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# The armored scales (Homoptera Diaspididae) of Algeria

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**ABSTRACT** Diaspididae (Hemiptera Coccomorpha) is one of the largest and most diverse family of scale insects and it contains many agricultural parasites worldwide. The study collected data from those previously reported in the literature over the period of 123 years. The inventory includes armored scales collected from field samples in several regions of Algeria as well as from a bibliographic survey. A critical review of the literature on armored scales in Algeria revealed the presence of 114 species, with mainly a palearctic distribution belonging to 48 genera distributed in four tribes. The Diaspidini tribe is the most abundant (50 species, 24 genera), followed by the Aspidiotini (47 species, 18 genera) and the Parlatorini (13 species, 4 genera) and finally the Odonaspidini (2 genera, 2 species). According to our survey, conducted between 1987 and 2020, 79 species were recorded, belonging to 37 genera distributed in four tribes. Compared to the Maghreb countries, Algeria has a significant coccidological richness in relation to the total number of species.

**KEY WORDS** Diaspididae; scale insects; inventory; Algeria.

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## INTRODUCTION

Algeria enjoys an exceptional situation since it is the tenth largest country in the world (2.382 million km²) and the largest country on the African continent. It is bordered to the north by the Mediterranean Sea with 1200 km of coastline, to the east by Tunisia and Libya, to the south by Niger and Mali, to the southwest by Mauritania and Western Sahara, and to the west by Morocco. It lies between the parallels 18°58' and 37°05'N latitude and 08°40' W and 11°58' E. This geographical situation provides it with very special climatic and ecological diversity. Its vast territory grants it a diversification of its climate, landscapes, soils and natural vegetation (Letreuch-Belarouci, 1995). This ecoclimatic diversity offers an adaptability to thousands of species of fauna and flora and their populations.

Scale insects are one of the most serious pests in its range (Demirozer et al., 2009). Diaspididae (Hemiptera Coccomorpha) are the largest and most diverse family of scales, with more than 2,500 species described in 400 genera (García et al., 2016). They infest more than 1,380 host plant genera in 182 botanical families (Miller & Davidson, 2005). In Algeria, these armored scales throughout the northern band of Algeria (Biche, 2012) are the main cause of these infestations and the damages on the various hosts. Studies conducted so far on the ecology and biosystematics of Diaspididae remain few and far between. However, some earlier works on coccidological fauna were undertaken by several authors among which we quote the most important: Newstead (1897), Marchal (1909), Trabut (1911), Balachowsky (1926, 1927, 1928, 1929, 1930, 1932, 1933, 1939, 1948, 1949, 1950, 1951, 1953, 1954, 1956, 1958), Balachowsky & Mesnil (1935), Piguet (1960), Iperti et al. (1970), Benassy (1975), Doumandji (1984, 1985), Biche (1987; 2012), Saighi et al. (2005) and recently Taibi et al. (2016), Aroua et al. (2019, 2020), Zaabta et al., (2019), Boudjemaa et al. (2020) and Boukhobza et al. (2020).

In Algeria, with the advent of national and international trade, other species of diaspines have appeared and are currently causing significant damage to plants. Among these armoured scale insect, there are *Aonidiella aurantii, Chrysomphalus dictyospermi, Lepidosaphes beckii, Parlatoria ziziphi* and *Comstockaspis perniciosa*. Due to the lack of research on scale studies, we have undertaken extensive research into the inventory and the accurate recognition of the geographic and floristic distribution.

## MATERIAL AND METHODS

### *Field survey and sampling*

The survey was carried out in several study sites in Algeria (Fig. 1, Table 1), over a period of 33 years (1987–2020). We started out by going out into the field and selecting infested plants to take samples of infested plant organs. We put them in bags bearing labels indicating the place, date, host plants, and brought them to the laboratory for examination. The specimens were mounted on blade according to the method described in Balachowsky and Mesnil of 1935 and in Kosztarab & Kozàr (1988) observed by optical microscopy and identified by key in Balachowsky (1949a, b; 1950; 1951; 1953; 1954a, b; 1956) and (Miller & Davidson, 2005) The identification of the scale was done by one of us.

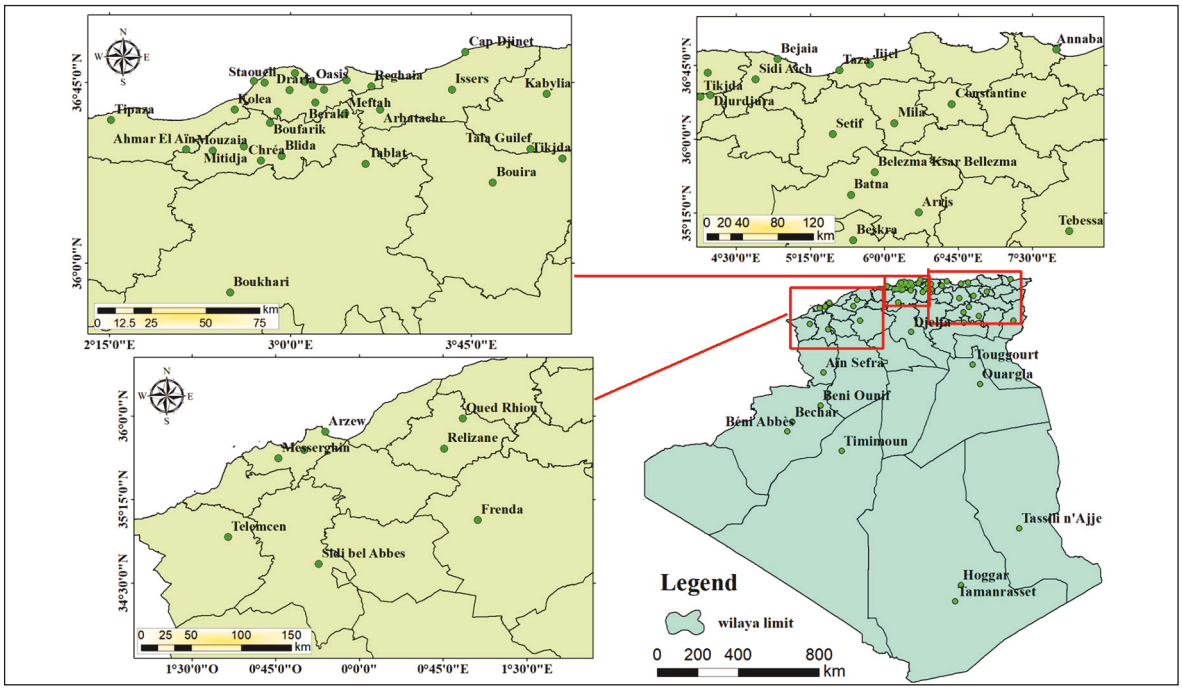


Figure 1. Location of study regions in Algeria.

| | Collected | | Bibliographic | | |
|---|---|---|---|---|---|
| | **Host plant** | **Place** | **Sources** | **Host plant** | **Place** |
| **ASPIDIOTINI** | | | | | |
| ***Aonidia*** | | | | | |
| 1. *A. lauri* (Bouche) | *Laurus nobilis* | 4, 22 | Balachowsky, 1927, 1932a | *Laurus nobilis* | 3 |
| | | | Saighi, et al., 2005 | *Lagerstroemia indica nivea* | 3 |
| 2. *A. mediterranea* (Lindinger) | | | Lindinger, 1910 | *Callitris articulata, Juniperus communis* | 4 |
| ***Aonidiella*** | | | | | |
| 3. *A. aurantii* (Maskell) * | *Citrus limetta, C. aurantium var. amara, C. clementina, C. sinensis, C. limon, C. reticulata, C. paradisi, C. medica, C. triptera, C. myrtifolia, C. japonica* | 4, 22 | Balachowsky, 1950 | *Citrus limetta, C. aurantium var. amara, C. clementina, C. sinensis, C. limon, C. reticulata, C. paradisi, C. medica, C. triptera, C. myrtifolia, C. japonica* | 55 |
| | | | Saighi, et al., 2005 | *Rosa major* | 4 |
| | | | Biche, 2012 | *Citrus* | 3 |
| | | | Franco et al., 2006 | *Citrus* | 3 |
| | | | Aroua et al., 2019 | *C. clementina, C. sinensis* | 4, 21 |
| | | | Boudjemaa et al., 2020 | *C. limon* | 4 |
| 4. *A. taxus* Leonardi | *Podocarpus neriifolius, Taxus baccata.* | 63 | Balachowsky, 1927 | *Taxus baccata* | 21 |
| | | | Saighi et al., 2005 | *Podocarpus nereifolia* | 4 |
| ***Aspidaspis*** | | | | | |
| 5. *A. longiloba* (Hall) | *Tamarix africana, T. gallica, Camellia* sp. | 4 | Belguendouz & Biche, 2015 | | 3 |
| ***Aspidiotus*** | | | | | |
| 6. *A. nerii* Bouche* | *Phoenix dactylifera, Hedera helix, Arthrocnemum indicum, Laurus nobilis, Citrus limetta, C. aurantium var. amara, C. clementina, C. sinensis, C. limon, C. reticulata, C. paradisi, C. medica, C. triptera, C. myrtifolia, C. japonica, Prunus spinosa, Morus nigra.* | 7, 22, 28 | Leonardi, 1920; Balachowsky, 1932a, 1950. | *Ceratonia siliqua, Sophora japonica, Morus pomifera* | 28 |
| | *Albizia lebbek, Chamaerops humilis, Vitis vinifera.* | 7, 28 | Delassus et al., 1927; Doumandji, 1985; Doumandji & Biche, 1986 | *Citrus limetta, C. aurantium var. amara, C. clementina, C. sinensis, C. limon, C. reticulata, C. paradisi, C. medica, C. triptera, C. myrtifolia, C. japonica* | 22, 25, 30, 32, 64, 68 |
| | *Nerium* sp., *Olea europaea, Smilax aspersa, Lavatera arborea, Calycotome spinosa, Pittosporum tobira, Crataegus oxyacantha.* | 1, 4, 16, 23, 28, 45, 57, 64, 77. | Signoret, 1877 | *Pistacia lentiscus* | |
| | *Sambucus nigra, Euonymus japonicus, Fraxinus angustifolia var. excelsior,* | 4 | Newstead, 1897 | | |

