

# The false codling moth, *Cryptophlebia leucotreta* (Meyrick) (Lepidoptera: Tortricidae) on avocado- a literature review

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## ABSTRACT

The false codling moth, *Cryptophlebia leucotreta* (Meyrick) (Lepidoptera: Tortricidae) has been known as a serious citrus pest for many years. *C. leucotreta* appears in all major avocado production areas and has a wide range of host plants. Eggs of *C. leucotreta* are laid on the fruit of the avocado. Larvae that develop from these may gnaw through the skin but are unable to develop. Lesions are caused which reduce the marketability of the fruit. Of the moth pests that damage avocado fruits, *C. leucotreta* was found to be the most important. A survey conducted in the Nelspruit/Hazyview region indicated that the cultivars Edranol, Hass and Pinkerton were the most susceptible to attack by *C. leucotreta*. The broad ranges of host plants, together with the mild tropical and subtropical winters, ensure that the pest is an all-year-round threat to crops in most areas. No insecticide is registered for the control of *C. leucotreta* on avocado. If Hass fruit is going to be exported to the USA in the future, *C. leucotreta* would be one of the pests of major concern to the United States Department of Agriculture. It is therefore essential to establish the host status of avocado for *C. leucotreta*.

## OPSOMMING

Die valskodlingmot, *Cryptophlebia leucotreta* (Meyrick) (Lepidoptera: Tortricidae) is vir baie jare as 'n ernstige sitrusplaag bekend. *C. leucotreta* kom in al die belangrike avokado produksiegebiede voor en het 'n wye reeks van gasheerplante. Eiers van *C. leucotreta* word op avokadovrugte gelê. Larwes dring die vrug binne maar ontwikkel nie verder nie. Letsels wat veroorsaak word, verlaag die afsetbaarheid van vrugte. Van al die mot plae wat op avokadovrugte voorkom, is *C. leucotreta* die belangrikste. 'n Ondersoek wat in die Nelspruit/Hazyview gebied gedoen is, het getoon dat die kultivars Edranol, Hass en Pinkerton die vatbaarste vir aanvalle van *C. leucotreta* is. Die wye reeks van gasheerplante tesame met die gematigde tropiese en subtropiese winters veroorsaak dat die plaag regdeur die jaar 'n bedreiging vir gewasse in meeste gebiede is. Geen insekdoders vir beheer van *C. leucotreta* op avokado is geregistreer nie. Indien Hass vrugte na die VSA uitgevoer sou word, is *C. leucotreta* een van die plae waarvoor die Verenigde State se Departement van

**Landbou begaan sou wees. Daarom is dit belangrik om die gasheerstatus van avokado vir *C. leucotreta* te bepaal.**

## **INTRODUCTION**

The false codling moth, *Cryptophlebia leucotreta* (Meyrick) (Lepidoptera:Tortricidae) has been known as a pest of citrus since the beginning of the century. The moth was first described as a pest of citrus in Natal (Fuller, 1901).

## **DISTRIBUTION**

*C. leucotreta* occurs throughout Africa south of the Sahara and nearby islands in the Atlantic and Indian Oceans. *C. leucotreta* is an important pest in all major citrus and avocado areas in the Republic of South Africa (Newton, 1998).

## **HOST PLANTS**

*C. leucotreta* has a very wide range of host plants. Schwartz (1981) reviewed some 21 cultivated and 14 indigenous host plants in Southern Africa. In cultivated crops it is particularly severe on citrus, but also attacks many other deciduous, subtropical and tropical fruits, including the fruit of the avocado.

## **ECONOMIC IMPORTANCE**

Eggs are laid on the fruit of avocado. Larvae that develop from these may gnaw through the skin but are unable to develop further (Schwartz, 1978). Lesions are caused which reduce the marketability of the fruit. Lesions caused by fruit flies and *C. leucotreta* are often confused. During the first few weeks of fruit damage, the fruit fly and *C. leucotreta* lesions are very similar in that they both display a small hole which is covered by fruit sap, which later dries and becomes a white powder (Du Toit *et al.*, 1979). Fruit damage by the fruit fly's ovipositor develops into a typical star shaped lesion in contrast with the raised crater with an inconspicuous hole in the middle where the larva of *C. leucotreta* has entered (Du Toit *et al.*, 1979). Granular excreta can also be seen in the case of *C. leucotreta*.

