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Infestation Levels and Molecular Identification Based on Mitochondrial COI Barcode Region of Five Invasive Gelechiidae Pest Species in Kenya

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Abstract

Invasive Gelechiidae pest species, namely *Tuta absoluta*, *Phthorimaea operculella*, *Aproaerema simplixella*, *Sitotroga cerealella*, and *Pectinophora gossypiella* are among the major constraints hampering agricultural economy in Kenya. Infestation levels were determined on respective host crops sampled from different localities and *P. operculella* recorded the highest infestation of 68.00 ± 4.92% on stored potato. *Aproaerema simplixella* and *T. absoluta*accounted for 61.33 ± 5.35% and 51.56 ± 5.22% maximal infestation on groundnuts and tomato leaves, respectively. Stored maize was significantly infested by *S. cerealella* (54.33 ± 5.31%) while no infestation was observed on the freshly harvested grains. Infestation on open bolls by *P. gossypiella* was relatively low (6.11 ± 3.46%) compared to *Anatrachyntis simplex* (45.67 ± 7.84%) that emerged as the key pest of cotton. The species were discriminated based on sequence similarities, evolutionary divergences, and phylogenetic analyses. A 658-bp fragment of mitochondrial cytochrome *c* oxidase subunit I (COI) gene was obtained from 302 specimens. Generally, genetic variations were low within and between Gelechiid populations, with an average of 0.02% and all intraspecific divergences were less than 2% except for *S. cerealella*. The Gelechiids data set generated eight Barcode Index Numbers (BINs), five of which were concordant and three belonging to *S. cerealella* were singleton. All species were separated into distinct clusters on a maximum likelihood tree. Data on infestation levels will be useful in defining the pest status of these Gelechiids in Kenya. DNA barcoding is also presented as a valuable tool to complement traditional taxonomy for rapid and accurate identification of these species of agronomic interest.

Keywords: invasive Gelechiidae species, infestation levels, species identification, DNA barcoding