

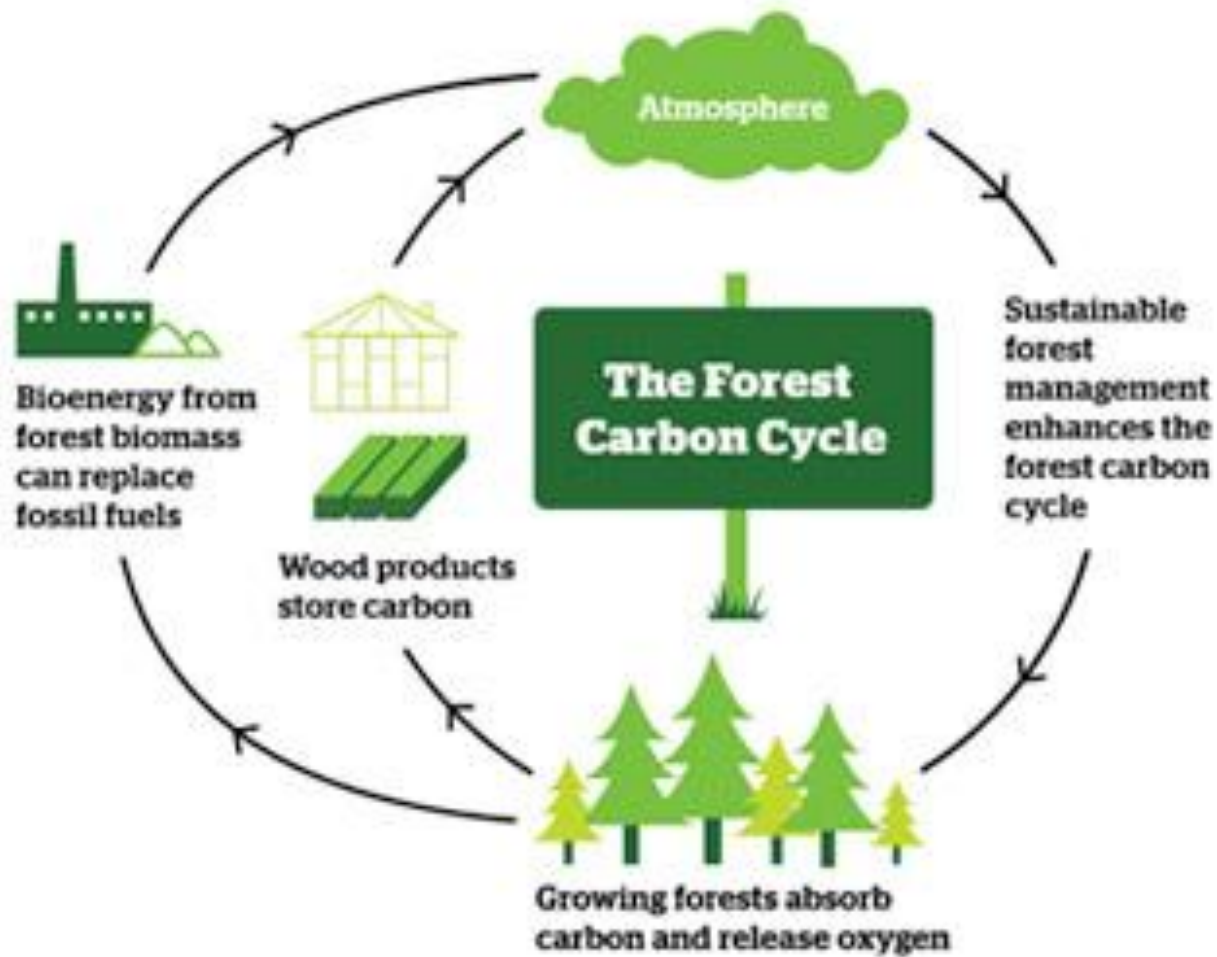


Effect of forest management on Carbon Cycle

Action ForC of LIFE ManFor C.BD.

