

# Cutting Edge

RESEARCH NEWS FROM CITRUS RESEARCH INTERNATIONAL  
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## **CRI Structured For Efficient Delivery**

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The southern African Citrus industry occupies an unsurpassed competitive position as exporter of fresh citrus to the world's most discerning and lucrative markets. A long history of insightful investment into Research and Technology has been a cornerstone to this success. However, the industry's technical foundation came into jeopardy when the industry deregulated.

Up until the formation of Capespan, Outspan had traditionally been the custodian of the industry's Research and Technical services. Capespan undertook to temporarily maintain Research and the Citrus Growers Association then took over responsibility for this industry service.

Outspan Citrus Centre was taken over from Capespan and Citrus Research International came into operation as of 1 June 2001. The Citrus Research Trust temporarily acted as a Governance Board for CRI until a CRI Board of Directors was formed in August 2001. The CGA tasked the CRI to take responsibility for all Research and Technical issues and ensure cost effective delivery of appropriate results.

The CRI's Mission is: "To maximise the long-term global competitiveness of the southern African citrus growers through the development, support, co-ordination and provision of Research and Technical services, by combining strengths of all CRI Group partners". The Board composition is reflective of this Mission, with nominees from the CGA (6), Citrus Consultants (1), Exporters Forum (1), ARC (1), University of

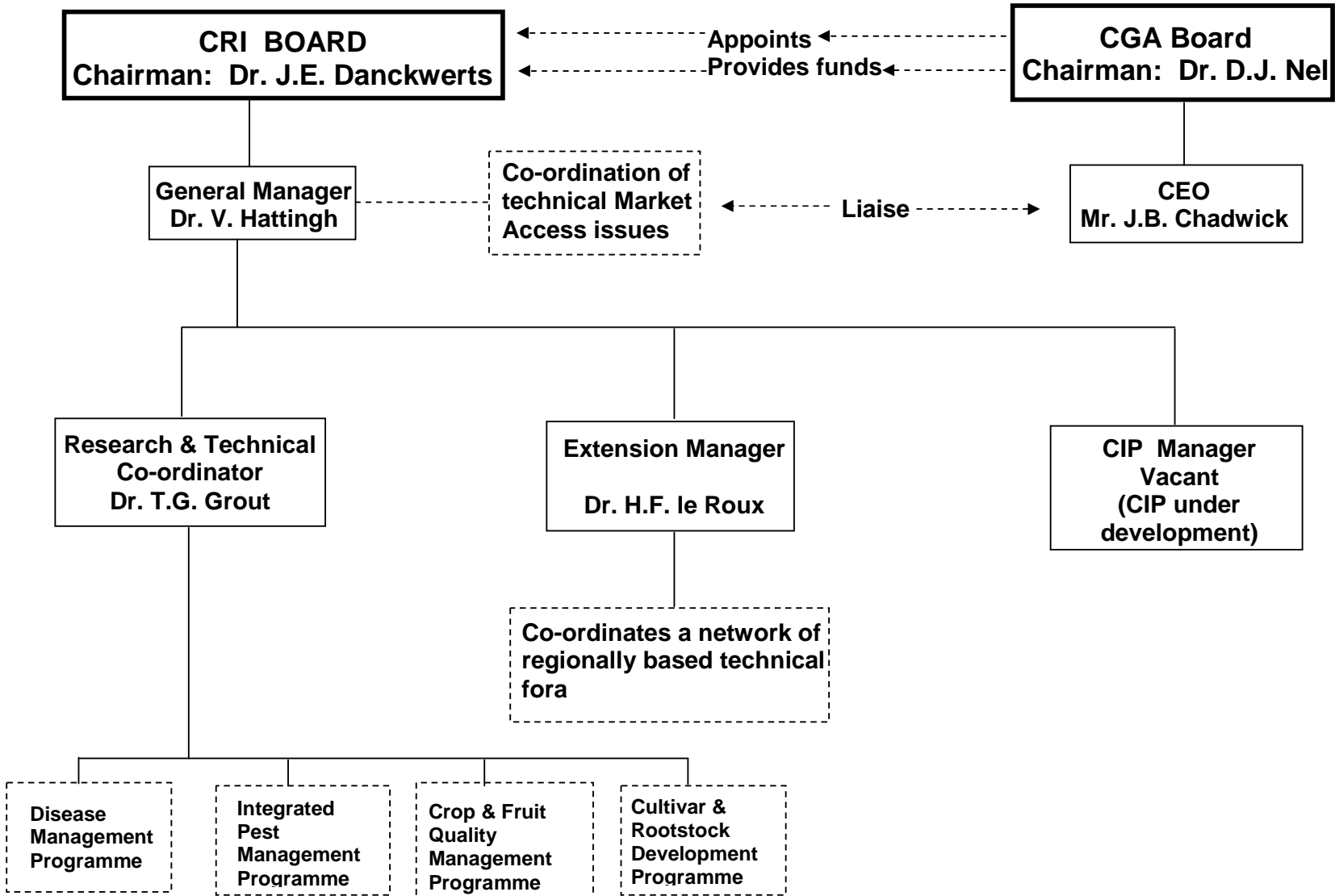
Pretoria (1) and University of Stellenbosch (1).

