Aleurodicus cocois

Introduction

The coconut whitefly, *Aleurodicus cocois* (Curtis) occurs mainly on coconuts and cashew in the Caribbean. According to Van Dinther (1960), Dr. F.J. Simmonds visited Suriname in 1951 and indicated that *A. cocois* is of minor importance. This is a fairly accurate assessment of the pest today (2002) in the Caribbean.

Identity

CAB International (2001)

Authority : Curtis (1846); Fransen (1990)

Classification

- Kingdom : Animalia
- Phylum : Arthropoda
- Class : Insecta
- Order : Hemiptera
- Family : Aleyrodidae
- Genus : *Aleurodicus*
- Species : *cocois*
- Synonyms : *Aleyrodes cocoas* (Curtis), 1846, *Aleurodicus anonae* (Morgan, 1892, *Aleurodicus cocoas anacardi* Carvalho, Arruda & Arruda).
- Common names : Whitefly, mosca blanca, coconut whitefly, weisse fliege, coconut mealybug, aleurodideo do cajueiro, cashew whitefly, mosca brancha do cajueiro, aleurodideo do cajueiro, and mosca branca do cajueiro.

Category

- Role : Pest

Signs & Symptoms

CAB International (2001)

Direct feeding on phloem sap by heavy infestations of *Aleurodicus* species, including *A. cocois*, may cause wilting due to loss of fluid and nutrients. Leaf undersides become covered with white woolly wax, which may impede gas exchange and photosynthesis. The honeydew excreted by the insects drops onto leaf surfaces below the infestation site and often forms a medium for sooty mold growth, screening more light and air from the leaves and further reducing photosynthetic productivity. Amenity trees become coated with an unsightly layer of black mould and the lower leaves die and fall, leaving a sparse crown/canopy. Ultimately the tree may die, leaving only the naked bole/branches.

Heavy infestations of coconut palms cause the oldest fronds to die and fall successively; flowers also die and fall off, and nuts fail to develop; eventually only the crown is left, and this dies and falls off, leaving the bole standing (Curtis, 1846; illustration in Martin and Watson, 1998). On cashew, the pest feeds in colonies on the lower leaf surfaces

(Coodenardoria de Sanidade Vegetal, 1976) and can kill trees (Dunham and Andrade, 1971).

Morphology J.H. Martin (1987)

Each **egg** is about 0.25 mm long, are laid perpendicular to the lower leaf surface, each on a very short pedicel. They are pale initially and turn dark grey as they mature. They are laid in a spiral pattern (about 2 cm or more across) amongst patches of white wax deposited by the female. The eggs hatch into tiny crawlers that tend to settle and feed within, or close to, the oviposition spiral of white wax patches; after this, the insect is sessile until the winged adult emerges.

Larvae, there are four immature stages, each successively larger than the last, with the fourth instar/pupal stage measuring 0.95-1.4 mm long and 0.75-1.05 mm wide (see fig. 1); males are smaller than females. In the second to fourth instars, legs are reduced to non-functional stubs. Shortly after molting, each immature stage develops a coating of mealy white wax, thicker in some areas than others. With the passage of time, a marginal fringe of thick, white, flocculent wax is produced to form a striking feature, forming thick, sculpted patterns around, and (in the case of *A. cocois*) sometimes over, the late pupal stage. Paired dorsal submarginal compound pores each secrete a filament of glassy wax that projects from the insect and periodically breaks off and falls to litter the immediate area with glistening rods. If several immature individuals are close together, the colony may become quite thickly coated with a mass of flocculent white wax and glassy wax filaments.

Adults emerges from the pupa as a yellow-orange insect, about 2- 2.5 mm long, with black eyes and 2 pairs of pale, translucent wings that are folded into a triangular profile with the wings held at a shallow angle to the horizontal, like some moths
(Fig. 2).

