

# NITROGEN FERTILISATION AND SUSTAINABILITY

Technology that enables polluting emissions from agricultural systems to be reduced based on handling nitrogen fertiliser and irrigation, the use of nitrification and urease inhibitors, handling automatic gas measurement systems (NO<sub>x</sub>, NH<sub>3</sub> and N<sub>2</sub>O) in the field and data management.





## Contact information

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## Technological Offers type

Technological scientific services

## Research and innovation areas

- Agriculture, Forestry, Natural Resources, Land Use and Blue Growth
- Climate, Energy and Mobility
- Digital Technologies, Artificial Intelligence, Cybersecurity, 5G, Robotics

## ODS



**Available from:** 2015

## Where?

Agricultural Environmental Risk Management Research and Study Centre (CEIGRAM). Joint UPM-ENESA-AGROSEGURO Centre  
Contamination of agroecosystems caused by agricultural practices

Keywords: | automatic gas measurement chambers | chemiluminescence | data management | greenhouse gases | irrigation-fertilization interaction | management of automatic gas measurement systems | micrometeorological techniques | nitrogen fertilization and irrigation | Polluting emissions from agricultural systems | polluting gases in agricultural soil (NH<sub>3</sub> and NO<sub>x</sub>) | Rogue G2308

## Handling nitrogen fertilisation to reduce emissions

### Description of the services offered

1. Developing tests under real farming conditions
2. Obtaining the GHG and NO<sub>x</sub> emission curve under various fertiliser formulas and irrigation systems with automatic measuring systems in-situ.
3. Carrying out tests with 15N to quantify processes in the N Quantification cycle of NH<sub>3</sub> volatilisation using micro-meteorological techniques.
4. Optimisation of fertiliser handling (inorganic and organic)

### Needs requested and applications

The agricultural industry's adaptation to the European Green Deal compels improvement to efficiency in the use of resources in agricultural systems over the next decade (2030). At the COAPA Research Group we do specialist reports and consultancy on greenhouse gas emissions and other contaminant gases on agricultural land (NH<sub>3</sub> and NO<sub>x</sub>) and we help in designing and reviewing

industrial research studies aimed at constructing innovative solutions. We provide facilities, equipment and human resources to carry out product studies and testing, and always seek the best way to protect the research results.

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### Sector or area of application

Fertiliser companies

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### Differential skills

The COAPA Group consists of 11 doctorate researchers, 3 trainee researchers and 2 technicians and is led by the Senior Lecturer, Antonio Vallejo. The services are carried out by specific staff with high technical and research qualifications in agriculture-based emission mitigation strategies (nitrogen fertiliser handling, use of nitrification and urease inhibitors, irrigation-fertilisation interaction and crop rotation), handling automatic gas measurement systems in the field (NO<sub>x</sub>, NH<sub>3</sub>, N<sub>2</sub>O) and data management (storage codes, data study and statistical analysis), which ensure the high quality of the services the group offers.

Visit the group's web site:

<https://ceigram.upm.es/grupos-de-investigacion/contaminacion-de-agrosistemas-por-practicas-agricolas-coapa/>

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### Previous references for provision of services

Over the past 5 years, the group has taken part in 16 projects with companies, foundations and associations in the fertiliser industry and associations of producers, and directed 5 Spanish projects and 4 international projects ([AgroGreen-SUDOE](#), [Towards INMS](#), International Atomic Energy Agency, International Institute for Applied Systems Analysis). It has also coordinated two regional projects ([AGRISOST](#)) using the technology set out in this offer.

**Enterprises the group has worked with:** Fertinagro Biotech S.L.¿ Eurochem Agro Iberia S.L.; Real Academia de Ingeniería (RAING); Fundación Biodiversidad

**Collaborating public research centres:** Centro de Investigación y Tecnología Agroalimentaria de Aragón, Centro de Ciencias medioambientales-CSIC, Centro IFAPA (Andalusia Local Government)

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### Equipment description

**COAPA group's equipment for taking measurements of polluting emissions in agricultural systems:** Equipment for measuring NO<sub>x</sub> and NH<sub>3</sub> for open chamber measurement (manual), both based on chemiluminescence; a chemiluminescence-based instrument for measuring O<sub>3</sub>; a set of 90 samplers for measuring NH<sub>3</sub> using micro-meteorological techniques; sonic anemometer; CRDS analyser for N<sub>2</sub>O, CH<sub>4</sub>, H<sub>2</sub>O vapour and CO<sub>2</sub> (Picarro G2308 with automatic 15 chamber system); air-conditioned field laboratory (8 m<sup>2</sup>); chemiluminescence-based NO<sub>x</sub> measuring system connected to a 15 chamber automatic measuring system in-situ; a 4x4 vehicle (Suzuki Grand Vitara) with a trailer adapted for installation of measuring equipment; and an element analyser – Leco TruMac CN and TOCN Analytik Jena 3100.

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### Request for service

A **request** for service can be made by contacting the science officer **Dr.**

#### Antonio Vallejo

via the e-mail [antonio.vallejo@upm.es](mailto:antonio.vallejo@upm.es) or the CEIGRAM Research and Innovation Management Team, via the e-mail [ceigram.etsiaab@upm.es](mailto:ceigram.etsiaab@upm.es)

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