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Increasing Legume and Soil Moisture Content Increases N₂O Emissions from Soil Following Fertiliser N Application

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Introduction

- N₂O - potent greenhouse gas
- Linked to - N inputs, soil moisture and land management practices¹
- Sources of N₂O emitted from soil - nitrification or denitrification.²⁻³

Materials and Methods

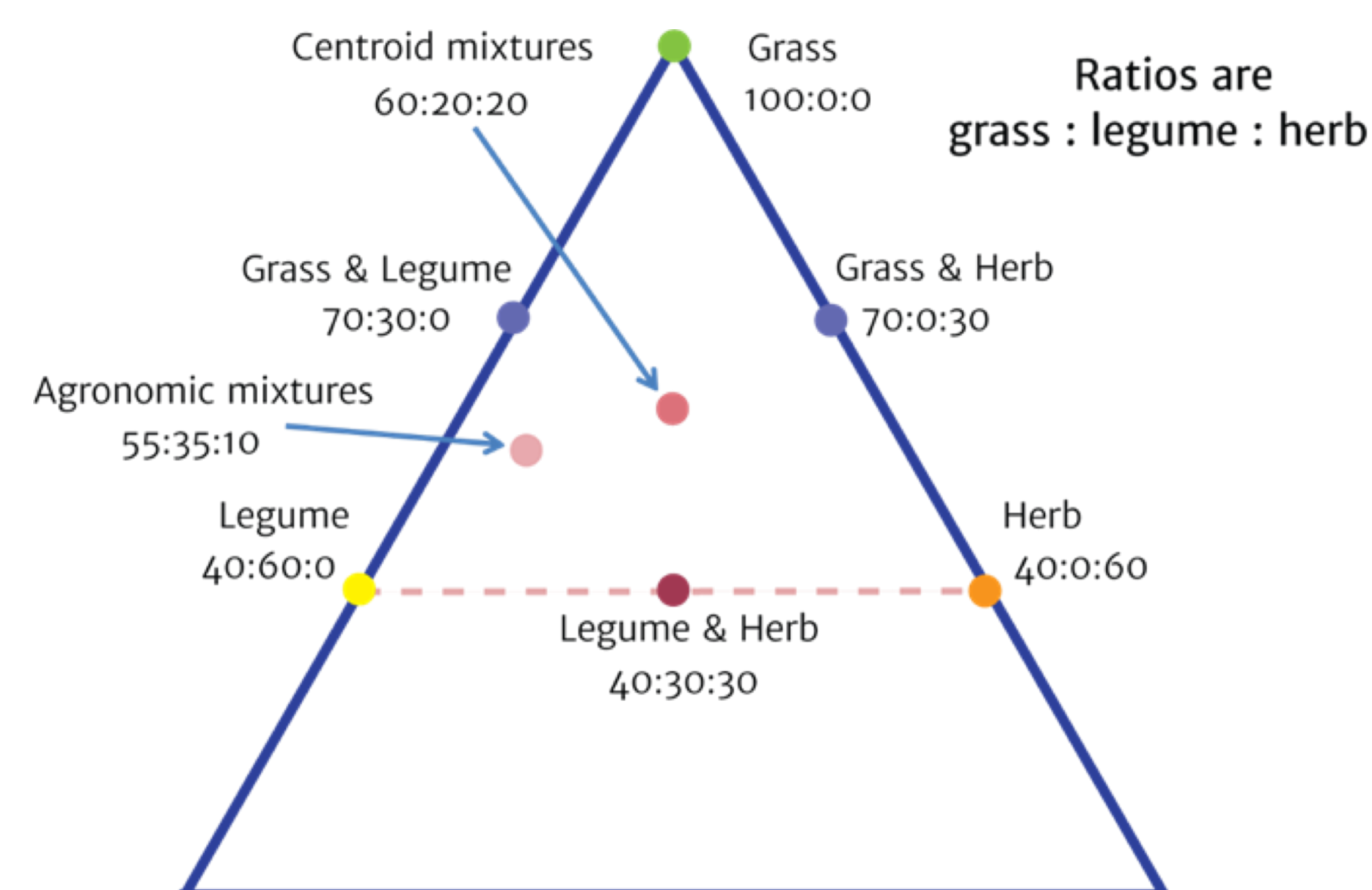


Figure 1: Conceptual drawing of restricted simplex-centroid design⁴, field plots at UCD Lyons Research Farm, and sampling of gas from static chambers to determine N₂O fluxes.