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|---|---|---|---|---|---|
| | *Olea europaea, Brachychiton populneus, Pistacia lenticularis, Acacia retinodes, Chamaerops humilis* | | | | |
| | *Pistaciaa atlantica, Hedera helix, Sambucus nigra, Acacia retinodes, Gleditsia triacanthos* var. *inermis, Lavatera arborea, Smilax aspera, Fraxinus angustifolia* var. *excelsior, Chamaerops humilis, Calycotome spinosa, Brachychiton populneus, Crataegus oxyacantha, Quercus* sp., *Olea europaea* | 4, 45, 78 | Saighi et al., 2005 | *Dracaena dracon, Yucca aloifolia, Acocanthera spectablis, Nerium oleander, Howea belmoreana, Phoenix canariensis, Rhapis flabelliformis, Berberis pruinosa, B. sanguinea, Bignonia cherere, Lonicera caprifolia, Viburnum* sp., *V. lantana, V. tinus, Evonymus japonica, Encephalartos caffer, Diospyros duelonal, D. kaki, Arbutus unedo, Aleurites palmatae, Ceratonia siliqua, Erythrina herbacea, Robinia pseudacacia, Shotia latifolia, Rosmarinus officinalis, Tetranthera* sp., *Asparagus falcatus, Strelitzia augusta, Fraxinus* sp., *Jasminum primulinum, Ligustrum vulgare, Olea europea, Pittosporum heterophyllum, P. tobira, P. undulatum, Grevillea robusta, Macadamia ternifolia, Prunus* sp., *P. laurocerasus, Datura arborea, Luhaea divaricata, Alpinia nutans* | 3 |
| ***Chrysomphalus*** | | | | | |
| 7. *C. aonidum* (Linnaeus) * | *Ficus retusa* var. *alba, F. carica, F. macrophylla, F. elastica, F. capensis, F. rubiginosa,F. indica, F. nitida, Fraxinus angustifolia* var. *excelsior, Citrus sinensis* | 4, 19, 22, 47 | Balachowsky, 1927, 1928a, 1932a, 1950 | *Bupleurum lateriflorum, Cocos plumosa, Howea selloniana, Phoenix canariensis, Aralia papyrifera, Meryta denhamii, Nerium* sp., *Carissa bispinosa, Acer* sp., *Acer negundo, Begonia* sp., *Opuntia tomentosa, Euonymus japonicus, Ricinus communis, Brexia* sp., *Laurus nobilis, Persea gratissima, Musa* sp., *Strelitzia augusta, Eucalyptus* sp., *Psidium guajava, Ficus elastica, Panicum parlatorei, Citrus aurantium.* var. *amara, C. aurantium* var. *amara, C. clementina, C. sinensis, C. limon, C. reticulata, C. paradisi, C. medica, C. triptera, C. myrtifolia, C. japonica,C. bigaradia, Eriobotrya japonica, Prunus laurocerasus, Rhamnus alaternus, Camellia* sp., *Magnolia grandiflora, Ficus retusa, Morus nigra, M. pomifera* | 4 |
| | | | Aroua et al., 2019 | *C. clementina, C. sinensis* | |

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| 8. *C. dictyospermi* (Morgan) * | *Ficus retusa* var. *alba, F. carica, F. macrophylla, F. elastica, F. capensis, F. rubiginosa, F. indica, F. nitida, Olea europaea* | 4, 48 | Balachowsky, 1927, 1932a, 1950 | *Monstera deliciosa, Cocos romanzoffiana, Howea selloniana, Phoenix canariensis, Pritchardia filifera, Lithraea aroeira, Pistacia lenticularis, Buxus sempervirens, B. balearica, Euonymus europaeus, Cyperus alternifolius, Arbutus unedo, Acacia cyanaphylla, Cercis siliquastrum, Ceratonia siliqua, Sophora davididae, Quercus lusitanic, Ophiopogon japonicus, Ruscus aculeatus, R. hypoglossum, Ficus retusa* var. *alba, F. carica, F. macrophylla, F. elastica, F. capensis, F. rubiginosa, F. indica, F. nitida, F.heterophylus, Olea europaea, Yucca elephantipes, Strelitzia augusta, S. reginae, Eugenia jambo, Chamaerops humilis, Gigantochloa asersa, Pittosporum tobira, Platanus orientalis, Eriobotrya japonica, Prunus laurocerasus, Pyrus communis, Platanus reclinata, Bonksia* sp., *Punica granatum, Brachychiton populneus, Populus alba, P. nigra, Cotoneaster* sp. | |
| | | | Saighi et al., 2005 | *Chorisia speciosa, Cupressus sempervirens, Ficus elastica, F. retusa, Eucalyptus botryoides, Platanus orientalis, Brachychiton acerifolium, Sterculia platanifolia,* | 4 |
| | | | Biche, 2012; Franco et al., 2006 | *Citrus* | 3 |
| | | | Aroua et al., 2019 | *C. clementina, C. sinensis* | 4, 21 |
| 9. *C. pinnulifer* (Maskell) | | | Balachowsky, 1932a | *Citrus limetta, C. aurantium* var. *amara, C. clementina, C. sinensis, C. limon, C. reticulata, C. paradisi, C. medica, C. triptera, C. myrtifolia, C. japonica* | |
| ***Clavaspis*** | | | | | |
| 10. *C. herculeana* (Cockerell & Hadden) | *Bauhinia purpirae* | 4 | Saighi et al., 2005 | *Tithonia tagetiflora, Aleurites palmatae, Bauhinia aculeata, B. purpurea, Gleditschia triacanthos.* | 4 |
| ***Comstockaspis*** | | | | | |
| 11. *C. perniciosa* (Comstock) * | *Carya porcina, Pterocarua fraxinifolia, Cydonia* sp., *Malus communis, Prunus pissardi* | 4, 21, 22, 45, 78, 81 | Borchsenius, 1966 | *Malus communis* | 22, 45, 50 |
| | | | Cabi, 1986 | | 3 |
| ***Cryptoparlatoreopsis*** | | | | | |
| 12. *C. meccae* (Hall) | | | Balachowsky, 1951 | *Ziziphus* sp. | 18 |
| 13. *C. tlaiae* (Balachowsky) | | | Balachowsky, 1927 | *Tamarix aphylla* | 3 |

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| | | | Balachowsky, 1951 | *Tamarix* sp. | 17 |
| ***Diaspidiotus*** | | | | | |
| 14. *D. armenicus* (Borchsenius) | *Tamarix* sp. | 70 | Belguendouz & Biche, 2015 | | 3 |
| 15. *D. braunschvigi (*Rungs*)* | *Pistaciaa atlantica* | 30 | Belguendouz & Biche, 2015 | | 3 |
| 16. *D. cecconii* (Leonardi) | *Anabasis oropediorum* | 54 | Borchsenius, 1966; Marchal, 1909; Sanders, 1909; Balachowsky, 1927, 1932a | *Sedum album, Moricandia arvensis, Ephedra* sp., *Ephedra altissima, Asparagus* sp. | 57 |
| | | | Bodenheimer, 1937 et 1943 | *Ephedra* sp. | |
| 17. *D. distinctus* (Leonardi) | | | Balachowsky, 1932a | *Quercus lusitanica* | 4 |
| 18. *D. forbesi* (Johnson) | *Tamarix* sp. | 70 | Belguendouz & Biche, 2015 | | 3 |
| 19. *D. gigas* (Thiem & Gerneck) | | | Balachowsky, 1950 | *Myrtus alba, M. nevelii, Ficus retusa* var. *alba, Solanum sodomaeum, Populus nigra, Salix alba, S. pedicellata, Tilia parvifolia* | 21 |
| 20. *D. labiatarum* (Marchal) | | | Balachowsky, 1929a, 1932a, 1934; Kaussari, 1955 | *Teucrium capitatum* | |
| 21. *D. laperrinei* (Balachowsky) | *Nerium* sp., *Tamarix africana, T. gallica, T. aphylla* | | Balachowsky, 1929a, 1932d, 1934; Kaussari, 1955 | *Nerium* sp., *Myrtus nevelii, Olea lapperrinei, Olea europaea* | 29, 40 |
| 22. *D. lenticularis* (Lindinger) | *Pistacia lenticularis, Fraxinus angustifolia* var. *excelsior, Prunus avium, Rhamnus alaternus, R. alaternus* | 4, 50, 60. | Belguendouz & Biche, 2015 | | 3 |
| | *Olea europaea* | 23, 26, 56, 59, | | | |
| 23. *D. lepineyi* (Balachowsky) | *Chamaerops* sp., *C. humilis, Prunus domestica* | 4 | Belguendouz & Biche, 2015 | | 3 |
| 24. *D. maleti* (Vayssière) | *Fraxinus angustifolia* var. *excelsior, Olea europaea* | 8, 14, 26, 44, 50, 61, 64, 81 | Balachowsky, 1927, 1932a | *Olea europaea* | 4 |
| 25. *D. nitrariae* (Marchal) | | | Marchal, 1911; Balachowsky, 1930 a, 1932a | *Nitraria sp* | 4 |
| 26. *D. ostreaeformis* (Curtis) | *Quercus ilex, Fraxinus angustifolia* var. *excelsior* | 4, 76 | Balachowsky, 1928b, 1932a | | 3 |
| 27. *D. pyri* (Lichtenstein) | *Chamaerops* sp., *Olea europaea, Platanus orientalis, Prunus dulcis* | 26, 59, 64 | Balachowsky, 1928b, 1932a, 1948 | | 4 |
| 28. *D. wuenni* (Lindinger) | *Ilex aquitifolius* | 70 | Belguendouz & Biche, 2015 | | 3 |
| 29. *D. zonatus* (Frauenfeld) | *Ficus carica* | 4, 30, 46, 79 | Belguendouz & Biche, 2015 | | 3 |

