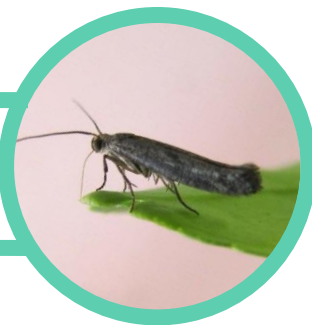


Citrus flower moth



Prays citri (Millière)

Common names: Citrus blossom moth, lemon borer moth, sitrusblommot

Higher taxon: Lepidoptera: Yponomeutidae

Synonyms: *Acrolepia citri* Millière

EPPO code: PRAYCI

The citrus flower moth is a tiny moth which is found throughout many areas of the world and attacks most types of citrus. The larvae are the damaging stage, feeding on flowers, blossoms and buds, and shallowly boring into young fruit. In South Africa, citrus flower moth is most abundant on lemon and can cause gumming and brown necrotic lesions on young and mature fruit. Monitoring of citrus blossoms should be conducted for larvae or damage in the springtime either visually or with a pheromone trap. *Bacillus thuringiensis* has proven to be an effective control.



Citrus flower moth, *Prays citri*, adult.

PR Stephen, CRI

BIOLOGY

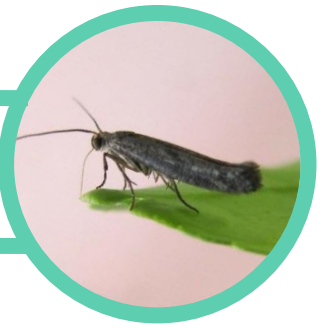
Number of generations per year: unknown in South Africa; 11 in Sicily; 8-10 in Israel; up to 15 in the laboratory

Length of generation: 14-47 days

Threshold for development: ~10° C.

In South Africa, the life cycle of this moth has not been studied in detail. Population levels are low in winter and spring and higher in summer and autumn. Eggs are laid individually on flowers early in the season or on outside of fruitlets later in the season. First instar larvae hatch and immediately bore shallowly into the small fruit or flower.

Citrus flower moth



Prays citri (Millière)

IDENTIFICATION

Egg

Size: ~0.2 mm

Duration: 2-6 days; 4 days at 25° C

Eggs of the citrus flower moth are usually deposited on flower buds. They are slightly oval and white.



PR Stephen, CRI

Citrus flower moth, *Prays citri*, hatched egg.

Larva

Final instar size: 4.2-5.5 mm

Duration: 7 days; 12 days at 25° C

Larvae are light grey, green or brown. They penetrate into citrus buds and feed on the inside of buds.



PR Stephen, CRI

Citrus flower moth, *Prays citri*, larva.

Pupa

Duration: 3-10 days; 6 days at 25° C

Pupae are light green to dark brown and found among damaged flowers, fruits or leaves.

Adult

Size: 3.6-4.5 mm

Duration: 2-18 days; <5 days at 26° C

Number of eggs laid by single female: 39-334 eggs

Adults are small and slender with thread-like antennae. The forewings are greyish-brown and spotted with irregular spots. Hind wings very narrow, are light grey with no spots. Both wings heavily fringed.



<https://alchetron.com/Prays-citri-4064296-W>

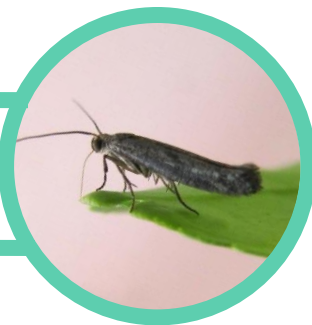
Citrus flower moth, *Prays citri*, adult.



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Citrus flower moth, *Prays citri*, pupae.

Citrus flower moth



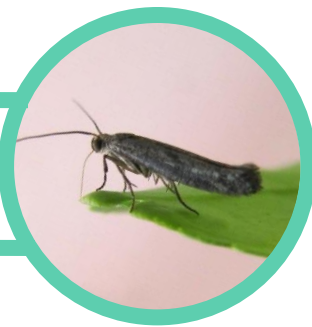
Prays citri (Millière)

HOST PLANTS

In South Africa citrus flower moth attacks mostly flowers of lemon and lime. However, several more potential hosts are known from South Africa and the world, mostly citrus plants, but also other plants as well.

