

AusMac2024

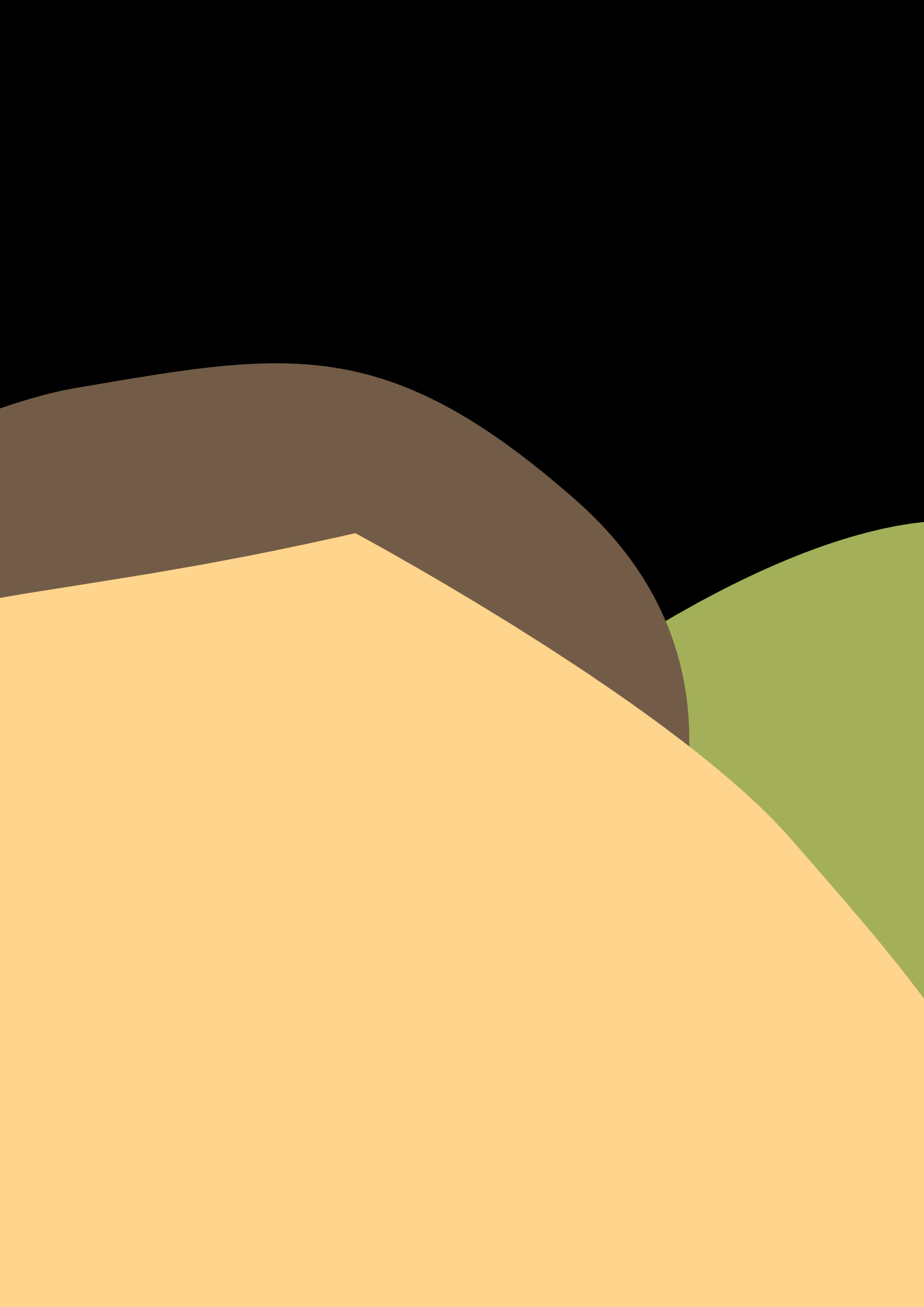
# Innovation Lounge

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## Presentation Summaries





## Morning Tea (10.20am to 11.10am)

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### 10.30am **From data to decisions: How remote sensing and AI are maximising efficiency in macadamia orchards: Success stories from Australia and South Africa**

*Dr Chris Cannizzaro, Macadamia Farm Management & Dr Yoav Yichie, Aerobotics*

This presentation explores how macadamia growers in Australia and South Africa are using Aerobotics technology to increase production and improve farm efficiency. It shares success stories from both countries, showing how high-resolution drone imagery, per-tree analytics tools, and a scouting mobile app are making a difference. Attendees will learn how these technologies give real-time data and insights to optimise crop health, improve irrigation and more.

