Analysis of N_2O emissions and isotopomers to understand nitrogen cycling associated with multispecies grassland swards at a lysimeter scale.

Conor Bracken[a, b, c], Gary Lanigan[c], Karl Richards[c], Christoph Müller[b, d, e], Saoirse Tracy[a, b], Paul Murphy[a, b]
[a]UCD School of Agriculture and Food Science; [b]UCD Earth Institute; [c]Teagasc, Environmental Research Center, Johnstown Castle; [d]Institute of Plant Ecology, Justus-Liebig University; [e]UCD School of Biology and Environmental Science

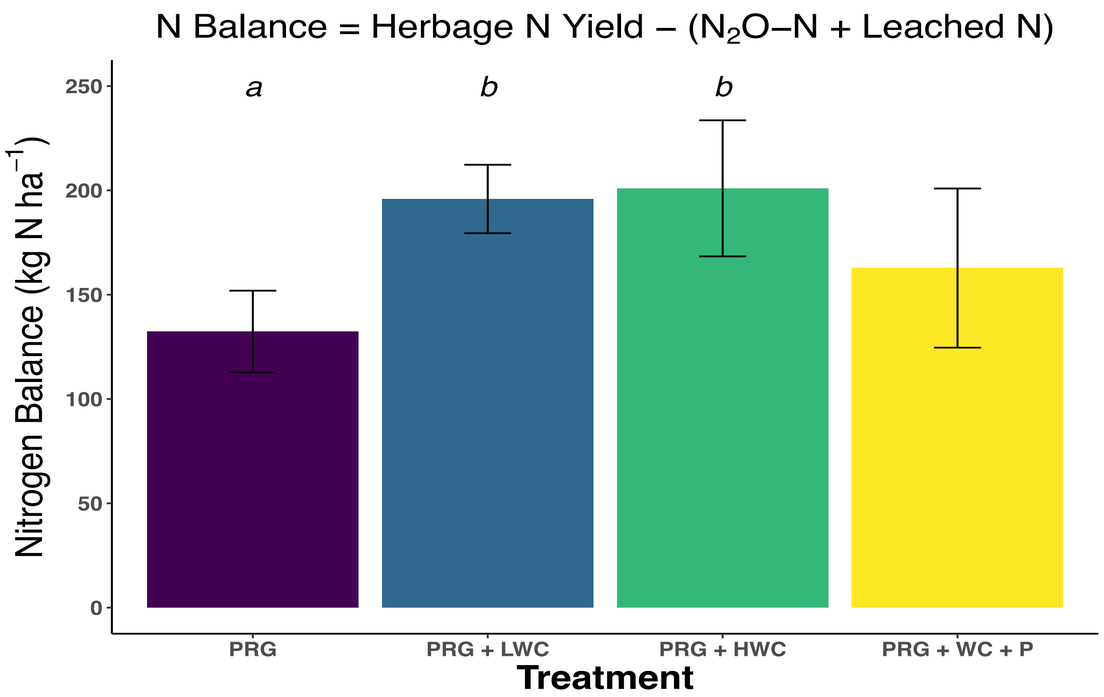
Introduction

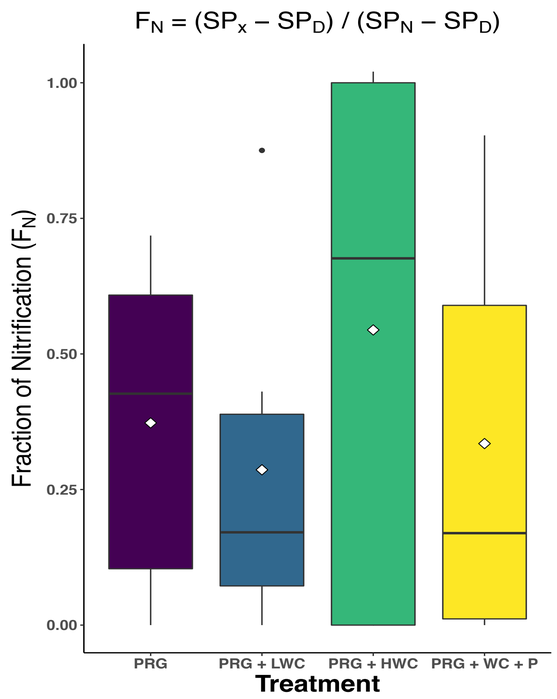
N_2O is a potent GHG associated with N fertiliser inputs and management practices.[1] N_2O isotopomers are useful indicators of N_2O source pathways.[2,3] Minimising N losses is key to improving the efficiency and sustainability of grassland agriculture systems.[4] Multispecies swards have been considered as an option to reduce N fertiliser inputs, maintain yields and mitigate N losses.

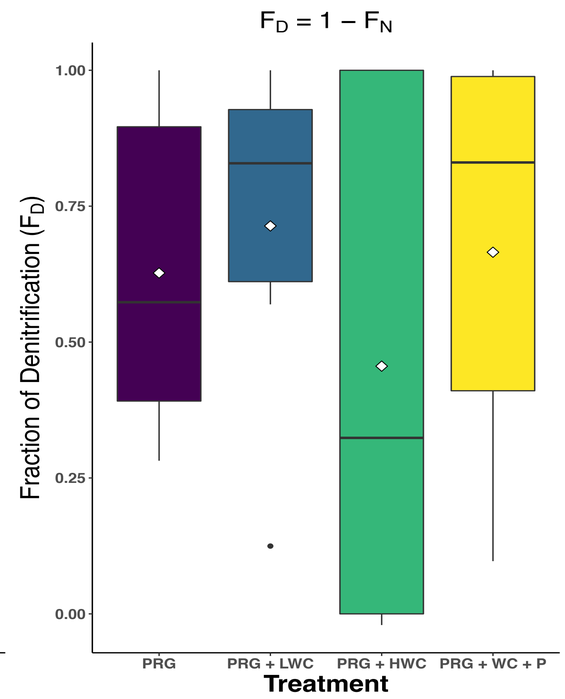
Materials and Methods

Completely randomised block design. 4 treatments: Perennial ryegrass only (PRG, 250 kg N ha^{-1} yr^{-1}), PRG + low white clover (PRG+LWC, 90 kg N ha^{-1} yr^{-1}), PRG + high WC (PRG+HWC, 0 kg N ha^{-1} yr^{-1}) and PRG + WC + ribwort plantain (PRG+WC+P, 45 kg N ha^{-1} yr^{-1}).

Results and Conclusions







Nitrogen balances were significantly greater from PRG+LWC and PRG+HWC than PRG only. Both required less annual fertiliser N to sustain DM production. There were no significant differences in cumulative N_2O emissions or total leached N among treatments. No significant difference in the fraction of nitrification (F_N) or denitrification (F_D) was detected between treatments around peak N_2O fluxes linked to fertiliser application.

References

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