Integrating predictive modelling in participatory approaches to enhance pest control services at the landscape level

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Résumé

Effective farming management that strengthens the role of natural enemies in controlling pests can help achieve the critical objective of reducing the use of pesticides in modern agriculture. However, current efforts to achieve this goal tend to concentrate on modifying practices at the field level, overlooking the fact that pests and their natural enemies are also influenced by ecological patterns and processes that extend beyond individual fields and farms. Consequently, enhancing natural pest control require addressing practices at the landscape scale as well. This situation calls for exploring with farmers how their own management decisions and those of their neighbours can affect pest control in individual fields across landscapes. Here, we present an operational framework that addresses this need and combines (i) long-term monitoring of natural pest control, landscape-scale farming practices and landscape configuration, (ii) identification with local stakeholders of potential changes in their practices they are willing to engage with and (iii) a spatially-explicit simulation tool predicting natural pest control in response to changes in farming practices at the field, farm and landscape levels. We then report on how this framework has been implemented

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in two contrasted landscapes of the French long-term monitoring network SEBIOPAG: one arable landscape near Dijon (Burgundy) and one mixed farming landscape near Toulouse (Occitanie). In both situations, we predict that the changes envisioned by farmers will boost natural pest control and that there is much more gain for individual farmers if all neighbouring farmers also engage in the transformation on their own farm. We then describe the stakeholders' perceptions of these outcomes and how they utilized these findings to identify essential actions they are willing to undertake collectively in their landscape.

Mots-Clés: agroecology, landscape design, natural pest control, collective action, simulation tool