



National Vegetable Extension Network

VegNET
NORTH QUEENSLAND

**CASE
STUDY**

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Drones vs. humans: Approach to release beneficial insects in veg crops tested in Qld

Introduction

In northern Queensland, vegetable crops are increasingly targeted by pests that threaten yield and quality. To manage these pests, beneficial insects are often introduced to act as natural predators. Traditionally, this process is completed manually by hand, but with advances in technology, drones are now being explored as an alternative method.

VegNET Northern Queensland conducted a trial to evaluate and compare the efficacy of drone-assisted and hand release methods for the distribution of beneficial insects in vegetable crops, focusing on factors such as coverage, cost, labour, and pest control outcomes.

For each method, beneficial insects were distributed across 20 hectares of capsicum, cucumber and tomato crops, totalling an area of 40 hectares. The beneficials included lacewings (*Chrysoperla spp.*) and ladybugs (*Hippodamia spp.*) with 10,000 insects used per hectare.

Field workers manually released beneficial insects in targeted areas, while multirotor drones equipped with specialised dispersal systems released beneficials in a pre-programmed flight path to achieve even distribution.

The following approach was used to collect relevant data and analyse the results.

- **Coverage:** Assess the evenness of distribution using grid sampling.
- **Pest control effectiveness:** Measure pest populations before and after release.
- **Labor and time efficiency:** Track time and labour required for each method.
- **Costs:** Compare costs associated with drones (including purchase/lease and maintenance) versus hand labour.



Image: The beneficial insect *Harmonia octomaculata* (lady bird) mixed before drone release. **Credit:** NQ Aerovation

Key messages

- Vegetable growers are increasingly turning to an integrated pest management approach to combat pests. This approach uses cultural, biological and chemical methods to control pests, including the use of beneficial insects as natural pest predators.
- A trial in northern Queensland examined the effectiveness, efficiency and practicality of using drones versus hand release methods to distribute beneficial insects in vegetable crops.
- The results showed that despite higher initial costs, the long-term benefits in pest control efficiency and effectiveness made drones a promising technology for modern agricultural pest management.
- However, further research is required and practical considerations such as drone technology availability and cost constraints should be evaluated by individual growers before implementation.

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The results are in

The beneficial insects distributed manually in the field required approximately eight hours of labour per 20-hectare field, resulting in higher labour costs due to the need for multiple workers and longer time to complete the task. This approach achieved 85 per cent coverage of beneficial insects, with uneven distribution in some areas.

In comparison, the drones distributed the beneficial insects across the 20-hectare field in approximately two hours, reducing labour costs by 75 per cent and minimising the need for manual labour. This approach achieved an average 95 per cent coverage of the targeted areas with more even distribution of beneficial insects.

The drone release resulted in significant reduction in pest populations, with a 70 per cent decrease in pests observed within two weeks. The beneficial insects released by hand reduced the number of pests by 50 per cent in the same period; however they were more effective in targeted areas where they were distributed accurately.

While the initial costs to purchase and maintain a drone were higher, operational costs were lower in the long-term due to reduced labour. Alternatively, the hand release method resulted in lower initial costs but higher ongoing labour costs and associated work health and safety (WHS) risks such as fatigue.

Improving grower productivity, profitability, preparedness and competitiveness

In this trial, the drone release method was more effective in achieving an even distribution of beneficial insects across 20 hectares of vegetable crops in northern Queensland. The ability of drones to cover large areas quickly and uniformly contributed to a more significant reduction in pest populations compared to the hand release method.

Drones provided a substantial improvement in time and labour efficiency. Although the initial investment in drone technology was higher, the reduced labour requirements and increased operational efficiency and effectiveness in pest control offset these costs over time.

While drones offer numerous advantages, their use is contingent on the availability of the necessary technology and training. Hand release remains a viable option in scenarios where drones are not accessible or feasible.

Next steps and recommendations

This case study provides a framework for understanding the potential benefits of integrating advanced technologies into traditional agricultural practices and highlights the importance of adapting methods to specific operational contexts.

Following the results of the trial, it is recommended that large-scale vegetable growing operations consider investing in drone technology to maximise efficiency and effectiveness in pest control. Smaller-scale operations can consider hybrid approaches or gradual integration of drone technology.

Further research is required in this area, and long-term studies should be conducted to evaluate the impact of drones on various crops and pest scenarios. For VegNET Northern Queensland, additional trials are needed to improve grower knowledge on the value of releasing beneficial insects more effectively and reducing chemical use.



Image: A trial in northern Queensland tested the effectiveness of using a drone to distribute beneficial insects in vegetable crops versus traditional hand release. Credit: NQ Aerovation

Further information

Contact VegNET Northern Queensland Regional Development Officer at rdo@bowengumlugrowers.com.au or 0419 429 808.

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