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

M. R. Mosquera-Losada, G. Moreno-Marcos, A. Rigueiro-Rodríguez

Crop Production Department. University of Santiago de Compostela. Campus de Lugo. Spain

Forestry Research Group. University of Extremadura. Campus de Plasencia Spain

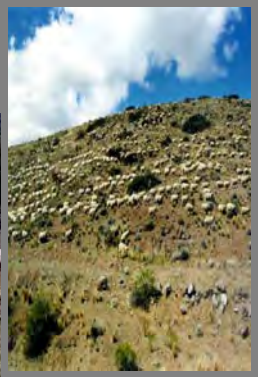
This presentation aims at describing the recent research findings in different Spanish Environments to get

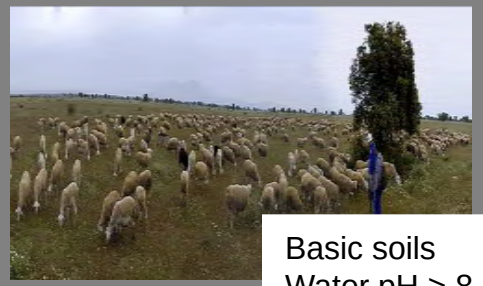
* better production
  - Tree
  - Crop

* sustainable systems to promote environmental benefits:
  - Biodiversity
  - Carbon

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

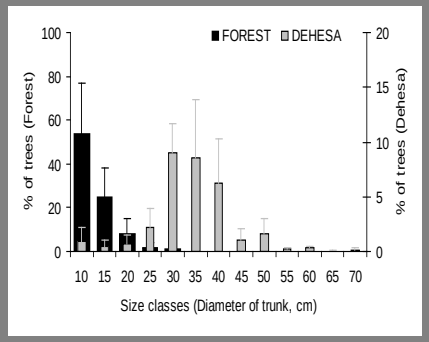
Acid soils
Water pH < 4.5

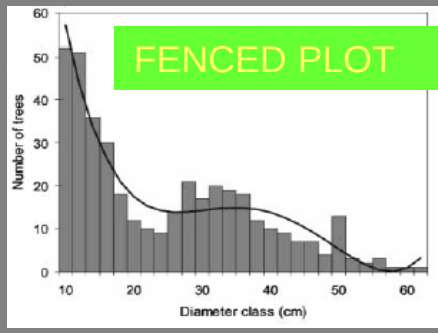




Basic soils
Water pH > 8

Initial Tree-pasture interaction





Tree regeneration:

Adequate environment is needed:

Mediterranean:

The lack of grazing protects tree sapling development

Atlantic:

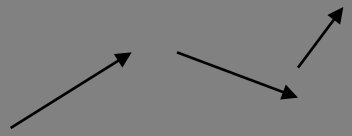
Shrub grazing promotes tree sapling establishment

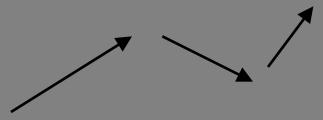
Clover promotes initial fast growing tree species growth

