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Morphological Study on Third Instar Nymph of *Aleyrolobus barodensis* Mask. (Homoptera: Aleyrodidae)

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Abstract: In this study a detailed morphological description of third instar nymph of *Aleyrolobus barodensis* Mask. has been performed. The colour of the third instar nymph of *Aleyrolobus barodensis* is dark brownish yellow in living conditions. The body shape is elongated to ovoidal, broadest at ligular region. The range of length of the body of the third instar nymph of *Aleyrolobus barodensis* Mask. was 1.75 to 2.04 mm and the range of width of the body was 0.45 to 0.98 mm. The average numbers of anterior and posterior submarginal setae were 2 to 3 pairs and 1 to 2 pairs, respectively. The range of length of the anterior submarginal setae is 0.026 to 0.086 mm, while, posterior submarginal setae is 0.035 to 0.045 mm long. The body is divided into head, thorax and abdomen. The average length of the head of the third instar nymph is 0.12 to 0.17 mm and width is 0.18 to 0.29 mm. The average length of the thorax of the third instar nymph is 0.31 to 0.33 mm and width is 0.39 to 0.42 mm. The thorax is three segmented and segments are separated by each other by complete distinct suture. Each thoracic segment bears a pair of legs. Each leg seems one segmented and without spine. First segment of the mesothorax bears one pair of submedian setae. The range of length of the setae is 0.055 to 0.075 mm. One pair of thoracic tracheal pores is present and quite distinct than that of the second instar nymph but their location is same. The range of length of the abdomen of the third instar nymph of *Aleyrolobus barodensis* Mask. is 0.65 to 0.89 mm and the range of width of the abdomen is 0.25 to 0.48 mm. The broadest part of the abdomen is in the fourth abdominal segment. The suture in between first and second and second and third are incomplete like that of the second instar, however, sutures in between third and fourth, fourth and fifth and fifth and sixth are very distinct but the suture between sixth and seventh are not so distinct. Segment seventh and eight bears one pair of submarginal setae and its range of length is 0.036 to 0.048 mm. The size of abdomen starts decreasing from fifth abdominal segment to posterior. The dorsum of each abdominal segment (third, fourth, fifth and sixth) bears a pair of posterior submedian setae. On the ventral side of the margin of abdominal segment, caudal furrow is developed. Vasiform orifice is roughly triangular and its range of length is 0.09 to 0.11 mm. Operculum and ligula both are markedly developed than that of the second instar nymph. Operculum is subcircular in shape and ligula is exposed. The range of length of the operculum and ligula are 0.06 to 0.09 mm and 0.05 to 0.07 mm, respectively.

Keywords: *Aleyrolobus barodensis*, Morphology, Third instar, Nymph

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Introduction

Aleyrolobus barodensis Mask. belongs to the family Aleyrodidae and it is commonly known as white fly. This species is considerable pest of sugarcane but it also infests Jwar, Bajra, Maize and Wheat etc. It is distributed in almost all states of India. The biology of this species in detail has not been studied so far. Takahashi and Mament (1962), Martin (2007) and Hazarika *et al.* (2011) studied this species only for taxonomical purpose. Both adult and nymph *Aleyrolobus barodensis* Mask. suck the sap from under surface of the leaf of the sugarcane plants. The present study was aimed to investigate the biology of *Aleyrolobus barodensis* which would be helpful for planning of pest control.

Materials and Methods

The present study was performed at Department of Zoology, J.S. University, Shikohabad, India from October 2020 to January 2022. Periodical observations on the mating behaviour and egg laying time of white fly were done in natural conditions on the plants. The material including third instar nymph of *Aleyrolobus barodensis* Mask. was collected from host plants' leaves with the help of a sharp horticultural budding knife or shear. The shaved material was kept in tight closed cellophane bags to minimize desiccation. Specimens for microscopy were removed from host plant leaves and preserved in either 70% alcohol or dry preserved or preserved in conserving fluid.

For counting the eggs of the gravid female, permanent slides from the collected preserved material containing different stages of lifecycle were prepared with the aid of binocular microscope according to the method described by Williams and Kosztarab (1970).

