



Universiteit
Leiden
The Netherlands

Impact of nitrogen fertilization on the soil microbiome and nitrous oxide emissions

Cassman, N.A.

Citation

Cassman, N. A. (2019, April 17). *Impact of nitrogen fertilization on the soil microbiome and nitrous oxide emissions*. Retrieved from <https://hdl.handle.net/1887/71732>

Version: Not Applicable (or Unknown)

License: [Leiden University Non-exclusive license](#)

Downloaded from: <https://hdl.handle.net/1887/71732>

Note: To cite this publication please use the final published version (if applicable).

Cover Page



Universiteit Leiden



The handle <http://hdl.handle.net/1887/71732> holds various files of this Leiden University dissertation.

Author: Cassman, N.A.

Title: Impact of nitrogen fertilization on the soil microbiome and nitrous oxide emissions

Issue Date: 2019-04-17

Publications

Publications in the thesis:

Pan Y*, **Cassman N***, de Hollander M, Mendes LW, Korevaar H, Geerts RH, van Veen JA, Kuramae EE. Impact of long-term N, P, K, and NPK fertilization on the composition and potential functions of the bacterial community in grassland soil. *FEMS microbiology ecology*. 2014 Oct 1. 90(1):195-205.

Cassman NA, Leite MF, Pan Y, De Hollander M, Van Veen JA, Kuramae EE. Plant and soil fungal but not soil bacterial communities are linked in long-term fertilized grassland. *Scientific reports*. 2016 Mar 29. 6:23680.

Soares JR*, **Cassman NA***, Kielak AM, Pijl A, Carmo JB, Lourenço KS, Laanbroek HJ, Cantarella H, Kuramae EE. Nitrous oxide emission related to ammonia-oxidizing bacteria and mitigation options from N fertilization in a tropical soil. *Scientific reports*. 2016 Jul 27. 6:30349.

Cassman NA, Lourenço KS, Carmo JB, Cantarella H, Kuramae EE. Genome-resolved metagenomics of sugarcane vinasse bacteria. *Biotechnology for biofuels*. 2018 Dec. 11(1):48.

Cassman NA, Soares JR, Pijl A, Lourenço KS, van Veen JA, Cantarella H, Kuramae EE. Nitrification inhibitors effectively target N₂O-producing *Nitrosospora* spp. in tropical soil. *Environmental microbiology*. 2019 Feb 8.

* indicates shared first authorship

Other publications (reverse chronological order):

Lourenco KS, **Cassman NA**, Pijl A, van Veen JA, Cantarella H, Kuramae EE. Nitrosospira sp. govern nitrous oxide emissions in a tropical soil amended with residues of bioenergy crop. *Frontiers in microbiology*. 2018;9:674.

Navarrete AA, Tsai SM, Mendes LW, Faust K, de Hollander M, **Cassman NA**, Raes J, van Veen JA, Kuramae EE. Soil microbiome responses to the short-term effects of Amazonian deforestation. *Molecular ecology*. 2015 May;24(10):2433-48.

Matthews TD, Schmieder R, Silva GG, Busch J, **Cassman N**, Dutilh BE, Green D, Matlock B, Heffernan B, Olsen GJ, Hanna LF. Genomic comparison of the closely-related Salmonella enterica serovars Enteritidis, Dublin and Gallinarum. *PLoS One*. 2015 Jun 3;10(6):e0126883.

Edwards RA, Haggerty JM, **Cassman N**, Busch JC, Aguinaldo K, Chinta S, Vaughn MH, Morey R, Harkins TT, Teiling C, Fredrikson K. Microbes, metagenomes and marine mammals: enabling the next generation of scientist to enter the genomic era. *BMC genomics*. 2013 Dec;14(1):600.

Dutilh BE, **Cassman N**, McNair K, Sanchez SE, Silva GG, Boling L, Barr JJ, Speth DR, Seguritan V, Aziz RK, Felts B. A highly abundant bacteriophage discovered in the unknown sequences of human faecal metagenomes. *Nature communications*. 2014 Jul 24;5:4498.

Cassman N*, **Prieto-Davó A***, Walsh K, Silva GG, Angly F, Akhter S, Barott K, Busch J, McDole T, Haggerty JM, Willner D. Oxygen minimum zones harbour novel viral communities with low diversity. *Environmental microbiology*. 2012 Nov;14(11):3043-65.

* indicates shared first authorship

Acknowledgements

Acknowledgements

To the collaborators in Brazil – **Heitor Cantarella**, **Janaina Braga do Carmo**, **Juliana Ramos**, **Leonardo**, **Acacio Navarette** and **Helio Danilo** – thank you very much for your support during my trips to Brazil and your contributions to our various publications. Muita obrigada!

Big thanks go to my co-authors. **Riks**, your body of work admirably presents the path of curiosity-driven science and I look forward to finishing our collaborations. **Jos**, I really appreciated your insightful questions during presentations – yours is the most valuable skill for a scientist to have.

Johnny, **Késia** and **Leonardo**, without you I would not have a thesis. Thank you for sharing the data from your experiments. **Johnny**, thank you also for sharing your family's home and culture in Ouro Fino, I will always remember the beautiful fazenda and the live sertãozinho. **Késia**, you know so much about soil and agriculture and I could always chat with you about N₂O and vinasse at any time. **Leo**, I enjoyed getting to know your intelligent and adventurous nature, thanks for the fun times in Brazil and the Netherlands.

