Predatory Mite Release methods in SA Strawberries – A comparison

INNOVATION AT WORK CASE STUDY | **July 2025**

FIRST YEAR PROGRESS CASE STUDY | APRIL 2024

OVERVIEW

A muti-farm demonstration trial with Mt Barker Strawberries, Ceravolo Berries and DJ's Growers Services (an Elders company.)

Mt Barker Strawberries, a third-generation farm established in 1980 in the Adelaide Hills, is run by Con Piliouras, his son George, and grandson Kon in Mt Barker.

Ceravolo Berries entered the berry market several years ago, adding to their extensive operations growing apples and cherries, packing, producing juice and acting as a grower agent.

Two farms in the Ceravolo berry operation collaborate with agronomist Sam Freeman from DJ's Growers to optimise strawberry production and Integrated Pest Management (IPM) programs.

The strategic release of predatory insects is a key component of strawberry IPM (IPM Strategy). This trial focuses on assessing the efficiency, costs, and effectiveness of predatory insect release methods.

This project aimed to identify effective release methods for predatory mites in the strawberry industry. It examined effectiveness of three methods: hand release, ground mechanical release, and UAV (drone) application, along with the associated costs per application.

Monitoring pest populations and predatory mite levels weekly supported the assessment of release method efficacy.

The predatory mites Persimilis, Californicus, and Montdorensis were released in trial patches, each covering 1 to 1.5 hectares.

KEY FINDINGS

- UAV, ground-based air, and hand release methods are all effective
- UAV shows slightly better insect establishment rates and longevity
- Hand release is time-consuming, more variable and can pose Occupational Health and Safety (OHS) risks.
- Availability of the ground unit, impacted the study in second year.
- Dust is an issue with hand release, and a potential OHS issue.
- Further investigation is needed on all methods, including the newly identified Entomatic™ release system by Bio-best

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THE CHALLENGE

Year One
Beneficial insect release can be time consuming and inefficient.

Releasing predatory mites such as Persimilis, Californicus, and Montdorensis into strawberry patches can effectively control Two Spotted Mite (TSM) and thrips when using an Integrated Pest Management (IPM) approach. According to Senior Agronomist Sam Freeman, determining the most cost-effective release method between UAVs, Ground blower and hand has been a "guessing game", with decisions made often based on guesswork, grower preference or interest in Ag-tech (UAV). This trial aims to identify the preferred method for releasing these insects.

Historically, mites have been hand-released using cardboard tubes containing 10,000 mites mixed with vermiculite, which is time-consuming. UAV release is becoming more common in South Australia's berry industry, but timing and conditions remain major considerations. The ground unit air-release method is new and faces obstacles such as ground conditions and the availability of machinery.

ABOVE, Aerobugs – UAV

UAVs are expensive and require experienced, licensed operators. They can also result in off-target insect dispersal, particularly in mid-rows, leading to some efficiency loss. The primary challenge is ensuring efficient operation and dispersal. By using a contractor, the farm avoids additional investment in equipment.

Ground unit air release requires an extra operator to drive the tractor/ ground unit. The challenge is ensuring farm management has the necessary experience and can efficiently move in and out of the tractor cab for refilling. This method also incurs off-target dispersal, resulting in efficiency loss.

ABOVE, AEROBUGS Ground unit

From Aerobugs

Key features of the units:

The UAV has a spinning delivery system that holds vermiculite below the main body of the UAV and above the delivery system. The unit can carry 20L of vermiculite and cover 1Ha per pass.

The ground-air release unit can hold approximately 60L of vermiculite and, depending on the machinery it's mounted on, can cover 1-3 hectares per pass. For this project, we mounted the unit on the grower's tractor to accommodate the strawberry row widths, which allowed it to cover 1 hectare per pass.

Hand release involved multiple tubes of 10,000 Persimilis carried, to release a total of 10 x 10,000 per hectare. This is a time and labor intensive process.