Results and Discussion

The colour of the third instar nymph of *Aleyrolobus barodensis* is dark brownish yellow in living conditions. The body shape is elongated to ovoidal, broadest at ligular region (Fig. 1). The range of length of the body of the third instar

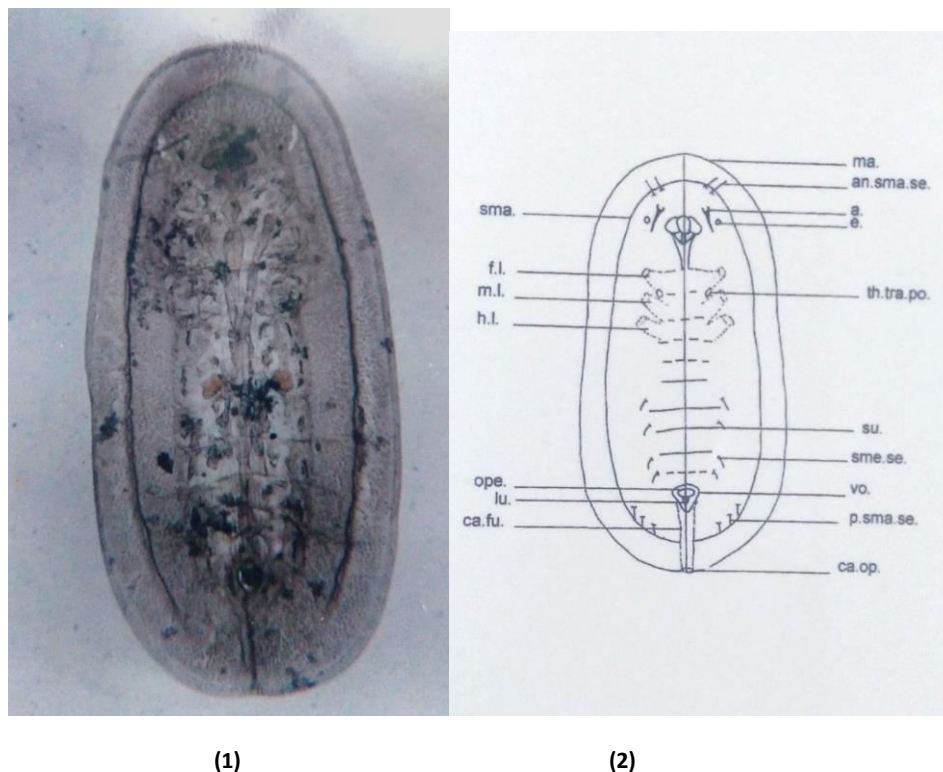
nymph of *Aleyrolobus barodensis* Mask. was 1.75 to 2.04 mm and the range of width of the body was 0.45 to 0.98 mm. The length was nearly 2.4 times than the width. The margin was smooth. The average numbers of anterior and posterior submarginal setae were 2 to 3 pairs and 1 to 2 pairs, respectively (Fig. 2). The range of length of the anterior submarginal setae is 0.026 to 0.086 mm, while, posterior submarginal setae is 0.035 to 0.045 mm long.

The body is divided into head, thorax and abdomen.

Head: The average length of the head of the third instar nymph is 0.12 to 0.17 mm and width is 0.18 to 0.29 mm.

Thorax: The average length of the thorax of the third instar nymph is 0.31 to 0.33 mm and width is 0.39 to 0.42 mm. The thorax is three segmented and segments are separated by each other by complete distinct suture. Each thoracic segment bears a pair of legs which are distinct than the legs of the second instar nymph. Each leg seems one segmented and without spine (Fig. 2). First segment of the mesothorax bears one pair of submedian setae. The range of length of the setae is 0.055 to 0.075 mm. One pair of thoracic tracheal pores is present (Fig. 2) and quite distinct than that of the second instar nymph but their location is same.

