Shade-Resistant, Higher-Yield Crops with Modified Phytochromes

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WARF: P120139US02

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing transgenic plants with enhanced light sensitivity and seed germination.

Overview

Feeding a surging world population will require improvements to agricultural productivity. However, simply growing crops like corn and rice in higher density is problematic. One challenge is that plants grown in crowded environments receive less quality light. This triggers a series of 'shade avoidance responses' that result in long stems, immature fruits, curtailed seed production and premature flowers.

Identifying the genetic factors behind shade avoidance could dramatically impact agriculture. A class of proteins called phytochromes is known to play a key role. They act as photoreceptors, responding to changes in ambient light. Targeting phytochromes could lead to more crowd-adapted crops.

The Invention

UW–Madison researchers have enhanced the light sensitivity of plants by modifying their Phytochrome B (*PhyB*) gene. Using standard techniques, the researchers made several mutations to the gene sequence. One important change was the substitution of a different amino acid for Tyrosine 361. The modified seedlings grew smaller, exhibiting decreased height, stem diameter, petiole and internode length.

Applications

- Modified corn, soybeans, rice and ornamental plants

Key Benefits

- Improves shade tolerance
- Enhances seed germination in low light
- Crops are hypersensitive to white/red light with respect to hypocotyl and stem growth.
- Crops are smaller and grow more densely.

Additional Information

Related Technologies

- WARF reference number P08462US02 describes blue-green phytochrome-based fluorophores that are small and thermostable.

Publications

- Zhang J., Stankey R.J. and Vierstra R.D. 2013. Structure-Guided Engineering of Plant Phytochrome B with Altered Photochemistry and Light Signaling. Plant Physiol. 161, 1445-1457.

Tech Fields

- Animals, Agriculture & Food : Plant biotech

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