Improving Management of Leafrollers in Rubus and Blueberry

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Leafroller pests are becoming an increasing problem for berry growers along Australia's east coast. While light-brown apple moth (LBAM) has been a long-standing issue, mango flower webworm (MFW) and orange fruit borer (OFB) are now emerging as the most damaging leafrollers in Rubus and blueberry crops.

Larvae of these pests feed on young leaves, shoots, flower buds and developing fruit, reducing plant vigour, fruit set and yield. Damage can also open the door to secondary pests and diseases, further affecting fruit quality and market access. And because leafroller larvae are mostly hidden within rolled leaves, early infestations can be difficult to detect, and monitoring tools for MFW and OFB are currently limited, making it hard to track pest activity and decide on control actions effectively.

Hort Innovation have recently funded the project '*Improving management of leafrollers in Rubus and blueberry* (MT24009) from berry industry levies, with contributions from the Australian government. This project is being delivered by NSW DPIRD and aims to support growers with better knowledge and improved decision-making tools that fit within existing integrated pest management (IPM) programs.

Seeing high leafroller pressure on your farm? Get in touch with project lead Saleh Adnan — the team is keen to visit, sample and help.

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What is the project doing?

This project is undertaking a series of laboratory and field assessments to improve our understanding of when leafrollers occur in berry crops, which plants they use as hosts, how much damage they cause at different crop stages, and how natural enemies may help suppress their populations.

On-farm monitoring

Regular field monitoring is underway at eight commercial berry farms in northern NSW (four Rubus and four blueberry sites). Crops are being checked fortnightly during the production season and monthly during the off-season to track leafroller activity across the year.

At each visit, leafroller larvae are counted and grouped by size to understand population build-up over the season. Larvae are classified into five instars based on body length and head capsule size (See Figure 1). Freshly rolled leaves are also recorded alongside crop growth stage to assess pest pressure and potential crop impact.

Figure 1. Five larval instars of leafrollers, progressing from small, newly hatched larvae (left) to fully grown late-instar larvae (right). Instars are distinguished based on body length and head capsule size. Larval colour varies from translucent yellow to bright green as larvae mature Photo credit: Saleh Adnan, NSW DPIRD

Understanding alternative hosts

Nearby horticultural crops, including macadamia, avocado, nursery plants, citrus, lychee and mango, are also being surveyed where they occur close to berry farms. This work aims to determine whether surrounding vegetation serves as reservoirs for leafroller populations that move into berry crops.

Natural enemies

Surveys for beneficial insects are being conducted at the same time as pest monitoring. Rolled leaves are collected, and larvae are reared under controlled conditions to check if any potential parasitoids emerge from field-collected larval populations. Egg parasitoids are also being assessed using sentinel egg techniques in commercial berry blocks. Also, any sick or dead larvae showing signs of decay are being collected and screened to identify potential entomopathogenic microbes associated with larval death. Together, this work will help inform better-timed monitoring and support more effective, sustainable leafroller management for berry growers.

What does the monitoring show so far?

Leafroller pressure is highest during vegetative growth and early flowering.

Across raspberry and blueberry crops, the number of rolled leaves has been greatest during vegetative flush and bud–bloom stages, then declined steadily as fruit developed and matured. This indicates that early crop growth stages are the most vulnerable to leafroller damage.

Young larvae dominate early in the season, larger larvae later on

Seasonal monitoring shows a higher proportion of early instar (small) larvae in spring, shifting to larger instars through summer and autumn. This pattern highlights the importance of early detection, when larvae are smaller and easier to control.

Crop differences are evident

Blueberries showed comparatively higher numbers of rolled leaves than raspberries during vegetative flush and bud development, suggesting that crops and their growth stage influence leafroller activity.

Figure 2. Field samplings for assessing leafroller population and impact in commercial berry farms in northern NSW
Photo credit: Saleh Adnan, NSW DPIRD

What does this mean for growers?

- Focus monitoring and scouting early in the season, particularly during vegetative flush and pre-flowering
- Early intervention is critical, as small larvae are more responsive to control options
- Improved timing of monitoring tools will help reduce unnecessary sprays and support IPM programs

Laboratory rearing of leafrollers

Following field sampling, adult leafroller moth colonies were established and are being maintained under laboratory conditions at the Wollongbar Research Station in northern New South Wales. Colonies were initiated using wild larvae collected from freshly rolled leaves, with regular introduction of new field-collected material to maintain genetic diversity.

In the laboratory, leafrollers are kept under stable temperature and light conditions and provided with suitable food sources. Adult moths are maintained in cages, allowed to mate naturally, and egg batches are collected for further rearing. These colonies allow the project team to closely study leafroller life history traits and behaviour under consistent conditions.

Pheromone collection

Female moths are used to collect pheromone samples during their peak calling period. Pheromone glands are being carefully extracted and preserved for laboratory analysis. These samples will be analysed using gas chromatography–mass spectrometry (GC–MS) to identify potential pheromone compounds, which will support the development of improved monitoring and management tools for leafrollers in berry crops.

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