CBGP
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la Gestion des Populations

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METABARCODING APPLIED TO BIOLOGICAL CONTROL INVOLVING MICROARTHROPODS: EARLY STEPS AND PROSPECTS

par

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I will start my presentation with a quick overview of the activities I developed in the last few years at Embrapa, Genetic Resources and Biotechnology, Brasilia, Brazil, including results from the collaborations at the CBGP and future perspectives. The last challenge of this collaboration is still in progress; I will focus on this work as described below.

Maximizing the delivery of key ecosystem services such as biological control through the management of natural enemy communities is one of the major challenges for modern agriculture. However, biological control implementation can be hampered by lack of information on the community composition and on ecological features, mainly on trophic interactions in communities. A promising avenue for the study of trophic interactions, including deciphering generalist predator diets is offered by metagenomic approaches, e.g. DNA metabarcoding. This approach has been recently used for studying insects communities in agricultural systems providing valuable information for biological control. However application of metabarcoding to explore trophic interactions involving microarthropods has not been explored. Early steps on the application of DNA metabarcoding to study the diet of an utmost group of microarthropods, the predatory mites in the Phytoseiidae family, are presented. These microarthropods are specially interesting since (i) both prey and predator are minute resulting in minimum retrieval of total DNA from one specimen; (ii) main group of prey, i.e. phytophagous mites, are phylogenetically close organisms requiring specials protocols to prey identification ; (iii) microscopic or molecular analysis of predatory mites's gut content is impossible since they ingest predigested fluids from their prey; iv) around 90% of species are generalists; v) feeding behavior in the field is scarcely known.

This is a first attempt of applying a metabarcoding approach to determine the diet of predatory mites included steps for methodological development, controlled experiments and in situ evaluations. Shortcomings and prospects for the innovative technology are discussed.

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