



## Mealybug variant : A first report from Kaliabor region, Nagaon, Assam

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### Abstract

There is the report of twenty two mealy bug species worldwide of which five are in India. A morphological variant of mealybug is observed infecting *Ocimum tenuiflorum* during winter season in Kaliabor sub-division of Assam, India which may lead to identification of a new species. Further work is necessary.

**Keywords:** mealybug, pseudococcidae, monophlebidae, *Ocimum tenuiflorum*

### 1. Introduction

Mealybugs are the small phloem sucking insects, the nymphs and adult female of insect feeds on the sap of the plants such as root, trunk, leaves, rachis and fruits of the plants causing direct and indirect damages to the plant. (Pacheco da Silva VC, et.al., 2014). Pseudococcidae(mealybug) is a large taxonomic group, taxonomic identification and management of mealybugs became today most challenging problem worldwide.

In India five mealybug species are recorded as minor cotton pest as *Nipaecoccus viridis*, *Ferrisia virgata*, *Rastrococcus iceryoides*, *Maconellicoccus hirsutus*, *Perissoppeumon tamarindus*. Pakistani dominant mealybug species is *P. gossypiphilous* (Nagrare et.al., 2014).

There are no existing reports of mealy bugs from the kaliabor subdivision of state of Assam. The observed specimens infects *Ocimum tenuiflorum* (tulsi) shows many morphological variations from the other 22 species reported worldwide and may be a unknown variant. It will need detail analysis for confirmation. This work is limited to morphological comparison of the keys for identification of the new variant of mealy bug from Assam.

### 2. Methodology

Study area: The sample is collected from

Ambagan of Nagaon district. The latitude 26.35 and longitude 92.68 is the geocoordinate of the region.

Sample collection: the sample (mealybug) is collected from Ambagan region of Nagaon district in the month of November. It is found as a pest of tulsi plant (*Ocimum tenuiflorum*). Sample is collected in small glass container using forceps, care is taken so as not to damage the specimen.

Preservation: the sample is host preserved. Sample is allowed to grow in host plant.

### 3. Result

#### (A) Climatic parameters

The new suspected variant is a seasonal pest in the host plant, *Ocimum tenuiflorum*. The climatic conditions observe where the species is available during winter, temperature ranges from 12°C to 21°C. Humidity of the area ranges from 85% to 95%. The uv-index is recorded as low approximately 0.

#### (B) Characteristics of the mealybug species:

The specimen found is morphologically different from the other variants. The nymph structures are different in all the stages on the basis of the body measurement and the range of presence of pseudo appendages. The geographical condition plays a major role in appearance of the species it is present during winter (approx, October last to January) i.e., in the

**Table 1:** Comparative analysis, morphology of the species

characteristics →	Species colour	Body segmentation	antenna	Pseudo appendages or white wax.	Larval/nymph stages	Host plant (family)
species ↓						
Newly recorded mealybug	Brownish-orange in colour covered with white wax. 1.1-2.5 cm long and 0.7-1.5cm wide	Unevenly segmented	1 pair of tiny filiform antenna	Long waxy pseudo appendages range from 16-25 in number	7 nymph stage	<i>Ocimum tenuiflorum</i>
<i>Nipaecoccus viridis</i>	Dark green, purple with white wax covering. 2.5-4mm long and 1.5-3 mm wide	7 segments	7 segmented	Very short wax lining from the body lining	3 larval stages	Fabaceae, Euphorbiaceae, Acanthaceae, Malvaceae, Liliaceae, Rutaceae
<i>Ferrisia virgata</i>	Pale greenish yellow in colour with striped and white wax covered and 4-4.5mm long.	segmented	8 segmented antenna	Long and thin thread like, measurement about half of the body.	3 instar	Citrus, seagrape, hibiscus, copperleaf
<i>Rastrococcus iceryoides</i>	Different colours according to host plant. Body is 3-4mm long	segmented	9 segmented	No extra wax or pseudo appendages	4 growth stage	Ornamental plants
<i>Maconellicoccus hirsutus</i>	Grey-Pink colour with white waxy covering. 2.5-4mm long	segmented	Long antenna with 9 segments	White wax only in the posterior position	2 nymph stage	Fabaceae, Malvaceae, Moraceae
<i>Perissoppe umon tamarindus</i>	Yellow brown with white wax around the body. Body is 8-	segmented	Conspicuous antenna	No extra wax or pseudo appendages	4 female and 5 male instar	Citrus, woody shrubs