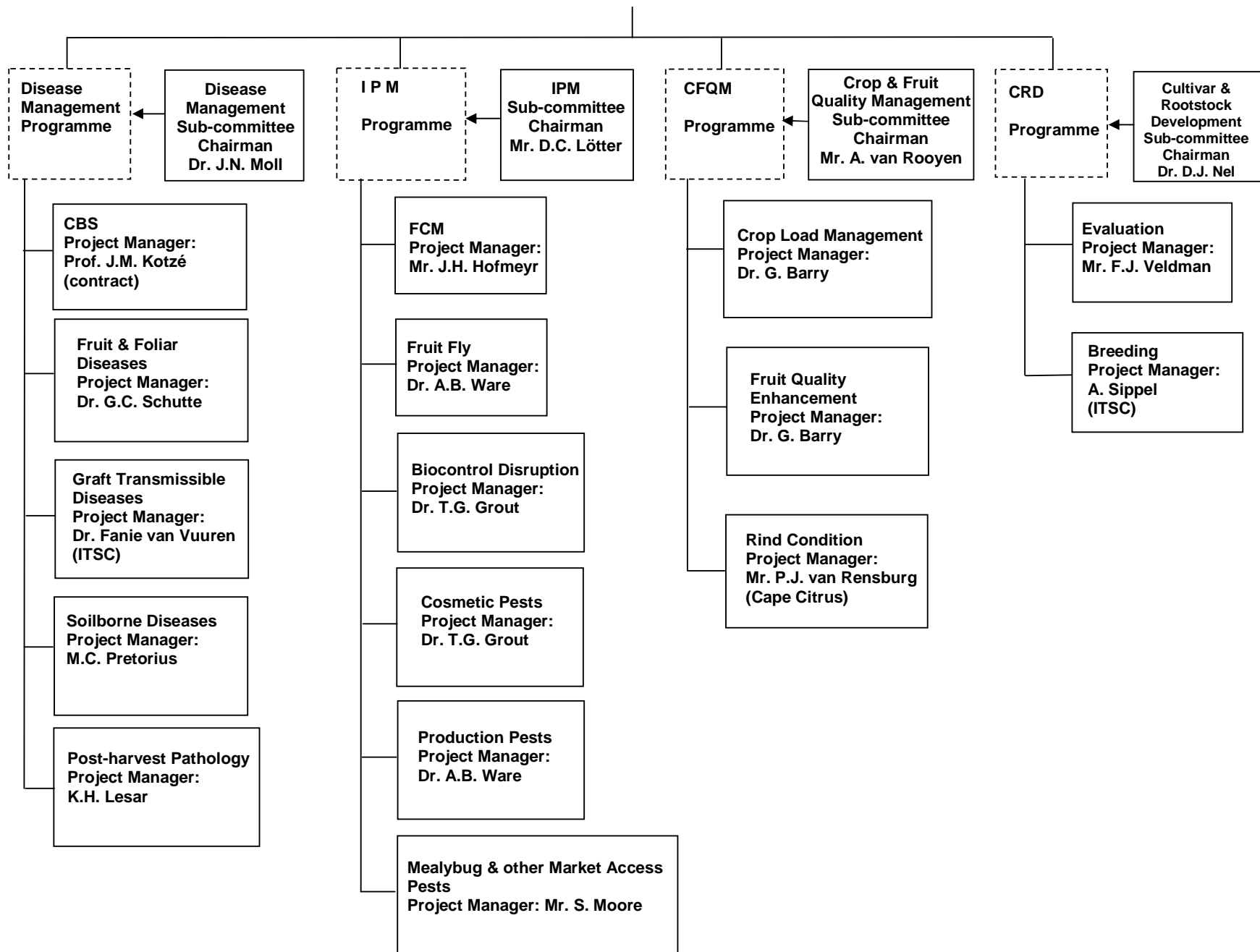
The organisational structure of the industry's Research and Technical services has gone through a phase of re-organisation and re-alignments over the past three to four years. This phase is now behind us and the organisation of Research and Technical services is now set for the delivery of results. The CRI Group represents a multi-party alliance where the strengths of the various role players can be optimally harnessed without concern as to researchers' affiliations.