Pinus pinaster

Eucaliptus nitens

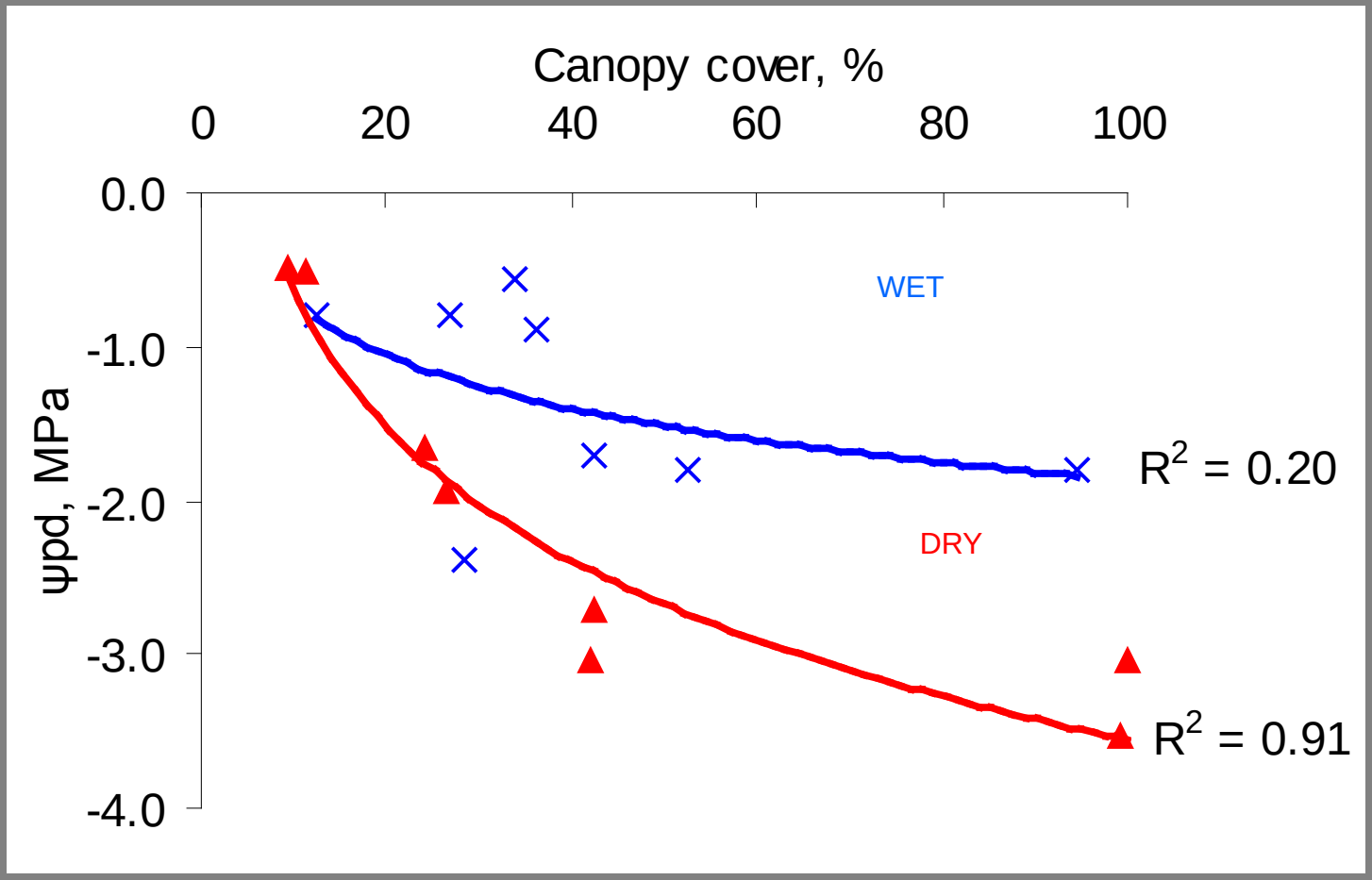
Height





Castanea sativa

Quercus robur



LOW TREE DENSITY IS NEEDED IN SEMIARID ENVIRONMENTS

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

