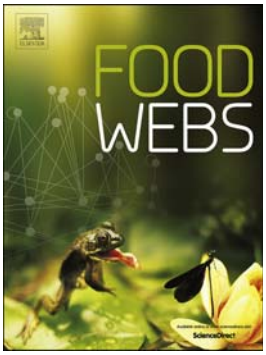

Food webs and biological control. A review of molecular tools used to reveal trophic interactions in agricultural systems

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Food webs and biological control. A review of molecular tools used to reveal trophic interactions in agricultural systems.

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Abstract

Modern monocultural agro-ecosystems can be perceived as a simplification of natural ecosystems, where a single plant species is usually grown over vast areas. In these systems, it has historically been assumed that the concept of a *food chain* can describe the relationships between an insect pest and a single biocontrol agent. In reality, multiple potentially complex ecological interactions are involved, and these comprise food webs. However, identifying, analysing and quantifying the relative strengths of these multi-trophic interactions are very difficult using orthodox methods such as dissection and subsequent visual gut-content identification. An emerging field of study using molecular tools to analyse prey DNA in predators as well as parasitoid DNA within their hosts can now begin to address these impediments and help to better understand multi-trophic dynamics and improve biological control. In this article, we review the scientific literature published between 2000 and 2015 related to the use of molecular tools to analyse trophic interactions in agroecosystems in the context of biological control, using the ISI Web of Science search engine. A total of 213 articles were found and a steady increase in the volume of this literature occurred over the period studied. Based on the analysis of those publications, we propose future avenues in which advanced molecular tools can contribute to a mechanistic understanding of biological control, suggesting how this approach could help design agricultural systems based on agroecological techniques.

Keywords: ELISA, PCR, NGS, agro-ecology, predators, parasitoids.