

THE MORPHOLOGICAL STUDY ON FIRST INSTAR NYMPH OF ALEYROLOBUS BARODENSIS, MASK. (HOMOPTERA: ALEYRODIDAE)

Dr. Anju Singh, Dr. Shiv Dutta

¹J.S.University, Shikohabad
²Rettd. Head N.D.College, Shikohabad

ABSTRACT

A detailed morphological description of first instar nymph of *Aleyrolobus barodensis*, Mask.

Keywords: *Aleyrolobus barodensis*, Morphology, Shikohabad.

INTRODUCTION

Aleyrolobus barodensis, Mask. Is belonging to the family Aleyrodidae and commonly known as sugarcane whitefly. The adults of this species are usually active and whitish in colour. Insects belonging to this family are active, live on the underside of leaves and cause damage by sucking the plant sap, acting as vectors of viral disease and production of honey dew leading to the development of moulds on leaves, thus adversely affecting photosynthesis. The biology of this species in the detail has not been study so far. Takahashi and Mament 1962; Martin2007; and Hazarika et. al. 2011; unfortunaly studied this species taxonomical purpose only. *Aleyrolobus barodensis*, Mask. The present study would be helpful to understand the biology of past and also for planning of pest control.

MATERIALS AND METHODS

The investigation work is carried out in zoology department at J.S.University, Shikohabad from October 2020 to January 2022. Periodical observations on the mating behaviour and egg laying time 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 colophone bags to minimize dessication. 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 of 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).

OBSERVATIONS

COLOUR: colour light yellow and black in later stage. **SHAPE:** The body shape broadly elliptical (Fig. 1).

MESUREMENT AND SUBMARGINAL SETAE: The range of length of the body of the first instar nymph of *Aleyrolobus barodensis*, Mask. Was 0.39 to 0.52mm and the range of width of the head in the middle of wing process region was 0.45 to 0.66mm. The margin was smooth. The average numbers of anterior and posterior submarginal setae were 3 to 4 pairs and 2 to 3 pairs (Fig. 2).

Segmentation of body: body is divided into head, thorax and abdomen.

HEAD: The average length of the head of the first instar nymph 0.39 to 0.52mm and the range of breadth of the head in the middle of wing process region was 0.45 to 0.66mm. Head bear on both right and left side wing like process which increase the jumping activity of the nymph, so that it can reach to get suitable place for attachment to the host leaf. The head bears one pair of antennae, one pair of compound eye, piercing and sucking type mouth parts (Fig. 2) and a pair of sensory setae in the wing process region. Each antenna is elongated and its range of length was 0.03 to 0.06mm. Each eye is looked in the form of brownish eye spot, located on the inner of antenna. **THORAX:** The average length of the thorax of the first instar nymph of *Aleyrolobus barodensis*, Mask. was 0.45 to 0.55mm and the range of width of the thorax was 0.19 to 0.22mm. The thorax is three segmented, clearly visible from dorsal side as it is separated by incomplete suture. Each segment bears a pair of legs. Each leg is two segmented with curved clearly visible spine (Fig. 2). Three segments of the thorax are nearly of equal in size. On the ventral side of the mesothorax one pair of the thoracic tracheal pores are present. Each trachea is located in between the first and second pair of the leg at the posterior margin of the first thoracic segmented (Fig. 2). Setae are present at the base of mid and hind legs.

ABDOMEN: The average of length of the abdomen of the first instar nymph of *Aleyrolobus barodensis*, Mask. was 0.48 to 0.69mm and the average of width of the abdomen in the broadest part of the abdomen in between third and fourth abdominal segment was 0.19 to 0.28mm. The width of the abdomen after the fourth segment is narrowing successively posterior words. On each ventral side of the margin of each abdominal segment, a caudal furrow is roughly developed and not reaching up to the margin (Fig. 2). Posterior abdominal pair of spiracles is very distinct. The abdominal sutures between the segments first and second, second and third are not clearly visible, however, sutures present in between segment third and fourth, fourth and fifth are quite distinct. The sutures between segments six and seventh, seventh and eight are also present but not so distinct as the suture between the third and fourth, fourth and fifth segments. Segment eight is longest and its range of length is 0.21 to 0.34mm. Segment seventh is much reduced. The vasiform orifice is roughly triangular narrowing posterior words (Fig. 2). The range of length of vasiform orifice was 0.08 to 0.09mm. Operculum is nearly subcircular in shape and its range of length was 0.03 to 0.06mm. Ligula is exposed and its range of length was 0.02 to 0.03mm and its posterior end is semicircular.

