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A NEW HOST RECORD FOR *LEPTOCENTRUS TAURUS* AND EXTENDED HOST RECORDS FOR *OXYCARACHIS TARANDUS*

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ABSTRACT

During August 2022, membracids were found on the aerial apical parts of amaltas (*Cassia fistula* L.) and cutch tree (*Acacia catechu* Willd). These were identified as *Oxyrachis tarandus* F. and *Leptocentrus taurus* F. (Hemiptera: Membracidae). These were observed to feed on the apical portions of stem, making them rough and woody and brown which gradually dried, and the apical leaves were shed off. This is the first report of *A. catechu* as a new host for *L. taurus* and *C. fistula* is an extended host for *O. tarandus*.

Key words: Amaltas, cutch, *Cassia fistula*, *Acacia catechu*, forest, Hemiptera, Membracidae, damage, mtCo1, *Leptocentrus taurus, Oxyrachis tarandus,* host records, New Delhi

India's forest cover accounts for approximately 21.71% of the nation's geographical area and combined forested areas represent roughly 2% of the world's forests (ISFR, 2021). India's forests are known for their rich diversity, housing over 500 tree species belonging to 244 genera and 67 families (Dhiman, 2021). Among the various tree species found in Indian forests, *Acacia catechu* Willd, a deciduous and gregarious tree, stands out for its economic significance; it plays a crucial role in agroforestry systems in India. The active compounds within *A. catechu*, such as catechin and epicatechin, serve important functions as anti-inflammatory and antioxidant agents. Tannins present in this tree are responsible for their astringent properties and have shown potential in wound healing (Sharma and Lingha, 2021). This tree offers a diverse range of valuable products, including timber and woody resources (Sundararaj, 2014). *Acacia* spp. have been severely impacted by pests such as the wattle bagworm, *Helopeltis* sp. and larvae of *Plusia* sp. (Sundararaj, 2014).

Cassia fistula L., a deciduous tree belonging to the Fabaceae family, is commonly known as Amaltas. It is extensively distributed across India, particularly in regions such as the Gangetic Valley, Central India, and South India. This tree is often planted for its attractive flowers along roadways and serves as a food source for wild animals. Medicinally, *C. fistula* offers a wide array of pharmacological properties and used in various forms, such as infusions, decoctions, or powders, either on its own or in combination with other medicinal plants (Nadeem et al., 2010; Chauhan et al., 2011). The present study explores the Membracidae occurring on these two forest trees viz., *A. catechu* and *C. fistula.*

MATERIALS AND METHODS

In an 8.25 ha *Acacia catechu* and 2 ha *Cassia fistula* forest area infested with tree hoppers, a systematic study was undertaken. Ten *A. catechu* and *C. fistula* plants were randomly selected and gathered insects were carefully placed in containers. The collected specimens were compared with reference samples and literature (Ikram et al., 2023). For molecular identification, samples were preserved in 70% ethanol and stored until DNA extraction. The DNA extraction process was executed using a modified version of the CTAB method. The extracted DNA underwent evaluation through electrophoresis on a 0.8% agarose gel infused with 0.5 g/ml of ethidium bromide. The quantified DNA samples were then subjected to further analysis via PCR. Specifically, a fragment of the mtCOI gene was selectively amplified using the universal primers LCO (5'-GGTCAACAAATCATAAAGATATTGG-3') and HCO (5'-TAACTTCAGGGTGACCAAAAAATCA-3'). In a reaction mixture of 25 µl, consisting of 12.5 µl of PCR master mix (Promega M750A), 7.5 µl of nuclease-free water, 1 µl each of forward and reverse primers, and 3 µl of the DNA template, PCR amplification was carried out (Rudra Gouda et al., 2023). Subsequently, a portion (3 µl) of the PCR-amplified product was subjected to electrophoresis at 100 V for 45 min on a 1.2% agarose gel in 1X TAE buffer. The purification and sequencing of the amplified PCR products were

outsourced to Barcode Biosciences Pvt Ltd, Bangalore. Subsequently, BLAST analysis was performed, utilising the NCBI database of homologous sequences (http://ncbi.nlm.nih.gov/BLAST). The resultant sequence was submitted to the NCBI GenBank. For the purpose of conducting homology searches, multiple alignments were conducted using the Clustal W algorithm software, and dendrograms were generated using the MEGA11 software.