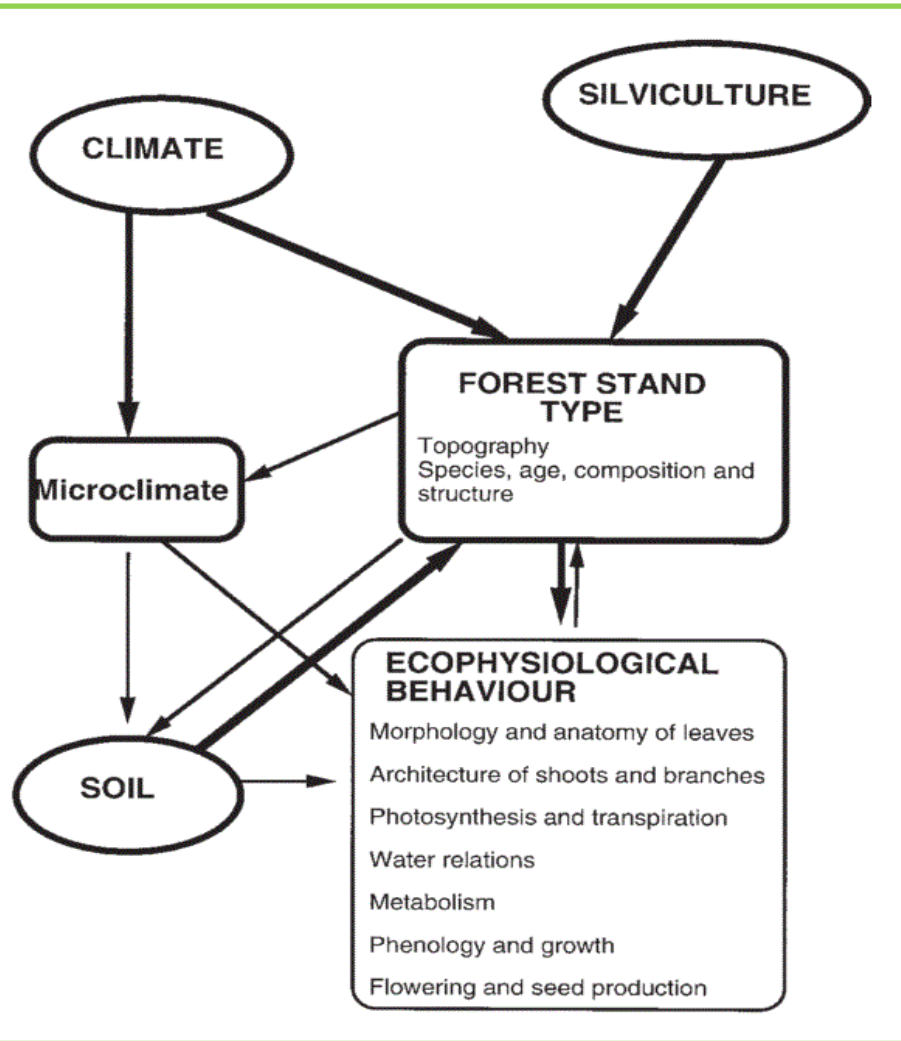
CNR and SFI

*Giornata finale del progetto LIFE+ ManFor C.BD.
Aula Convegni del Consiglio Nazionale delle Ricerche
Roma 13 Maggio 2016*



<http://www.foresteurope.org>

Interactions between changes in forest structure and forest Carbon Cycle



Climatic variables are greatly modified by forest structure, which creates a microclimate.

Management interact with forest structure and modify the microclimatic parameters.

Modifications of microclimatic parameters have a effect on carbon cycling.

(Aussenac, 2000)

Interaction between structure modification and Carbon Cycle

Forest management and harvesting operations have effects of on soil C and N.

- **The positive effect on soil C and N of residues**

- Changes in Soil Organic Carbon:

1. mixing and movement of the organic material or litter layer into the mineral soil
2. Possible soil erosion.
3. Leaching of dissolved organic carbon nitrogen.

Interactions between changes in forest structure and forest Carbon Cycle

Forest management can induce changes in soil respiration

1. directly affect living roots (consequently root respiration) removing trees;
2. reduce competition for soil moisture and nutrients, that stimulates production in the surviving trees consequently with an higher roots production and respiration;
3. modify microclimatic characteristics of soil (moisture and temperature)

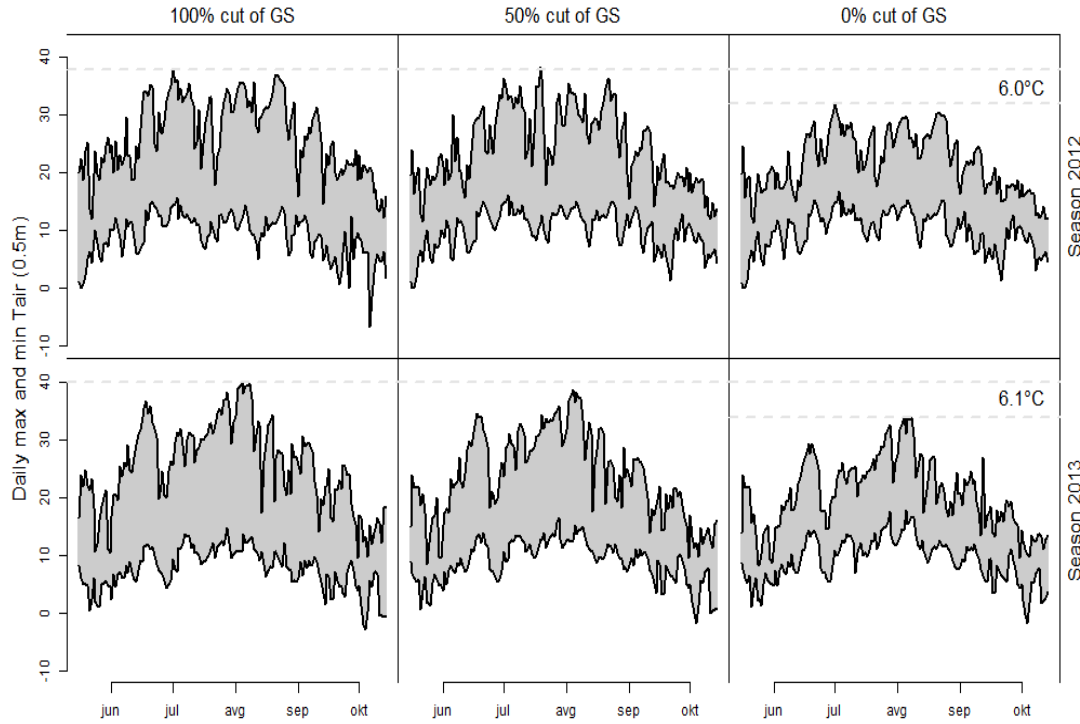
Interactions between changes in forest structure and forest Carbon Cycle

