

Maxime Jacquot, David Muru, Pierre-François Duyck, Frédéric Chiroleu, Philippe Tixier et Jean-Philippe Deguine (2014). Influence of plant diversity, insecticide applications and landscape on arthropod species richness of two trophic levels in mango orchards. Joint 2014 Annual Meeting British Ecological Society and Société Française d'Ecologie, 9 – 12 Décembre, Lille, France.

Abstract

Conservation biological control implies an appropriate management of arthropod communities at several trophic levels. Plant addition in agroecosystems has effects on upper trophic levels by providing basal resources and new habitats. The abundance and species richness of phytophagous and predatory arthropods may therefore be modified with a potential impact on pest control. Landscape characteristics and pesticide applications are also well known to influence the different trophic levels of the agroecosystems. However, simultaneous influences of these factors on different trophic levels are still poorly reported.

In mango orchards in Reunion, we tested the hypothesis that species richness (SR) of two trophic levels (primary and secondary consumers), are determined by frequency of insecticides application (FIA), addition of cover plants and landscape features. To this end, we used mixed linear models on data on arthropods from extensive sampling (34738 individuals of 469 species in 20 mango orchards).

Our results showed that SR of primary consumers is significantly influenced by the abundance of plant detritus, SR of plants, FIA, proportion of semi-natural elements and the amount of ecotones (transition areas) in the landscape. Species richness of secondary consumers is significantly influenced by these same factors plus SR and abundance of primary consumers.

These results confirm that an integrative approach is essential to understand the factors influencing species richness at the different trophic levels. From an applied perspective, changes in SR of plants and frequency of pesticide use can be levers to design new cropping systems increasing biodiversity. Success or failure of such agroecological practices should also take into account the surrounding landscape.