Common name	Scientific name	Family
Lime	<i>Citrus aurantiifolia</i>	Rutaceae
Lemon	<i>Citrus limon</i>	Rutaceae
Sour orange	<i>Citrus aurantium</i>	Rutaceae
Mandarin	<i>Citrus reticulata</i>	Rutaceae
Navel orange	<i>Citrus sinensis</i>	Rutaceae
Grapefruit	<i>Citrus x paradisi</i>	Rutaceae
White sapote	<i>Casimiroa edulis</i>	Rutaceae
Broad-leafed privet	<i>Ligustrum lucidum</i>	Oleaceae
Sapodilla	<i>Manilkara zapota</i>	Sapotaceae

Citrus flower moth



Prays citri (Millière)

ECONOMIC IMPORTANCE

In South Africa, the citrus flower moth is of minor importance although its importance has been growing in recent years, especially on lemon. The increasing importance of the citrus flower moth in South Africa may be due to pesticide programmes, declines in natural enemies, or size shifts in first generation moths. Previously, damage to lemons was thought to be caused by lemon borer moth, *Cryptoblabes gnidiella*, but in 2014 it was found that most (if not all) damage was actually caused by citrus flower moth.

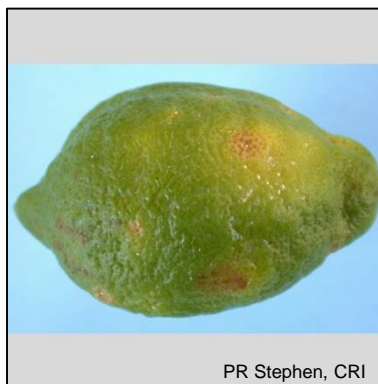
The larvae are the most damaging stage, as they eat into the flower parts or web them together. Mature larvae can consume entire blossoms and pea-sized fruitlets. The first generation of the season lays its eggs on the blossoms and larvae bore into the blossoms. The second generation lays its eggs on the young fruits. The larvae bore into the fruit and die. These penetration marks, while quite small at first, cause gumming of the fruit and, when the fruit matures, appear as brown necrotic lesions. Although the citrus flower moth larvae cannot survive on lemon fruit, the damage they cause by boring is still enough to damage the lemons and occasionally lead to their downgrading.

The most damage is caused to blossoms and young fruit in the spring and mid-summer. Damage may appear similar to leafhopper damage, but the egg shell is normally visible in the center of the scarring. Severe infestation can cause fruit drop and crop reduction, often causing damage to fruit until it reaches golf-ball size.

In the Mediterranean region, citrus flower moth is an important pest, especially on lemon where it can result in up to 90% loss in flower production in Spain and 15-70% flower reduction in Portugal. In Egypt it is also an important pest on lime.



Citrus flower moth, *Prays citri*, larvae and webbing on fruitlets.



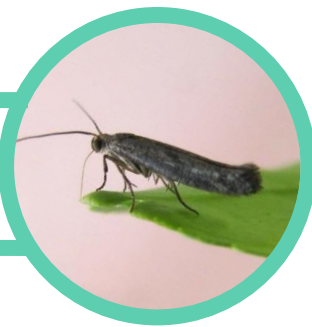
Citrus flower moth, *Prays citri*, brown necrotic lesions.



Citrus flower moth, *Prays citri*, damage.



Citrus flower moth



Prays citri (Millière)

MANAGEMENT

Monitoring

Citrus blossoms should be inspected for larvae or damage in the springtime. Pheromone traps for monitoring are of questionable use with some studies saying they are effective and others saying they are not effective. In South Africa, no clear relationship could be found between citrus flower moth trap catches, blossom infestation and fruit damage.

Prevention

Orchards experiencing water stress seem to have much higher infestation levels in Sicily than non-water stressed orchards.

Control measures

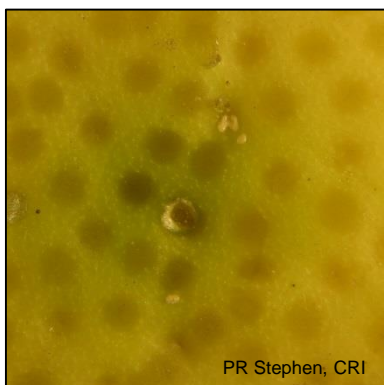
No plant protection products are registered for the control of this pest in South Africa. In the past, few controls were needed since population levels were naturally low. Citrus flower moth is easily controlled with organophosphates, carbamate or pyrethroids applied for the control of other pests. However, resistance development to organophosphates has been shown in Israel.

Once eggs are laid on fruit, control is difficult. Triflumuron has been successful as a control measure in some cases. Controls should be applied against the first generation of larvae which attack the blossoms in order to prevent the second generation which could attack the small fruits.



PR Stephen, CRI

Citrus flower moth, *Prays citri*,
dead larva in albedo.



