AgriFutures Australia

Annual Forum 2025

Theme 3 Driving industry growth through innovation and integrated communication and engagement

Theme Leader: Ben Stodart, CSU

November 25

I acknowledge Palawa/Tasmanian Aborigines as the original owners of this island Lutruwita/Tasmania.

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Overview

Theme 3 addresses several challenges identified by the industry:

Project 3.1. Hazelnut drying and optimise for sustainable processing, *Dr. Yong Wang, UNSW*

Project 3.2. Implementing an integrated communication and engagement strategy for industry growth, innovation and sustainability. *Dr. Ben Stodart, CSU.*

Project 3.3: Recent advances in technologies for optimised biosecurity in hazelnut orchards. *Dr. Jian Liu, CSU.*

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HAZELNUT GROWERS OF AUSTRALIA INC

Charles Sturt University

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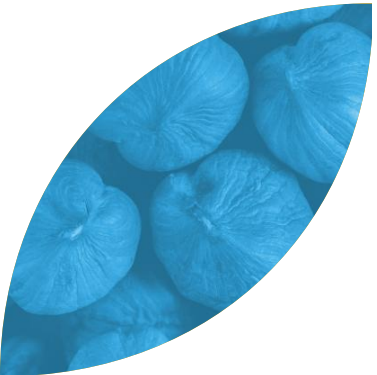
Project 3.1

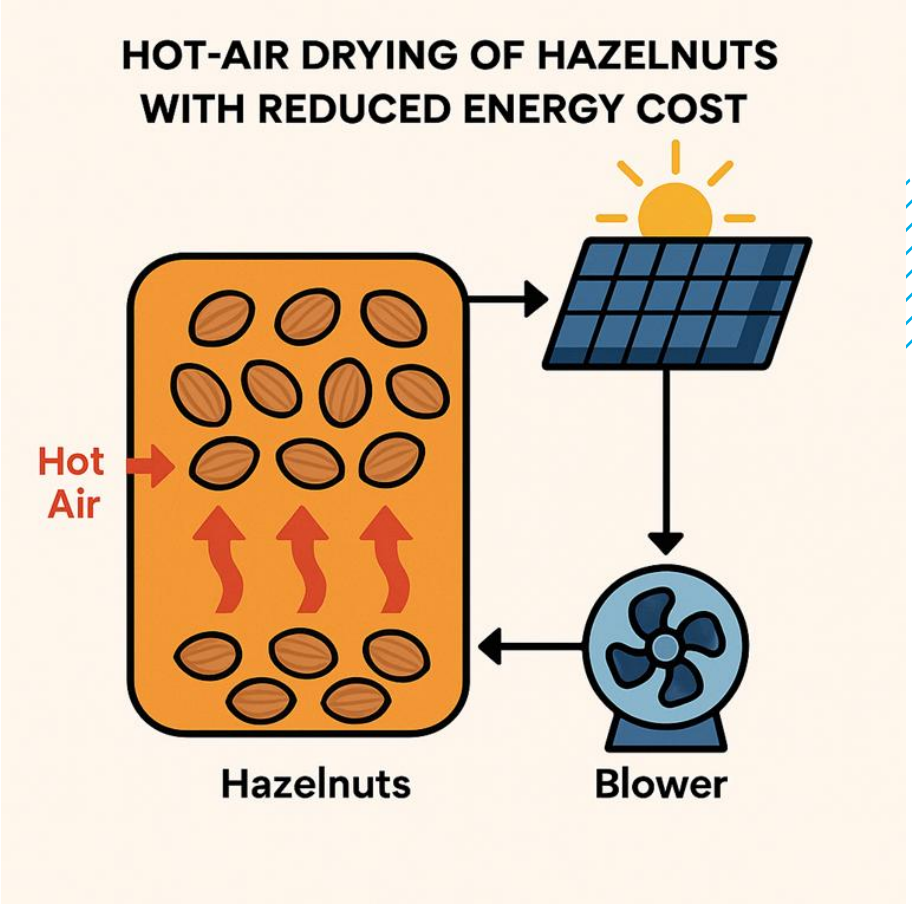
Hazelnut drying and optimise for sustainable processing.
Dr. Yong Wang, UNSW

Identify suitable drying techniques for hazelnut varieties grown under Australian conditions.