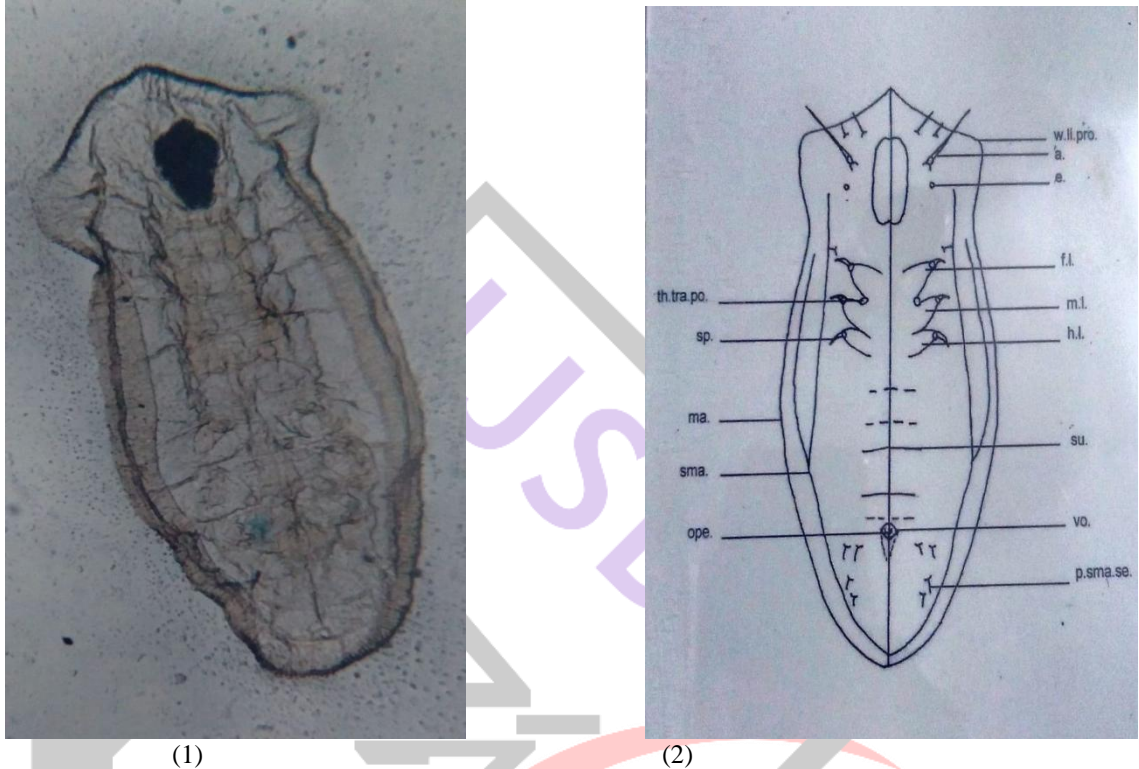


Fig. 1, 2 showing first instar nymph of *Aleyrolobus barodensis*, Mask.

a.(antenna), e.(eye), f.l.(fore leg), h.l.(hind leg), ma.(margin), m.l.(mid leg), ope.(operculum), p.sma.se.(posterior submarginal setae), s sp.(spine), sma.(submargin), su.(suture), th.tra.po.(thoracic tracheal pore), vo.(vasiform orifice), w.li.pro.(wing like process)

RESULT AND DISCUSSION

The colour of the body of the first instar nymph of *Aleyrolobus barodensis*, Mask. is light yellow like that of *Bemisia tabaci* (Gennadius) (Patel and Srivastava, 1989) as reported in this species by numerous authors Azad et al. (1971), Bhardwaj and Kushwaha (1984), Mohanty and Basu (1987) and Hendi et al. (1992), while, in the colour of the body of the first instar nymph of *Agrostaleyrodes arcanus* (Ko et al., 2001) was light green to yellow, however, in the colour of the body of the first instar nymph of *Lipaleyrodes emiliae* (Chen and Ko, 2006) was pale to yellowish.

The shape of the body of the first instar nymph of *Aleyrolobus barodensis*, Mask. is elliptical like that of *Bemisia tabaci* (Gennadius) as noted in this species by numerous authors Pruthi and Samuel (1942), Bhardwaj and Kushwaha (1984), Pimpale and Summanwar (1984), Patel and Srivastava (1989), and Zanic et al. (2001), while, in *Agrostaleyrodes arcanus* (Ko et al., 2001) the shape of the body of the first instar nymph was outline elongated, however, in the shape of the body of first instar nymph of *Lipaleyrodes emiliae* (Chen and Ko, 2006) was elongated to ovoid and broadest at mesothorax.

