INTRODUCTION

Despite the economic importance of aphids, very few studies have so far been carried out to provide a preliminary check list of species inhabiting the Maltese Islands. Perhaps the first Maltese naturalist to mention aphid species from Malta was Borg (1922) in his book entitled “Cultivation and diseases of fruit trees in the Maltese Islands”. However, in this work (Borg, 1922) it is often not clear if species mentioned were actually observed in the Maltese Islands or not. Caruana Gatto (1926) provided a detailed study on some 90 plant deformations/galls found in the Maltese Islands. In this work, some 20 aphid species were listed as causing leaf deformations or plant galls. It is possible that most of the aphid species listed in this work were entirely based on plant gall morphology. Saliba (1963) produced a general work on insect pests of crop plants in the Maltese Islands. In this work, he listed 11 species of aphids as injurious on several economically important crop plants. In this work the only details provided for these aphids included local abundance and host crops. Most likely the species list of Saliba (1963) was more based on direct aphid observations on crops rather than on detailed taxonomic studies of the aphids themselves. Hille Ris Lamber (1969) described Protrama baronii from material collected from Malta. In the early 1970s, the Plant Protection Section (through Mrs June Wilkinson) of the Ministry of Agriculture in Malta was in correspondence with the Department of Entomology (through Dr V.F. Eastop) of the then British Museum (Natural History). In this correspondence (of which only a small part was available), reference is provided for some aphid species identified by V.F. Eastop. In 1994, the Plant Health Section of the Ministry for Agriculture and Fisheries in Malta embarked on a Plant Quarantine Strengthening Project funded by FAO. This technical cooperation project (TCP) involved a number of consultants from different disciplines (including entomologists) and following field sampling and species identifications, plant pests and diseases are to be found in unpublished FAO reports (e.g. Watson, 1994; Watson and Ismay, 1994). In these reports, 29 species of aphids are included of which three were not identified to species level. It is not the scope of the present work to provide a list of these aphids, but these will be included in a future work dealing with aphids on crop plants of the Maltese Islands. Blackman and Eastop (1994) recorded Forda riccobonii De Stefani Perez from Malta based on material housed at The Natural History Museum in London and Ortiz-Rivas et al. (2009) used material of this species collected from Valletta for a molecular study. Farrugia (1997) recorded four aphids as occurring on cauliflower in Gozo. Mifsud and Watson (1999) provided information on four introduced and established aphid species in Malta and Mifsud (2008) provided further information on a recently established species, Greenidea ficicola Takahashi. Blackman and Eastop (2006) cited also Dysaphis cifibmi (Buckton) from Malta. In a recent study (2009) on aphids associated with native trees in the Maltese Islands, Mifsud et al., (2009) reported a total of 25 aphid records of which 18 represented new records. This work was almost entirely based on a detailed morphological study of the aphid itself and only one species, Tetraneura nigrriabdominalis was identified on the bases of plant-gall morphology alone.

METHODOLOG

All previously published information was carefully examined and a list of aphid species (in alphabetical order) is included. In this list we provide currently accepted names, source of publication with reference to the Maltese literature and any other relevant information. Finally, a brief overview on tree dwelling aphids of the Maltese Islands is provided with details of local distributions and other notes were relevant.
RESULTS

Aphid species records from the Maltese Islands:

1. *Amphorophora rubi* (Kaltenbach); CARUANA GATTO, 1926. This species was recorded under the name *Nectarisorhaphis rubi* Kalt. as causing leaf deformations on *Rubus ulmifolius*. These symptoms are unusual for that aphid and therefore it is suspected that *Aphis ruborum* (Börner) could also be involved.

2. *Anuraphis farfarae* (Koch); CARUANA GATTO, 1926; SALIBA, 1963. This species was locally recorded under the names of *Aphis kecki* Schouteden and *Aphis pyri* Koch respectively.

3. *Aphis craccivora* Koch; MISUD et al., 2009


6. *Aphis nerii* Boyer de Fonscolombe; CARUANA GATTO, 1926

7. *Aphis pomi* De Geer; CARUANA GATTO, 1926; SALIBA, 1963. *Aphis eriobothryae* Sch. recorded by CARUANA GATTO (1926) is incorrect and should refer to *A. pomi*.

8. *Aphis pomi* (Linnaeus); CARUANA GATTO, 1926

9. *Aphis rumicis* Linnaeus; CARUANA GATTO, 1926

10. *Aphis umbrella* (Börner); CARUANA GATTO, 1926. This species was recorded as *Aphis malsae* Koch and as causing leaf deformation on *Althea rosea* and *Malva* spp.

