



TECHNOLOGY

A Microbial Biosensor for Ethylene Gas

OVERVIEW

Background

Ethylene is a gas that serves as a hormone in plants and is critical for many aspects of plant growth and development such as stimulating or regulating the ripening of fruit, the opening of flowers, and the shedding of leaves.

Environmental cues such as flooding, drought, chilling, wounding, and pathogen attack can induce ethylene formation in the plant. Ethylene shortens the shelf life of many fruits and cut flowers by hastening fruit ripening and floral abscission. Flowers and plants which are subjected to stress during shipping, handling, or storage produce ethylene causing a significant reduction in floral display and thereby significant economic losses for florists, markets, suppliers, and growers.

The currently available means for measuring ethylene gas require special instrumentation (eg. gas chromatographs) which is expensive. Currently, plant ethylene receptor function is assessed by the binding of radiolabelled gas which has health and safety issues, or by assessing phenotypic changes in plants following chemical application which complicates readout in plants.

Innovative Technology

Researchers at the University of Maryland have developed a strategy biologically simulate ethylene response using a naturally derived protein. This method of predicting ethylene response can sense and respond to ethylene produced by plants or that present in the environment.

APPLICATIONS

The identified bacterial protein can serve as components of bioassay:

- to detect ethylene gas in the environment,
- to identify compounds that can alter ethylene receptor activity in plants, and
- a circuit component in synthetic biology to create new signaling modules responsive to ethylene

The proposed system has an ethylene binding domain that can function as:

- an assay for plant growth and ethylene binding, and
- screening tool for ethylene receptor function to genetically engineer plants with altered ethylene function

ADVANTAGES

- The proposed bioassay is an inexpensive and safer alternative for the measurement of ethylene gas and for assessing ethylene receptor function.

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Additional Information

INSTITUTION

University of Maryland, College Park

PATENT STATUS

Patent(s) pending

LICENSE STATUS

Available for exclusive or non-exclusive license

CATEGORIES

- Sensors/Monitors

EXTERNAL RESOURCES

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