Present and future role of forest resources in the socio-economic development of rural areas

Parallel Session 2

Forests, agroforestry and bioenergy.

Potentialities and uncertainties of novel agroforestry systems in the European CAP: farmers' and professionals' perspective in Italy

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Summary

IBAF was formerly *Institute for Agroforestry*

1. SAFE project: <u>Silvoarable Agroforestry For Europe</u>

2. Traditional and novel agroforestry systems

3. Modelling silvoarable systems

4. On-farm survey and professionals survey

5. Concluding remarks

Silvoarable Agroforestry For Europe: SAFE project

8 countries, 17 partners and sub-contractors
http://www.ensam.inra.fr/safe/index.php

Overall aims:

- **reduce the uncertainties concerning the validity of silvoarable systems** ➔ **production, profitability, environment**

- **extrapolate plot-scale results to individual farms or sub-regions** ➔ **potential areas for SA**

- **suggest unified European policy guidelines for implementing agroforestry**

Agroforestry systems
Mixed and complex systems involving trees, arable crops and livestock

pré-verger and *streuobst*;

Silvopastoral systems

Timber tree systems: oaks, walnut, poplar

Agroforestry systems – temperate examples

Traditional   *Innovative*

Silvopastoral systems

Chestnut grove with grazing

Pinus radiata with grazing

Silvoarable systems

Olive grove with cereal

Hybrid poplar with cereal

Linear systems

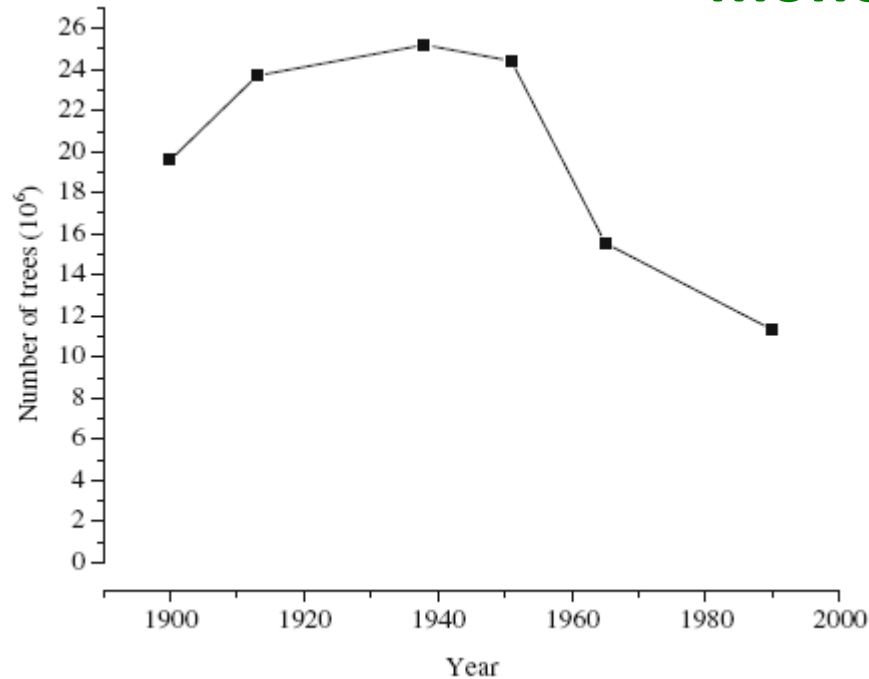Oak hedgerow along field boundary
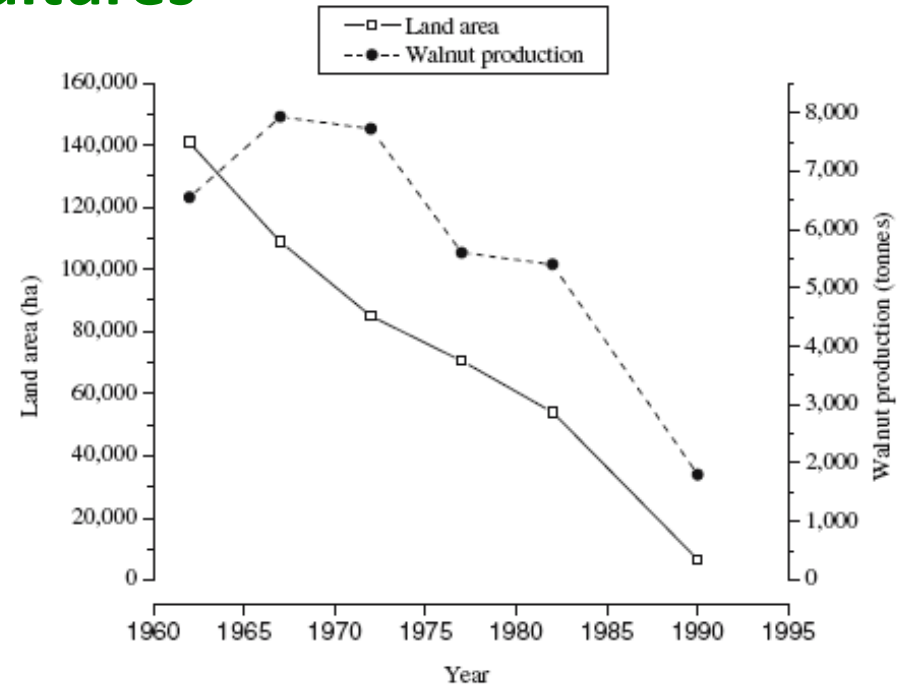
Buffer strip for phytoremediation