11. *Aploneura lenticis* (Passerini); CARUANA GATTO, 1926; MISUD et al., 2009

12. *Baizonga pisiacea* (Linnaeus); CARUANA GATTO, 1926; MISUD et al., 2009. CARUANA GATTO (1926) recorded this species under its synonym *Pemphigus cornicularius* Pass. [sic].

13. *Brachycoccus cardui* (Linnaeus); CARUANA GATTO (1926). This species was recorded by CARUANA GATTO (1926) on the authority of BORG (1922), who collected the aphid on *Prunus domestica* and naming it as *Aphis pruni* Koch.

14. *Brachycoccus schwartzi* (Börner); CARUANA GATTO, 1926; SALIBA, 1963. The latter author recorded this species under the name of *Anuraphis persicae* Fonsc. This name has been applied for both *Brachycoccus persicae* (Passerini) and *B. schwartzi*. Collections carried out in recent years in Malta point out the frequent presence of the latter species in Malta.

15. *Brachycoccus cucubali* (Passerini); CARUANA GATTO, 1926

16. *Brachycoccus tamarici* (Lichtenstein); MISUD et al., 2009

17. *Brevicoryne brassicae* (Linnaeus); CARUANA GATTO, 1926; SALIBA, 1963; FARRUGIA, 1997

18. *Cavariella aegeropodi* (Scopoli); MISUD et al., 2009

19. *Chaetosiphon fragaefolii* (Cockerell); SALIBA, 1963

20. *Chaitophorus capræae* (Mosley); MISUD et al., 2009

21. *Chaitophorus populilabae* (Boyer de Fonscolombe); MISUD et al., 2009

22. *Cinara cupressi* (Buckton); MISUD et al., 2009

23. *Cinara maghrebica* Mímeur; MISUD et al., 2009

24. *Cinara palaestinensis* Hille Ris Lambers; CARUANA GATTO, 1926; SALIBA, 1963

25. *Dysaphis crithmi* (Buckton); BLACKMAN and EASTOP, 2006

26. *Dysaphis plantaginea* (Passerini); CARUANA GATTO, 1926. This aphid was recorded as *Myzus mali* Ferrari [sic].

27. *Eriosoma lanigerum* (Hausmann); CARUANA GATTO, 1926; SALIBA, 1963. CARUANA GATTO (1926) recorded this species under *Myzoxylus laniger* Hausm.

28. *Eriosoma langerianum* (Hartig); CARUANA GATTO, 1926; MISUD et al., 2009

29. *Essigella californica* (Essig); MISUD et al., 2009

30. *Eulachnus rileyi* (Williams); MISUD et al., 2009

31. *Eulachnus tuberculostemmatus* (Theobald); MISUD et al., 2009

32. *Forda riccobonii* (De Stefani Perez); BLACKMAN and EASTOP, 1994; MISUD et al., 2009; ORTIZ-RIVAS et al., 2009

33. *Greenidea ficiola* Takahashi; MISUD, 2008

34. *Hayhurstia atriplicis* (Linnaeus); CARUANA GATTO, 1926

35. *Hoplocallis picta* (Ferrari); MISUD et al., 2009

36. *Lachnus robors* (Linnaeus); MISUD et al., 2009

37. *Lipaphis pseudobrassicae* (Davis); FARRUGIA, 1997. The species was previously recorded under the name of *L. erysimi* Kaltenbach.

38. *Myzallus schreberi* Hille Ris Lambers and Stroyan; MISUD et al., 2009

39. *Myzus cerasi* (Fabricius); SALIBA, 1963

40. *Myzus persicae* (Sulzer); FARRUGIA, 1997; MISUD and WATSON, 1999

41. *Paralectus cimiciformis* von Heyden; CARUANA GATTO, 1926; MISUD et al., 2009. This species was recorded by CARUANA GATTO (1926) under its synonym, *Pemphigus Derbei* Licht.

42. *Smynthurodes betae* Westwood; FARRUGIA, 1997; MISUD et al., 2009

43. *Tetraneura nigriglandula* (Sasaki); MISUD et al., 2009

44. *Tetraneura ulmi* (Linnaeus); CARUANA GATTO, 1926

45. *Theclaxus suberi* (Del Guercio); MISUD et al., 2009

46. *Timocalis takachihoensis* Higuchi; MISUD et al., 2009

47. *Toxoptera auranti* (Boyer de Fonscolombe); CARUANA GATTO, 1926; SALIBA, 1963

48. *Trama baronii* (Hille Ris Lambers); HILLIE RIS LAMBERS, 1969

49. *Tuberolachnus salignus* (Hausmann); MISUD et al., 2009

50. *Viteus vitifoliæ* (Fitch); BORG, 1922; CARUANA GATTO, 1926; SALIBA, 1963; MISUD and WATSON, 1999. BORG (1922) and CARUANA GATTO (1926) recorded this species under the name *Phylloxera vastatrix* Planchon.

