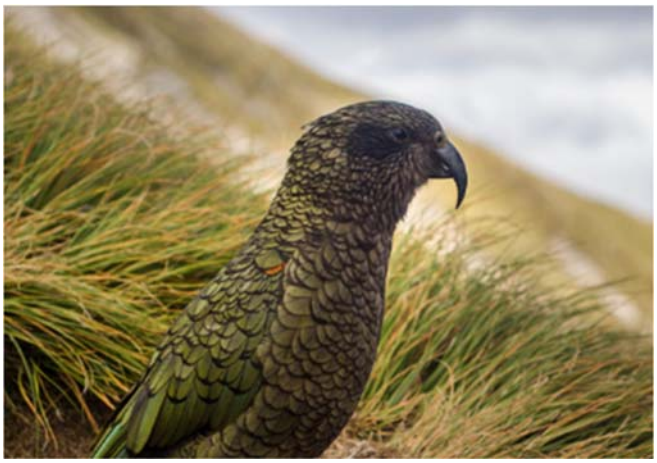
Faculty of Agriculture and Life Sciences

Honours Projects
2024



LINCOLN UNIVERSITY
TE WHARE WĀNAKA O AORAKI

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Introduction

BAgrSc (Hons), BSc (Hons) and BV&O (Hons) students are required to complete a 40-credit project and write a dissertation at the 600-level. These dissertations are research-based and supervised by an academic staff member.

This booklet contains a list of some of the projects that are available in the coming year; it may be that other projects are also an option. Students are strongly advised to talk to potential supervisors as soon as possible.

Academic research staff have their own web-pages at:
https://researchers.lincoln.ac.nz/

Aims

Dissertations are aimed towards individual research and study. Such an approach provides for student initiative in developing a research idea through the initial proposal, review of literature, design of experiments, conduct of experiments, analysis of results and their discussion. This will provide an assessment of the student's ability to conduct independent research and communicate results to other students and staff.

Objectives

At the completion of a dissertation a student should be able to:

- break down a problem into key questions.
- develop those questions into a research proposal.
- read and critically assess literature on the chosen research topic.
- write a research proposal.
- plan and conduct appropriate research work.
- analyse results according to accepted statistical procedures.
- write up the results in a form that encompasses the above and discusses the significance of the results compared with other studies.
- communicate progress and results through written and verbal methods.

Dissertations are assessed by the supervisor and an independent examiner, who is normally an academic staff member of Lincoln University.

Enrolment

Please refer to the University website:
https://www.lincoln.ac.nz/study/study-programmes/

The regulations for the BSc (Hons), BAgrSc (Hons) and BV&O honours degrees and the entry processes differ, and detail is available here:

- BAgSc (Hons): https://www.lincoln.ac.nz/study/study-programmes/programme-search/bachelor-of-agricultural-science/
- BSc (Hons): https://www.lincoln.ac.nz/study/study-programmes/programme-search/bachelor-of-science-with-honours/
- BV&O (Hons): https://www.lincoln.ac.nz/study/study-programmes/programme-search/bachelor-of-viticulture-and-oenology-honours/

If you have any questions, then contact:

- BAgrSc (Hons) Professor Derrick Moot, Professor Leo Condron, Professor Jon Hickford
- BSc (Hons) Dr Carol Smith
- BV&O (Hons) Dr Olaf Schelezki

Application checklist:

You need

- English as a first language or provide documentation of your English Language proficiency
- Birth certificate or passport, certified copies only
- Academic transcripts, official copies or certified copies of all tertiary education qualifications either completed or partially completed
- The name of the area you're applying for honours in (e.g. Ecology) and a statement of research interest

To apply online go to: https://www.lincoln.ac.nz/study/apply-and-enrol/

Special note: If after Bachelor degree study you receive a letter of invitation from Lincoln University to study Honours, **you are still required to complete an application form prior to registration.**

