PhD Studentship Opportunity

Multispecies grasslands: Influence of mixture composition on nitrous oxide emissions and nitrogen use efficiency

Background

Intensive grassland-based livestock production in Ireland has been highly dependent on high-yielding monocultures of perennial ryegrass, requiring large inputs of mineral nitrogen (N) fertilisers. These high fertiliser N inputs can contribute to N loss via nitrate leaching, and as greenhouse gas (GHG) emissions, particularly nitrous oxide (N\(_2\)O). Recent research has shown that multispecies grassland mixtures, which are less reliant on high N fertiliser inputs, can significantly reduce N\(_2\)O emissions. In addition, four-species grass-legume swards and six-species mixtures have demonstrated important yield advantages compared to monocultures of either grasses or legumes. These yield advantages and the influence of species diversity will contribute to overall emissions intensity (nitrous oxide produced per unit biomass of yield). With sharply rising costs of fertilisers, combined with deleterious environmental side effects of excessive N application, multispecies have great potential for improving N use efficiency on farms and lowering environmental impact.

This Scholarship is part of the collaborative DAFM-DAERA-funded Multi4More project. Through a combination of field experiments and plot trials, this research will experimentally manipulate the composition of grassland mixtures, and assess what combinations of species and functional groups are needed to optimise yield, lower N\(_2\)O emissions and increase overall N use efficiency. Main activities of this PhD research will include design and maintenance of field and lab experiments; data collection, analysis and interpretation, and; publication of results. The student will develop and apply statistical models to the results from their experiments, and there will be opportunities for travel to visit other laboratories and to attend national and international conferences. The successful candidate will join a team with a track record of success in this research topic, and have access to research infrastructure (field plots, harvesting equipment, sample processing, technical and farm support, glasshouses, sample analysis) and development (PhD training, statistical modelling of mixture experiments, and professional development).

The doctoral candidate will be supervised jointly by Dr Suzanne Higgins, Agri-Food and Biosciences Institute (AFBI) in Belfast, and Prof. Caroline Brophy, Trinity College Dublin. The candidate will also work closely with a team at Teagasc Johnstown Castle, Wexford, led by Dr John Finn. The successful candidate will be located at AFBI in Northern Ireland during their PhD, and registered as a PhD student at Trinity College Dublin.
Requirements: Applicants should possess a first class or upper second-class honours degree in soil science, environmental science, ecology, agricultural science, plant science or a related subject, and a Master’s degree will be an advantage. Knowledge of agronomy/plant ecology and a strong quantitative ability are desirable, and training will be provided. Applicants must hold a full EU driving licence. For further information, please contact Dr Suzanne Higgins (Suzanne.Higgins@afbini.gov.uk) or Prof. Caroline Brophy (caroline.brophy@tcd.ie).

Award: The scholarship funding is €24,000 per annum, which includes University fees of up to a maximum of €6,000 per annum and the remainder paid as stipend to the Scholar, and is tenable for 4 years.

Application procedure: Applications should be sent by email to both Dr Suzanne Higgins Suzanne.Higgins@afbini.gov.uk and Prof. Caroline Brophy caroline.brophy@tcd.ie on or before Friday 29th July 2022 and should include a covering letter and CV, copies of relevant degree transcripts and the names and contact details of two academic referees. Details regarding English language requirements can be found here.

Closing date: 29th July 2022. September 2022 start date expected (some flexibility to March 2023).

FURTHER INFORMATION
Examples of our recent research are available at: https://farmecol.blogspot.com/2021/03/multi-species-mixtures-at-british.html and other blog posts. This includes the yield benefits of multi-species mixtures, their effects on nitrous oxide emissions, and resilience to drought.