Supplementary Material

Field soil properties and experimental nutrient addition drive the nitrous oxide ratio in laboratory denitrification experiments: A systematic review

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# Supplementary Figures and Tables

## Supplementary Figures

**A screen shot of a computer screen

Description automatically generated**

**Supplementary Figure 1.** Model improvement assessed by likelihood ratio test, with P-values and Q test statistic (for residual heterogeneity) below each added moderator. Solid green lines show moderator additions that resulted in significant improvement, while dashed red lines show moderator additions that did not significantly improve the model.

A graph with blue and black dots

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**Supplementary Figure 2.** Results from subgroup analysis for N2O ratio treatment effect (mean difference) subdivided by soil texture with soil pH overlaid with color. Error bars represent 95% confidence intervals. The number of observations and studies included are also presented (as observations/studies).

A graph with blue dots and numbers

Description automatically generated

**Supplementary Figure 3.** Results from subgroup analysis for N2O ratio treatment effect (mean difference) subdivided by soil texture with C addition overlaid with color. Error bars represent 95% confidence intervals. The number of observations and studies included are also presented (as observations/studies).

## Supplementary Tables

**Supplementary Table 1** Overview of studies included in the full database.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Obs.***a* | **Ctrl?***b* | **Study location** | **Site description(s)** | **Reference** |
| 17 | yes | Czech Republic | pasture | (Brůček et al., 2009) |
| 12 | yes | USA | agricultural (ag) field, wetland | (Ducey et al., 2015) |
| 12 | yes | USA | wetland | (Hunt et al., 2014) |
| 12 | yes | USA | ag field, forest, pasture | (Foltz et al., 2021) |
| 12 | yes | USA | ag field, grassland | (Hu et al., 2016) |
| 11 | yes | Canada | ag field | (Miller et al., 2008) |
| 10 | yes | USA | riparian buffer/zone | (Hunt et al., 2007) |
| 9 | yes | China | orchard | (Huang et al., 2015) |
| 9 | yes | USA | wetland | (Pfeifer-Meister et al., 2018) |
| 9 | yes | USA | pasture, wetland | (Hu et al., 2015) |
| 6 | yes | USA | wetland | (Miller et al., 2017) |
| 6 | yes | USA | pasture, wetland | (Hu et al., 2020) |
| 4 | yes | Denmark | ag field, forest | (Yu et al., 2000) |
| 3 | yes | Germany | not reported | (Köster et al., 2013) |
| 3 | yes | Canada | ag field | (Tenuta and Sparling, 2011) |
| 116 | no | Japan | ag field, forest, grassland | (Yanai et al., 2007) |
| 32 | no | China | ag field | (Sun et al., 2018) |
| 27 | no | Germany | ag field, grassland | (Surey et al., 2021) |
| 25 | no | Czech Republic | pasture | (Čuhel and Šimek, 2011a) |
| 24 | no | Canada | wetland | (Ma et al., 2011) |
| 24 | no | China | ag field | (Liao et al., 2021) |
| 20 | no | Denmark | ag field, forest, grassland | (Ambus, 1998) |
| 20 | no | New Zealand | ag field | (Anderson et al., 2018) |
| 18 | no | Spain | pasture | (Estavillo et al., 2002) |
| 18 | no | Spain | orchard | (Sánchez-García et al., 2016) |
| 16 | no | USA | ag field | (Cavigelli and Robertson, 2000) |
| 15 | no | France | water catchment | (Oehler et al., 2007) |
| 14 | no | Germany | grassland | (Kaleem Abbasi and Müller, 2011) |
| 12 | no | China | rice paddy | (Song et al., 2017) |
| 11 | no | Spain | ag field | (Menéndez et al., 2008) |
| 11 | no | Czech Republic | ag field | (Šimek et al., 2002) |
| 10 | no | Canada | ag field, grassland, rice paddy, vineyard | (Ma et al., 2019) |
| 9 | no | China | riparian buffer/zone | (Yan et al., 2019) |
| 7 | no | Czech Republic | grassland | (Čuhel and Šimek, 2011b) |

*a*Obs. = number of observations

*b* Crtl? = whether or not the study included control experiments without nutrient addition (if yes, study was included in the meta-analysis)

**Supplementary Table 1** **(continued)** Overview of studies included in the final database.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Obs.***a* | **Ctrl?***b* | **Study location** | **Site description(s)** | **Reference** |
| 6 | no | Spain | ag field | (Abalos et al., 2012) |
| 6 | no | Czech Republic | pasture | (Chroňáková et al., 2009) |
| 6 | no | USA | wetland | (Dodla et al., 2008) |
| 6 | no | China | urban | (Li et al., 2014) |
| 6 | no | Germany | ag field | (Surey et al., 2020) |
| 6 | no | New Zealand | pasture | (Zhong et al., 2016) |
| 5 | no | France | water catchment | (Müller et al., 2002) |
| 4 | no | UK | ag field | (Colbourn et al., 1984) |
| 4 | no | China | rice paddy | (Liu et al., 2018) |
| 4 | no | Czech Republic | pasture | (Owens et al., 2016) |
| 4 | no | New Zealand | pasture | (Zhong et al., 2015) |
| 4 | no | New Zealand | grassland | (Zhong et al., 2018) |
| 2 | no | USA | wetland | (Hunt et al., 2003) |
| 2 | no | China | riparian buffer/zone | (Liu et al., 2016) |
| 2 | no | Czech Republic | pasture | (Šimek et al., 2006) |
| 1 | no | UK | forest | (Dendooven et al., 1996) |
| 1 | no | USA | wetland | (Hunt et al., 2009) |
| 1 | no | China | ag field | (Qin et al., 2012) |

*a*Obs. = number of observations

*b* Crtl? = whether or not the study included control experiments without nutrient addition (if yes, study was included in the meta-analysis)

**Supplementary Table 2** Variable importance table for original tree-based model with 17 splits.

|  |  |
| --- | --- |
| **Variable** | **Importance** |
| pH | 19 |
| Texture | 14 |
| Soil source | 12 |
| Incubation time | 11 |
| N added | 8 |
| C/N added | 7 |
| Soil amount | 7 |
| C added | 5 |
| Headspace gas | 4 |
| Added C type | 4 |
| Incubation temperature | 4 |
| Inhibitors | 2 |

**Supplementary Table 3** Variable importance table for pruned tree-based model with 3 splits.

|  |  |
| --- | --- |
| **Variable** | **Importance** |
| pH | 28 |
| Texture | 22 |
| Soil source | 14 |
| Soil amount | 11 |
| N added | 9 |
| Incubation time | 7 |
| Inhibitors | 4 |
| Incubation temperature | 2 |
| C/N added | 2 |
| Headspace gas | 2 |

# Complete list of studies included in the full database

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