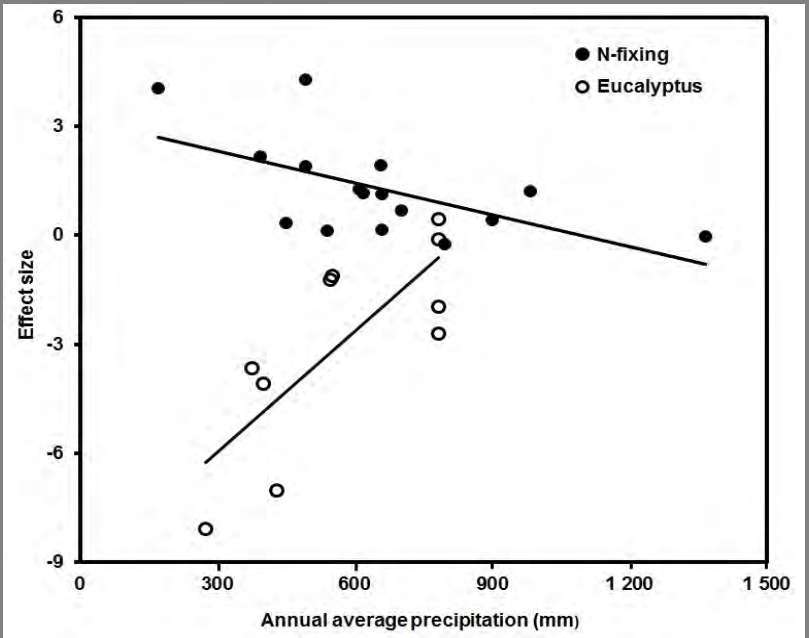
It depends on

Tree species

Indicator: Tree cover NOT tree density

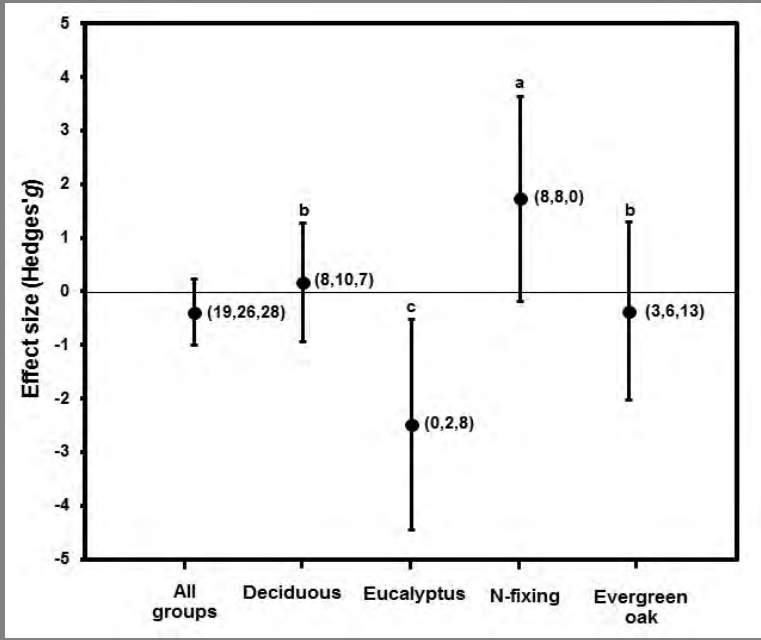
Agroforestry systems: a land use option to enhance productive, environment and social benefits : Pasture Production

