STUDIES OF THE COCCOIDEA

12. SPECIES OCCURRING ON DECIDUOUS FRUIT AND NUT TREES IN QUEENSLAND

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SUMMARY

Thirty species of scale insects have been recorded from deciduous fruit and nut trees in Queensland. At least 26 are importations.

Thirteen of the species are on record from the Stanthorpe district, the main deciduous fruit growing area of the State. In that area, however, only five occur on deciduous fruit trees: two, *Quadraspidiotus perniciosus* (Comstock) and *Eulecanium persicae* (F.), particularly the former, are of economic importance.

INTRODUCTION

Scale insects on deciduous fruits have constantly received close attention in Queensland for some 70 years. Because of the increased sensitiveness of the export market to the presence of these insects on deciduous fruits (Bengston 1961), relevant detailed records are now presented in a consolidated form. Species, under family headings, are discussed with respect to general distribution, Queensland distribution, deciduous hosts and pest status.

FAMILY DIASPIDIDAE

Aonidiella aurantii (Maskell).—Red Scale

This cosmopolitan insect is a major pest of citrus in most countries. Although described from material partly from Sydney, the original home is believed to be in either Asia or Europe.

In Queensland, where it was first recorded in 1889 (Tryon 1889), occurrences on the various species of citrus are known from most parts of the State. The host list, however, includes a wide variety of species, practically all of which are introduced. Most of the commercial deciduous fruits are hosts but there is no record of the pest in the commercial fruit-growing areas of the Stanthorpe district. The most commonly attacked deciduous host is *Ficus carica* L.; others are *Juglans regia* L., *Malus sylvestris* Mill., *Morus alba* L., *Prunus amygdalus* Batsch., *Prunus armeniaca* L. and *Vitis vinifera* L. Infestations on these are occasional and light, and mainly on twigs and branches.

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Aspidiotus hederae (Vallot).—Ivy Scale

The ivy scale is an outstandingly polyphagous species and also one of the most widely distributed throughout the world. Extreme variations shown in morphological characters have resulted in a long list of synonyms.

In Queensland this species was first noted in 1899 (Departmental record) and since has been found in most parts of the State on a wide variety of plants but rarely as a pest. It is not, however, known to occur in the Stanthorpe deciduous fruit growing area. In other districts deciduous fruit hosts are *Diospyros kaki* L.f., *Malus sylvestris, Prunus avium* L., *Psidium guajava* L. and *Pyrus communis* L. Infestations on these are occasional and light, mainly on twigs but sometimes on leaves and fruit.

Chrysomphalus dictyospermi (Morgan).—Dictyospermum Scale

This species is known to occur in most tropical and subtropical countries on a variety of hosts but mainly ornamental palms.

In Queensland occurrences are known throughout the eastern coastal belt on both introduced and native hosts. Establishment in this country is of long standing but as early collections were misidentified the species has not previously been recorded here. The insect does not occur in the Stanthorpe district. The only recorded deciduous fruit host is *Pyrus communis,* on which infestations occurred on the twigs.

Chrysomphalus ficus (Ashmead).—Circular Black Scale

This insect is known in most countries on a wide variety of plants and is of some economic importance.

Records in Queensland, dating back to 1889 (Tryon 1889), are mostly from the eastern coastal belt extending as far north as Koah. The orange is a favoured host and the few inland records are from this tree. There are, however, no records from the Stanthorpe district. Deciduous fruits as hosts in other districts are *Annona squamosa* L. and *Vitis vinifera.* Infestations have been occasional and light on twigs and leaves.

Clavaspis herculeana (Hadden).—Clavate Scale

Originally the clavate scale was known from Pacific tropical islands and has spread to some tropical and subtropical mainland countries. It occurs on a variety of hosts but is of little economic importance.

Occurrence of this species in Queensland is of long standing although only recently established (Brimblecombe 1955). Records are from the south-eastern part of the State; none are from the Stanthorpe district. The only deciduous fruit host is *Ficus carica,* and infestations are occasional and light on twigs.

Diaspidiotus ancylus (Putnam).—Putnam's Scale

This insect is known in Europe and is recorded as a pest on various deciduous fruits in the United States of America.

The present single record for Queensland is from *Carya illinoiensis* (Wagenh.) K. Koch, at Amamoor in the south-eastern part of the State. The insects were in small numbers on twigs.

