

Targeting Mealybug with *Eco-Bb*[®]



**Andermatt
Madumbi**

Healthy Food and
Healthy Environment,
for all

Mealybug and bio crop protection using Andermatt Madumbi's *Eco-Bb*[®]

The recent approval and registration of *Eco-Bb*[®], for the control of mealybug on pome fruit (apples, pears), citrus and grapes has attracted much interest and attention from growers.



Mealybugs are one of the most important pests of citrus and vines in South Africa but is also of economic importance in many other crops such as apples, pears, mangos, macadamia nuts, sweet peppers, blueberries and other vegetables and ornamentals.

Mealybugs can cause significant loss of revenue in the agricultural sector, especially in the citrus and grape industries. The loss is further compounded in the grape industry as mealybugs are responsible for the spread of viruses. Also, in many of our export markets mealybug is a phytosanitary pest and may not be present on fruit that is exported. Farmers struggle to control these pests.

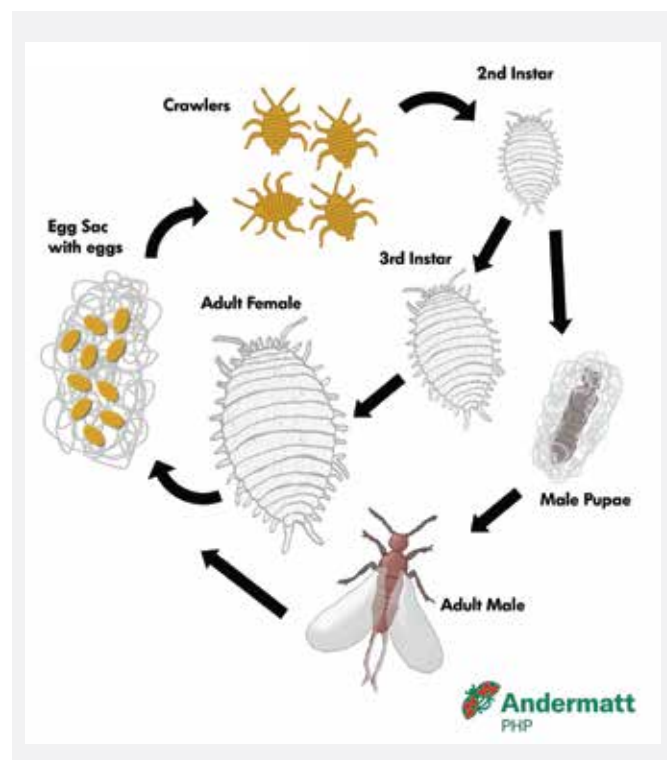
Mealybugs are important economic pests on a wide range of cultivated and ornamental crops in agriculture and horticulture. The most important species occurring on citrus are citrus mealybug (*Planococcus citri* Risso) (Hemiptera: Pseudococcidae), oleander mealybug (*Paracoccus burnerae* (Brain)) and long-tailed mealybug (*Pseudococcus longispinus* (Targioni Tozzetti)) while the most important species occurring on grapevines is the vine mealybug (*Planococcus ficus* (Signoret)) although citrus mealybugs can also occur on grapevines.

Reference: Mealybug control in citrus orchards and vineyards: an Integrated Pest Management approach

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Mealybugs damage crops in a variety of ways including the retardance of plant growth, fruit malformations, cosmetic damage and fruit drop. Mealybug also secrete honeydew, a substrate for a group of fungi commonly known as sooty mould. Sooty mould attracts ants and together these visual factors are often an indication of pest infestation.

The Mealybug Life Cycle



Using *Eco-Bb*® to target mealybug

Which life stages are most susceptible?

Laboratory bioassays conducted at Andermatt PHP have shown the following:

- Crawlers are highly susceptible to *Eco-Bb*® (Fig. 2.1) and death occurs within 3 days under favorable conditions.
- Mealybug feeding may decrease after inoculation with *Eco-Bb*®, but this has not been tested.
- It is possible that newly moulted instars (i.e. without the waxy layer) are also susceptible to *Eco-Bb*® infection, but this is still to be confirmed with further bioassays.
- Adult females have zero to low susceptibility, this is most-likely due to their waxy cuticle.
- Mealybugs co-exist with several other microorganisms, and sooty moulds, such as *Penicillium* (Fig. 2.2), can colonise the crawler cadavers following *Eco-Bb*® applications.



Figure 2.1: Mealybug crawler cadaver showing mycosis (fungal growth) of *Eco-Bb*®; not visible to the naked eye.

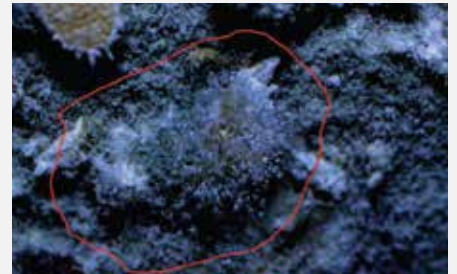


Figure 2.2: Mealybug cadaver colonised by *Penicillium* sp.

