

Future Perspective of Plant BioDesign Research

Background

- Plant biosystems design seeks to redesign natural plants and construct new plant systems through an integration of multiple research areas. A step change to address challenges in food, products and energy requires using biosystems design approaches to expand the potential of plants.

Conclusions

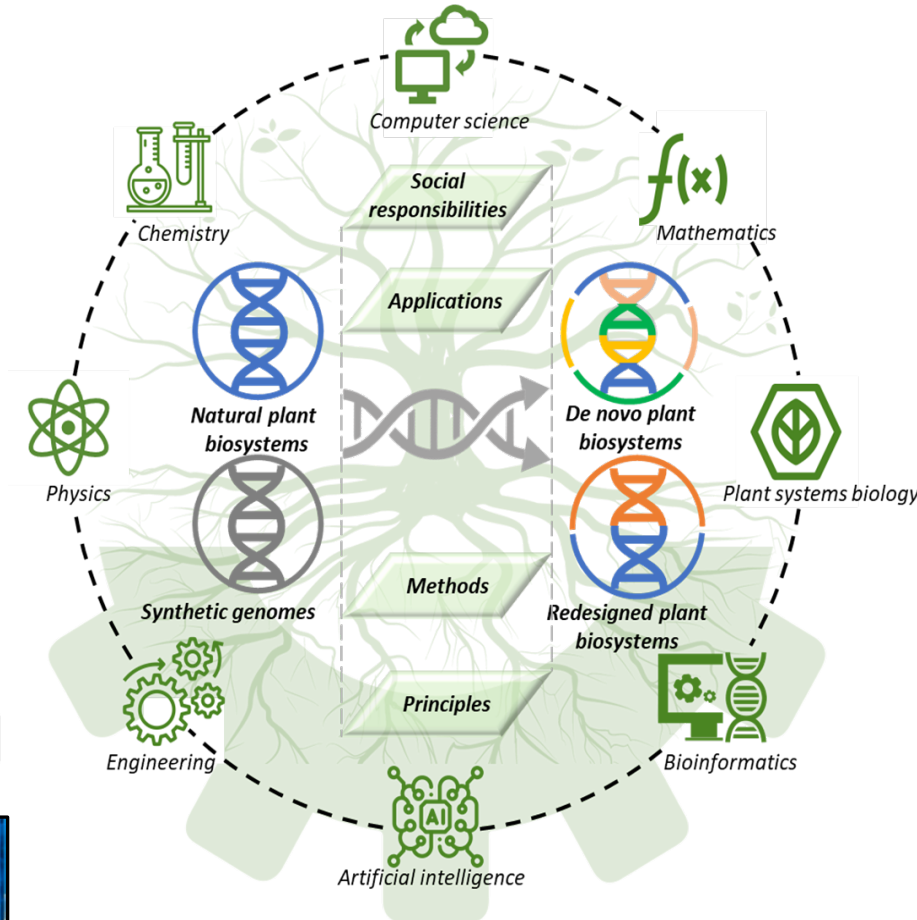
- ORNL led an international effort to develop a roadmap for plant biodesign research. This included 36 researchers from 18 institutions.
- The resulting paper presents a comprehensive roadmap for plant biosystems design covering theories, principles, and technical methods, along with potential applications in basic and applied plant biology research.
- It identifies challenges, opportunities, and priorities of plant biodesign research in the aspects of principles, methods, applications, and social responsibilities.
- It outlines a *Plant Biodesign Hub* as a framework for international collaboration.

Significance

- The roadmap highlights the application of plant biodesign approaches to bioenergy and bioeconomy research, representing a shift in plant science research from relatively simple trial-and-error approaches to innovative strategies based on predictive models of biological systems.
- This paper was featured on JGI's *Genomic Insider* — where ORNL scientist Xiaohan Yang talks about how plant biodesign can help humans attain a renewable energy future and lock away more carbon.
<https://jgi.doe.gov/genome-insider-episode-8-plantiful-future-xiaohan-yang-ornl/>



Yang, X, ..., Tuskan, GA. 2020. Plant Biosystems Design Research Roadmap 1.0. *BioDesign Research*. 2020: 8051764 (In press). <https://spj.sciencemag.org/journals/bdr/aip/8051764/>



The interrelated scope of plant biodesign approaches and principles.