An Integrated Approach to Managing Caterpillar Pests in Subtropical Raspberries

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- Caterpillar pests are an increasing challenge for subtropical Rubus growers
- Damage trend monitoring showed that integrated treatments were particularly effective at flattening damage peaks
- No single tool is enough to manage caterpillar pests reliably in subtropical raspberries

Why caterpillars are becoming a bigger issue

Caterpillar pests are an increasing challenge for subtropical Rubus growers, particularly from spring through late summer. In raspberries, larvae can damage plants from early vegetative growth right through to fruit ripening, feeding on leaves, buds, flowers and green fruit.

Amongst the caterpillars impacting Rubus production in subtropical areas, *Helicoverpa armigera*, *Helicoverpa punctigera*, and *Spodoptera litura* remain the most challenging pests to manage. These pests are highly mobile, have multiple generations per season, and can quickly build damaging populations under favourable conditions.

Helicoverpa armigera
Photo credit: Costa Berries

Helicoverpa punctigera
Photo credit: Cesar Australia

Spodoptera litura
Photo credit: Saleh Adnan

Chemical control remains the primary management option for most growers. However, increasing resistance pressure, limited spray windows, and concerns around beneficial insects mean there is growing interest in integrated pest management (IPM) approaches that reduce reliance on insecticides while maintaining effective control.

Deploying IPM into practice in subtropical Rubus

During the 2024–25 and 2025-26 seasons, field trials were conducted in a commercial raspberry farm at Corindi, NSW, to evaluate how different IPM tools could be combined to manage caterpillar pests more effectively.

The trial focused on integrating three key strategies:

1. **Mass trapping using pheromones**
2. **Release of egg parasitoids**
3. **Conservation biological control using flowering plants**

The aim was not to reduce reliance on insecticides largely, but to reduce pest pressure early, slow population build-up, and limit crop damage during critical growth stages.

Mass trapping: reducing pressure early

Commercially available species-specific Pheromone traps were used to mass-trap male moths of *Helicoverpa armigera*, *H. punctigera*, and *S. litura*. By reducing male moth numbers, mating success and subsequent egg laying can be suppressed.

Traps were placed within raspberry tunnels at canopy height and monitored fortnightly. In addition to suppressing populations, the traps provide valuable early warning of moth activity, allowing timely decisions around parasitoid release and other interventions. Throughout the season, moth activity showed clear peaks, reinforcing the value of pheromone traps as both a monitoring and a management tool.

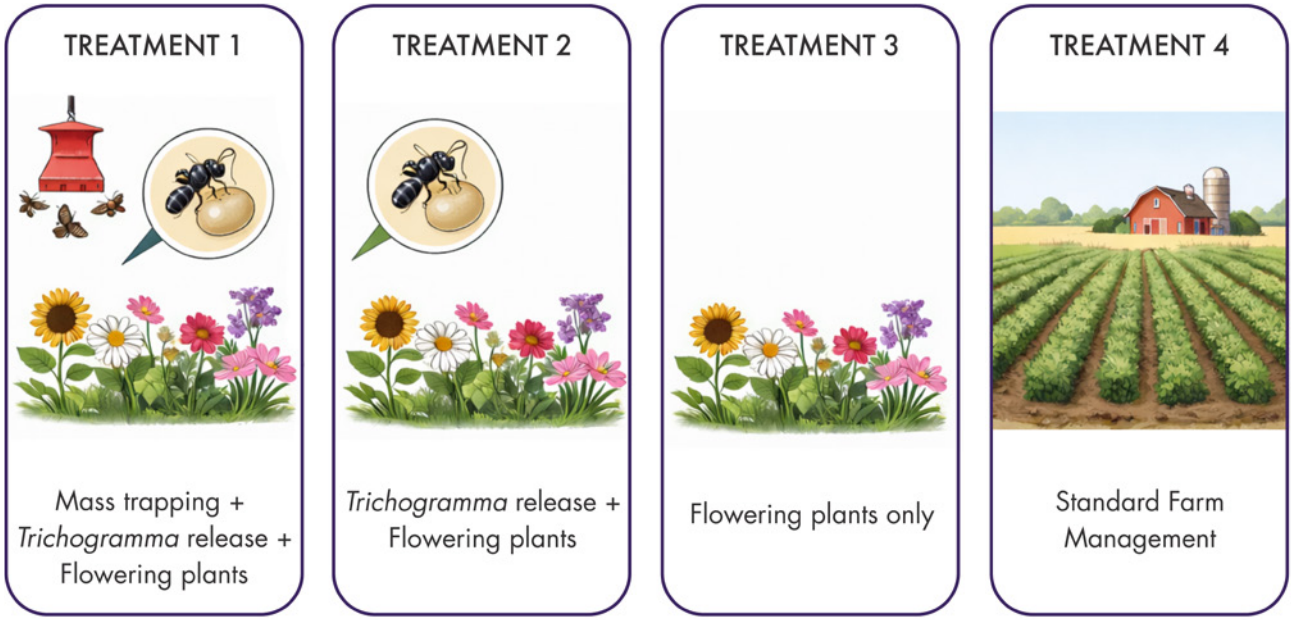
Egg parasitoids: targeting the pest before damage starts

