PLANT SYNBIO AUSTRALIA

TRANSFORMING AGRICULTURE AND BIOMANUFACTURING THROUGH PLANT SYNTHETIC BIOLOGY



Bioinformatics and data analytics

at Plant SynBio Australia

Plant SynBio Australia offers bioinformatics support to design and optimise plant synthetic biology experiments across the full design–build–test–learn cycle. Our services include genome analysis, pathway reconstruction, and comparative genomics to identify targets, as well as CRISPR gene editing design, validation, and assessment. We can analyse transcriptomic and functional genomics data to understand the effects of genetic changes.

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Plant SynBio Australia is funded through Bioplatforms Australia under the National Collaborative Research Infrastructure Strategy (NCRIS) and institutional partners

NCRIS National Research Infrastructure for Australia An Australian Government Initiative

BIOPLATFORMS AUSTRALIA

Adelaide University

Government of South Australia

Bioinformatics and data analytics

Plant SynBio Australia (Plant SynBio) provides bioinformatics expertise to support the design and optimisation of plant synthetic biology experiments across the design–build–test–learn cycle.

Our services include genome interrogation, biochemical pathway reconstruction, and comparative and pan-genomic analyses to support target identification.

We provide comprehensive CRISPR gene editing design, assessment, and validation, alongside analysis of transcriptomic and functional genomics datasets to evaluate the potential molecular and pathway-level impacts of genetic modifications.

For species not yet well established in synthetic biology pipelines, bespoke bioinformatics analyses can be developed to define project scope and de-risk experimental design.

Bioinformatics workflows are delivered using ARDC high-performance computing infrastructure and modern, reproducible pipelines. These services are delivered in close collaboration with our transformation platform to integrate procedures for efficient and secure optimisation and task delivery.

Research connections

Plant SynBio is part of Bioplatforms Australia, a national infrastructure network providing research facilities and expertise to support life science research tackling national challenges in health, agriculture, food, and biodiversity. This allows us to support an integrated approach to research projects spanning genomics, proteomics, metabolomics and bioinformatics projects.

As part of Australia's National Collaborative Research Infrastructure Strategy (NCRIS) we are connected with over $4 billion worth of state-of-the-art infrastructure, data and expertise to help address complex research challenges. These connections include the Australian Plant Phenomics Network (APPN). Australian Research Data Commons (ARDC) and AARNet.

Availability

Bio-informatics and data analytics services are available through Plant SynBio Nodes at Adelaide University, ANU Canberra, La Trobe University Melbourne, and the University of Western Australia Perth.

Capabilities:

- **Intelligent CRISPR design for crops.** Species-specific guide design with off-target, efficiency and phenotypic risk scoring that accounts for polyploid genomes.
- ***In silico* edit prediction.** Predict protein, splicing, and regulatory impacts computationally before stepping into the lab.
- **Design/Build/Test pipeline.** SynBio project tracking from construct design to validated phenotype, in a unified data framework.
- **Multi-omic target discovery.** Identify potential engineering targets for yield, stress, disease, and quality traits.
- **Regulatory-ready characterisation.** Insertion mapping, copy number, contamination checks, and edit profiling packaged for compliance.
- **Computational enzyme pathway characterisation.** *In silico* identification, design and optimisation of biosynthetic pathways for novel traits. Including selecting candidate enzymes, host suitability assessment and construct design for experimental testing.

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