Increase in growth of trees is the result of several phenomena linked to forest management :

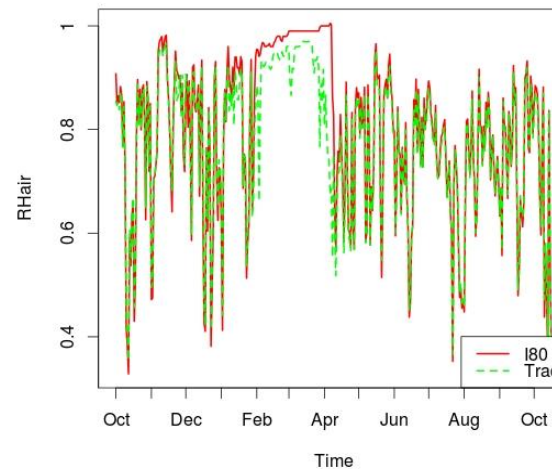
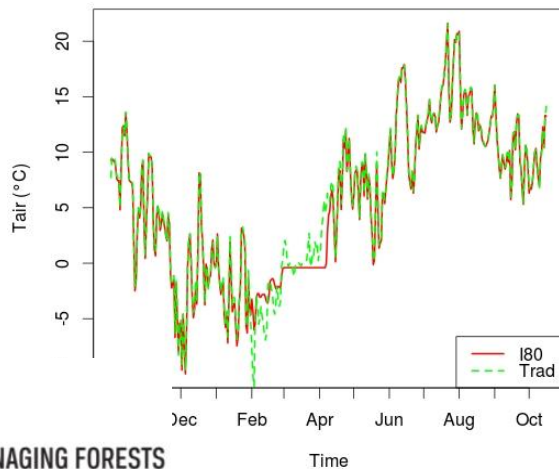
- the increase of light in the lower parts of the crown which favours photosynthesis;
- the increase of soil water availability and reduction of water consumption;
- Changes in the soil surface, resulting in faster humus mineralization, which releases nitrogen and other nutrients.

Lessons and results from LIFE ManFor

Effect of management on microclimatic parameters

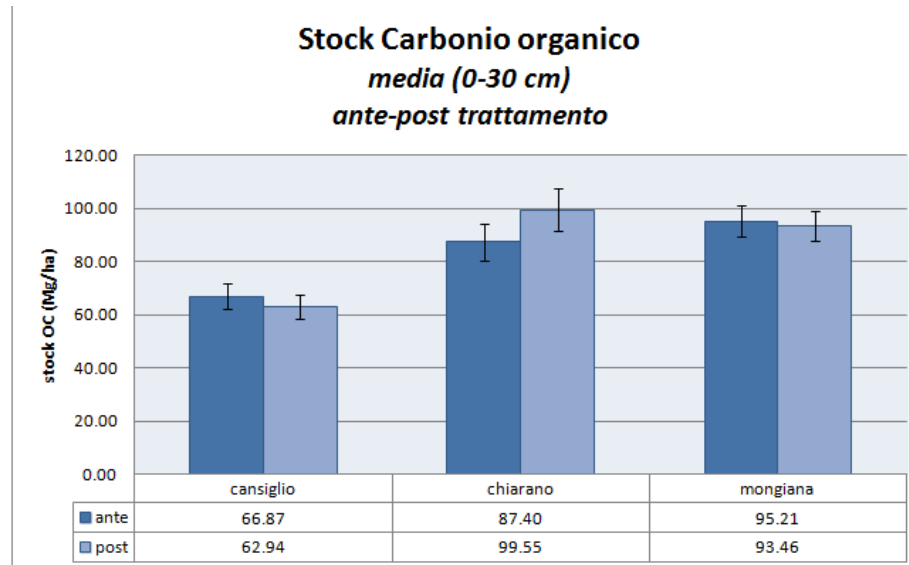
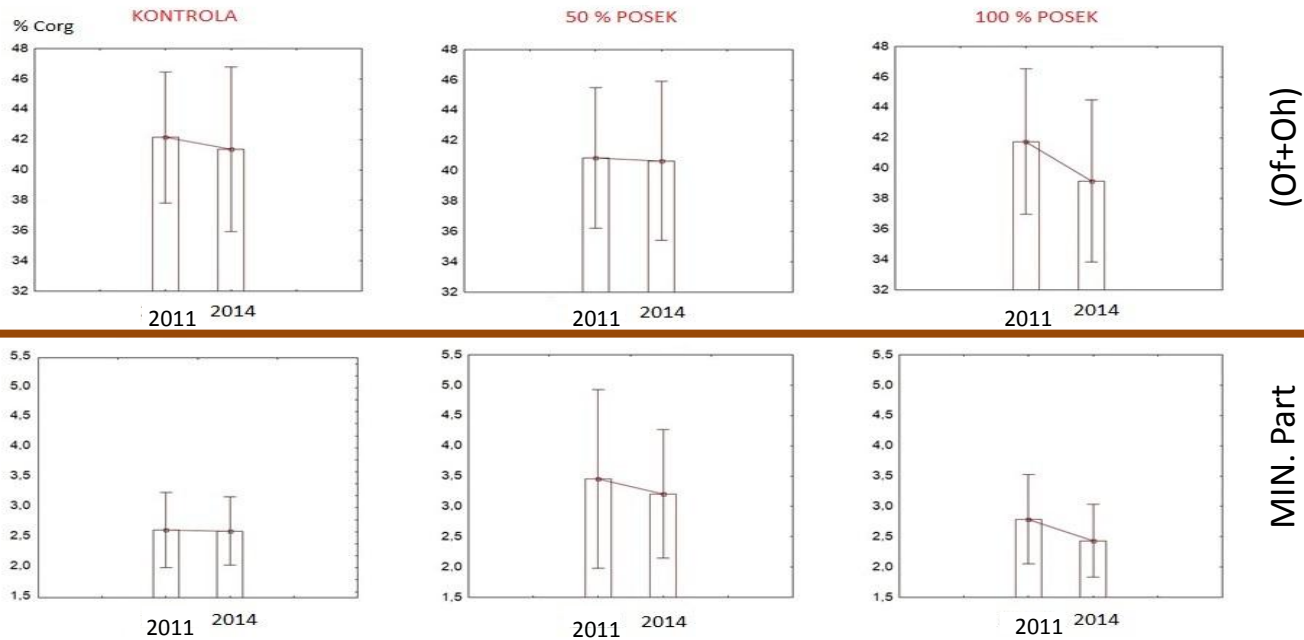