	14mm long					
<i>Phenacoccus madeirensis</i>	Yellowish to light gray with body measurement 3.5-4 mm long , 2mm wide	segmented	Clavated antenna	18 pairs of extra hair like appendages	3 nymphal stage	<i>Coronilla</i> sp., ornamental plants, <i>crytrina bogotensis</i> , <i>Dyospiro duclouxii</i> , <i>lantana comara</i> , <i>Malva parviflora</i> .
<i>Planococcus vovae</i>	Pinkish yellow or brown in colour	Abdomen segmented	8 segments in antenna	2 pair of posterior pseudo appendages	2 nymphal stages	<i>Cupressus semervirens</i>
<i>Planococcus citri</i>	White or pink or brownish in colour	Abdomen segmented	clavate	present	1 nymph stage	<i>Dyospiro duclouxii</i> , <i>Ocimum basilicum</i> , <i>Solanum lycoperican</i> , <i>Ceratonia siliqual</i>
<i>Dysmicoccus boninsis</i>	Gray in colour	segmented	8 segmented antenna	4-6 short filaments	3 nymph stages	<i>Saccharum officinarum</i>
<i>Planococcus peruvianus</i>	-----	-----	-----	present	3 nymph	<i>Myoporum</i> sp , <i>Aucuba japonica</i> , <i>Bougainvillea</i> , <i>Justicia suberecta</i>
<i>Pseudococcus longispinus</i>	Pink in colour	----	present	Waxy filament with tail like long appendages	4 nymph stages	<i>Cordilyne stricta</i> , <i>Cuonymus japonicus</i>

<i>Pseudococcus viburni</i>	Pinkish grey body colour	----	----	present	1 nymph	<i>Salvia. sp</i>
<i>Phenacoccus solani</i>	Brown in colour	segmented	present	present	3 nymph stages	<i>Capisicum annum</i>
<i>Delottooccus aberiae</i>	Browish amber	Longitudinal strip	present	Very short with few long tail type appendages	----	<i>Citrus reticulata</i>
<i>Phenococcus manihoti</i>	Pink in colour	Apparent segments	9 segmented antenna	Very short pseudo appendages	4 nymph stages	Cassava stem
<i>Pseudococcus gossypii</i>	Greyish in colour	segmented	Short antenna	3 parallel row of small wax filaments	3 nymph stages	Ornamental plants
<i>Pseudococcus freneriae</i>	Greenish in colour	----	9 segments of antenna	18 pairs of wax filaments	----	Wild plants
<i>Planococcus ficus</i>	Greyish in colour	segmented	Short – small antenna	absent	2 nymph stage	Apple, grape, pears etc
<i>Dysmicoccus brevipes</i>	Pink or orange in body colour	segmented	8 segments	Short filaments	4 nymph stage	Pineapple, cotton, citrus, coffees, banana plant etc
<i>Sacchasicoccus sacchari</i>	Pink in colour	segmented	10 segments	Short filaments	4-5 stages of nymph	Sugar cane, ratoon crops

warm- humid sessions.

The body colour of the other mealybugs are dark green, purple, pale greenish yellow, grey-pink, yellowish brown, pinkish yellow, white, brown, brownish amber and orange with wax surrounded the body. But the newly suspected variant is brownly-orange with body covered with white wax.

