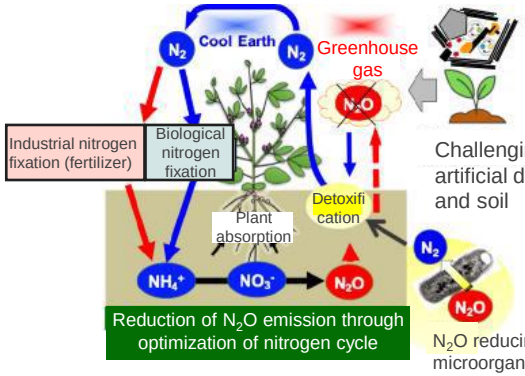
Tohoku Univ. Technology

Rhizobia that reduce soil N_2O

Possible to reduce greenhouse gas in agricultural land!

NEDO Moon shot R&D project



Challenging research of artificial design of plant and soil

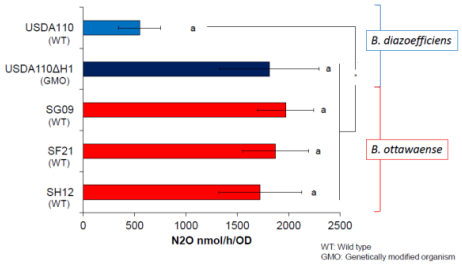
Reference https://w 3.tohoku.ac.jp/moonshot/project/minamizawa/

Overview

Dinitrogen monoxide (N_2O) is an intense greenhouse gas having about 300 times greater effect than carbon dioxide (CO_2). It is said that 59% of anthropogenic emission comes from agriculture.

In particular, chemical fertilizer overuse in large scale agriculture is a cause of N_2O emission from the soil since more chemical fertilizers are applied than the absorption by plant. A certain rhizobia (*Bradyrhizobium diazoefficiens* USDA110) is known to reduce N_2O to harmless nitrogen (N2), but the bacteria are not effective enough to solve the problem. In the context that non GMO rhizobia usage with high N_2O reductase activity is expected from the viewpoint of global warming control and soil ecosystem, this invention proposes a natural rhizobia (*Bradyrhizobium ottawaense* SG09, etc.) with stronger N_2O reductase activity than the conventional rhizobia, and its application.

Features・Outstanding



N_2O reduction activity was compared between:
-Known wild strain
-GMO strain with enhanced N_2O reduction activity
-Patented natural strain
→**The patented natural strain showed same level of reduction activity as GMO strain.**

No significant difference in activity by Tukey test
T-test shows that B.ottawaense and Nos enhanced strain are significantly more active than USDA110 (n=3-5)

Comparison of soybean growth

Left: Inoculated with the invented strain
Right: No inoculation

Product Application

- ☐ Microbial material
- ☐ Fertilizer
- ☐ Growing soil

Related Works

[1] Itakura et al. 2013. Nature Climate Change 3: 208-212. DOI: 10.1038/NCLIMATE1734
[2] Sánchez et al. 2017. Environ Microbiol Rep. 2017 9: 389-396. doi: 10.1111/1758-2229.12543.
[3] Wasai-Hara et al. 2020. Microbes Environ. 35: ME19102. doi: 10.1264/jsme2.ME19102.

IP Data

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