DISTINGUISHING PALM APHID AND ARECANUT WHITEFLY, TWO EMERGING PESTS IN PALMS

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Introduction

Climate change has been identified as a causal factor for diverse ecological changes worldwide including emergence of sucking pests on coconut palms. Palm aphid and arecanut whitefly resemble alike and at times they are confused in identity leading to erroneous management strategy. Some of the morphological similarities, damage symptoms and management strategies of these two sucking pests are discussed. Recently emergence of palm aphid was reported from dwarf coconut accessions in Kerala whereas outbreak of arecanut whitefly was found to be gradient in nature coinciding with summer months.

Palm production faces serious challenges ranging from diseases to damage by insect pests, all of which may reduce productivity by as high as 30% (Gitau *et al.,* 2009). Management practices that ensure the sustainability of palm production system require a sound understanding of the interaction between biological system and palm. Invasion by sucking insect pests on coconut has been an emerging problem in Kerala, India in the recent past drastically affecting the vigour and vitality of younger palms as well as nursery seedlings. Several reasons have been attributed to this phenomenon *viz.,* climate change, changing cropping systems sidelining diversity principles, adoption of agro-technologies for higher productivity without looking into ecological balance of nature, neglecting phytosanitation and farm hygiene towards perennial crops etc are handful of them. In this context, emergence of palm aphid, *Cerataphis brasiliensis* (Hempel) [Aphididae : Hemiptera] and arecanut whitefly, *Aleurocanthus arecae* David (Aleyrodidae : Hemiptera) in coconut ecosystem of Kerala along with the morphological similarities, damage symptoms and management strategies are presented.

Palm aphid *(Cerataphis brasiliensis)*

The palm aphid, *C. brasiliensis* was reported from Africa, Puerto Rico, Philippines, Indonesia, Surinam, British Solomon Islands, India, Florida and California (Denmark, 1965). In India, palm aphid was first recorded on coconut seedlings imported from Sri Lanka and later on from Tamil Nadu and Karnataka states of South India. *Cerataphis* sp. was previously reported from arecanut palm, but never observed to cause appreciable damage (Nair and Menon, 1963; Pillai and Kurian, 1959). However, recently it was reported as a pest on arecanut palm causing shedding of both fertilized and unfertilized flowers (Daniel et al., 2000).

Damage symptoms

C. brasiliensis was found aggregating on the spear leaves of coconut seedlings planted in a contiguous area belonging to 'Kalparaksha' (a selection from MGD) cultivar from Kayangulam area in about 3% of seedlings (Josephrajkumar *et al.,* 2011). *C. brasiliensis* was not reported from any native coconut cultivars. In Florida, USA also

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the pest was found infesting only Malayan dwarf accessions sparing the local Jamaican Tall accessions. The pest was noticed on young coconut palms during post-monsoon period (September-October) in this area.

A moderate population of about 1-3 aphids were recorded on 1 cm^2 area of the spear leaf (Josephrajkumar *et al.,* 2011). Population was so high leading to choking of spindle leaves and stunting of infested seedlings. The aphids reduce the plant vigour by continuous de-sapping and sometimes cause yellowing of the feeding area. The insects were not found feeding on mature leaflets but were confined predominantly in the spindle region. Under natural conditions colonies of aphids were attended by ants. Such aphids develop more rapidly, produce more nymphs and migrate less and also respond to palpitation by ants by increasing the intake of phloem sap and exudation of more honey dew (Howard *et al.,* 2001). Sooty mould accompanies an infestation as honey dew is given off by the nymphs and adults. The photosynthetic efficiency of aphid-infested palms is badly affected.

Morphological features

The insects are semi-sedentary, nymphs and adults retain functional legs. Body is circular, slightly convex with a fringe of white waxy filaments circumscribing the body and possessing simple rather than compound eyes (See Plate). Presence of a mid-dorsal ridge on the convex aphid is the characteristic feature. Cornicles, the key aphid character are present in *C. brasiliensis* but reduced to inconspicuous shallow rings. One of the most characteristic features of palm aphid is that the legs are highly reduced, not exposed laterally beyond the body region and are therefore visibly unclear at the first sight. Nymphs and adults of *C. brasiliensis* can rotate several degrees in either direction around their inserted mouth parts. The immature instars are smaller, light green to olive green in colour with more noticeable legs. Anal cauda is occasionally raised and the insect forcibly ejects a droplet of honey dew (Howard *et al.,* 2001). Apterous forms of the aphid are quite common in palms and they reproduce through parthenogenesis.

Management

Planting different varieties of coconut and intercropping the plantation with spices, fruit plants, vegetables and tuber crops have to be encouraged so as to diffuse specific volatile cues favouring the emergence of the pest. In the presence of phoretic ant species there will be restriction on the role of natural enemies and are seldom located. Chemical control may be a better option for the management of the pest especially in the nurseries and two sprays of dimethoate (0.05%) at an interval of 15-20 days were found quite effective in suppression of the pest on 'Kalparaksha'. In the prevalence of ants in aphid colonies, need-based spot application of systemic insecticides holds the key for improving the vitality of palm.

Arecanut whitefly *(Aleurocanthus arecae)*

A. *arecae* was first described and reported infesting arecanut palms from Karnataka by David and Manjunatha (2003). Nearly 41% of young coconut palms of tall and dwarf accessions were found infested by *A. arecae* at Kayangulam, Kerala of which 35% palms evinced occurrence of the pest in >25% of leaves (Chandrika Mohan *et al.,* 2007). Insect population varied extensively ranging from 7-1200 / leaflet.

