



## GUIDELINES FOR MONITORING FALSE CODLING MOTH

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CRI's IPM Production Guidelines for false codling moth (FCM) management were last updated in 2003. Since then a few important aspects regarding monitoring of FCM in citrus orchards have changed. These stem from both the insect's increased pest status – due to market pressure – and new information generated from recent studies. This article will therefore serve both as a reminder about important aspects on monitoring FCM and an announcement of new alternative recommendations.

### Purpose of monitoring

Monitoring must entail both the use of pheromone traps and inspection of dropped fruit.

Pheromone traps are recommended for the following purposes: to indicate if FCM is present; to provide a comparison of FCM pressure between orchards, farms and seasons; and to assist with the accurate timing of products, such as viruses.

The inspection of dropped fruit will provide exact data for losses due to FCM; an indication of the efficacy of treatments; a possible indication of whether further treatments for FCM are required; and an indication of post-harvest risk and therefore market suitability.

### Trapping

#### *Trap and lure type*

Traditionally only the PVC pipe trap has been recommended for monitoring FCM. However, it has been found that the Delta design trap is a more efficient and therefore more effective design. When using the same type of pheromone dispenser, **the Yellow Delta trap has been found to catch 2.75X more moths (FCM adult males) than the pipe trap. Growers therefore have the option of using either the pipe trap or the Yellow Delta trap.** Currently, the Delta trap is supplied by Chempac and Insect Science.

Although there are three different pheromone dispensers registered for monitoring FCM and growers are free to use the lure of their choice, **CRI recommends the use of the Lorelei lure.** This is for two reasons: this dispenser has been found to release pheromone at the most consistent rate; and there are data from trials conducted over many years, which relate trap catches to fruit infestation. Further studies are being conducted with all lures to improve understanding of them. Any resultant change in recommendation will be communicated.

The Lorelei lure can be used in the Yellow Delta trap by cutting a small cross, using a pocket knife, in the middle of one of the sides of the trap, just below the roof apex. The dispenser can then be inserted into this hole.

#### *Trap placement*

Essentially, there are no changes to these recommendations. **The trap should be positioned on the upwind side of the orchard** so that the pheromone plume can be carried into the orchard. Male moths actively fly against the wind and will thus detect the pheromone and home in on the trap. **Traps should not be placed closer than 200 m from one another. Each trap can service 4 ha or even a slightly larger area.** The trap should be hung on the southern side of the tree. However, if trees form a hedgerow without gaps (where rows are orientated north-south) the trap should be placed on the south-western or western side. If the prevailing wind direction is at right angles to the row orientation (eg a southerly wind and an east-west row orientation), particularly where trees form a hedgerow, traps can be placed on poles between trees. **The trap must be suspended as high as an outstretched arm can reach** in partial shade in the outer foliage. The height at which the trap is hung has great influence on the number of moths which will be caught. Therefore, for reliable comparison, trap height should be consistent from orchard to orchard and season to season. If traps have been hung higher than the recommended height, this practice may be continued for the sake of reliable comparison (however, never lower than the recommended height). **The trap must be clearly visible, providing moths with unhindered access.** To achieve this, all twigs and leaves around the trap must be removed.

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**The position of the trap must be regularly monitored and maintained throughout the season.** As the tree flushes and as fruit begins to weigh down branches, the position of the trap can quickly and easily become compromised.

#### *Treatment threshold*

The Lorelei trapping system was originally devised as a predictive tool for economic fruit loss. The threshold value for the trap was set at 10 males per trap per week. If this threshold was exceeded for a few weeks consecutively, the application of a control programme was considered necessary to counter resultant economically unacceptable crop loss due to FCM infestation. **The use of an action threshold is no longer recommended.** This is because the pest status and market access risk of the pest is of such a nature that where FCM is present, **FCM control measures should be applied in all orchards which are destined for export.**

It is very important to realise that **where mating disruption for FCM is employed in an orchard, trap shutdown will be experienced.** Although traps should still be hung in such orchards, as long as the mating disruption product is having any effect, very few – if any – moths will be caught.

