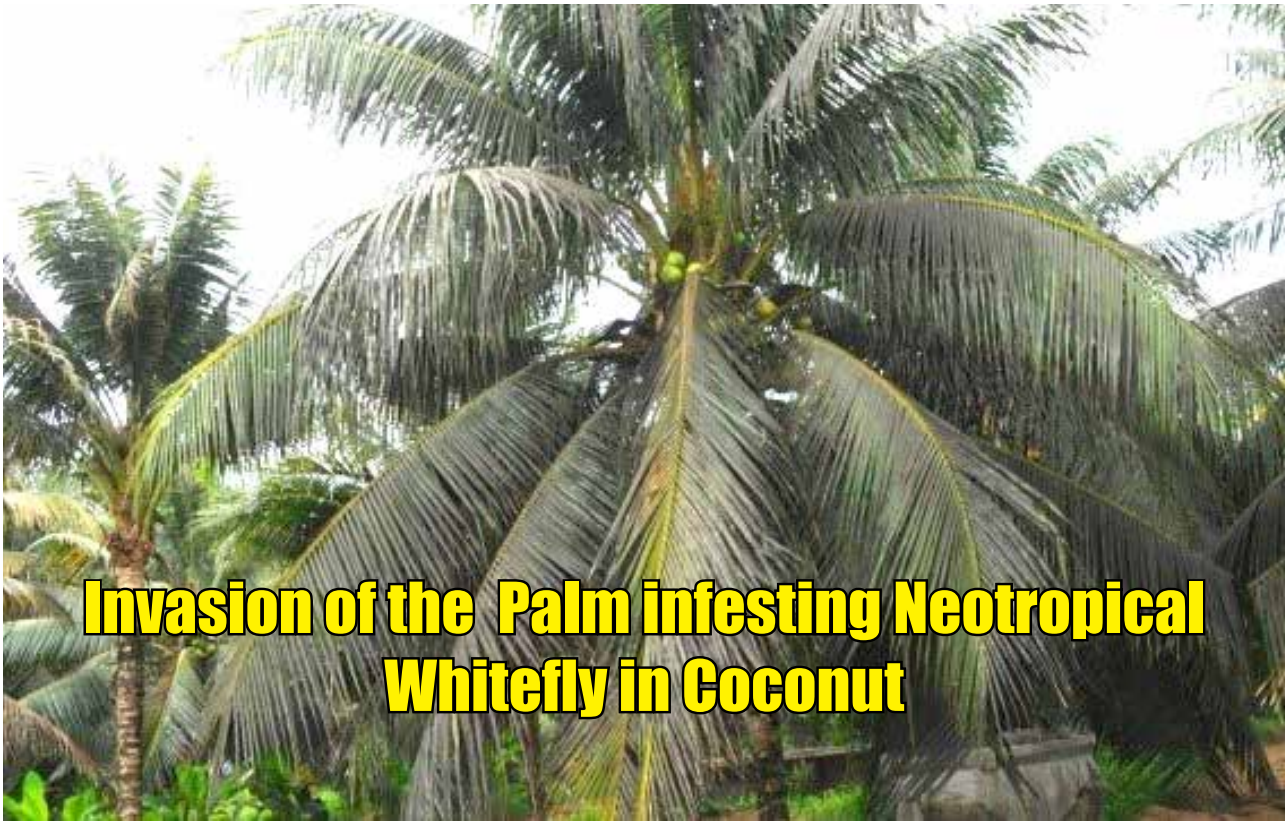

Invasion of the Palm infesting Neotropical Whitefly in Coconut

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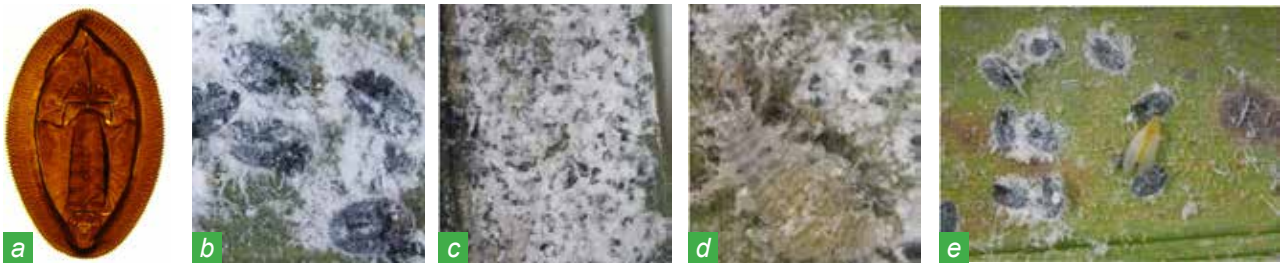
Increased trade, transport and travel are the major drivers of bioinvasions and will continue to increase as a by-product of globalization and invasive exotic species move from one region of the world to the other. The enormous increase in the volume, diversity and swiftness of movement of plant products throughout the world has led to a proliferation and dissemination of invasive species, particularly those closely associated with plants, such as scale insects and whiteflies. So far, more than 110 exotic insect species had been reported from India, of which, whiteflies and mealybugs constitute a major part of the invasion. In India, 463 whiteflies species belonging to 68 genera are known to feed on many agricultural, horticultural and forestry crop plants which include four recently invaded species viz.,solanum whitefly, *Aleurothrixustrachoides* (Back) on 24 host plants *(Sundararajet al., 2018)*, rugose spiralling whitefly, *Aleurodicusrugioperculatus* Martin on coconut and several horticultural and ornamental plants (Sundararaj and Selvaraj, 2017), Bondar's nesting whitefly, P*araleyrodesbondari Peracchi* and *P. mineilaccarino* on coconut (ICAR-CPCRI, 2018; Chandrika Mohan *et al., 2019*). During February 2019, one more palm infesting, highly invasive whitefly species, *AleurotrachelusatratusHempel* (Hemiptera: Aleyrodidae) was found colonizing on members of *Arecaceaeviz.*, coconut, (*Cocos nucifera*) and ornamental areca palm (*Dypsealutescens*) at Mysore and Mandya districts of Karnataka, India.

