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Abstract

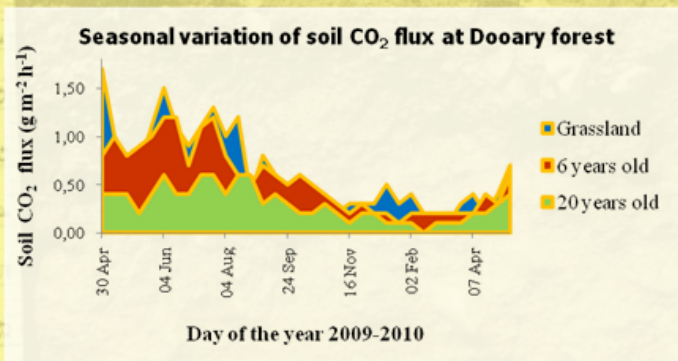
The effects of land use change on soil CO₂ emission are still not well understood. In this study three sites have been assessed for the impact of afforestation on soil respiration. Using rain out shelters the effect of reductions in water availability on soil respiration emission have also been examined because of the predicted drier summers resulting from climate change. The results showed that afforestation of semi-natural grassland decreased the emission of CO₂ in to the atmosphere. Reductions in water availability and increases in soil temperature inside the shelters resulted in higher emissions. Of the parameters measured soil temperature had the bigger influence on soil carbon dioxide emissions.



Site description and methods

The three sites include a semi-natural grassland dominated by *Juncus spp.*, a 6 year-old and a 20 years-old Sitka spruce (*Picea sitchensis*) (Bong.) Carr.) forest. The three sites are located on wet mineral soils (surface water gley) at Dooary forest, Timahoe, Co. Laois. The Dooary forest is a first rotation plantation established on former grassland. Regular measurements of carbon dioxide emissions have been taken using a PP System Infra-red gas analyser with a soil respiration chamber.

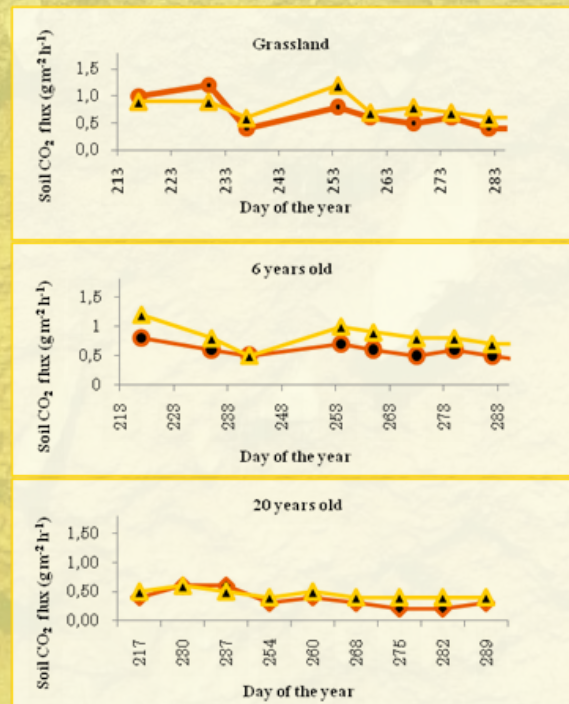
The effect of land use change



The highest soil CO₂ emissions were observed in the grassland site with lower emissions in the 6 and 20 year-old forest. In this study afforestation decreased the emission of CO₂ in to the atmosphere. Soil temperature showed the strongest relationship with soil respiration (r^2 values: 0.4227, 0.5167, 0.7536).

As a result of reductions in water availability carbon dioxide emissions were generally higher inside the exclusion shelters at all sites analyzed.

The effect of simulated climate change



- Soil CO₂ efflux inside the shelters
- Soil CO₂ efflux outside the shelters

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