The presentation highlights case studies that show real improvements in orchard performance and resource management using remote sensing and task assignment features. It also explains how Aerobotics' zonal maps help growers adopt sustainable farming practices by reducing waste and using resources more efficiently.

### 10.45am **Biochar: A circular economy solution for the nut industry**

*Emma Greenhatch, Pyrocal & Michelle Herbert, Stahmann Webster*

Stahmann Webster is leading an Australian-first initiative in the nut industry to convert walnut shell waste into biochar at their Leeton facility, aiming to enhance waste management, improve soil health, and reduce greenhouse gas emissions. The facility uses Pyrocal's industrial-scale biochar system. Biochar is known to increase soil carbon content, improve nutrient storage, enhance water retention, and boost fertiliser efficiency, while helping to sequester carbon and combat climate change. Stahmann Webster and Pyrocal will jointly present on the motivations behind the project, how the technology works, and its benefits.

## Lunch (12.30pm to 2.00pm)

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### 1.00pm **Advanced irrigation and sensor technology in macadamia orchards**

*Dr Dan Manson, Rural Funds Management & Steve Lockyer, Inform Ag*

Steve Lockyer from Inform Ag and Dan Mason from Rural Funds Management (RFM) will discuss how Inform Ag's GrowData Irrigate product is enhancing yields and operational efficiency in RFM's macadamia orchards. The system integrates direct irrigation control with sensors, probes, and weather inputs. The irrigation system is fully integrated with the pump and filter stations using PLC (Programmable Logic Controller) technology. Each part of the system is controlled automatically through this integration, eliminating the need for any external control devices or manual intervention.

The use of high-speed Mesh Wi-Fi has improved communication and safety across remote orchards. Orchard data is collected and graphically displayed via business analytics tool Power BI, supporting decision-making for staff at all levels.

The presentation will also feature the world-first implementation of a plant-based sensor network in RFM's Queensland orchards. These sensors provide live data on tree water status, enabling AI-driven irrigation scheduling that has already improved water-use efficiency.

### 1.15pm **The benefits of autonomous and robotic technology in permanent tree crops**

*Cam Clifford, GOTrack*

This presentation will discuss how robotic and autonomous technology can be used in permanent tree crops, focusing on the challenges and how they are being tackled. It will highlight GOTrack, a retrofit technology that allows growers to use their existing equipment instead of buying new robotics. The presentation will also cover the return on investment (ROI) and cost benefits of using GOTrack, showing how it provides a practical way to integrate advanced technology into current farming practices.

**1.30pm Rapid nut quality assessment**

*Dr Michael Farrar & Associate Professor Shahla Hosseini Bai, Griffith University*

Macadamia growers and processors depend on producing high-quality kernels to maximise productivity and profit. Two critical quality measures within the assessment of macadamia kernels are internal discolouration (brown centre) and rancidity level (peroxide value: PV). However, these issues can often go undetected during modern processing because brown centres are not always visible on the kernel surface, and rancidity is entirely invisible. As a result, these defects may not be identified by colour sorters, which rely solely on visible spectrum information. This research highlights the potential of imaging technologies to predict nut quality in real-time, enabling processors and growers to expedite quality assessments.

**Afternoon Tea/ Trade Expo Networking (3.45pm to 6.00pm)**

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**4.05pm How autonomous agriculture can improve precision, efficiency and sustainability in macadamia**

*Braden Hellmuth, Farm Concepts*

This presentation will explore how autonomous machinery is transforming agricultural operations by increasing precision, efficiency, and sustainability. Farm Concepts focuses on providing customised, data-driven solutions that address specific challenges faced by farmers, such as labour-intensive management and the demand for more sustainable farming practices, which are particularly relevant to the macadamia industry currently.

The session will highlight how innovations like Farm Concept's ROBOTTI LongRange, an autonomous implement carrier and the company's robotic mower, can be applied in a range of scenarios. Attendees will learn how these technologies can reduce reliance on labour, increase operational efficiency, and contribute to a more sustainable future for macadamia growers. The presentation will also discuss the importance of collaboration between farmers and technology providers to ensure seamless integration and maximum productivity.