Abdomen: The range of length of the abdomen of the third instar nymph of *Aleyrolobus barodensis* Mask. is 0.65 to 0.89 mm and the range of width of the abdomen is 0.25 to 0.48 mm. The broadest part of the abdomen is in the fourth abdominal segment. The suture in between first and second and second and third are incomplete like that of the second instar, however, sutures in between third and fourth, fourth and fifth and fifth and sixth are very distinct but the suture between sixth and seventh are not so distinct. Segment seventh and eighth bears one pair of submarginal setae and its range of length is 0.036 to 0.048 mm. The size of abdomen starts decreasing from fifth



Figs. 1, 2: Third instar nymph of *Aleyrolobus barodensis* Mask. (a= antenna, an.sma.se.= anterior submarginal setae, ca.fu.= caudal furrow, ca.op.= caudal opening, e.(eye), f.l.= fore leg, h.l.= hind leg, lu.=ligula, ma.=margin, m.l.= mid leg, ope.=operculum, p.sma.se.= posterior submarginal setae, sma.= submargin, sme.se.= submedian setae, su.=suture, th.tr.a.po.= thoracic tracheal pore, vo.=vasiform orifice).

abdominal segment to posterior. The dorsum of each abdominal segment (third, fourth, fifth and sixth) bears a pair of posterior submedian setae. On the ventral side of the margin of abdominal segment, caudal furrow is developed (Fig. 2). Vasiform orifice is roughly triangular and its range of length is 0.09 to 0.11 mm. Operculum and ligula both are markedly developed than that of the second instar nymph. Operculum is subcircular in shape and ligula is exposed. The range of length of the operculum and ligula are 0.06 to 0.09 mm and 0.05 to 0.07 mm, respectively.

The third instar nymph of *Bemisia tabaci* (Gennadius) has been reported as greenish yellow to dark yellow in colour (Patel and Srivastava, 1989). The third instar nymphs of *Agrostaleyrodes arcanus* (Ko *et al.*, 2001) and *Lipaleyrodes emiliae* (Chen and Ko, 2006) have been reported as pale yellow in colour. In the present study the third instar nymph of *Aleyrolobus barodensis* Mask. has

been noticed as dark brownish yellow in colour.

Patel and Srivastava (1989) reported the shape of the body of the third instar nymph of *Bemisia tabaci* (Gennadius) as oval. Ko *et al.* (2001) noted the shape of the body of the third instar nymph of *Agrostaleyrodes arcanus* as elongated. Chen and Ko (2006) reported the shape of the body of the third instar nymph of *Lipaleyrodes emiliae* as elongated to ovoid which is similar to the observations of present study as in third instar nymph of *Aleyrolobus barodensis* Mask. the body is also ovoid.

The range of length of the body of the third instar nymph of *Bemisia tabaci* (Gennadius) (Patel and Srivastava, 1989) was 0.425 to 0.575 mm and the range of width was 0.275 to 0.375 mm, however, the range of length of the body of the third instar nymph of *Parabemisia myricae* (Kuwana) and *Dialeurodes citri* (Ashmead) (Uygun *et al.*, 1990) was found to be 0.56 to 0.65 mm and

0.65 to 0.79 mm, and the range of width was 0.38 to 0.46 mm and 0.46 to 0.54 mm respectively. The range of length of the body of the third instar nymph of *Agrostaleyrodes arcanus* (Ko *et al.*, 2001) was 0.98 to 1.12 mm and the range of width was 0.24 to 0.31 mm, however, the length of the body of the third instar nymph of *Lipaleyrodes emiliae* (Chen and Ko, 2006) was 1.43 times as long as wide as 0.46 to 0.32 mm. The range of length of the body of the third instar nymph of *Aleyrolobus barodensis* Mask. is 1.75 to 2.04 mm and the range of width is 0.45 to 0.98 mm.

Ko *et al.* (2001) reported the margin of the third instar nymph of *Agrostaleyrodes arcanus* irregularly crenulated, however, Chen and Ko (2006) noticed the margin of the third instar nymph of *Lipaleyrodes emiliae* as crenulate. In this study the margin of the third instar nymph of *Aleyrolobus barodensis* Mask. has been noticed as smooth.

