

Cryptolaemus

Mealybug predator

Biocontrol organism

Cryptolaemus montrouzieri

The cryptolaemus beetle is a type of ladybird. It is a very efficient natural enemy of mealybugs, with both the larvae and the adult beetle preying on these pests. Cryptolaemus is native to Australia and has been exported to many countries around the world to improve biological control of mealybugs.

The adult beetle is about 4 mm long, oval in shape with an orange head and black wing covers. Cryptolaemus larvae grow to 13 mm long



Plate 4: Cryptolaemus larva and adult beetle feeding on mealybug egg mass

and are covered in white waxy filaments, making them very similar in appearance to mealybugs. Older larvae, however, are larger than mealybugs, and with experience the two can readily be differentiated.

Adult females lay up to ten eggs per day directly into the egg masses of the mealybugs. They are able to lay up to 500 eggs in total, depending on their diet. Adult beetles and newly hatched larvae feed on mealybug eggs and young nymphs. Larger larvae will also consume adult mealybugs.

Larvae move to protected areas such as the undersides of leaves and crevices to pupate, and subsequently emerge as adult beetles. The entire life cycle takes 4–7 weeks, depending on temperature.

Cryptolaemus has a wide-ranging diet, and will consume some soft scales (e.g. pulvinaria scales and soft brown scale) as well as its preferred food, mealybugs.

Target pests

- ☞ Mealybugs (various species)
- ☞ Pulvinaria scales
- ☞ Soft scales (at crawler stage)

Mealybugs are serious pests in orchards and vineyards, as well as on many indoor and glasshouse plants. They thrive in protected areas between clustering fruit, in the growing tips of

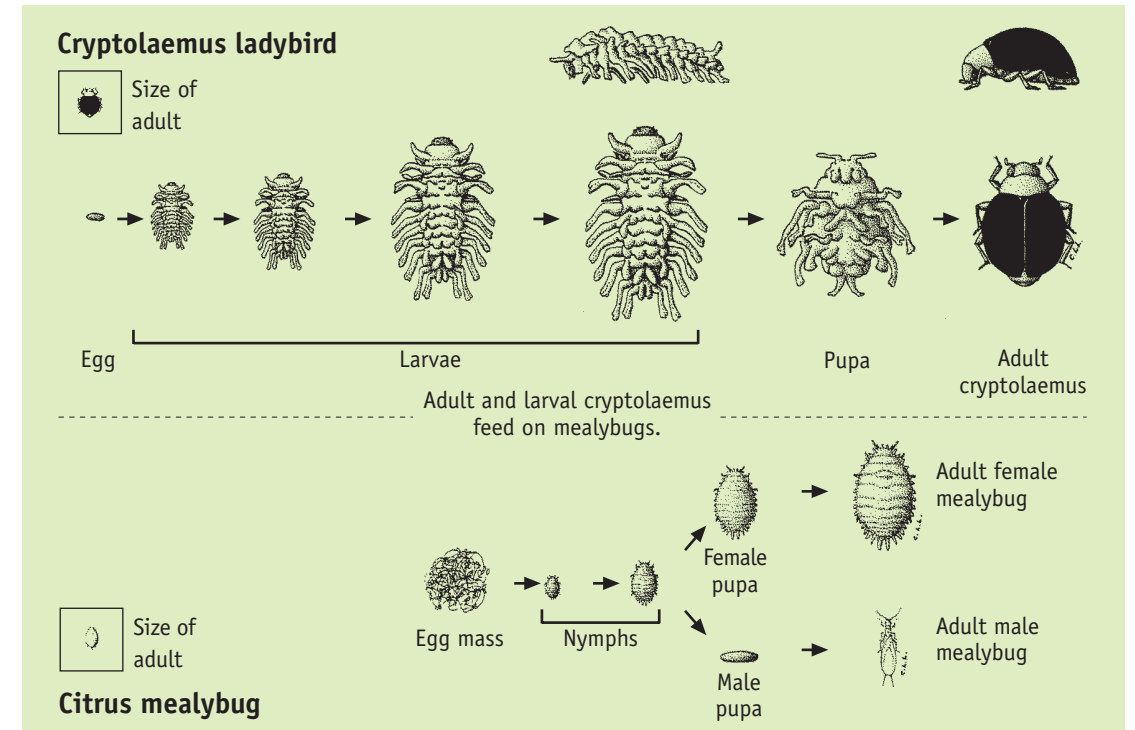


Figure 1: Life cycles of the cryptolaemus ladybird and citrus mealybug

many ornamental plants and in flower buds. Mealybugs feed by sucking sap.

All mealybugs make large quantities of honeydew, on which sooty moulds grow. They take about 4 weeks to reach maturity in summer, producing up to 500 eggs in a white, woolly egg mass.