The body measurement of the mealybugs worldwide ranges from 2 mm to 14 mm, whereas the body measurement of the suspected new variant is 1.1-2.5 cm long and 0.7- 1.5 cm wide.

The mealybugs of the species have symmetrically segmented body whereas the suspected new variant is unevenly segmented.

The nymph structures are also different. The

nymph shows the growth stage from the egg to adults and each stage of nymph is morphologically different with size, shape, wax covering etc with 7 nymphal stages but the other mealybugs shows a range of 1-5 larval/ nymphal stages.

The antenna of different mealybug species are segmented with 7,8,9 or 10 segments, some species have conspicuous antenna , clavated antenna , some species have small or longer antenna , but in the newly suspected variant the antenna have a pair of tiny filiform antenna.

The pseudo-appendages or wax covering the body of the new suspected variant is long and ranges from 16-25in number in adults. Whereas the wax covering of the other species are vary different from the studies

species as few have wax covering only in posterior side or few are very short or few have parallel row of wax filaments or in some species the filaments are absent.

The new suspected variant is only seen in the host plant *Ocimum tenuiflorum*, whereas the other mealybug species have a wide range of host plants.

The mealybug is classified according to Hyman's (1915) systematic classification

Phylum: Arthropoda

Class: Insect

Order: Hemiptera

Superfamily: Coccoidea

Family: Pseudococcidae (Hyman's, 1915)

### (C) Detailed characterization of egg, instars and adult of the suspected new variant.

#### (i) Characteristics of eggs of mealy bug:

Adult female (@&) lays eggs on cottony white sac. In the specimen a cluster of 12 eggs in a sac found the measurement varies from 0.3mm to 0.5mm in length. The eggs are hatched within 10-20 days of the eggs laid. The colours of the eggs are yellow with no distinctive antenna and legs.

#### (ii) Characteristics of 1<sup>st</sup> instar nymph:

Body elongated, oval, brown in colour. With body measurement of length 0.3 cm and wide 0.1 cm. The body is non segmented, 2 distinctive antenna, 3 pairs of



**Fig. 1:** Eggs of mealy bug

legs measuring 0.5 mm in length. The body is not covered by white cottony wax.

#### (iii) characteristics of 2<sup>nd</sup> instar nymph;

Body elongated oval, brown in colour, body measures about 0.4 cm long and 0.25 cm in wide. Body segmentation observes with formation of white cottony



**Fig. 2:** 1<sup>st</sup> instar (crawlers) of mealy bug

wax around the body. 2 antenna with 3pairs of legs measuring 0.6 cm I length. In the dorsal margin pairs of cerarii is recognizable. (Pic-3)

**(iv) Characteristics of 3<sup>rd</sup> and 4<sup>th</sup> instar nymph:**

Body elongated oval shape with partially body fully covered with cottony white wax. 1pair of antenna and 3pair of legs. body measurement 3<sup>rd</sup> instar ( 0.5 cm long, 0.3 cm wide)(pic-4) , 4<sup>th</sup> instar( 0.6 cm long with 0.35 cm wide of body).formation of pseudo



**Fig. 3:** 2<sup>st</sup> instar (crawlers) of mealy bug

appendages from the body lining starts to appear. In dorsal margin pairs of cerarii present.

**(v) Characteristics of 5<sup>th</sup>, 6<sup>th</sup> and 7<sup>th</sup> instar nymph:**

The 5<sup>th</sup>, 6<sup>th</sup> and 7<sup>th</sup> instar nymph are although similar but the body measurement, number of pseudo appendages is different. The 5<sup>th</sup> instar nymph the body is 0.7cm long and 0.4 cm wide with pseudo appendages



**Fig. 4:** 3<sup>rd</sup> instar of mealy bug



**Fig.5:** 4<sup>th</sup> instar of mealy bug

on posterior side of the body (pic-6). 6<sup>th</sup> instar nymph is 0.8 cm in length and 0.5cm in wide. Pseudo appendages present on the sides of the body along with posterior side (pic-7). 7<sup>th</sup> instar nymph is 0.9cm in length and 0.6 cm id wide the pseudo appendages range from 10-16 fully covered on the sides of the body.(pic-8).