The length of the body of the first instar nymph of *Bemisia tabaci* (Gennadius) (Patel and Srivastava, 1989) ranged from 0.238 to 0.275mm and width average from 0.125 to 0.163mm, however, the average of length of the body of the first instar nymph of *Parabemisia myricae* (Kuwana) and *Dialeurodes citri* (Ashmead) (Uygun et al., 1990) was 0.25 to 0.31mm and 0.25 to 0.33mm, the range of width was 0.17 to 0.20mm and 0.19 to 0.23mm respectively, while, the length of the body of the first instar nymph of *Agrostaleyrodes arcanus* (Ko et al., 2001) ranged from 0.35 to 0.38mm and the width average from 0.10 to 0.12mm, however, the

length of the body of the first instar nymph of *Lipaleyrodes emiliae* (Chen and Ko, 2006) was 1.69 times as long as width at 0.23 to 0.14mm, while, the average of length of the body of the first instar nymph of *Aleyrolobus barodensis*, Mask. is 1.1 to 1.6mm and the range of width is 0.32 to 0.65mm.

Ko et al. (2001) reported the margin of the first instar nymph of whitefly, *Agrostaleyrodes arcanus* smooth like that of *Aleyrolobus barodensis*, Mask., while, Chen and Ko (2006) described the margin of the first instar nymph of whitefly, *Lipaleyrodes emiliae* crenulate.

Anterior and posterior marginal setae in *Bemisia tabaci* (Gennadius) (Patel and Srivastava, 1989) were 16 pairs, while, anterior and posterior marginal setae in *Agrostaleyrodes arcanus* (Ko et al., 2001) and in *Lipaleyrodes emiliae* (Chen and Ko, 2006) were present in both species respectively, however, in *Aleyrolobus barodensis*, Mask. the anterior and posterior submarginal setae are 3 to 4 pairs and 2 to 3 pairs respectively.

Ko et al. (2001) showed only presence of eye spots in first instar nymph of whitefly, *Agrostaleyrodes arcanus*, while, Patel and Srivastava (1989), Gerling and Mayer (1995) reported to bright red eyes spots in the first instar nymph of *Bemisia tabaci* (Gennadius), however, in the first nymph of *Aleyrolobus barodensis*, Mask. the eye spots are distinct and brownish in color. The three segmented legs of the first instar nymph of *Lipaleyrodes emiliae* noted by Chen and Ko (2006), while, in *Aleyrolobus barodensis*, Mask. the legs of the first instar nymph are two segmented.

Ko et al. (2001) and Chen and Ko (2006) not reported the trachea in the first instar nymph of *Agrostaleyrodes arcanus* and *Lipaleyrodes emiliae* in both respective species, while, in the first instar nymph of *Aleyrolobus barodensis*, Mask. one pair of thoracic tracheal pores are present.

Four to seven sutures on abdomen normally visible in the first instar nymph of *Agrostaleyrodes arcanus* (Ko et al., 2001), while, abdominal sutures in the first instar nymph of *Lipaleyrodes emiliae* (Chen and Ko, 2006) were also present, however, in the first instar nymph of *Aleyrolobus barodensis*, Mask. four abdominal sutures are present.

The vasiform orifice reported in the first instar nymph of *Agrostaleyrodes arcanus* (Ko et al., 2001) roughly triangular acutely curved posteriorly, 25 to 35 μ m length, 30 to 35 μ m width, ligula not extending beyond operculum, included in vasiform orifice, while, in the first instar nymph of *Lipaleyrodes emiliae* (Chen and Ko, 2006) the vasiform orifice reported triangular to trapezoidal, posterior margin poorly defined, with lateral teeth on both sides, little longer than width at 70 to 63 μ m, ligula exposed almost included with in vasiform orifice except for the slightly tapering, exposed spinulose apex, however, in the first instar nymph of *Aleyrolobus barodensis*, Mask. the vasiform orifice is roughly triangular narrowing posterior words, the range of length is 0.08 to 0.09mm, ligula is exposed, operculum is subcircular shape in the first instar nymph of *Aleyrolobus barodensis*, Mask., while, dumbbell shaped in the first instar nymph of *Lipaleyrodes emiliae* (Chen and Ko, 2006).