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| ***Dynaspidiotus*** | | | | | |
| 30. *D. abietis* (Schrank) | | | Balachowsky, 1928b, 1932a | *Pinus halepensis, Quercus pubescens, Ficus carica, Platanus orientalis* | |
| 31. *D. britannicus* (Newstead) | | | Balachowsky, 1928b, 1932a, 1950 | *Ilex aquitifolius, Buxus sempervirens, B.balearica, Pinus halepensis,* | 4 |
| 32. *D. ephedrarum* (Lindinger) | | | Balachowsky, 1930a, 1950 | *Ephedra* sp., *Ephedra nebrodensis, Cedrus* sp., *Pinus sylvestris* | 27 |
| 33. *D. regnieri* (Balachowsky) | *Fraxinus communis, Cedrus atlantica* | 16, 64, 76 | Balachowsky, 1950, 1954a | *Cedrus* sp. | 27 |
| ***Gonaspidiotus*** | | | | | |
| 34. *G. minimus* (Leonardi) | | 16, 52, 79, 81 | Balachowsky 1928b, 1932a, 1932b | | 4 |
| 35. *G. seurati* (Marchal) | | | Marchal, 1911 | *Acanthorrhinum ramosissimum* | 3 |
| | | | Balachowsky 1934,1956 | *Trichodesma africanum* | 3 |
| ***Hemiberlesia*** | | | | | |
| 36. *H. lataniae* (Signoret) * | *Olea europaea, Calycotome spinosa* | 26, 44 | Balachowsky, 1927, 1932a, 1950 | *Chrysanthemum segetum, Beta maritima, Eriodendron sp, Ficus heterophylus, F. indica, Inula viscosa, Strelitzia reginae, Opuntia tomentosa, Solanum sodomaeum, Vitis vinifera* | 4 |
| | *Nerium sp, Olea europaea, Eriobotrya japonica, Prunus amygdalus* | 57 | Saighi *et al*., 2005 | *Aralia* sp., *Hedera helix algeriensis, Meryta denhamii, Corypha australis, Catalpa fargesii, Chorisia speciosa, Buddleia davidii, Buxus balearica, B. japonica, B. sempervirens, Eleadendron capense, Cyperus* sp., *Erica arborea, Aleurites palmatae, Bauhinia purpurea, Cercis siliquastrum* var. *alba, Aberia caffra, Ginkgo biloba, Rosmarinus officinalis, Persea americana, Magnolia grandiflora* var. *exoniensis, Cocculus laurifolius, Ficus retusa, Morus rubra, Strelitzia augusta, S. nicolai, Theophrasta* sp., *Eugenia uniflora, Feijoa sellowiana, Fraxinus angustifolia, Phytolacca decandra, Macadamia ternifolia, Hovenia dulcis, Crataegus oxyacantha, Prunus laurocerasus, Citrus aurantium var.amara, Populus alba, Brachychiton populneum, Sterculia platanifolia, Taxus baccata, Tilia euculana, Ulmus campestris, Vitis* sp., *V. berlandieri, V. riparia, V. rupestris* | 4 |
| | *Prunus dulcis, Fraxinus angustifolia* var. *excelsior* | 45 | | | |
| | *Bauhinia grandiflora, Euonymus japonicus, Hypericum canariensis, Ficus rubiginosa, Chamaerops humilis, Calycotome spinosa, Sterculia platanifolia* | 4, 39 | | | |

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| 37. *H. rapax* (Comstock) * | *Chamaerops humilis, Hedera* sp., *Cercis siliquastrum, Fraxinus* sp., *Olea europaea, Platanus orientalis, Rubus* sp. | 4, 44, 57 | Newstead, 1897; Balachowsky, 1927; 1932a, 1950 | *Hedera helix, Inula viscosa, Elaeagnus reflexa, Laurus nobilis, Theophrasta* sp., *Myrtus alba, Morus alba, Fraxinus oxyphylla, Phytolacca dioica, Platanus orientalis, Populus alba, Ruta angustifolia* | 4, 7, 65 |
| | | | Saighi et al., 2005 | *Corypha australis, Platanus orientalis* | 4 |
| ***Morganella*** | | | | | |
| 38. *M. longispina* (Morgan) | *Fraxinus communis* | 4 | Balachowsky, 1926, 1927, 1950; Ferris, 1938 | *Ficus carica, Fraxinus communis, Olea europaea* | 4 |
| | | | Saighi et al., 2005 | *Corylus avellana, Catalpa fargesii, Cordia myxa, C. nodosa, Buddleia davidii, Aleurites mollucana, A. palmatae, Acacia arabica, A. floribunda, Bauhinia purpurea, B. racemosa, Ceratonia siliqua, Gleditschia sinensis, G.triacanthos var. inermis,Castanea sativa, Aesculus californica, Lagunaria patersonii, Ficus* sp., *F. carica, F. elastica, F macrophylla, Morus nigra, Morus pomifera, Musa* sp., *Fraxinus* sp., *F. angustifolia, Ligustrum japonicum, Olea europea,Palliurus australis, Prunus* sp., *Populus nigra, Salix alba, Cestrum foetidissimum, C. futibum, C. nocturnum, Iochromaa tubulosa, Luhaea divaricata* | 4 |
| 39. *M. claviformis* Balachowsky et Richardeau | | | Balachowsky, 1951; Balachowsky & Richardeau, 1942 | *Tamarix gallica* | 82, 58 |
| 40. *M. megapora* (Balachowsky) | | | Balachowsky, 1951 | *Tamarix aphylla* | 82 |
| ***Oceanaspidiotus*** | | | | | |
| 41. *O. spinosus* (Comstock) * | *Meryta denhamii, Nerium* sp., *Euonymus japonicus, Olea europaea, Pittosporum tobira, Platanus* sp., *Brachychiton populneus, Crataegus* sp., *Crataegus oxydentalis, Rhamnus alaternus* | 4, 26, 57, 21 | Balachowsky, 1932a; Ferris, 1938 | | |
| | | | Balachowsky, 1948; 1950 | *Euonymus japonicus, Nephelium longana* | |
| | *Phoenix reclinata, Euonymus japonicus, Olea europaea, Populus alba* | 4 | Saighi et al., 2005 | *Acer* sp., *A. negundo, Dracaena draco, Chamaerops humilis, Bauhinia racemosa, Cercis siliquastrum, Robinia pseudacacia, Castanea sativa, Carya porcina, Pterocarya fraxinifolia, Rosmarinus officinalis, Persea indica, Morus nigra, M. pomifera, Musa* sp., *Fraxinus excelsior,* | 4 |

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| | | | | *Ziziphus* sp., *Crataegus oxyacantha, Cydonia vulgaris, Eriobotrya japonica, Prunus* sp., *Nephelium longana, Sterculia macrocarpa, Celtis australis, C. occidentalis, Ulmus campestris* | |
| ***Rhizaspidiotus*** | | | | | |
| 42. *R. donacis* (Leonardi) | | | Balachowsky, 1928c, 1932a; Ferris, 1943 | *Arundo donax, Phragmites australis* | 4 |
| ***Rungaspis*** | | | | | |
| 43. *R. capparidis* (Bodenheimer) | *Pistacia atlantica, Atriplex halimus, Halocnemum strobilaceum* | 30, 57 | Balachowsky, 1949a, 1951 | *Convolvulus trabutianus, Calligonum comosum* | 62 |
| ***Saharaspis*** | | | | | |
| 44. *S. ceardi* (Balachowsky) | *Pistacia atlantica, P. lenticularis.* | 23, 26, 76 | Balachowsky, 1932a; Balachowsky & Mesnil, 1935; Rungs, 1935. | *Ficus carica, Vitis vinifera* | 2, 13, 17 28, 77, 82 |
| | *Ficus carica, Olea europaea, Vitis vinifera* | 4, 20, 30, 44, 50, 54, 57, 59 | | | |
| ***Targionia*** | | | | | |
| 45. *T. halophila* (Balachowsky) | *Platanus orientalis* | 4 | Balachowsky, 1932a; Ferris, 1943 | *Halocnemum strobilaceum* | 28 |
| 46. *T. nigra* Signore*t* | *Debregeasia longifolia* | 54 | Balachowsky, 1932a; Ferris, 1943 | *Helichrysum angustifolium, Senecio cineraria, Suaeda vermiculata, Arundo donax, Retama raetam, Debregeasia longifolia* | 56 |
| 47. *T. vitis* (Signoret) | *Atriplex halimus* | 10 | Leonardi 1900; Trabut, 1911; Balachowsky, 1927; Ferris, 1943 | *Arbutus* sp., *Quercus ilex, Oplismenus compositus.* | 28, 51 |
| **DIASPIDINI** | | | | | |
| ***Acanthomytilus*** | | | | | |
| 48. *A. intermittens* (Hall) | | | Balachowsky, 1954b | *Panicum sp* | 72 |
| ***Andaspis*** | | | | | |
| 49. *A. hawaiiensis* (Maskell) | *Acacia farnesiana, Acacia arabica, Sophora davididae, Olea europaea* | 4 | Balachowsky, 1928b | *Albizia* sp., *Mimosa* sp. | |
| | | | Balachowsky, 1954b | *Cassia* sp.,*Cedrus atlantica, Albizzia lebbek, Erythrina* sp., *Mimosa* sp. | 4 |
| | | | Saighi et al., 2005 | *Buddleia davidii, Acacia floribunda, Albizzia lophantae, Cassia tora, Gleditschia triacanthos* var. *inermis, Lagerstroemia indica nivea, Hibiscus elatus, Lagunaria patersonii, Lavatera olbia, Fraxinus angustifolia, F. excelsior, Salix pubescens, Harpullia* sp., *Kobrenteria paniculata, Spindus utilis* | 4 |