Decline of traditional agroforestry systems
Agroforestry systems have been replaced by crop monocultures

Number of fruit trees in Streuobst, Germany.
Herzog and Oetmann (2001).

Area and production of walnut silvoarable systems, Italy.
Istituto Nazionale di Statistica Agraria.

Eichhorn M. *et al.* Agroforestry Systems, 67, 29-50.

Novel agroforestry systems
Silvoarable systems: widely spaced trees intercropped with annual or perennial crops

Main advantages:

- Increase of overall productivity and profitability;
- Control of soil erosion and nutrients leaching;
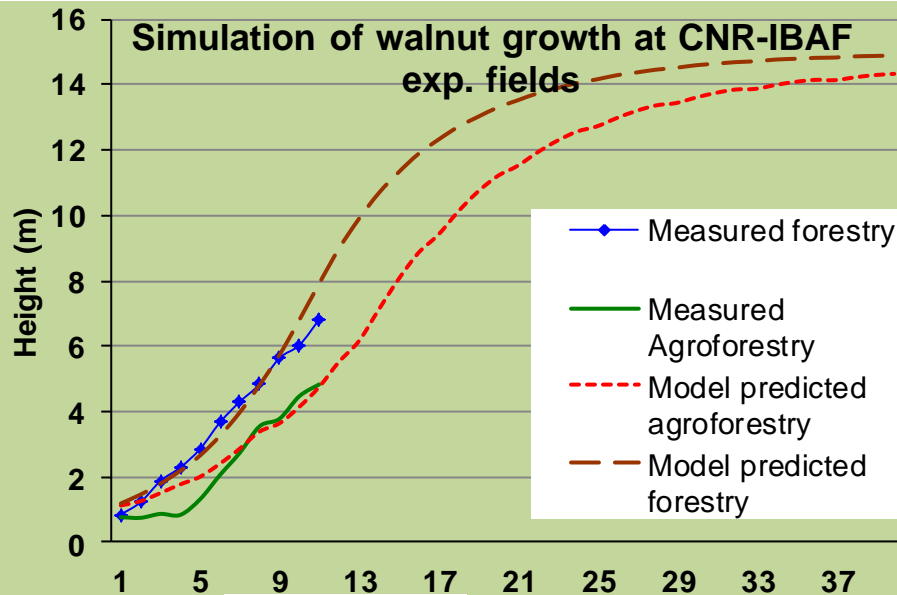- Increase of carbon sequestration;
- Improvement of landscape biodiversity
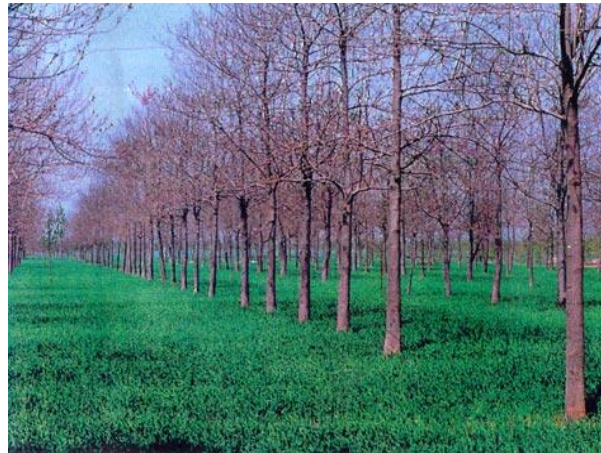
Modelling silvoarable systems

