GLOBAL RESEARCH ALLIANCE

ON AGRICULTURAL GREENHOUSE GASES

Marta Alfaro and Tony van der Weerden (AgResearch)

Development of context-specific emission factors from the application of nitrogenous fertilisers

Situation/Issue

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- Significant N_2O emissions result from direct sources through the application of nitrogenous fertilisers (EF_1) and indirect sources via ammonia volatilisation (FracGASF) and N leaching (FracLEACH)

- However, there is a dearth of information on the environmental and soil conditions and relevant variables including farm systems and management practices (timing, amount, rate and location of fertiliser application) that underpin estimates of these emissions, and there are large gaps in some regions and productive systems

- This affects the ability of countries to accurately account for and report N_2O emissions in national greenhouse gas inventories

Flagship Project Goal(s)

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To compile existing data and undertake new field measurements to develop **context-specific emissions factors** relating to the application of **synthetic N fertilisers** for the purpose of inventory improvement including N_2O **mitigation accounting**

Anticipated Flagship Outcomes/Impacts

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Phase I	Expanded database	Scientific manuscripts	Public release of database
Phase II	Protocol and guidelines	Scientific manuscripts	New research grants
Phase III	New mitigation options	Tier 2 & 2+	Scientific manuscripts

Over 750 emission factors collated

Flagship Project Partners

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Europe	Latin America
REfining Emission Factors for Inventory Reporting (REEFIR) [IRE-NZ agricultural GHG joint call]. 4-year proposal, led by Tony van der Weerden (AgResearch) and Dominika Krol (Teagasc) → AIM: develop Tier 2/3 N_2O emission factors for various N sources including synthetic N fertiliser • €1.49M	**Optimizando el uso de nitrógeno, mayor producción y menor impacto (N4R) (FONTAGRO).** 4-year proposal, led by Sara Hube (INIA), with participation of Argentina, Perú, Domenican Republic, Panama and Chile → AIM: develop Tier 2 N_2O emission factors for various N sources including synthetic N fertiliser • US$400,000

Activities/Results To Date

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NZ/Ireland	Latin America
REfining Emission Factors for Inventory Reporting (REEFIR) [IRE-NZ agricultural GHG joint call]. • NZ & Irish Tier 2 emission factor data collated • Focus on collating Tier 2 EFs from other countries • Process-based modelling: APSIM (NZ) output compared with NZ and Swiss test datasets; Ireland (DNDC & Daycent) to do the same shortly • 2025 field experiments: urea, urea +DCD, CAN	**Optimizando el uso de nitrógeno, mayor producción y menor impacto (N4R) (FONTAGRO).** • Capacity building activity January 2025 • Field activities being implemented

- Annual newsletter
- Participation in conferences
- Webinar on “Nitrogen mineral fertilisers, updates on methodologies and relevant work for inventory development”

Given delays in the process of implementing pillar projects, a 9-12 months extension for the N GRA Flagship will be required

Opportunities to get involved

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1. Contributing historical and future measurements of N_2O emissions and ammonia emissions from diverse production systems and fertiliser treatments, with associated site information (database analysis e.g. DATAMAN initiative)

2. Participation on dissemination activities

3. Contributing expertise in statistical analysis, modelling

4. New funding collaborative initiatives

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