Genetically Engineering Biosensors in Plants

Background

- Biosensors offer an alternative to traditional destructive sampling schemes. Molecules, organisms, or devices in a biological context that sense specific stimuli or molecules and convert such signals into a quantitative or qualitative indicator can function as biosensors. With the power of fluorescent proteins and other visible reporters, genetically encoded visible biosensors provide promising tools for non-invasive environmental monitoring and bioimaging of biological processes in plants.

Approach

- Plant-based biosensors were categorized according to the mode of action. Representative validated biological and molecular components were curated for engineering each type of biosensor.

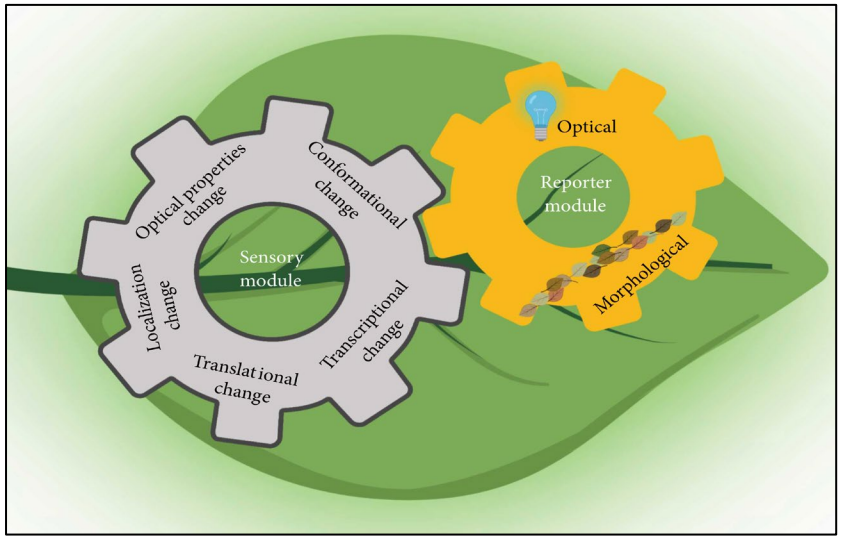
Results

- In this review, we generated a framework for designing genetically encoded biosensors in plants and created a decision tree to guide the selection of biosensors for various applications.
- A list of representative biological components for engineering plant-based biosensors was presented.
- Finally, strategies for identifying new biological components of plant-based biosensor and addressing the challenges of constructing multicellular plant biosensors to monitor the environment were outlined.

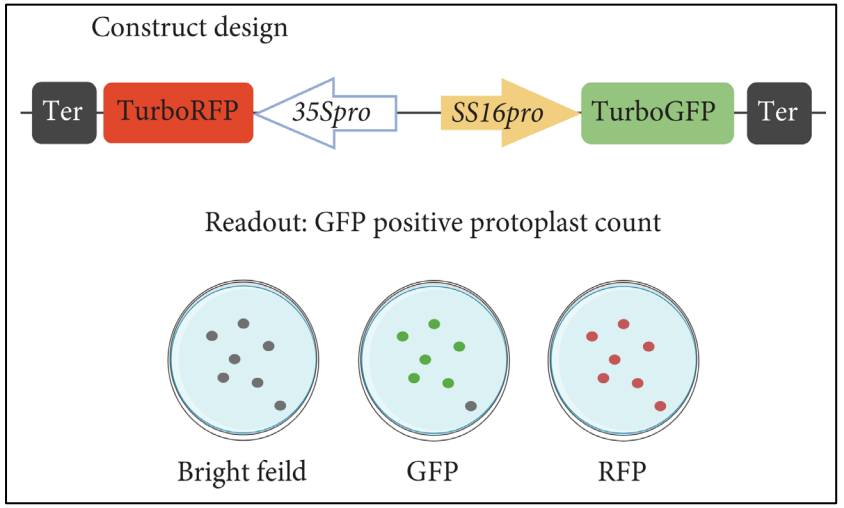
Significance

- The knowledge synthesis will accelerate the technology development of *in vivo* plant-based biosensors.
- This publication laid out a very clear blueprint for future application of plant-based biosensors in basic and applied plant science research.

Liu, Y. *et al*. 2022. *Biodesign Research* 9863496. doi.org/10.34133/2022/9863496



Conceptual framework of genetically encoded plant-based biosensors design.



Design and application of transcriptional regulation-based plant biosensors.