The significance of molecular tools in the conservation and farming of edible insects

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Abstract

Edible insects are important in mitigating food insecurity due to growing world's population and climate change. We reviewed published works on the use of molecular techniques to identify edible insects, their contaminants, natural enemies and host plants for sustainable farming and consumption. We found that molecular tools have resolved the contradictions in the identity of the long-horned grasshopper popular consumed in East Africa, confirming that the species is *Ruspolia differens* Serville and not *Ruspolia nitidula* (Scopoli). Palm weevils from the same region which showed morphological polymorphism have also been confirmed to be a single species, *Rhynchophorus phoenicis* Fabricius. A new species of edible cricket in Kenya i.e., *Scapsipedus icipe* Hugel and Tanga was discovered through molecular techniques. The same approach has been used to identify eight species of edible saturniids from coastal Kenya. Further, the techniques have been successfully used to verify the identity of insect species in food products. Additionally, the tools helped to unravel the natural host plants of wild populations of the *R. differens*. These plants were subsequently used to formulate the rearing diet of *R.*

differens with improved reproductive and developmental performance. The techniques have also helped to elucidate natural enemies of *R. differens*, which threaten its mass rearing, including fungi, bacteria, and parasitoid: *Glaurocara flava* Thomson. Molecular techniques have further been employed to detect mycotoxin-producing moulds like *Aspergillus fumigatus* Fresenius and *Aspergillus neobridgeri* Frisvad & Samson in processed edible insects. Conclusively, molecular tools are of immense significance in advancing conservation and farming of edible insects.

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Ethics declarations

Research involving human participants and/or animals

This study did not involve use of human and/or vertebrate animals.

Conflict of interest

The authors declare that they have no conflict of interest.

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