



# SWITCHING TO AMMONIUM BASED FERTILISER CAN REDUCE N<sub>2</sub>O

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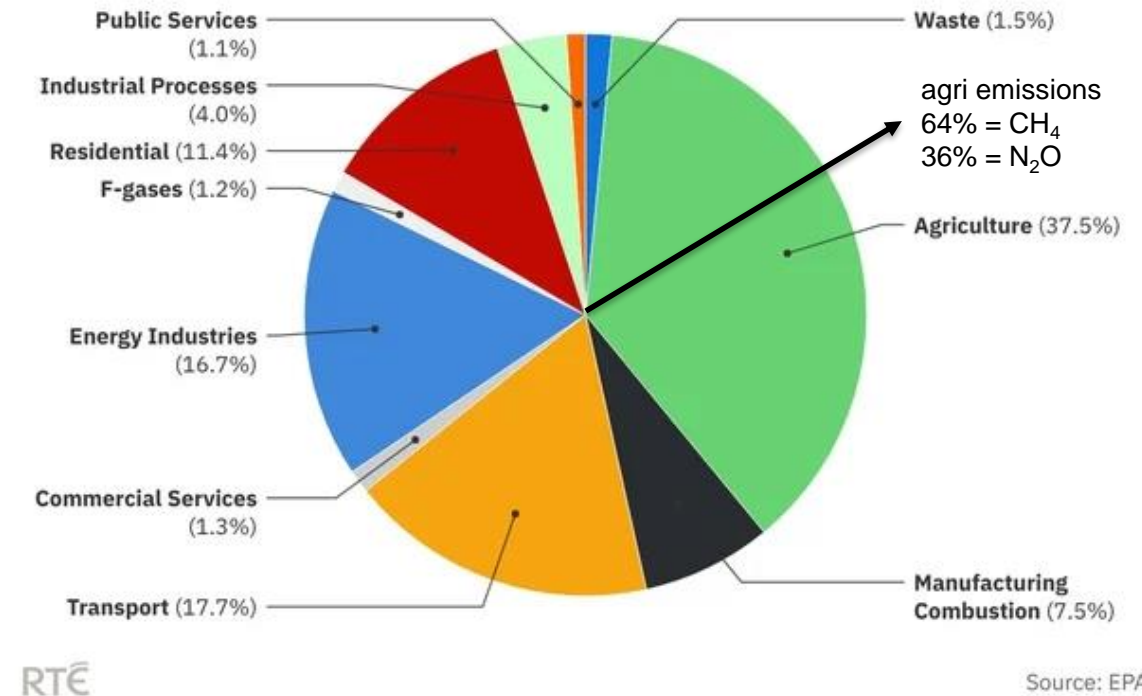
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# Introduction

- Grasslands receive up to 250 kg N ha<sup>-1</sup> yr<sup>-1</sup>
- Irish agriculture uses c. 400,000 T N yr<sup>-1</sup>  
50% straight N and 50% compound NPK
- Irish agriculture: ➤90% of national N<sub>2</sub>O emissions
- Agriculture to reduce GHG emissions by 22-30% by 2030
- **Aim: To evaluate and refine the emission factor (EF) for a range of N-P-K compound fertilizers**

## 2021 greenhouse gas emissions by sector

Last year, the agriculture sector produced 37.5% of Ireland's greenhouse gas emissions, according to the EPA, well over three times the EU average of 11%