PR Stephen, CRI

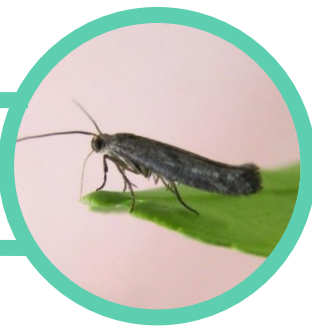
Citrus flower moth, *Prays citri*,
egg and penetration damage.



PR Stephen, CRI

Citrus flower moth, *Prays citri*,
damage – brown necrotic
lesions and “gumming”.

Citrus flower moth



Prays citri (Millière)

MANAGEMENT

Natural enemies (biological control)

Bacillus thuringiensis is used in Europe to control this pest and trial work in South Africa has shown it to be effective here, as well. In Egypt, application of a commercially available *Bacillus thuringiensis* reduced larval infestation by about 60-75%.

Several species of parasitoid have been found which attack citrus flower moth larvae in South Africa. The most important of these is an unidentified wasp from genus *Chelonus* (Braconidae). This parasitoid is present in high numbers even when the moth host is present at low levels only.

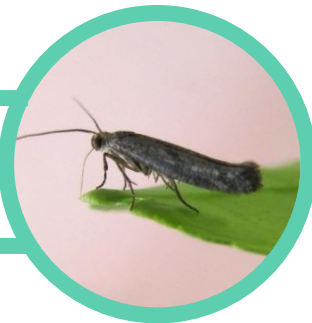
In Israel, an egg parasitoid, *Trichogramma evanescens*, is very effective. In other regions of the world, known natural enemies include wasps, tachinid flies and ants (Philippines and Israel), as well as egg predators including bugs (*Orius niger*) and thrips (*Aeolothrips tenuicornis*).

Attractants and trapping (pheromonal control)

A synthetic female sex pheromone (Z) -7- tetracdecenal was developed in 1977 in Israel and is known to be highly attractive to male moths of *P. citri* with relatively high specificity (although a few males of closely related *P. oleae* were also attracted). It is commercially available and can be used in either a bucket trap or a delta trap.

No threshold for intervention has been determined yet in South Africa. It is unclear whether high trap catches correlate with high levels of infestation of blossoms. This relationship is heavily influenced by locality, climatic and cultural factors. Mass trapping and mating disruption have not proved to be very promising as control measures. However, research in Israel has shown that placement of 120 traps/hectare was more efficient and cost effective than 3-6 organophosphate applications.

Citrus flower moth



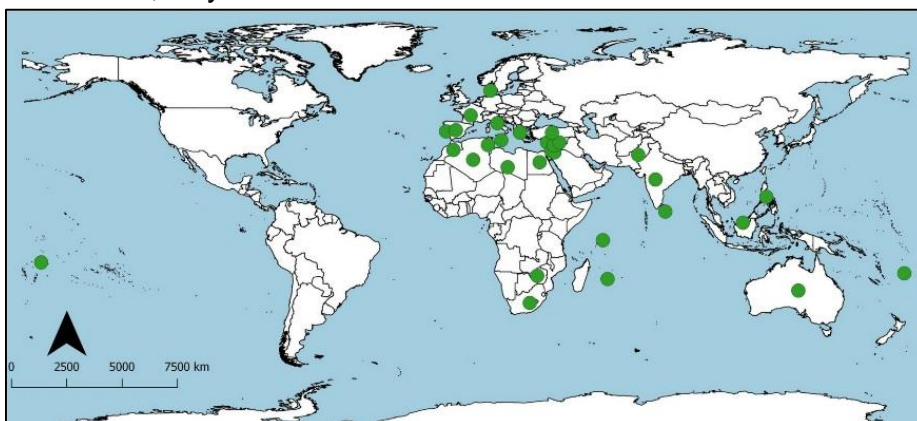
Prays citri (Millière)

QUARANTINE REGULATIONS

Citrus flower moth is not considered to be a quarantine pest by EPPO.

DISTRIBUTION

Citrus flower moth has been known in South Africa since 1915 from KwaZulu-Natal and Pretoria, but is now present everywhere in South Africa where citrus is cultivated, particularly in the Eastern Cape. It also occurs throughout Europe, the Mediterranean region, south east Asia, the Philippines, Oceania and Australia. In Africa, it is known to occur in North Africa, southern Africa and the Indian Ocean islands of Réunion, Seychelles and Mauritius.



Citrus flower moth, *Prays citri*, distribution. Data from CABI (2017). Map drawn by C.S. Bazelet.

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