**(vi) Characteristics of the adult:**

Body elongated, covered with thin uniform mealy wax and cottony threads, measure from range of 1.1cm- 2.5 cm long and 0.7cm – 1.5cm wide. Body segmentation is distinct around the mid- ventral area. The elongated pseudo appendages or waxy filaments



**Fig. 6:** 5<sup>th</sup> instar of mealy bug



**Fig. 7:** 6<sup>th</sup> instar of mealy bug



**Fig. 8:** 7<sup>th</sup> instar of mealy bug

are surrounded fully around the adult body. The adult female (@&) produces ovisac around the body where eggs accumulate. In adults the dorsal side of the body

has labrum. The pseudoappendages in adults range from 17-30 in number.



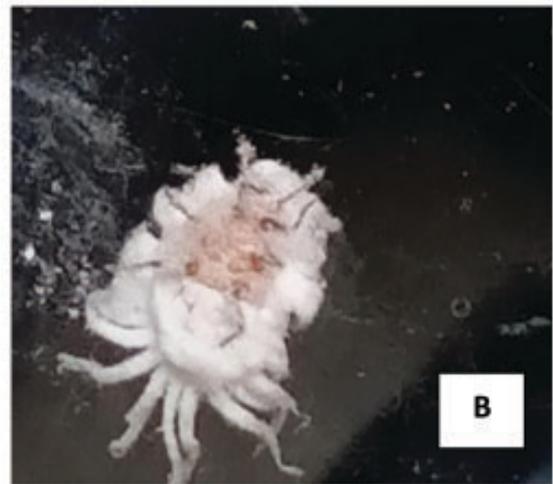
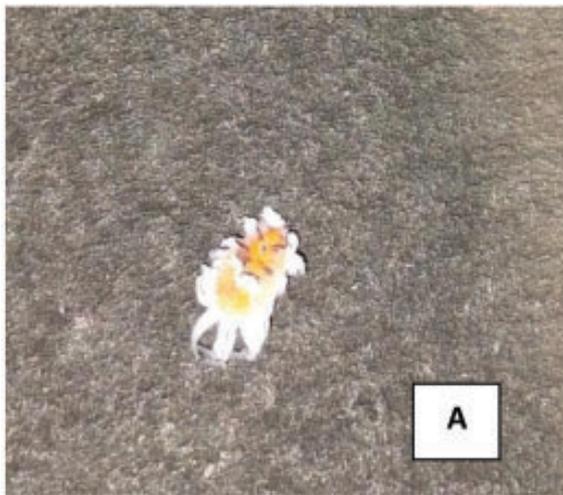
**Fig. 9:** adult mealy bug



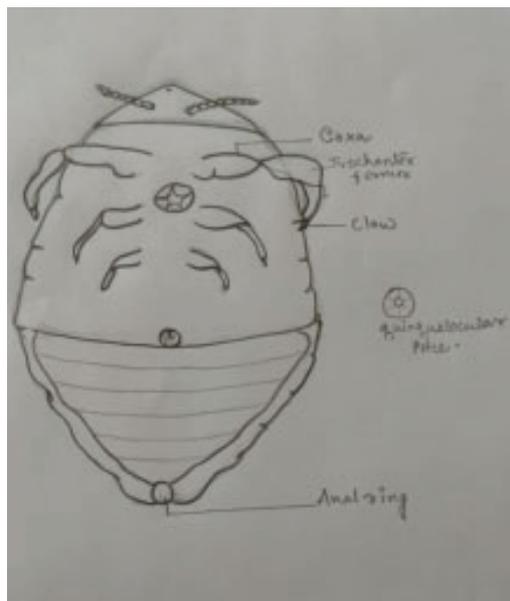
**Fig. 10:** mealy bug in host plant *Ocimum tenuiflorum*



**Fig.11:** developmental stages of mealy bug species



**Fig. 12:** A. dorsal view of the mealy bug species  
B. dorsal view (higher magnification)



#### 4. Discussion

The new variant has its distinctive characteristics such as body colour, antenna type, host plant, stages of development and shows variability with the identified mealy bug species. The variant is morphologically different than the other mealybug species. The difference may be due to the climatic condition of the area or it may be a new variant of mealybug.

