Integrated Pest Management for Citrus

1 Introduction to Integrated Pest Management

Learner Guide

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Citrus Growers' Association OF SOUTHERN AFRICA
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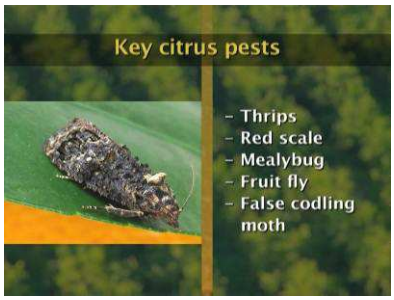
Second Edition

The first edition of the Integrated Pest Management for Citrus learner guides were exact transcripts of the audio-visual modules which they accompanied. This second edition has been updated with additional information and new developments. The changes are in *italics and underlined*.

Introduction

Citrus pest management is one of the most dynamic aspects of pre-harvest production of citrus fruit. There are dozens of different pests that can occur on citrus in Southern Africa, although there are only a few that occur and that require any form of control measure and these we would call key citrus pests. These would be pests such as:

- Citrus thrips
- California red scale
- Mealybug
- Fruit fly
- False codling moth



Pest Categories

Pests can fall into a number of different categories. The first is **cosmetic** pests, which are pests which cause no harm to the actual quality of the fruit, but they blemish the fruit and make the fruit less marketable. An example of a cosmetic pest would be citrus thrips.

The second would be what we would call **production** pests or pests that influence the crop size of the orchard. An example of a production pest, a pest that affects the yield, would be bollworm, which could also be a cosmetic pest.

Another category of citrus pests is **phytosanitary** pests, which are endemic to the production area. This means they only occur in the production area, which could be Southern Africa or Africa, and they are pests that export markets don't want to get into their countries. This includes pests like fruit fly. Closely related to this category would be pests that cause pre- and postharvest waste problems. Fruit fly and false codling moth would fall into this category.

A further category would be **vectors**, pests that are no problem to the fruit other than that they vector certain undesirable diseases, such as the citrus psylla which is a vector of citrus greening disease.

Integrated Pest Management

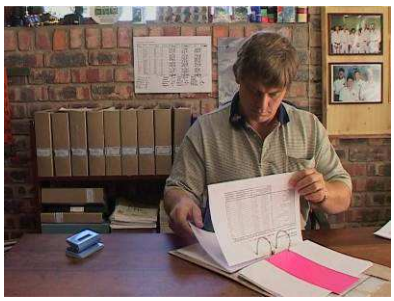
How do we control these pests? Traditionally, on all agricultural crops, chemical control has been the way in which all these pests have been controlled. But from about the 1950s, certain problems were experienced with chemical control, such as:

- **Secondary pest outbreaks** from the use of broad spectrum harsh chemicals,
- The increasing **cost of chemical control** related to rising oil prices, and
- The **development of resistance** to chemical pesticides

What developed as a result was an approach called integrated pest management (IPM), which is the approach that the Southern African citrus industry adopts towards their pre-harvest pest control for the most part. IPM is a holistic approach to pest management which consists of three main elements.

The first element is that it is a **multifaceted approach** and there are three main factors, being biological control, cultural control and chemical control. The second element would be the use of economic, intervention or action **thresholds**, which would be measurements to determine when one needs to act. The third would be **environmental responsibility** or conservation.

Pest Monitoring



Within IPM the emphasis is very often laid on the integration of the three types of approaches – biological, chemical and cultural. However, the emphasis should actually lay on management, which implies an understanding.

In order to be a good manager and to practice that good understanding, one needs to be able to accumulate and interpret relevant, accurate and specific data for each and every single orchard and for each and every single pest on that farm. This will determine not only if and when and what is necessary to spray, but almost more importantly, it will determine when it is not necessary to spray, which could be a great cost saving to the farmer and could also be very influential in preserving the beneficial natural enemies in that orchard, which would be jeopardised by a spray.

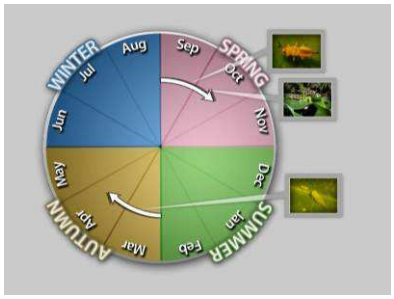
How does a farmer collect this data? Well, he does so by monitoring, and it is often said that monitoring is the cornerstone of an effective IPM approach.

