the achenes were ignored for the determination of *Lactuca* species by previous authors and students of the Maltese Flora, because from the literature review we carried out, none emphasised the distinct taxonomic value that the achenes have. It was perhaps because of this lack of knowledge that, as stated by Borg (1927), it was easy to confuse these two closely-related *Lactuca* species.

Poor herbarium evidence makes it is difficult to assess and ascertain historical records, however, two considerations were taken into account. Since historical literature indicated that *L. virosa* was not rare in Malta – for example: "*Malta, qua e là, Hamrun, Zabbar, Ghirghenti, Marsa, ecc.!*" (Sommier & Caruana Gatto 1915) – there is no plausible justification to explain why this species succumbed while the closely related *L. scariola* survived if both share the same habitat (Sommier & Caruana Gatto 1915; Borg 1927). Moreover, Caruana Gatto's specimens L513 (Table 3) cited as *L. virosa* but being determined as *L. serriola* f. *integrifolia* further supports the general misconception about these two taxa since the early 20th century.

With regards to *L. saligna*, the species was more common in the past, both from the old records and the herbarium specimens collected between 1960-1990 (refer to Table 3). The last sightings dated about 30 years ago from Victoria, Gozo (pers. comm. Edwin Lanfranco, 2019 & Michael Briffa, 2019) and since it has not been confirmed or reported in either publications of reports by the citizen science, *L. saligna* was considered extirpated or presumably extinct. The rediscovery by one us [SM] close to the Xewkija Industrial

Estate, Gozo (Fig. 3), is a welcome finding for the Flora of the Maltese Islands. Two plants were observed on the 8th of November 2017, in their vegetative state and confirmed as *L. saligna* the year after (7th October 2018), where five adult plants were found very close to each other. A survey on the 18th September 2019 resulted in nine flowering plants showing a small but significant increase in its population.

This study also resulted in an assessment of the variation of *L. serriola* in the Maltese Islands. Both *L. serriola* f. *serriola* (89% of the population) and *L. serriola* f. *integrifolia* (= *L. virosa* auctt. melit. non L.) (see Fig. 4) were encountered, the latter represented by specimens L07, L23, L26, L30, L33, L39, L41, L58, L63, L65, L80 and L82 (refer to ESF 1). Few plants here referred as *intermediate* forms were characterised by having variably lobed leaves mostly being shallowly lobed or/and possessing entire and lobed leaves on the same plant (L14, L26, L33, L35, L38, L40, L52 and L62). In the past, these forms were given some recognition (Ferakova 1976; Prince & Carter 1977; Haslam & al. 1977; Pignatti 1982) but currently, *L. serriola* is considered as a monogenetic variable species where these old forms based on the shape and lobation of the leaves have no more any taxonomic value.

Out of interest, Sommier & Caruana Gatto (1915) and Borg (1927) give the impression that *L. serriola* and *L. virosa* were scarce or infrequent in Malta, where they only give and a handful of localities in their flora. In contrast, the current distribution of *L. serriola* is widespread throughout the Maltese Islands (Fig. 1) and this divergence raises doubts if this species was introduced in Malta around the end of the 19th century and flourished during the last 100 years.

Fig. 3. *Lactuca saligna*, Xewkija (close to Ulysses Grove), Gozo (7-Oct-2018).

Fig. 4. *Lactuca serriola* with entire leaves where it was previously referred to as f. *integrifolia* and sometimes misidentified as *L. virosa*. (specimen L41, Qala, Gozo).

Conclusions

This investigation concludes that *Lactuca virosa* does not occur in the Maltese Islands. Most probably, it was a past misidentification based on the misconception that plants having entire or shallowly-lobed leaves were determined as *L. virosa,* whereas only plants with runcinate-lobed leaves were ascribed as *L. scariola.* In the past these plants where instead referable to as *L. serriola* f. *integrifolia* and f. *serriola* respectively *sensu* Ferakova (1976). The fact that all herbarium specimens labelled as *L. virosa* had entire leaves supports this supposition. It stands out that examination of the achenes was not carried out for the determination of *Lactuca* species in Malta. Moreover, *L. saligna*, a species of urban habitats that has not been observed for more than 30 years has been substantiated from Xewkija, Gozo in 2017. Hence the wild *Lactuca* species occurring in the Maltese Islands are *L. serriola* (common), *L. saligna* (very rare) and the cultivated crop *L. sativa* which seldom escapes as a casual and short-lived alien close to fields where it was originally in cultivation.

