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Rhizobial tRNA-Derived Small RNAs Are Signal Molecules Regulating Plant Nodulation

Genetic engineering utilizing tRNA-derived small RNAs significantly improves nitrogen fixation in plants by dramatically increasing the number of productive infections, leading to enhanced crop yield and reduced input costs.

Nitrogen-fixation is often the limiting factor for plant growth and crop yield, because nodulation is hindered by inefficient interactions between Rhizobial bacteria and plants. This technology uses tRNA-derived small RNAs to increase root hair curling and nodule number in legumes. Through gene editing of plants with the tRNA-derived small RNAs, the number of productive Rhizobial infections is dramatically increased. Genetic engineering of plants to promote nodulation has applications in enhancing nitrogen-fixation in legumes and in extending nitrogen fixation capabilities to non-legumes.

Advantages:

-Improved nitrogen fixation

-Lower cost of inputs

Potential Applications:

-Engineering plants to improve nitrogen fixation

TRL: 3

Intellectual Property:

Provisional-Patent, 2019-05-16, United States | PCT-Gov. Funding, 2020-05-18, WO | NATL-Patent, 2020-05-18, China | NATL-Patent, 2021-11-16, Brazil | NATL-Patent, 2021-11-16, United States | DIV-Patent, 2025-09-02, United States

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