Diaspidiotus loranthi (Laing)

This native insect was described from a mistletoe in Victoria (Laing 1929) but no further occurrences have been recorded.

In Queensland the species is known from several hosts other than mistletoe. All records are from the south-eastern part of the State. Although it is known to occur in the Stanthorpe district, the only deciduous fruit host is *Ficus carica* at Rochedale, near Brisbane. Light infestations occur on twigs and small branches.

Duplaspidiotus claviger (Cockerell).—Dupla Scale

The dupla scale is known in Africa, North America and India.

In Queensland it occurs in coastal and subcoastal areas, mainly in rain forest in the south-eastern part of the State. No records are from the Stanthorpe district, and the only deciduous fruit host elsewhere is *Vitis vinifera*. The insects occur under the epidermis on stems and branches.

Hemiberlesia lataniae (Vallot).—Latania Scale

The latania scale is one of the very common cosmopolitan scale insects and has a wide range of cultivated and native hosts in most countries.

Early records in Queensland were under the name of *Aspidiotus cydoniae*. Occurrences in this State are mainly from coastal and subcoastal areas. While it is known from several deciduous fruits, there are no records of its occurrence in the Stanthorpe district. Most records on these hosts are from *Vitis vinifera*. Other deciduous fruit and nut tree hosts are *Carya illinoiensis, Cydonia oblonga* Mill., *Ficus carica, Juglans regia, Malus sylvestris, Prunus avium, Prunus persica* (L.) Batsch., and *Pyrus communis*. Infestations occur on twigs and branches.

Hemiberlesia rapax (Comstock).—Rapacious Scale

This scale was first recorded in California but like the latania scale is now common in most countries and on a wide variety of hosts.

Early records in Queensland were under the name *Aspidiotus camelliae*. Recorded occurrences in this State show that the species is widely distributed in the coastal and subcoastal areas as far north as Gladstone and extending westwards onto the Darling Downs. Several kinds of deciduous fruits are hosts but no

occurrences on these are recorded from the Stanthorpe district. They are *Ficus carica, Malus sylvestris, Psidium guajava, Pyrus communis* and *Vitis vinifera.* Infestations occur on trunks and branches.

Morganella longispina (Morgan).—Plumose Scale

The plumose scale occurs in several countries but is not common and rarely in dense populations.

Distribution in Queensland is limited to the south-eastern part (Brimblecombe 1955) but not including the Stanthorpe district. The only deciduous fruit host is *Ficus carica,* on which infestations occur on twigs and branches.

Quadraspidiotus perniciosus (Comstock).—San José Scale

The San José scale (Figures 1 and 2) is the most widely known scale pest of commercial deciduous fruits and infests these in all countries where they are grown.

Fig. 1.—*Quadraspidiotus perniciosus.* Left, heavily infested apple twig. Right, clean twig.