#### 5. Conclusion

The taxonomical identification obtained via morphological characteristics allowed the clear identification of the species as a different variant. Further work is in progress towards the full identification toward the genus and species level.

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#### References

- Bettra .A, Soto .A, 2011, “New record of mealybugs (Hemiptera: Pseudococcidae) from Spain., *Phytoparasitica*,39,385-387.
- Bettra .A,Soto. A, Malausa .T., 2012., “Molecular and morphological characteristics of Pseudococcidae surveyed on crop and ornamental plants in Spain., *Bulletin of entomological research*,102,165-172.
- Camargo UA, Toniello .J, Hoffmann .A.,(2011).,” *Advances in grape culture in brazil.*, rev bras frutic E:144-149
- Culik. MP, Gullan PJ. 2005,” A new pest of tomato and other records of mealybug(Hemiptera:Pseudococcidae)from Espirito Santo, Brazil., *Zootaxa* 964:1-8.
- Graora .D, Spasic .R, Ilic. S, (2014).” *Biology and harmfulness of Planococcus vovae* (Nassonov) (Hemiptera: Pseudococcidae) in Bigrade area., *Pestic Phytomed.*, 29 (1): 67-74.
- Jahn C.G, Beardsley W.J, Gonzalez-Hernandez .H, 2003., A review of the association of ants with mealybug wilt disease of pineapple., *Proceeding of the Hawaiian entomological society.*, 36,9-28.
- Nagrare .V, kumar .R, Dharajothi .B, 2014. “A record of five mealybug species as minor pest of cotton in India”. *Journal of entomology and zoology studies.* ,(4):110-114.
- Penny J.G, Melinda L.M., Leng M.C., 2013.” A new species of Mealybugs (Hemiptera:Pseudococcidae)from critically Endangered *Banksia montana* in western Australia., *Records of the western Australian museum.*, 28: 13-20
- Pung jun zhang, Huang . F, Binlu Y. 2015., “ the mealybug *phenococcus solenopsis* suppresses plant defence response by manipulating JA-SA crosstalk”., *nature* 9354(5).
- Rabou S.A., Shalaby . H, Germain J.F., Ris N, Kreiter .P, Malausa.T., 2012,” identification of mealybug pest species (Hemiptera:Pseudococcidae)in Egypt and France, using a DNA barcoding approach., *bulletin of Entomological Research.*, 102: 515-523.
- Ulasli .B.T, Kaydon M.B, Musta. M, Vlusoy.M.R., 2016., “Development and life table parameters of *Phenococcus madeirensis* Green (Hemiptera: Pseudococcidae) on four ornamental plants”., *Neotropical entomology.*, 45(4).
- Vitor.p.da silva .C, Bertin .A, Blin.A, Germain J.F, Bernardi .D, Rignol. G, Botton .M, Malausa. T, 2014., “Molecular and morphological identification of mealybug species(Hemiptera:Pseudococcidae)in brazilian vineyards.,*PLoS ONE* 9(7):e103267.
- Vennila .S, Deshmukh AJ, Pinjarkar. D, Agarwal .M, Ramamurthy V.V, Josh .S, Kranthi K.R, Bambawale O.M., 2020” *Biology of the mealybug, Phenacoccus solenopsis* on cotton in the laboratory., *Journal of Insect Science.* 115(10)
- William. D.J., 1998” The mealybug genus *Rastrococcus ferris*( Hemiptera: Pseudococcidae., *systematic Entamology.*, 14-433-486.

