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53. ES in Agricultural Ecosystems to enhance ecosystem services : specificities in concepts, measurement methods and promotion tools (OPEN) & 54. Managing Biodiversity and ES in Agricultural Habitats (OPEN)

Ecosystem Services evaluation as a tool for the design of cropping systems

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Over several decades, agricultural scientists and practitioners have developed frameworks to help farms in the design/management of their cropping systems. Approaches such as regional diagnoses, yield gap analysis, multicriteria assessment of agricultural systems, prototyping, participatory modeling, have been used to this aim, with varied outcomes and successes. Such approaches have included criteria related to the protection of the environment.

The Ecosystem Services (ES) framework has emerged as a tool to conciliate the interests of human societies as a whole with the interests of individual or associate entrepreneurs. For this to occur, ES must be explicitly and systematically integrated into decision making by individuals, corporations, and governments (Daily et al., 2009).

We are working on including this framework in cropping system design, so that land managers include the provision of diverse ecosystem services in their decision making about agricultural crops and practices.

In this presentation, we show on specific case studies in temperate and tropical environments how the structure (strategic decision making) and management (tactical decision making) of complex agricultural systems can change the delivery of ES. We show that some cropping systems are particularly promising in delivering balanced sets of ecosystems services. Nevertheless, the introduction of biological diversity into cropping systems is a knowledge intensive strategy, and its outcomes are tightly linked to the context. Moreover, a particular strategy might be profitable one year, and produce negative outcomes the following year. We present an example of adaptative management of agricultural systems, where decision rules based on the environment or on the crop stand are used to customize practices to the current context, providing ES in a sustained way.

We then propose different places in the cropping system design pathway where these ES framework and measurement can be usefully introduced, in order to conciliate the profitability and/or resilience of food production with the delivery of ES from these systems.

We conclude on the way ahead to fully integrate the ES framework in cropping system design, so that this framework achieves part of its promises regarding the modification of decision making in agriculture and consequently the development of a greener agriculture.