List of Projects

No.	Project Title	Supervisor and email
1	Acid soils and aluminium toxicity: Novel legumes for high country	Dr Jim Moir Jim.Moir@lincoln.ac.nz
2	Are pine plantations greenhouse gas sources or sinks?	Prof. Tim Clough Timothy.Clough@lincoln.ac.nz
3	Biases, Biodiversity and Big data	Dr Will Godsoe William.Godsoe@lincoln.ac.nz
4	Biomarkers of disease progression in sheep models of Batten disease	Dr Nadia Mitchell Nadia.Mitchell@lincoln.ac.nz
5	Can plantain-based pasture be used for more environmentally sustainable dairy systems?	Dr Omar Al-Marashdeh Omar.Al-Marashdeh@lincoln.ac.nz
6	Comparison of plantain or annual ryegrass over-drilled into a 7 year-old year old Caucasian clover sward in March	Dr Tom Maxwell Tom.Maxwell@lincoln.ac.nz
7	Developing new tools for monitoring groundwater nitrate mitigation efforts	Dr Naomi Wells Naomi.Wells@lincoln.ac.nz
8	Diversified versus Standard pastures for sheep grazing systems	Dr Tom Maxwell Tom.Maxwell@lincoln.ac.nz
9	Effect of a fungal bioactive compound on plant performance under abiotic stress	Prof. John Hampton John.Hampton@lincoln.ac.nz
10	Effect of a fungal bioactive compound on two soil-borne plant pathogens.	Dr Hossein Alizadeh Hossein.Alizadeh@lincoln.ac.nz
11	Effect of early life milk feeding on life time performance	Dr Racheal Bryant Racheal.Bryant@lincoln.ac.nz
12	Effect of shell material and geometry of milk liners on milking performance of dairy cows	Dr Omar Al-Marashdeh Omar.Al-Marashdeh@lincoln.ac.nz
13	Evaluating the diversity and distribution of plant-parasitic nematodes in New Zealand Kumara	Dr Manjula Kularathna Manjula.Kularathna@lincoln.ac.nz

No.	Project Title	Supervisor and email
14	Exploring the effect of Barrique barrels made from single origin oak and different toasting levels on Pinot Noir quality	Dr Olaf Schelezki Olaf.Schelezki@lincoln.ac.nz
15	Exploring the functional role of different AMF species on the growth and fruit composition of tomato plants.	Dr Romy Moukarzel Romy.Moukarzel@lincoln.ac.nz
16	Gastrointestinal pathology in sheep models of Batten disease	Dr Nadia Mitchell Nadia.Mitchell@lincoln.ac.nz
17	Growing high-value wheat and maize on Canterbury soils	Dr Nik Lehto Niklas.Lehto@lincoln.ac.nz
18	Impact of breeding heat tolerance into the New Zealand dairy herd	Dr Racheal Bryant Racheal.Bryant@lincoln.ac.nz
19	Low N dairy farm systems	Dr Racheal Bryant Racheal.Bryant@lincoln.ac.nz
20	Nitrogen cycling in temperate rainforest soils	Dr Naomi Wells Naomi.Wells@lincoln.ac.nz
21	Numerical simulation of water transport in variably-saturated soils	Dr Chamindu Deepagoda Chamindu.Deepagoda@lincoln.ac.nz
22	Pasture Persistence – determining factors that drive performance of perennial grass cultivars over time	Dr Tom Maxwell Tom.Maxwell@lincoln.ac.nz
23	Phosphorus mobilisation from farm drains	Dr Nik Lehto Niklas.Lehto@lincoln.ac.nz
24	Stop kiwifruit spreading into the wild from orchards	Dr Jon Sullivan Jon.Sullivan@lincoln.ac.nz
25	The use of technologies to optimise operational performance of dairy farming	Dr Omar Al-Marashdeh Omar.Al-Marashdeh@lincoln.ac.nz
26	What lies beneath: uncovering temporal changes in arbuscular mycorrhizal fungal community in Pinot noir rootstocks	Dr Romy Moukarzel Romy.Moukarzel@lincoln.ac.nz