Of the moth pests that damage avocado fruits, *C. leucotreta* was found to be the most important (Erichsen & Schoeman, 1992). A survey conducted in the seventies indicated that *C. leucotreta* was responsible for a cull of 1.22% at one grower (Schwartz, 1978). The cultivar Edranol was more damaged than Fuerte. A survey conducted in the Nelspruit/Hazyview region during 1991 found that *C. leucotreta* was responsible for damage to 1.32% of fruit (Erichsen & Schoeman, 1992). The cultivars Edranol, Hass and Pinkerton were the most susceptible to attack by *C. leucotreta*. During April 1993 extensive *C. leucotreta* damage was reported on Pinkerton avocado in the Brondal area (Joubert & Du Toit, 1993). The avocado trees were approximately 3 years old and interplanted with maize. A cypermethrin spray programme was used to control maize stalk borer and as a result natural enemies were probably destroyed on the avocado trees. Up to 50 eggs were counted on a single fruit, while the overall damage was estimated at approximately 80%.

If Hass fruit is going to be exported to the USA in the future, *C. leucotreta* would be one of the pests of major concern to the United States Department of Agriculture. It is

therefore essential to establish the host status of avocado for *C. leucotreta*. If it cannot be proven that Hass avocado is a non-host for *C. leucotreta* under any circumstance, a disinfestation treatment has to be developed.

## **BIOLOGY**

*C. leucotreta* adults are nocturnal and live for two to three weeks during which time the female mates several times (Schwartz, 1981). The eggs are oviposited on the fruit. Cannibalism by the larvae ensures that most often only one larva develops on a fruit (Catling & Aschenborn, 1978). Entrance holes on the fruit can be spotted by the white exudate and frass which is often apparent. The larva does not complete its development in the avocado but in other fruit it exits the fruit upon pupation. The larva drops to the ground and pupates in a cocoon of fine soil particles on the soil surface or beneath leaf litter.

## **SEASONAL HISTORY**

The broad ranges of host plants, together with the mild tropical and subtropical winters, ensure that the pest is an all-year-round threat to crop hosts in most areas (Newton, 1998). The insect will breed throughout the year in groves with a continuous supply of fruit. Populations increase towards late summer and then gradually decline with the onset of low winter temperatures.

## **NATURAL ENEMIES**

Many natural enemies of *C. leucotreta* have been recorded and a review is given by Newton (1998). Trichogrammatoidea egg parasitoids appear to have the most significant impact. How many of these parasitoids are present or effective against *C. leucotreta* in avocado orchards has not been determined.

## **CHEMICAL CONTROL**

No insecticide is registered for the control of *C. leucotreta* on avocado (Krause *et al.*, 1996)

## **POST-HARVEST CONTROL**

Preliminary research on the use of low temperatures for controlling *C. leucotreta* in shipments of citrus fruit was carried out by Cottier (1952). An experimental shipment of infested fruit was made to New Zealand, a journey of 21 days at 31°F (-0.55°C). This work was continued by Myburgh (1965) who discovered a progressive increase in resistance to low temperatures from egg to pupal stage. Preliminary experiments showed that all stages could not be sterilized by low temperatures in transit only. At 40°F (4.4°C) a considerable proportion of larvae survived for as long as 28 days thereafter. Storage at 34°F (1°C) and 31°F (-0.55°C) indicated possibilities as sterilization treatments. Pre-shipment low temperatures complemented the in transit cold storage effectively. If avocado is proven to be a host of *C. leucotreta*, a possible technique for disinfestation will be heat-conditioning followed by cold storage.

## **ORCHARD SANITATION**

The orchard sanitation measures suggested by Fuller (1901) have remained the single most important recommendation for suppressing the pest in citrus orchards.

## FURTHER RESEARCH

The presence of *C. leucotreta* has resulted in embargos being placed on South African avocado by quarantine authorities in certain countries, thus closing potentially valuable markets. Further research must firstly establish the host status of avocado for *C. leucotreta*. This will have to be aimed specifically at Hass avocados. Artificial infestation trails will have to be carried out. If it cannot be proven that Hass avocados are a non-host for *C. leucotreta* under any circumstances, a post-harvest disinfestations treatment must be developed. Any additional information on the seasonal abundance and biology of *C. leucotreta* on avocado will contribute towards the present knowledge and will lead to a better understanding and managing of this pest.

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