Life cycle and behaviour, in photo's



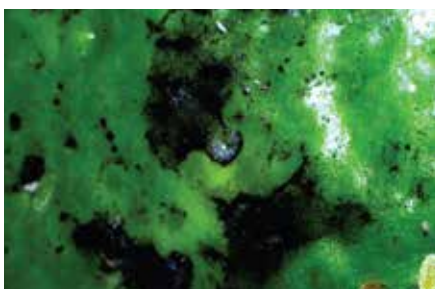
Adult female mealybug with cottony-like ovisac and glossy yellow eggs



First instars (crawlers) and second instar in the process of shedding



Adult female mealybug secreting a drop of honeydew from anal opening



Sooty mould on mealybug-infested citrus



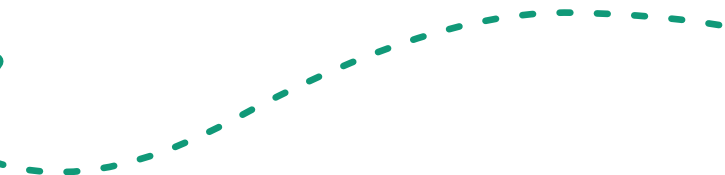
Mealybug nymph shedding its waxy cuticle



Adult male mealybug mating with wingless female



Mealybug colony with different life stages existing together



How to optimise the use of *Eco-Bb*[®] against mealybug

Start applications at first signs of mealybug infestation

It's vital that the first application be made while pest pressure is low (as soon as the infestation is first noticed), or preventatively. This will target the crawlers from the initial population, and prevent these individuals reaching later instars and adults, which are less susceptible to infection.

Multiple applications are required to achieve sustained efficacy

Eco-Bb[®] does not kill the adult female stage and therefore females continue to produce eggs for their full lifespan (up to 29 days). Multiple applications are required to target new crawlers that are continuously hatching and entering the population.

Spray coverage is essential

Mealybugs are sucking insects that use a long, thin, threadlike mouthpart (stylet) to suck sap out of the plant. For this reason, they will not ingest *Eco-Bb*[®] spores, thus, making direct contact with the mealybug is vital to achieving good efficacy. Spray equipment used must provide good coverage and a compatible wetter/spreader can be used to help reach the hiding places of the crawlers, such as in crevices and underneath adults within the mealybug colony.

Eco-Bb[®] contains a living fungus and must be treated with care

In order to maximise the efficacy of *Eco-Bb*[®], it must be handled and applied correctly:

- Maintain the viability of the product by storing it in the fridge and transporting it in cool conditions. If the product reaches temperatures above 35 °C, the viability of the product could be immediately compromised.
- The product must not be mixed with incompatible fungicides, and equipment that is used to spray incompatible fungicides must be thoroughly cleaned before using it to spray *Eco-Bb*[®].
- Ideally, *Eco-Bb*[®] should be sprayed in the late afternoon or evening as UV can cause the spores to become nonviable.
- The powder or mixture must not be left standing in the sun.
- Do not apply the product when temperatures are below 15 °C or above 35 °C.

Effective scouting

Local scouting guidelines should be followed in order to detect early infestations. *Eco-Bb*[®] applications should start as early as possible in order to prevent an increase and spread of the mealybug population (mainly via crawlers).



Mealybug infestation on a citrus crop



Spraying apple orchards in the Western Cape



Andermatt Madumbi Team, working at an apple orchard in the Western Cape



What to expect when using *Eco-Bb*[®] in the field

Eco-Bb[®] will prevent an increase in the initial mealybug population size

The adult stage female has low to zero susceptibility to *Eco-Bb*[®] and therefore the severity of the initial mealybug infestation will only decrease once the adults reach the end of their natural lifespan, are killed by natural predators/parasitoids or other interventions. Due to their waxy coating, the later instars are also less susceptible to *Eco-Bb*[®] than the crawlers. Therefore, you will probably not notice a decrease in the size of existing mealybug colonies. In fact, to the naked eye, the colonies may appear as though they are increasing, as the individual mealybugs (not colonies) grow in physical size over time.

Eco-Bb[®] will kill the crawlers and therefore help prevent the establishment of new mealybug colonies.

Observing mycosing mealybug in the field is very difficult

Mycosis refers to the outgrowth of *Eco-Bb*[®] from the insect's body and the formation of spores on the outside of the insect cadaver. In the case of mealybug, to observe this in the field is almost impossible.

Instead of looking for mycosing insects as an indication that *Eco-Bb*[®] is working, rather observe whether areas of the plant that were not infested at the time of application have new colonies established. As *Eco-Bb*[®] is most effective against the crawlers, it should prevent the active crawlers from moving into non-infested areas and establishing new colonies.

One application is not enough!

As already mentioned, multiple applications will increase the efficacy provided by the product. Under low pest pressure, a maximum interval of 14 days should be used and under higher pest pressure a shorter interval (7 – 10 days) is recommended. Using the lower application rate (600 g/ha) with more applications will be more effective than using the high rate (1 kg/ha) with fewer applications. If only one or two applications are possible, then the high rate should be used.



For more information please visit www.ndermatt.co.za or contact your regional Biospecialist today.



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