

## JS1-1:

# Rhizosphere is a textbook for microbial N cycle

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The term “ rhizosphere ” was first coined in 1904 by Lorenz Hiltner in Germany, who had a special interest in N transformations around leguminous nodules in fields. Our group has revealed active N transformation including N<sub>2</sub>O in soybean rhizosphere. A <sup>15</sup>N tracer experiment indicated that the N<sub>2</sub>O was derived from N fixed in the nodules. As for nitrification, the addition of nitrification inhibitors significantly reduced N<sub>2</sub>O flux. Both AOA and AOB were detected by PCR analysis with increase of N<sub>2</sub>O flux in soybean rhizosphere. <sup>15</sup>N experiment and fungal isolation indicated that nitrite-utilizing fungi including *Fusarium* species substantially mediate N<sub>2</sub>O emission in soybean rhizosphere. Inoculation experiments with soybean bradyrhizobia showed that they contribute to both production and consumption of N<sub>2</sub>O via bacterial denitrification. From these results, the organic-N inside of the nodules was mineralized to NH<sub>4</sub><sup>+</sup>, and N<sub>2</sub>O-producing processes simultaneously occur in soybean rhizosphere via bacterial nitrification, fungal denitrification and rhizobial denitrification, which provides a textbook for microbial N cycle in the environments.

keywords: Nitrogen cycle, Denitrification, Nitrification, Rhizosphere, Nitrous oxide

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