

Best Biodiversity presentation 2026 at ENVIRON 2026

Speaker: Ragna Hoogenboom, University College Dublin

Supervisor: Grace Cott, University College Dublin

Title: The Effect of Elevated CO₂ and Temperature on the Carbon Sequestration Potential of Salt marsh Grasses *Puccinellia maritima* and *Spartina anglica*

My research is at the intersection of plant physiology and climate change in salt marsh habitats to answer the question: how will future salt marshes lock away carbon? Salt marshes are temperate coastal ecosystems that are under the influence of the tides. They are vegetated by salt-tolerant grasses and shrubs that are specialised in growing within the intertidal zones of the coast. The waterlogged conditions and high salinity in the soils allow for salt marshes to absorb carbon from the atmosphere into their soils at rates that rank among the highest of any global habitat.

Plant morphological and physical traits respond to higher temperatures and higher atmospheric CO₂ levels, caused by climate change. The shift in functional traits of plants will alter the carbon dynamics of an ecosystem. My aim is to quantify plant trait changes of two common salt marsh species, *Spartina anglica* (Common cordgrass) and *Puccinellia maritima* (Common salt marsh grass), under climate change to assess the long-term capacity of these ecosystems to serve as critical carbon sinks.

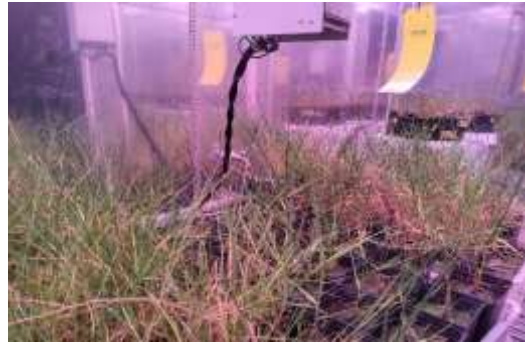
Based on IPCC predictions, during my two-month experiment, the grasses were exposed to three climate change scenarios of enriched atmospheric CO₂ and increased temperature, grown separately and together to assess for competitive advantage, due to their distinctive photosynthetic mechanisms. *S. anglica* uses C4 carbon fixation for its photosynthesis, which allows the plant to create an enriched CO₂ environment in its leaves. Instead, *P. maritima* has C3 carbon fixation for photosynthesis which is most common for plants globally.

Results showed that the future climate stimulates shoot biomass growth along the climate scenarios in both *P. maritima* (+90%) and *S. anglica* (+120%) when grown together. When grown alone, *S. anglica* doubled its biomass investment in the roots (101%). An increase in water use efficiency, allowing for more carbon uptake without loss of water, combined with lower respiration, caused the increase of growth.

Biomass increases indicate that future saltmarshes will remain valuable climate mitigation assets by capturing and storing atmospheric carbon. Increased investment in below-ground biomass results in an elevated carbon sequestration rate by direct input of carbon from plant roots in the soil and indirectly by facilitating trapping of allochthonous carbon-rich sediment. As climate change continues to be a threat, the elevated carbon sequestration rate of temperate saltmarsh ecosystem in the future shows the potential for these ecosystems to be a resilient carbon sink.



Li-6400 analyser



Pots in climate chamber



Spartina anglica



Puccinellia maritima



Biomass bags

This PhD research is part of the BlueC project, more details of this project are available at <https://www.bluec.ie/>

Contact Ragna on:

Email: ragna.hoogenboom@ucdconnect.ie

LinkedIn: [linkedin.com/in/ragna-hoogenboom-ba63b81b0](https://www.linkedin.com/in/ragna-hoogenboom-ba63b81b0)

