

Improving detection and identification of five common internal grain pests by molecular methods

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Abstract

Intensive in-storage sampling is essential for pest detection and integrated pest management (IPM) in grain industry to determine grain quality and satisfy biosecurity concerns. However, traditional sieving methods are not suitable to detect hidden infestations of internal development stages of grain pest species. Thus, the need of more advanced strategies to work in unison with management strategies is recognized. In this study, molecular techniques have been used to improve the detection of internal insect stages in grain industry by multiplex polymerase chain reaction (PCR). Five specific primers pairs of the most common internal pest species in stored grain facilities were designed from the COI (Cytochrome Oxidase I) mitochondrial region. Those species include *Rhyzopertha dominica* (Fabricius) (Coleoptera: Bostrychidae), *Sitophilus zeamais* (Motschulsky) *S. oryzae* (L.) and *S. granarius* (L.) (Coleoptera: Curculionidae), as well as the the moth *Sitotroga cerealella* (Olivier) (Lepidoptera: Gelechiidae). Optimal PCR conditions were established and the specific amplification of each target species was optimized. Specificity of the designed primers was studied by testing other species potentially present in grain facilities.

Keywords: biological control, COI, internal feeders, PCR, molecular identification