Details of Projects

1 Acid soils and aluminium toxicity: Novel legumes for high country

The productivity of South Island high country is typified by a short, often soil moisture limited growing season, and acid soils (pH < 5.5). Traditionally, white clover has been sown as the key pasture legume, but fails to persist. The use of alternative pasture species, such as deep rooting Lucerne, has been suggested to improve dryland pasture production. However, lucerne is known to be intolerant of acid soil conditions, and related aluminium (Al) toxicity issues. Nutrient (especially P) and trace element availability is also strongly influenced by soil pH. To offset increased soil acidity, lime must be applied, and where this cannot be done, soils may be too acidic for legumes and productivity declines sharply. Often the cost of lime is uneconomic in extensive high country, and the response to liming unknown. Although the relative Al tolerance of some forage legumes has been examined, information on many legumes is at best, vague. This study will examine a selection of novel pasture legume species grown in acidic / high aluminium soil conditions at Lincoln University. Soils will be adjusted to reflect a range of soil pH conditions and the establishment and growth rate will be used to determine the relative performance of the focus legumes. Other soil ameliorants will also be examined.

Supervisor: ***Dr Jim Moir***

Email: **Jim.Moir@lincoln.ac.nz**

2 Are pine plantations greenhouse gas sources or sinks?

Carbon credits for tree plantings are increasingly a key part of farm budgets. Currently these carbon credits are based entirely on the amount of carbon captured by the trees. However, our preliminary work shows that the soils under pine plantations can also act as a sink for greenhouse gasses like methane and nitrous oxide. The aim of this Honours project will be to identify the climate drivers and quantify the magnitude of these greenhouse gas sinks. This project will involve field measurements, data analysis, and potentially laboratory experiments. Work will be carried out in collaboration with Scion researchers.

Supervisor: ***Prof Tim Clough, Dr Naomi Wells***

Email: **Timothy.Clough@lincoln.ac.nz**

3 Biases, Biodiversity and Big data

The student will investigate the importance of biodiversity in ecology using large datasets from experiments and analyses all over the world. It is often thought that biodiversity is beneficial to people. However, several groups of researchers overseas have argued that diversity is far less important than we have thought. To better understand this the student will dig through datasets to help develop new analyses for the effects of biodiversity. Willingness to run analyses on computers is needed and some practice is appreciated.

Supervisor: ***Dr Will Godsoe***

Email: **William.Godsoe@lincoln.ac.nz**

4 Biomarkers of disease progression in sheep models of Batten disease

Batten disease is an inherited, fatal neurodegenerative disease primarily affecting children. Many other species carry the same disease-causing genetic mutations, including Borderdale and South Hampshire sheep. Our group works with both breeds, representing two different forms of Batten disease. Batten disease sheep show comparable clinical signs and neuropathology to patients, including extensive brain atrophy and increased inflammation in the brain. Biomarkers are measurable indicators of disease state which are useful for tracking disease progression and efficacy of treatments. The proposed project will involve testing clinically relevant biomarkers of disease progression in sheep blood, cerebrospinal fluid and brain tissue, with the aim of developing biomarkers to inform on efficacy of gene therapy in sheep. This project will provide an introduction to protein biochemistry and neuropathology and the use of large animal models to study human disease, as well as technical skills including Western blotting, brain tissue processing, immunohistochemistry, and microscopy.