Predict the effects of silvoarable systems on production, farm profitability and environmental services
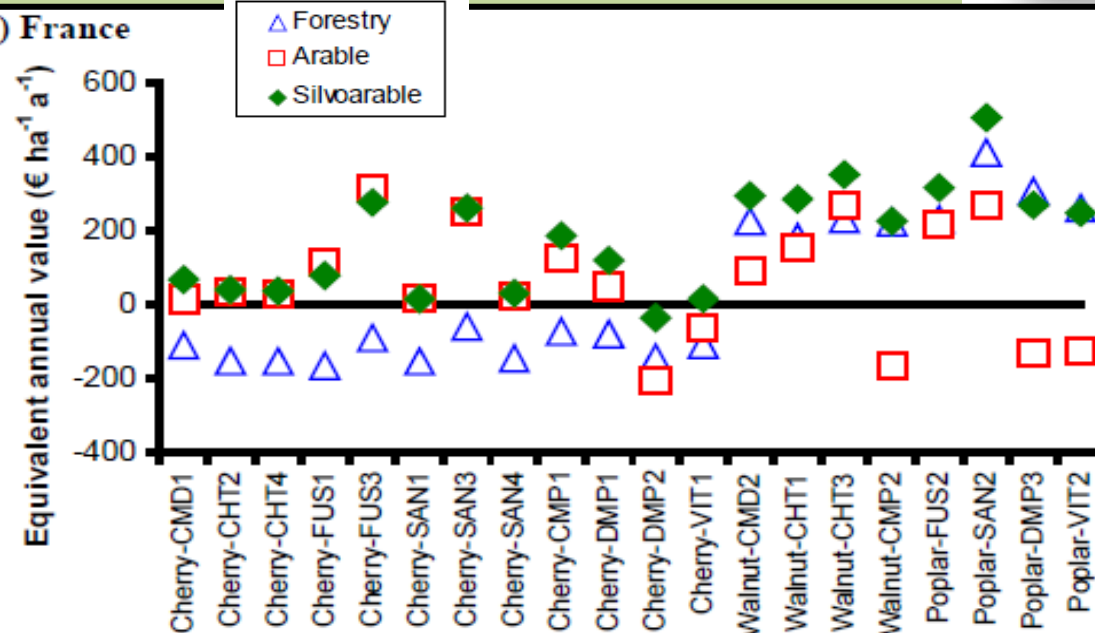
<u>**SAFE simulation models for scaling up:**</u>

- **Hi SAFE:** bio-physical 3D model for studying detailed interaction between crops and trees

- **Yield-SAFE:** bio-physical yield estimator on long term (20-100 years)

- **Farm-SAFE:** for long term economic balance of silvoarable vs. monoculture systems

SAFE Models: growth and economic profitability

Simulation of walnut growth at CNR-IBAF exp. fields

Height (m) vs. year
- Measured forestry
- Measured Agroforestry
- Model predicted agroforestry
- Model predicted forestry

