

## **Novel Genetically Engineered Plants for Efficient Growth in Low-Light Environments**

### **INVENTION:**

Investigators at the Salk Institute have engineered mutations in the VAS1 enzyme in plants, which uncouple auxin and ethylene biosynthesis. This allows for a reduction in auxin levels without the concurrent reduction in ethylene, resulting in plants that can grow more efficiently in low light environments. Researchers were able to evolve a VAS1 mutant with altered substrate specificity, which uses a different amino acid than the natural amino donor, thus allowing for modulation of auxin metabolism, but not ethylene, in response to shade. Modulation of the shade avoidance syndrome (SAS) by uncoupling of auxin and ethylene biosynthesis allows plants to grow more efficiently in low light environments and at high planting density without the development of unwanted SAS phenotypes.

### **APPLICATIONS:**

- Food crops
- Decorative plants

### **ADVANTAGES:**

- Can plant at higher density without the associated decreases in productivity
- Increased productivity
- Increased crop yield and biomass
- Increased resistance to herbivores and insect pests
- Modulation of the shade avoidance response is controlled at the metabolic level

**STAGE OF DEVELOPMENT:** In vivo in Arabidopsis

**BACKGROUND:** Growth in plants is regulated by an intricate interplay between internal signals and external cues, which often converge on hormone regulation. When plants are shaded, they respond by increasing synthesis of two phytohormones, auxin and ethylene, which results in the rapid elongation of stems and petioles. This response, known as the shade avoidance syndrome (SAS) allows for the plants to outcompete their neighbors for sunlight. Unfortunately, the response can also lead to undesirable traits such as decreased crop yields, biomass and chlorophyll, and lower seed yield and/or quality. Suppression of the SAS in crops has the potential to diminish these unwanted phenotypes and enhance desirable traits such as crop yield and biomass.

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**PATENT STATUS:** U.S. patent application US-2015-0167014-A1 is pending

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