Trnovo
Slovenia

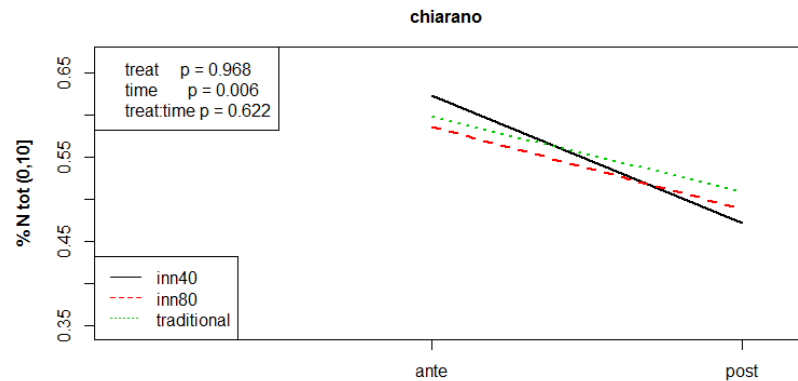
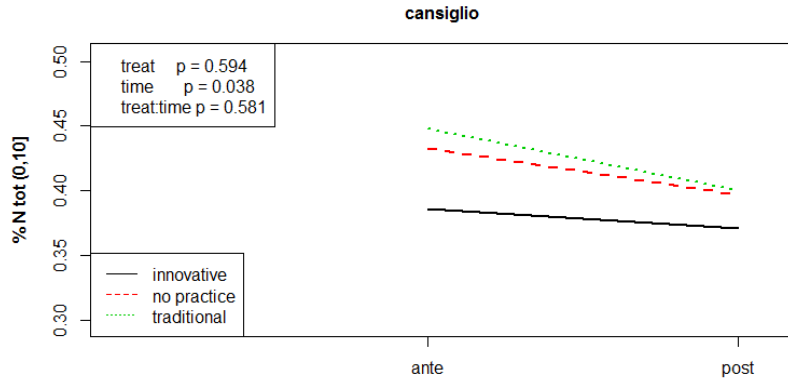