CNR-IBAF; Italy

b) France
- Forestry
- Arable
- Silvoarable
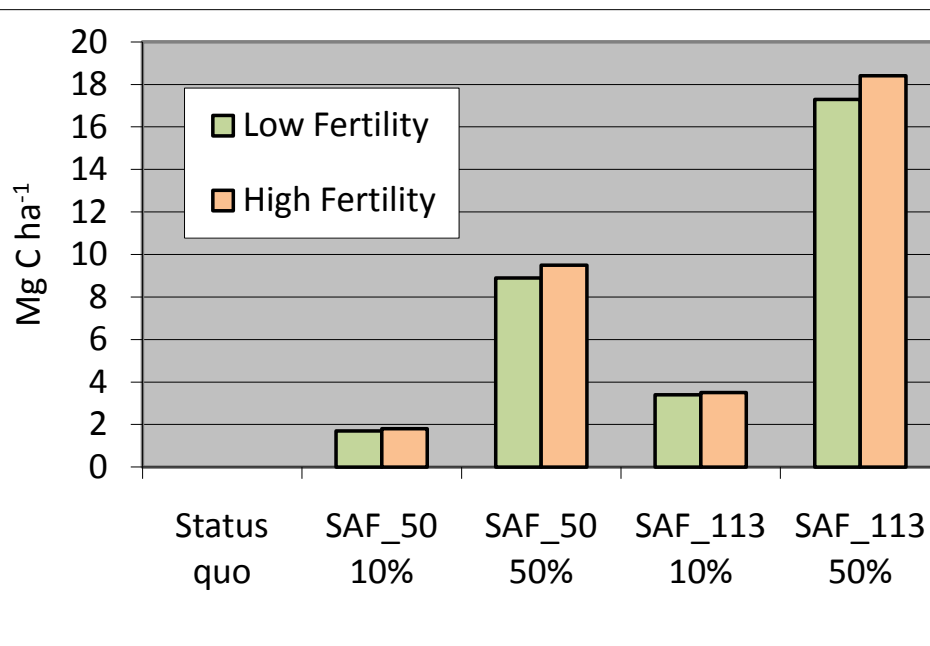
Equivalent annual value (€ ha⁻¹ a⁻¹)

Comparing profitability of Silvoarable vs. Arable vs. Forestry in different land test sites across France
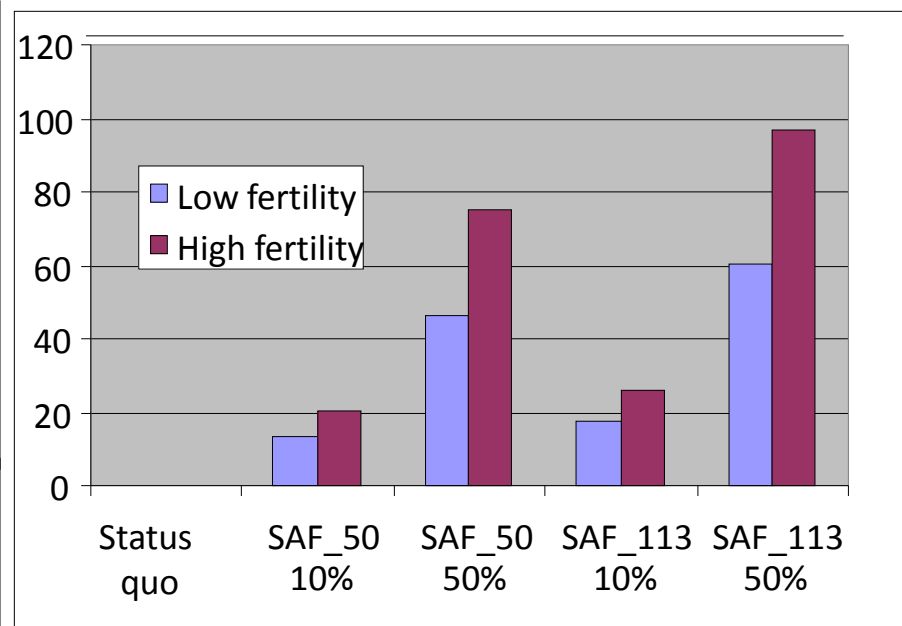
SAFE Models: environmental benefits
Soil erosion, nitrate leaching, landscape biodiversity, C sequestration