Fig. 1: Pupa

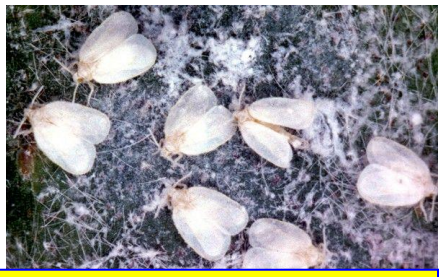

Fig. 2: Adult

(Picture: CAB International Crop Protection Compendium Global Module 2001)

The hind wings are only slightly shorter than the forewings. The insect remains sitting on the leaf near the oviposition spiral for 1-2 days while it develops a powdery wax coating. Wax pores on either side of the abdomen produce powdery white wax that is used to coat the body with a mealy layer and to turn the wings white. In *A. cocois* (also in *A. dispersus* and *A. destructor*, which do not belong to the *A. cocois* species group but do occur on palms), the wings are entirely white. In *A. pulvinatus* and several other species in the *A. cocois* species group, part of each forewing has a faint patch of grey pigment. Like most species in subfamily Aleurodicinae, the males have a very large pair of claspers at the posterior end.

Biology & Ecology

CAB International (2001)

Members of the *A. cocois* species group form colonies on the lower leaf surfaces of their host plants. In Ceara State, Brazil, Melo and Calvacante (1979) noticed that infestations of *A. cocois* are heaviest in areas near the coast where humidity was high, and decreased steadily as the relative humidity decreased. Populations of whiteflies are often reduced by strong wind and heavy rain, however, the waxy colonies of *Aleurodicus* species, situated on the protected leaf undersides, are less badly affected than most.

Life cycle

Reproduction is usually sexual in whiteflies, although parthenogenesis may occur in some species. Gondim and Sales (1983), record a sex ratio of 1 male: 2 females in *A. cocois* in laboratory studies. Like other species of *Aleurodicus*, the female of *A. cocois* walks in a tight spiral on the leaf underside, laying eggs and depositing patches of white wax as she goes, forming an oviposition spiral of small white patches, about 2 cm across. This often remains visible even after the immature have emerged and are developing.

Once the crawler settles at a feeding site, development continues. There are four immature instars altogether, all of which feed and produce honeydew. The last immature stage ceases to feed after a while and goes on to metamorphose into the adult, hence, this stage is termed a pupa, or 'pseudopupa' (since technically a true pupa never feeds). The adult emerges from a T-shaped split in the dorsum of the pupa. In the laboratory at 20-25°C and about 88% RH, with a photoperiod of around 12 hours, Gondim and Sales (1983) recorded the average duration of the four instars of *A. cocois* anacardi as 6.17, 7.5, 5.5 and 8.5 days respectively, and the adults lived 16.14 +/- 1.99 days. They found there was a pre-oviposition period of ca. 3.4 days.

Dispersal/vectors

CAB International (2001)

Distribution of *A. cocois* is mainly achieved by the winged adults, which fly about actively especially when disturbed; wind probably assists their dispersal over longer distances. The first-instar (“crawler”) stage usually moves only a few millimetres from the egg before settling to feed, thus immature stages are often found in small colonies. “Crawlers” may be carried longer distances if picked up by the wind or passing animals. Subsequent immature stages are incapable of locomotion. Longer distances may be traversed if man transports plant material infested by eggs and immature stages.

Management

M.J.K. Cock (1985)

Biological Control

Introduction of *Encarsiella noyesi* and Scymnine predators from Trinidad to Barbados achieved successful control of *A. cocois* (Simmonds, 1958; IIBC, 1997). Similar introductions were made into Brazil in 1962, but the results are unknown (Cock, 1985).

Natural enemies must be important in controlling populations of *A. cocois* on cashew in Algoas, Sergipe and Bahia states in Brazil, since outbreaks of this pest have been attributed to a disruption of biological control (Dunham and Andrade, 1971).

