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CAWTHRON MARLBOROUGH ENVIRONMENT AWARDS 2023

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JUDGES' REPORT

BUSINESS INNOVATION

CROPSY TECHNOLOGIES

INTERVIEWED	Ali Alomari, Cropsy Technologies and Gerard Logan, Pernod Ricard Winemakers
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JUDGES	Helen Smale, Dorien Vermaas, Bev Doole

INTRODUCTION

Knowledge is power, and Cropsy Technologies is bringing that knowledge to the vineyard with their tractor-mounted camera that records data on every plant as it goes down the rows. The camera and artificial intelligence analysis provided by Cropsy detects disease, stages of growth, missing or dead vines, and missing posts.

Armed with this information, a grower can identify problem areas within a block, down to the needs of an individual plant. The images and data enable timely actions to deal with any issues. This information, captured over time, becomes a growing archive allowing comparisons between years and climate conditions.

Cropsy aims to help growers not only save costs but also achieve the best crop performance and increase productivity while also improving sustainability such as maximising vineyard land use, and reducing fuel and chemical use.

GENERAL INFORMATION

Cropsy was founded by Ali Alomari and Leila Deljkovic in 2019 when they were studying computer systems engineering at Auckland University. The business, which started in Ali's garage, has grown to include co-founders Winston Su and Rory Buchanan, and a total staff of nine based in Auckland.

Cropsy is a machine vision system that captures, transmits and analyses data.
The camera/computer equipment is mounted on a tractor or autonomous vineyard vehicle and powered by the vehicle's battery, with no intervention by vineyard staff.

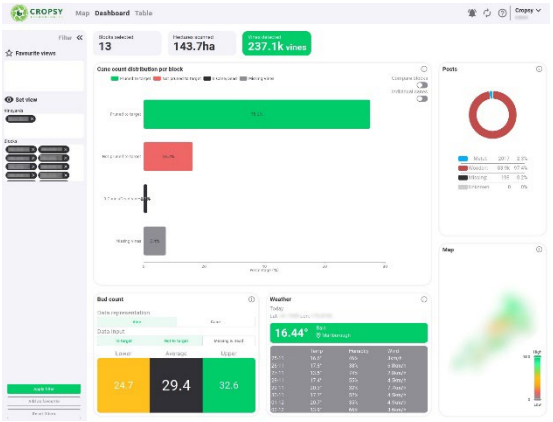
Cropsy's unique imaging techniques remove reflections, shadows and sunlight so images are clear and detailed. They can also be gathered at night and in the rain.

The system takes seven frames per second of every plant on both sides of a row, monitoring different aspects throughout the seasons. These include: The number of canes, buds and shoots; inflorescence; clusters and berries, canopy vigour, disease such as powdery mildew and botrytis, missing posts and missing vines.

The powerful on-board computer processes up to 4TB of data per day, and sends extracted insights to the Cloud for storage and easy access by the client via tablet or mobile phone.
The user interface is designed to make the data easy to understand and use.

Over time, Cropsy aims to use the data to create a digital twin of the vineyard. This information would show past trends and help forecast for the future, eg, which vines cope with flood or drought; yield estimation, nutrient deficiency and climate resilience.

Pernod Ricard Winemakers (PRW) are early adopters and are working closely with Cropsy in Marlborough to test the technology. Combined with their trialling of Smart Machine's OXIN autonomous vineyard tractor, they are keen to see how Cropsy can improve vineyard health, efficiency and sustainability.



With 2000 ha (4.7 million vines) in Marlborough, Hawkes Bay, Waipara and Central Otago, PRW are a key client. They are providing proof of concept and leading the way for other companies to see the benefits of the technology.

As part of the development phase, Ali works closely with PRW to ground-truth the images by walking the rows and manually validating the data. He says they are getting up to 98% accuracy on some of the images and analysis.

Cropsy are targeting the top eight wine companies in New Zealand with areas serviced by Cropsy currently averaging 100 ha. The hardware and technology will be provided as an annual subscription of about $300/ha and the estimated return on investment for the grower is $3600/ha/year.

Sustainability benefits of using the data captured by Cropsy:

- Targeted spraying, eg, specific areas of powdery mildew and botrytis.
- Future potential to target irrigation to blocks rather than the whole vineyard.
- Identification of missing posts for replacement (preferably with non-chemically treated options).
- Reduction in fuel use and soil compaction due to targeted approach to issues in the vineyard.

