First report of aphid, *Astegopteryx bambusae* (Buckton) (Aphididae: Hemiptera) on Bamboo (*Dendrocalamus strictus*) from Gujarat, India

ABSTRACT

Survey was conducted on Bamboo, *Dendrocalamus strictus* (Roxb.) Nees during November, 2023 at C. P. College of Agriculture, S. D. Agricultural University, Sardarkrushinagar, Gujarat. During survey we noticed Aphid, *Astegopteryx bambusae* (Buckton) infesting bamboo plantation. Damage is caused by sucking sap and upper side of infested leaves were covered with sticky exude. Adult female was apterous, broadly pear shaped, small in size and yellowish green or pale green in colour. Based on morphological and molecular characterization, the pest is identified as *Astegopteryx bambusae* (Buckton) and it is the first confirmed report of occurrence of new pest in Bamboo plantation of Gujarat, India.

Keywords: *Astegopteryx bambusae*, *Dendrocalamus strictus*, Gujarat

1. INTRODUCTION

Bamboo*, Dendrocalamus strictus* (Roxb.) Nees is part of the Bambusoideae; Poaceae family which grows in many parts of the globe. Bamboo is naturally distributed on all continents except Europe and Antarctica and is dominant in tropical and subtropical regions, especially in eastern and southern Asia and South and Central America (Ohrnberger, 1999; Jiang *et al*., 2007). There are a total of 1642 bamboo species belonging to 123 genera worldwide according to the *World Checklist of Bamboos and Rattans* (Vorontsova *et al*., 2016). In terms of the whole bamboo community, India is the second-largest cultivars of bamboo species, with 160 species, after China. Of the 25 districts in Gujarat, bamboo forests are located in 13 districts. However, the major concentration of bamboos is in the southern districts of Valsad, Dangs, Surat and Narmada. The use of bamboo stem is wide and its major quantity is utilized as raw material for housing, utensils, agricultural applications, handicraft items, packing materials, paper and pulp industry, etc. Therefore, commonly, bamboo described as “friend of people”, “poor man’s timber”, “green gasoline” and “the cradle to coffin timber” (Singh 2008). In 2021, the share of bamboo increased and the estimated size of the market was 57.86 billion dollars. With the increasing share and contribution of bamboo, the estimated compound interest of the annual growth rate is 5.7%. This rising rate declares bamboo share as a “fast-growing market”.

Bamboo in India suffer from insect damage, right from the seed to the finished products. More than 800 insect species on bamboo have been recorded from Asian countries (Wang *et al*.,1998). Many insect pests including borers, defoliators, culm and shoot borers and sapsuckers attack the plants and hamper the growth and production. Among them, Bamboo aphid is most destructive pest. Bamboo aphid, *A. bambusae* belongs to the Order: Homoptera Family: Aphididae, are small aphids with well-developed frontal horns and segmentally arranged wax glands, forming large colonies on the leaves. *A. bambusae* was found infesting *D. strictus* throughout the year.

2. MATERIALS AND METHODS

During the survey at Sardarkrushinagar, Bamboo plantation showed distinguished damage symptoms. The infested leaves were covered with oily exude. As the aphid observed were different from known aphid species, they were brought to the laboratory of Department of Entomology, C. P. College of Agriculture, S. D. Agricultural University, Sardarkrushinagar for detailed observation. The morphological characters of specimens were examined under the SMZ800N microscope. Several specimens were transferred into glass vial containing 70% ethyl alcohol to preserve samples. The

collected specimens were sent to the National Bureau of Agricultural Insect Resources, Bengaluru for the identification and confirmation of the species.

Molecular characterization study was conducted at Department of Entomology, C. P. College of Agriculture, Sardarkrushinagar. The collected samples were preserved in a solution containing 100 per cent ethanol at -20 ºC. The analysis used was *mtCO1* (Mitochondrially Encoded Cytochrome Oxidase subunit I). Adult aphid was used for DNA extraction. The DNA of aphid was extracted by using the D Neasy blood and tissue extraction kit (QIAGEN). Amplification was carried out using *mtCO1* forward primer, LCO1490F (5' GGTCAACAAATCATAAAGATATTGG-3') and reverse primer, HCO2198R (5' TAAACTTCAGGGTGACCAAAAAATCA-3'). The amplification of DNA was then checked by running the samples on 1 per cent agarose gel using 100 bp with 1 kb DNA ladder and visualized in gel documentary system. The amplified products were then sent to commercial sequencing at SLS Research Pvt Ltd., Surat. The most commonly used method of DNA sequencing is the sanger dideoxy method or chain termination method. The amplified products of COI gene were sequenced at SLS Research Pvt Ltd., Surat. The COI gene sequence data was retrieved in the form of chromatograms. Chromatograms were edited to discard ambiguous bases and edited sequences were aligned by using the Basic Local Alignment Search Tool (BLAST), with the sequences of same or related genera retrieved from the nucleotide database (PUBMED) of National Centre for Biotechnology Information (NCBI). The sequenced data was submitted to NCBI and accession numbers were obtained.