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|---|---|---|---|---|---|
| ***Aulacaspis*** | | | | | |
| 50. *A. herbae* (Green) | | | Bodenheimer, 1924, 1937 | *Bambusa* sp., *Erythrina* sp., *Phragmites communis* | |
| | | | Green, 1899 | *Oplismenus compositus, Panicum parlatorei* | |
| 51. *A. rosae* (Bouché) * | *Rubus ulmifolius* | 4, 28, 45 | Trabut, 1911 | *Laurus nobilis* | 4 |
| | | | Balachowsky, 1954b | *Rubus* sp. | |
| ***Carulaspis*** | | | | | |
| 52. *C. atlantica* (Lindinger) | *Cupressus sempervirens, Cupressus lusitanica, Juniperus communis, Juniperus phoenicea, Taxus baccata* | 4, 28, 59 | Belguendouz & Biche, 2015 | | 3 |
| 53. *C. juniperi* (Bouché) * | *Cedrus atlantica, C.libanotica* | 31 | Danzig & Pellizzari, 1998 | *Albizia leb* | 3 |
| | *Cedrus* sp. | 73 | Miller and Davidson, 2005 | | 3 |
| 54. *C. minima* (Signoret) * | *Cupressus sempervirens, Biota orientalis* | 4 | Balachowsky 1926, 1954b | | 4 |
| | | | Rosen & DeBach, 1978 | | 3 |
| | | | Miller & Davidson, 2005 | | 3 |
| 55. *C. taxicola* (Vayssière) | *Taxus baccata* | 21 | Vayssière, 1913 | *Taxus baccata* | |
| 56. *C. visci* (Schrank) | *Juniperus phoenicea, Taxus baccata* | 14, 79 | Balchowsky, 1954b | *Juniperus oxycedrus, Viscum* sp., *Pinus* sp., *Taxus* sp. | 4, 9, 31 |
| | *Cupressus sempervirens* | 4 | | | |
| ***Chionaspis*** | | | | | |
| 57. *C. etrusca* Leonardi | *Tamarix africana, T. gallica, T.* sp. | 30, 57 | Balachowsky, 1954b | *Tamarix* sp. | |
| | *Tamarix africana, T. gallica* | 42, 57 | Danzig & Pellizzari, 1998 | *Quercus sp, Tamarix africana, Myricaria* sp., *Tilia* sp. | 4 |
| 58. *C. kabyliensis* Balachowsky | *Pinus pinea* | 73 | Balachowsky, 1930 a, 1954a,b | *Cedrus* sp., *Cedrus atlantica, Pinus pinea, P. sylvestris* | 11, 76 |
| | *Cedrus* sp. | 30 | | | |
| 59. *C. platani* (Cooley) | *Tamarix* sp. | 4 | Belguendouz & Biche, 2015 | | 3 |
| 60. *C. salicis* (Linnaeus) | *Salix pubescens* | 27 | Balachowsky 1954b | *Salix pubescens* | 27, 53, 81 |
| | *Populus alba* | 4 | Danzig & Pellizzari, 1998 | | 4 |
| ***Contigaspis*** | | | | | |
| 61. *C. bilobis* (Newstead) | *Calycotome spinosa* | 20, 54 | Newstead, 1895 | | 3 |
| | | | Balachowsky, 1954b | *Foeniculum vulgare, Calycotome spinosa* | 4, 20, 72 |
| | | | Balachowsky 1926 | *Globularia alypum* | 4 |
| 62. *C. farsetiae* (Hall) | | | Danzig & Pellizzari, 1998 | | 3 |
| ***Diaspis*** | | | | | |
| 63. *D. asparagi* Giard | | | Giard, 1893 | *Asparagus horridus* | |
| 64. *D. boisduvalii* Signoret* | *Phoenix dactylifera* | 4 | Lepiney & Mimeur, 1931 | *Phoenix canariensis* | |
| | | | Balachowsky 1929b, 1954b | *Cocos plumosa, Cocos weddelliana* | 55 |
| | | | Saighi, et al., 2005 | *Phoenix dactylifera* | 4 |

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|---|---|---|---|---|---|
| 65. *D. coccois* Lichtenstein | *Cocos romanzoffiana* | 4 | Balachowsky, 1954b | *Cocos romanzoffiana, Cocos nucifera* | 4 |
| 66. *D. echinocacti* (Bouché) * | *Ficus indica* | 5 | Newstead, 1901 | *Opuntia elongate* | 3 |
| | | | Saighi et al., 2005 | *Opuntia ficus-indica* | 4 |
| 67. *D. radicicola* Ferris | | | Balachowsky 1927, 1954b; Nakahara, 1982 | *Opuntia tomentosa* | 4 |
| ***Discodiaspis*** | | | | | |
| 68. *D. numidica* (Balachowsky) | *Helianthemum virgatum* | 57 | Balachowsky, 1949b | *Helianthemum virgatum, Helianthemum pilosum* | 57 |
| 69. *D. salicorniae* (Gómez-Menor Ortega) | *Atriplex campestris, Salsola strobilaceum, Salsola vermiculata* var. *pubescens, Salicornia* sp., *Holocnemum strabilaceum* | 57 | Belguendouz & Biche, 2015 | | 3 |
| ***Duplachionaspis*** | | | | | |
| 70. *D. berlesii* (Leonardi) | *Pistacia lentiscus, Asparagus acutifolia, Pittosporum* sp. | 4 | Leonardi, 1920 | | |
| | | | Balachowsky, 1954b | *Pistacia lentiscus, Asparagus* sp. | 4, 21, 66 |
| 71. *D. divergens* (Green) | | | Trabut, 1910; Hall, 1923 | *Arundo donax* | |
| 72. *D. monodi* (Rungs) | | | Balachowsky, 1954b | *Panicum* sp. | 71, 72 |
| 73. *D. natalensis* (Maskell) * | | | Rungs, 1942 | *Panicum parlatorei* | |
| 74. *D. noaeae* (Hall) | | | Balachowsky, 1933, 1954b | *Arthrocnemun glaucum, Arthrocnemum indicum, Salicornia fruticosa, S.* sp. | 55 |
| 75. *D. sicula* (Lupo) | | | Balachowsky, 1954b | *Aphyllanthes monspessulanus, Lygeum spartum* | 3 |
| ***Epidiaspis*** | | | | | |
| 76. *E. leperii* (Signoret) | *Olea europaea, Prunus persica* | 4, 43 | Balachowsky, 1954a | *Malus* sp., *Prunus* sp., *Pyrus communis, Mespilus germanica* | 43, 11 |
| | | | Trabut, 1911 | | |
| | | | Miller & Davidson, 2005 | | |
| ***Fiorinia*** | | | | | |
| 77. *F. fioriniae* (Targioni Tozzetti) * | *Chamaerops humilis* | 68 | Mamet, 1943 | *Citrus limetta, C. aurantium* var. *amara, C. clementina, C. sinensis, C. limon, C.reticulata, C. paradisi, C. medica, C. triptera, C. myrtifolia, C. japonica* | |
| | *Bupleurum spinosum, Phoenix canariensis, Buxus balearica, Laurus nobilis, Musa* sp. | 4 | Balachowsky, 1954b | *Howea* sp., *Phoenix* sp., *Pistacia* sp., *Buxus* sp., *Laurus* sp., *Eucalyptus* sp., *Chamaerops* sp., *Tilia* sp., | |
| | | | Saighi et al., 2005 | *Chamaerops humilis, Phoenix canariensis, Laurus nobilis, Musa* sp., *Strelitzia nicolai* | 4 |
| ***Froggattiella*** | | | | | |
| 78. *F. penicillata* (Green) | | | Balachowsky, 1953; Takagi, 1969 | *Bambusa* sp. | |
| | | | Saighi et al., 2005 | *Arundo donax, Bambusa vulgaris* | 4 |
| ***Furchadaspis*** | | | | | |
| 79. *F. zamiae* (Morgan) * | *Cycas revoluta, Encephalartos caffer* | 4 | Balachowsky, 1954b | *Cussonia spicata, Cycas revoluta, Ceratozamia mexicana* | 4 |