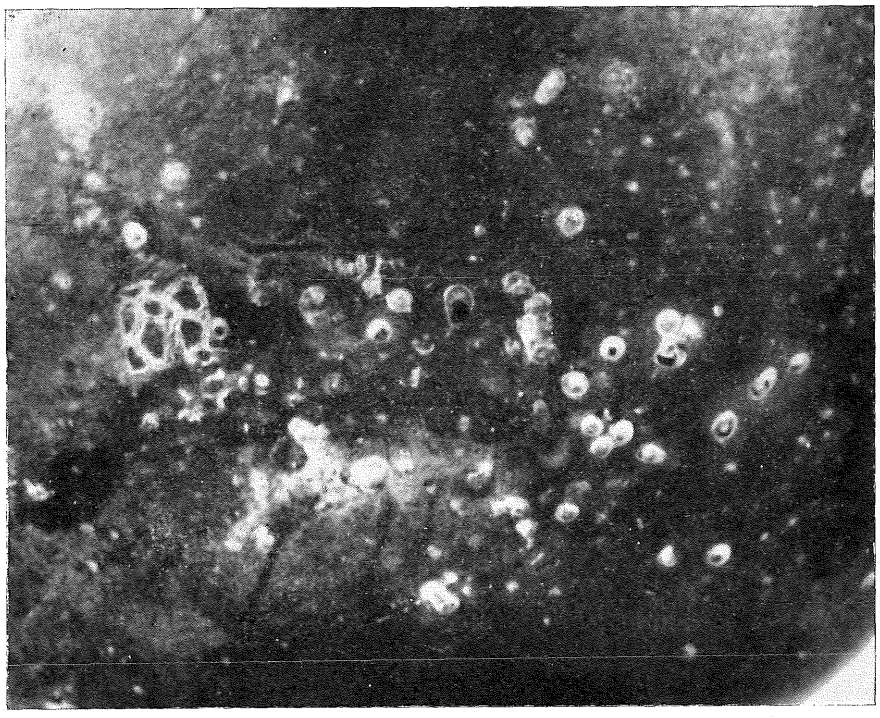

Fig. 2.—*Quadraspidiotus perniciosus.* Scales on plum fruit.

In Queensland it was first found in 1895 on apples in the Stanthorpe district (Tryon 1898) and since has been of concern in varying degrees in commercial deciduous fruit orchards, mainly on apples. Occurrences are known from most parts of the State where these fruits are grown, extending from the southern border to the Atherton Tableland in the north and as far west as Roma.

The ban on the presence of San José scale on any fruit exported to some overseas countries has focussed greater attention to the relative importance of this insect. Winter oil sprays in the past, as required, adequately controlled the normally low populations in Queensland orchards. A general increase in numbers has followed the use of the newer insecticides and the movement away from winter oil sprays (Bengston 1961).

Deciduous fruit and nut tree hosts in this State are *Cydonia oblonga, Juglans regia, Malus sylvestris, Prunus amygdalus, Prunus armeniaca, Prunus avium, Prunus domestica* L., *Prunus persica* and *Pyrus communis.* Infestations occur mainly on twigs and branches but can spread to fruit (Figure 2).

Howardia biclavis (Comstock).—Burrowing Scale

This scale was first found on nursery plants in America and on such no doubt has spread to most countries of the world.

Specimens were collected in Queensland as early as 1910 but the species was not then determined and recorded. Distribution extends in the coastal belt from Cleveland in the south to Kuranda in the north, but the species does not occur in the Stanthorpe district. Deciduous fruit hosts are *Annona squamosa* and *Ficus carica*. The insects occur mostly under the epidermal tissue on small branches and stems.

Lepidosaphes ulmi (L.).—Apple Mussel Scale

This species is present in most countries where deciduous fruits are grown. In Queensland it was recorded early in the present century but is comparatively rare even in the commercial orchards of the Stanthorpe district. The only recorded host is *Malus sylvestris,* on which it occurs on twigs and branches.

Parlatoria oleae (Colveé).—Olive Parlatoria Scale

Although first found in Europe on olive trees, this species occurs on a wide variety of plants and is now known from many countries. Occurrence in Queensland is limited to the Brisbane area, where it has been recorded from *Malus sylvestris* and *Pyrus communis*. The insects occur on leaves and twigs.

Parlatoria proteus (Curtis).—Orchid Parlatoria Scale

This species, like the previous, is widely distributed throughout the world on a wide variety of hosts, mostly ornamentals.

Records in Queensland show that the distribution of the insect extends in the coastal area from Brisbane to Cairns, mostly on orchids. A number of records in Annual Reports of the Department late in the last century quote several deciduous fruits as hosts in the Brisbane area, namely *Malus sylvestris, Prunus domestica, Prunus persica* and *Pyrus communis*. These species have not been confirmed as hosts in Queensland and it is noted that they are not listed as hosts overseas (McKenzie 1945).

Pseudaulacaspis pentagona (Targioni-Tozzetti).—White Peach Scale

This species occurs in several countries on a variety of hosts, sometimes as a serious pest.

In Queensland most records are from the south-eastern part of the State, although it is known as far north as Mackay. In 1889 (Tryon 1889) it was recorded from Brisbane, and in later years from the Stanthorpe district, but the insect is very rare. The only deciduous fruit host is *Prunus persica*, on which twigs were infested.

FAMILY COCCIDAE

Ceroplastes ceriferus (Anderson).—Indian White Wax Scale

This species is known from several tropical islands and mainland countries.

