

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

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

Co-design

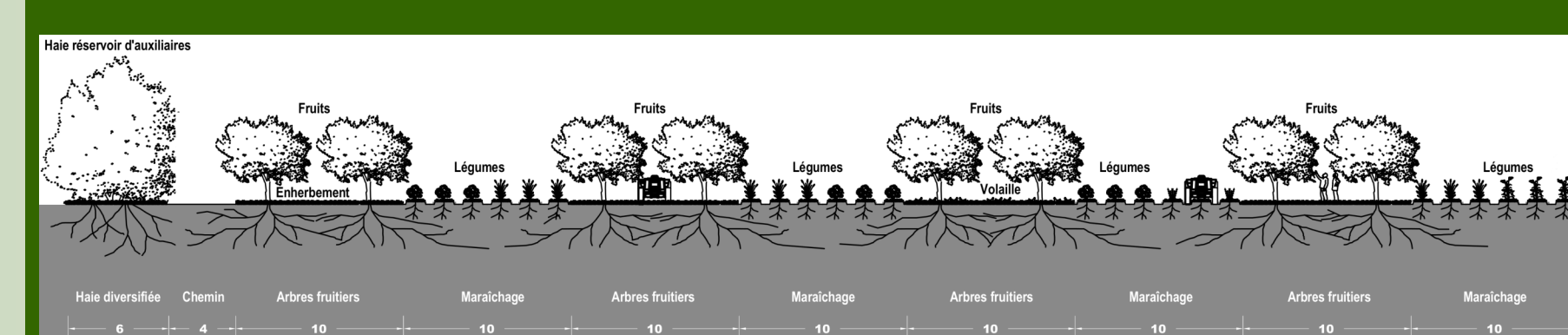
The designing of **sustainable agroforestry orchards systems** required a **collaborative learning**. This design has been led on two sites: TAB and Durette by a collaborative groups of scientists, farmers and technicians. Setting up production **objectives** and **constraints**, designing **3D patterns** 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.

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)



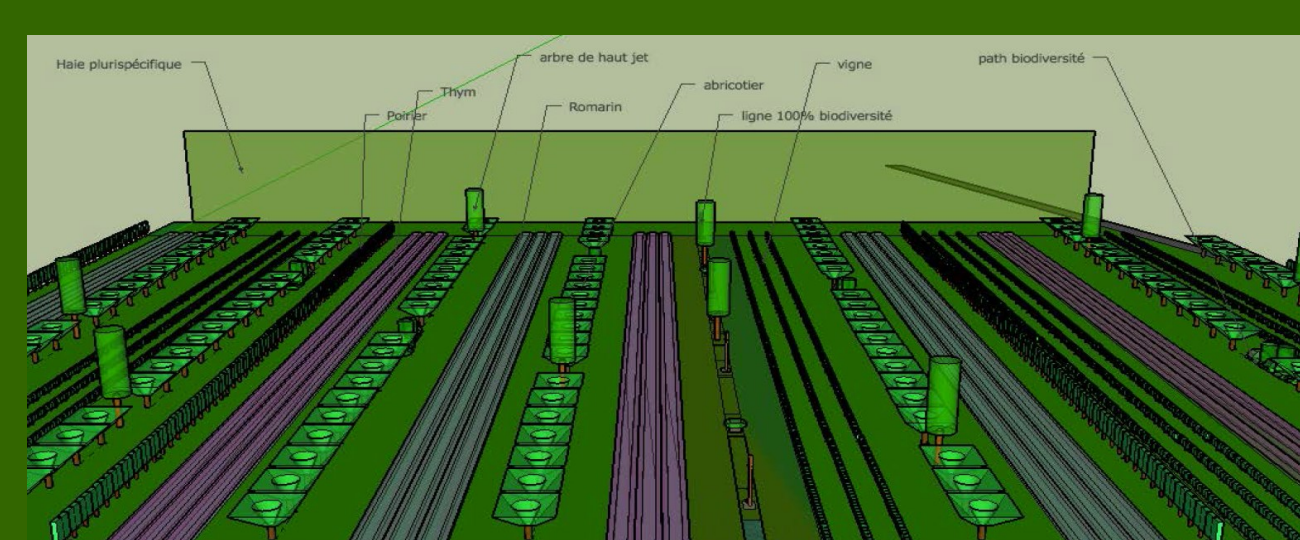
- Double-row of fruit trees
 - Maximum ground coverage between the trees
 - Presence of poultry (pests control)