BENEFICIAL INSECTS

Key considerations for growers

Sam Freeman, an agronomist with almost 20 years experience in horticulture and the strawberry industry, explains the importance for growers to understand the following for live insect release:

1. *Weather conditions are important for all methods of release. Ideally spreading in the cool of the morning in low wind conditions.*

2. *As live insects are released, the time from receival to dispersal should be as short as possible.*

3. *Product is sent by air freight to reduce the time from beneficial harvest to release.*

4. *If a release is delayed due to weather conditions, it's important to follow the storage protocols provided by insect release companies, such as Bugs For Bugs , to minimize insect loss.*

BUGS FOR BUGS

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TRIAL METHOD

Pest monitoring in year one began mid-September in trial blocks on two grower properties in the Mt Lofty Ranges and Southern Fleurieu. The trial is now at the midpoint of the two-year program. Predatory mites have been released across the trial blocks on three occasions, using three different methods: hand release, UAV release, and ground blower release.

Plant insect count data has been collected to quantify establishment of predatory mites and control of two spotted mites. Sticky traps have also been used to compare distribution patterns for predatory mites released using drone and ground blower approaches although data from sticky pads have been inconclusive.

LABOUR COMPARISON

UAV contractor: 1 operator.
Ground unit release: 1 contractor operator plus 1 farm personnel, totalling 2 people.
Hand release: Requires 3 personnel and is time-consuming. More people are required to effectively release the 3 species of predators in a timely manner, as insects are alive and weather conditions and exposure can impact survival rate.

TRIAL RESULTS

Initial pest incidence data in year one suggested that the UAV application method may be slightly more effective in establishment than the ground-blower release. Figure 3 shows that UAV-released Persimilis established more rapidly and with a higher total incidence compared to the ground-blower method. Mite persistence was also greater in the UAV release, indicating a potentially higher survival rate, though this may have been due to better initial establishment. Overall, trends for both Persimilis and TSM show that both the UAV and ground-blower methods have been successful.

The hand release method in year one (Figure 2) showed a similar but more variable response, likely due to the uneven spread typically associated with hand release.

Figure 2. Hand Release Year One

Average mite percentage of incidence across two farms in the Adelaide Hills and Fleurieu Peninsula combined over time