The genus *Aleurotrachelus* is one of the largest genera of whiteflies and currently containing 74 species worldwide with 12 species known to be well distributed in the Afrotropical region (*Evans, 2008*). *A. atratus* is a Neotropical whitefly, originally described by Hempel (1922) from Brazil and reported widely in

Fig 1: Aleurotrachelus atratus



a) Mounted puparium, b) Puparium, c) Colony structure, d) Dichochrysa predator, e) Adult

the tropics and subtropics and colonize on more than 110 plant species belonging to *Arecaceae, Rutaceae, Solanacee, Cycadaceae and Lauraceae* (Malumphy and Treseder, 2011). *A. atratushas* spread rapidly in the Neotropical region viz., Antigua, Bahamas, Barbados, Bermuda, Brazil, Colombia, Guyana, Nevis, Puerto Rico, Venezuela and USA, (Florida). It is now also found in Africa, North and South America, Central America and the Caribbean, Europe and Oceania (Borowiec *et al., 2010*).

Whitefly specimens were collected from infested plants (Coconut & Areca palm) from several locations in Mandya and Mysore districts of Karnataka. The identity of the whitefly is confirmed using best mounted slides as Aleurotrachelusatratus Hempel (*Hemiptera: Aleyrodidae*) based on the specific puparial taxonomic characteristics, which includes, Elongate oval puparium with entire dark cuticle (Fig. 1a); marginal teeth separated, with converging subtruncate or rounded apices, each one with serrated margins; absence of first abdominal and mesothoracic setae, metathoracic setae extending beyond 2nd abdominal segment, 8th abdominal setae longer than the vasiform orifice, caudal setae very long and set on tubercles; submarginal area with rows of flat, elongate granules of subequal size; lingula tip rounded.