Patel and Srivastava (1989) reported one pair of caudal setae in the third instar nymph of *Bemisia tabaci* (Gennadius), however, Ko *et al.* (2001) noticed anterior, posterior marginal setae, cephalic setae, hind thoracic setae and caudal setae in the third instar nymph of *Agrostaleyrodes arcanus*. Chen and Ko (2006) observed one pair of anterior and posterior marginal setae, 2 pairs dorsal setae, cephalic and caudal setae in the third instar nymph of *Lipaleyrodes emiliae*. In the present study there are 1 to 3 pairs anterior, 1 to 2 pairs posterior submarginal and one pair of submedian setae in the third instar nymph of *Aleyrolobus barodensis* Mask.

Ko *et al.* (2001) observed cephalothoracic sutures short, turned slightly forward, reaching subdorsal area in the third instar nymph of *Agrostaleyrodes arcanus* whereas Chen and Ko (2006) reported abdominal sutures ending on subdorsum in the third instar nymph of *Lipaleyrodes emiliae*. In this study there are present five abdominal sutures in the third instar nymph of *Aleyrolobus barodensis* Mask.

Ko *et al.* (2001) reported that in the third

instar nymph of *Agrostaleyrodes arcanus* vasiform orifice was subtriangular which is 55 to 60 μ m long and 45 to 50 μ m width. In the third instar nymph of *Lipaleyrodes emiliae* (Chen and Ko, 2006), vasiform orifice was triangular to trapezoidal, wider than long, 49 μ m long and 52 μ m wide, operculum semicircular, 1.61 times as wide as long (26 to 42 μ m), truncate at hind margin, occupying about half of vasiform orifice, ligula exposed, 59 μ m long, almost enclosed in vasiform orifice, except a small part of posterior end exposed outside, awl-shaped, slightly tapering and spinulose. In the third instar nymph of *Aleyrolobus barodensis* Mask. vasiform orifice is triangular, the range of length is 0.09 to 0.11 mm, operculum and ligula both are markedly developed, the range of length are 0.06 to 0.09 mm and 0.05 to 0.07 mm, respectively.

References

- Chun-Hung C and Chiun-Cheng K. (2006) *Lipaleyrodes emiliae*, a new species of whitefly (Hemiptera : Aleyrodidae) from Taiwan and Hong Kong. *Zootaxa* 1331: 31-54.
- Hazarika S, Ganeshamurthy AN and Sakthivel T. (2011) Long-term management effects on spatial variability of quality characteristics of soils under guava (*Psidium guajava*) and sapota (*Manilkara achras*) orchards in south-western climate of India. *Indian J Agricult Sci.* 81(2): 119-124.
- Ko Chiun-Cheng, Chou-Liang Yih and Wen-Jer W. (2001) *Agrostaleyrodes arcanus*, a new genus and species of whitefly (Homoptera : Aleyrodidae) from Taiwan. *Zool Stud.* 40: 177-186.
- Martin JH. (2007) Giant whiteflies (Sternorrhyncha, Aleyrodidae): a discussion of their taxonomic and evolutionary significance, with the description of a new species of *Udamoselis* Enderlein from Ecuador. *Tijdschrift Entomologie* 150: 13-29.
- Patel MB and Srivastava KP. (1989) Biology of insect vector, *Bemisia tabaci* (Gennadius) (Homoptera: Aleyrodidae) on Cowpea, *Vigna unguiculata* (Linnaeus) Walpers. *Bull Ent.* 30(1): 99-109.
- Takahashi R and Mament R. (1962) Two new genera and species of Aleyrodidae from Madagascar (Homoptera). *Proc Royal Soc London B Entomol.* 31: 100-102.
- Uygun N, Ohnesorge-B and Ulusoy R. (1990) Two species of whitefly on citrus in eastern

Mediterranean: *Parabemisia myricae* (Kuwana) and *Dialeurodes citri* (Ashmead). Morphology, biology, host plants and control in southern Turkey. J Appl Entomol. 110(4): 471-482.

Williams ML and Kasztarab mp. (1970) A morphological

and systematic study of the first instar nymphs of the genus *Lecanodiaspis* (Homoptera: Coccoidea: Lecanodiaspididae). Bull Virginia Polytech Institute State University Res Div. 52: 1-96.