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Climate change effects on grassland plant-soil interactions

Background - The impact of global change on terrestrial biodiversity is increasing as the world population continues its unprecedented growth. A key challenge to 21st century agriculture will be to ensure food security while protecting biodiversity and sustaining ecosystem services against a backdrop of climate change. Specifically, there remains a need to balance farmland management for economically viable production with crucial non-market ecosystem services, such as C sequestration, nutrient cycling and greenhouse gas (GHG) mitigation. There is now widespread recognition that the delivery of these ecosystem services depends on both above- and below-ground biodiversity, and the interactions between them. Across Europe, grasslands cover a large part (40-50%) of the EU land surface with significant potential for greater C storage in the future. However, the effects of interactions between global climate change and the resilience of grassland plant-soil biodiversity, its biological traits and the mechanisms underpinning C sequestration and greenhouse gas (GHG) emissions remain poorly understood.

New Science - This studentship project will utilise established grassland field gradients across the EU, new experiments and experimental mesocosms subjected to climate and biodiversity manipulations to answer the question:
How will predicted changes in atmospheric temperature and precipitation interact with plant-soil biodiversity to influence grassland ecosystem services (i.e. C sequestration and GHG emissions)?

The PhD student will work across two recently funded research projects, BBSRC Ecotraits and EU Ecofinders to establish and work on novel global change and plant-soil biodiversity manipulation experiments in the UK and across Europe. Measurements of plant-soil biodiversity traits and C dynamics will be central to this project. i.e. screening plant and soil ecological and biogeochemical traits (soil physico-chemical properties; plant diversity; biomass; phenology; physiology; productivity; leaf-root inputs and their location-quality; soil biological diversity measures (PLFAs, 16S rRNA gene molecular techniques, fauna). Biogeochemical measurements of C and N cycles (sequestration), isotope tracers and GHGs (IRGAs and Gas chromatography) will be crucial.