Chiarano
Abruzzo

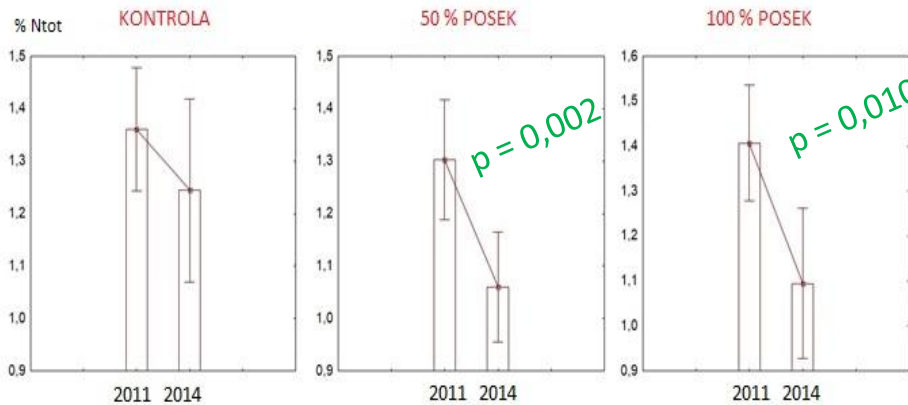
Effect of management on Organic Carbon



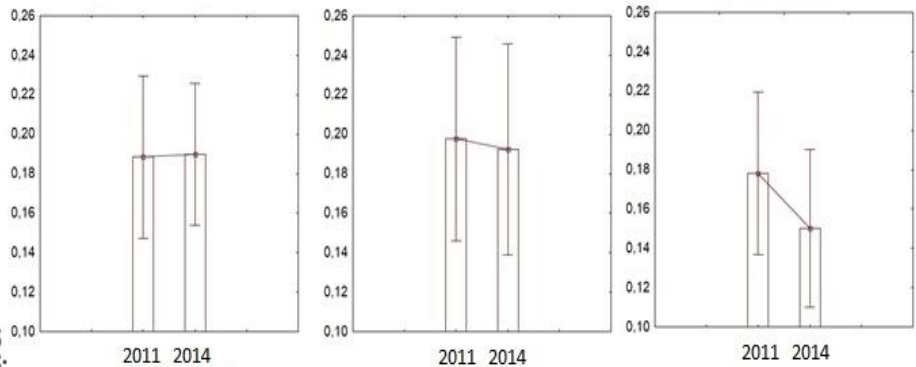
Effect of management on soil Nitrogen



data

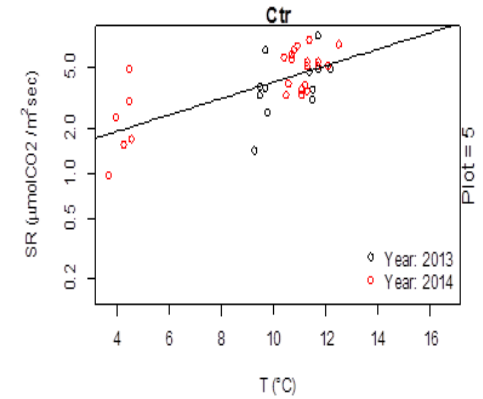
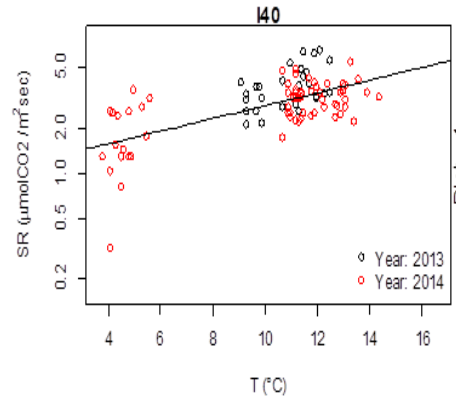
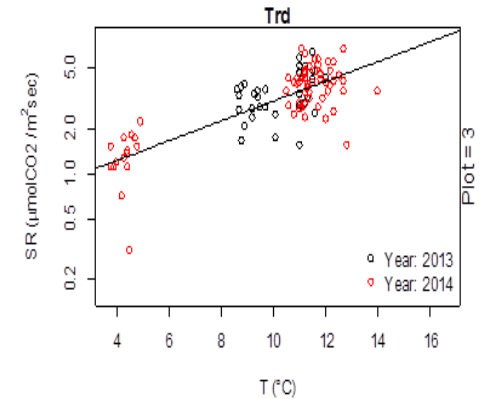
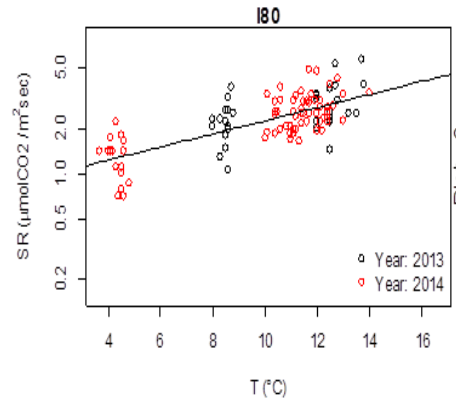
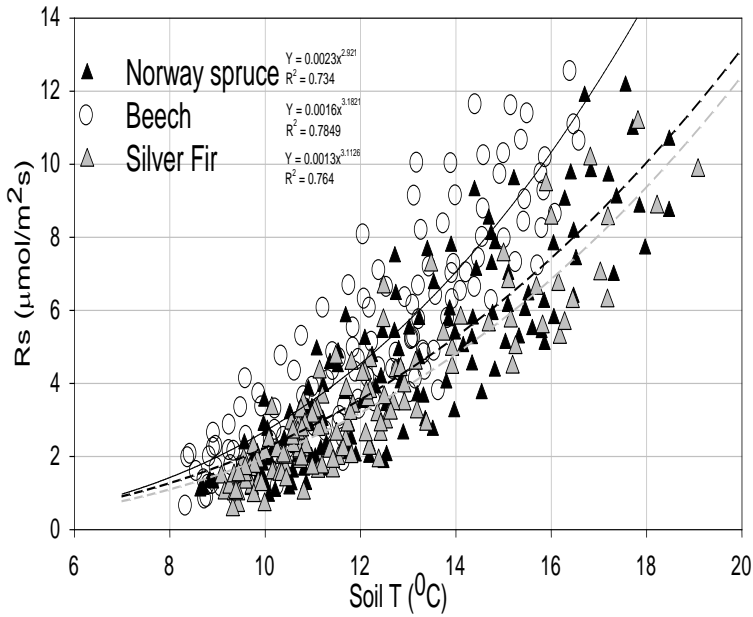


(Of+Oh)