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References

Bentham, G. 1865: Handbook of the British flora, **1.** – London.
Bonett, G. & Attard, J. 2005: The Maltese Countryside, **1.** – Malta.
Borg, J. 1927: Descriptive flora of the Maltese Islands. – Malta.
— & Penza, C. 1924: Argotti Botanic Gardens General Catalogue. – Malta.
Camilleri, P. 2004: Uċuħ tar-raba' u l-Kultivazzjoni tagħhom. Il-Ħass.[Open fields and their cultivations]. – Pp.2-3 in: Camilleri, P. (ed.) Biedja u Sajd.[Agriculture and Fishery] **167.** – Malta
Casha, A. 2013: Flora of the Maltese Islands: An Introduction, **3.** – Malta.
Euro+Med (2006-) *Euro+Med PlantBase* - the information resource for Euro-Mediterranean plant diversity. – http://ww2.bgbm.org/EuroPlusMed/ [Last accessed 10/9/2019].
Ferakova, V. 1976: *Lactuca.* – Pp. 328-331 in: Tutin, T. G., Heywood, V. H., Burges, N. A., Valentine, D. H., Walters, S. M. & Webb, D. A. (eds) Flora Europaea, **4.** – Cambridge.
FAO 2017: UN Food & Agriculture Organization, Statistics Division. Lettuce (with chicory) production in 2017. – http://www.fao.org/faostat/en/#data/QC/visualize [Last Accessed 5/9/2019]
Giardina, G., Raimondo, F. M. & Spadaro, V. 2007: A catalogue of plants growing in Sicily. – Bocconea **20:** 5-582.
Grech Delicata, J. C. 1853: Flora Melitensis. – Malta.
Gulia, Gav. 1855-1856: Repertorio botanico Maltese. – Malta.
— 1858-1859: Repertorio di storia naturale. – Malta.
— 1869: Stirps compositarum Florulae *Melitensis.* – Bull. Soc. Bot. France. **16:** 253-255.

Gulia, Giov. 1889-1890: Prontuario di Storia Naturale, contenente la nomenclatura scientific coi corrispondenti vocaboli italiani ed inglesi. – Malta.

Haslam, S. M., Sell, P. D. & Wolseley, P. A. 1977: A Flora of the Maltese Islands. – Malta.

Jemelková, M., Kitner, M., Křístková, E., Doležalová, I. & Lebeda, A. 2018: Genetic variability and distance between *Lactuca serriola* L. populations from Sweden and Slovenia assessed by SSR and AFLP markers. – Acta Bot. Croatica **77(2):** 172-180. https://doi.org/10.2478/botcro-2018-0019.

Keil, D. J. & Stebbins, G. L. 2012: *Lactuca*, in Jepson Flora Project (eds) Jepson eFlora, http://ucjeps.berkeley.edu/eflora/eflora_display.php?tid=493 [Last Accessed 14/11/2019]

Lanfranco, E. 1995: Pjanti Vaskulari. In Sultana, J., Flora u Fawna ta' Malta [Flora and Fauna of Malta]. – Malta.

— & Bonnett, G. 2015: Nature Guide Series: Wild Flowers of the Maltese Islands. – Malta.

Lanfranco, G. 1960: Guide to the Flora of Malta. – Malta.

— 1969: Field Guide to the Wild Flowers of Malta. – Malta

— 1975: Duwa u semm fil-hxejjex Maltin [Virtues and medicinal properties of Maltese wild plants]. – Malta.

— 1993: Hxejjex medicinali u ohrajn fil-gzejjer Maltin [Medicinal plants and others in the Maltese Islands]. – Malta.

Le Floc'h, E., Boulos, L. & Véla, E. 2010: Catalogue synonymique commenté de la Flore de Tunisie. – Tunisi.

Lebeda, A., Doležalová, I., Ferakova, V. & Astley, D. 2004: Geographical Distribution of Wild *Lactuca* Species (*Asteraceae*, *Lactuceae*). – Bot. Rev. **70(3):** 328-356 https://doi.org/10.1663/0006-8101(2004)070[0328:GDOWLS]2.0.CO;2

Mifsud, S., Lanfranco, E., Fiorentino, J. & Mifsud, S. D. 2016: An Updated Flora of Selmunett (St. Paul's Island) including Mosses and Lichens. – Xjenza Online **4:** 142-159.

Oswald, P. H. 2000: Historical records of *Lactuca serriola* L. and *L. virosa* L. in Britain, with special reference to Cambridgeshire (v.c. 29). – Watsonia **23:** 149-159.

Penza, C. 1969: *Il-Flora Maltija Medicinali* [The medicinal maltese flora]. – Malta.

Pignatti, S. 2018: Flora d'Italia*,* 2nd ed., **3.** – Milano.

Prince, S. D. & Carter R. N. 1977: Prickly Lettuce (*Lactuca serriola* L.) in Britain. – Watsonia **11:** 331-338.

POWO 2019: Plants of the World Online*.* Kew Science. – http://powo.science.kew.org/ [Last Accessed on 6/9/ 2019].

Rich, T. C. G. & Jermy, A. C. 1998: Plant crib 1998. – London.

Sciberras, A. & Sciberras, J. 2010: Topography and Flora of the Satellite islets surrounding the Maltese Archipelago. – Centr. Medit. Naturalist **5(2):** 31-42.

Sommier, S. & Caruana Gatto, A. 1915: Flora melitensis nova. – Firenze

Sultana, J. 2006: Gmiel il-Flora Maltija [The beauty of the Maltese flora]. – Malta.

Tison, J.-M., Jauzein, P. & Michaud, H. (2015) Flore de la France méditerranéenne continentale. – Paris.

Vella, S. L. & Penza, C. 1938: The Botanic Garden of the Royal University of Malta – List of seeds for exchange collected in the year 1937. – Malta.

Weber, H. C. & Kendzior, B. 2006: Flora of the Maltese Islands. A field Guide*.* – Weikersheim.

Zerapha, S. 1827: Florae Melitensis Thesaurus, **1.** – Malta.

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