Pasture production depends on



depends on Climate

Tree species



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

Biodiversity

heterogeneity at farm scale

Climate

Soil

Tree

Shade tolerant

Dicots

Animal

Annuals

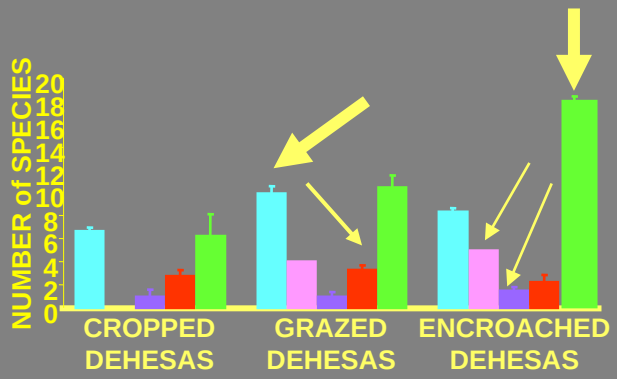
Nitrophilous

Animal selection

Farming-Techniques

Perennials

Annuals



SMALL BIRDS

MEDIUM MAMMALS

SMALL MAMMALS

WORMS

SHRUBS

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

Biodiversity

heterogeneity at landscape scale

Climate

Soil

Daily movement: *Q. pyrenaica* in Portugal

Hedges

Transtermitance: Lowlands to highlands

Transhumance: Silver pathway

Biodiversity

Microbian

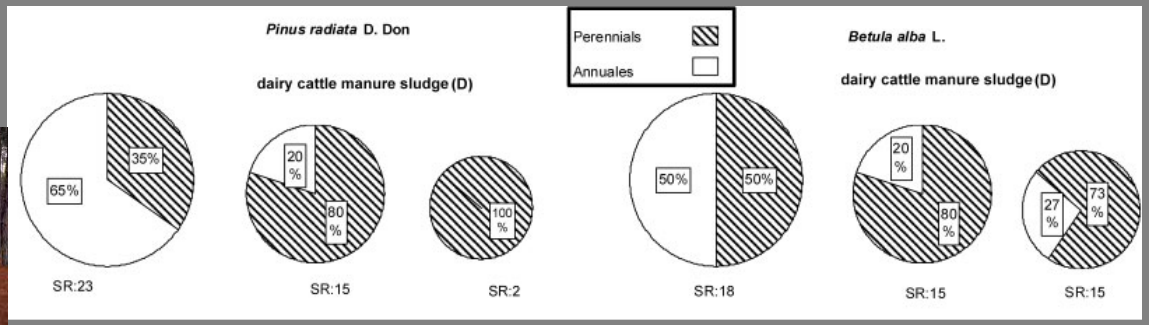
Artropods

Flora

Fauna

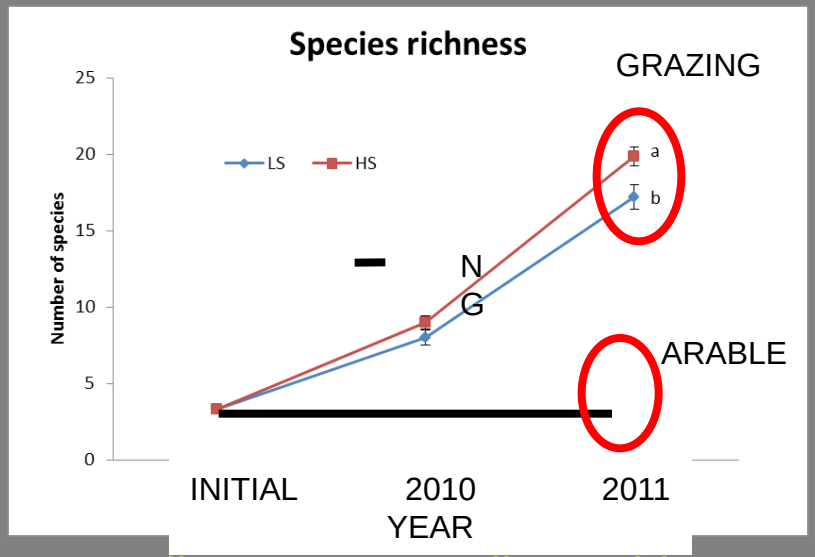
Agroforestry systems: a land use option to enhance productive, environment and social benefits: Biodiversity