Supervisor: ***Dr Nadia Mitchell***

Email: **Nadia.Mitchell@lincoln.ac.nz**

5 Can plantain-based pasture be used for more environmentally sustainable dairy systems?

Plantain (Plantago lanceolata L.) has been used as an alternative forage to ryegrass–white clover sward to reduce the environmental footprint of grazing dairy farms. However, effectiveness of plantain in reducing nitrate leaching at farm level is yet to be confirmed. Farmlet study including increasing level of plantain in the ryegrass-white clover mixed sward (nill, 30% or 50% in the total pasture DM) has been established at the Lincoln University Research Dairy Farm. The long-term farm system study aims to evaluate the effect of increasing dietary level of plantain on dairy farm performance and environmental footprint over multiple production seasons. The student working on this project will have a chance to use modelling tools such as Farmax and Overseer to simulate treatment effect on farm financial and environmental outputs.

Supervisor: ***Dr Omar Al-Marashdeh***

Email: **Omar.Al-Marashdeh@lincoln.ac.nz**

6 Comparison of plantain or annual ryegrass over-drilled into a 7 year-old year old Caucasian clover sward in March

It is difficult to maintain a high clover content in perennial pastures. Grasses such as perennial ryegrass usually dominate white clover after a few years. Nitrogen fertilisers hasten this grass dominance. Plantain is a less aggressive companion for clovers so that the pasture nutritive value is improved with increased clover in the pasture. But plantain and / or white clover may not persist more than three or four years. In contrast, annual ryegrass will dominate during the winter but managing the transition to other species in spring is challenging. Caucasian clover may offer a more persistent legume option. In contrast to white clover's short lived taproot and stolons which are vulnerable to drought, Caucasian clover has a deep perennial tap root and a dense mat of rhizomes. It may be possible to manage Caucasian clover as a persistent source of biologically fixed N and nutritious forage when compatible species such as plantain or annual ryegrass are direct-drilled into established Caucasian swards in autumn. This could provide either a winter active grass, or a herb which is less aggressive than a perennial grass. An Honours student would be involved in designing the experiment prior to drilling in March and monitoring the pasture treatments through to early spring.

Supervisor: ***Dr Tom Maxwell, Mr Dick Lucas***

Email: **Tom.Maxwell@lincoln.ac.nz**

7 Developing new tools for monitoring groundwater nitrate mitigation efforts

South Island farmers are under increasing pressure to decrease nitrate levels in groundwater. However, these efforts are often frustrated by the difficulty in linking management practices directly to environmental outcomes. The aim of this Honours project will be to use a combination of in-situ high-resolution nitrate sensors and isotope measurements to identify the environmental v management drivers of groundwater nitrate levels within a south Canterbury catchment. Work will be carried out in close collaboration with local managers and Dairy NZ. The student will gain experience working with communities, managing large datasets, and carrying out isotope analyses.

Supervisor: ***Dr Naomi Wells, Dr Lee Burbery (Dairy NZ)***

Email: **Naomi.Wells@lincoln.ac.nz**

8 Diversified versus Standard pastures for sheep grazing systems

The study monitors sheep productivity on a plantain-Italian ryegrass-red clover pasture or a perennial ryegrass pasture-white clover pasture in a farmlet system at Ashley Dene Research and Development Station. The project will compare animal (liveweight gain) and feeding value (production, botanical composition, persistence) and soil (N availability) data from 8 year-old diversified pasture compared to 8 year-old standard pasture.

Supervisor: ***Dr Tom Maxwell***

Email: **Tom.Maxwell@lincoln.ac.nz**

9 Effect of a fungal bioactive compound on plant performance under abiotic stress

Climate change induced drought and heat stress will have a negative impact on plant growth. We have discovered that a bioactive chemical compound produced by a soil inhabiting fungus can interact with plants through chemical signalling which upregulates the plant's defence pathways, thus allowing it to more strongly resist abiotic stress. This project will aim to assess the impact of the fungal bioactive compound applied within a seed coating on (1) the performance of plants (pasture or wheat or potatoes) under controlled conditions of drought and heat stress, and (2) the accumulation of oxidants and the antioxidant response in stressed plants.