Optimise methods to ensure improve product quality, are energy efficient, and scalable.

Deliver validated protocols to aid the industry consistently achieve high-quality post-harvest processing.





Develop efficient and sustainable hazelnut drying strategies for the Australian food industry.
Dr. Yong Wang UNSW

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Project 3.1

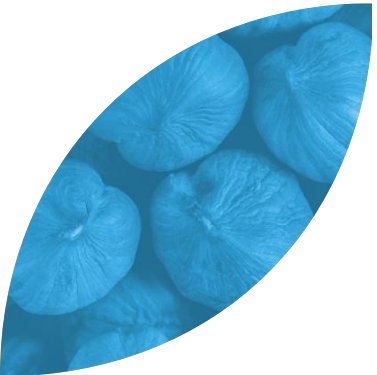
Comprehensive *review paper* on hazelnut drying processes.

Draft *Guideline for Efficient and Sustainable Hazelnut Drying*.

The design and fabrication of a solar-powered (PV) dryer with IoT-based monitoring.

Computational fluid dynamics (CFD) simulations to optimise airflow and temperature uniformity.

Laboratory-scale trials initiated to evaluate energy use, drying kinetics, and product quality under controlled conditions.



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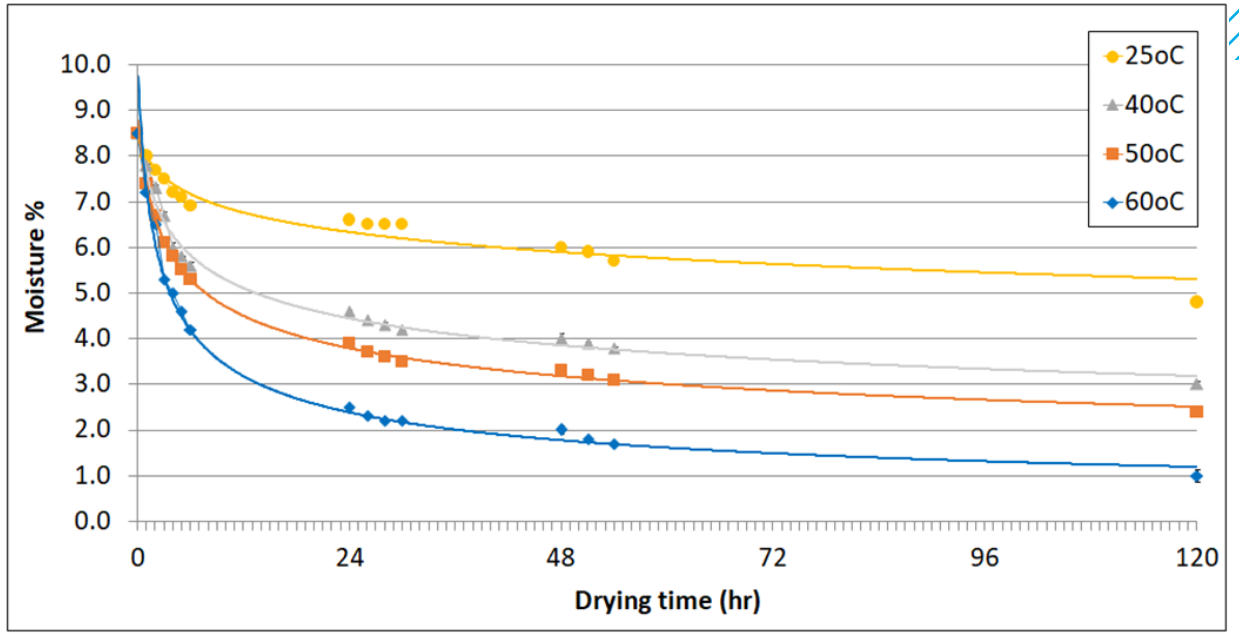
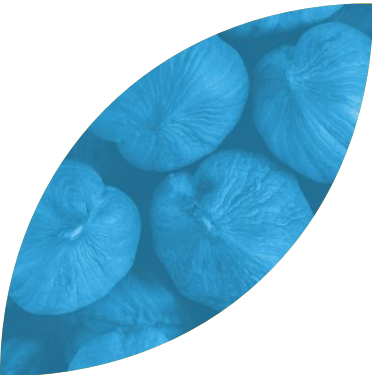
Project 3.1

Evaluated hot-air drying (25–60 °C) with microwave pre-treatment (30–240s).

