Makandi employs biotechnology to tackle a threat to fruit production

Makandi Estates is introducing measures to control damage to crops caused by the False Codling Moth

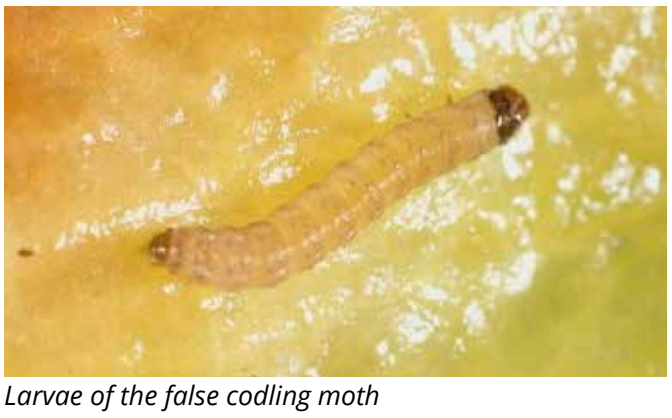
Thaumatotibia (Cryptophlebia) leucotreta is commonly known as the false codling moth (FCM). At Makandi, where we grow Avocados and Macadamias for export, we have found an increase in the moth over the last few seasons and the severity of its damage to our fruit. Two seasons ago, we packed out at just under 50%, with the main reason for rejection being FCM damage.

A new line of defense has therefore been introduced – biotechnology - and is already improving the scenario, whilst minimizing the use of harmful pesticides as much as possible

Most moths of this genus have a similar appearance and characteristics. The wings are patterned with greys, light browns, creams, blacks and orange browns, and have a span of 1,5cm to 2cm. The moth attacks fruit at all stages of its development. If this occurs early on, the fruit may ripen prematurely and drop off. Amongst the many crops targeted are avocados, beans, coffee, cotton, grapes, macadamias, maize and tomatoes.

Reproduction
Females lay three to eight eggs, each about 1mm in diameter, on the surface of the fruit. When laid they are creamy-white, but turn pinkish before hatching. This can take from two days to three weeks, depending on the temperature. As they hatch, the caterpillars bore into the fruit, leaving a discolouration. Once inside, they feed on the soft pulp, which creates mushiness in the fruit. As they mature, they tunnel deeper into the fruit.

In addition to this internal damage, the holes on the surface caused by the caterpillar expose the fruit to disease and mould.



Larvae of the false codling moth

On reaching maturity two to eight weeks later, the caterpillar drops to the ground on a silken thread. It is pinkish and 1,5cm to 2cm long. It spins a cocoon in the soil and remains here for up to six weeks, depending on temperature, before metamorphosing into an adult.

Economic Impact:

The false codling moth is adapted for warm climate survival and is believed to have originated in Sub-

Damage to avocados caused by the false codling moth

Saharan Africa, impacting crop production for many years and causing untold losses to farmers. Outside of Africa the FCM has had limited success in establishing itself; however, it has now been detected in Europe and the United States and with these incidences, international growers are waking up to the potential threat. Based on its status as a pest in Africa, establishment of FCM in the USA could result in significant economic losses.

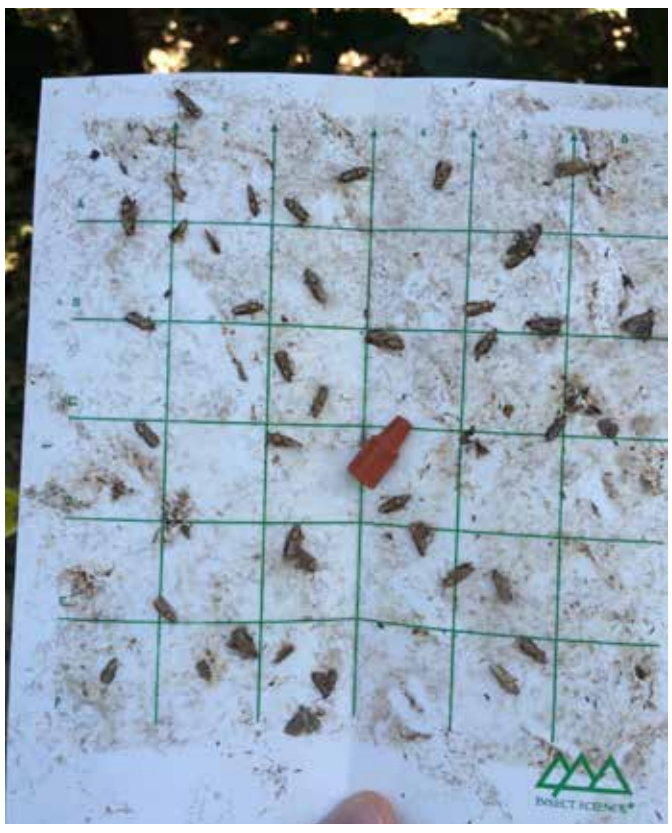
Environmental Impact:
Establishment of this moth causes direct environmental damage via increased pesticide use by commercial and residential growers. Additionally, populations of threatened and endangered plant species internationally could be severely threatened or extirpated should the moth adapt to feeding on them.

Natural enemies
Two wasp species, Anagyrus cuthbertsonii and Trichogrammatoidea cryptophlebia control moth populations. But studies have shown that, on their own, these wasps are unable to keep moth numbers manageable.

Control measures
Many methods are used to control the false codling moth: chemical, microbial, sanitation, destruction of the host plant, biological, and irradiation. There have been reports of widespread resistance to many of the commonly used insecticides. As females attract males by releasing sex pheromones (chemicals that trigger a mating response in the males) into the air, Pheromone traps are now widely employed and it is this method of control that we are now employing to protect our avocados and macadamias at Makandi.

Bio-technology solutions
It is generally accepted that there is a need to reduce reliance on broad-spectrum insecticides by accelerating efforts to incorporate ecologically sound technologies into agricultural pest-management programs. The development and implementation of pest control technology based on behavior controlling chemicals, or semiochemicals, offers a unique opportunity to move in this direction. Semiochemicals are chemical messages that organisms use to communicate with each other. Among the semiochemicals, insect sex pheromones have probably received the most attention from the scientific, regulatory and agricultural communities. Sex pheromones are chemical messages between individuals of the same species and their use for insect control would not disrupt other biological interactions within a cropping system.

At Makandi, traps, laced with the attractive pheromone, are placed throughout the plantation and male moths are drawn to them in large numbers, disrupting normal breeding opportunities. On arrival at the trap, the male lands and is fatally trapped by a sticky glue.



Traps are set to control the moth

Impact on Makandi production
Since the introduction of the biological control program with the help of South African based company, Insect Science, last season's fruit damage has already decreased and we have packed out closer to 60%. This coming season we intend to take the control one step further by totally eradicating the use of insecticides for FCM, relying solely on the mating disruption system. We place stations in the trees that emit pheromones to confuse the FCM, disrupting their mating habits. We also have monitoring traps in all the orchards which are checked weekly to ensure the stations are working. As back-up we have the option of a moth male sterility program, but this will only be deployed if absolutely necessary. With options at hand, and initial impact already made, we are delighted with the prospect of a future with reduced pesticide reliance at Makandi.