PhD in Ecology

Design of multi-species grassland mixtures to optimise nitrogen replacement value and yield stability

Walsh Scholarships Ref Number 2021023

Applications are invited for a full-time PhD research position funded by Teagasc, and in collaboration with Trinity College Dublin.

Background

Agricultural systems are increasingly expected to increase production to feed the growing world population, while lowering environmental impacts and coping with further stress from extreme weather events due to climate change. Research is needed to inform the choice of appropriate agricultural systems to thrive under these pressures. Within intensively managed agricultural grasslands, recent results demonstrate important yield advantages of four-species grass-legume swards compared to monocultures of either grasses or legumes. Our recent research shows additional advantages of six-species mixtures comprising grasses, legumes and herbs, and that mixtures with lower-nitrogen fertiliser can out-perform perennial ryegrass monocultures with high-nitrogen fertiliser application. Thus, mixed swards in general, and especially mixed swards with legumes, offer an important practical, farm-scale management practice for more sustainable agriculture.

Through a combination of field experiments and pot trials, this research project will experimentally manipulate the composition of grassland mixtures (from one to six species), and assess what combinations of species and functional groups are needed to optimise yield, nitrogen use efficiency, and yield stability. As well as being of applied importance in understanding strategies for grassland production under lower-nitrogen fertiliser conditions, this project will also have strong relevance to testing ecological theories about how diversity affects ecosystem function. Main activities of this PhD research will include design and maintenance of field experiments; data collection, analysis and interpretation, and; publication of results in international journals. This will include analysis of data from existing livestock experiment with two separate dairy herds on a low-nitrogen multi-species mixture and higher nitrogen grass-clover grassland. There will also be opportunities for travel to visit other laboratories abroad 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 support (PhD training, statistical modelling of mixture experiments, and professional development).

The doctoral candidate will be supervised jointly by Dr. Caroline Brophy, Trinity College Dublin, and Dr John Finn, Teagasc, Johnstown Castle, Wexford. The successful candidate will be located at Teagasc, Johnstown Castle, Wexford during their PhD, and will be registered as a PhD student at Trinity College Dublin.

Requirements: Applicants should possess a first class or upper second-class honours degree in ecology, agricultural science, plant physiology or a related subject, and a Master's degree will be a distinct advantage. Knowledge of plant ecology and a strong quantitative ability to apply statistical models to experimental data will be essential. An ability to drive is advantageous. Applications should be sent by email to caroline.brophy@tcd.ie and john.finn@teagasc.ie on or before Friday 7th May 2021 and should include a covering letter and CV, and the names and contact details of two academic referees. The start date of the position will be 1st October 2021.

Award: The scholarship funding is €24,000 per annum and includes University fees of up to a maximum of €6,000 per annum and is tenable for 4 years.

Application procedure: For further information about the project, please contact Dr John Finn (john.finn@teagasc.ie) or Dr Caroline Brophy (caroline.brophy@tcd.ie). Details regarding English requirements can be found at: https://www.tcd.ie/study/international/how-to-apply/entry-requirements.php

Closing date: Friday 7th May 2021

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.