

EXPERIENCING THE TRANSITION TOWARDS AGROFORESTRY IN THE MEDITERRANEAN: A NEW LONG TERM EXPERIMENT IN CENTRAL ITALY



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INTRODUCTION

- Recent studies in Italy highlighted the historic importance of traditional and innovative **Agroforestry (AF) systems** and their capacity to produce **climate-smart food and sustainable high value timber production** (Paris et al., 2019).
- During the past century, the **tradition of separating between science and practice in agriculture and in forestry** has left **untapped opportunities** for a functional use of trees in the agroecosystem in order to sustain food, fibre and timber production.
- Trees may play an important role in the sustainable management** of agricultural landscapes through **increased ecosystem services** generated by both **traditional and innovative AF systems**

AIMS

- A **multidisciplinary team** is focusing on the design and the establishment of a **40-ha Long Term Experiment (LTE)**, to evaluate the **transition of a conventional arable system towards AF in Tuscany**.
- The purpose of the LTE is to **assess the sustainability** and the feasibility of **AF compared with conventional arable and forestry systems** as well as the potential transferability to **real farm condition**.

STUDY SITE AND EXPERIMENTAL DESIGN

- The **LTE**, started in 2018, is located in **Centre for Agro-Environmental Research "Enrico Avanzi"** of the **University of Pisa**, San Piero a Grado (**Pisa- Italy**) (43.667205 N, 10.313160 E) (Fig.1).
- Two **AF systems**, Silvo-Arable (SA) and Agro-Silvo-Pastoral (ASP), are compared with the respective controls, **Arable (AR)** and **Mixed (MX)** systems (Table 1). The AR and SA rotation consist in **durum wheat, sorghum and faba bean**. In MX and ASP, the 3 annual crops are followed by a **4-year meadow of italian ryegrass, orchard-grass, tall fescue, sulla and alfalfa**.
- In **SA and ASP**, **oak and poplar** have been planted alternate on the row **every 5 m**, along one side of each field, 2 m away from drainage ditches, **corresponding to a density of 60 trees ha⁻¹**. The space between tree rows and ditches is managed as semi-permanent **buffer strips to support functional biodiversity** and to limit **nutrient leaching**.
- Forestry control fields are two pure stands of poplar and oak and a polycyclic plantation based on oak, poplar, hazelnut and alder.

Table 1 – Cropping systems and rotations of LTE

Arable	Agroforestry	Forestry
Arable (AR) (3yr)	Silvo-arable (SA) (3yr)	Poplar (10yr) or oak (45 yr) (P), (O)
Mixed (MX) (7yr)	Agro-silvo-pastoral (ASP) (7yr)	3P polycyclic plantation (3P) (45 yr)

Figure 1 - Location and overview of the agroforestry Long-term Experiment in Pisa, Italy



EXPECTED RESULTS

Overall challenge for agroforestry is to identify which **combination of crop and tree species optimizes the use of light, water and nutrients**, and how the **micro-climate** inside the systems may interact with **animal welfare and productivity** .
Based on this, this **LTE will be the basis for future studies on agroforestry agroecosystem services and demonstration activities**.

Reference

1. Paris P. et al. 2019. What is the future for agroforestry in Italy? Agrofor. Syst.

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