Comparing C sequestration in 60 years among different silvoarable scenarios
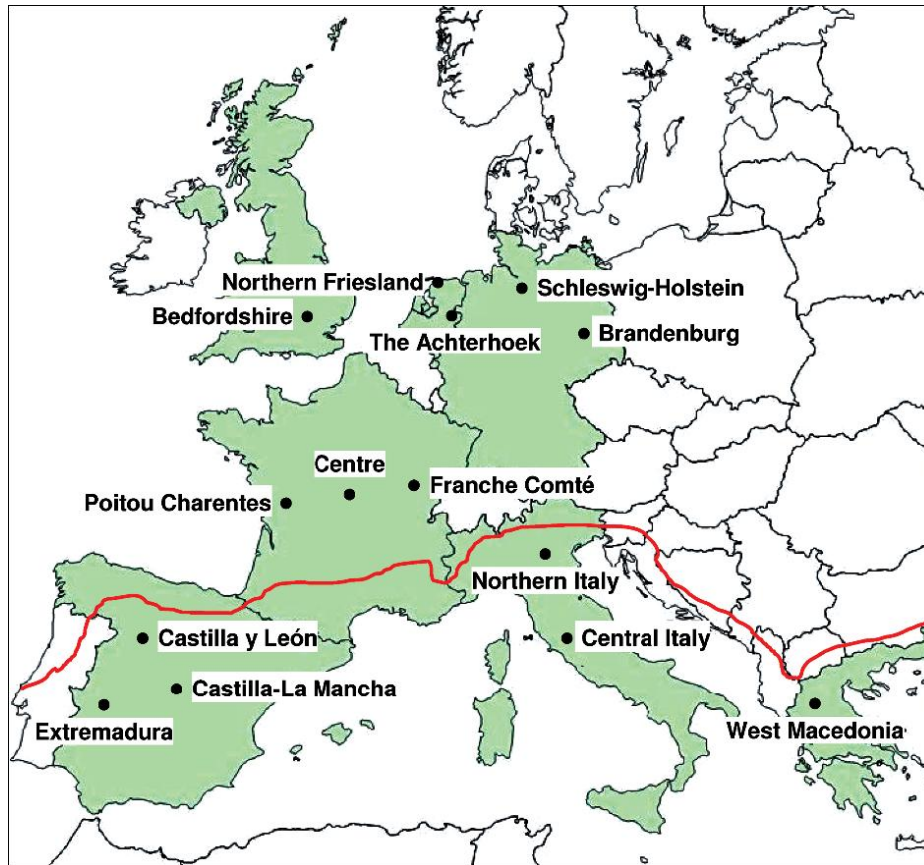

Pinus pinea and *Quercus ilex*

Juglans, populus, prunus

Foreste Italiane: 2,7 t C ha^{-1}anno^{-1} x 60 anni=162 t C ha^{-1}

Palma *et al*.: Agriculture, Ecosystems and Environment, 2007,119: 320-334

On farm survey

Objective: to assess farmers' awareness of silvoarable systems and to understand their interest in establishing silvoarable systems into the farmlands
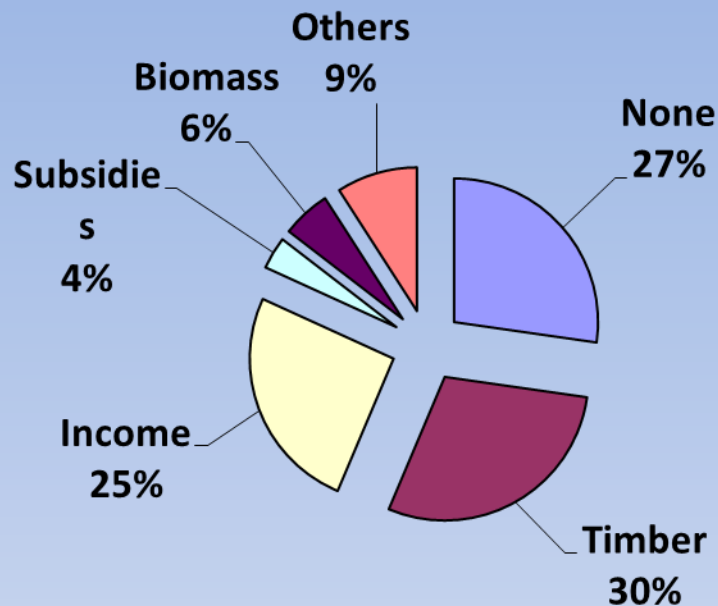

14 areas in 7 countries; face to face interview to farmers:

