LegumeLegacy

NEWSLETTER

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THIS ISSUE

- LegumeLegacy DRs presenting results at different Conferences:
- 46th Conference on Applied Statistics, in Ireland. Presentation by Rouven.
- Mathematical Models in Ecology and Evolution conference, at University College Cork, Ireland. Presentation by Die.
- 13th International Symposium on Earthworm Ecology in Wageningen, the Netherlands. Poster presentation from Ellen.
- EAAP Annual Meeting in Hamburg, Germany. Presentation by Raniel.



Advancing Diversity-Interactions models to investigate weed invasion in agricultural grasslands

In May 2026, I had the opportunity to present part of my research at the 46th Conference on Applied Statistics in Ireland (CASI 2026). My presentation focused on advancements in Diversity-Interactions (DI) models and their application to investigate how sown species diversity affects weed invasion in productive agricultural grasslands.

Weed invasion, defined as the establishment of unwanted plants, is a major source of inefficiency in agricultural grasslands, reducing productivity and forage quality. Understanding how different combinations of sown species can help to minimise weeds without using high amounts of chemical inputs is therefore important for developing more sustainable grassland management practices.

To investigate this, I analysed data from 32 experimental sites across 15 countries within LegacyNet, an international network of experimental sites and a partner project of LegumeLegacy, using DI models.

These statistical models can be used to investigate how individual species, their relative proportions, and interactions between species affect outcomes such as weed invasion. However, weed invasion is often measured as proportional values, ranging from 0% to 100%, which can create challenges for conventional statistical models. To address these challenges, I applied DI models within a beta regression framework, which is specifically designed for proportional responses. By combining this approach with mixed-effects models, I was also able to account for differences between experimental sites.

My results demonstrate that increasing sown species diversity can substantially reduce weed invasion, although the effectiveness depends strongly on the combination of species. Across the experimental sites, several species mixtures showed consistently low weed proportions and reduced variability, suggesting that these mixtures can maintain low weed levels across different environmental conditions. I also identified species mixtures that achieved weed proportions comparable to, or even lower than those of a grass monoculture receiving high levels of nitrogen fertiliser.

Rouven Lattner

DRs Posters and Presentations at Conferences

Presenting New Statistical Methodology at International Mathematical Ecology Conference

In July 2026, I presented my research at the Mathematical Models in Ecology and Evolution conference, at University College Cork. My presentation, “Asymptotic inference for ecosystem multifunctionality based on multivariate Diversity-Interactions models”, introduced a computationally efficient approach to assessing uncertainty in ecosystem multifunctionality.

Ecosystems provide multiple functions, including biomass production, weed suppression and nutrient cycling. Understanding how biodiversity influences these functions simultaneously is important for sustainable ecosystem management. Multivariate Diversity-Interactions models analyse multiple ecosystem functions jointly while accounting for correlations among them. Building on this modelling framework, I introduced a new statistical approach to assess this uncertainty more efficiently.

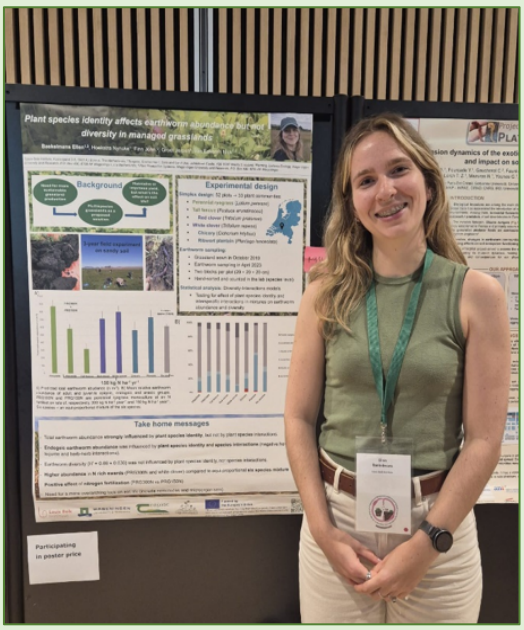
My simulation studies showed that the new method performed similarly to the established approach. When applied to real grassland data, it substantially reduced computation time. These findings provide an additional, computationally efficient approach to quantifying uncertainty in ecosystem multifunctionality, supporting future biodiversity research.

Die Hu

13th International Symposium on Earthworm Ecology

Can you imagine talking about earthworms non-stop for an entire week? Well, neither could I, nor anyone I spoke to. Yet, in the last week of August, I had the opportunity to attend the 13th International Symposium on Earthworm Ecology in Wageningen, the Netherlands. There, I presented my research on the effect of plant species on earthworm abundance in soil, communicating that we found that earthworm abundance was dependent on the plant species, rather than on plant species richness, and that earthworms prefer plant species that are high in nitrogen concentration.

During the symposium, I was delighted by the breadth of topics covered and the engaging conversations I had with fellow researchers. It was also exciting to meet in person some of the researchers whose papers I had previously cited and to learn more about their current work.