#### **Fruit infestation**

Although the use of traps is the only reliable predictive method for monitoring FCM, it can never be entirely accurate. One is monitoring male moths as a means to predict fruit infestation. The assumption therefore is that male moth numbers reflect female moth numbers, which reflect egg laying on the fruit, which in turn reflects egg hatching, which finally indicates fruit infestation. There are many variables which can influence and alter each one of these steps, such as climate and natural enemies. However, **the monitoring of fruit infestation is a direct measurement of exactly what one wants to know. It is therefore essential that this be done** in all FCM susceptible orchards on a weekly basis, starting from December or January and continuing right up to harvest. In addition, such surveys will corroborate the accuracy of trap data and enable producers to gain confidence in their trap counts or indicate possible problems

with the trapping procedure, in particular poor trap placement.

It is recommended that at least five trees be used as a data station. Each orchard should have its own data station. Where orchards are exceptionally large, there should at least be one data station for each trap. Ideally, trees should be spaced throughout the orchard. However, for the sake of convenience these may be positioned near the trap. All dropped fruit must be collected under the data trees, cut open and the probable reason for the fruit drop recorded. FCM infestation is identified either by the presence of the larva or the presence of its frass (and moulted head capsules), if the larva has already exited the fruit. Note that there are other larvae which can also infest fruit and these should not be confused with FCM larvae. Fruit fly and vinegar fly larvae should fairly easily be distinguishable from FCM larvae. However, some larvae can easily be mistaken for FCM larvae (e.g. Carob moth and scavenging beetle larvae) if inspections are not conducted with the necessary attention to detail. Particularly with Navel oranges, there are often a multitude of other causes of fruit drop, such as fruit splitting, *Alternaria* navel end rot, bud mite and several others, including natural abscission and other unidentifiable factors. Without cutting fruit it is very easy to form an incorrect impression of the extent of the FCM problem and therefore the efficacy of treatments.

#### **Data recording**

**All trapping and fruit infestation data must be recorded and saved.** This will allow comparisons of FCM levels between orchards, treatment programmes and seasons. By doing this, growers can learn from their experiences and adapt their practices for the best end results.

For more detailed recommendations, consult the CRI IPM Production Guidelines, taking note of changes in recommendations given in this Cutting Edge article. Any further queries or requests for more detailed technical information in regard to this article can be addressed to Dr Sean Moore, CRI: [seanmoore@cri.co.za](mailto:seanmoore@cri.co.za).



## RIGLYNE VIR MONITERING VAN VALSKODLINGMOT

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CRI se Riglyne vir Geïntegreerde Plaaigbeheer (GPB) vir die beheer van valskodlingmot (VKM) is laas in 2003 opgedateer. Sedertdien het 'n paar belangrike aspekte rondom die monitering van VKM in sitrusboorde verander as gevolg van beide die insek se verhoogde plaagstatus – as gevolg van markdruk – en nuwe inligting van onlangse studies. Hierdie artikel sal dus dien as beide 'n herinnering van belangrike aspekte oor VKM monitering en bekendmaking van nuwe alternatiewe aanbevelings.

### Doel van monitering

Monitering moet beide die gebruik van feromoon lokvalle en inspeksie van vrugval behels.

Feromoon lokvalle word vir die volgende doeleindes aanbeveel: om aan te dui of VKM teenwoordig is; om 'n vergelyking van VKM-druk tussen boorde, plase en seisoene te maak; en om te help met die akkurate tydsberekening van toediening van produkte, soos virusse.

Die inspeksie van gevalde vrugte sal presiese data vir VKM verliese voorsien; 'n aanduiding van die werking van behandelings; 'n moontlike aanduiding van die behoefte vir verdere behandelings vir VKM; en 'n aanduiding van naes risiko en dus mark geskiktheid.

### Lokval gebruik

#### *Lokval en tipe lokmiddel*

Tradisioneel word net die PVC pyplokval vir VKM monitering aanbeveel, maar dit is gevind dat die Delta-ontwerp lokval 'n meer effektiewe en dus 'n meer doeltreffende ontwerp is. Wanneer dieselfde tipe feromoon vrysteller gebruik word, is dit gevind dat **die Geel Delta lokval 2.75X meer motte (volwasse VKM mannetjies) as die pyplokval vang. Produsente het dus die opsie om of die pyplokval of die Geel Delta lokval te gebruik.** Tans word die Delta lokval deur Chempac en Insect Science verskaf.