Supervisor: ***Prof. John Hampton, Dr Hossein Alizadeh***

Email: **John.Hampton@lincoln.ac.nz**

10 Effect of a fungal bioactive compound on two soil-borne plant pathogens.

Soil-borne pathogens are an increasing problem for agricultural production. We will be investigating the ability of a bioactive chemical compound produced by a soil inhabiting fungus to control two soil-borne pathogens in pasture, wheat, and potatoes. The effect of the compound on the pathogens will be first investigated in vitro. The project will aim to assess the impact of the compound applied as a seed coating on the two soil-borne pathogens in a glasshouse study to determine: (1) disease severity and plant mortality in the presence and absence of the compound (2) plant production in the presence and absence of the compound.

Supervisor: ***Dr Hossein Alizadeh, Professor John Hampton***

Email: **Hossein.Alizadeh@lincoln.ac.nz**

11 Effect of early life milk feeding on life time performance

In this research project, the student will compare growth rate and milk yield of calves which have different pre and post weaning growth rates to determine the impact on life time performance. Heifer replacements were reared as calves as either receiving restricted or high allowance milk feeding. The impact of these regimes has altered pre-weaning growth and potentially their milking ability, this research will investigate live weight gain and first lactation milk yield of these heifers.

Supervisor: ***Dr Racheal Bryant***

Email: **Racheal.Bryant@lincoln.ac.nz**

12 Effect of shell material and geometry of milk liners on milking performance of dairy cows

The milking process involves the milk liner, which is the sole component of the milking machine in direct contact with the cow's teat. However, both the design of the teat cup shell and the geometry of milk liners can influence milking performance and the comfort of the cow. Limited data is available on the effect shell material and geometry of milk liners on milking performance of dairy cows. In this project, the student will investigate the impact of various shell materials, each fitted with liners of different geometries, on both milking performance and the comfort of the cows.

Supervisor: ***Dr Omar Al-Marashdeh***

Email: **Omar.Al-Marashdeh@lincoln.ac.nz**

13 Evaluating the diversity and distribution of plant-parasitic nematodes in New Zealand Kumara

Plant-parasitic nematodes (PPNs) cause significant losses to the global sweet potato (Kumara) industry. Previous reports had indicated these losses to be around 10-11% in susceptible sweet potato varieties. Even though there have been reports indicating the association of nematodes with sweet potatoes, for almost two decades, no research had been done to understand their detrimental effects on the NZ sweet potato industry. Therefore, this honours project will be conducted to evaluate the current nematode status and the potential threat they pose to the sweet potato industry in NZ. The findings from this research would be extremely important to develop strategies to mitigate existing nematode related problems. The research would enable us to develop sustainable, environmentally friendly management strategies to minimize nematode damage in the future.

Supervisor: ***Dr Manjula Kularathna, Prof. Nick Roskruge (Massey University)***

Email: Manjula.Kularathna@lincoln.ac.nz

14 Exploring the effect of Barrique barrels made from single origin oak and different toasting levels on Pinot Noir quality

The concept of Forest Origin for barrels is en vogue for its contribution into terroir and sense of place. This provides merit for enhanced wine quality and marketing. Little is known on how the forest location, and consequently altered oak composition, translates into differences in wine chemistry and sensory characteristics, particularly in the context of NZ Pinot Noir. In addition, the impact of toasting levels in relationship to the oak origin (and inherent grain structures) are not yet defined.

Therefore, this project aims to unravel those characteristics derived from different single-origin oak by analysing the wine chemical and sensory characteristics of the resulting Pinot Noir wines, as well as evaluating the wine qualities via an industry expert panel. This trial spans over at least two vintages, presenting a unique opportunity to evaluate the decline of extraction from 1st to 2nd filling, and the respective implication on wine chemical and sensory quality, as well as effects on wine ageability.

This project is supported by Tonnellerie Cadus (https://tonnellerie-cadus.com/) and the student will work closely with the wine industry (Kinross, Central Otago; Cloudy Bay, Marlborough; Mount Difficulty, Central Otago; and Alexandra Vintners, Central Otago).