3. RESULTS AND DISCUSSION

3.1 Morphological characters

Adult female was apterous, broadly pear shaped, small in size and yellowish green or pale green in colour. Antennae were very long, thread and pointed at the tip. They varying in markings, with one form having two dark green uninterrupted longitudinal stripes. Alternatively they may have two separate pairs of short green stripes, the first stripe runs from thorax to abdominal tergite I and the second from tergites V to VII. Head and pronotum fused forming cephalothorax that has few scantly arranged hairs. Thorax was narrow, wax is sometime present as a fringe at the margin of head and usually in tufts around the thorax and abdomen. Eyes small, black, having 3 facets. Cornicles were very small, pale placed on dark sclerotic cones surrounded by 8-10 long hairs (Fig. 1).

Fig 1: Bamboo aphid, *A. bambusae*

3.2 NATURE OF DAMAGE

During the observation, the infestation of *A. bambusae* was noticed on bamboo in the month of November 2023 to March 2024. Bamboo aphid cause damage mainly to the leaves. Colonies of light green to yellowish green and broadly pear shaped aphids were observed on the underside of leaf blades of *D. strictus* plants. Both adults and nymphs suck the cell sap from the lower surface of bamboo leaves and tender shoots in young plantations. Upper side of infested leaves were covered with sticky substance (Fig. 2 and 3).The honeydew produced is deposited on the bamboo leaves which encourages the growth of sooty moulds. The infested leaf blades bore pale look and had dry streaks inside and on margins with dry lumpy patches that extended from center to the leaf margins or vice versa (Fig. 4). Adults and nymphs fed gregariously on the lower surface of the leaves.

Fig 2: Aphid infested leaves

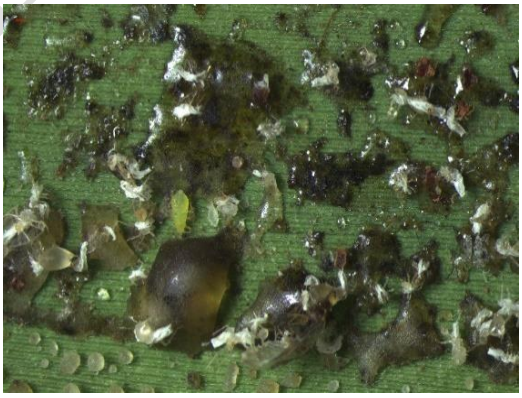

Fig 3: Leaves covered with sticky exclude

Fig 4: Aphid infested bamboo plant

3.3 MOLECULAR CHARACTERIZATION

The aphid population showed high similarity with the database sequences of *A. bambusae* (Accession No. PP869062) from NCBI Genbank.

***Astegopteryx bambusae* COI gene sequence**

AAATAAATGTTGATATAAAATAGGATCTCCACCACCAGAAGGATCAAAAAAAGATGTATTTAAATTTCGATCTGTT
AATAATATTGTAATAGCACCAGCTAAAATTGGTAATGATAATATTAATAAAATTGCTGTAATTAAGATAGATCATGG
AAATAATGAAATTTGATTAAATTTTATATTTATAGGTATTATATTTAAAATTGTGCAAATAAAATTAATAGCTCCTAGA
ATTGATGAAATTCCAGCTAAATGAAGAGAAAAAATAGTTAAATCTACAGAAATATTATTATGAGCAATATTATGTG
ATAAAGGTGGATAAATAGTTCATCCTGTTCCTGTACCATTATTAATTATAAATCTTAAAATTATTATTATTAATGAGG
GTGGTAATATTCAAAATCTAATATTATTTAATCGTGGGAAAGATATATCAGGAGATCCTATTATTAAAGGAATTAAT
CAATTTCCAAATCCTCCAATTACAATTGGTATAGTTATAAAAAAAATTATGATAAAAGCATGAATTGTAACAATTAC
ATTATATAATTGATTATTATTAATAATAGAATTAATTTGTCTTAATTCTAAACGAATTAAAATTCTTAAAGAAGATCCT
AATATTCCTGATCAGATTCCAAAAATAAAATAAAGAGTT

4. DISCUSSION

Astegopteryx bambusae (Buckton), although reported from Uttar Pradesh, India by Buckton (1893) as *Oregma bambusae* on *Bambusa arundinacea* L. It was also reported as a sucking pest of bamboo in Kerala. Aphid species, *Hysteroneura setariae* (Thomas) on *D. stocksii*, *Astegopteryx bambusae* (Buckton) on *D. strictus*, *Pseudoregma bambusicola* (Takahashi) on *B. pallida* and *Melanaphis bambusae* on *B. bambos* were recorded as sap sucking pests in South India by Revathi and Remadevi (2011). According to the past investigations, 20-80% of leaves in the different species of bamboo were found infested by different species of bamboo aphid.

5. CONCLUSION

Based on survey, bamboo aphid, *Astegopteryx bambusae* (Buckton) was seen to colonize bamboo leaves at C. P. College of Agriculture, S. D. Agricultural University, Sardarkrushinagar (District: Banaskantha) during November 2023 to March 2024.

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