Alhoewel daar drie verskillende feromoon vrystellers vir die monitering van VKM geregistreer is, en al is produsente vry om die

lokmiddel van hul keuse te gebruik, **beveel CRI die gebruik van die Lorelei lokmiddel aan**, vir twee redes: dit is gevind dat hierdie vrysteller feromoon teen die mees konstante tempo vrylaat; en daar is data van navorsing wat oor baie jare strek wat lokvalvangstes met vrugbesmetting koppel. Verdere studies word tans met alle vrystellers uitgevoer om ons begrip van hulle te verbeter. Enige verandering in aanbevelings as gevolg hiervan sal aan die bedryf oorgedra word.

Die Lorelei vrysteller kan in die Geel Delta lokval gebruik word deur 'n klein kruisie in die middel van een van die kante van die lokval, net onder die punt van die dak, met 'n sakmes te sny. Die vrylater kan dan in hierdie gatjie ingedruk word.

#### *Lokval plasing*

Hoofsaaklik is daar geen verandering aan hierdie aanbevelings nie. **Die lokval moet aan die wind-op kant van die boord geplaas word** sodat die feromoonpluim deur die boord kan trek. Mannetjie motte vlieg aktief teen die wind en sal dus die feromoon optel en die lokval kry. **Lokvalle moet nie nader as 200 m van mekaar geplaas word nie. Elke lokval kan 4 ha diens of selfs 'n bietjie groter.** Die lokval moet aan die suidelike kant van die boom gehang word. As bome egter 'n laningry sonder openinge vorm (waar rye noord-suid georiënteer is) moet die lokvalle aan die suid-westlike of westelike kant gehang word. As die heersende windrigting teen die regte hoek met die ry-oriëntasie is (bvb 'n suidelike wind en 'n oos-wes ry-oriëntasie), veral waar bome 'n laningry vorm, kan lokvalle op pale tussen bome gehang word. **Die lokval moet so hoog soos 'n uitgestrekte arm** in gedeeltelike skadu in die buite-blaarkap van die boom gehang word. Die hoogte waarteen die lokval gehang word het 'n groot invloed op die hoeveelheid motte wat gevang sal word. Daarom, om betroubare vergelykings te maak, moet lokval-hoogte van boord tot boord en seisoen tot seisoen konstant wees. As lokvalle hoër as die aanbevole hoogte gehang word, moet hierdie praktyk voortgesit word (maar nooit laer as die aanbevole hoogte nie) omrede 'n betroubare vergelyking te kan maak. **Die lokval moet duidelik sigbaar wees dat motte ongehinderde toegang het.** Om dit te bereik moet alle takkies en blare rondom die lokval verwyder word. **Die posisie van die lokval moet gereeld deur die seisoen gemonitor, en as nodig, reggestel word.**

JOU HEFFING WERK VIR JOU – PRODUSENTE SE HEFFINGS WORD AANGEWEND OM DIE AKTIWITEITE VAN DIE CRI TE BEFONDS



Soos die boom nuwe groei stoot en soos vrugte die takke begin aftrek, kan lokval-posisie vinnig en maklik verander.

### *Behandelings drempelwaarde*

Die Lorelei moniteringstelsel is oorspronklik as 'n voorspellingsriglyn vir ekonomiese vrugverlies ontwikkel. Die drempelwaarde vir die lokval is op 10 mannetjies per lokval per week gestel. As hierdie drempelwaarde vir 'n paar agtereenvolgende weke oorskry is, is die toepassing van 'n bestrydingsprogram as noodsaaklik beskou om die voortvloeiende onaanvaarbare ekonomiese vrugverlies as gevolg van VKM besmetting te voorkom. **Die gebruik van 'n aksie drempelwaarde word nie meer aanbeveel nie** omdat die plaagstatus en marktoegangsrisiko van die plaag van so 'n aard is dat waar VKM teenwoordig is, **beheermaatreels in alle boorde wat vir uitvoer bestem is, toegepas word.**

Dit is baie belangrik om te besef dat **waar paringsontwrigting vir VKM in 'n boord toegepas word, sal die lokval nie meer effektief kan werk nie.** Alhoewel lokvalle nog steeds in sulke boorde gehang moet word, terwyl die paringsontwrigting-produk 'n effek uitoefen, sal baie min, indien enige, motte gevang word.

