TreMonti

RACK1A Regulated Drought-Resistant Plants

Enables drought-resistant food and bio-energy crops

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Inventors
Hemayet Ullah, Ph.D.

Field
Agricultural, Biotechnology, Energy

Technology
Genetically modified crops with drought-resistant traits, and potential resistance to other harsh environmental conditions

Key Features
-Produces drought-resistant plants
-Applicable to food and biofuel crops
-Result of a novel discovery of a gene function that is not presently exploited for drought-resistance

Stage of Development
Proof of concept demonstrated in Arabidopsis

Status
Seeking a seed production company as a commercialization and/or development partner

Patent Status
Patent pending

Technology

This invention provides genetically engineered plants that are drought resistant, and potentially resistant to other harsh environmental conditions. The plants are genetically modified to under-express *RACK1A,* which has been shown to regulate drought responses in Arabidopsis. The technology is capable of addressing drought-tolerance and resistance in a number of crops that are significant for biofuel and food production, as the RACK1 gene is known to be present in rice, rape, soybean, tobacco, tomato, beech and alfalfa and algae.

Potential Application

A commercial product incorporating this invention would be seeds for crops that are genetically engineered to under-express RACK1A. These crops would be resistant to harsh environmental conditions such as drought, cold, heat-stress, and less than optimal salinity and oxygen levels. The invention can be applied to both food and biofuel crops. Specific and immediate demand could be heightened for seeds of crops that have suffered significant losses in recent years due to drought conditions around various parts of the globe.

Opportunity

Drought resistance is a target trait of agribusiness and agri-biotechnology companies, which realize the potential to prevent significant crops loss as global warming continues to be a concern. It is reported that drought resistance is one of a battery of traits that agronomists hope to refine in the next several decades, during which time populations are expected to grow significantly, thus requiring increased food sources that modern agriculture cannot presently deliver.

The global market for drought-resistant corn crops alone is expected to reach 150 million acres, and is valued at nearly $2.7 billion.

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INVENTOR:

Hemayet Ullah, Ph.D.
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EDUCATION

Ph.D., University of North Carolina, Chapel Hill, 2002

SPECIALTY

Plant Cell Signaling, Environmental Stress Physiology, Plant Molecular and Cellular Biology

RECENT PUBLICATIONS

Ullah, H., Scappini, E., Moon, AF., Williams, LV., Armstrong, DL., and Pedersen, LC (2008) Crystal Structure of a signal transduction regulator, RACK1, from Arabidopsis thaliana. Protein Sci 17(10):1771-80. (on cover page)

Magee, K., Michael, A., Ullah, H., and Dutta, SK. (2007) Dechlorination of PCB in the presence of plant nitrate reductase. Environmental Toxicology and Pharmacology 25:144-147.

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Nina M. Storey, NM., Gentile, S., Ullah, H.,Russo, A., Muessel, M., Erxleben, C., and Armstrong, DL. (2006) Rapid signaling at the plasma membrane by a nuclear receptor for thyroid hormone. Proceedings of the National Academy of Sciences, USA. 103: 5197-5201.

Ullah H, Chen JG, Temple B, Alonso J, Ecker J, Boyes D, Davis K, and Jones AM (2003) Auxin Signaling Coupled by Heterotrimeric G protein in Arabidopsis Lateral Root Formation. Plant Cell 15, 393-409.

Ullah H, Chen JG, and Jones AM (2002) Role of GPA1 in Regulation of Arabidopsis Seed Germination. Plant Physiology 129, 897-907.