- Knowledge of agroforestry
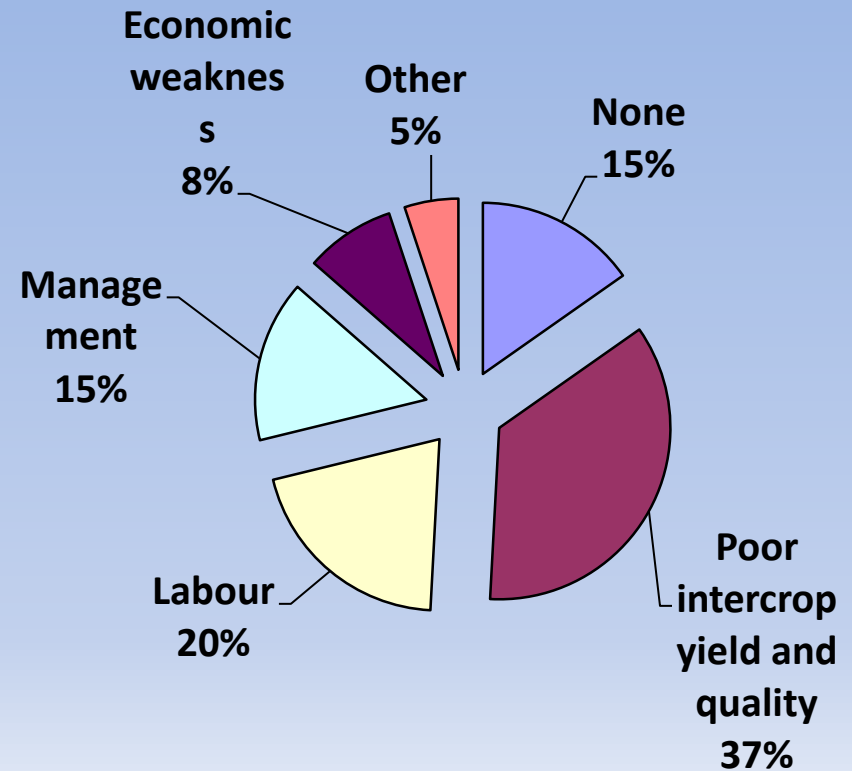- Perception of silvoarable systems (+/-)
- Design silvoarable systems

A. R. Graves, *et al.:* Advances in Agroforestry, Vol. 6, pp 67-86.

40 farmers interviewed in Central and Northern Italy

Contrasting farmers' knowledge about agroforestry
Common presence of trees in the farmlands
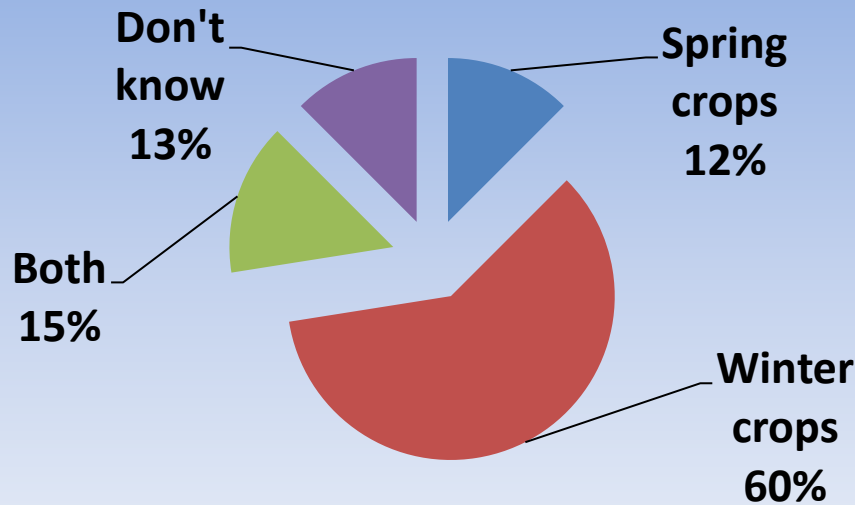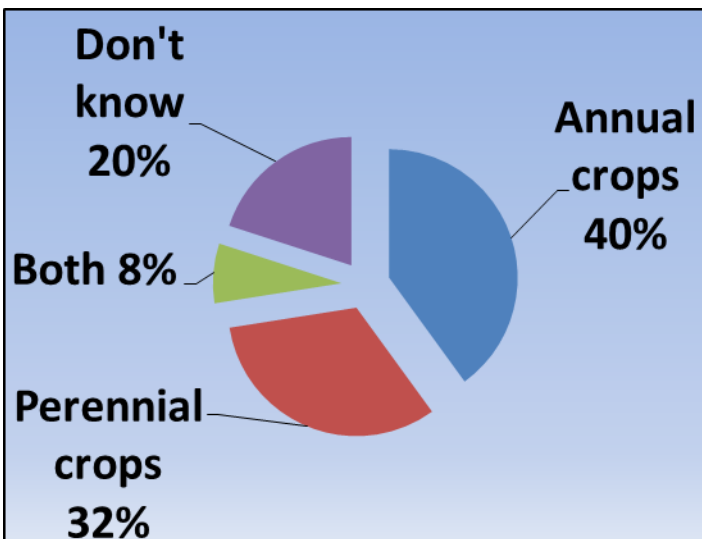

