

6th EUROPEAN
AGROFORESTRY
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Agroforestry and the Environment



Climate Change (adaptation & mitigation)

*The AgroForageTree project:
Agroforestry for forage production in
permanent grasslands using fodder
tree hedgerows*



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The AgroForageTree project



Context

Climate change is an important driver of losses in **forage yield and quality** in permanent grasslands, especially due to increasing **drought** periods. Agroforestry for forage production could be a promising solution to provide additional **tree-based forage** because tree species can be more resistant to drought due to their **deeper root system**. Furthermore, leaves of specific fodder tree species can have **excellent digestibility and nutritional value** for livestock.

Aims of the project

The **AgroForageTree** project aims at evaluating the potential of fodder tree species to provide supplementary tree-based forage in late summer-beginning of autumn and is organized according to **four main objectives**:

- 1 Monitoring the survival and growth of fodder tree species along a climatic and altitudinal gradient
- 2 Determining leaf production, leaf nutrient content and digestibility of these fodder tree species
- 3 Investigating the impacts of fodder tree hedgerows on ecosystem biodiversity and services
- 4 Assessing the palatability and selection of the tree species by different livestock categories.

Experimental design

- **Five tree species** identified as the most interesting fodder tree species for livestock in terms of **yield and forage quality**:

Fraxinus ornus



Salix caprea



Tilia platyphyllos



Morus alba



Alnus cordata



- **Seven on-farm sites** along an **altitudinal** (from 450 to 800 m) and climatic gradient (mean annual **temperature** from 11 to 5°C and **precipitation** from 900 to 1600 mm).
- Two paddocks per site corresponding to **two grazing intensities**, see experimental design in Figure 1. Grazing will start from year 3 or 4.
- **Different livestock categories** depending on site (suckler and dairy cows, goats and horses).

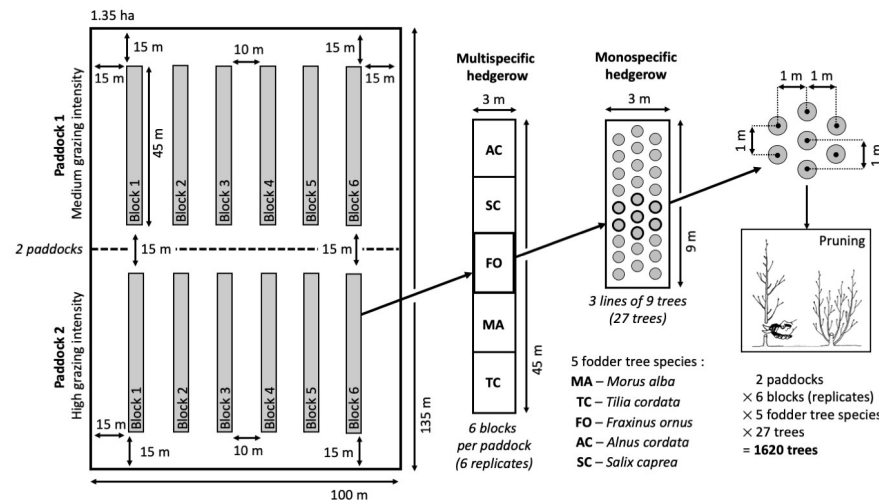


Figure 1: Experimental design of the AgroForageTree project aiming at evaluating the forage yield and quality of fodder tree hedgerows and their consumption and selection by livestock. Each multispecific hedgerow (45 m with 3 parallel lines) is composed out of five randomly arranged monospecific hedgerows of 9 m each, corresponding to the five selected fodder tree species. Tree lines are 1 m apart and trees are separated by 1 m from each other within lines.

Measurements

Fodder tree growth

Fodder tree diameter and branches number, leaf-level carbon uptake and water use efficiency for each tree species at each site.

Forage yield and quality

Leaves number, plant functional traits (SLA, LDMC), leaf nutrient content, fibers, phenols and condensed tannins.

Ecosystem services

Soil moisture, soil respiration, soil organic carbon and inorganic nitrogen under and around hedgerows, biodiversity (birds, bats, grasshoppers, pollinators, plants) and grass-based forage biomass.

Selection by livestock

Digestibility of leaves and methane emissions (*in vitro*), leaves consumption (count of leaves before and after grazing), GPS tracking of animals (tree species preferences).

Knowledge outcomes

- ✓ **Optimal climatic conditions** for five fodder tree species in Western Switzerland.
- ✓ **Seasonal and interannual variability in forage yield and quality** for the five fodder tree species.
- ✓ **Appetence and preference** for some fodder tree species rather than others depending on **livestock categories**.
- ✓ Impact of fodder tree hedgerows on **ecosystem biodiversity and services** despite intensive use for forage production.



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