Morphological and molecular characterization of groundnut leaf miner confirms the occurrence of *Aproaerema modicella* Deventer (Lepidoptera: Gelechiidae) in Tamil Nadu, India

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The groundnut leaf miner (GLM), *Aproaerema modicella* Deventer (Lepidoptera: Gelechiidae), is a consequential pest of groundnut and other leguminous crops, which causes yield loss of up to 30–60% in groundnut in India. Nevertheless, some scientific studies have reported the occurrence of soybean moth, *Aproaerema simplexella* Walker attacking groundnut in India. The present study was conducted to assess the leaf miner species destroying groundnut in different regions of Tamil Nadu, India. Correctly identifying an insect species based on morphological and molecular techniques may pave the way for formulating accurate insect pest management strategies. Studies on the morphological characters of GLM confirmed that the species found in different districts of Tamil Nadu is *A. modicella*. However, BLAST search of GLM sequences indicated 100% similarity with *A. simplexella*. Since morphological characters of larva, pupa, adult, and male genitalia indicated the GLM species available in Tamil Nadu, as *A. modicella*, the sequences acquired from the present study have been submitted as the first entry in the NCBI database for species-level representation of *A. modicella*.

Keywords: *Aproaerema modicella*, *Aproaerema simplexella*, DNA barcoding, leguminous crops, morphological identification.

SPECIMEN recognition at the species level is vital to recognize stage study[4]. Occasionally, phenotypic plasticity hinders conventional morphological identification[5]. Besides, cryptic species are hard to characterize with the background of morphological characters. In addition, the successful use of taxonomic keys requires a high degree of experience[6]. To overcome this challenge, molecular techniques have commonly employed by taxonomists in recent times to resolve the ambiguity in conventional taxonomic approaches[7]. Among these techniques, DNA barcoding is the simplest and most extensively adopted approach to discriminate against the species using a short, uniform gene region of the mitochondrial cytochrome oxidase subunit I (COI)[8,9]. The length of the DNA barcode is around 658 bp, which acts as a species tag for an individual animal taxon[3]. Moreover, because of its pertinent sequence length and strong universal primers, the amplification of this COI segment is quick and secure[10]. In this regard, the correct identification of an insect species based on both morphological and molecular techniques may pave the way for formulating accurate insect pest management strategies.

Groundnut (*Arachis hypogaea* L.), the 'king' of oilseeds, is an important annual legume crop cultivated in India, China, Nigeria and Myanmar[11]. In India, it occupies an area of 4.89 M ha with a production of 9.25 MT and productivity of 1893 kg ha^{-1} (ref. 12). Groundnut is affected by several insects, of which groundnut leaf miner (GLM) *Aproaerema modicella* Deventer is a devastating pest on groundnut