- Targeted land management, eg, if a certain rootstock is underperforming, the data shows which block to replant.

Cropsy has attracted more than $2 million from a wide range of funders, including Angel Investors Marlborough, NZGCP, K1W1, and Callaghan Innovation, as well as support from PRW, who purchased the hardware up front.

While this entry is focused on vineyard management, the technology can also be applied to orchards and other crops. In terms of development, Ali says: "We're at the tip of the iceberg at the moment, with a big road map ahead."

THE JUDGES WERE IMPRESSED BY:

- Level of innovation in developing the system from scratch, including a unique computer vision approach that enables around-the-clock imaging.
- Game-changing approach to gathering data and analysing it to provide focused and timely management in the vineyard.
- The potential to improve productivity.
- A user interface that allows easy understanding of the data.
- The versatility of the technology to be used for food crops and help ensure supply in the face of climate change.
- The opportunity for data to be used to improve management of resources – chemicals, water, fuel and land.
- A subscription model that provides the most up-to-date version of the technology each year.
- The collaboration between Cropsy, PRW, and OXIN/Smart Machine combines high-tech AI and operational ground-truthing. It provides a New Zealand technology value proposition for winegrowers resulting in improved productivity and could be part of solving the issue of chronic labour shortages.
- An equality of partnership where all parties listen and learn from each other. This is an inspiring business model for the industry and the region.
- The company has a clear vision of what they want to achieve.
  The ability to explain the technology in lay man's terms has helped attract publicity and promote the system to funders.
- The role of PRW in the Marlborough innovation ecosystem. Their support and partnership is helping nurture new high-tech companies in the region, to the benefit of all parties.

PROBLEMS AND HOW THEY HAVE BEEN TACKLED

Supply chain – the Cropsy system relies on microchips from overseas and is vulnerable to the shortage of silicon and supply chain issues in the wake of the pandemic. What is in stock and available one day can be unavailable at short notice. This may impact the ability to supply the

Cropsy hardware. These challenges are being met by being adaptable and creating fall-back options as part of the design work and buying stock in advance.

Staff recruitment – Finding staff with the level of technical knowledge is not easy. Ali estimates they need a team of 30. They are recruiting for someone to take over Ali's engineering role so he can focus on being the CEO. This requires perseverance and waiting for the right person.

Trusting new technology – Relying on artificial intelligence to monitor changes in the vineyard is a big step for growers. Cropsy have recognised the need to work alongside clients in the field and introduce them gradually to the power of the data and the potential for decision-making assistance for growing their crop.

Raising finance – As with any start-up, the ability to grow is limited by the ability to raise funding and have the right people on board. Cropsy have taken a diversified approach to funding including angel investors, venture capitalists, government grants and a planned capital raising in the US. Clear communication and a compelling innovation story have helped get investors on board.

SUMMARY

Cropsy Technologies have created a machine vision system that is the "eyes and brains in the vineyard". Their camera technology to gather data combined with AI analysis of those images provides growers with the information needed to take action to remedy issues with the crop and their vines.

The ability to monitor the crop, vine by vine, at scale enables precision management to improve productivity and more sustainable use of resources.

As well as the innovative technology, the judges were impressed by the collaboration with Pernod Ricard Winemakers and OXIN/Smart Machine and the benefits of this for these companies and the wider industry.

SUGGESTIONS

- Use your partnership with Pernod Ricard Winemakers as an exemplar to develop similar models with other companies. This example of collaboration would make a good feature in NZ Winegrower magazine and NZ Story.
- Offer an internship to university students to help ease staff shortages. There may be Callaghan Innovation funding available for this.
- Consider an approach Puro, New Zealand's largest grower of medicinal cannabis, who have 25ha under cultivation in Kekerengu, Marlborough, and plans to expand to 100 ha. www.puro.co.nz.
- The Cropsy website is focused on vineyard management and production. There is room to do more on your website and marketing to promote the potential of the technology for environmental benefits.
- As you develop overseas clients, (eg, Orange groves in Valencia, almond orchards in California), consider employing a Spanish speaker on staff or a local on the ground to help tell your story and sell the technology.