Mealybugs are difficult to control with pesticides. This is largely due to their waxy coverings, their habit of infesting sheltered plant parts, and the consequent difficulty in achieving effective spray coverage. Mealybugs also readily develop resistance to pesticides.

Suitable crops/environments

Cryptolaemus can be used to control mealybugs in a range of crops and environments. Like many other predatory beetles, cryptolaemus is

most efficient when the host is plentiful. If the citrus mealybug (*Planococcus citri*) is present, cryptolaemus should be used with the wasp parasite leptomastix, where this is available.

Both adult beetles and their larvae prey on mealybugs. They survive at temperatures of 16–33°C but do best at temperatures around 28°C. Adult beetles are most active in sunny weather.

Because cryptolaemus disperses readily, it works best if the mealybug population is large or if the beetles can be contained near the infested crop. Cryptolaemus performs well in glasshouse, nursery and indoor situations.

Before release

In indoor or nursery environments, cryptolaemus is best released whenever mealybugs are present. Best results are obtained when a full



Plate 5: *Cryptolaemus* adult and larva feeding on citrus mealybugs. The younger larvae can easily be confused with the mealybugs on which they feed. Older larvae, however (as shown), are larger than mealybugs.



Plate 6: *Cryptolaemus* adult beetles feeding on eggs of pulvinaria scale



Plate 7: Citrus mealybug adult

release is made early in the season, followed by smaller 'top-up' releases at intervals of 3–6 weeks. This is known as the 'dribble release' technique. In orchard environments, *cryptolaemus* should be released when active mealybugs are present.

Like other beneficial insects, *cryptolaemus* should be protected from extremes of heat and low humidity. Avoid using insecticides for at least 2 weeks before release.

At release

Cryptolaemus is supplied either in punnets of 40 beetles or in tubs of 500 beetles. The container should be opened and the beetles dislodged by lightly tapping the container onto plant foliage near mealybug infestations.

Recommended release rates

Orchards: Minimum 1000 beetles per hectare (25 punnets or 2 tubs per hectare)

Enclosed situations: Minimum 1–2 beetles per square metre (one punnet per 20–40 m²)

Higher rates of release may be required where there is a history of mealybug problems. Regular 'dribble releases' of *cryptolaemus* in conjunction with the wasp parasite *leptomastix* are encouraged in nurseries and glasshouses to keep mealybugs at low levels.

After release

After release, beetles rapidly disperse throughout the treated area, laying eggs into the mealybug egg masses. It may then be 2–3 weeks before *cryptolaemus* larvae can be seen feeding on the pest. The adult beetles may not be obvious after release.

Regular monitoring by an experienced scout is recommended after release, to check that *cryptolaemus* is established. Because the younger

larvae of *cryptolaemus* look similar to those of mealybugs, care should be taken not to confuse the two. Significant control is possible within one generation of *cryptolaemus* (about 4 weeks). However, large pest populations may take longer to control and may require 'booster' releases.

Cultural practices to aid *cryptolaemus* establishment

Adult ladybirds are strong fliers and will establish best if populations of mealybugs are large or a special effort is made to keep beetles close to the infestation.

Enclosed situations

In enclosed situations, a useful technique is to confine some beetles to one or two heavily infested plants with mosquito netting (or similar material) for a few days while they are laying their eggs. Avoid releasing the beetles where bright lights may attract them away from the release area. In shopping centres and similar situations, it is best to release *cryptolaemus* beetles after hours.

Orchard and outdoor situations

For infested trees, the use of branch netting cages in key locations may help improve establishment. Small shrubs may be covered with a cloth cage as for plants in enclosed situations.

Chemical use

Pesticide residues may slow or prevent the establishment of *cryptolaemus*. Copper and nutritional sprays will usually not harm *cryptolaemus*, and some miticides are also quite safe. Organophosphate, carbamate and synthetic pyrethroid insecticides are very toxic and should be avoided where possible. If these sprays are applied, a minimum of 4 weeks should elapse before *cryptolaemus* is released.



Plate 8: Mealybug-infested fruit with sooty mould

Prevent drift of pesticides from neighbouring areas. Some insect growth regulators (IGRs) are also harmful to predatory beetles.

Additional information

Cryptolaemus are dispatched by overnight courier where possible, and should be received within 1–2 days. Honey is smeared under the lids of the punnets as food for the beetles.

On their arrival, *cryptolaemus* should be released as soon as possible. In the event of adverse weather such as extreme heat or high rainfall, the beetles may be stored for 1–2 days in a cool, dark room at about 17°C. Extra honey should be placed under the lids for additional nourishment.

Other natural enemies of mealybug

The parasitic wasp *Leptomastix dactylopii*
 The parasitic wasp *Leptomastidea abnormis*
 Lacewing *Mallada signata*