

Leafrollers

Tortricid moths are often known as leafrollers as the larvae roll shoots and leaves together with silken web and feed on leaves and bunches, then pupate within this protected rolled shelter (Lo et al 2000; Simpson and Leong 2023).

Leafroller moths, particularly light-brown apple moth (LBAM, *Epiphyas postvittana* Walker), Orange fruit borer and (OFB, *Isotenes miserana* Walker), Mango flower webworm (MFW, *Dudua aprobola* Meyrick) are significant pests of diverse horticultural crops including cherry, grapes, macadamia, avocado, berries, nurseries, citrus, lychee, and mango.

Feeding damage by leafrollers impairs vegetative growth, impacts new flush and flowering, and reduces fruit setting, not only reducing productivity and market value but also rendering the damaged crop vulnerable to infestation by secondary pests and infection by pathogens (Bailey et al 1996).

The Light brown apple moth (LBAM) is an important leafroller pest with an exceptionally wide host range including fruit crops, broadleaf pastures, and weeds both in its native and introduced ranges. While LBAM is native to south-eastern Australia (Danthanarayana 1975), it has invaded and established in Western

Australia, New Zealand, mainland USA, Hawaii, and much of England (Suckling and Brockerhoff, 2010).

Given LBAM is found throughout Australia, pest pressure is greater in cooler areas with mild summers as it does not survive well at high temperatures.

Orange fruit borer (OFB) is another native tortricid leafroller moth that attacks a wider number of fruit trees including orange, avocado, macadamia, lychee, grapes and morus (Mulberry) species. While in Australia it is established in the Northern Territory, Queensland, New South Wales and Victoria, this moth has also invaded New Zealand and South Asia (Hoare & Hudson 2018).

Over recent years, Mango flower webworm (MFW) has caused increased levels of damage in berries (Adnan 2023). Being native to South and Southeast Asia, it invaded many countries including Australia and has been found to infest mango, cashew, guava, lychee, malay apple, ornamentals, and peanut.



Figure 1: Rolled Rubus leaves (L) and rolled blueberry leaves with MFW larvae (R)

Photo credit: Saleh Adnan, NSW DPI

Mango flower webworm Identification

The adult moth has pale brownish forewings with various dark markings. Hindwings are plain brown. On the thorax region, there is a crest of dark scales. Female moths lay cream-coloured eggs in small numbers between veins on the undersides of leaves. Newly hatched larvae roll flower buds and young leaves together to form silken webbed feeding shelters.

Pupation also occurs in the larval feeding shelter. While successive generations may occur throughout the year, unlike LBAM their activity is relatively higher in warmer months (September to March in NSW). Given substantial damage has been evident on blueberry and Rubus due to MFW, overall impact is yet to be estimated.



Figure 2. Life stages of Mango flower webworm eggs (1), larvae (2), pupae (3), and adult (4)

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Leaf rolling caused by the larvae of both MFW and OFB are often mistaken for LBAM, resulting in a failure to detect these pests, to recognise their prevalence and impact, and to mount species-appropriate responses.

How to identify causal leafroller species

Causal leafroller species can be distinguished by their larval appearances (Figure 3). In LBAM, mature caterpillars are pale green with a brown head, whereas mature MFW larvae are translucent yellowish green with black head, and with black first two pairs of legs (Figure 3). Also, fully grown OFB larvae are greyish with a dark brown head capsule and a pair of brown stripes along the body.



Figure 3. Leafroller larvae (1) Light brown apple moth, (2) orange fruit borer, and (3) Mango flower webworm.

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Monitoring and management

While growers have reliable monitoring tools as well as management strategies for light brown apple moths (LBAM), such tools are not established yet to monitor and manage other two leafrollers. Usually, growers rely on intermittent scouting for early detection of rolled leaves as soon as new flushes of leaves and flowers become available.

Unlike LBAM, biological options for managing other leafroller species are limited. Currently synthetic products like Chlorantraniliprole (Coragen®), Emamectin (Proclaim®), Tebufenozide are registered on the APVMA database for use against leafrollers in Australia.

Please check the APVMA PUBCRIS website for up-to-date information about permits and chemical registrations: portal.apvma.gov.au/pubcris

Overall, further research targeted for the development of effective monitoring tools and sustainable management practises (i.e., biological control) are advocated to improve the management strategies for Mango flower webworm and Orange fruit borer in berries.

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