



The role of spray drones in vegetable farming



National Vegetable
Extension Network
VICTORIA - GIPPSLAND

Introduction

Drone technology is showing itself to be a leader in the AgTech space and a versatile tool in vegetable farming. From weed detection and monitoring of crop health and yield, to the spraying of chemicals and fertilisers, drones have the potential for enhanced crop management, and improved efficiencies and productivity.

VegNET Gippsland, in partnership with Schreurs & Sons, Syngenta, and E.E. Muir & Sons hosted a drone spray demonstration night in April 2024. The event enabled Gippsland vegetable growers to witness a direct in-field comparison between conventional tractor mounted spray applications and new drone mounted technology. The event provided around 60 attendees with the opportunity to see spray drones in action and learn about the regulations and practicalities of utilising spray drones in intensive vegetable production.

Tailored Event

Drones are of significant interest to Victorian vegetable growers following a very wet summer that saw substantial crop losses due to extended periods of restricted field access. Staff from 14 vegetable farms attended the event



Danny Rickard and Jamin Fleming giving a drone demonstration.

which consisted of four key elements – a drone demonstration, technical presentation, networking BBQ, and a field walk.

The event kicked off with a drone spray demonstration featuring the latest model from Jamin Fleming at Oztech Drones. Jamin, alongside Adam Schreurs and Danny Rickard from Schreurs & Sons, provided practical information on the use of spray drones in vegetable farming. “I was impressed straight away,” said Adam after he switched to drones.

“I was impressed straight away.”

-Adam Schreurs

Len Ibbotson from Syngenta led a technical discussion around the regulations associated with drone use for spraying chemicals. Following the BBQ and networking session there was a night-time field walk through snow-pea tendrils and a celery crop, using UV light to compare the differences between tractor mounted and drone spray applications.

The Benefits

Precision agriculture through drone technology can provide not only increased efficiencies, but also reduce fertiliser, chemical, and water usage, delivering environmental and cost benefits.

Unlike conventional tractor applications, drones can safely apply fertiliser to crops when vehicle access is restricted by water or mud. “It’s about access and timing; getting into the paddock and not having to wait for things to dry out,” said Len. A significant number of attendees commented that they saw accessibility during wet conditions as a primary benefit of the technology and the key reason they were interested in purchasing a drone.



Spray drone and the smart phone interface (insert).

Through the integration of spray drones into crop-care programs, growers can decrease the number of tractor passes. This subsequently reduces the impact on crops, including wheel ruts and mud splatter, and minimises soil compaction and the spread of disease. Adam noted that disease was a key factor in Schreurs & Sons' decision to go airborne. "We could see a physical pattern where the tractor had gone, moving the disease around the paddock," he explained. "We had no diseases, no issues at all following the change."

The effective automation of a manual process can reduce labour requirements and speed up application, delivering significant cost savings for a farm. An easy-to-use smartphone app coupled with a highly intelligent device allows for accurate site-specific programming, with automatic or manual operation available. "We average around eight hectares per hour with the drone, which is about the same as we get with a ground rig," said Adam.

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Len identified that using the right product was half the solution to successful crop protection, with optimal timing and the correct application technique also essential for exceptional results. Spray drift, droplet size, swath width, water rate, and evaporation rate are key considerations when using spray drones.

Danny stressed that the key to efficiency was having a good set-up for transporting, charging, and refilling the drone. "I can't emphasise enough, you have to have a

good setup. Don't skimp, go bigger; have a good mixing vat, make sure the chemicals are mixed well," he said. Weight was also a highlight. Drones are becoming lighter and more easily managed by one person, with removable batteries and tank, and foldable props. With advanced technology, batteries are also lasting longer and charging faster.

Adam explained what a great tool the drone has become for Schreurs & Sons. "We are finding more and more uses for it," he said. "Initially it was just fungicides and insecticides, but now we are applying herbicides with it as well." The Oztech drone can quickly and easily be adapted to hold a seeder that can distribute granular fertiliser, seed and even beneficials for integrated pest management. Powdered products can also be used in a spray drone through pre-mixing and good agitation.