The egg parasitoid *Trichogramma pretiosum* was released fortnightly once moths were detected in traps. These tiny wasps parasitise moth eggs before larvae emerge, preventing feeding damage altogether.

Releases were timed to coincide with moth activity, ensuring parasitoids were present when egg laying occurred. This approach targets pests at their most vulnerable stage and fits well with reduced-spray programs.

Female of parasitoid *Trichogramma* (0.5 mm in size)
Photo credit: Dr Victor Fursov CC BY-SA 4.0

Overview of pest management treatments evaluated in the caterpillar IPM trial in subtropical Rubus



Flowering plants: supporting beneficial insects

Flowering plants were introduced into tunnels as part of a conservation biological control strategy. Species included zinnias, marigold, buckwheat and sunflower, selected for their ability to provide nectar and pollen resources for beneficial insects.

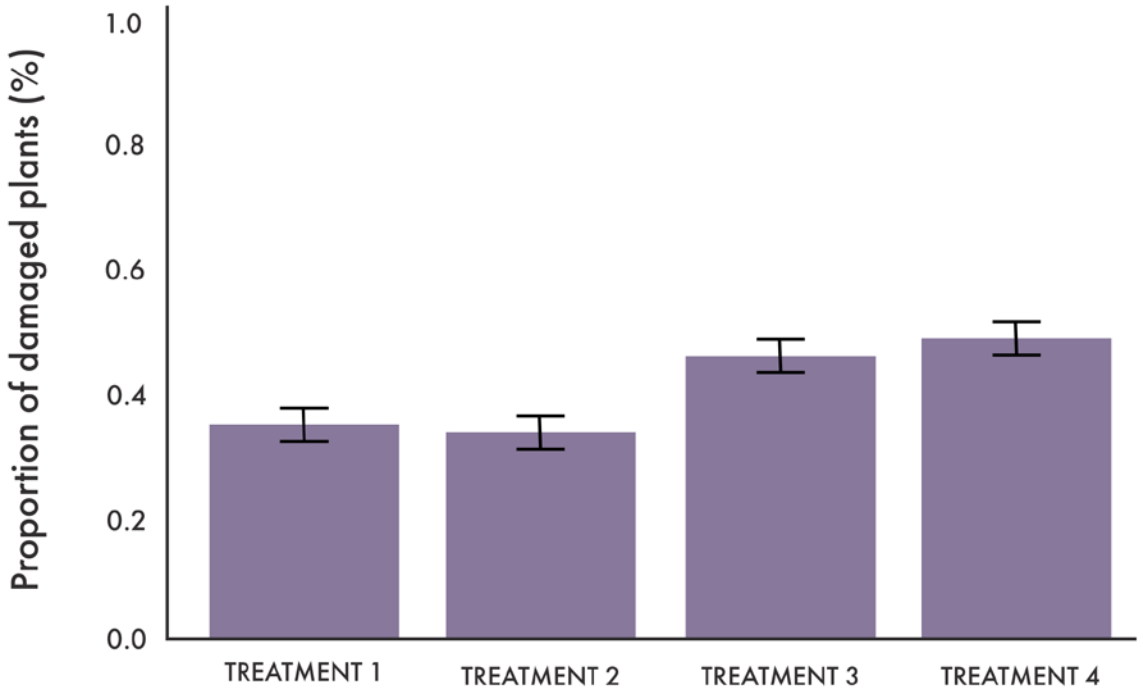
These plants were established during the vegetative stage of raspberry growth and spaced along rows within tunnels. The goal was to support parasitoids and other natural enemies, helping them persist and function more effectively within the crop.

Data collection

Non-destructive inspections were conducted on 10% of raspberry plants within each treatment module at fortnightly intervals to record larval abundance and assess caterpillar damage. Adult moth populations were also recorded fortnightly using pheromone traps.

