

Paul Horne's visit to NZ

Dr. Paul Horne is an applied entomologist with extensive expertise in Integrated Pest Management (IPM). He owns an Australian company, IPM Technologies Pty Ltd, based in the north-east of Melbourne. His company helps farmers get better value from fewer insecticide applications and improves insect pest control through the use of IPM strategies.

Potatoes NZ and Vegetables NZ hosted Dr. Paul Horne in New Zealand at the end of February 2025. During his visit, he led multiple grower workshops at Lincoln University, Massey University, and in Pukekohe, as well as held one-on-one meetings with growers across Canterbury, Manawatū, and Pukekohe.

Paul shared insights on integrated pest strategies, their application in vegetable crops, and current pest control methods, exploring how these approaches can be improved through IPM.

The tour began in Canterbury on the 24th of February with a visit to a McCain grower group. The following day included visits to two potato growers and a vegetable grower, concluding with a workshop at Lincoln University. These visits focused on onsite insect identification, discussions around existing spray programmes, key grower challenges, pest management options (biological, cultural, and chemical), and the development of effective control strategies. The primary insect concerns in Canterbury were aphids, caterpillars, and tomato potato psyllids (TPP).



The tour then continued in the Manawatū area, where Paul visited two vegetable growers, followed by a workshop at Massey University. Many students participated and found the session highly engaging and informative.

The final stop was in the Pukekohe area, where Paul met with a variety of growers, visited the Vegetable Centre of Excellence (VICE) site, and led another well-attended grower workshop.

A recorded presentation from the Pukekohe workshop was made available on the Potatoes NZ and Vegetables NZ websites for growers who were unable to meet with Paul in person.



Insights from Dr. Paul Horne's Visit

- Growers have experimented with certain elements of Integrated Pest Management (IPM), but they often do not implement all three key components: biological, cultural, and chemical controls in an integrated way.
For example: border planting was used to encourage beneficial species, but the spray programme was not adjusted accordingly, resulting in the unintentional killing of those beneficial insects.
- Growers often seek assistance only during a crisis, such as pesticide failure. As a result, the primary driver for implementing IPM tends to be the development of resistance in pests.
- IPM involves the combined and compatible use of biological, cultural, and chemical controls to manage pest populations effectively and sustainably.
- Key biological control agents include predators, parasitoids, and pathogens.

For example:

- ✓ Aphids are controlled by predators (ladybirds, lacewings, hoverflies), parasitoids (tiny wasps), and pathogens (usually fungi).
 - ✓ Tomato potato psyllid (TPP) is targeted by hoverflies, brown lacewings, ladybirds, and damsel bugs.
 - ✓ Potato tuber moth is managed by native predatory damsel bugs and introduced parasitoid wasps.
- Cultural controls are often the most critical and yet the most overlooked aspect of pest control.

Examples include:

- ✓ Isolation of seed crops to prevent virus spread via insect vectors.
 - ✓ Soil management and irrigation for potato tuber moth, to prevent larvae from accessing tubers underground.
 - ✓ Reducing pest pressure by removing alternative host plants (e.g., boxthorn for TPP).
 - ✓ Providing nectar sources (e.g., flowering plants) to support beneficial insects like wasps and hoverflies, which increases their lifespan and reproductive capacity.
- Insecticides and fungicides vary widely in their impact on beneficial species. While some products are broadly toxic, many newer pesticides are more selective, being safe for certain beneficials while targeting pests.
From an IPM standpoint, it's critical to choose products that control the pest without harming key beneficial species.
- Start by selecting one crop or paddock to trial a full IPM program. Regularly monitor for both pests and beneficial insects, paying attention to all life stages. Use selective insecticides when necessary and aim to make changes proactively, before a crisis occurs.
- *Bacillus thuringiensis* (Bt) sprays should be considered for caterpillar control, as they are an important component of an IPM-compatible chemical approach.