### **Vrugbesmetting**

Alhoewel die gebruik van lokvalle die enigste betroubare moniterings metode is vir voorspelling van VKM, kan dit nooit heeltemal akkuraat wees nie. Mannetjie motte word gemonitor om vrugbesmetting te voorspel. Daarom is die veronderstelling dat mannetjie motgetalle die wyfie motgetalle gaan weerspieël, wat eierlegging op vrugte gaan weerspieël, wat dan 'n aanduiding van uitbroei van eiers gaan gee, wat laastens 'n indikasie van vrugbesmetting gaan gee. Daar is baie faktore wat elkeen van hierdie stappe kan beïnvloed en verander, soos klimaat en natuurlike vyande. **Nogtans is die monitering van vrugbesmetting 'n direkte aanduiding van presies wat 'n mens wil weet. Gevolglik is dit noodsaaklik dat dit in alle VKM-vatbare boorde gedoen word.** Dit moet 'n weeklikse praktyk wees van Desember of Januarie tot oestyd. Onder andere sal sulke opnames die akkuraatheid van lokvaldata vasstel en produsente in staat stel om vertroue in hul

lokvalvangstes op te bou of moontlike probleme met lokval prosedures aandui, veral swak lokvalplasing.

Dit word aanbeveel dat minstens vyf bome as 'n datastasie gebruik word. Elke boorde moet sy eie datastasie hê. Waar boorde besonders groot is moet daar minstens een datastasie per lokval wees. Ideaal moet bome deur die boord gepasieer word, maar vir gerieflikheidshalwe mag dit naby die lokval geleë wees. Alle gevalde vrugte moet van onder die data bome versamel word, oopgesny word en die waarskynlike rede vir vrugval aangeteken word. VKM besmetting word bepaal deur die teenwoordigheid van die larwe of sy mis (en vervelde kopkapsules), as die larwe alreeds die vrug verlaat het. Let op dat daar ook ander larwes is wat vrugte kan besmet en hierdie moet nie met VKM larwes verwar word nie. Vrugtevlug en asynvlieg larwes behoort redelik maklik van VKM larwes onderskeibaar te word. Nogtans kan sekere larwes (bvb Karobmot en aaskewer larwes) redelik maklik verkeerdelik as VKM larwes geïdentifiseer word as inspeksies nie met die nodige aandag vir detail gedoen word nie. Veral met nawels is daar gereeld verskeie ander oorsake van vrugval, soos nawelentbars, *Alternaria* nawelentvrot, knopmyt en verskeie ander faktore, insluitend die wat onbepaalbaar is. Sonder dat 'n mens vrugte opsny, kan 'n wanpersepsie van die omvang van die VKM-probleem maklik gevorm word, en daarom ook van die doeltreffendheid van 'n behandeling.

### **Data rekordhouding**

**Rekord moet van alle lokval en vrugbesmettingsdata gehou word.** Dit sal meebring dat vergelykings in VKM-vlakke tussen boorde, bestrydings programme en seisoene gemaak kan word. Sodoende kan produsente van hulle ondervindinge leer en hul praktyke dus aanpas vir die beste eindresultate.

Vir meer omvattende aanbevelings moet die CRI GPB Produksieriglyne geraadpleeg word, met klem op veranderings in aanbevelings wat in hierdie Snykant-artikel voorgelê is. Enige navrae of versoeke vir meer tegniese inligting in verband met hierdie skrywe kan gestuur word aan Dr. Sean Moore, CRI: [seanmoore@cri.co.za](mailto:seanmoore@cri.co.za).