The student will gain in-depth knowledge about the influence of barrel use on Pinot Noir and the related chemistry, as well as acquire laboratory skills in the analysis of wine quality parameters.

Timing: Trial starting with vintage 2024

Requirements: B.Sc. in Viticulture and Oenology or in a similar discipline (B+ average), driver's licence.

Supervisor: ***Dr Olaf Schelezki, Dr Bin Tian and Dr Leandro Dias Araujo***

Email: **Olaf.Schelezki@lincoln.ac.nz**

15 Exploring the functional role of different AMF species on the growth and fruit composition of tomato plants.

Tomato quality has declined due to conventional breeding, requiring heavy fertilizer use for high yields. Microbial inoculants such as arbuscular mycorrhizal fungi (AMF) could serve as promising bio stimulants to promote crop yield and quality. This honours project will identify the functional role of three different AMF species on the growth parameters and fruit composition of commercially available tomato varieties grown under controlled conditions. Tomato plants will be inoculated with single and a mixture of AMF species. Non-inoculated plants will be use as the control treatment. The student will be collecting growth, biomass and yield data, staining roots for mycorrhizal colonisation assessment, and extracting juice for primary and secondary metabolites assessment.

Supervisor: ***Dr Romy Moukarzel***

Email: **Romy.Moukarzel@lincoln.ac.nz**

16 Gastrointestinal pathology in sheep models of Batten disease

Batten disease is an inherited, fatal neurodegenerative disease primarily affecting children. Many other species carry the same disease-causing genetic mutations, including Borderdale and South Hampshire sheep. Our group works with both breeds, representing two different forms of Batten disease. As well as affecting the central nervous system, it is suspected that Batten disease also affects the nervous system in the gut (enteric nervous system). The proposed project will investigate gut health in Batten disease affected sheep by assessing gastrointestinal (GI) transit time in vivo and studying post-mortem GI tissue to look for neuron loss and other pathological abnormalities. This project will provide an overview of pathology in the enteric nervous system as well as the use of sheep to model human diseases. Technical skills gained will include animal husbandry, immunohistochemistry, histopathology, and microscopy.

Supervisor: ***Dr Nadia Mitchell***

Email: **Nadia.Mitchell@lincoln.ac.nz**

17 Growing high-value wheat and maize on Canterbury soils

Arable farming systems have traditionally emphasized increasing crop productivity and grain yield over their nutritional quality. This strategy has significantly increased micronutrient deficiencies within food grains, thus contributing to malnutrition ("a hidden hunger") among some consumers in New Zealand. Today's arable farming sector is undergoing a fundamental shift, transitioning from a focus on merely increasing grain yield to prioritizing the cultivation of high-value nutrient-rich staple foods like wheat and maize in substantial quantities. Arable farms in Canterbury are well known for their world class yields, but the low concentrations of key trace element micronutrients, zinc and selenium, in the region's soils means that the nutritional profile of the grains is often lower than those of overseas imports. The current volatility in international milk prices and grain supply and changing climatic conditions locally are driving an urgent need diversify our agricultural production to ensure the security of our food production into the future. Wheat is already grown extensively in Canterbury, while maize has been identified as a potential future crop for the region as the local climate becomes warmer (Canterbury Farming, Dec 2022, p 4-5). This project will test different fertilisation strategies to enhance the uptake of zinc and selenium by these crops in a range of Canterbury soils with a view to identifying optimal management strategies to achieve high yields together with an enhanced nutritional profile.