**4.20pm Agricultural tools and climate projections that improve grower decision making**

*Jamieson Lowe, Bureau of Meteorology (BOM)*

This session will showcase some of the Bureau of Meteorology's weather tools designed for agricultural users. The presenter will showcase long range forecast tools and discuss the current state of climate drivers, how they interact, and will demonstrate handy functions within BOM's seasonal outlooks.

Attendees will also learn how to access recent rainfall maps and detailed forecasts for thunderstorms, temperature, frost, wind, and humidity via MetEye on the website. Additionally, Jamieson will demonstrate the 'My Climate View' tool, showcasing climate projections for the 2030s, 2050s, and 2070s, and how to customise commodity-specific climate factors and thresholds.

**4.35pm Meeting the challenges of agriculture with vision-based autonomous farm operations**

*Brian Baumgartner, Bonsai Robotics*

As operational costs rise and skilled labour becomes scarcer, robotics and automation can help improve efficiency in orchard management. Bonsai Robotics focuses on vision-based autonomy solutions for challenging environments, such as macadamia orchards. Their flagship technology, Visionsteer, operates without GPS or LiDAR, providing seamless, high-performance functionality in remote and rugged terrain at a lower cost. This presentation will explore how Bonsai Robotics, in partnership with the equipment manufacturers, is bringing automation to tasks such as spraying, sweeping, shaking, and general orchard maintenance for crops like macadamias, almonds, and pistachios, helping to reduce labour costs and improve productivity.

## Morning Tea (10.30am to 11.15am)

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### 10.45am Using microalgae-based soil probiotics to improve nutrient retention in macadamia farms

*Dr Edoardo Bertone, Griffith University & Dr Juliane Wolf, University of Queensland*

Researchers at Griffith University have been investigating sustainable biofertilisers that can deliver nutrients efficiently while minimising energy and water use. The project investigated the effectiveness of soil 'probiotics' containing live bacteria and microalgae. These probiotics aim to shift the soil microbiome towards beneficial strains, improving soil health and function. Another benefit is that microalgae deliver captured CO<sub>2</sub> to the soil. The researchers have also trialled incorporating these probiotic additives into mats used for erosion control and revegetation.

## Lunch (1.00pm to 3.00pm)

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### 1.30pm Innovative spraying and tractor solutions for nut growers

*Erin Wagstaff, John Deere*

John Deere produces innovative technologies that help growers improve productivity, sustainability and profitability. This presentation will explore recent advances from John Deere, including:

- Smart Apply: A LiDAR-based spray system that detects crop canopy and only applies chemicals where needed, significantly reducing input costs.
- GUSS: A semi-autonomous, self-propelled sprayer designed to address the labour shortages in rural areas by allowing a single operator to monitor multiple machines remotely.
- 5ML Specialty Tractors: The latest tractors built for nut and orchard growers, offering powerful performance and narrow width options for efficient operation in tight rows.

The session will highlight the practical benefits of these innovations for growers, focusing on reducing chemical use, improving efficiency, and addressing labour challenges. The presentation will also touch on future developments and how farmers can begin integrating these solutions into their operations today.

### 1.45pm How SwarmFarm Robotics can provide integrated autonomy in agriculture

*Paul Brady, SwarmFarm*

This presentation will introduce SwarmFarm Robotics' approach to integrated autonomy in agriculture. SwarmFarm Robotics builds autonomous robots for agricultural field tasks and provides an open developer ecosystem that allows ag tech developers and machinery manufacturers to integrate their products into SwarmFarm robots. The company has deployed autonomous robots across 5.2 million acres, achieving 220,000 commercial working hours and helping farmers to reduce inputs whilst increasing efficiency.

