



HAL
open science

The diversity of the N₂O reducers matters for the relative proportion of N₂O emitted across cropping systems by denitrification

Luiz Domeignoz Horta, Aymé Spor, David Bru, Marie-Christine Breuil, Florian Bizouard, Joël J. Léonard, Laurent Philippot

► To cite this version:

Luiz Domeignoz Horta, Aymé Spor, David Bru, Marie-Christine Breuil, Florian Bizouard, et al.. The diversity of the N₂O reducers matters for the relative proportion of N₂O emitted across cropping systems by denitrification. 20th European Nitrogen Cycle Meeting, ENC2015 Conference, University of Aberdeen. GBR., Sep 2015, Aberdeen, United Kingdom. 65 p. hal-02743401

HAL Id: hal-02743401

<https://hal.inrae.fr/hal-02743401v1>

Submitted on 3 Jun 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

ORAL PRESENTATIONS

Diversity of N₂O reducers matters for the relative proportion of N₂O emitted across cropping systems by denitrification

Luiz Domeignoz-Horta, A. Spor, D. Bru, M.C. Breuil, F. Bizouard, J. Léonard, Laurent Philippot

INRA, UMR 1347 Agroécologie, F-21065 Dijon cedex, France

luizdomeignoz@gmail.com

Agriculture is the main source of terrestrial emissions of N₂O, a potent greenhouse gas and the main cause of ozone layer depletion. The reduction of N₂O into N₂ by microorganisms carrying the nitrous oxide reductase gene (*nosZ*) is the only biological process known to eliminate this greenhouse gas. Recent studies showed that a previously unknown clade of N₂O-reducers was related to the capacity of the soil to act as an N₂O sink, opening the way for new strategies to mitigate emissions. Here, we investigated whether the agricultural practices could differently influence the two N₂O reducer clades with consequences for denitrification end-products. The abundance of N₂O-reducers and producers was quantified by real-time PCR, and the diversity of both *nosZ* clades was determined by 454 pyrosequencing. Potential N₂O emissions and potential denitrification activity were used to calculate the N₂O emission ratio. Overall, the results showed limited differences between management practices but there were significant differences between cropping systems in both the abundance and structure of the *nosZII* community, as well as in the N₂O emission ratio. More limited differences were observed in the *nosZI* community, suggesting that the newly identified *nosZII* clade is more sensitive than *nosZI* to environmental changes. Potential denitrification activity and potential N₂O emissions were explained mainly by the soil properties while the diversity of the *nosZII* clade on its own explained 26 percent of the proportion of N₂O emitted, which highlights the importance of understanding the ecology of this newly identified clade of N₂O reducers for mitigation strategies.