How to Use Bt sprays (e.g. Dipel, XenTari)



Bt stands for *Bacillus thuringiensis*, a species of bacteria that is formulated as an insecticide to control caterpillar pests. There are two sub-species, *B.t. kurstaki* (e.g. Dipel and Delfin) and *B.t. aizawai* (e.g. XenTari) which contain different toxins. Bt acts as a stomach poison and must be eaten by the caterpillars. Alternate between spraying each of the sub-species.

The following are factors that IPM Technologies P/L considers important when using Bt's

1. Check the "USE-BY" date or "Date of Manufacture". It should be no more than 2 years after the batch date.
2. Use a high water volume to ensure good coverage, especially on larger, leafy plants. In most vegetable crops at least 500 L/ha.
3. Spray after 3:00pm to avoid peak UV radiation.
4. Use a sticker such as Nu-Film-P, FilmStar, FlexStic or Bond.
5. Avoid overhead watering or rain for 24 hours after spraying.

The above points are the major factors, but the points below are also important and will influence the effectiveness of the sprays.

6. Use a feeding attractant such as milk powder or molasses.
7. Target small caterpillars.
8. Make sure the tank and lines are clean of other pesticides (especially Synthetic Pyrethroids).
9. Use a wetting agent.
10. Use the right rate.
11. Ensure that the water is a neutral pH.
12. Use as part of an IPM programme.



Integrated Pest Management in Potatoes

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Following his visit, the idea emerged to establish a commercial production site in Canterbury that strictly follows an IPM approach.

Project Proposal

The project aims to demonstrate Integrated Pest Management (IPM) in potato production.

IPM integrates a combination of:

- Chemical control (insecticides and fungicides),
- Biological control (insects and mites that feed on pests), and
- Cultural control (management practices that influence either pests or beneficial organisms).

Importantly, IPM does not mean that insecticides are never used. Instead, insecticides are carefully selected based on their impact on beneficial species, not solely on pest control efficacy. Transitioning from a pesticide-based approach to IPM requires a significant mindset shift and is often perceived as risky.

Key biological controls include predators, parasitoids, and pathogens. The choice of control agent depends on the specific pest involved, with varying degrees of effectiveness.

Cultural controls are often the most critical yet underestimated component of pest control. Examples include:

- ✓ Site isolation to reduce virus transmission by insects,
- ✓ Soil and irrigation management, and
- ✓ Border plantings that provide food and shelter for beneficial insects.

Project Objectives

This demonstration project aims to provide growers and advisors with the knowledge to:

- Monitor potato crops effectively,
- Identify pests, diseases, and their natural enemies,
- Make informed pest control decisions,
- Select appropriate agrichemicals,
- Gain confidence that IPM is practical, cost-effective, and sustainable thus reducing perceived risks.

Implementation

The demonstration will be conducted on a commercial potato site in Canterbury. Potatoes NZ and McCain will provide support as needed. The project will be managed and led by Jessica Vereijssen (Plant & Food Research) and Paul Horne (IPM Technologies).

The target variety is Russet Burbank, with an expected yield of 80 tonnes/ha. Compensation for any crop loss will need to be defined and clarified with the grower.

Weekly crop scouting will be conducted to monitor pests and beneficial species. The key to effective monitoring is accurately assessing population levels and identifying all life stages. Based on findings, an appropriate integrated approach will be recommended.

Growers and advisors will be invited to regularly attend the site and be involved in the decision-making process, with the main goal of demonstrating and educating them on IPM principles in a managed environment, making it a valuable learning experience.

Deliverables

A final report and case study will be developed at the project's conclusion.

An extension / training programme to upskill potato growers, agronomists and industry support providers in the implementation of a full IPM crop protection strategy – including pest and beneficial insect identification, pest thresholds, selective habitats for beneficials and insecticide selection, other cultural practices.

When growers implement IPM, the results can be remarkable. By reducing the use of disruptive insecticides and encouraging beneficial species, the effectiveness of biological control agents is greatly enhanced. Combined with cultural practices, this approach achieves comprehensive pest management without relying solely on pesticides. An added benefit of this strategy is the reduced risk of insecticide resistance, extending the lifespan of available products.