FP7 ERA-NET BiodivERsA/FACCE-JPI

Projet Ecodeal

Title : Enhancing biodiversity-based ecosystem services to crops through optimized densities of green infrastructure in agricultural landscapes

Ecological intensification relies on ecosystem services to substitute external inputs in agriculture and has been proposed as a way to achieve high yielding, stable and sustainable crop production, while allowing us to reach other societal targets such as nature conservation or human health. Pollination and natural pest control are key ecosystem services that can lower pesticide use and increase crop yield quantity and quality.

Organisms delivering these services depend to a large extent on non-crop habitats, or "green infrastructure" in the landscape, as cropland is not well suited as a habitat all year round. ECODEAL is a European research project assessing the impacts of green infrastructure on the delivery of ecosystem services and consequences for individual farmers and the whole society. How much green infrastructure do we need to maintain stable communities of ecosystem service providers, and a high flow and stability of the services to the crop? Since establishing non-crop habitat comes at a cost, which densities of green infrastructure will enhance crop yield and populations of conservation relevant species while providing net increases in crop productivity as well as net economic benefits to the farmer? ECODEAL will answer these questions.

A sound scientific basis now links increased densities of different elements of green infrastructure in the landscape to increased local biodiversity. Further work is needed to understand how increases in green infrastructure at different scales can be translated to benefits in terms of enhanced crop production, in particular in a context in which variability in climate and agricultural prices will differentially affect crop growth, the populations of pests and beneficial organisms, and the costs of converting productive land to green infrastructure.

ECODEAL will :
(1) disentangle the linkages between density of green infrastructure and the structure and stability of the interaction networks linking the crop and the non-crop habitats communities over multiple years,
(2) quantify increases in crop productivity mediated by pollination and natural pest control under different densities of agricultural non-crop habitats at different scales, as an essential step towards assessing costs and benefits, and
(3) assess costs and benefits for the farmer and the wider society of enhancing the density of green infrastructure, and quantify possible trade-offs between enhancing green infrastructure for ecological intensification of agriculture as opposed to supporting conservation-relevant species.

ECODEAL synthesizes large existing databases to model the relationship between density of green infrastructure and the distributions of functional traits and the structure of the ecological interaction networks that underlie pollination and natural pest control. Cases studies from established study areas covering economically important field crops will be used to fill the gaps in the existing data, and will be used to validate and update the ecosystem service models derived from the synthesis work.

Cooperation with land owners and managers, institutions and organisations designing and implementing agri-environment schemes, advising farmers, managing protected areas, and developing agricultural and environmental policy, ensures that the ECODEAL assessment of the question "how much green infrastructure do we need for enhanced, stable ecosystem services in crops?" finds ownership among key stakeholders.