

# New Host Record of *Rastrococcus iceryoides* (Green, 1908) (Hemiptera: Pseudococcidae), an Emerging Pest of Arecanut from West Bengal, India

Jaydeep Halder<sup>1</sup> · Debjani Dey<sup>2</sup> · A. B. Rai<sup>1</sup>

Received: 21 January 2017/Revised: 19 April 2017/Accepted: 25 June 2018/Published online: 26 September 2018  
© The National Academy of Sciences, India 2018

**Abstract** The present study records the occurrence of mealybug, *Rastrococcus iceryoides* (Green) on Arecanut (*Areca catechu*) from West Bengal, India for the first time. Critical observations revealed that infestations started initially from the young leaves of terminal shoots and gradually moved to tender fruits and inflorescence. With increase in population, they move to and settled on the peduncle of the tender nuts. In cases of severe infestations, shedding of leaves and inflorescence leading to reduced fruit-setting and pre-mature dropping of young fruits occurred. The affected fruits became smaller in size with malformed or undersized nuts inside. The affected fruits failed to fetch a higher market price. Suitable control measures should be initiated as and when the first incidence of this nefarious pest was observed on this valuable plantation crop.

**Keywords** Arecanut · New host record · *Rastrococcus iceryoides* · West Bengal

Arecanut or betelnut or supari (*Areca catechu* Linn.; Family: Arecaceae) is an important evergreen, plantation

crop in India grows almost all along the coastal and north eastern states of the country. It is chewed both as raw nut and cut pieces after processing. Owing to its medicinal properties, it is used for treating leucoderma, cough, fits, worms, anemia and obesity [1]. Apart from its direct consumption, it is an essential requisite for several religious and social ceremonies and also used as an interior landscaping species. It is often used as ornamental plant in large indoor areas and lawns. Amongst the different arecanut growing states, West Bengal alone produced 21,200 m arecanut from an area of 11,400 ha during 2013–2014 [1]. In West Bengal, this perennial plantation crop is widely grown in the districts of North and South 24 Parganas, Howrah, Nadia, Jalpaiguri, Cooch Behar and Darjeeling. Since this crop does not require much attention, it is often considered as an alternate cash crop by the farmers of the state. Due to its tall and perennial nature, the crop is also used in multistoried cropping.

The production of arecanut is hampered by several insect pests throughout its growth period. For example, spindle bug (*Carvalhoia arecae* Miller and China 1957A), inflorescence caterpillar (*Tirathaba mundella* Walker, 1864), pentatomid bug [*Halyomorpha marmorata* (Fabricius, 1781)], root grub (*Leucopholis lepidophora* Blanchard, 1851), inflorescence aphid [*Cerataphis lataniae* (Boisduval, 1867)] and scale insect [*Icerya aegyptiaca* (Douglas 1890)] are the major one [2]. During the last couple of years a new sucking pest infesting arecanut in South 24 Parganas region of West Bengal, India during *Kharif* season was observed. The crops grown at the bank of Hooghly river suffered heavily due to this emerging pest causing 30–40% fruit damage. The tender fruits were initially observed to be heavily covered with whitish powdery masses of mealybugs. Later, the fruits and leaves were covered with black sooty mould which developed on the

✉ Jaydeep Halder  
jaydeep.halder@gmail.com

Debjani Dey  
ddeyiari@hotmail.com

A. B. Rai  
abraiiivr@gmail.com

<sup>1</sup> Crop Protection Division, ICAR-Indian Institute of Vegetable Research, Varanasi, Uttar Pradesh 221305, India

<sup>2</sup> ICAR-Indian Agricultural Research Institute, Pusa Campus, New Delhi 110012, India