To **Márcio**, fellow nerd, thanks for your statistical expertise and all the nice chats. **Agaat** and **Késia**, thank you for helping me to learn the “real meaning of qPCR,” and **Agaat** thanks also for your vast and efficient work on our various sequencing projects. **Roos**, in addition to your work on the chemostat project, thank you for sharing swimming and moss-ing adventures with me.

To **Mattias**, you were there from my very first interview! For the innumerable times I poked my head around the monitor to say, “Hey Mattias...” with an accompanying question, thanks for always giving your attention and a helpful suggestion, not to mention the innumerable lunches and chats about sustainable travel and hobbies.

To my office mates past and present: **Victor de Jager**, thanks for your help with bioinformatics questions and for sharing your photography interest with me. **Fleur**, though you only joined us halfway through my PhD I feel like you have always been there. Thank you for all your friendly words and support. **Kay**, your

great scientific and communication abilities astound me and I am sure you will be a very successful scientist or any career of your choosing.

To the NIOO postdocs, especially **Victor Carrion, Irene, Mauricio, Viviane, Ben, Olaf, Annelies, Desalegn, Adrian, Sainur, Chunxu, Nurmi, Anna Kielak, Sang Yoon, Natalia, Lara, Emilia** and **Max**, thank you for your inspiring curiosity, scientific drive and interesting conversations about work and life during lunches and elsewhere. **Jenny Ouyang**, it was great to have you as a neighbor in Utrecht.

To the **Kuramae group**, past and present, and other ME students: **Thiago**, thank you for your infectious enthusiasm and friendship, best of luck back in Brazil. **Afnan**, you always have a calming presence and I see you becoming a great professor, thank you for being there to listen to my complaints. And of course, we are always going to be the Taquaral Survivors! **Ohana**, we share a lot of common interests and it is always nice to converse with you, I wish you lots of luck with the science! Thank you **Je Seun** for your kindness, and I will never forget your amazing artistic talent. Thank you to **Adam, Juan, Marcelo, Adriano, Manoeli, Raul, Valeria, Sarah vdB., Kristin, Anna C., Sytske, Femke, Ruth G.** and **Yani** for the snacks and all the nice conversations.

To **Sabine**, for sharing an interest in English literature; and to **Sarash**, for great conversations about everything and anything. Thanks to the **NIOO and its denizens**, especially to **Eke** for knowing how to save an injured koot, and to **Elly** and **Gerda** for your myriad support with paperwork. For the relief of freeing myself sometimes from the constraints of scientific writing, I thank **Froukje** and the rest of the **NIOOScoop** team. To my student **Stan**, thanks for your inspiring work ethic.

To the Wageningen friends, thanks for your friendship, dinners and the fun times: **Ruth S., Paolo, Maaike, Marta, Julia, Antonella, Julie, Nico, Kadri** and **Kim**.

Maaike, your friendship has meant a lot to me! Thanks for sharing your creativity and sharing with me your family's farm. May you keep having memorable adventures. **Ruth S.**, my thanks for your friendship and for the fun times in Utrecht and beyond.

To people in other departments, thank you for great conversations and for contributing to the great working environment at NIOO: **Stijn, Jeff, Minghui, Jasper, Kelly, Dedmer, Antica, Peiyu, Wei and Tanya.**

To the Utrecht friends – **Frédérique, Joost, Frerik, Gwen, Robert,** and everyone else – thank you for including me in your lives, your friendship has meant a lot as I integrate as much as I can into Dutch life.

To the friends around the globe, especially **Hannah, Sonny, Sally, Peter, Ben and Carol,** thank you for helping me to develop my voice, which is the crucial instrument not only for communicating science but also for self-expression. To my extended family of **Cassmans, Hamamotos and Friedmans,** and to the newest family members – to **Pravin** and the **Patels,** to the **Dutilhs, Bloems** and **Ruijses** – thank you for your love and support over the past few years.

Deep thanks go to my family, who have always loved and believed in me. **Sarah,** I am so proud of you as you reach for the sky and beyond. **Eva,** you already adult incredibly well and I can't wait to see what the future holds for you. **Mom,** your work ethic, intelligence and zest for life have always inspired me. **Dad,** it is your love of knowledge and curiosity that I have brought to science.

Dear **Bas,** thanks for sailing your ship next to mine on the vast ocean of life.

Curriculum vitae

Nori was born on July 1, 1986 in Santiago, Chile, as the first of three daughters to a diplomatic family. From 2004 to 2008, she attended the Florida Institute of Technology (Melbourne, Florida, USA), during which time she contributed to research in microbial genetics and colloidal enzymes at Florida Tech and bone density loss at the cellular level at the Kennedy Space Science Center (Cape Canaveral, Florida, USA). She graduated in 2008 with a BSc. in Biochemistry and a minor in Psychology. Following an interest in computer programming, Nori completed her Masters in Bioinformatics and Medical Informatics from San Diego State University (San Diego, California, USA), which included a Masters thesis titled “The functional contributions of integrated phages to marine bacterial communities.” Nori moved to the Netherlands in 2013 to work as a Junior Researcher at the Netherlands Institute of Ecology (NIOO-KNAW) in Wageningen, and continued as a PhD Researcher from 2014 to 2018 under the supervision of Prof. dr. Johannes A van Veen and Dr. Eiko Kuramae. The results of Nori’s research at the NIOO-KNAW are detailed in this thesis. She lives in Utrecht as of 2013, which at five years and counting is the longest she has lived in one place. She looks forward to professional opportunities in improving environmental and human health, and currently freelances as a bioinformatician. Nori can be contacted at noriko.cassman@gmail.com.