Damage symptoms

In young coconut plantations, *A. areca* adults are found feeding on mature leaflets. Usually spindle leaves of coconut are not invaded by the arecanut whitefly. In case of severe damage, black envelope of sooty mould fungus is visualized on upper surface of leaf. Nymphs and adults insert the stylets on plant tissues, feed on the phloem sap and secrete honeydew. These sugar-rich excreta support sooty mould fungus interfering with photosynthesis (David and Manjunatha, 2003). In most cases, ants are commonly not associated with the pest. The pest was noticed in young coconut palms of both tall and dwarf accessions during April-May.

Morphological features

Eggs laid in circular to spiral rings on the abaxial surface of leaves are one of the unique identification features. First-instar crawlers are mobile and other instars are sedentary. *A. arecae* adults are small (1-3 mm), fly-like, fragile and often smoky-greyish in colour. Immature stages secrete waxy substances in the exuviae. Body is circular, slightly convex in shape with a fringe of white waxy filaments that circumscribes the body thus resembling that of palm aphid (See plate). In general, whitefly pupae have blackish setae on the body.

Management

Lady beetles *viz., Seragium parcesetosum, Jauravia pallidula* and a hump-backed nitidulid predator, *Cybocephalus* sp. were found predaceous on adults and nymphs of *A. arecae*. Eggs of *A. arecae* were also fed by an anthocorid bug in Kerala. Natural biological suppression is found to be very successful and no intervention with insecticides is recommended at this point of time (Chandrika Mohan et al., 2007).

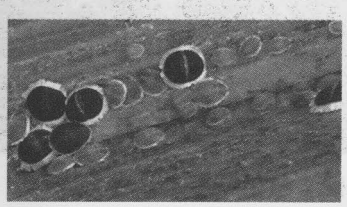
Epilogue

At the first sight, adult aphids and whitefly pupae resemble in most aspects especially the presence of fringe of white waxy filaments circumscribing the body. When blackish setae are present on whitefly immatures/pupae, adult aphids are smooth with mid-dorsal ridge and inconspicuous siphunculi. However, a few dissimilarities are enumerated below.

Palm aphid *(Cerataphis brasiliensis)*

Aphid encrustation on spindle leaf

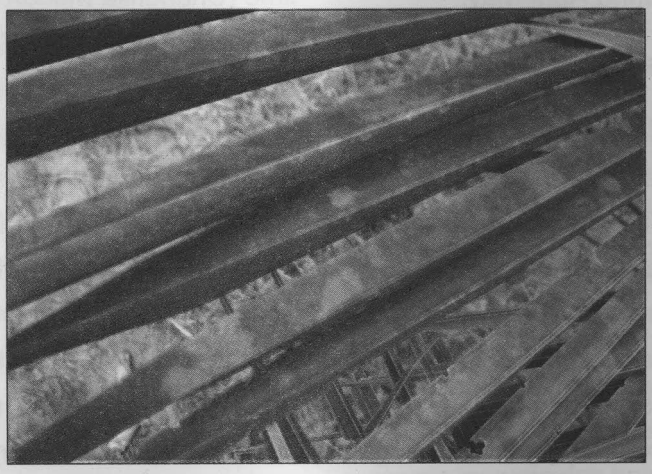
Aphid colony attended by ants



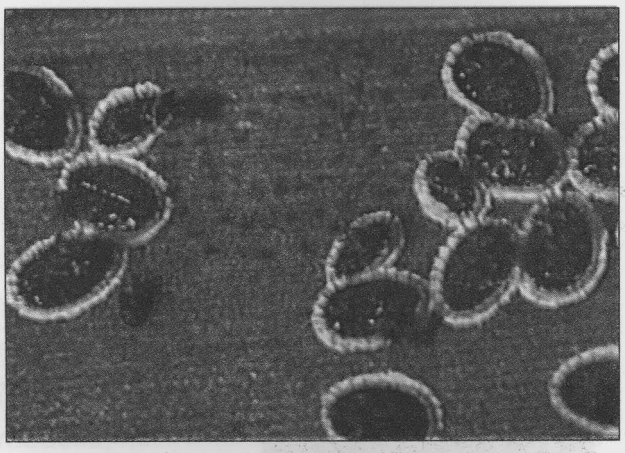
Aphid with mild-dorsal ridge

Arecanut Whitefly *(Aleurocanthus arecae)*

Whitefly encrusted on undersurface of leaf



Sooty mould on uppersurface of leaf



Spiral eggs and puparia with black setae

Adult whitefly with smoky grey wings

Characters	Palm aphid	Arecanut whitefly
Age of infested palm	Young palms	Seedlings and young palms
Habitat	Spindle leaves of dwarf accessions	Mature leaflets of all cultivars
Peak season	September-October	April-May
Reproduction	Parthenogenesis in palms	Eggs laid in spiral rings
Immature stages	Nymphs olive green with well developed legs	First-instar crawlers are mobile and other stages sedentary and secrete waxy substance
Pupa	Absent	Pseudopupae resemble adult aphid with black setae on dorsum
Adult	Convex shaped, smooth with prominent mid-dorsal ridge. Apterous on palms	Fly-like, fragile with prominent two pairs of wings which are ash coloured
Adult legs	Retracted and not seen laterally	Well developed and seen from lateral sides.
Natural enemies	Not very common	Many predators are documented
Presence of ants	Normally seen	Not quite common
Sooty mould	Seen	Seen normally on the upper leaf surface

Understanding the pest is therefore very important to adopt relevant pest management strategy. In this case, palm aphid needs spot application of systemic insecticides whereas the arecanut whitefly is naturally suppressed by predators.

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