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|---|---|---|---|---|---|
| | | | Saighi et al., 2005 | *Cycas revoluta, Encephalartos caffer* | 4 |
| ***Getulaspis*** | | | | | |
| 80. *G. bupleuri* (Marchal) | *Olea europaea* | 23, 49 | Marchal, 1904 | *Bupleurum gibraltaricum* | |
| | | | Balachowsky, 1954b | *Bupleurum gibraltaricum, Bupleurum lateriflorum, Bupleurum spinosum, Olea europaea* | 28 |
| ***Kuwanaspis*** | | | | | |
| 81. *K. bambusicola* (Cockerell) | | | Cockerel, 1902 | *Bambusa bambos, Bambusa spinosa* | |
| | | | Balachowsky, 1927, 1954b | *Aralia papyrifera, Asparagus falcatus, Asparagus horridus* | 4 |
| | | | Saighi et al., 2005 | *Bambusa vulgaris* | 4 |
| 82. *K. pseudoleucaspis* (Kuwana) * | *Bambusa macroculmis, Eragrostis* sp., *Arundinaria* sp., *Phyllostachys* sp. | 4 | Balachowsky, 1954b | *Tetranthera* sp. | 4 |
| ***Lepidosaphes*** | | | | | |
| 83. *L. beckii* (Newman) * | *Citrus limetta, C. aurantium* var. *amara, C. clementina, C. sinensis, C. limon, C. reticulata, C. paradisi, C. medica, C. triptera, C. myrtifolia, C. japonica* | | Balachowsky, 1930b, 1954b | *Citrus limetta, C. aurantium* var. *amara, C. clementina, C. sinensis, C. limon, C. reticulata, C. paradisi, C. medica, C. triptera, C. myrtifolia, C. japonica* | 51 |
| | | | Franco et al., 2006 | *Citrus* ? | 3 |
| | | | Saighi et al., 2005 | *Buddleia davidii, Murraya exotica, Citrus aurantium* var. *amara* | 4 |
| | | | Biche, 2012 | *Citrus* | 3 |
| | | | Zaabta et al., 2020; Boukhobza et al., 2020 | *C. sinensis* | 4 |
| 84. *L. conchiformis* (Gmelin) * | *Tilia parvifolia* | 42, 57 | Newstead, 1897; Balachowsky, 1954b | | 3 |
| | *Bauhinia racemosa* | 4, 28, 57 | Saighi et al., 2005 | *Ficus carcia* | 4 |
| | *Olea europaea* | 26 | | | |
| | *Cupressus sempervirens* | 59 | | | |
| 85. *L. flava* (Signoret) | *Olea europaea* | 4, 14, 21, 23, 26, 44, 45, 54, 57, 59, 61, 64, 81 | Bodenheimer, 1924 | *Olea europaea* | |
| | | | Balachowsky, 1954b; Benassy, 1986; Biche et Bourahla, 1991 | *Phillyrea media, Olea europaea* | 55, 79, 24 |
| | | | Pellizzari & Fontana, 1996 | *Olea europaea* | |
| 86. *L. gloverii* (Packard) * | *Citrus limetta, C. aurantium* var. *amara, C. clementina, C. sinensis, C. limon, C. reticulata, C. paradisi, C. medica, C. triptera, C. myrtifolia,* | 51, 21, 57 | Piguet, 1960 | *Citrus limetta, C. aurantium* var. *amara, C. clementina, C. sinensis, C. limon, C. reticulata, C. paradisi, C. medica, C. triptera, C. myrtifolia, C. japonica* | 51 |

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|---|---|---|---|---|---|
| | *C. japonica* | | Danzig & Pellizzari, 1998; Tena & Garcia Mari, 2011; Biche, 2012 | *Citrus* | 3 |
| | | | Saighi et al., 2005 | *Citrus aurantium* var. *amara,* | 4 |
| 87. *L. granati* Koroneos | *Crataegus oxyacantha,* | 16 | Balachowsky, 195b | *Crateagus* sp. | 27, 76 |
| | *Pinus maritime* | | Danzig, 1972 | *Brexia* sp. | |
| 88. *L. ulmi* (Linnaeus) * | *Biota orientalis, Citrus aurantiu.* var. *amara* | 45 | Balachowsky, 1954 | *Pinus* sp. | 55 |
| | *Elaeagnus angustifolia, Pinus maritime, Ulmus rosae* | 4 | Merrill, 1953 | | |
| ***Lineaspis*** | | | | | |
| 89. *L. striata* (Newstead) | *Taxus baccata* | 76 | Balachowsky, 1954b | *Cupressus* sp., *Cupressus lusitanica, Callitris quadrivalvis, Juniperus oxycedrus, Taxus baccata* | 4, 7, 28, 11, 36, 43, 78, |
| | *Juniperus phoenicea* | 75 | | | |
| | | | Newstead, 1897 | | |
| ***Mohelnaspis*** | | | | | |
| 90. *M. ampelodesmae* (Newstead) | *Ampelodesma tenax* | 28 | Newstead, 1897 | *Ampelodesma tenax* | 3 |
| ***Pinnaspis*** | | | | | |
| 91. *P. aspidistrae aspidistrae* (Signoret)* | | | Balachowsky, 1954b | *Ophiopogon japonicus* | 4 |
| ***Salicicola*** | | | | | |
| 92. *S. vayssierei* (Balachowsky) | | | Balachowsky, 1958b | *Rhus pentaphylla* | |
| | | | Rungs, 1942 | *Rhus tripartitum* | |
| | | | Lepiney & Mimeur, 1931 | *Argania sideroxylon* | |
| ***Thysanofiorinia*** | | | | | |
| 93. *T. nephelii* (Maskell) | | | Marchal, 1906; Balachowsky, 1954b; Takagi, 1970; Danzig & Pellizzari, 1998 | *Nephelium longana* | 4 |
| ***Unachionaspis*** | | | | | |
| 94. *U. bambusae* (Cockerell) | | | Balachowsky, 1927 | *Bambusa* sp. | |
| ***Unaspis*** | | | | | |
| 95. *U. citri* (Comstock) | | | Trabut, 1910; Borchsenius, 1966 | *Citrus limetta, C. aurantium* var. *amara, C. clementina, C. sinensis, C. limon, C. reticulata, C. paradisi, C. medica, C. triptera, C. myrtifolia, C. japonica* | 3 |
| 96. *U. euonymi* (Comstock) * | | | Nakahara, 1982 | *Euonymus japonicus* | |
| | | | Lepiney & Mimeur, 1931 | *Euonymus europaeus* | |
| | | | Borchsenius, 1966 | *Lonicera* sp., *Syringa* sp., *Fraxinus berlandieri, Ligustrum vulgare, Olea europaea* | |
| ***Voraspis*** | | | | | |
| 97. *V. Ceratoniae* (Marchal) | *Ceratonia siliqua* | 4, 57 | Marchal, 1904 | | |
| | | | Balachowsky, 1954b | *Ceratonia siliqua* | 3, 28 |
| 98. *V. nerii* (Newstead) | *Nerium* sp. | 20, 28 | Newstead, 1895; Lindinger,1910 | | |

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|---|---|---|---|---|---|
| | *Nerium* sp., *Laurus nobilis* | 4, 57, 20 | Balachowsky, 1954b | *Beta maritima* | 20, 28 |
| **PARLATORINI** | | | | | |
| ***Cryptoparlatoreopsis*** | | | | | |
| 99. *C. tlaiae* (Balachowsky) | | | Balachowsky, 1927 | *Tamarix aphylla* | 3 |
| ***Parlatoreopsis*** | | | | | |
| 100. *P. longispina* (Newstead) | *Ficus macrophylla, Persea gratissima, Tetranthera* sp. | 4 | Doumandji, 1984 | *Persea gratissima, Viscum* sp., *Asparagus* sp., *Ophiopogon japonicus* | 4 |
| 101. *P. pyri* (Marlatt) | *Ficus retusa* var. *alba* | 35, 41, 47, 38 | Doumandji, 1984 | | 4 |
| ***Parlatoria*** | | | | | |
| 102. *P. blanchardi* (Targioni Tozzetti) | *Ficus retusa* var. *alba, Ficus elastic* | 20 | Targioni, 1892; Palmer, 1905; Balachowsky, 1953; Carpenter et al., 1978 | *Howea belmoreana* | 13, 20, 58 |
| | | | Miller & Davidson, 2005 | | |
| 103. *P. camelliae* Comstock | *Euonymus japonicus* | 39 | Saighi et al., 2005 | *Evonymus japonica, Citrus aurantium* var. *amara* | 4 |
| 104. *P. fluggeae* Hall | *Sambucus nigra, Euonymus* sp. | 4 | Balachowsky, 1953 | *Oplismenus compositus* | |
| | | | Danzig & Pellizzari, 1998 | | |
| | | | Saighi et al., 2005 | *Erythrina herbacea, Robinia pseudocacia, Logunaria patersonii, Salix pubescens, Cestrum foetidissimum, C. nocturnum, Luhaea divaricata, Debregeasia longifolia* | 4 |
| 105. *P. oleae* (Colvée) * | *Olea europaea* | 57, 64, 65, 70, 78 | Newstead, 1897; Balachowsky, 1953 | | 4, 57 |
| | *Prunus* sp., *Rubus ulmifolius* | 26, 44, 45, 50, 59, 61 | Trabut, 1911 | | |
| | *Pittosporum heterophyllum, Pyrus communis, Prunus aspersa* | 21, 26 | Biche, 1987 | *Olea europaea* | 26 |
| | *Photinia Japonica* | 12 | | | |
| | *Prunus cerasus, Rhaphiolepis indica* | 21, 80; 81 | | | |
| | *Euonymus japonicus, Fraxinus* sp., *Cotoneaster pannosa, Eriobotrya japonica, Prunus armeniaca, Mespilus germanica* | 74 | | | |
| | *Ficus retusa* var. *alba* | 4 | | | |
| | *Eucalyptus botryoides* | 7 | | | |
| | *Pistacia* sp., *Schinus terebinthifolius, Calicotome spinosa, Fraxinus ornus, Pinus nigra* | 76 | | | |