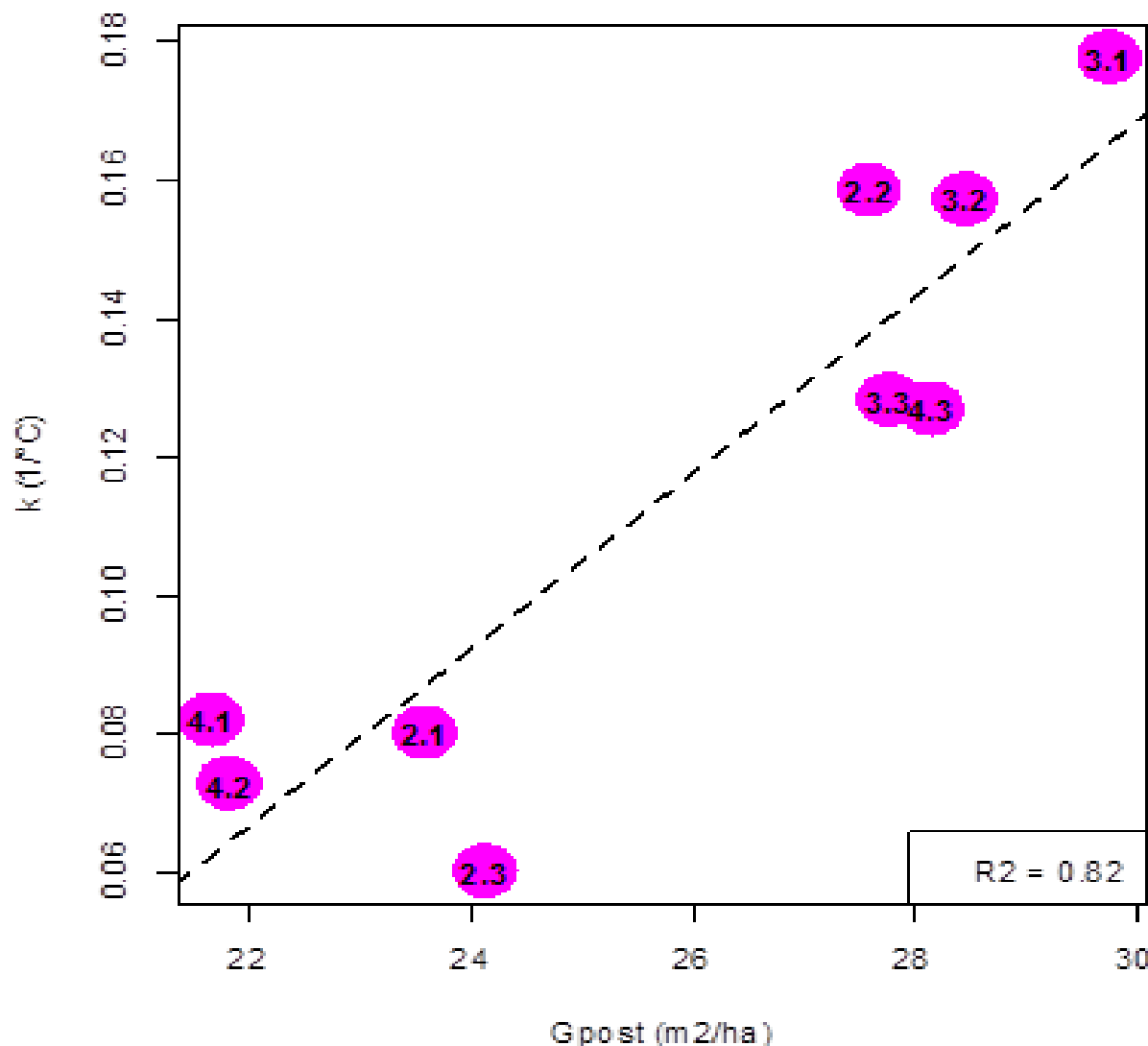


MIN. Part

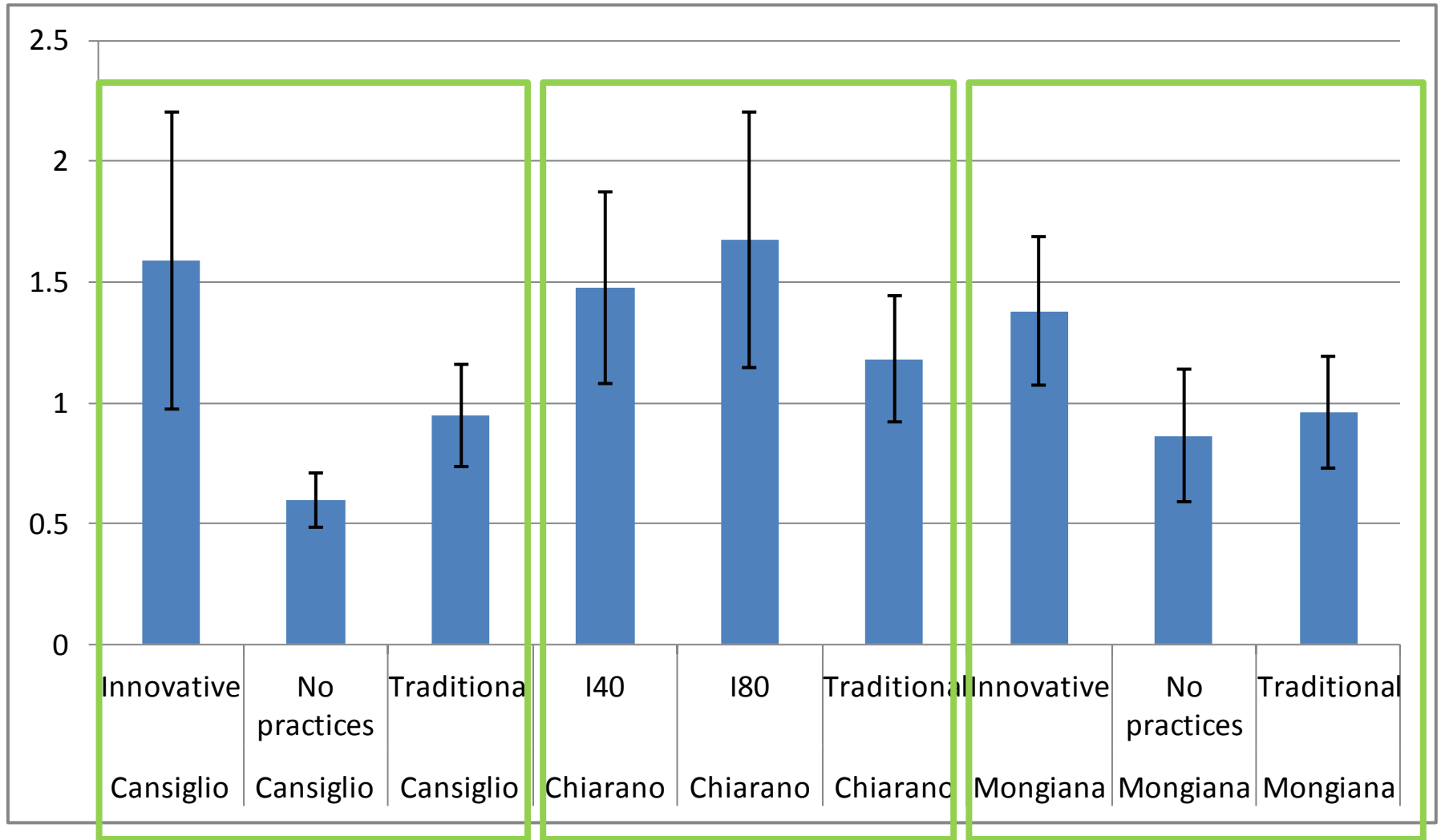
Relation between temperature and Soil respiration



