GLOBAL RESEARCH ALLIANCE

ON AGRICULTURAL GREENHOUSE GASES

GRA FLAGSHIP PROJECT TITLE: Development of context-specific emissions factors from the application of nitrogenous fertilisers



GLOBAL RESEARCH ALLIANCE ON AGRICULTURAL GREENHOUSE GASES



Marta Alfaro (Chile) malfaro@inia.cl



Tony van der Weerden (New Zealand) tony.vanderweerden@agresearch.co.nz

Overview of project

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- Start date and project length:
- March 2022
- 48 months

- Brief description of project:
- Fertiliser, nitrous oxide, ammonia, emissions factors, GHG inventory, mitigation
- Significant N₂O emissions result from the application of nitrogenous fertilisers through direct N₂O emissions (EF₁) and indirect N₂O via ammonia volatilization (FracGASF) and N leaching (FracLEACH-(H)).
- 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.



 To compile existing data and undertake new field measurements to develop contextspecific emissions factors relating to the application of synthetic N fertilisers for the purpose of inventory improvement including N₂O mitigation accounting.

Key Participants and Resources

Current participants and resources:

Countries/institutions/organisations involved in discussions to date include

- Chile (INIA)
- Argentina (INTA)
- Costa Rica (INTA; Univ. of Costa Rica)
- Peru (La Molina Univ.)
- Brazil (Embrapa)
- New Zealand (AgResearch; Landcare Research; Lincoln Univ.)
- Australia (Queensland Univ. of Technology)
- Ireland (Teagasc)
- UK (Rothamsted Research; Bangor Univ.)
- Switzerland (ETH Zurich)
- Denmark (Aarhus Univ.)
- Norway (Univ. of Oslo)
- Spain (Univ. Politechnic Madrid)
- Germany (Thuenen Institute; Univ. of Goettingen; Univ. of Hohenheim)

- Canada (AAFC)
- USA (USDA; Colorado State Univ.)

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- China (CAAS)
- IITA CGIAR
- CIMMYT CGIAR
- International Fertiliser Association
- The Nature Conservancy Trust

Project phases



• Modify DATAMAN database • ID key factors for data collation Data collation Database collation and release Phase I Yr 1-4 (months 1-40) • Complete ongoing field research • Conduct new studies based on data gap analysis Field Research Phase II • New grants/funding Yr 2-3 (months 12-36) • Dataset gap filling • Statistical modelling Data modelling Process-based modelling (ensemble of models) Phase III Yr 1-4 Context–specific EFs and mitigation recommended (months 1-40)

Expected outputs



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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 & 3	Scientific manuscripts

Activities to date

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1. 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).

 \rightarrow AIM: develop Tier 2/3 N₂O emission factors for various N sources including synthetic N fertiliser.

- Builds on the DATAMAN project
- Focus on temperate grassland systems
- Collating emissions data from synthetic N fertilizer sources, including mitigation technologies
- Conducting new experimental work quantifying emissions from N sources in Ireland and NZ
- Synthetic N fertiliser database analyzed using both statistical and process-based modeling approaches.

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

4-year proposal, led by Marta Alfaro (INIA)

- → AIM: develop Tier 2/3 N₂O emission factors for various N sources including synthetic N fertiliser.
- Focus on temperate and tropical cropping and grassland systems
- Conducting new experimental work quantifying emissions from synthetic N fertilizer sources and testing mitigation technologies
- This grants will carry out experimental sites in Argentina, Perú, Domenican Republic, Panama and Chile. US\$400.000

• €1.49M

Opportunities for involvement



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

2. Contributing expertise in statistical analysis, modelling

3. New funding collaborative initiatives

Proposed face-to-face meeting



Proposed kick-off meeting for Flagship project in Wexford, Ireland in early March 2023

Aim of meeting: to discuss and confirm overall structure, responsibilities and deliverables of project

Contact Dominika Krol (Teagasc) if you would like to receive ongoing correspondence on this proposed meeting

dominika.krol@teagasc.ie

Contacts us





Marta Alfaro (Chile) malfaro@inia.cl



Tony van der Weerden (New Zealand)

tony.vanderweerden@agresearch.co.nz