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Genetic Enhancement for Plant Insect Resistance (2013-029)

New Protease Inhibitor Enhances Insect Resistance in Plant Species, Reduces Crop Losses

Market Overview

This cloned soybean cysteine protease inhibitor gene is involved in plant response to biotic stress and its overexpression in plants leads to enhanced insect resistance. Biotic stresses such as destructive pests and plant diseases cause substantial losses in crop yield and quality. In the U.S. alone, pest-related crop losses are estimated at $33 billion annually. While chemical pesticides are used extensively in the United States, use of these pesticides add tremendously to operational costs and raise serious environmental and health concerns. One of the most important targets for enhancing agricultural production and quality is the resistance to biotic stress. Clemson University researchers have identified a soybean cysteine protease inhibitor gene shown to enhance plant pest and disease resistance. Use of this inhibitor gene would result in better crop yield and quality.

Application

Agriculture production

Stage of Development

Ready for field trials

Advantages

- Enhances plant pest and disease resistance, resulting in better crop yield and quality
- Can be used to genetically engineer crop species, producing new breeding materials and cultivars

Technical Summary

Clemson University researchers have cloned a soybean cysteine protease inhibitor gene GmCPI1 from nematode-resistant genotype. Transgenic Arabidopsis plants overexpressing GmCPI1 exhibited dramatically enhanced resistance against thrips. Transient essay using soybean root transformation demonstrated that, compared to wild-type control plants, transgenic soybean roots overexpressing GmCPI1 had a 60 percent decrease in nematode infection. This locus-specific new plant cysteine protease inhibitor gene, GmCPI1, demonstrates effectiveness in improving plant pest and disease resistance for better yield and quality, enhancing agricultural production. Future applications of this technology may lead to the reduction in chemical pesticide use and the enhancement of the crop production and quality.

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App Type	Country	Serial No.	Patent No.	CURF Ref. Number	Inventors
Provisional Utility	United States	61/761,148 14/173,639	9,441,241	2013-029	Hong Luo, Halina Knap, Zhigang Li, April Warner, Qian Hu

About the Inventor

Dr. Hong Luo is a Professor of Genetics and Biochemistry at Clemson University. He earned his Ph.D. in Molecular Biology from Catholic University of Louvain. Dr. Luo is the author of numerous publications and was the recipient of the 2013 Clemson University Godley-Snell Agricultural Award for Excellence in Agricultural Research. His research interests focus on transgenic plants and genomics.

For More Information

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