Records of occurrence in Queensland date back into last century but some at least of these have been proved to be misidentifications of *C. destructor* Newstead. The record of Tryon (1889) of a waxy scale on quince at Toowoomba apparently relates to this insect. Authentic records from available material date from 1911 (Brimblecombe 1956). Occurrences are known only from the south-eastern part of the State, and although these include the Stanthorpe district there are no records on deciduous fruits in that area. In other areas deciduous fruit hosts are *Cydonia oblonga* and *Diospyros kaki.*

Ceroplastes destructor Newstead.—White Wax Scale

White wax scale is widely distributed in Africa. Occurrences in several other countries are known and spread to these from Africa has been questioned. What is now regarded as this species was exhibited in Queensland in 1869 (Bancroft 1869).

Occurrences in Queensland are in a coastal and subcoastal belt extending from the southern border to the Atherton Tableland in the north and involve a very wide range of hosts (Brimblecombe 1956). The only deciduous fruit host in the Stanthorpe district is *Prunus armeniaca.* In other areas it occurs on *Diospyros kaki, Malus sylvestris,* and *Psidium guajava.* Infestations are on twigs.

Ceroplastes rubens (Maskell).—Pink Wax Scale

Although this species was described from material collected in Brisbane, it could be questioned whether this country is its original home. Early in the present century (Green 1909) and no doubt for some considerable time previously the insect was known on various cultivated and native plants in India, Japan and Hawaii; Froggatt (1915) suggested that the insect may have been introduced into Australia. It is quite likely, however, that scale insects on tea-tree (*Melaleuca*) referred to by Bancroft (1869) belong to this species.

Pink wax scale in Queensland occurs mainly in the eastern coastal belt, where it is widely spread on a variety of native and cultivated hosts (Brimblecombe 1956). The occurrences of the insect on deciduous fruit trees in this State have been recorded mainly in the Brisbane metropolitan area, where a heavy population is ever present on many hosts such as the mango, or in nearby fruit districts where it occurs on other cultivated hosts as well as native trees such as *Melaleuca metrosideros.* There are no records from the Stanthorpe district. Deciduous fruit species recorded as hosts elsewhere in the State are *Annona squamosa, Ficus carica, Malus sylvestris, Morus alba* and *Psidium guajava.* Infestations may be heavy on both twigs and leaves, more particularly near midribs or large veins.

Coccus elongatus (Signoret).—Long Soft Scale

This insect occurs in several countries but is not a troublesome pest. It is common in Queensland on a variety of plants, mostly in the coastal and subcoastal areas. Normally occurrences are confined to localized colonies on one or two

plants. Early records are under the names *Lecanium longulum* and *Coccus longulum*. There are no records from the Stanthorpe district. Deciduous fruit hosts in other areas are *Annona squamosa, Carya illinoiensis, Diospyros kaki, Prunus domestica, Pyrus communis* and *Vitis vinifera.* Infestations are mainly on twigs.

Coccus hesperidum L.—Soft Brown Scale

This is one of the most cosmopolitan and polyphagous of the scale insects but is not frequently of serious economic importance. The associated sooty mould is often conspicuous and tends to add to the importance of the insect.

Records in Queensland dating from 1889 (Tryon 1889) are from practically all parts of the State, since the insect appears to be tolerant of dry inland climates as well as humid hothouse conditions. In rain-forest areas entomogenous fungi are important controlling factors. Records are known from the Stanthorpe district but not from deciduous fruits. These hosts in other areas are *Diospyros kaki, Malus sylvestris, Morus alba* and *Vitis vinifera.* Infestations occur on young twigs.

Eulecanium persicae (F.).—Grape Scale

The grape scale (Figure 3) prefers a temperate climate and has spread to regions of this kind in several countries growing deciduous fruits. In Queensland it is practically confined to the temperate Stanthorpe district, where it sometimes assumes economic importance, more particularly on *Vitis vinifera* (Bengston 1960). Three deciduous hosts are *Prunus domestica, Prunus persica* and *Pyrus communis.* Heavy infestations can occur on young but woody timber of twigs and vines.

Saissetia coffeae (Walker).—Hemispherical Scale

This is a widely distributed species on a variety of hosts, particularly ornamentals. It occurs throughout coastal and subcoastal areas of Queensland, sometimes assuming importance. Although known from the Stanthorpe district it does not occur on any deciduous fruits in that area. Hosts of this kind in other areas are *Annona squamosa, Diospyros kaki* and *Ficus carica.* The insects infest the twigs.