Results

- N₂O emissions greater from wet soil conditions (Fig. 2).
- Significant interaction of grass with soil moisture ($p < 0.05$).
- Increasing legume proportions significantly increase emissions ($p < 0.01$, Fig. 3).

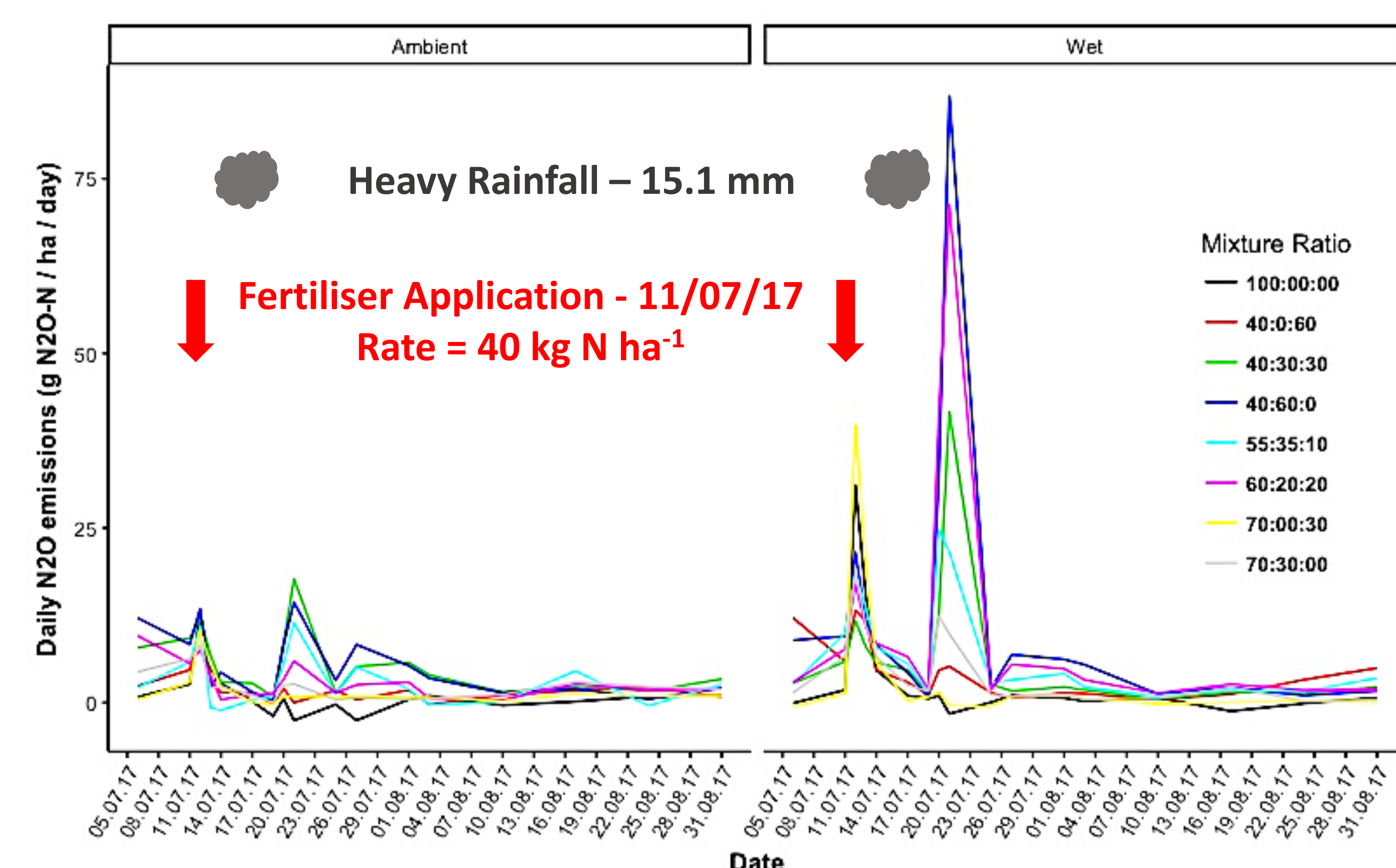


Figure 2: Temporal N₂O fluxes

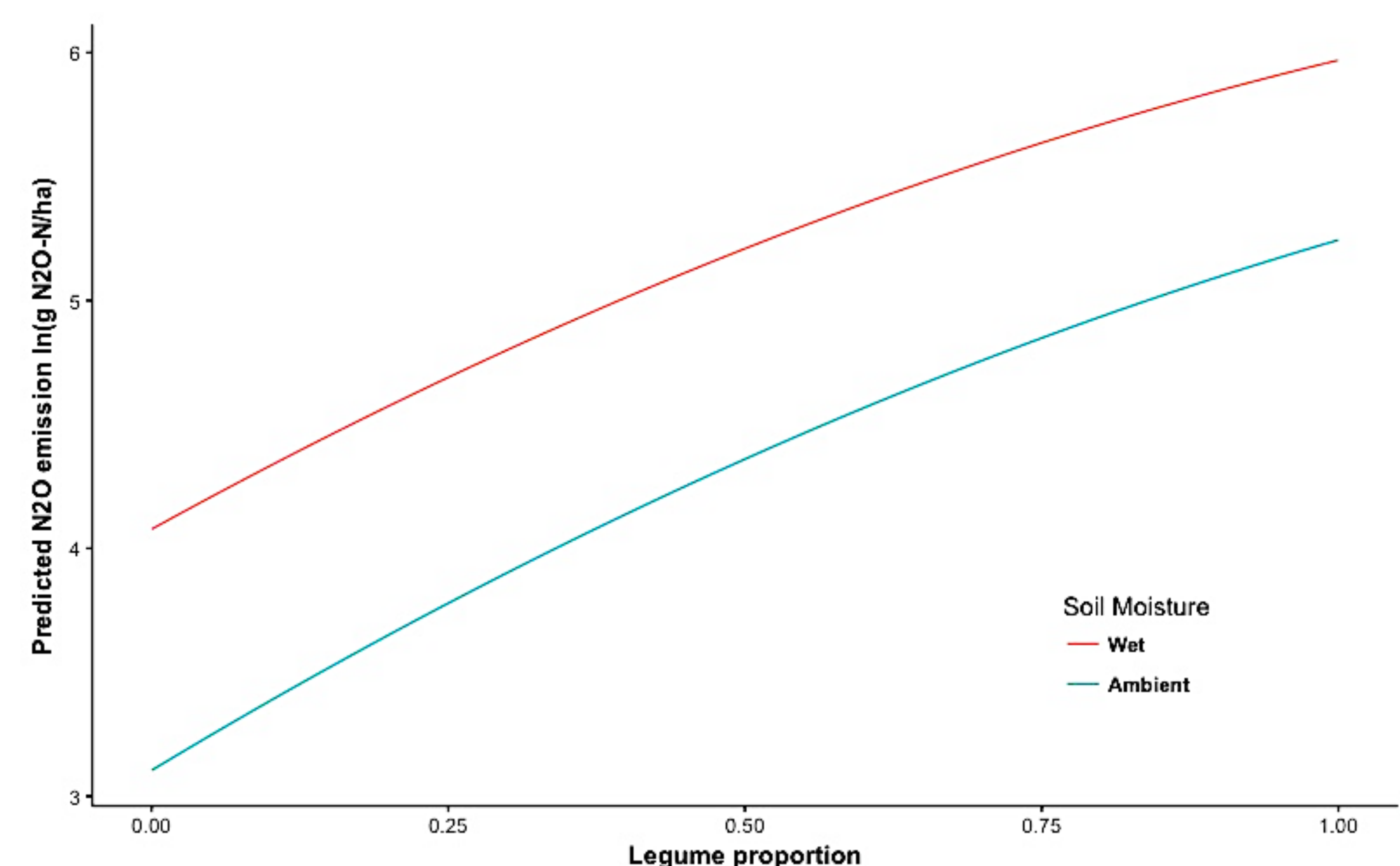


Figure 3: Legume effect on N₂O

Discussion and Conclusion

- Legume-rich swards had greater N₂O emissions. (However, uniform fertilizer N).
- N₂O emissions higher under wetter soil conditions.
- Important to adjust N fertiliser rates for swards containing N-fixing legumes.
- Time applications to avoid overly wet soil conditions.

References

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- ⁴Grace, C., *et al.* (2018). "The effect of varying levels of nitrogen input on the annual and seasonal dry matter yield of multispecies mixtures compared to a perennial ryegrass monoculture." Under review.

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