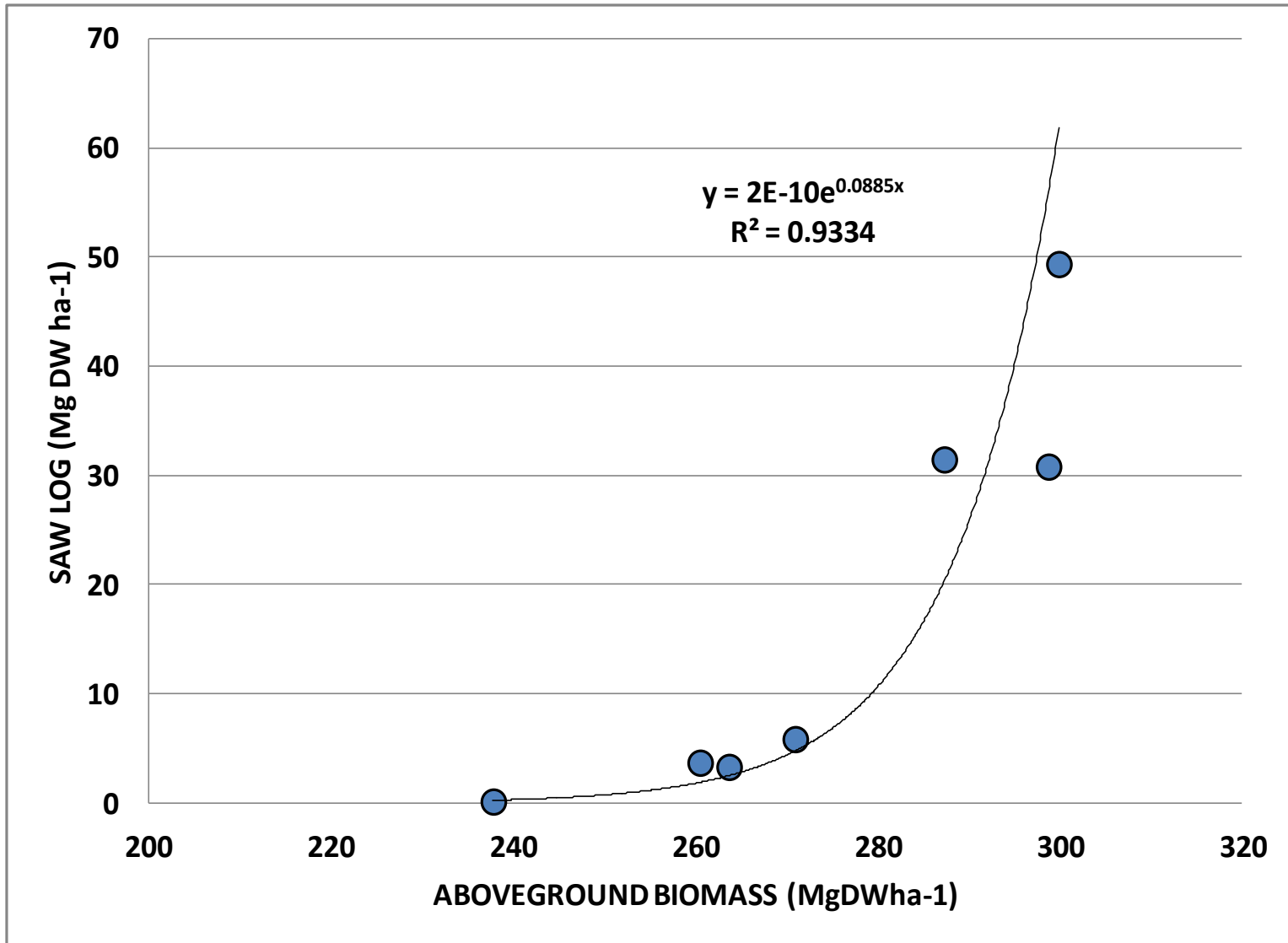
Soil respiration of forests with more biomass are more responsive to changes in temperature