Saissetia nigra (Nietner).—Nigra Scale

This also is a widely distributed species on a variety of hosts. It is, however, more tolerant of dry conditions and therefore in Queensland extends to the mid-west in addition to occurring throughout coastal and subcoastal areas. It does not occur in the Stanthorpe district. Deciduous hosts in other areas are *Annona squamosa, Ficus carica, Morus alba, Psidium guajava* and *Vitis vinifera.* Colonies occur on twigs or vines.

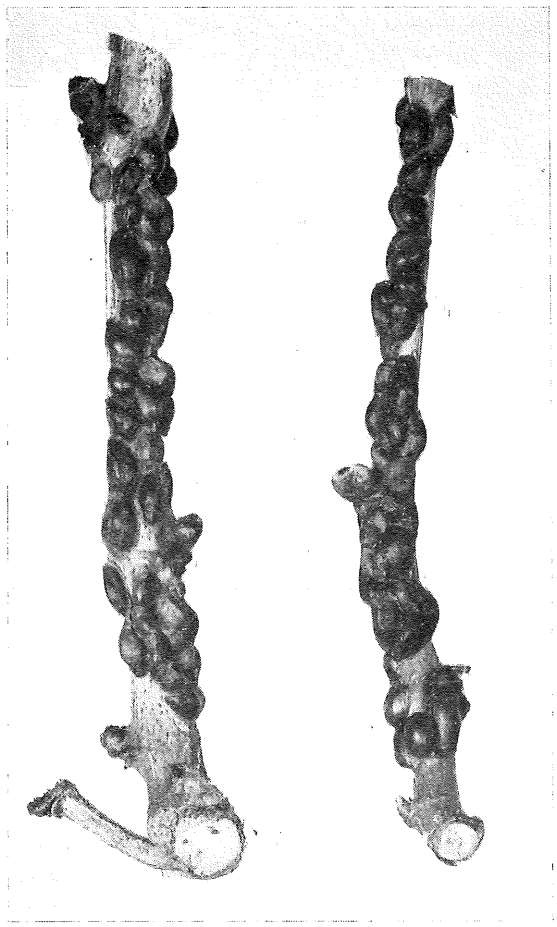

Fig. 3.—*Eulecanium persicae*. Heavily infested grape cuttings.

Saissetia oleae (Bernard).—Olive Scale

Although originally known from a temperate climate, this insect has spread to both humid and dry areas in many countries. Similarly in Queensland it inhabits widely different areas covering most of the State, but rarely as a pest.

Occurrences are known from the Stanthorpe district but not on deciduous fruits. In other areas hosts of this kind are *Cydonia oblonga, Diospyros kaki, Ficus carica, Morus alba, Prunus armeniaca, Prunus domestica, Prunus persica, Pyrus communis* and *Vitis vinifera*. Infestations occur on twigs.

FAMILY PSEUDOCOCCIDAE

Planococcus citri (Risso).—Citrus Mealy Bug

This mealy bug is an economic pest in several countries, more particularly on citrus. Occasionally it has been troublesome in localized instances in Queensland. Occurrences are known throughout the coastal area as far north

as Townsville. In recent years its importance as a pest has increased on *Annona squamosa* and more particularly on *Vitis vinifera,* on which fruit and bunches respectively can be heavily infested. Occurrences of this kind are confined to the south-east of the State. The insect is not known from the Stanthorpe district.

Pseudococcus adonidum (L.).—Long-tailed Mealy Bug

Elsewhere, this is a common mealy bug on a wide variety of plants, especially ornamentals. In Queensland it is not common, occurring on only a few hosts in the south-east but not in the Stanthorpe district. The only deciduous fruit host is *Annona squamosa.*

Pseudococcus malacearum Ferris

This insect appears to be widely distributed but no doubt in the past has been misdetermined as some closely allied species. Ferris (1942) described the species while revising the genus in North America. One record has been made in Queensland. This was from *Vitis vinifera* at Stanthorpe. The insect occurs on young parts of vines but is rare in the district.

FAMILY LACCIFERIDAE

Tachardina decorella (Maskell).—Rosette Lac Scale

This native insect is widely distributed in south-eastern Queensland. Infestations can be dense on isolated trees; they have not been of any economic concern. The insect occurs in the Stanthorpe district but not on any cultivated plants. The only deciduous fruit host is *Carya illinoiensis.*

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