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|---|---|---|---|---|---|
| | *Prunus* sp. | 59 | | | |
| 106. *P. pergandii* Comstock* | *Citrus limetta, C. aurantium* var. *amara, C. clementina, C. sinensis, C. limon, C. reticulata, C. paradisi, C. medica, C. triptera, C. myrtifolia, C. japonica* | 7, 28, 42, 51, 52, 57, 63, 61, 67, 81, | Balachowsky, 1953 | *Euonymus japonicus* | |
| | | | Newstead, 1897; Piguet, 1960; Benassy, 1975 | *Bupleurum spinosum, Citrus limetta, C. aurantium* var. *amara, C. clementina, C. sinensis, C. limon, C. reticulata, C. paradisi,* | 51 |
| | | | | *C. medica, C. triptera, C. myrtifolia, C. japonica* | |
| | | | Biche, 2012 | *Citrus* | 3 |
| | | | Aroua et al., 2019 | *C. clementina, C. sinensis* | 4, 21 |
| 107. *P. theae* Cockerell * | *Euonymus* sp., *Viburnus* sp. | 4 | Belguendouz & Biche, 2015 | | 3 |
| 108. *P. ziziphi* (Lucas) * | *Citrus limetta, C. aurantium* var. *amara, C. clementina, C. sinensis, C. limon, C. reticulata, C. paradisi, C. medica, C. triptera, C. nobilis, C. myrthifolia, C. japonica, C. bigaradia* | 55 | Boisduval, 1867; Piguet 1960 | | |
| | | | Benassy, 1975 | *Citrus* | |
| | | | Boisduval, 1867 | | |
| | | | Saighi et al., 2005 | *Citrus* sp., *C. aurantium* var. *amara, C. limetta* | 4 |
| | | | Belguendouz et al., 2009; Belguendouz et al., 2011; Biche, 2012; Belguendouz, 2014 | *Citrus ssp* | 51 |
| | | | Franco et al., 2006 | *Citrus* | 3 |
| | | | Taibi et al., 2016 | *Citrus* | 81 |
| | | | Takarli et al., 2015 | *C. clementina,* | 51 |
| | | | Aroua et al., 2019; Aroua et al., 2020 | *C. clementina, C. sinensis* | 4 |
| ***Leucaspis*** | | | | | |
| 109. *L. pini* (Hartig) | *Cedrus atlantica* | 4, 16, 22, 27, 31, 76, | Saighi et al., 2005 | *Pinus halepensis, P. longifolia, P. pinea* | 4 |
| | *Pinus nigra* | 22, 34, 57, 79 | Belguendouz & Biche, 2015 | | 3 |
| | *Pinus* sp., *Pinus halepensis* | 12, 16, 30 | | | |
| 110. *L. pusilla* Löw | | | Saighi et al., 2005 | *Pinus halepensis, P. longifolia, P. pinea* | 4 |
| 111 *L. riccae* Targioni-Tozzetti | *Ephedra alata, Ephedra corsoniana* | 4 | Marchal, 1909 | *Ephedra* | |
| | | | Balachowsky, 1953 | | 57 |

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|---|---|---|---|---|---|
| 112. *L. signoreti* (Signoret) | *Pinus nigra* | 76, 14 | Balachowsky, 1928b | | |
| | | | Balachowsky, 1953 | *Cedrus* sp., *Cedrus atlantica* | 31 |
| **ODONASPIDINI** | | | | | |
| ***Froggattiella*** | | | | | |
| 113. *F. penicillata* (Green) | *Bambusa macroculmus* | 4 | Balachowsky, 1953 | *Bambusa* sp. | 4 |
| | | | Takagi, 1969 | | |
| | | | Saighi et al., 2005 | *Arundo donax, Bambusa vulgaris* | 4 |
| ***Odonaspis*** | | | | | |
| 114. *O. secreta* (Cockerell) | | | Lindinger, 1912; Borchenius, 1937; Balachowsky, 1953; Takagi, 1970 | *Bambusa* sp. | 4 |

Table 1. Armored scales species of Algeria.

### *Data Analysis*

The listed species, are grouped by separate tribe by region and host plant, with corresponding references for each species.

## RESULTS AND DISCUSSION

### *Bibliographic inventory of Algerian citrus scales*

In light of the results, we list the Diaspididae which now has 114 species belonging to 48 genera in four tribes; 27 of them are considered cosmopolitan species. The host plants of the Diaspididae reach 488 plant species belonging to 94 botanical families. Although these species have primarily a palearctic distribution, the Diaspidini tribe is the most abundant with 50 species in 24 genera, followed by the Aspidiotini with 47 species in 18 genera with, the Parlatorini with 13 species in 4 genera the Odonaspidini is the least represented with 2 genera and 2 species. The two species *Froggattiella penicillata* (Green) and *Odonaspis secreta* (Cockerell) infested only species of the Poaceae family and were found only in Algiers.

### *Census study*

Based on the results of our 33-year survey, we identified 79 species belonging to 37 genera in four tribes, 24 of which are considered cosmopolitan species. The Diaspidini tribe is the most abundant with 35 species in 18 genera, followed by the Aspidiotini with 31 species in 15 genera with, the Parlatorini with 12 species in 3 genera the Odonaspidini is the least represented with one genus and one species.

In Table 1 we organized the distribution of the species according to different regions in Algeria; namely Ahmar El Aïn (1), Ain Sefra (2), Algeria (3), Algiers (4), All regions of Algeria (5), All the localities of this host (6), Annaba (7), Arbatache (8), Arris (9), Arzew (10), Aures (11), Batna (12), Bechar (13), Bejaia (14), Bel Abbes (15), Belazma (16), Beni Abbes (17), Beni Ounif (18), Beraki (19), Biskra (20), Blida (21), Boufarik (22), Bouira (23), Boukhari (24), Bouzarea (25), Cap Djinet (26), Chréa (27), Constantine (28), Djanet (29), Djelfa (30), Djurdjura (31), Draria (32), El Harrach (33), Elmeurdja (34), Fort-De-l'Eau (35), Frenda (36), Ghardaia (37), Hacen Badi (38), Hassi Bounif (Oran) (39), Hoggar (40), Issers (41), Jijel (42), Kabylia (43), Khemis Miliana (44), Kolea (45), Media (46), Meftah (47), Messerghin (48), Mila (49), Miliana (50), Mitidja (51), Mostaganem (52), Mouzaia (53), M'Sila (54), Northern of Algeria (55), Oasis (56), Oran (57), Ouargla (58), Oued Rhiou (59), Reghaia (60), Relizane (61), Sahara (62), Setif (63), Sidi Aich (64), Sidi Bel Abbès (65), Sidi Fredj (66), Skikda (67), Staoueli (68), Tablat (69), Tala Guilef (70), Tamanrasset (71), Tassili N'Ajjers (72), Taza (73), Tebessa (74), Tiaret (75), Tikjda (76), Timimoun (77), Tipaza (78), Tizi Ouzou (79), Tizi Rached (80), Tlemcen (81), Touggourt (82). On the other hand the cosmopolite is (**).

The results show that the distribution is not yet complete, as it is to be considered the presence of other species that could not be encountered, but this shows that the majority is located on the northern strip of Algeria where concentrated fruit trees and forests and ornamental.

## CONCLUSIONS

This study is the third report dealing with the armored scales fauna in Algeria, the first is reporting in 2005 and the second in 2015. It is intending to present news on the host plants and the biogeography, which have appeared in this region since. The publication of the first contribution 1987. The object of this work is to draw up an exhaustive inventory of diaspine in Algeria, which will be a reference base for other faunistic and zoogeographical studies of this group of insects. Our list is at least an important contribution, quite complete on the armored scales in Algeria, to the overall knowledge.

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## REFERENCES

Aroua K., Kaydan M.B., Achiri T.D. & Biche M., 2020. The influence of the region and the host plant on population dynamics of *Parlatoria ziziphi* (Lucas) (Hemiptera: Diaspididae) in Mitidja (Algeria). Ecology, Environment and Conservation, 26: 333–340.

Aroua K., Kaydan M.B., Belguendouz R., Achiri T.D. & Biche M., 2019. Inventaire Des cochenilles des Agrumes (Clémentinier et Oranger) dans Deux Régions de la Mitidja (Algérie). Revue Agrobiologia, 9: 1707–1714.

Balachowsky A.S., 1926. Note sur un coccide de la faune Neo-tropicale récemment aclimaté et nuisible au figuier en Algerie. Bulletin de la Société d'Histoire Naturelle de l'Afrique du Nord, 17: 63–69.

Balachowsky A.S., 1927. Contribution à l'étude des coccides de l'Afrique mineure (1re note) Annales de la Société Entomologique de France, 96: 175–207.