"One of the biggest things that impressed us was the running costs of the drone, how good they were."

-Danny Rickard

The benefits of spray drone technology were clear to attendees, with 90% of those who completed the feedback form stating that they would likely change farm practices due to the event, with a significant number of growers stating that they plan to hire or purchase a drone.

The agricultural drone market is expanding and improving, with a variety of models and brands now available with ever increasing payloads and functionality. A ready-to-go drone package sits within the five-figure range, while a tractor and sprayer set-up is well into the six-figure range. "One of the biggest things that impressed us was the running costs of the drone, how good they were," said Danny.



Jamin Fleming explaining the features of a spray drone.



The Practicalities

Regulations around the use of drones (also referred to as Unmanned Aerial Vehicle [UAV] or Remote Piloted Aircraft [RPA]) are changing regularly. The Civil Aviation Safety Authority (CASA) is the regulatory body and requires a drone for agricultural purposes to be registered prior to use. Many farms in Victoria are in proximity to restricted airspace, something that also needs to be considered.

A Remote Pilot Licence (RePL) is required to fly an agricultural spray drone and can be obtained through CASA, with an additional 'type endorsement' required for each different drone. Licensing and certification for drone usage includes both theory and practical test components. It is advised that any farm wishing to use drones should seek appropriate advice around certification and licensing.

“Products that don’t have any mention of aircraft or aerial application on the label cannot be put through a drone.”

-Len Ibbotson

There is legislation in place to support the use of spray drones for chemical application, with the Australian Pesticides and Veterinary Medicines Authority (APVMA) regulating the use of agricultural chemical products in Australia. Chemical safety is a key consideration as drone technology means operators are handling chemicals in much higher concentrations than they normally would. “It is not just your own safety, but your team’s safety, your crops’ safety and your neighbours’ as well,” emphasised Len.



Spray drone demonstration night at Schreurs & Sons.



Len Ibbotson from Syngenta outlining chemical usage in drones.

Attendees considered legislation and the lack of chemicals registered for drone use to be a primary challenge associated with aerial spraying. “Products that don’t have any mention of aircraft or aerial application on the label cannot be put through a drone,” stated Len. “As the type of technology changes, the regulations need to change; we need to be future-proofing products that are being introduced now.”

Conclusions

Following the field walk, both Danny and Adam were surprised at the effectiveness of the drone in the celery crop. “The celery; I was surprised and impressed,” said Adam. “One hundred litres per hectare with the drone compared to 250 litres per hectare with the spray boom, to me, it was the equivalent job, if not a little bit better with the drone.”

“I’m super impressed at how much the droplets penetrated the bottom canopy of the celery.”

-Danny Rickard

Danny added: “It got rained on a little bit; I was surprised, the top of the leaf didn’t run or get smeared as much as I thought. I’m super impressed at how much the droplets penetrated the bottom canopy of the celery.” “The drone produces more disturbance from the airflow, the downwash; if you had a look at the top-leaf of the celery, there were droplets on both sides of the leaf, which is better,” Danny said.

It was clear throughout the drone spray demonstration night that being able to see a spray drone in action and hear directly from those using it, took drones from a

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concept to something that is well within reach for many growers. One attendee noted that they saw drones as being very practical and viable in the vegetable industry, while others noted the efficiency gains and coverage.

Qualitative feedback showed that there was, on average, an 80% increase in attendees' knowledge and skills. Additionally, responses indicated a 90% increase in awareness associated with drone spray technology following the event. One attendee stated, "the event was far more in-depth than I expected; well worth the time." Another noted, "it was very well done and informative and nice to see farmers get together over common interests."

Next Steps

VegNET Gippsland will continue to identify and facilitate opportunities for Gippsland growers to learn about, see demonstrations of, and trial new AgTech innovations in horticulture. Precision agriculture, automation, digital technologies, robotics, and decision support technology provide important opportunities for growers to improve input efficiencies, optimise land use, increase accuracy, reduce costs, and detect pests and diseases.



UV dye spray patterns on snow-pea tendrils and celery (insert).

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