Enhancing Growth and Development of Non-Leguminous Crops

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The Wisconsin Alumni Research Foundation is seeking commercial partners interested in developing a method for stimulating non-leguminous plant growth using water-soluble chitin oligosaccharides (COs).

COs have been shown to enhance root growth in rice, wheat and corn. Importantly, COs lack a lipid component, making them water soluble and cheaper to manufacture than currently used products and thereby easier to mass produce for commercial use.

Overview

Arbuscular mycorrhizal (AM) fungi provide nutrients to plants and aid their growth. This symbiotic interaction is mediated by signaling molecules, most notably lipochito-oligosaccharides (LCOs). LCOs are used commercially to stimulate plant growth and increase crop yield.

However, the lipid component of LCOs makes them complicated and expensive to produce and decreases solubility in aqueous solutions. This presents challenges in synthesizing large quantities of LCOs for commercial use. Due to these difficulties, an alternative is needed to allow large-scale applications of this yield-enhancing product.

The Invention

The inventors have developed methods and compositions for promoting plant growth using chitin oligosaccharides (COs), which lack lipids and are water soluble. COs are produced by AM fungi, and like LCOs already on the market, act as an additional signaling molecule in symbiotic interactions. The lack of lipids on these newly developed COs has the added benefit of making synthesis easier to achieve and expanding the large-scale production potential.

The new COs can be applied by various methods to promote plant growth including submerging seedlings, coating seeds and foliar treatment, all of which were shown to increase root growth specifically in non-leguminous plants and multiple cereal grains, including rice, wheat and corn (maize).

Applications

- Enhanced production of commercially important cereal grains (rice, wheat, corn)
- Increases both lateral and crown root growth of non-leguminous plants

Key Benefits

- Cheaper and more efficient large-scale production potential compared to currently used products (LCOs)
- Used at numerous stages of plant development to increase growth (to seedlings, soil, plant parts)
- Multiple CO compositions effectively increase plant growth

Stage of Development

The development of this technology was supported by WARF Accelerator. WARF Accelerator selects WARF's most commercially promising technologies and provides expert assistance and funding to enable achievement of commercially significant milestones.

The inventors have shown significant stimulation of root development when CO4 and CO8 are applied to rice via numerous application methods. They have further expanded to test the root-enhancing properties of CO4 and CO8 on other cereal grains including wheat and corn.

Additional Information

For More Information About the Inventors

- Jean-Michel Ané

Publications

- Sun et al. Activation of symbiosis signaling by arbuscular mycorrhizal fungi in legumes and rice. Plant Cell. 2015 Mar;27(3):823-38. doi: 10.1105/tpc.114.131326. Epub 2015 Feb 27. PMID: 25724637; PMCID: PMC4558648.

Tech Fields

- Animals, Agriculture & Food : Plant biotech

For current licensing status, please contact Emily Bauer at emily@warf.org or 608-960-9842