Plate-forme TAB

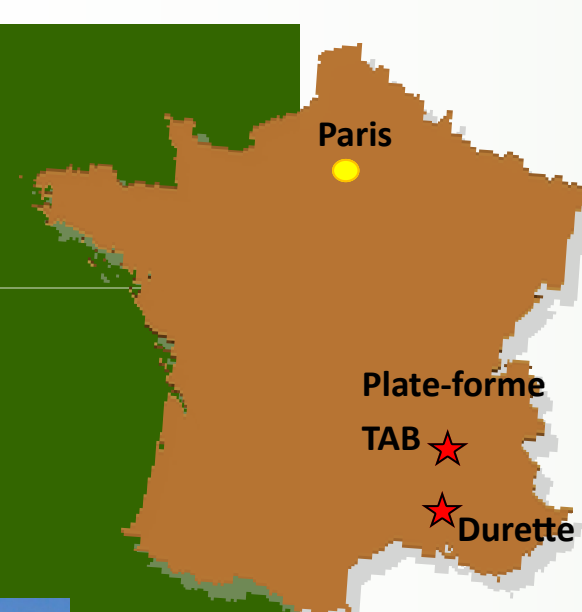
- Set up in 2013
- 6 ha in Etoile-sur-Rhône



- 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



Co-design process

2011
2012
2013
2014
2015
2016

Long-term

Organisation of the agroecosystem

Crop mixing and diversification. Pest-tolerant cultivars. Crop rotation and soil cover, improved soil fertility. Increased non-productive biodiversity areas

Mid-term

Prophylaxis and preventive practices

Cultural practices: reduce irrigation frequency and tillage, increase seeding rate to compete with weeds
Managing pests and pathogens propagation

Reduction of fertilization

Introduction of animals

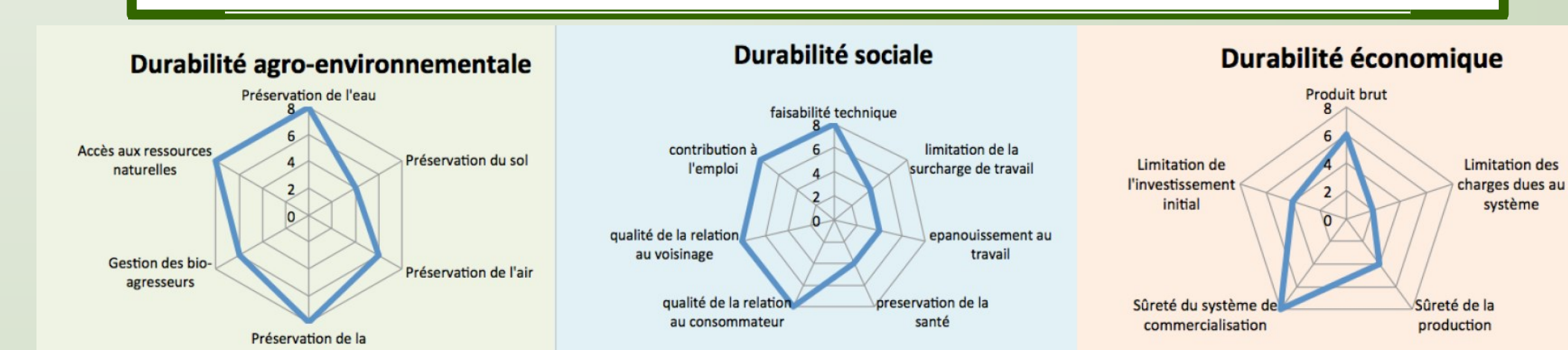
Short-term

Direct pest control

Mechanical weed control and plant protection treatments

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...