Proper management stimulates growth

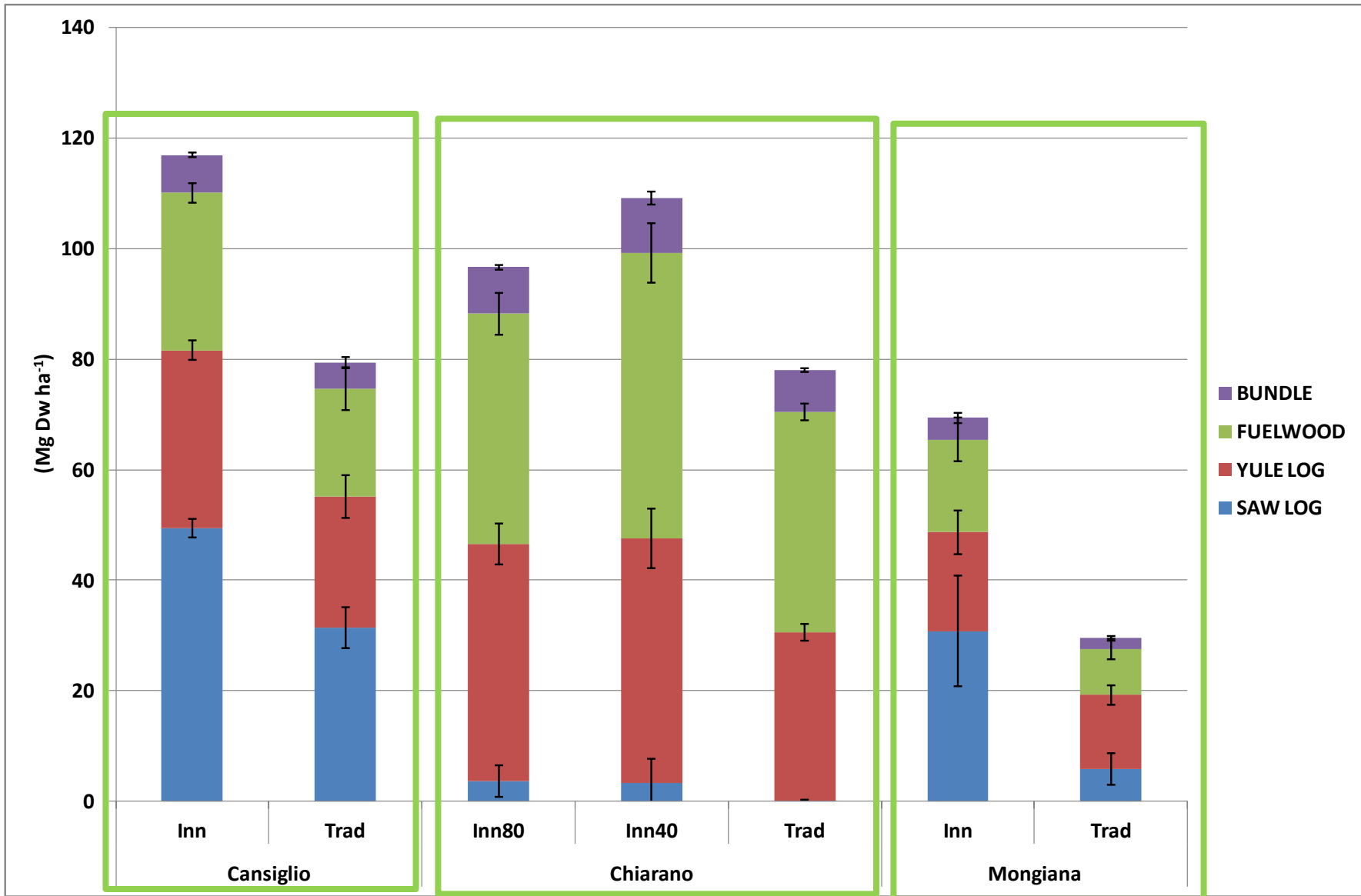


Carbon cycle out of forest (forest products)



Removing some bigger trees
Increase the fraction of roundwood

Carbon cycle out of forest (forest products)



Take-home messages

- Effect of forest management on microclimatic parameters is very sensitive to strength of silvicultural treatments.
- No changes in stock of soil organic carbon at any of the ManFor site
- Decrease in soil nitrogen – transfer to plants.
- Soil respiration is a key process
- At all sites innovative treatments affect more positively the stem growth compared to traditional or delayed treatments.
- Innovative options potentially produced high quality wood to produce durable goods that store carbon for longer times