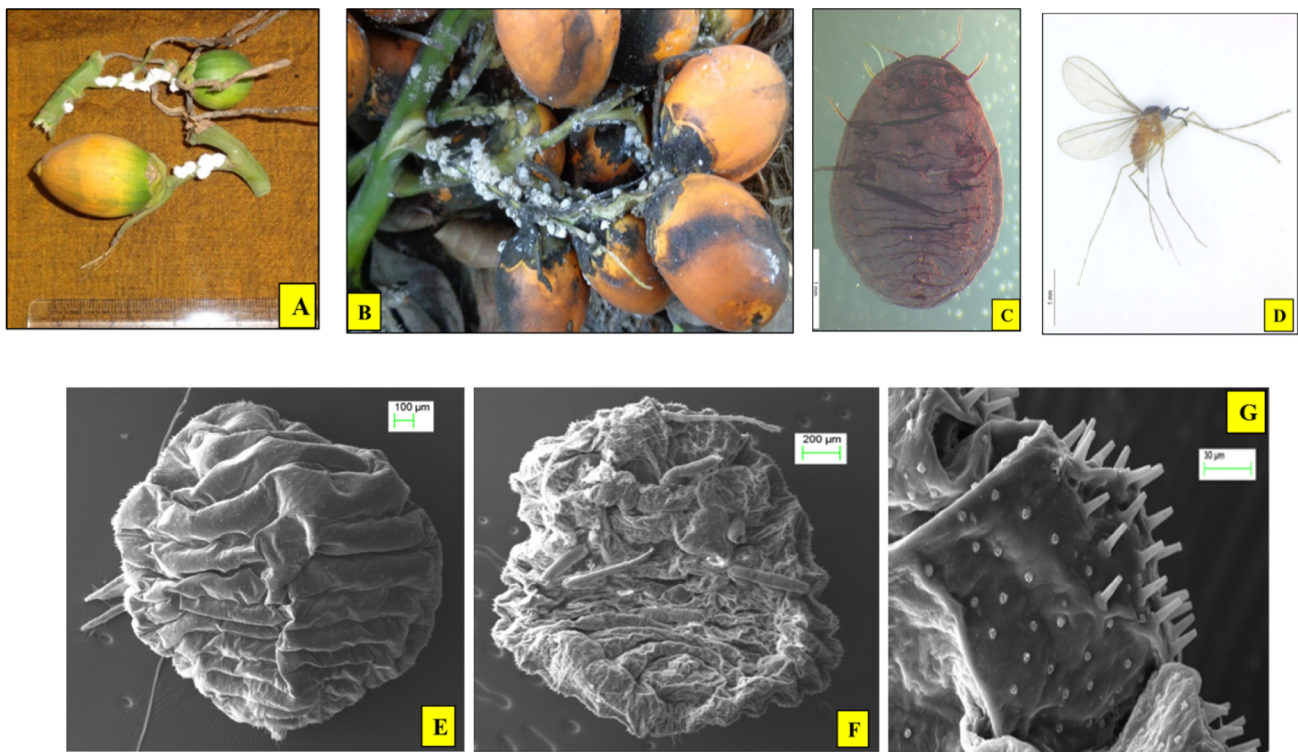
honeydew secreted by these insects. During the survey, several local farmers also reported the same problem. This prompted us to conduct a detailed study about this nefarious pest as practically no information is available about this pest from this region on arecanut as well as from the Indo-Gangetic plains of northern India.

The specimens of mealybugs were collected and preserved in 80% alcohol, and sent to National Pusa Collection, Division of Entomology, ICAR-Indian Agricultural Research Institute, New Delhi, India for detailed taxonomic studies. The specimens were identified as *Rastrococcus iceryoides* (Green, 1908) (Hemiptera: Pseudococcidae) by the following characters viz., Adult female—body covered with long waxy tassels, broadly oval in outline (Fig. 1c), 3.05 mm long and 2.32 mm wide ( $n = 5$ ); derm membranous. Antennae nine-segmented, stout, terminal segment slightly elongated, each segment with a stout setae; labium elongate conical, two-segmented, with sensilla at its apex. Simple, dark, conical eyes present at the base of antennae. Thoracic spiracles large, with few multilocular pores near atrium; legs slender, well developed, translucent pores present on the hind femora and tibiae, legs bear stout, spine-like setae, claw stout, with denticles, claw digitules stout at base, tapering to slender acute tips. Circulus transversely rectangular, located within

borders of abdominal segment III; both anterior and posterior pairs of ostioles well developed; Cerarii numbering 17 pairs, each abdominal cerarii having 14–25 truncate-conical setae situated on a membranous area, cerarii on head and thorax with more truncated setae, along with large, distorted trilocular pores, extending to submargins. Multilocular disc pores are present in double to triple rows across ventral medial areas of abdominal segments and around margins. Quinquelocular pores are distributed ventrally over the medial and submedial areas. Tubular ducts slender, present on sides of labium and medially on the thoracic region. Dorsal setae present, minute and lanceolate. Anal ring with inner row of cells, bearing 6 long flagellate setae, flanked by similar long flagellate setae; anal lobe not distinct, with truncated conical setae and long flagellate seta.

Males are cylindrical, body divided into 3 tagmata as head, thorax, and abdomen (Fig. 1d); well-developed forewings on mesothorax and metathoracic with hamulohalteres; 3 pairs of long legs. Males also have long, fili-form, 10-segmented antennae and a conspicuous, genital segment small, conical with a short narrow style curving upward laterally.