Supervisor: ***Assoc. Prof. Nik Lehto***

Email: **Niklas.Lehto@lincoln.ac.nz**

18 Impact of breeding heat tolerance into the New Zealand dairy herd

Lincoln University is collaborating with Livestock Improvement Corporation (LIC) to investigate the effect of breeding dairy cows carrying the SLICK gene on heat and cold tolerance. A population of SLICK carrier heifer replacements has been established to investigate the impact of breeding for improved welfare in a changing climate. In this research, calves born in spring 2023 and 2022 with or without the SLICK gene will be compared in their growth rate, grazing behaviour and body temperature when exposed to South Island winter conditions. The research will be carried out on the university's research dairy farms. Temperature and activity sensors will be attached to calves and visual observations of their behaviour, will be carried out to determine whether animal genetics affects behaviour of young stock.

Supervisor: ***Dr Racheal Bryant***

Email: **Racheal.Bryant@lincoln.ac.nz**

19 Low N dairy farm systems

In order to make an sizeable impact on reducing N loss from intensive farming systems, farmers will be required to adopt multiple mitigation practises to reduce nitrate leaching and green house gas emissions. Two farmlets at LURDF have been established to investigate the effect of combining N mitigations on production, profit and environment. This honours project is part of the wider Low N Systems project and The Living Laboratory which brings together the skills and expertise from DairyNZ, AgResearch, Fonterra and CRV.

Supervisor: ***Dr Racheal Bryant***

Email: **Racheal.Bryant@lincoln.ac.nz**

20 Nitrogen cycling in temperate rainforest soils

The earth system models used to predict climate change trajectories require a functional understanding of nitrogen dynamics. But the extreme magnitude of human alterations to the nitrogen cycle limit our ability to establish 'baseline' relationships between nitrogen and carbon cycling. The relatively pristine rainforests on the west coast of the South Island provide a powerful natural laboratory to explore these relationships. The aim of this Honours project is to use soils collected from across forest altitude and climate gradients to better understand the relationship between nitrogen availability, climate, and ecosystem productivity. This work will involve field sampling and detailed laboratory characterisation of soil chemistry and nitrogen processing.

Supervisor: ***Dr Naomi Wells, Dr Charlotte Alster***

Email: **Naomi.Wells@lincoln.ac.nz**

21 Numerical simulation of water transport in variably-saturated soils

Investigation of water flow in differently-saturated soils is essential to characterize water distribution in vadose zone. It also provides great implications to investigate dissolved contaminant transport to groundwater causing groundwater pollution. Due to inherently complex nature in vadose zone soils with different soil layers and variable soil-water characteristics, it is challenging to accurately characterize soil water flow in variably-saturated soils. This study will take a numerical approach to simulate land-applied water migration in physically heterogeneous and variably-saturated soil profiles.

Supervisor: ***Dr Chamindu Deepagoda***

Email: **Chamindu.Deepagoda@lincoln.ac.nz**

22 Pasture Persistence – determining factors that drive performance of perennial grass cultivars over time

Unravelling the complex interacting biotic and abiotic factors that drive pasture community change is important to develop the appropriate pasture management to improve persistence. Identifying primary driving factors (soil type, summer rainfall, plant N status, population survival mechanisms) and secondary driving factors (invertebrate pest pressure, diseases, weed ingress and high intensity grazing) which act and/or interact to determine productive sown pasture longevity are critical to understanding and therefore managing for pasture persistence. To address this need, and provide the DairyNZ Forage Value Index with persistence trait data for perennial pasture grass species, a long-term pasture persistence trial, consisting of repeated annual sowings, commenced in Canterbury in 2015 and is planned to continue until 2024. This project measures DM yield, botanical composition, grass morphology and density of ten grass cultivars from pasture plots continuously stocked with sheep. Pastures range in age from 9, 8, 7, 6, 5, 4, 3, 2, 1 and 6 months old. Comparison of pasture performance between these increasingly aged pastures provides valuable insights for grass-based pasture persistence ecology.