<https://www.rte.ie/news/politics/2022/0727/1312514-emissions/>

# Background – Move from nitrate to ammonium/urea fertilisers

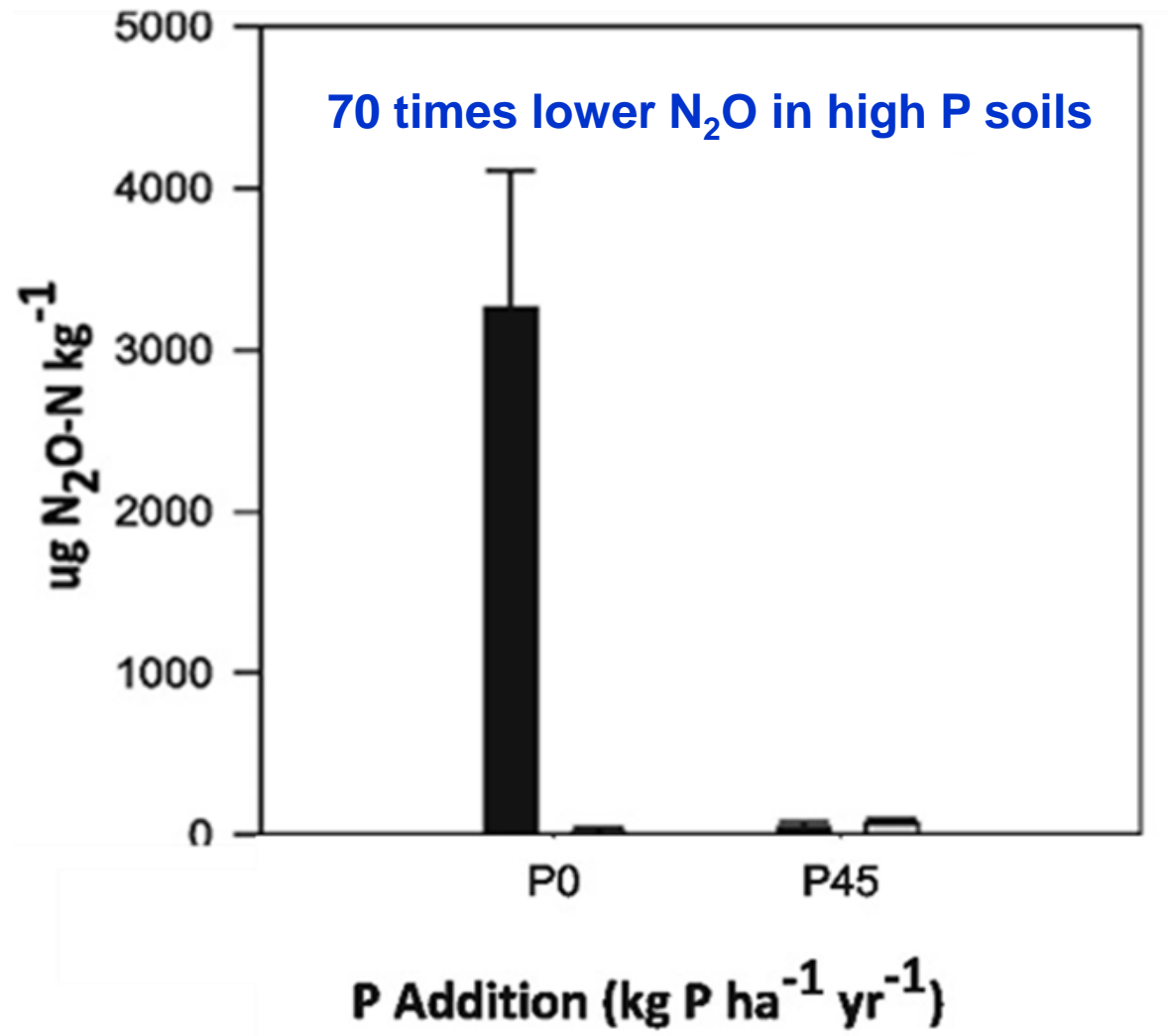
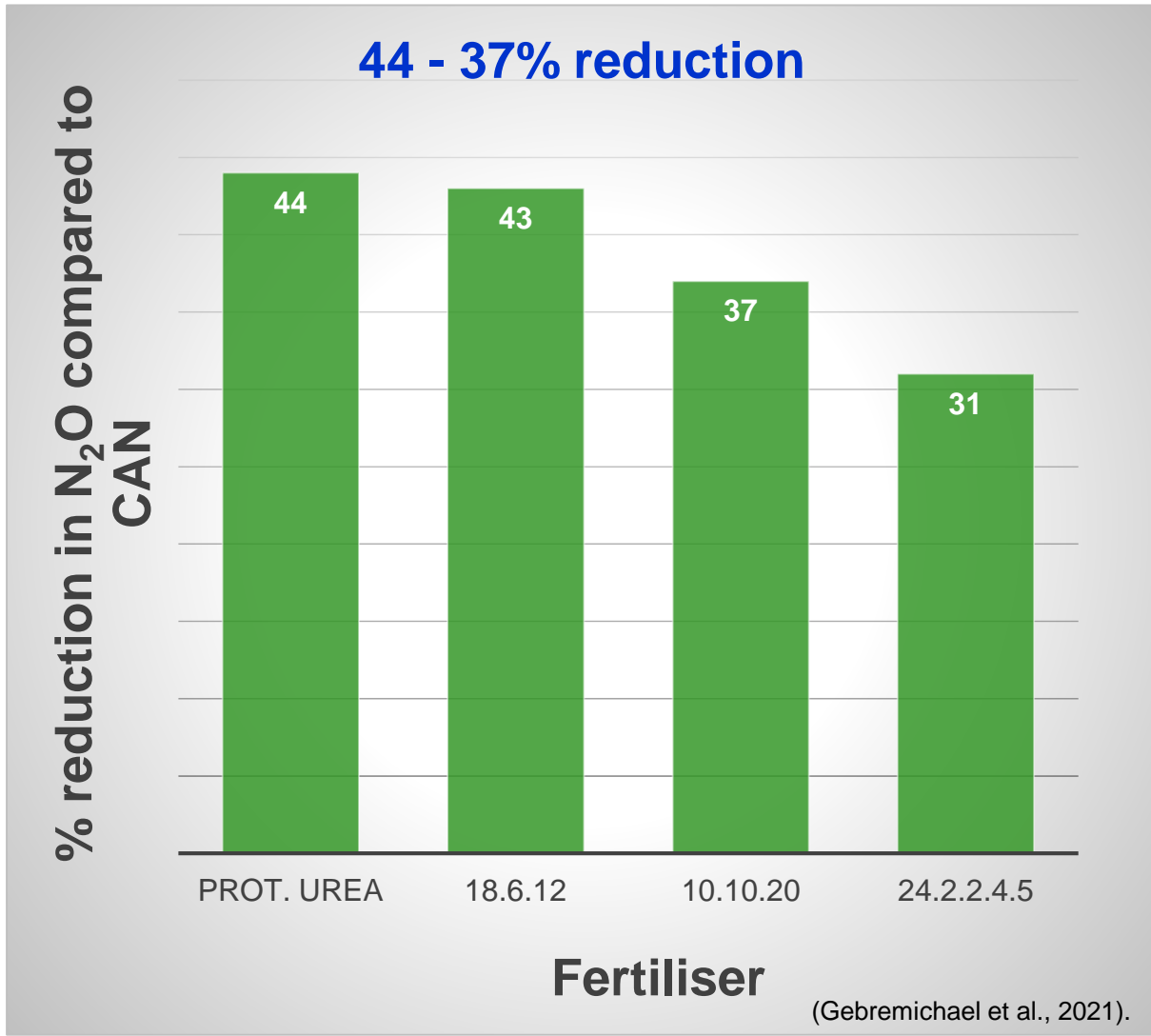
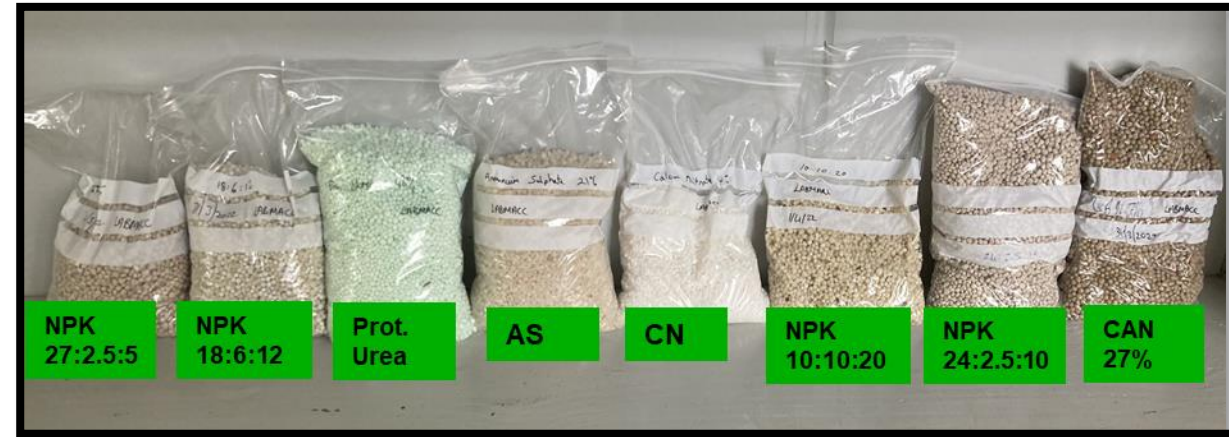


