

THE ROLE OF BATS IN THE BIOLOGICAL CONTROL OF PESTS FROM MACADAMIA ORCHARDS IN LIMPOPO PROVINCE, SOUTH AFRICA

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ABSTRACT

Stinkbugs (Heteroptera: Hemiptera: Pentatomidae) which damage macadamia are important pests for many crops including macadamia, feeding mostly on seeds and immature fruits. DNA barcoding is a taxonomic method that uses a short genetic marker in an organism's DNA to identify it as belonging to a particular species. DNA barcoding of agricultural pests is a high priority as it allows rapid and accurate identification of pests. Too few of these pest insects have been DNA-barcoded and this leads to a problem, e.g. when identifying pests or possible biological control agents. Insectivorous bats are believed to feed on pest insects in agricultural lands. However, a study to see if bats do eat stinkbugs and how they can be used to control these pests has never been undertaken in South Africa.

This study focuses on 10 bug species which includes some that are known to be agricultural pests. Some of the stinkbugs included in the study belong to families other than Pentatomidae and, only *Nezara viridula* has been listed on GenBank. Using the barcoding region (mitochondrial cytochrome oxidase I control region) 658 bp was sequenced, and analysed in relation to available hemipteran sequences on GenBank, with the aim to DNA barcode the pests and determine the phylogenetic relationship of stinkbugs in South Africa. The results indicate that there is still a lot to be done in South Africa to have a complete record of the pests.

In connection with insect sequences available on GenBank and BOLD, the newly acquired sequences allowed to probe the diet of bats, using next generation sequencing (NGS) of fecal pellets of six species targeting only 157 bp of the COI region, and NGS data from bat fecal pellets matched the known diet of six South African bat species based on previous microscopic dietary studies but provide greater taxonomic precision of prey items eaten down to family, genus and species level though most of pests in South Africa were not found. All three foraging groups from clutter-feeding bats, clutter edge bats and open-air feeders feed on pest *Nezara viridula* stinkbug which is not what was originally expected given that stinkbugs are not very mobile and spend much of their time resting on branches.

Keywords; Macadamia, DNA Barcoding, Biological control, next generation sequencing