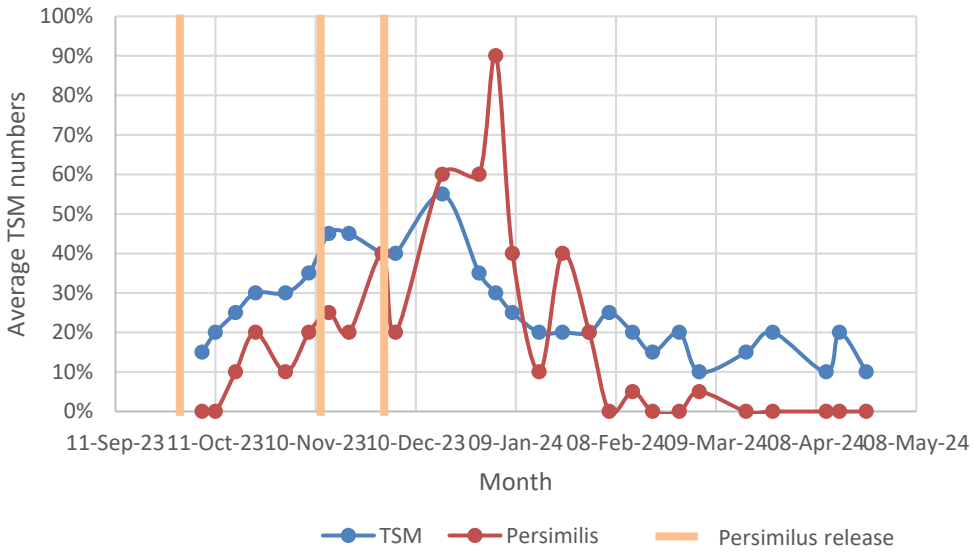
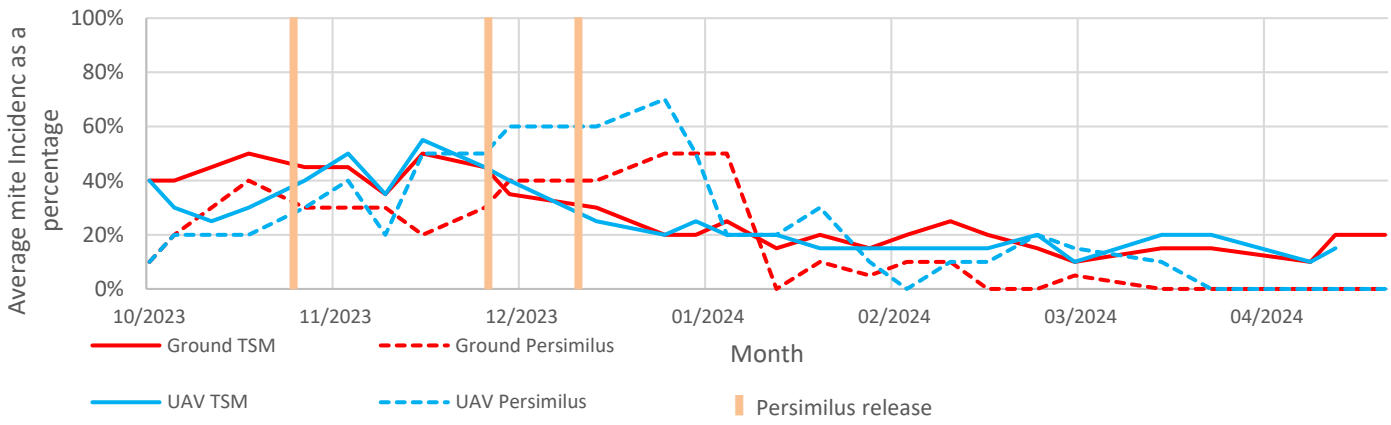


Figure 3. Ground-blower vs UAV Release Year One

Percentage of mite incidence across two farms in the Adelaide Hills and Fleurieu Peninsula over time



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THE CHALLENGE

Year Two

In year one we determined the need for reliability and efficiency. Did we achieve the forementioned this season? We did not.

- Initial UAV unit breakdown, requiring extended repair. This resulted in another unit needing to be sourced and equipped.
- The ground application unit was unavailable, but year one's data did show this unit as a more costly application.
- Mixing of multiple predatory mites for hand release, while more efficient, created some issue with different mediums creating more dust. (vermiculite and sawdust utilized).
- While UAV's remain an expensive investment for farms, they are also becoming easier to use and manage.

ABOVE, Adelaide Drone Repair – DJI T50 UAV

The DJI T50 UAV, with some training on operations, can be piloted on farm by owner operators.

Contractor options are also available. By using a contractor, the farm avoids additional investment in equipment. This unit is able to release multiple predatory mites over a 1Ha area per pass quickly.

Units of this sort also have the ability to be utilised for other on farm jobs. Additional carrying attachments can also perform granular spreading or liquid foliar spray application.

ABOVE Aerobugs Mini Drone

From Aerobugs

Key features:
The Aerobugs **Mini UAV** has a slowly rotating delivery system that holds vermiculite below the main body of the UAV. This allows for minimal disturbance to the predatory mite. The unit can carry enough Persimilis and cover 1Ha per pass.

Hand release efficiency was managed in year two by utilising a mix of Californicus, Persimilis and Montdornesis. This allowed for one pass application. This remained time consuming due to mixing, and walking individual released rows. However, it was an improvement in efficiency on last season.

