



GLOBAL RESEARCH ALLIANCE

ON AGRICULTURAL GREENHOUSE GASES

Marta Alfaro and Tony van der Weerden (BSI)

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

Situation/Issue

- 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 **N₂O mitigation accounting**

Anticipated Flagship Outcomes/Impacts

Phase I

**Over 800 emission
factors collated**

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

Flagship Project Partners

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Europe	Latin America	Europe
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 N₂O 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, Dominican Republic, Panama and Chile □ AIM: develop Tier 2 N₂O emission factors for various N sources including synthetic N fertiliser • US\$400,000	Wageningen University Research FY26 Data collection and incorporation on N₂O emissions from temperate cropping systems

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].

Optimizando el uso de nitrógeno, mayor producción y menor impacto (N4R) (FONTAGRO).

- Collation of data continues, with over 800 observations collated for developing Tier 2 emission factors
- Process-based modelling: APSIM, DNDC, Daycent models compared with NZ and Swiss test datasets
- Field experiments comparing urea, urea +DCD/ urea + NBPT, CAN completed, data being collated for modelling

- Capacity building activity January 2025
- 7 field experiments implemented (Argentina, Chile, Peru, Panama and The Dominican Republic)
- Pasture and cropping systems

- Webinar on “Nitrogen mineral fertilisers, pathways for nitrous oxide mitigation” (March 2026)
- Annual newsletter published in GRA website (May 2026)

Given delays in the process of implementing pillar projects, a 9-12 months extension for the N GRA Flagship will be required (May 2028).

Opportunities to get involved

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1. Contributing historical and future measurements of N₂O 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

Funded by the New Zealand Government to support the objectives of the Global Research Alliance on Agricultural Greenhouse Gases

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