Perception of the benefits

Others 9%
Biomass 6%
Subsidies 4%
None 27%
Income 25%
Timber 30%

Perception of the constraints

Economic weakness 8%
Other 5%
None 15%
Management 15%
Labour 20%
Poor intercrop yield and quality 37%

Timber and fruit production as main aims

Preferred crop species

Don't know 13%
Spring crops 12%
Both 15%
Winter crops 60%

Preferred crop cycle

Don't know 20%
Annual crops 40%
Both 8%
Perennial crops 32%

Need to create network among different stakeholders to facilitate the adoption of silvoarable systems

Professionals survey:

Objective: to evaluate the knowledge and interest of professional technicians responsible to apply measure 2.2.2 of RDP at Regional level ➔ 27 technicians (Umbria and Veneto regions)
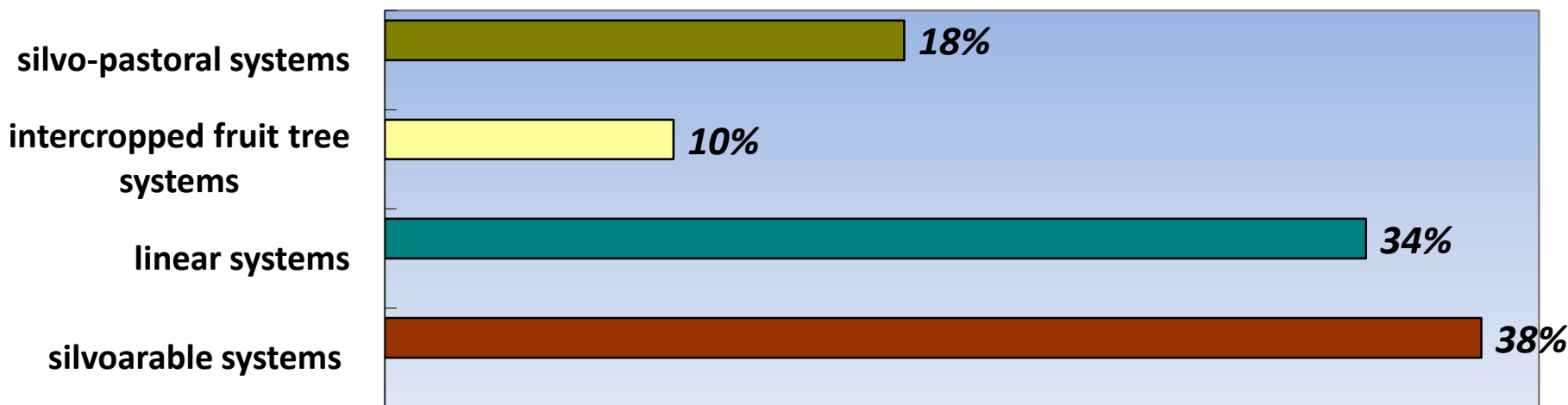
knowledge measure 2.2.2	
yes	70%
no	30%

All professionals interviewed believe that the SAF are appropriate cultural practices to the characteristics of the territory in which they work

System	Percentage
silvo-pastoral systems	18%
intercropped fruit tree systems	10%
linear systems	34%
silvoarable systems	38%

AF systems profitability	
yes	46%
no	54%

AF systems reduction of the UAA	
yes	69%
no	31%

39% knows how to calculate the reduction of UAA due to the presence of trees

90% of professionals interviewed recognized insufficient promotion of measures 2.2.2 by the Regions