Hand release involved multiple tubes of 10,000 Persimilis carried, to release a total of 10 x 10,000 per hectare. This is a time and labor-intensive process.

BENEFICIAL INSECTS

Key considerations for growers

Sam Freeman, an agronomist with almost 20 years experience in horticulture and the strawberry industry, explains the importance for growers to understand the following for live insect release:

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TRIAL METHOD

Pest monitoring began mid-September in year two, in trial blocks on two grower properties in the Mt Lofty Ranges and Southern Fleurieu. Predatory mites were released across the trial blocks on two occasions, using three different methods: hand release, UAV release, and mini drone release.

Plant insect count data was collected to quantify establishment of predatory mites and control of two spotted mites.

LABOUR COMPARISON

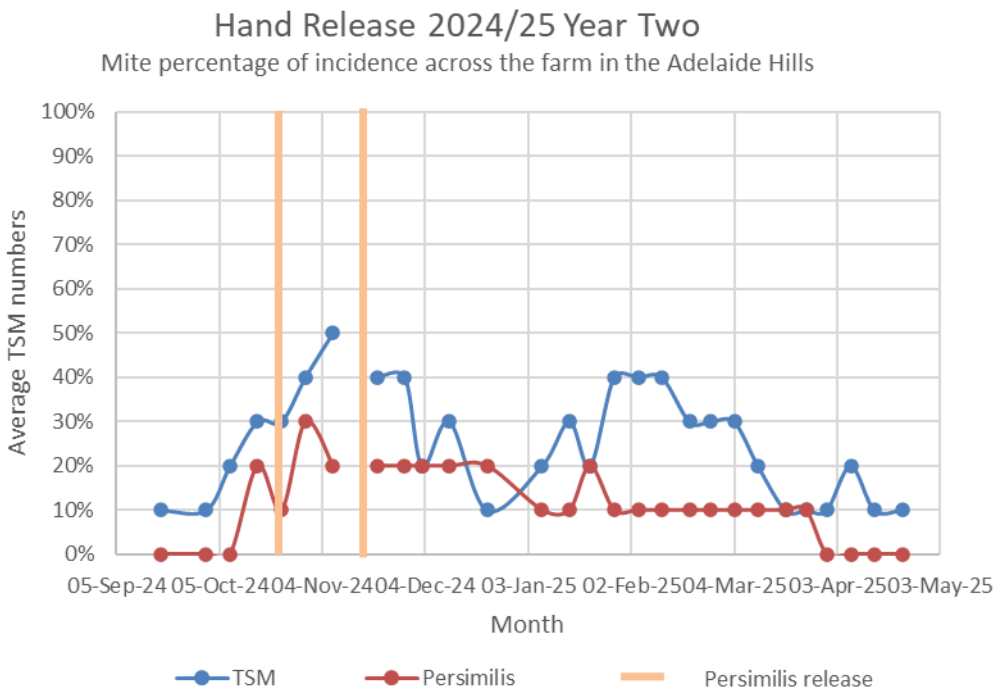
UAV contractor: 1 operator.
Mini UAV: 1 operator.
Hand release: Requires 2 personnel this season and is time-consuming. Combining predatory mites for a single release increased efficiency but, as insects are alive and weather conditions and exposure can impact survival rate.