Supervisor: ***Dr Tom Maxwell***

Email: **Tom.Maxwell@lincoln.ac.nz**

23 Phosphorus mobilisation from farm drains

Eutrophication of freshwater ecosystems is a major environmental challenge in New Zealand's agricultural landscapes. Massive phytoplankton growth under eutrophic conditions impacts on the recreational, ecological and cultural values of freshwater resources. Phosphorus (P) is a critical nutrient in regulating phytoplankton growth in aquatic ecosystems, so understanding the factors that drive P release into rivers is critical for helping to mitigate its impacts on local ecosystems. Sediments in farm drains and ditches often contain large amounts of fixed P, and this can be mobilised into local rivers under specific conditions. In lowland areas, the sediment-bound P can make a significant contribution to bioavailable P loads that are deposited into end-of-river environments (lakes, estuaries, wetlands, etc.). The extent to which can happen in Canterbury is currently unknown. In this project you will survey farm drains around the LII/Ārarira river catchment and measure P mobilisation fluxes from the drains under a range environmental conditions to estimate their contribution to the overall P loading in the LII river, and ultimately to Lake Ellesmere/Te Waihora. This project will involve extensive work in the field (you'll need a driver's licence!) and you will develop expertise in a wide range of novel laboratory analyses.

Supervisor: ***Assoc. Prof. Nik Lehto***

Email: **Niklas.Lehto@lincoln.ac.nz**

24 Stop kiwifruit spreading into the wild from orchards

Wild kiwifruit act as environmental weeds in New Zealand, and industry-led contractors remove several tens of thousands of wild kiwifruit every year, mostly from the native forested gullies of the kiwifruit growing areas of Bay of Plenty and increasingly from other areas of the country also (Nelson-Tasman is a new focus of wild kiwifruit spread and control). Industry-funded wild kiwifruit control has been ongoing for over two decades now, and population modelling indicates that the great majority of the seed that fuels this spread is now coming from orchards, not from wild vines. The industry needs to know the ecology of how most seeds are spreading from orchards. This project will be assisting the kiwifruit industry to learn more about kiwifruit seed dispersal. This will involve on-orchard seed dispersal work identifying the most common seed dispersers of kiwifruit in NZ, quantifying the distance seed is travelling from orchards, and developing orchard management methods for trial to reduce the seed flow into the wild.

Supervisor: ***Dr Jon Sullivan***

Email: **Jon.Sullivan@lincoln.ac.nz**

25 The use of technologies to optimise operational performance of dairy farming

Precision farming has embraced technological advancements to optimise operational performance. Within dairy farming, monitoring grazing behaviour is pivotal for assessing dairy cow dry matter intake, health, and overall welfare. Behavioural sensors have been innovated to precisely measure the duration animals spend grazing or ruminating. However, in New Zealand, the validation of grazing detection devices remains insufficiently explored. Hence, the student involved in this project will have the opportunity to investigate the accuracy and reliability of various wearable behavioural sensors designed for monitoring dairy cattle.

Supervisor: ***Dr Omar Al-Marashdeh***

Email: **Omar.Al-Marashdeh@lincoln.ac.nz**

26 What lies beneath: uncovering temporal changes in arbuscular mycorrhizal fungal community in Pinot noir rootstocks

Arbuscular mycorrhizal fungi (AMF) are an important group of soil microorganisms that can establish symbiotic interactions with over 90% of the terrestrial plants including grapevine roots. This project aims to characterise the AMF community composition in the rhizosphere and roots of Pinot noir grapevine rootstocks at two different vine phenological stages. The rootstock trial is located at Lincoln University vineyard. The student will be exposed to a variety of field and laboratory techniques which involve (1) vine monitoring and sample collection at two different time points, (2) morphological identification of AMF spores extracted from the rhizosphere, (3) root staining and assessment of AMF colonisation rate and (4) molecular identification of AMF. The results from this study will then be compared with existing research contributing to the broader understanding of AMF interactions with grapevines.

Supervisor: ***Dr Romy Moukarzel, Dr Amber Parker***

Email: **Romy.Moukarzel@lincoln.ac.nz**