Agroforestry and Single Farm Payment

Study cases of the reduction of SFP due to the presence of agroforestry systems

Linear systems: width > 2m →

← **Scattered trees: density > 50 trees/ha**

SYSTEM 1
Location: Umbria - Castel Giorgio
UAA (Used Agricultural Area): 1.86.31 ha with sunflower
Not Used Agricultural Area (tare): linear system with oaks 0.06.62 ha
Single Farm Payment: amount: 280,35€/ha.
Economic Impact of the linear system: 3,43%

SYSTEM 2
Location: Umbria - Castel Viscardo
**UAA (Used Agricultural Area):** 2.21.37 ha with wheat
Not Used Agricultural Area (tare): linear system with *Quercus cerris* L. and *Carpinus betulus* L. 0.14.15 ha
Single Farm Payment: amount: 343,34€/ha.
Economic Impact of the linear system: 6%

Conclusions

- **Recently, significant implementation of knowledge on agroforestry systems in Europe (economical and environmental benefits)**

- **New modeling tolls are available, but they need further research implantation**

- **European CAP has just recently initiated to promote agroforestry, but with very contrasting approaches (Meas. 222 vs. Single Farm Payment)**

- **Strong need for technical extension of agroforestry knowledge among professionals and stakeholders**

- **Strong need for long terms demonstrative areas as convincing examples for stakeholders interested to adopt agroforestry**
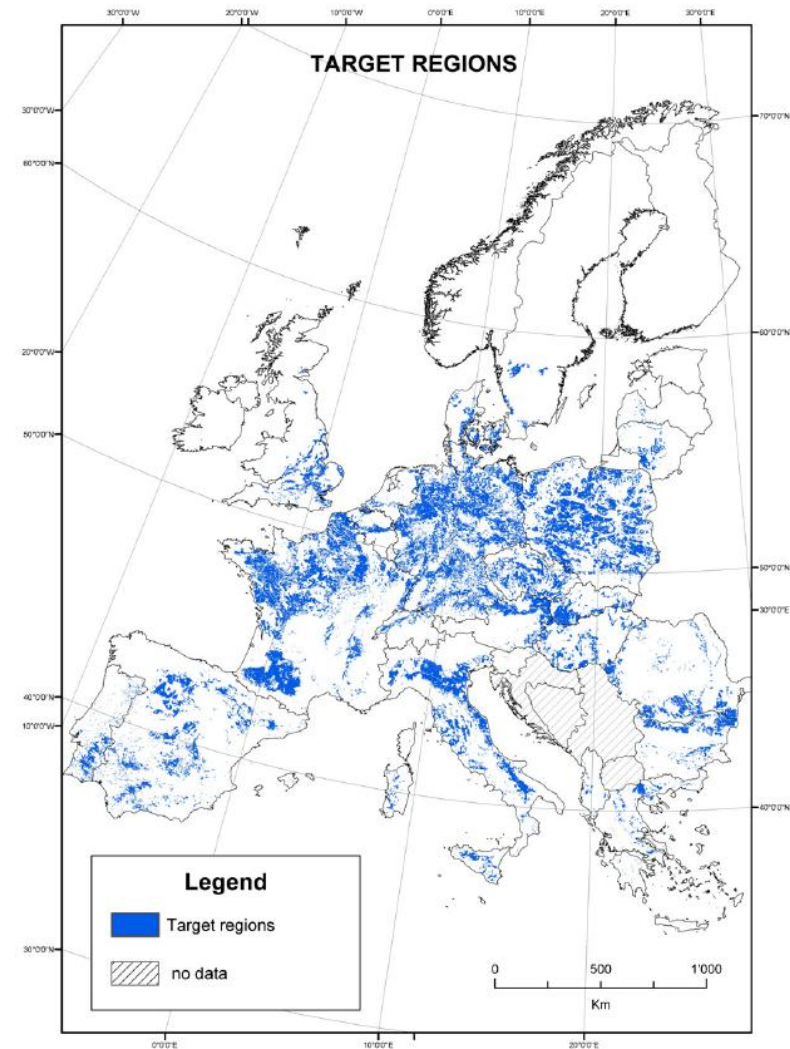
Target regions for silvoarable agroforestry in Europe, from: Reisner *et al.,* Ecological engineering 29 (2007) 401–418

Thanks for the attention!