Pinus radiate



Betula alba

Prunus avium L. 400 trees ha^{-1}

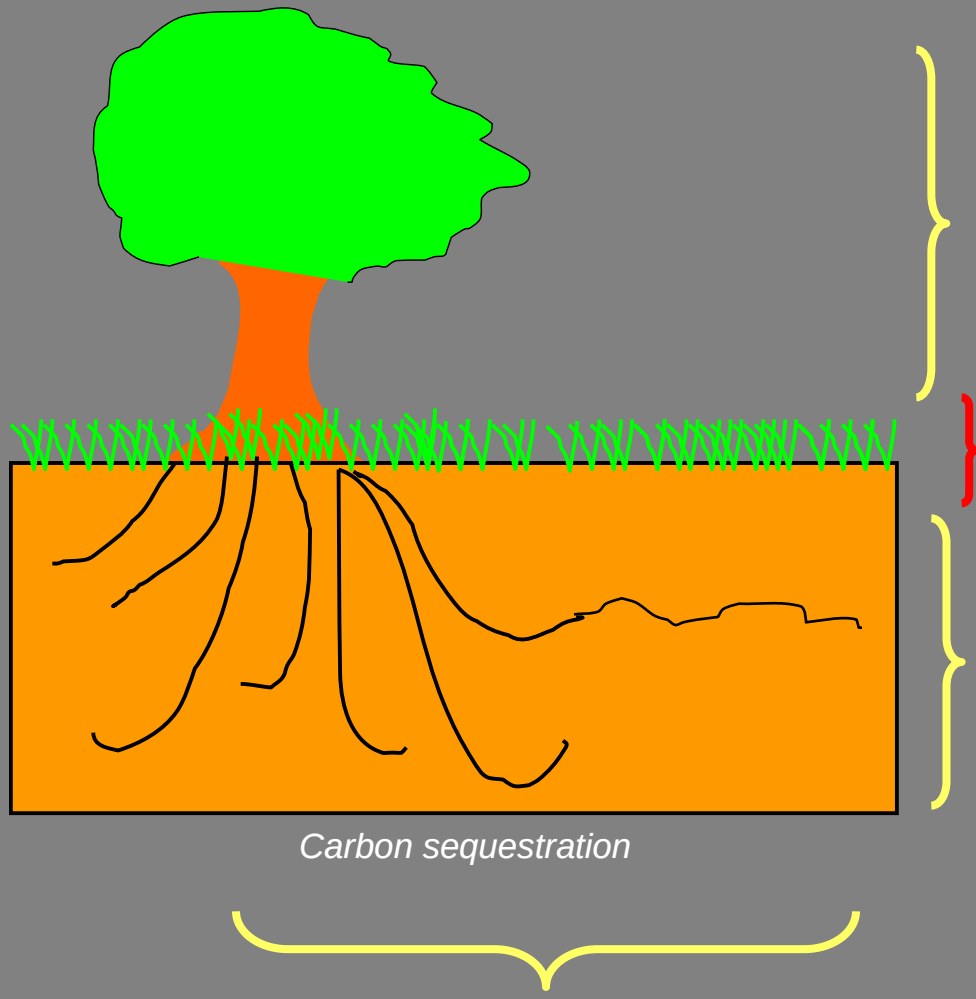


Silvopasture>> silvoarable

AVOIDING BIODIVERSITY LOSSES

AVOIDING CARBON LOSSES

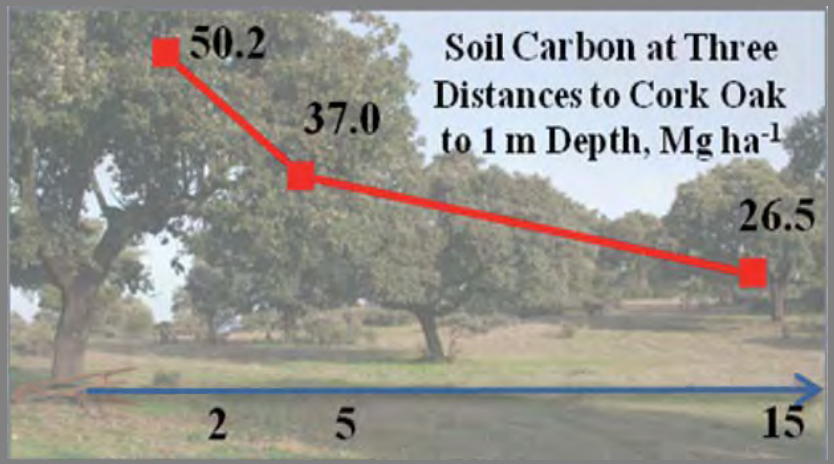
Agroforestry systems: a land use option to enhance productive, environment and social benefits: Carbon