Optimal condition: 50 °C hot-air + 120 s microwave → fastest moisture removal while maintaining quality.

Laboratory scale Solar Dryer had comparable performance to 50 °C hot-air drying while using **≈66% less energy.**





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Project 3.3

Recent advances in technologies for optimised biosecurity in hazelnut orchards.
Dr. Jian Liu, CSU.

Conducting a desktop analysis of the latest technology and tools for the detection orchard pests.

Determine potential for adaptation to benefit the hazelnut industry.

Evaluated and evidenced performance of biothreat detection technologies and associated efficacy for combating biothreats considered important for hazelnut production systems.

Autonabit ('Avvy') https://autonabit.nz/

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Project 3.3

Source of image https://www.afr.com/technology/bioscout-goes-global-using-ai-to-protect-farms-vineyards-from-disease-20250528-p5m2vr?utm_source=afr-web&utm_medium=share_article&utm_campaign=technology&utm_term=product_feature

Diseases detection

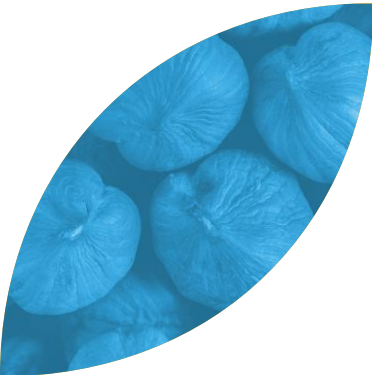
Traditional Methods reliant on visual inspection and culturing – labour intensive, often time consuming.

Molecular Methods:

- PCR and qPCR are highly specific and sensitive
- LAMP: rapid, low-cost, and field-deployable
- Nanopore sequencing: real-time genomics.

Emerging Technologies

- Machine learning image-based detection of leaf diseases
- Remote sensing: large-scale disease monitoring
- Biosensors and autonomous systems (e.g. BioScout)



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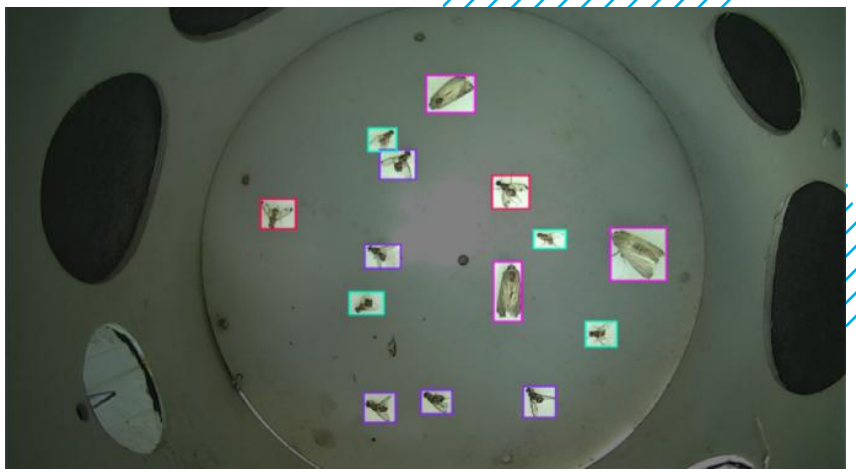
Project 3.3