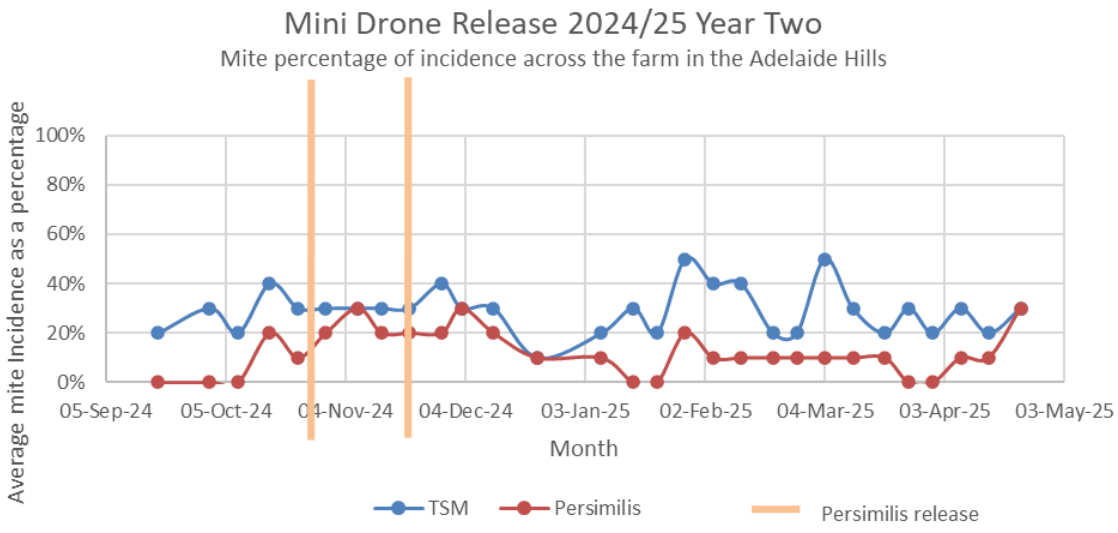
TRIAL RESULTS

Initial pest incidence data did not show any significant establishment differences in year two. Seasonal conditions were very favourable to predatory mite release and establishment, with mild, humid conditions.

The hand release trial block had a higher level of Two Spotted Mite (TSM) early in the season, but it reduced quickly and was comparable with the mini drone and UAV release.

This season showed a consistent level of TSM across the year as the season remained dry.





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KEY MESSAGES YEAR TWO

Breakdowns when dealing with live insects can greatly increase the pressure on the operator, supplier and grower. The efficiencies are still there, but reliability of equipment is paramount. We were able to move to the DJI T50 UAV this season with a local supplier and operator that managed the breakdown. This was able to occur within the same day. More and more operators are in the market, giving flexibility and support.

Growers are now considering purchasing their own UAV units to run a range of jobs.

Multiple predatory mite combined hand release application was a success and greatly reduced time from last season. Reduced by half even after mixing procedures.

We see a place for both operations on farm. Hand release early with multiple species when plant canopy is small with a targeted application.

UAV release of multiple species when plants are established and pressure increases with warmer temperatures.

Top up with mini drone application of Persimilis only when hot spots or pressure rises during hot dry conditions.

WHAT'S NEXT?

Grower information sessions to bring results to industry. One such event as part of this project involved SA Berry growers at Mt Barker strawberries.

Further information of this grower day to be presented, including UAV dispersal distribution.

Exploration of ways to supply grower options for beneficial insect release in a format that is easy to follow and execute.

- In house, on farm (own or lease equipment)
- Contractor options and local availability
- Matched agronomy service to ensure correct application and control.

RESOURCES

Aerobugs - pioneering new pathways for sustainable agriculture through the use of Agricultural Drones for Integrated Pest Management.

https://dronesalesadelaide.com.au/ for UAV T50 unit.

Bugs For Bugs - Pest management & fruit fly specialists - Helping Australian growers achieve best practice pest management with minimal pesticides

Develop an effective IPM Strategy to deal with pests in the Victorian Strawberry industry - Dr Paul Horne IPM Technologies

Entomatic™ – adaptable automated dispenser for fast even distribution of beneficials

ACKNOWLEDGEMENTS

Elders and DJ's Growers Services would like to thank Mt Barker Strawberries and Ceravolo Berries for hosting this trial.
Bugs For Bugs for support in supply and hand release. Aerobugs for operating the beneficial release of UAV, Ground-unit in year one and Mini UAV in year two.

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