Aphid species recorded from the Maltese Islands whose identity remains uncertain:

1. *Aphis sp*. This taxon was reported by CARUANA GATTO (1926). He described leaf deformations of this possibly single *Aphis* sp. from *Carthamus lanatus*, *Hedya* *runcinatum* and *Polygonum convolvulus*. Such deformations may be caused by several species of *Aphis* or other taxa of different genera, but in the absence of recently collected material on the mentioned host plants no definite conclusions are taken.

2. *Aphis sp*. This taxon was reported by CARUANA GATTO (1926) on *Sisymbrium officinale*. From the description of the plant deformations caused by this aphid, the record may be attributed to *Brevicoryne brassicae* or *Lipaphis erysimi* or to some other species.

3. *Aphis persicae* Fonsc. This species was recorded by CARUANA GATTO (1926) on both *Prunus amygdalus* (almond) and *Prunus persica* (peach). There is no doubt that the record on peach should refer to *Brachycoccus schwartzi* as quoted above, but the record on almond could be attributed to more than one species. From the
description of the host plant deformations it could be *Brachycerus amygadalinus*, but this remains to be asserted with collection of new material.

4. *Aphis pyri* Kock. This species was reported by SALIBA (1963) as occasionally found on pear (see above, under *Anuraphis farfarae*), as well as on apple and on pomegranate; but records on these latter two plants should be refer to different aphid species.

**DISCUSSION AND CONCLUSION**

The above list provides detailed literature records of aphid species from the Maltese Islands. A total of 50 species are included and the identity of some additional records remain uncertain. Most of the aphid studies carried out in Malta so far were mainly based on plant symptoms/ plant-gall morphology (e.g. CARUANA GATTO, 1926) or listing of aphid pests associated with crop plants which are known to be present in Southern Europe (e.g. BORG, 1922; SALIBA, 1963). A few aphid studies were carried out where detailed taxonomic studies of the aphids were undertaken. One such comprehensive study was that carried out by MIFSUD et al., (2009) were a total of 25 aphid species associated with 25 species of trees were found. In this study trees of economic importance (mainly crops) were not considered because these will be included in a separate study on aphids of crops in Malta. Some general considerations are here included with respect to aphids associated with native trees in Malta.

As a general statement, the Maltese Islands are not rich in tree species and several Euro-Mediterranean species which are known to host several aphid species are completely lacking (e.g. *Abies*, *Acer*, *Betula*, *Castanea*, *Juniperus*, *Picea*, several *Pinus* and others). Perhaps the most common tree which is widely distributed in Malta is *Ceratonia siliqua* with which a common aphid is found between May and June, *Aphis craccivora*. Another very common tree is *Pistacia lentiscus*, present in most habitat types and which almost always hosts *Aploneura lentisci*. Other *Pistacia* are not common and mainly found in private or public gardens and afforested areas. *Pistacia atlantica* hosting *Forda riccobonii* and *Smythurodes betae* was found on pear (see above, under *Eucalyptus californica*). The former three species may be regarded as frequent and rather rare and with a restricted distribution. On the other hand *Tamarix* spp. are not known to host aphids in Malta. The presence of this species in Malta in such an isolated and natural place is somewhat unusual even though the species was found in several Euro-Mediterranean localities and on different species of elms (DÖRING, 2007). The aphid must have reached the Maltese Islands, by strong winds. Another alien species which is widely distributed in Malta and common on cultivated *Ficus spp.* is *Greenidea fuscata* (MIFSUD, 2008).

We are of the opinion that more species of aphids associated with trees will be eventually found in Malta. Certain trees which are known to host aphids (e.g. *Crataegus*) and which are present in Malta have not been properly investigated. The above checklist was developed to facilitate future work which is ongoing on aphids on crop plants and aphids on herbaceous plants and shrubs in Malta. With the rich flora of the Maltese Islands, especially herbaceous plants and shrubs, some 150-200 aphid species are expected to be found.

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**REFERENCES**


FARRUGIA C., 1997 – *Insect pests on cauliflower (Brassica oleracea var. botrytis) in Gozo (Maltese Islands, Central Mediterranean)*. - The Central Mediterranean Naturalist, 2 (4): 152-165.