Balachowsky A.S., 1928a. Contribution à l'étude des coccids de L'Afrique mineure (3e note). *Chrysomphalus aonidum* L. - biologie - traitement. Bulletin de la Société d'Histoire Naturelle de l'Afrique du Nord, 19: 156–180.

Balachowsky A.S., 1928b. Contribution à l'étude des coccides de l'Afrique Mineure (2ème note). Bulletin de la Societe d'Histoire Naturelle de l'Afrique du Nord, 19: 121–144.

Balachowsky A.S., 1928c. Contribution à l'étude des Coccides de l'Afrique mineure (4ème note). Nouvelle liste de Coccides nord-africains avec description d'espèces nouvelles. Bulletin de la Société Entomologique de France, 33: 273–279.

Balachowsky A.S., 1929a. Contribution à l'étude des coccides de l'Afrique Mineure (6ème note). Faune du Hoggar. Annales de la Société Entomologique de France, 98: 301–322.

Balachowsky A.S., 1929b. Contribution à l'étude de la faune du Congo Belge. Diaspines nuisibles au caféier et au cacaoyer. Revue de Pathologie Végétale et d'Entomologie Agricole de France, 16: 141–145.

Balachowsky A.S., 1930a. Contribution à l'étude des coccides de l'Afrique mineure (9me note). Addition a la faune du nord-africain avec description de trois espèces nouvelles. Bulletin de la Societe d'Histoire Naturelle de l'Afrique du nord, 21: 119–125.

Balachowsky A.S., 1930b. Deux *Chionaspis* (Hem. Coccidae) nouveaux de *Abies pinsapo* et du cèdre. Bulletin de la Société d'Histoire Naturelle de France, 17: 266–273.

Balachowsky A.S., 1932a. Étude biologique des coccides du bassin occidental de la Méditerranée. Encyclopédie Entomologique, XV P. Lechevalier & Fils Paris 214 pp + LXVII.

Balachowsky A.S., 1932b. Contribution à l'étude des coccides de l'Afrique mineure [11ème note]. Sur une diaspine nouvelle récoltée par M.P. Vayssiere dans le Haute-Atlas. Bulletin de la Société Entomologique de France, 37: 18–20.

Balachowsky A.S., 1933. Contribution à l'étude des coccides du Nord-Africain [12ème note]. Diaspines récoltée dans la région de Tamanrasset (Massif du Hoggar) par J. lauriol. Bulletin de la Société d'Histoire Naturelle de l'Afrique du Nord, 24: 253–254.

Balachowsky A.S., 1934. Les coccidés du Sahara central. Mission du Hoggar. III. (Février à Mai 1928) In: Seurat L.-G., Études Zoologiques sur le Sahara Central. Mémoires de la Société d'Histoire Naturelle de l'Afrique du Nord, 4 : 145–157.

Balachowsky A.S., 1948. Entomologie appliquée. Les cochenilles de France d'Europe du Nord de l'Afrique et du bassin méditerranéen. Ed. Hermann et Cie,

Paris, Collection Actualités Scientifiques et Industrielles, n° 1054, T. IV, 549 pp.

Balachowsky A.S., 1949a. Sur un genre nouveau d'Aspidiotini [Hem. Coccidea] du sud de l'Anti-Atlas (Maroc méridional). Bulletin de la Société Entomologique de France, 54: 74–76.

Balachowsky A.S., 1949b. Sur un Rugaspidiotus (Coccoidea-Odonaspidini) nouveau d'Oranie. Bulletin de la Société d'Histoire Naturelle de l'Afrique du Nord, 40: 107–110.

Balachowsky A.S., 1950. Les cochenilles de France, d'Europe, du Nord de l'Afrique et du Bassin Méditerranéen. V. Monographie des Coccoidea; Diaspidinae (deuxième partie) Aspidiotini. Entomologique Applicata Actualités Sciences et Industrielles 1087, pp 397–557, Entomologie Appliquée Actualités Scientifiques et Industrielles, 1127: 561–720.

Balachowsky A.S., 1951. Les cochenilles de France, d'Europe, du Nord de l'Afrique et du bassin Méditerranéen. VI. Monographie des Coccoidea; Diaspidinae (3ème partie) Aspidiotini (fin). Entomologie Appliquée Actualités Scientifiques et Industrielles, 1127: 561–720.

Balachowsky A.S., 1953. Les cochenilles de France d'Europe, du Nord de l'Afrique, et du bassin Méditerranéen. VII. - Monographie des Coccoidea ; Diaspidinae-IV, Odonaspidini - Parlatorini. Entomologie Appliquée Actualités Scientifiques et Industrielles, 1202: 725–929.

Balachowsky A.S., 1954a. Étude comparative des cochenilles du cèdre au Liban et en Afrique du Nord. Revue de Pathologie Végétale et d'Entomologie Agricole de France, 33: 108–114.

Balachowsky A.S., 1954b. Les cochenilles Paléarctiques de la tribu des Diaspidini. Memoires Scientifiques de l'Institut Pasteur, Paris, 450 pp.

Balachowsky, A.S., 1956. Les cochenilles du continent Africain Noir. Vol. 1 - Aspidiotini (1ère partie). Annales du Musée Royal du Congo Belge, N.S. 4: 145–356.

Balachowsky A.S., 1958. Les cochenilles du continent Africain Noir. Vol. 2 Aspidiotini (2ème partie), Odonaspidini and Parlatorini. Annales du Musée Royal du Congo Belge, N.S. 4: 145–356.

Balachowsky A.S. & Mesnil L., 1935. Les insectes nuisibles aux plantes cultivées leurs mœurs, leur destruction. Ed. Busson, Paris, T. 1, 627 pp.

Balachowsky A.S. & Richardeau D., 1942. Sur un nouveau genre de coccoides vivant sur *Tamarix* dans le Sahara Nord-Africaine avec description d'une espèce nouvelle. Bulletin de la Société Entomologique de France, 47: 100–103.

Belguendouz R., 2014. Relations plantes hôtes cochenilles diaspines sur les agrumes (*Citrus* sp) en Algerie: cas de *Parlatoria ziziphi* (Lucas, 1853) (Homoptera: Diaspididae). Thèse. Doctorat, Ecole Nationale Supérieure Agronomique, El Harrach (Alger), 265 pp.

Belguendouz R. & Biche M., 2015. Biodiversity of diaspididae scale insects (Homoptera), their host plants and natural enemies in Algeria. Journey of Entomology and Zoology Studies (Algeria), 3: 302–309.

Belguendouz R., Biche M. & Haddoum M., 2009. Biologie du Pou noir de l'oranger *Parlatoria ziziphi* (Hemiptera: Diaspididae) et l'impact de son parasitoïde *Encarsia citrinus* (Hymenoptera Aphelinidae) dans la régulation de son niveau d'infestation sur clémentinier en Mitidja (Algérie). In: Proceeding of 2009. AMMP Scholars Conference.

Belguendouz R., Biche M. & Seninet I., 2011. Etude de la teneur en protéine et en phosphore des feuilles de jeunes plantes d'agrumes sous serre non éclairée avec la pullulation du Pou noir de l'oranger *Parlatoria ziziphi* (Homoptera: Diaspididae) en Mitidja Algérie. In the proceeding of 2011. AFPP Conference: 120-129.

Benassy C., 1975. Les cochenilles des agrumes dans le bassin méditerranéen. Annale de l'Institut National Agronomique, El – Harrach (Alger), 5: 118–142.

Biche M., 1987. Bioécologie de *Parlatoria oleae* Colvée (Hom. Diaspididae) Ravageur de l'olivier, *Olea europea* L., dans la région de Cap-Djinet (Algérie) et étude biologique de son parasite externe *Aphytis maculicornis* Masi (Hym. Aphelinidae). Diplome Universitaire de Recherches, Université de Nice (France), 119 pp.

Biche M., 2012. Les principaux insectes ravageurs des agrumes en Algérie et leurs ennemis naturels. Ed. FAO., Regional Integrated Pest Management Programme in the Near East / GTFS/REM/070/ITA, 36 pp.

Bodenheimer F.S, 1924. The Coccidae of Palestine. First report on this family. Zionist Organization Institute of Agriculture and Natural History, Agricultural Experiment Station Bulletin, 1: 1–100.

Bodenheimer F.S., 1937. *Prodromus* Faunae Palestinae. Essai sur les éléments zoogéographiques et historiques du Sud-Oest du sous-règne paléarctique. T. 33. Le Caire, l'InstITUTE Français d'Archéologie Orientale, 286 pp.

Bodenheimer F.S., 1943. A first survey of the Coccoidea of Iraq. Government of Iraq, Ministry of Economics, Directorate General of Agriculture, Bulletin 28: 1–33.

Boisduval J.B.A., 1867. Essai sur l'entomologie horticole. [Report on horticultural eneomology.]. Ed. Donnaud Paris, 648 pp.

Borchsenius N.S., 1937. Tables for the identification of coccids injurious to cultivated plants and forests in the USSR. Quarantine Regional Inspection, Leningrad, 148 pp.

Borchsenius N.S., 1966. A catalogue of the armoured scale insects (Diaspidoïdea) of the world. Nauka, Moscow & Leningrad, 449 pp.

