



# **Saline Soils Emit More N2O than productive soils in the Northern Great Plains**

August 4, 2021



*Top: Chambers for taking greenhouse gas measurements in the field. Bottom: That's not snow—it's salt. Some areas on the righthand side of this photo are starting to look a bit better after four years. Photos courtesy of Sharon Clay.*

---

Saline/sodic soils in the Northern Great Plains are intertwined with productive soils.

Although plant growth is limited, they are often cropped in the same way as more productive areas.

In a two-year study published in the *Journal of Environmental Quality*, researchers compared greenhouse gas (GHG) emissions from highly productive and saline/sodic soils treated with 0 or 200 lb N/ac. They measured emissions every four hours for seven days in mid-July. Scientists analyzed soil samples for inorganic N, microbial biomass, and copy numbers of specific denitrification functional genes.

The team found that productive soil had greater CO<sub>2</sub>-C emission and microbial biomass and less N<sub>2</sub>O-N emission than saline/sodic soils. Nitrogen application did not influence CO<sub>2</sub>-C emission; however, fertilizer-derived N<sub>2</sub>O-N emissions were 57–84% greater from saline/sodic soil than productive soil. The nitrite reductase gene, *nirS*, copy number was 42-fold greater in the saline/sodic than productive soil.

These data suggest that saline/sodic soil has a large denitrification potential and N<sub>2</sub>O-N emissions would be reduced by not applying N to these areas.

### **Dig Deeper**

Fiedler, D.J., Clay, D.E., Joshi, D.R., Engel, A., Marzano, S.-Y., Jakubowski, D., ... & Clay, S.A. (2021). CO<sub>2</sub> and N<sub>2</sub>O emissions and microbial community structure from fields that include salt-affected soils. *Journal of Environmental Quality*, 50, 567–579.

<https://doi.org/10.1002/jeq2.20223>

[More science articles](#)

[Back to issue](#)

[Back to home](#)

---

*Text © . The authors. CC BY-NC-ND 4.0. Except where otherwise noted, images are subject to copyright. Any reuse without express permission from the copyright owner is prohibited.*