Eggs and larvae of *A. atratus* occur on the underside of palm fronds, and when abundant they are highly conspicuous due to the dense flocculent white wax which covers the black pupae. Eggs are stalked, initially creamy white and turn to dark brown before hatching. The first instars have four pairs of wax plumes excreted by glands at the base of dorsal setae (Fig.2c). Puparia are elliptical, black, 1.0-1.1 mm long with a long marginal white wax fringe and dorsal wax filaments that often completely cover the insect (Fig.1b). Adults differ from the recently invaded whiteflies infesting palms; smaller than *Aleurodicusrugioperculatus* but larger than *P. bondariand P. minei* and without any wavy marking on the wings (Fig 1e). *A. atratus* can be easily diagnosed from its closely related and other recently invaded species *Aleurothrixestrachoides* (Back) by elongate oval puparium, the marginal teeth having crenulations on their sides, the pattern of the tile-like sculpturing on the submargin, and the rounded lingula tip which is not bilobed.

Symptoms of damage: Found infesting mainly on the under surface of leaflets in groups ranging from 97 to 186 nymphs per group with 3 to 48 groups per leaflet. In severe cases more than 60% coverage of leaflet by the nymphs resulting in chlorosis or necrosis and loss of vigour with drying of leaflets (Fig.1c). Further indirect damage is caused by the excreted honeydew that serves as a medium for the growth of sooty moulds.

Natural enemies: Considering the economic importance of new invasion of *A. atratusin* in India, an attempt to find natural enemies revealed no parasitisation but four species of predators such Dichochrysaastur (Banks) (=Malladaastur (Banks)) (*Neuroptera: Chrysopidae*) *Jauraviapallidula (Motschulsky), Chilocorusnigrita (Fabricius) (Coleoptera: Coccinellidae), Cybochephalusspp. (Coleoptera: Nitidulidae)* were found feeding in the field condition.

Considering the economic importance of new invasion of *A. atratus in* India, an attempt to find natural enemies revealed no parasitisation but four species of predators such *Dichochrysaastur* (Banks) (*Malladaastur (Banks*) (*Neuroptera: Chrysopidae*), *Jauraviapallidula* (Motschulsky), *Chilocorusnigrita* (Fabricius) (*Coleoptera: Coccinellidae*), *Cybochephalusspp*. (*Coleoptera: Nitidulidae*) were found feeding in the field condition.

Impact on coconut: India being the largest coconut producing country in the world, contributes 31% of global production. Coconut palm provides

food security and livelihood opportunities to more than 12 million people in India, covering 16 states and three Union Territories. Coconut and coconut products are gaining global importance as a contributing factor to the health, nutrition and wellness of human being. India ranks second in terms of productivity (10349 nuts / ha) next to Brazil (11574 nuts / ha), among the major coconut growing countries (Murthy, 2018). With the current report of A. atratus, altogether 464 species of whiteflies belonging to 68 genera are known from India in which so far six species viz., *Aleurocanthusarecae* David & Manjunatha, *Aleurodicusdispersus* Russell, *Aleurodicusrugioperculatus* Martin and P. bondariand *P. minei* are known to infest coconut palm in India. Among these whiteflies, except *Aleurocanthusarecae*, all others were invasive to India. The present study revealed that rugose spiralling whitefly, *A. rugioperculatus* seems to be slowly getting replaced by *A. atratus* as only few colonies or nil colonies /population (10-15 life stages/leaflet) could be seen in the same infested leaflet as interspecific competition is more common in Hemiptera and Homoptera because of their life-history traits, such as their aggregated and sedentary lifestyle. Thus danger posed by *A. stratus* is likely to spread to other coconut producing states in India and extent its host ranges on other Arecaceae palms, Solanaceae and Rutaceae plants.

Though, two parasitoids, *Encarsiabasicincta* and *Eretmoceruscoco is reported* as efficient natural enemies for the suppression of this coconut whitefly population in its native range in Brazil. However, In India, nil natural parasitism either by native or exotic parasitoid could be observed so far thus indicating that pest was introduced probably without natural enemies complex into India. Therefore, it could be a potential threat to coconut cultivation as well as a threat to environmental tourism in India if unchecked. In view of above to develop effective management strategies, intensive surveys for its distribution, host range, intensity and natural may be enemies has been initiated. Red pest alert note issued to all other stakeholders to look out its occurrence on other locations and host plants as soon as they notice this potential pest. ■

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