Trapping

Monitoring is done through the usage of traps, which could either be traps which attract the pest through **colour**, for example leafhoppers which are attracted to a yellow colour, or through **pheromones**, such as traps for false codling moth and California red scale, or through **food attractants** as is the case with traps for fruit fly females.

Scouting

The other form of monitoring is scouting and most pests would be monitored through scouting. This is extremely important. Farmers need to appoint their most trustworthy employees on the farm, make sure that they are properly trained, make sure that they are properly incentivised, and that they have a proper understanding. Scouting needs to be given priority and precedence, and must be conducted regularly on the farm.



The farmer also needs to be aware of when these pests usually occur in the orchards. Certain pests already occur in spring such as citrus thrips and bollworm.

Then there are other pests which only become relevant later in the season. For example, green citrus leafhopper would only appear once the fruit starts to colour up, so monitoring for this pest would only begin much later in the season.

Pest Control Methods

Biological Control

Biological control can be **classical** biological control, which is the introduction and release of natural enemies – parasitoids and predators – which do not naturally or did not previously occur in that area.

This however is something that is outside of the hands of the farmer and is something that would be conducted by researchers in the industry.

Then there is **conservation** biological control. This involves recognising the potentially highly effective complex of beneficial natural enemies which are already resident in the citrus orchard.

These parasitoids and predators can very effectively reduce pest numbers, prevent pest outbreaks and even make any further intervention – particularly chemical intervention – unnecessary.

All the grower needs to do is preserve these natural enemies by only spraying when absolutely necessary and then judiciously selecting minimum-impact, short-residual pesticides. In addition, ants, which can disrupt natural enemies, should be kept out of trees.

Finally, there is **augmentation** biological control. In South Africa there are some commercial insectaries, which rear natural enemies for mass release for control of certain key citrus pests.

Cultural Control

Two good examples of important cultural control are: firstly, to **keep ants out** of the tree. Ants treat sucking insects as if they were their cows. They milk these insects and they protect them against the attack of beneficial natural enemies, parasitoids and predators. Ants are very often responsible for serious outbreaks of sucking insects such as red scale, mealybug and leafhoppers.

The second example of cultural control is **orchard sanitation**. Orchard sanitation is the regular removal of damaged, infested fruit, both from the orchard floor and fruit that are still hanging in the trees, and the destruction of these fruit.

Research has shown in the case of, for example, false codling moth in certain areas, on average over the whole season, 75% of the false codling moth larvae occurring in that orchard can be removed by simple weekly orchard sanitation.

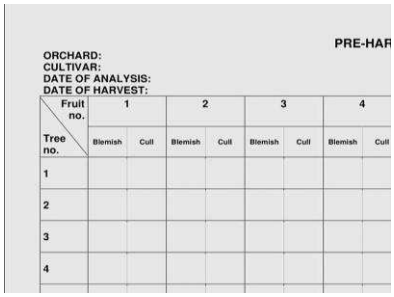
Chemical Control

The third and last aspect of IPM is chemical control. Chemical control should only be adopted as a last resort and when one does decide to spray, one needs to select very carefully which chemical to use.

Pest Management Planning

Lastly, planning of one's pest management programme must be done before the season begins.

Planning already begins during the previous season. The farmer conducts a pre-harvest blemish analysis in his orchard before he harvests the fruit. He would do this by conducting a survey of the fruit hanging in his orchard and determining what the major causes of damage are, the major causes of blemishes, and the major cause of infestation of the fruit in the orchard. He would quantify these and these would dictate, in certain cases, which pests would be necessary to control the following season.

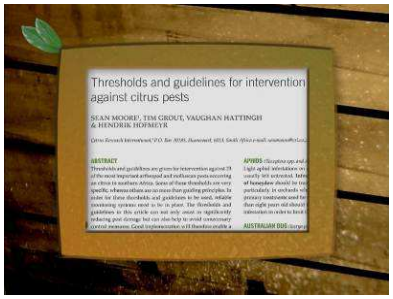


Some pests are better controlled by preventative treatment. These would be pests such as California red scale and mealybug.

Some pests are better controlled only by corrective treatment and this means only once the pests has appeared on the tree or on the part of the plant or the fruit where it needs to be controlled. An example of this would be citrus thrips, the reason being that one would want to use a short residual IPM compatible product and there is no point in applying a treatment for citrus thrips before the pest has appeared.

Conclusion

Protecting citrus fruit and trees against attacks from pest insects is an essential part of citrus production management. It involves obtaining reliable, current information on the pest status in each orchard, and keeping record of this information.



It also requires that the farm manager keeps up to date with research findings and recommendations. Lastly, it requires that the manager understands how to use all of this information in developing an effective plant protection strategy for his farm.