REFERENCES

1. Azad,A.K.; Megahad,M.M. and Ei-Mirsawi,D.H. 1971 On the biology of *Bemisia tabaci* (Gennadius) (Homoptera : Aleyrodidae). *Bulletin of the Entomological Society of Egypt*. V. 55; P. 305-315.
2. Bhardwaj,S.C. and Kushwaha,K.S. 1984 Whitefly, *Bemisia tabaci* (Gennadius) (Homoptera : Aleyrodidae) infesting tomato in Rajsthan. *Bull. Ent.* V. 25(1); P. 76-97.
3. Chun-Hung Chen and Chiun-Cheng Ko 2006 *Lipaleyrodes emiliae*, a new species of whitefly (Hemiptera : Aleyrodidae) from Taiwan and Hong Kong. *Zootaxa 1331*. P. 31-54.
4. Gerling,A. and Mayer,R.T (Eds) 1995 *Bemisia* Taxonomy, biology, damage, control and management. *Andover, Intercept Ltd*. P. 692.
5. Hazarika S, Ganeshamurthy AN and Sakthivel T. 2011 long term management effects on spatial variability of quality Characteristics of soil under guava (*Psidium guajava*) and sapota (*Monilkara achras*) orchards in south-western climate of India. *Indian J. Agric.Sci* .81:119-24.
6. Hendi,A.; Abdel-Fattah,M.I. and Ei-sayed,A. 1992 Biological study on the whitefly, *Bemisia tabaci* (Gennadius) (Homoptera : Aleyrodidae). *Bulletin of the Entomological Society of Egypt*. V. 65; P. 101-108.
7. Ko Chiun-Cheng; Chou-Liang Yih and Wen-Jer Wu 2001 *Agrostaleyrodes arcanus*, a new genus and species of whitefly (Homoptera : Aleyrodidae) from Taiwan. *Zoological studies*. V. 40; P. 177-186.
8. Martin,J.H. 2007 Gaint whiteflies (sternorrhyncha, Aleyrodidae) a discussion of their taxonomic and evolutionary significance, with the description of a new species of *Udamoselis estrellamarinae* (Enderlein) from Ecuador. *Tijdschrift voor Entomologie*. V. 150; P. 13-19. Figs. 1-33. table 1. [ISSN 0040-7496]. 2007 Nederlandse Entomologische Vereniging, Published 1 June 2007.
9. Mohanty,A.K. and Basu,A.N. 1987 Biology of the whitefly vector *Bemisia tabaci* (Gennadius) on four host plants throughout the year. *Journal of Entomological Research*. V. 11 (1); P. 15-18.
10. Patel,M.B. and K.P.Srivastava 1989 Biology of insect vector, *Bemisia tabaci* (Gennadius) (Homoptera : Aleyrodidae) on Cowpea, *Vigna unguiculata* (Linnaeus) Walpers. *Bull. Ent.* V. 30(1); P. 99-109.

11. Pimpale,T.D. and Summanwar,A.S. 1984 Studies on different stages in the life cycle and Influence of season on the duration of different generation of whitefly, *Bemisia tabaci* (Gennadius). *Pestology*. V. 8(12); P. 15-19.
12. Pruthi,H.S. and Samuel,C.K. 1942 Entomological investigations on the leaf curl disease of tobacco in northern India. V. Biology and population of the whitefly vector *Bemisia tabaci* (Gennadius) in relation to the incidence of the disease. *Indian J. Agric. Sci.* V. 12; P. 35-37.
13. Takahashi,R. and Mament,R. 1962 Two new genera and species of Aleyrodidae from Madagascar (Homoptera). *Proceedings of the Royal Society of London. Series B, Entomology*. V. 31; P. 100-102.
14. 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. *Journal-of-Applied-Entomology*. V. 110 (4); P. 471-482.
15. Williams,L.N. and Kasztarab 1970 Morphology and systematics of scale insects No.2 A morphological and systematic study on the first instar nymph of the genus *Lecanodiaspis* (Homoptera : Coccoidea : Lecanodiaspididae). *Rev. div. Bull. 52 Virginia Polytechnic Inst. Blackaburg*. V.(1); P. 96.
16. Zanic-K ; Kacic-S and Katalinic-M 2001 Tobacco whitefly, *Bemisia tabaci* (Gennadius, 1889). (Homoptera : Aleyrodidae) in Croatia. *Entomologia-Croatica*. V. 5(1-2); P. 51-63.