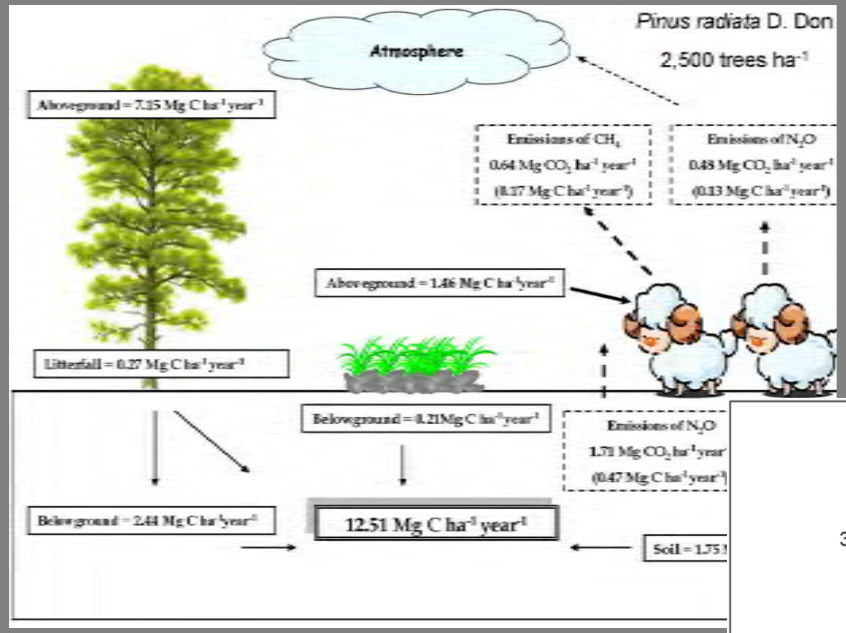


Carbon aerial sequestration depends on tree density

But, SOIL is the most important C reservoir in the terrestrial ecosystems.