Boudjemaa K., Karaca İ. & Biche M., 2020. Morphometric comparison between two populations of *Aonidiella aurantii* (Maskell) (Homoptera: Diaspididae) from Algeria and Turkey. Ukrainian Journal of Ecology, 10: 240–244. https://doi.org/10.15421/2020_237

Boukhobza L., Zaabta I., Belguendouz R., Mimeche F. & Biche M., 2020. Role of hymenopterous parasits Aphelinidae in the regulation of levels of *Lepidosaphes beckii* (Newton, 1869) (Homoptera Diaspididae) populations on orange trees in Rouiba area (Algeria). Biodiversity Journal, 11: 845–852. https://doi.org/10.31396/Biodiv.Jour.2020.11.4.845.852

Cockerell T.D.A., 1902. Bamboo coccids in Algeria. Entomologist's Monthly Magazine, 13: 86.

Danzig E.M. & Pellizzari G., 1998. Diaspididae. Catalogue of Palaearctic Coccoidea. Plant Protection Institute, Hungarian Academy of Sciences Budapest, Hungary, 526 pp.

Demirozer O., Kaydan M.B., Karacer I. & Ben-Dov Y., 2009. First records of armoured scale insects (Hemiptera: Coccoidea: Diaspididae) from the oil rose, *Rosa damascena*, in Turkey. Hellenic Plant Protection Journal, 2: 33–35.

Doumandji S.E., 1984. Une nouvelle cochenille pour la région paléarctique et pour l'Algérie, *Parlatoreopsis pyri* Marlatt. Bulletin de Zoologie Agricole, Institut National Agronomique., n° 9, El Harrach, 18 pp.

Doumandji S.E., 1985. Les cochenilles diaspines du caroubier, *Ceratonia siliqua* en Algérie. 1er Journée Etudes Scientifiques, Institut National d'Enseignement Superieur, Blida, 15 pp.

Ferris G.F., 1938. Atlas of the scale insects of North America. Series 2. Stanford University Press Palo Alto, California

Ferris G.F., 1943. The genus *Targionia* Signoret and some of its allies (Homoptera: Coccoidea: Diaspididae). Microentomology, 8: 81–111.

Franco C.J., Garcia Marí F., Ramos A.P. & Besri M., 2006. Survey on the situation of citrus pest management in Mediterranean countries. Bulletin IOBC/wprs, 29: 335–346.

García Morales M., Denno B., Miller D.R., Miller G.L., Ben-Dov Y. & Hardy N.B, 2016. ScaleNet: A literature-based model of scale insect biology and systematics. Database, 1–5: bav118; accessed on 5.10.2018.

Giard A., 1893. Communications. Annales de la Société Entomologique de France, 62: 199–201.

Green, E.E., 1899a. The Coccidae of Ceylon, Part II. Dulau London, pp. 105–169.

Iperti G., Laudého Y., Brun J. &Chippin De Janvry E., 1970. Les entomophages de *Parlatoria blanchardi* Targioni dans les palmiers de l'Adrar mauritanien. Annales de Zoologie et d'Ecologie Animale de France, 2: 617–638.

Kaussari M., 1955. La première liste des cochenilles de l'Iran. Ministère de l'Agriculture, Entomologie et Phytopathologie Appliquées, Publication du Département Général de la Protection Plantes, Téhéran 15: 14–20

Kosztarab M. & Kozar F., 1988. Scale insects of Central Europe. Akadémiai Kiadò, Budapest, 456 pp.

Leonardi G., 1900. Generi e specie di diaspiti. Saggio di sistematica degli Aspidiotus. Rivista di Patologia Vegetale, 8: 298–363.

Leonardi G., 1920. Monografia delle cocciniglie Italiane. Della Torre Portici, 555 pp.

Lepiney J. & Mimeur J.M., 1931. Les coccidés du Maroc. Revue de Pathologie Vegetale et d'Entomologie Agricole de France, 18: 243–255.

Letreuch Belarouci N., 1995. Réflexion autour du développement du forestier: les zones à potentiel de production les objectifs O.P.U. Algérie, 69 pp.

Lindinger L., 1910. Beiträge zur Kenntnis der Schildläuse und ihrer Verbreitung II. Zeitschrift für Wissenschaftliche Insektenbiologie, 6: 371–376

Lindinger L., 1912b. Die Schildläuse (Coccidae) Europas, Nordafrikas und Vorder-Asiens, einschliesslich der Azoren, der Kanaren und Madeiras. Ulmer Stuttgart, 388 pp.

Mamet J.R., 1943. A revised list of the Coccoidea of the islands of the western Indian Ocean, south of the equator. Mauritius Institute Bulletin, 2: 137–170.

Marchal P., 1904. Sur quelques cochenilles nouvelles. Bulletin du Muséum d'Histoire Naturelle de Paris, 10: 448–457.

Marchal P., 1906. Sur deux espèces de cochenilles nouvelles (Hem: Hom.) récoltées en Algérie. Bulletin de la Société Entomologique de France, 9: 143–145.

Marchal P., 1909. Sur deux cochenilles nouvelles sur les *Ephedra*. Bulletin de la Société Zoologique de France, 34: 59–60.

Marchal, P., 1911. Sur une cochenille nouvelle d'Algérie (Hem. Coccidae). Bulletin de la Société Entomologique de France, 4: 71 pp.

Merrill G.B., 1953. A revision of the scale insects of Florida. Bulletin of the Florida State Plant Board, 1: 1–143.

Miller D.R. & Davidson J.A., 2005. Armored Scale In-

sect Pests of Trees and Shrubs. Cornell Univ. Press Ithaca, New York, 442 pp.

Nakahara S., 1982. Checklist of the armored scales (Homoptera: Diaspididae) of the conterminous United States. United States Department of Agriculture, Animal and Plant Health Inspection Service, 110 pp.

Newstead R., 1895. Observations on Coccidae (No. 13). Entomologist's Monthly Magazine 31: 233–236.

Newstead R., 1897. New Coccidae collected in Algeria by the Rev. Alfred E. Eaton. Transactions of the Entomological Society of London: 93–103.

Newstead R., 1901. Monograph of the Coccidae of the British Isles. Ray Society London, 220 pp.

Pellizzari G. & Fontana P., 1996. Contribution to the knowledge of Homoptera Coccoidea of Sardinia with description of a new species. Bollettino di Zoologia Agraria e di Bachicoltura, 28: 119–140.

Piguet P., 1960. Les ennemis animaux des Agrumes en Afrique du Nord. Ed. Soc. Shell, Algérie, 117 pp.

Rosen D. & DeBach P., 1978. Diaspididae. Introduced Parasites and Predators of Arthropod Pests and Weeds: a World Review. Agricultural Research Service, United States Department of Agriculture Wasington D.C., 545 pp.

Rungs C., 1935. Coccidae du Maroc (3ème note). Revue de Pathologie Vegetale et d'Entomologie Agricole de France, 22: 270–282.

Rungs C., 1942. Une diaspine nouvelle du Maroc: *Diaspis diacanthii* nov. sp. (Hem. Coccidae). Bulletin de la Société d'Histoire Naturelle d'Afrique du Nord, France, 33: 59–61.

Saighi H., Doumandji S. & Biche M., 2005. Les cochenilles diaspines du Jardin d'Essai du Hamma (Alger) et leurs ennemis naturels (Hemiptera, Diaspididae). Bulletin de la Société Entomologique de France, 110: 429–928.

Sanders J.G., 1909. Catalogue of recently described Coccidae - II. United States Department of Agriculture, Bureau of Entomology, Technical Series, 16: 33–60.

Signoret V., 1877. Essai sur les cochenilles ou gallinsectes (Homoptères - Coccides), 18e et dernière partie. [Essay on gall-forming scale insects (Homoptera - Coccidae), 18th part.]. Annales de la Société Entomologique de France (serie 5) 6: 591–676.

Taibi A., Gacemi A., Medjdoub Y., Medjdoub I. & Doumandji S., 2016. *Citrus* infestation by the black scale, *Parlatoria ziziphi* Lucas (Homoptera: Diaspididae) in Tlemcen, Algeria. Journal of Entomological Research, 40: 217–221.

Takagi S., 1969. Diaspididae of Taiwan based on material collected in connection with the Japan-U.S. Co-operative Science Programme, 1965 (Homoptera: Coccoidea). Part I. Insecta Matsumurana, 32: 1–110.

Takagi S., 1970. Diaspididae of Taiwan based on material collected in connection with the Japan-U.S. Cooperative Science Programme, 1965 (Homoptera: Coccoidea). Pt. II. Insecta Matsumurana, 33: 1–146.

Tena A. & Garcia Mari F., 2011. Current situation of citrus pests and diseases in the Mediterranean basin. Bulletin IOBC/WRPS, 62: 365–378.

Trabut L., 1910. La dèfense contre les cochenilles et autres insectes fixés. Gouvernement. Général, Algérie, Alger, 151 pp.

Trabut L., 1911. Catalogue des cochenilles observées en Algérie. Bulletin de la Société d'Histoire Naturelle d'Afrique du Nord, France, 3: 51–64.

Vayssière P., 1913. Cochenilles nouvelles de l'Afrique Française. Revue de Phytopathologie Appliquée, 1: 124.

Zaabta I., Boukhobza L., Mimeche F. & Biche M., 2020. Role of *Aphytis lepidosaphes* Compere, 1955 (Hymenoptera Aphelinidae) in limiting *Lepidosaphes beckii* (Newman, 1869) (Homoptera Diaspididae) populations in an orange orchard in Rouiba (Algeria) Biodiversity Journal, 11: 35–40.
https://doi.org/10.31396/Biodiv.Jour.2020.11.1.35.40