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Host status of Hass avocado fruit for the false codling moth, *Cryptophlebia leucotreta* (Meyrick) (Lepidoptera: Tortricidae)

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ABSTRACT

The false codling moth, *Cryptophlebia leucotreta* (Meyrick) (Lepidoptera: Tortricidae) is a known pest of avocados in South Africa. In this study, the host status of Hass avocado for *C. leucotreta* was established. Hass fruit on trees were artificially infested with eggs of *C. leucotreta* at four different dates. Penetration marks, live or dead larvae and the developmental stage of the larvae were recorded. Penetration of *C. leucotreta* larvae in Hass fruit was superficial and larvae were mostly found in the area just below the skin. No development further than the first instar was recorded.

OPSOMMING

Die valskodlingmot, *Cryptophlebia leucotreta* (Meyrick) (Lepidoptera: Tortricidae) is 'n bekende plaag op avokado in Suid-Afrika. In hierdie studie is die gasheerstatus van Hass avokados vir C. Ieucofrefa bepaal. Hass vrugte aan die boom is kunsmatig met eiers van *C. leucotreta* op vier verskillende datums besmet. Penetrasie merke, lewende en dooie larwes en die ontwikkeling-stadium van die larwes is aangeteken. Indringing van die larwes was baie oppervlakkig en larwes het meestal onder die skil voorgekom. Geen ontwikkeling verder as eerste instar is waargeneem nie.

INTRODUCTION

The false codling moth, *Cryptophlebia leucotreta* (Meyrick) (Lepidoptera: Tortricidae) was first observed as a pest in 1901 (Fuller 1901) and has since been studied by several authors, whose results have been reviewed by Newton (1998). *C. leucotreta* has a very wide host range and Schwartz (1981) reviewed some 21 cultivated and 14 indigenous host plants in Southern Africa. In cultivated crops it is particularly severe on citrus, but it also attacks many other deciduous, subtropical and tropical fruit which includes the avocado. *C. leucotreta* is widespread in South Africa and occurs in all avocado production areas.

Eggs are laid superficially on the fruit of avocado. Larvae that develop from these eggs may enter through the skin but are unable to develop in avocado fruit (Schwartz, 1978). Lesions are caused which reduce the marketability of the fruit. The damage caused by *C. leucotreta* develops into a raised crater on the fruit surface with an inconspicuous

hole in the centre where the larva has entered (Du Toit *et al.* 1979). Granular excreta can also been seen. Of the Lepidoptera pests that damage avocado fruits, *C. leucotreta* was found to be the most important (Erichsen & Schoeman, 1992). A survey conducted in the Nelspruit/Hazyview region during 1991 indicated that *C. leucotreta* was responsible for damage of 1.32% to fruit (Erichsen & Schoeman, 1992). The cultivars Edranol, Hass and Pinkerton were the most susceptible to attack by *C. leucotreta.*

The South African avocado industry is interested in gaining access to USA markets with Hass fruit. However, *C. leucotreta* is one of the main pests of major concern to the United States Department of Agriculture. Therefore, it is essential to establish the host status of avocado for *C. leucotreta*. In this study Hass fruit on trees were artificially infested with eggs and the development of the larvae was monitored.

MATERIALS AND METHODS

Citrus and carambola (*Averrhoa carambola* L.) fruit infested with false codling moth larvae were collected at the Institute for Tropical and Subtropical Crops, Nelspruit. Fruit were placed on plastic trays with perforated bottoms suspended above sand. Pupae were collected from the sand. The moths that emerged, were placed on wax paper and covered with a kitchen gauze sieve to lay eggs. The eggs are cream coloured, flat oval discs with a granulated surface. Within a few days, the eggs turn orange and shortly before hatching turn black as the head capsule forms.

When eggs are kept at constant temperatures of 15°C, 20°C and 25°C, the average duration of the egg stage decreases from 19.5 to 9.8 days and 5.1 days respectively (Daiber, 1997a).

The paper with the eggs was cut into small pieces containing one to five eggs. Each paper cutting was attached to a Hass fruit on the tree with a small piece of 'Prestik'. Eggs were placed on green fruit on four occasions i. e. 24 May 1999, 1 June 1999, 3 and 18 August 1999, thus covering the normal Hass harvest season. The number of fruit infested were 17, 20, 11 and 26 respectively. Each fruit was covered with a gauze bag to avoid parasitoids and ants destroying the eggs. Two weeks after the infestation, a quarter of the fruit was removed and investigated. Similarly, fruit were removed 3, 4 and 6 weeks after infestation. Penetration marks, live or dead larvae and the developmental stage of the larvae were recorded. The latter was determined by measuring the head capsule (Daiber, 1979b). *C. leucotreta* passes through five larval instars. At constant temperatures of 15°C, 20°C and 25°C the average duration of the larval stage is 46.6, 18.8 and 11.6 days respectively (Daiber, 1979b). Food quality also influences the survival of larvae and the duration of the larval stage (Daiber, 1997b).

RESULTS AND DISCUSSION

Results are presented in Table 1.

Table 1 ***Survival of false codling moth in Hass following artificial infestation with eggs***

Removed after	Total number of infested fruit	Total number of eggs	Penetration marks	Live larvae	Dead larvae	Penetration depth
Date infested: 24/05/99						
2 weeks	4	7	2	0	2	2-3 mm
3 weeks	4	4	2	0	2	3-4 mm
4 weeks	4	4	4	0	0	2 mm
6 weeks	5	5	3	1	1	1-4 mm
Date infested: 01/06/99						
2 weeks	5	8	3	1	2	1,5-2 mm
3 weeks	5	5	2	0	0	2 mm
4 weeks	5	10	2	0	0	3 mm
6 weeks	5	5	5	1	0	2-4 mm
Date infested: 03/08/99						
2 weeks	2	3	0	0	0	
3 weeks	3	3	1	1	0	3 mm
4 weeks	3	3	0	0	0	
6 weeks	3	3	0	0	0	
Date infested: 18/08/99						
2 weeks	8	17	1	0	1	2 mm
3 weeks	6	15	3	0	0	2-3 mm
4 weeks	6	11	1	0	0	2 mm
6 weeks	6	16	2	0	0	1-2 mm

Only four live 1st instar larvae were found inside the fruit. The penetration passage was not more than 4 mm deep. Penetration of *C. leucotreta* larvae in Hass fruit was superficial and larvae were mostly found in the area just below the skin. The fruit flesh is apparently an unsuitable medium for development. No larvae reached maturity and only first instar larvae were found. This is in contrast with citrus where larvae penetrate and develop deep inside the fruit. These results indicate that *C. leucotreta* does not develop or complete its life cycle in avocado fruit on the tree and therefore this significantly reduces the danger for countries importing South African Hass avocados.

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