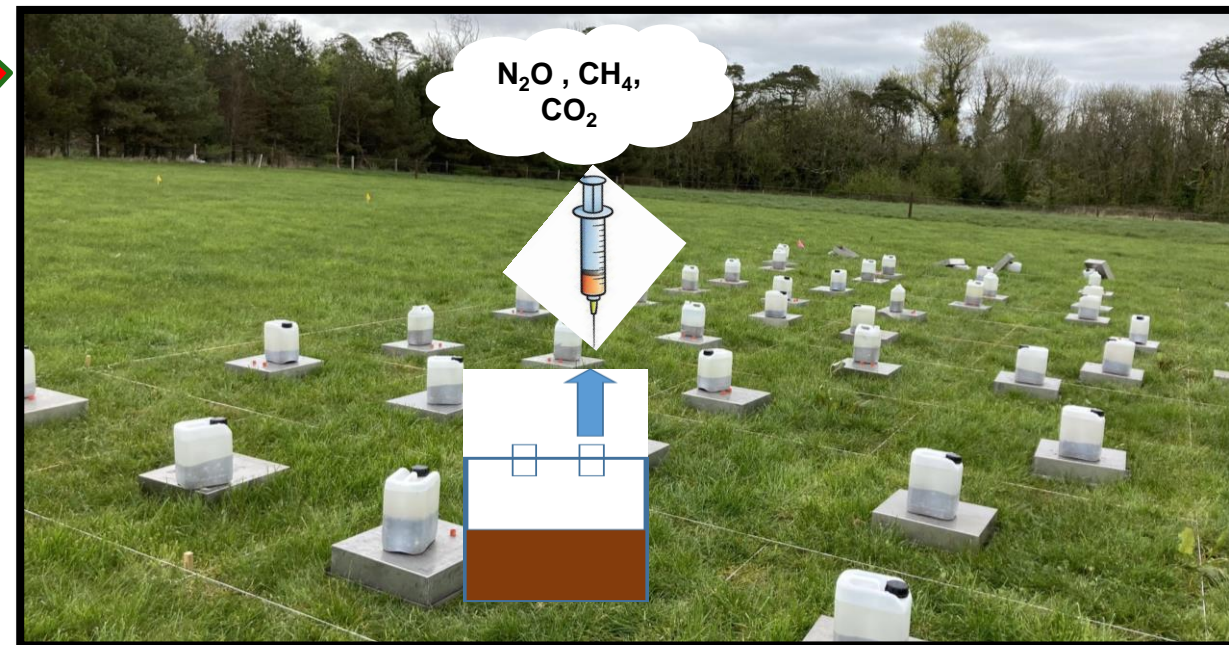
Figure. O'Neill et al., 2020. cumulative N<sub>2</sub>O from 0 kg P ha<sup>-1</sup> yr<sup>-1</sup> and 45 kg P ha<sup>-1</sup> yr<sup>-1</sup> treated soils following C + N or N addition. Means ± 1 SE. (n = 3). <https://doi.org/10.1016/j.soilbio.2020.107726>

# Materials and Methods

- Grazed permanent grassland
- 40 kg N/ha, April, May, June, July & August
- 8 fertiliser treatments
  1. Control (no fertiliser)
  2. 18-6-12 (ammonium-based)
  3. 10-10-20 (ammonium-based)
  4. 24-2.2-10 (nitrate-based),
  5. 27-2.5-5 (nitrate-based)
  6. Urea + NBPT (agrotain)
  7. Ammonium Sulphate
  8. Calcium Nitrate
  9. Liquid N. (UAN)
- $N_2O$  measured using static chambers for 24 months
- Measurements made frequently after fertiliser application.



Rate = 40 kg N ha<sup>-1</sup>





# Summary

- **Task:** Quantifying  $N_2O$  from a range of compound fertilisers with varying nitrate to ammonium/urea ratios.
- **Goal:** To generate EFs which can be included in the National Inventory Report and will allow for mitigation measures specific to Irish conditions
- **Background:** Compounds with the lowest nitrate ( $NO_3$ ) to ammonium ( $NH_4$ ) ratios gave the lowest emissions!

