



Nitrogen Flagship

Newsletter 2 – May 2025

The Nitrogen Flagship (N flagship) was implemented by the Global Research Alliance on Agricultural Greenhouse Gases (GRA) for the period $2022-2027^1$. The aim of this flagship is to help countries to improve their national inventories reporting under the Paris Agreement, by developing Tier 2 (reflecting local soil and climate conditions) and Tier 3 (modelling based) emission factors for the use of N fertiliser, relevant for the estimation and reporting of direct nitrous oxide (N₂O) emissions from soils.

This Flagship project seeks to compile existing data and undertake new field measurements to develop context-specific emission factors relating to the application of nitrogenous fertilisers for the purpose of inventory improvement, including N₂O mitigation accounting.

The activities of this Flagship are linked to the implementation of two pillar projects:

- 1. Refining Emission Factors for Inventory Reporting (REEFIR; 2022-NZIRL REEFIR-AGR), an Ireland-New Zealand (NZ) research initiative, and
- Optimizando el Uso de Nitrógeno, Mayor Producción y Menor Impacto (N4R; ATN/RF-20641-RG and ATN/RF-20642-RG), a research initiative including activities in Chile, Argentina, Panama, Peru, and The Dominican Republic, funded by Fondo Regional de Tecnología Agropecuaria (FONTAGRO).

During the last year, both pillar projects have started field experiments. The REEFIR initiative held a face-to-face meeting in Wexford, Ireland in September 2024, to progress planning for field experiments and discuss approaches for developing higher tier emission factors using process-based models. The field experiments have been designed to generate data for comparing and improving process-based models. A spring field experiment has commenced in Ireland; this will be followed by an autumn experiment. In NZ, planning is under way for spring experiments in two regions with different climates and soils. Experiments in both countries will include the same fertiliser treatments (urea and calcium ammonium nitrate fertiliser) but will investigate the effect of different inhibitors.

The N4R initiative held a kick-off workshop and training activity in Osorno (Chile), between the 13 and 17 of January 2025 with participation of 16 representatives from all five participating countries (Photo 1). As a result of this activity, a common protocol for N₂O quantification in cropping and grassland systems was agreed. Furthermore, field experiments at two sites in Argentina (Buenos Aires and Cordova), and one experimental site in Peru have already been established to quantify N₂O emissions from maize and potato cropping systems, respectively. Field experiments in Chile, Panama and The Dominican Republic are planned for the second half of 2025.

¹<u>Reducing N₂O emissions and improving accounting</u> | <u>Global Research Alliance</u>





In addition to these research activities, we have reached out to colleagues around the globe (Australia, Canada, Denmark, France, Germany, the United Kingdom, Uruguay, and The Netherlands, among others) for access to suitable Tier 2 emission factor data and assistance with its collation for future statistical analysis.



Photo 1. The N4R team during visit to INIA Chile and country representatives visiting field experiments as part of kick-off workshop held in January 2025.

The N flagship successfully participated in the Agriculture and Climate Change Conference: Science into Action, held in Dublin (Ireland) in association with the Annual GRA Council Meeting 2025, providing information on aims and key activities. We also held an online webinar on "Nitrogen mineral fertilisers, updates on methodologies and relevant work for inventory improvement" with participation of keynote speakers from the REEFIR (Dr. Shaun Connolly, Teagasc Ireland) and 4NR (Mrs. Sara Hube, INIA Chile) pillar projects. They covered key methodological considerations when comparing wind tunnels and integrated horizontal flux methods for measuring ammonia emissions from multiple synthetic fertilisers and provided an overview on challenges for N₂O quantification in non-traditional cropping systems in Latin-American countries, respectively.

We joined the GRA Cropland Research Group Annual Meeting (November 2024), providing an update on N flagship activities as well as seeking collaboration from other countries and collaborators. The N flagship also provided updates for the GRA Annual Council Meeting (September 2024 and May 2025).

If you are interested in the progress of one of these initiatives or you would like to contribute with data to the current work undertaken, please contact us through the GRA.

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