RESULTS AND DISCUSSION

During the survey conducted at the location (28.6156 ºN, 77.1984 ºE) *Leptocentrus taurus* F. on *A. catechu* and *Oxyrachis tarandus* F. on *C. fistula* were observed. The identification of *O. tarandus* relied on features like adult was 4-7 mm long, yellow-eyed, winged insects with three pairs of legs and two curved horns like projections on the thorax, and looking like a miniature cow (Sharma and Pati, 2011). The pronotum of *O. tarandus* is extended backward over the abdomen with an extended black, long protrusion along its back. They have a pair of mesopleural processes; the wings are large and concealed by the pronotum (Sharma and Pati, 2011). Nymphs develop a dense cluster around the stem's apex and underside of the apical leaves, and adult bugs very active and shy by nature, move to the other side of the stem if they being disturbed. *L. taurus* is characterised by its predominantly black coloration, with head relatively wide across the extremities of its eyes, with suprahumeral horns that are distinctly recurved and have a greyish-black hue. The surface of these horns is coarsely punctuated and sparsely covered in fine hairs (Fig. 1). The eyes of *L. taurus* are typically reddish-brown (Fig. 1). NCBI BLAST revealed an impressive 99.13% similarity match with *O. tarundus* and 99% with *L. taurus*, leading to the successful assignment of the obtained sequence with the accession numbers OR739577 and OR739578 (Fig. 2). Phenogram construction revealed two clades.

These insects are known for their wide range of host plants and their potential to cause economic damage. Grag (2015) documented their association with 65 host plants across 22 plant families. *O. tarandus* feeds on the apical part of the stem, and with heavy infestations feed extensively on young apical stems, gradually making them rough and corky in appearance with the characteristic feeding marks, apical portion dry up and shed off. Adults and nymphs caused damage by sucking the sap from succulent plant parts while *L. taurus* adult feeds by sucking plant juices; primarily, they are found

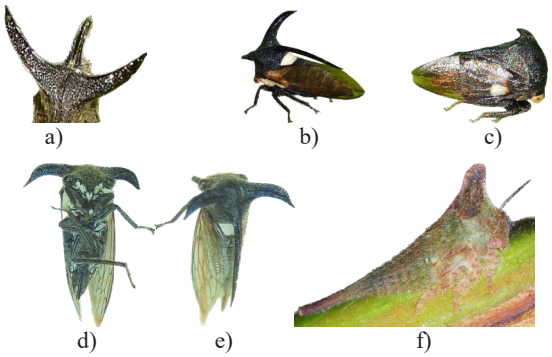

Fig. 1. Oxyrachis tarandus a) anterior view of horns b) lateral view of adult with extended protrusion c) nymph. Leptocentrus taurus d) ventral view of adult e) Dorsal view of adult with extended protrusion f) nymph

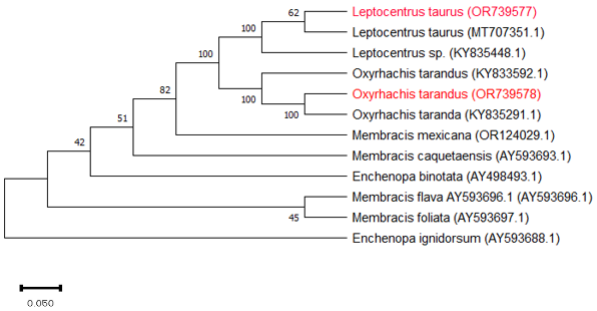

Fig. 2. mtCo1 phylogeny of tree hoppers. (Red colour indicates sequences generated in this study)

growing points of the lablab plants, viz., tips, flowers, and developing pods and damages the whole plant (Chandra, 2013).

The discovery of *L. taurus* on *A. catechu* and *O. tarandus* on *C. fistula* represents significant additions to the host range of these insect species. These findings indicate the potential for economic damage to valuable plant species, as both *A. catechu* and *C. fistula* have economic importance in various industries, including timber, pharmaceuticals, and ornamental horticulture. The feeding behavior of *L. taurus* and *O. tarandus* on the apical parts of their respective host plants can lead to extensive damage, impacting plant growth and productivity (Chandra, 2013). Continuous monitoring and surveillance efforts are essential for tracking the distribution and host preferences of agricultural pests like *L. taurus* and *O. tarandus*. Integrated pest management strategies should incorporate knowledge of the diverse host range of these insects to effectively mitigate potential economic losses (Sundararaj, 2014).

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AUTHOR CONTRIBUTION STATEMENT

MNR: Lab experiments, data collection analysis, draft preparation and revision of the draft; YM: collected specimen and literature; CNR: reviewed manuscript, and JSP: Conceptualization, reviewing and editing of the manuscript

CONFLICT OF INTEREST

No conflict of interest

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