Caterpillar damage was assessed on leaves, buds, flowers, and green fruits during vegetative and reproductive stages using a whole-plant damage scoring system adapted from Williams et al. (1989)

Score	Leaf damage	Flower, buds, and green fruits damage
0	*No visible symptoms*	No damage
1	*Pinhole on a few leaves*	<20%
2	*Pinhole and a small circular hole or windowpane* feeding on <1/3 of tender leaves	*20-30%*
3	*Short and elongated holes or windowpane (<0.5cm) on 1/3 of the tender leaves*	30-50%
4	*Several short holes and elongated lesions (0.5-1.0cm) on 50% of tender leaves*	50-70%
5	*Many short holes and elongated lesions (>1.0cm) on 50% of leaves*	70-90%
6	*Many elongated holes and large portions of leaves were eaten up*	100%



Caterpillar damage severity under different management treatments

What did we see in the crop?

Pheromone trapping clearly showed that *Spodoptera litura* was the dominant moth species throughout the season, with sharp population peaks in late December and January. These peaks align with periods of increased crop risk, particularly during flowering and early fruit development.

In contrast, *Helicoverpa armigera* and *H. punctigera* were present at much lower levels, although they were detected consistently across the season. This reinforces the value of pheromone traps not only for control, but also for early detection, even when pest pressure appears low.

The strong seasonal fluctuations seen in *S. litura* highlight why regular monitoring is critical. Without traps in place, these rapid increases in moth activity could easily go unnoticed until larval damage is already visible in the crop.

Plots using integrated strategies (Treatments 1 and 2) had the lowest levels of damaged plants. Treatments 1 and 2 also had a much higher proportion of plants in the lowest damage categories. Most damage in these plots was minor and unlikely to affect yield or fruit quality.

By comparison, Treatment 3 and untreated control (standard farm management) had a much higher proportion of damaged plants. Also, Treatment 3 and untreated control had a greater proportion of plants with moderate to severe damage. These higher damage scores represent more extensive leaf loss and feeding on buds and green fruit, which increases the risk of less crop set as well as yield loss.

Plots that combined mass trapping, parasitoid release and flowering plants consistently recorded:

- Lower caterpillar damage scores
- Slower increases in damage during peak pest periods
- Reduced larval numbers compared with single-tool approaches

Damage trends over the season showed that integrated treatments were particularly effective at flattening damage peaks, which is critical during flowering and early fruit development when crops are most vulnerable.

What does this mean for growers?

This work highlights that no single tool is enough to manage caterpillar pests reliably in subtropical raspberries.

However, when pheromone trapping, biological control and habitat support are combined, they can significantly reduce pest pressure and crop damage.

- Pheromone traps are valuable for both monitoring and reducing moth populations
- Timely parasitoid releases can prevent damage before it starts
- Flowering plants can help sustain beneficial insects within tunnels
- Integrated approaches can reduce reliance on insecticides, especially during high-risk periods

Looking ahead

Ongoing research is focused on identifying the key natural enemies associated with selected flowering plant combinations and determining how these biological control agents can be strategically integrated with existing pest management programs.

With increasing pest pressure in subtropical production systems, the adoption of practical and compatible IPM approaches will be essential to sustain crop productivity, minimise disruption to beneficial arthropod communities, and support the long-term sustainability of berry production.

NSW GOVERNMENT Hort Innovation RASPBERRY AND BLACKBERRY FUND

More About This Project

Integrated pest management approaches to address pest challenges in raspberry and blackberry (RB21000)

This project is a 5-year investment focused on strengthening integrated pest management (IPM) systems for Australian raspberry and blackberry growers, with practical outcomes designed to improve profitability and sustainability.

Key actionable outputs include the development of innovative, environmentally sound pest management programs that protect and enhance both naturally occurring and introduced beneficial insects through conservation biological control tailored to modern Rubus production systems. The project also aims to promote cultural practices that reduce pest establishment, giving growers additional non-chemical management tools.

Rubus growers can expect expanded biological control options, supported by improved understanding of natural enemy biodiversity and the conditions that help beneficial species establish and persist. The investment also hopes to deliver evidence-based decision support tools to guide pest and beneficial monitoring, intervention timing, and product selection, helping streamline on-farm decision-making.

Importantly, the program aims to build industry confidence in IPM adoption, ensuring growers have practical knowledge and research-backed strategies suited specifically to Australian Rubus production systems.

Several updates from this project have already been published and you can find these all in the **Berry Industry Resource Library at bit.ly/BA-RL** by searching **'RB21000'**

For more information, please contact the Project Lead:
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