Infestations started with the appearance of the early instar (mostly first and second) nymphs on the ventral



**Fig. 1** Arecanut fruits infected by mealy bugs *R. iceryoides* (a) and deposition of black sooty mould on fruit surface (b); adult female (c) and male (d); dorsal (e) and ventral (f) view of *R. iceryoides* under

scanning electron microscope; diagnostic character-abdominal cerarii with truncate conical setae (g)

surfaces of the young leaves on terminal shoots. As the population increased, they gradually spread to young shoots and inflorescences. Critical observations revealed when infestation was severe these mealybugs settled even on the peduncle of the tender nuts (Fig. 1a). A maximum 17 such bugs were observed to congregate on a single fruit. Both nymphs and adults were observed to suck sap via specially adapted mouthparts and also secreted the sugar rich honey dew which, when deposited on the fruits and foliage attracted the development of black sooty mould (Fig. 1b) thereby hindering the normal photosynthetic ability of the plants. It was also observed that nymphs and adults of *R. iceryoides* were myrmecophily and often attended by the black ants, *Camponotus compressus* (Fabricius, 1787) (Hymenoptera: Formicidae) which was the characteristic symptom of the attack of this mealybug could be easily traced even to obscure locations. Several overlapping generations were also noticed. In cases of severe infestations, shedding of leaves, inflorescence, reduced fruit-setting and pre-mature dropping of young fruits occurred. The affected fruits became smaller in size with malformed or undersized nuts inside. The affected fruits often failed to fetch a higher market price. Since, the un-branched plant bear fruits at its extreme proximal position, the early infestations of this bug were mostly unattended by the growers and noticed only after harvest of the fruit. A brief biology of this polyphagous pest was also studied with tender arecanut fruits as food in the laboratory. Gravid female lay up to 236 eggs during her lifetime. Freshly laid eggs were translucent white in colour. Incubation period ranged from 4.75 to 7.75 days (at 22–28 °C temperature, 70 ± 5% RH and 13:11 (L:D) hour photoperiod). Adult females attained maturity through three nymphal instars. First, second and third nymphal periods ranged from 6 to 10.5, 13.75–19.50 and 16.25–20.75 days, respectively, with an average of 8.50, 16.25 and 19.50 days.

*Rastrococcus iceryoides* has been recorded from afrotropical oriental and neotropical regions from countries like Benin, Congo, Gabon, Ghana, Senegal, Togo, Bangladesh, Bhutan, India (Andhra Pradesh, Bihar, Gujarat, Karnataka, Maharashtra, Odisha, Uttar Pradesh and Sikkim), Srilanka, Malaysia, Pakistan, Phillipines, Singapore,

Thailand, Vietnam, French Guiana [3]. Literature indicates that *R. iceryoides* has been recorded on 73 host plants belonging to 33 plant families [4]. In India, it is a well-known pest of several agricultural and horticultural crops viz., *Mangifera indica* L. [5], *Citrus* spp. [6]; *Gossypium hirsutum* L. [7]; *Cocos nucifera* L. [2]; *Psidium guajava* L. [8]; *Manilkara zapota* (L.); *Ficus carica* L. [9]; *Theobroma cacao* L. [10]; etc. To the best of our knowledge, there has been no report of this pest as a sap sucker on arecanut from Indo-Gangetic plains of northern India including West Bengal. The present study reported here is the first report of *R. iceryoides* as an emerging pest of arecanut from this region. We aim to conduct detailed studies on the bioecology and integrated management practices for this pest with special emphasis on their biological control.

**Acknowledgement** The authors are thankful to the arecanut growers of the district–South 24 Parganas, West Bengal, India for sharing their arecanut orchards for conducting the present study.

## References

1. Indian Horticulture Database (2014) Published by National Horticultural Board, Ministry of Agriculture, Government of India, Sector-18, Gurgaon
2. Ragupathy A, Ayyasamy R (2016) A guide on crop pests. Namrutha Publications, Chennai
3. Williams DJ (2004) Mealybugs of southern Asia. The Natural History Museum, Southdene
4. <http://www.sel.barc.usda.gov/scalenet/scalenet.html>. Accessed 16 Nov 2016
5. Nagalakshmi G, Verghese A, Varalakshmi KN (2014) Diagnostic characters of two *Rastrococcus* species (Hemiptera: Pseudococcidae) occurring on mango in India. *Pest Manag Horticult Ecosyst* 20(2):231–233
6. Seni A, Sahoo AK (2012) Biology of mealybug, *Rastrococcus iceryoides* (Green) on Citrus. *Ann Plant Prot Sci* 20(1):72–74
7. Dhobi CB, Bharpoda TM, Borad PK (2014) First record of *Paracoccus marginatus* Williams and Granara de Willink and *Rastrococcus iceryoides* (Green) on *Bt* cotton (*Gossypium hirsutum* L.) in Gujarat. *Insect Environ* 20(1):6–7
8. Mani M, Krishnamoorthy A (1998) Regulation of *Rastrococcus iceryoides* (Green) on guava. *Insect Environ* 4:71
9. Mani M, Krishnamoorthy A, Shivaraju C (2011) Biological suppression of major mealybug species on horticultural crops in India. *J Horticult Sci* 6(2):85–100
10. [www.agritech.tnau.ac.in/crop\\_protection/cocoa/cocoa\\_1.html](http://www.agritech.tnau.ac.in/crop_protection/cocoa/cocoa_1.html). Accessed 02 Dec 2016