Chemical Control

The effectiveness of pesticide sprays against *Aleurodicus* species tends to be reduced because of their habit of living under leaves, and the water-repellent waxy covering that develops over colonies. Any pesticide used against them should be carefully selected to avoid injury to the natural enemies, since they are likely to be important in helping to keep populations at low levels in the long term. Outbreaks of *A. cocois* on cashew in Algoas, Sergipe and Bahia states in Brazil have been attributed to a disruption of biological control (Dunham and Andrade, 1971), possibly due to the use of pesticides.
Sales *et al.*, (1983) reported excellent control of *A. cocois* in laboratory tests of 24 organo-synthetic insecticides in Brazil (Ceara) using each of: Malathion, methidathion, Fenithion, Endosulfan, Dichlovos and Parathion-Methyl. Branco-Filho *et al.*, (1988) tested five insecticides against *A. cocois* on cashew trees in the field in Piaui, Brazil, and found that Thiometon and Phosphamidon gave 98-100% control of all stages, as opposed to Diazinon and mineral oil, both of which gave only 68% control. However, no mention is made of the impact these pesticides had on the natural enemy populations.

Phytosanitary Measures

Detection and Inspection methods

Examine living palms and woody shrubs/trees; check leaf undersides for tight oviposition spirals about 2 cm across, small wax patches, clusters of immature stages coated in white woolly wax, surrounding leaf surfaces sometimes coated with a waxy bloom and glittering with short, broken rods of glassy wax; check for leaf upper surfaces coated with sooty mold or sticky honeydew. If white adults are present they often sit on the leaf undersides near colonies and may need to be disturbed before they fly actively. The honeydew produced may attract attendant ants.

Good light conditions are essential for examination, in poor light, a powerful flashlight is helpful. One of the commonest, favoured hosts of *A. cocois* is coconut palm. This is a good host to monitor for early detection of the arrival of either *A. cocois* or *A. pulvinatus*. *A. destructor* also favours coconut palm, and *A. dispersus* will also feed on it.

Regulatory Control

Various members of the *A. cocois* species group are not present on all the Caribbean islands, but several occurrences have demonstrated their pest potential on coconut palms (Curtis, 1846; Dash, 1922; Martin and Watson, 1998). As such, planting material of palms and guava originating in the neotropics should be checked to ensure they are free of *Aleurodicus* infestation before they are allowed into any country where members of the *A. cocois* species group are not already present.

List of natural enemies

Parasitoids: *Encarsiella aleurodici, Encarsiella noyesi*.
Predators: *Clitostethus dispar, Cryptognatha nodiceps, Nephaspis amnicola, Nephaspis cocois, Ocyptamus mentor*.

Pest significance and Phytosanitary Risk

A. cocois and closely related species such as *A. pulvinatus* have demonstrated serious pest potential on coconut, cashew and other tree crops in situations where their natural enemies are lacking, either due to introduction without them, or to their elimination by excessive pesticide use.

Host Notes	L.A. Mound (1978)

The recent separation of *Aleurodicus iridescens* from *A. cocois* (Martin and Watson, 1998) renders older literature records of the host range of *A. cocois* somewhat uncertain, as they may refer to *A. (iridescens) pulvinatus* or *A. cocois*, or both species. The list of host-plants given here is based on authentic specimens of *A. cocois* in the Natural History Museum (London, UK) collection. Literature published before 1998 may refer to *A. pulvinatus* or *A. cocois* or both species together, which is probably why the host range may appear larger, for example, Mound and Halsey (1978) list hosts from 14 plant families including guava (*Psidium guajava*) and seagrape (*Coccoloba uvifera*), which are common hosts for *A. (iridescens) pulvinatus.*

Primary hosts: Cocos *nucifera* (coconut), *Anacardium occidentale* (cashew nut).
Secondary hosts: Arecaceae, *Elaeis*, *Musa paradisiaca* (plantain), *Ficus*, *Piper Nigrum* (black pepper), *Persea americana* (avocado), *Hevea brasiliensis* (rubber).
A. cocois is an aleurodicine whitefly that attacks palms and other plants in tropical America.

Distribution	CAB International (2001)

A. cocois is present in the Lesser and Greater Antilles, Barbados, Trinidad & Tobago, Central and South America.

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Web Resource -

http://www.ag.vt.edu/ipmcrsp/trips/ja30.
http://www.pest.cabweb.org/PDF/BNI/Control/BNIra59.