High storage in Agroforestry than in Permanent Pasture alone



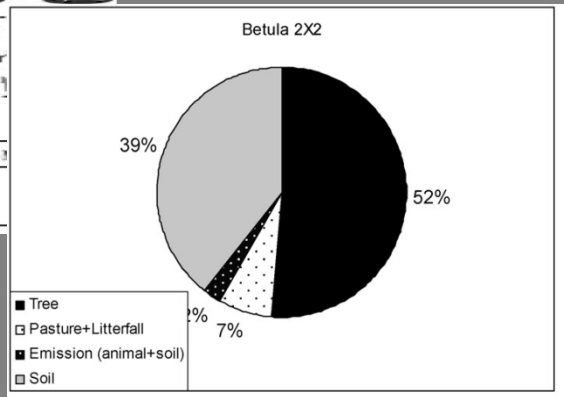


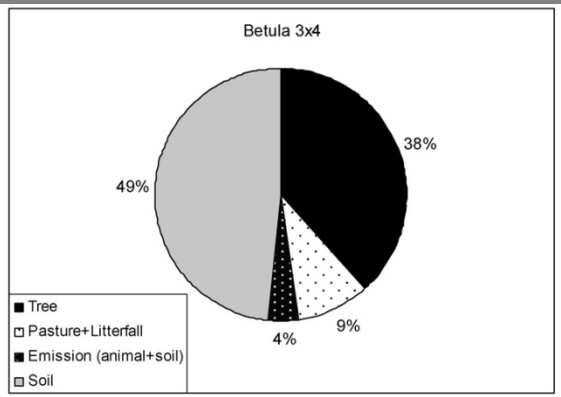
Pinus radiate > Betula alba

2500 trees ha^{-1}

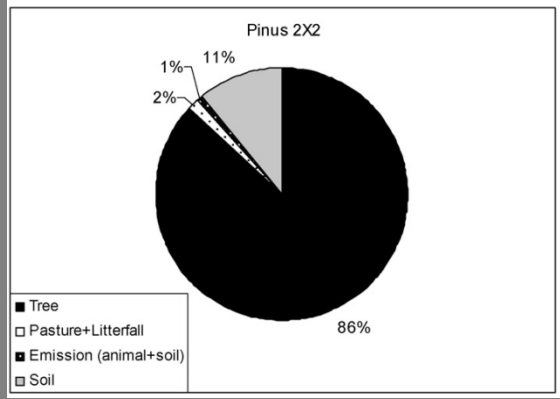
833 trees ha^{-1}

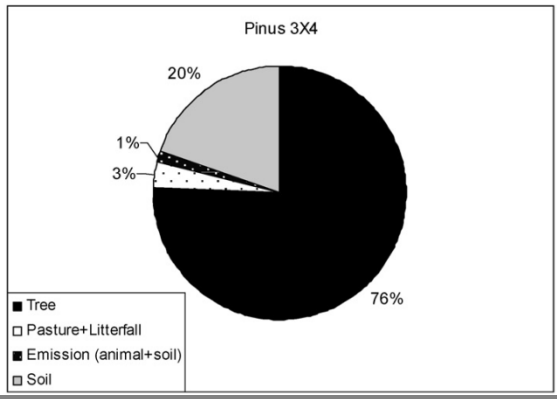
Betula alba





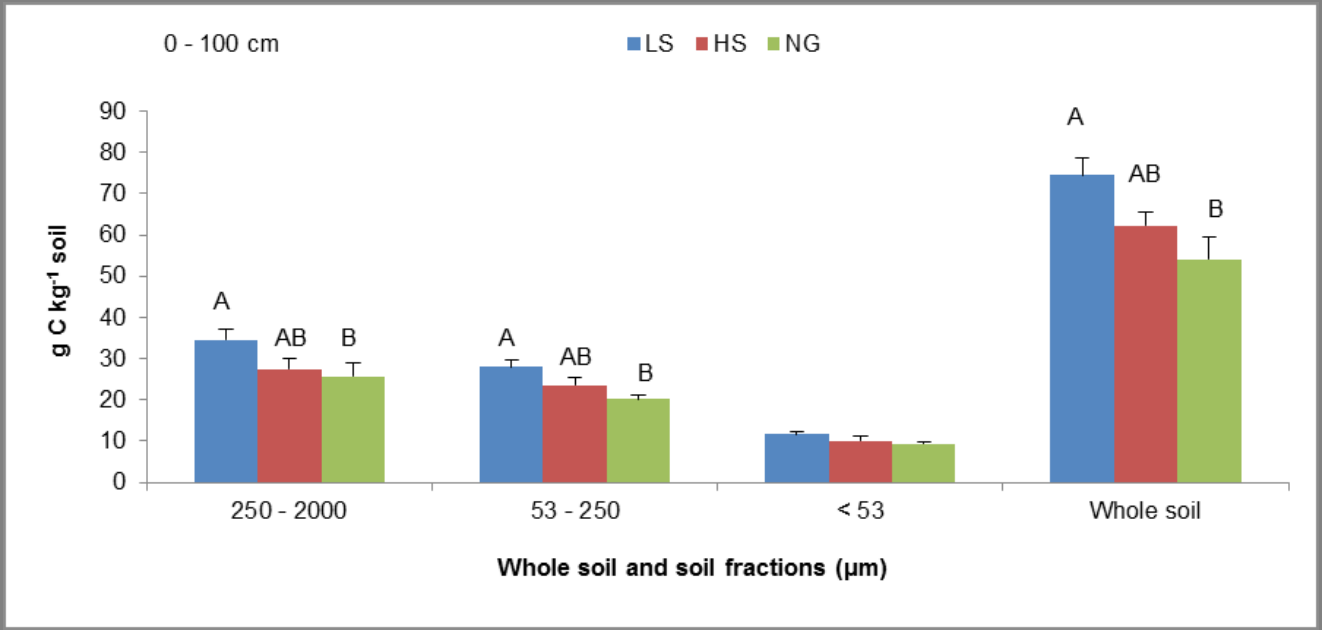
Pinus radiate





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

Prunus avium L. 400 trees ha^{-1}



Silvopasture>> silvoarable

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!