Introduction

Agricultural systems nowadays have to reduce their reliance on pesticides while remaining efficient.

**Crop diversification** and increasing of biodiversity in the agricultural system associated with the implementation of **agroecological practices** could promote biological pest control and increase the **sustainability** of the systems.

Hypothesis

Could the intercropping practices and biodiversity at plot and farm level promote a better biological pest control and increase the sustainability of the system?

Objectives

1. Produce references on the performances of the multispecies and multi-scale systems
2. Provide design support tools

Co-design

The designing of **sustainable agroforestry orchards systems** required a **collaborative learning**. This design has been led on two sites: TAB and Durette by a collaborative groups of scientists, farmers and technicians. Setting up production **objectives** and **constraints**, designing **3D patterns** and writing **metarules** of the system have constituted major steps and products of the design. The systems have been afterwards evaluated with an ex-ante evaluation tool.

Metarules : Different leverages to manage cultural systems

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<th>Long-term</th>
<th>Organisation of the agroecosystem</th>
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<td>Crop mixing and diversification. Pest-tolerant cultivars. Crop rotation and soil cover, improved soil fertility. Increased non-productive biodiversity areas</td>
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<td>Cultural practices: reduce irrigation frequency and tillage, increase seeding rate to compete with weeds</td>
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<td>Managing pests and pathogens propagation</td>
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<td>Mechanical weed control and plant protection treatments</td>
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Durette

Set up in 2014
5 ha in Avignon

Farm-scale approach with two independent farmers
Short food supply chain
Diversity of vegetables (30 and more) associated with various fruit trees
Composite and specific hedges (kiwi and grapes)

Double-row of fruit trees
- Maximum ground coverage between the trees
- Presence of poultry (pests control)

Plate-forme TAB

Set up in 2013
6 ha in Etoile-sur-Rhône

Experimental site scale with several experts
Products sold on distribution markets
Peach associated with arable crops (soya/corn seed/fababean/colza/wheat)
Composite hedges and hot spot of biodiversity

Different prototypes are considered for the future
Implementation of two other plots planned for 2016

Evaluation ex-ante

A first evaluation has been made to adjust their characteristics. A new ex-ante tool has been set up with the collaborative group to take into account the interactions between crops and trees in organic farming.

Evaluation ex-post

A multiple-criteria evaluation is conducted.

Dissemination

Articles, open field days for farmers, network building, scientific conferences...