In addition to the interesting oral presentations, considerable attention was given to poster sessions. In my limited experience with conferences and symposia, posters can sometimes feel like a side attraction rather than a central part of the programme. Here, however, each presenter had the opportunity to pitch their poster in one minute. This sparked my interest in posters that I might otherwise have overlooked and led to several interesting discussions.

Excited to dive into the world of earthworms? You can download the book of abstracts here: 13th International Symposium on Earthworm Ecology - Home. The symposium is organised every four years and the next edition will take place in Canada (dates still to be decided).

Ellen Baekelmans

(Copilot was used for suggestions to improve grammar and structure).

LegumeLegacy Research at the EAAP Annual Meeting

Sharing LegumeLegacy Research at the EAAP Annual Meeting (Hamburg, Germany)

Last month, I had the opportunity to present part of our LegumeLegacy project and my PhD research at the EAAP Annual Meeting in Hamburg, Germany. My presentation, entitled “Degradation Kinetics of Forage Monocultures and Multispecies Swards Harvested at Two Maturity Stages,” focused on how different forage species and harvest timings influence the breakdown (degradability) of forage and protein in the rumen (or stomach) of cattle.

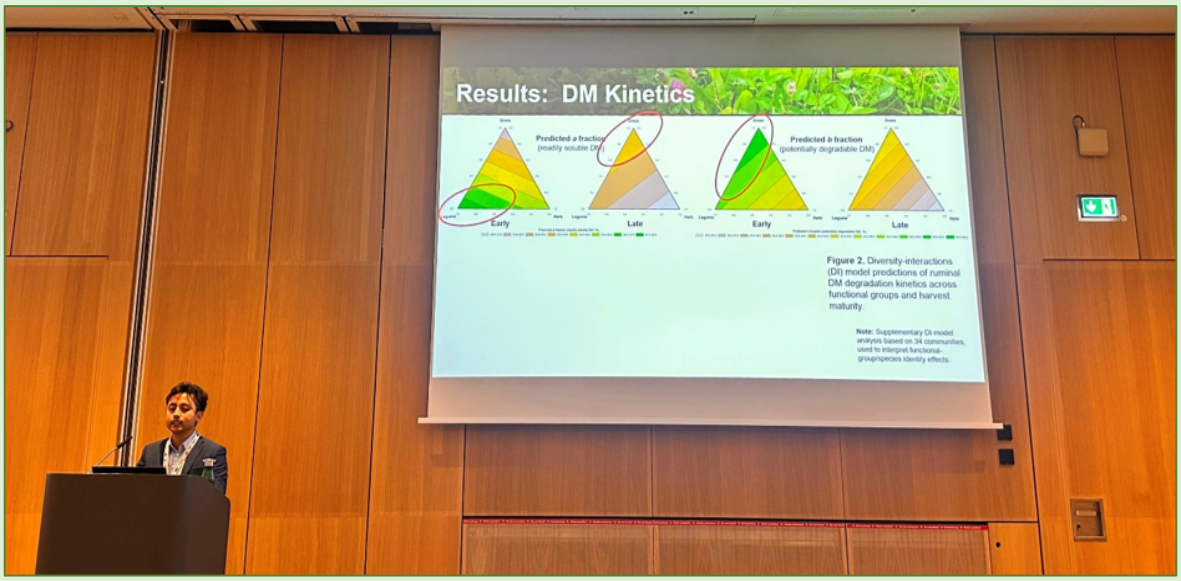
As part of our research, we investigated six forage species, including grasses (perennial ryegrass and timothy), legumes (white and red clover), and herbs (chicory and plantain), alongside a mixture containing all six species. We compared forage harvested at an earlier and a later stage of maturity to understand how these factors affect the amount and speed of forage breakdown in the rumen.

Our findings showed that harvesting forage at a later stage generally reduced the amount of forage and protein that could be broken down in the rumen. This reduction was particularly noticeable in legumes and herbs, while grasses generally showed smaller changes in dry matter degradability. Interestingly, legumes and herbs broke down faster than grasses, although harvesting later did not significantly affect the speed of degradation. The six-species mixture generally showed intermediate degradation characteristics, demonstrating how combining different forage species can influence their overall nutritional properties.

These findings highlight the importance of considering both forage species composition and harvest timing when managing grasslands for ruminant production. Understanding these relationships can help inform strategies to improve forage utilisation and support more sustainable livestock feeding systems.

Beyond presenting our findings, attending the EAAP Annual Meeting was a valuable opportunity to share our work with the wider animal science community, exchange ideas, and receive insightful feedback from researchers working across livestock nutrition, forage science, and sustainable agricultural systems. It was also a great experience to learn about ongoing research from different countries and explore new perspectives relevant to our LegumeLegacy project.

Raniel Valencia



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LegumeLegacy is an MSCA Doctoral Network

https://legumelegacy.scss.tcd.ie/

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