Arthropods pest detection

Traditional methods rely on direct observation and can have high labour demand

Molecular Methods

Molecular barcoding: precise identification of pest species and life stages

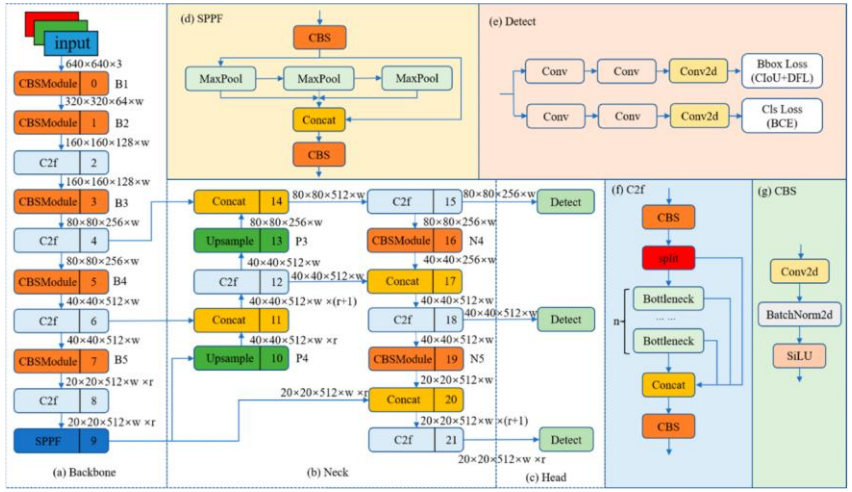
Emerging Technologies

Remote sensing & imaging (drone-based).

Terahertz imaging utilized for stink-bug–damage.

Smart traps using cameras + ML for automated species recognition.

Sensor networks integrating temperature, humidity, and pest activity data



Hakim, A., Srivastava, A.K., Hamza, A. *et al.* Yolo-pest: an optimized YoloV8x for detection of small insect pests using smart traps. *Sci Rep* **15**, 14029 (2025). https://doi.org/10.1038/s41598-025-97825-3

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Project 3.2

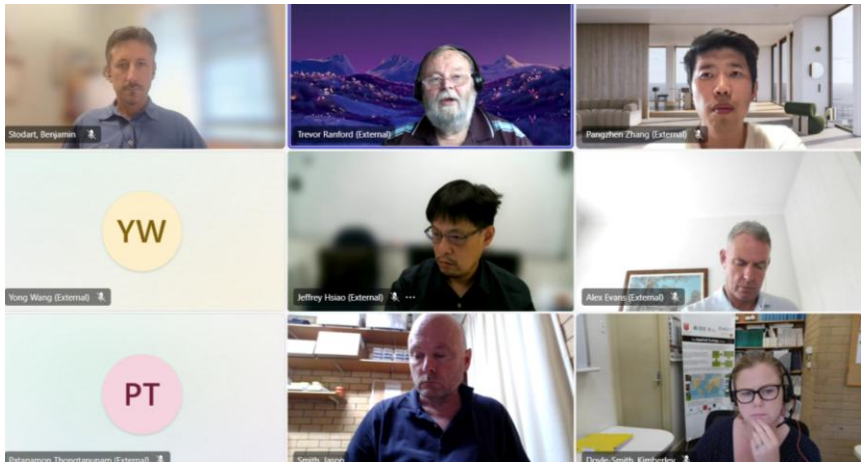
Implementing an integrated communication and engagement strategy for industry growth, innovation and sustainability.

Dr. Ben Stodart, Charles Sturt University.

Provide the pathway to the delivery of outcomes stemming directly from AUSHAZ.

In conjunction with HGA, act as the conduit between research providers and the research end users.

Providing collaborative access to enhance the existing knowledge networks, harnessing innovative solutions with a productivity focus, essential elements for industry expansion.



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Highlights

Project teams familiar with constraints and opportunities within the hazelnut production system.

Established networks of researchers and end-users.

Identification of sustainable approaches to address production constraints.

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Where to from here:

The coming years pose the following challenges:

Scaling solar drying from laboratory to field environments.

Achieving uniform drying performance under variable operating conditions.

Timing of extension activities:

- As outcomes are realised;
- As outputs are realised;
- To fit within grower “free” time.

Taking technology from concept to reality.

Pivoting focus to emerging/unexpected constraints.

“Challenged Hazelnut”
Image created with Google Gemini

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