
Meta-acoustic approach of cricket communities to detect biological invasion by exotic ants

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Abstract

With only 5% of the global terrestrial area, and more than 20% of the terrestrial plant and vertebrate species in the world, islands are major components of worldwide biodiversity and receive increasingly attention in the context of the current biodiversity crisis. Among threats, invasive ant species are recognized as one of the most noxious ones for island biodiversity. For example, in New Caledonia, there are 4 invasive ant species that are spreading. Regarding invasive ant and their management, one of the challenges is to detect early impacts in high value ecosystems. Cricket communities, are recognized as a major component of forest floors, according to their richness and high abundance all year round. Because of their high diversity and endemism level, and with the ability for male to produce sound through the environment to attract female, cricket fauna appear to be a good candidate to be used in community assessment. They contribute greatly to acoustic environments, which can be related, through analysis of sound signal complexity, to the richness of the community and then to perturbations from ants. We investigate the impact of invasive ant *Wasmannia auropunctata* on the structure and the composition of crickets including from acoustic perspective. We investigate how meta-acoustic can be used as a non invasive, innovative, and efficient method to identify biological invasions from ants, to manage natural and invasive free natural reserves. We tested its efficiency in the southern part of New Caledonia, contrasting different biotopes invaded or not by one of the three invasive ants found in the area. Our results already demonstrate that crickets communities modifications are efficient biomarkers to detect invasive ants, as the ants modify the composition and profile of cricket communities. Acoustic measurements of crickets may be used as an innovative tool to early detect biological invasion, using meta-acoustics.

Keywords: meta, acoustics, crickets communities, invasive ants, *wasmannia auropunctata*, new caledonia

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