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Report on the Occurrence of Cicada, *Platypleura octoguttata* (Hemiptera: Cicadidae) on Eucalyptus in Gujarat

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Original Research Article

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ABSTRACT

In order to determine the cicadas spotted on the Eucalyptus plants grown nearby to the college, Anand Agricultural University, Jabugam, between April and June 2022, an investigation was conducted. Adults were brought to the Department of Entomology lab at the College of Agriculture, Anand Agricultural University, Jabugam, for identification in addition to do further research. It is confirmed that the pest is cicadas on the Eucalyptus plant that have been reported from Gujarat, India, based on the morphological traits of the adults and DNA fingerprinting.

Keywords: DNA fingerprinting; eucalyptus plant; cicadae; shrubs.

1. INTRODUCTION

The genus Platypleura Amyot & Audinet-Serville, [1] (Order Hemiptera; Family Cicadidae; Subfamily Cicadinae; Tribe Platypleurini) contains a group of homopterous insects, of which the cicada is the most diverse. It is found throughout Africa [1], the Indian subcontinent [2],

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Southeast Asia [3-5], and East [6,3]. According to Sanborn [7], the genus contains 101 taxonomically distinct species worldwide, 21 of which have been found on the Indian subcontinent. India has the largest global diversity of cicadas in terms of generic diversity. Like many other insects in the area, the cicadas of the Indian subcontinent have not received enough research since the early 20th century [8].

Distant's description of over 100 cicada species that are found on the Indian subcontinent is now accepted as accurate. With 148 cicada species recognized in 44 genera, "The wildlife of British India, including Ceylon and Burma" [2] gave the first treatment of the region as a whole. There were 172 cicada species in 47 genera after this, according to an addendum [9], which identified an additional 24 species and three new genera for the area. The two described species of Mata kama [10], which was initially recorded from Darjeeling in West Bengal [2], and Mata rama [11], which was described from Bhutan, are both found in the India region [12]. Mata kama is distributed in India, Java, Malay states [13] and Nepal [14] and Mata rama is known only from Bhutan and China [12,8].

The cicadas are big insects that prefer different types of trees as hosts, but they have, also, caused damage to other woody plants when they emerge periodically. They naturally enjoy the sun [15,16]. The males typically make their calls in the morning sun from the highest branches of large trees. As the day wears on, they descend to the undergrowth and frequently make their calls from the little shrubs next to the stream [17]. Cicada "songs" can be heard whenever there are adults around, from early in the morning to late at night. The male cicadas are the ones who sing. The male cicadas' hollow abdomen acts as a resonating chamber and amplify the sound. The tymbal's sound it produced. A row of four flexible ribs is present on each tymbal [18,16]. A pulse of sound is produced as the cicadas flex his tymbals, causing the ribs to bend sequentially. There are no sound-producing organs in the female cicadas.

The cicadas (Hemiptera: Cicadidae) were observed in Gujarat between April and June 2022 at the Eucalyptus plants cultivated close to the College of Agriculture, Anand Agricultural University, Jabugam. Adults were brought for identification in the Department of Entomology laboratory at the College of Agriculture, Anand Agricultural University, Jabugam for further study. It is confirmed that the pest is cicadas, which are on Eucalyptus plants and have been reported from Gujarat, India, based on the morphological characteristics of the adults and DNA fingerprinting. According to search of the literature from the accessible sources, Gujarat's Eucalyptus plants infestation by cicadas has not been documented earlier.

2. METHODOLOGY

The molecular characterization of cicada was carried out to generate information on species authentication. The cicadae's specimens (10 No.) were collected from the infested Eucalyptus trees situated in experimental plot of College of Agriculture, Anand Agricultural University, Jabugam and preserved in 70% ethyl alcohol and stored at -20 ^{0}C until further use. Wings of the specimen were used to isolate genomic DNA of the specimen using DNA extraction kit (QIAGEN DNeasy blood and tissue kit, Germany) following the manufacturer's protocol. The extracted DNA was quantified using Nanodrop spectrophotometer. The concentration of DNA was ranged between 30-110 ng μl^{-1}**.** The good quality genomic DNA free from protein/RNA contamination was used for further analysis.

3. RESULTS AND DISCUSSION

The genomic DNA extracted from the specimen was subjected to PCR amplification of COXI (Cytochrome c oxidase subunit 1) gene following the standard protocol [19]. Primers used for amplification of COX1 gene were forward primer (LCO 1490 5'-GGTCAACAAATCATAAAGATATTGG-3') and reverse primer (HCO 2198 5'-TAAACTTCAGGGTGACCAAAAAATCA-3'). The amplified fragments of COXI gene were analyzed on 1.5 % agarose gel electrophoresis. The single amplicon of COXI gene of size 650 bp was visualized during the analysis. The PCR amplified products were purified by using QIAquick Gel Extraction kits to remove residual dNTPs, primers and salts. The purified PCR product was subjected to automated DNA sequencing on ABI 3500 Genetic analyzer (Applied Biosystem, USA). The PCR amplicons were sequenced bidirectionally. Forward and reverse sequences of COXI gene were assembled using BioEdit/clone manager software. Consensus sequence thus obtained was used for BLAST (Basic Local Alignment Search Tool) search in National Center for Biotechnology Information (NCBI).

The COXI generated consensus sequence of cicada found infesting eucalyptus tree has been deposited in NCBI Gen Bank database (NCBI accession no. **OP563725**).

Platypleura octoguttata cytochrome oxidase subunit I (COI) gene, partial cds; mitochondrial

TATTTCATTTTTGGTATTTGATCCGGGATAGT
TGGGACTGCATTAAGATTTTTAATTCGAATCG
AATTAGGAATACCTGGTTCTTTTATTGGAGAT
GATCAAATTTATAATGTGATTGTAACAGCTCA
TGCTTTTATTATAATCTTTTTTATAGTTATGCC
TATTATGATTGGGGGATTTGGGAATTGACTG
GTTCCCTTGATGATTGGTGCCCCTGACATGG
CATTCCCTCGTATAAATAATATAAGATTTTGA
CTTTTACCACCATCTTTAACACTTTTATTAATA
GGAAGAATAATTGATAGAGGGGCTGGAACTG
GATGAACTGTTTATCCTCCTTTATCAAGAGTT
ATATATCACTCTGGTTCTTGTGTTGACATAAC
TATTTTTTCTTTACATTTAGCAGGAGTTTCTTC
AATTTTAGGAGCTGTAAATTTCATTAGAACAA
TCTTCAATATACGATCCACAGGTATATTTTTG
GATCGAACACCTTTATTTGTATGGGCTGTTTT
AATTACAGCTTTTTTGTTATTGCTATCATTACC
TGTTTTAGCAGGTGCAATTACTATATTGCTTA
CGGATCGTAATTTAAATACATCTTTTTTTGAT
CCTGCAGGTGGGGGAGATCCAATTTTGTATC
AACATTTGTTTT

4. CONCLUSION

Based on the morphometric and supporting molecular analysis data, the cicada found infesting eucalyptus tree was identified as *Platypleura octoguttata.* This report appears to be the first report of natural occurrence of cicada, *Platypleura octoguttata* on eucalyptus in Gujarat, India.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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