Agroforestry systems: a land use option to enhance productive, environment and social benefits

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This presentation aims at describing the recent research findings in different Spanish Environments to get

* better production
  Tree
  Crop

* sustainable systems to promote environmental benefits:
  Biodiversity
  Carbon
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Acid soils
Water pH < 4.5

Basic soils
Water pH > 8
Initial Tree-pasture interaction

Tree regeneration: Adequate environment is needed:

**Mediterranean:**
The lack of grazing protects tree sapling development

**Atlantic:**
Shrub grazing promotes tree sapling establishment

Clover promotes initial fast growing tree species growth
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Height

Pinus pinaster

Eucaliptus nitens

Castanea sativa

Quercus robur
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LOW TREE DENSITY IS NEEDED IN SEMIARID ENVIRONMENTS
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It depends on

Tree species

Indicator: Tree cover NOT tree density
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Pasture production depends on

Tree species

depends on Climate
Agroforestry systems: a land use option to enhance productive, environment and social benefits: Biodiversity

Biodiversity
heterogeneity at farm scale

Climate

Animal

Farming-Techniques

Tree

Soil

Nitrophilous Annuals

Dehesas

Annuals

Perennials

Animal selection

Dicots

Shade tolerant

Number of Species

Small Birds

Medium Mammals

Small Mammals

Worms

Shrubs

Number of Species

Cropped Dehesas

Grazed Dehesas

Encroached Dehesas
Agroforestry systems: a land use option to enhance productive, environment and social benefits: **Biodiversity**

Biodiversity

- **heterogeneity at landscape scale**

**Climate**

Daily movement: *Q. pyrenaica* in Portugal

**Soil**

Hedges

**Biodiversity**

- Microbian
- Artropods
- Flora
- Fauna

**Transmission: Lowlands to highlands**

**Transhumance: Silver pathway**
Agroforestry systems: a land use option to enhance productive, environment and social benefits: **Biodiversity**

**Pinus radiata**

**Betula alba**

**Prunus avium L.** 400 trees ha\(^{-1}\)

**Species richness**

**Avoiding biodiversity losses**

**Avoiding carbon losses**

Silvopasture >> silvoarable
Agroforestry systems: a land use option to enhance productive, environment and social benefits: Carbon

Carbon aerial sequestration depends on tree density
But, SOIL is the most important C reservoir in the terrestrial ecosystems.

High storage in Agroforestry than in Permanent Pasture alone

Carbon sequestration

> 25 m
Agroforestry systems: a land use option to enhance productive, environment and social benefits:

Carbon

Pinus radiate > Betula alba

- 2500 trees ha⁻¹
- 833 trees ha⁻¹

Betula alba

Pinus radiate
Prunus avium L. 400 trees ha\(^{-1}\)

Silvopasture >> silvoarable

Agroforestry systems: a land use option to enhance productive, environment and social benefits: Biodiversity
Conclusions

Agroforestry have many productive and environment advantages

• Dissemination mechanisms should be established:

  There are a lot of knowledge that should be transferred to policy makers, administrators and farmers

More research is needed at local scale

Agroforestry systems should be promoted at European level, but considering local and regional edaphoclimatic conditions

In concrete:
Agroforestry systems should be promoted in areas with more than 50 trees ha$^{-1}$, such as grazed forests and tree plantations
Elegibility of agropastoral systems should be based on the existence of grazing activity rather than vegetation type or structure
Thanks!