**2.00pm Generalist predators for pest control in macadamia orchards**

*Dr Bishwo Mainali, Macquarie University*

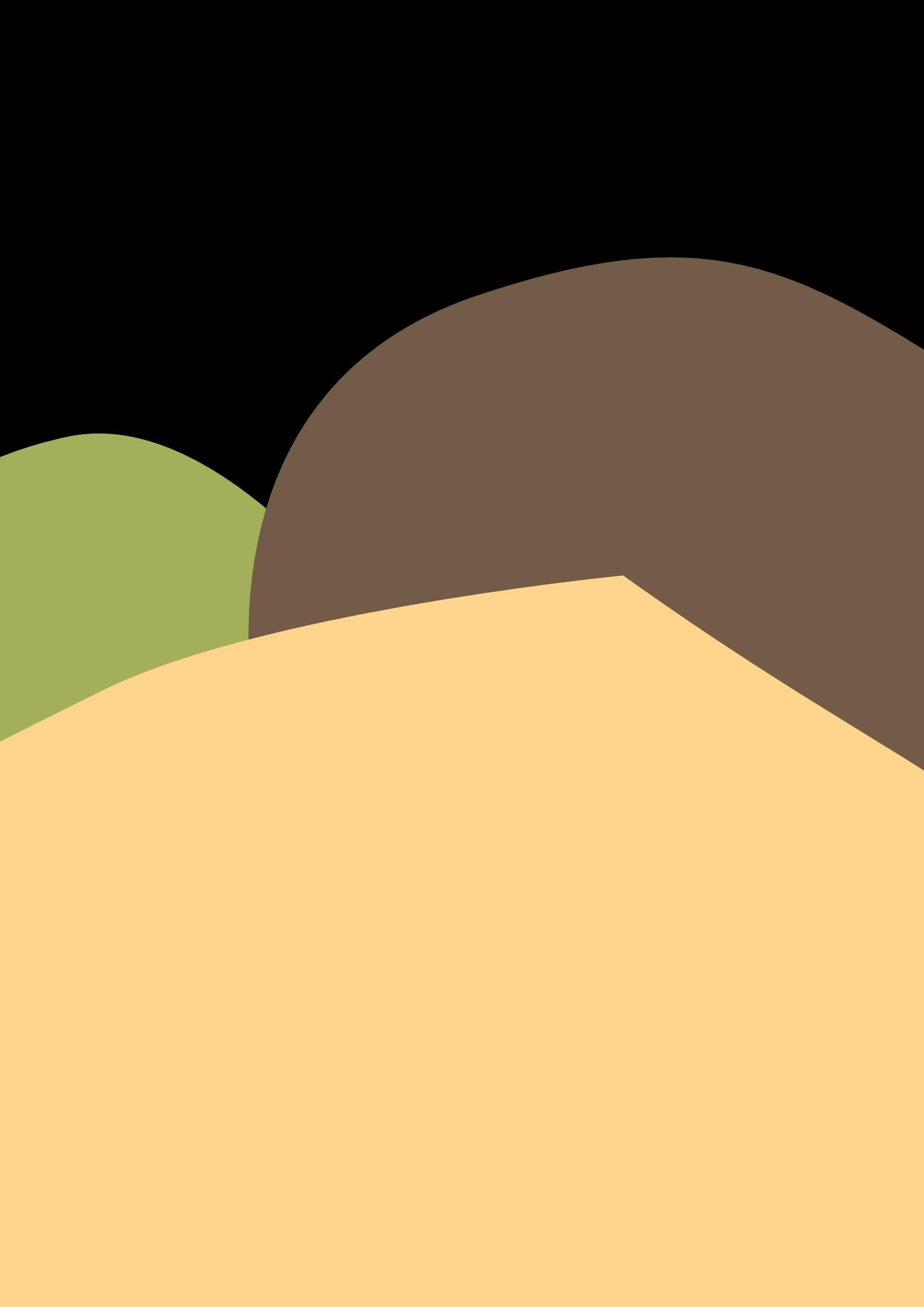
This presentation focuses on the potential predators for controlling macadamia pests, the gut contents analysis (genomic) of key predators, and the efficacy of predators on pest control. It will present orchard invertebrate community data, gut contents of predators and predator-prey interactions.

**2.15pm Using aerial imagery in macadamia production**

*Dr Bramwell Morton & Dr Rajandeep Singh, Ceres Imaging*

Ceres Imaging uses high-resolution multispectral and thermal imagery captured by scientific-grade cameras on light-wing aircraft to provide detailed crop insights to growers. The platform employs machine learning to analyse imagery with high accuracy and rapid turnaround.

This presentation will explore how Ceres Imaging's advanced data analytics platform can help farmers and agronomists monitor the health of their crops. Attendees will learn how the system can be used to detect early signs of stress, disease, nutrient deficiencies, and irrigation problems. Additionally, the presentation will cover how the platform optimises irrigation practices by identifying areas of over- or under-watering and diagnosing issues such as water leaks or blockages.



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