CRI (Pty) Ltd. forms the core of CRI Group's operational organisation. Its role is principally to ensure cost effective delivery of relevant R&T results through the harnessing of Group Partners' inputs and to manage the processes involved in doing so. The attached organogram reflects the CRI Group operational organisation.

Industry research requirements are established by the Extension manager and the technology transfer network that he co-ordinates. These requirements are prioritised by the research sub-committees who oversee the research portfolio composition and funding allocation. The Research and Technical Co-ordinator co-ordinates the assignment of industry research requirements to CRI Group Project Managers via the research sub-committees and ensures the delivery of research results in the form of two-monthly and annual reports.









## FCM Working Group

**Tim G Grout and Hendrik Hofmeyr**  
Citrus Research International

False codling moth (FCM) can currently be considered the most important phytosanitary insect threat to our citrus exports. Not surprisingly, the 2002 research budget for FCM amounts to more than 40% of the Integrated Pest Management (IPM) budget. With the recent changes in structure in CRI (Pty) Ltd and the falling away of Programme Managers, the role of Project Managers has become more important and multi-institutional. The position of Project Manager: FCM is filled by Hendrik Hofmeyr of CRI (Pty) Ltd in the Western Cape.

In October 2001, Tim Grout chaired a meeting of the FCM working group that had previously met in January 1999 when it was chaired by Andrew Hadlow. This group primarily consists of researchers and technical managers from citrus estates who have been investigating strategies to control FCM. Due to the status of this pest and the wide interest in it amongst growers, the minutes from the meeting are provided below. Before the close of the meeting it was decided that one annual meeting of the working group was adequate and that it would meet again in September or October 2002. That meeting would be chaired by Hendrik Hofmeyr.

### **Review of grower experiences in managing FCM in 2001**

FCM infestation had been severe at Schoeman Boerdery (Marble Hall) last season and they had had up to 40% of fruit drop infested by picking time. They only sanitised (picked up) early drop in navel blocks but with hindsight, they should have done this for other cultivars as well. They shred the fallen fruit rather than place it in bags as Kevin Language doubted whether the bags got hot enough to kill the FCM. High temperatures with an average of 33°C in late January and early February resulted in more FCM fruit drop later on, yet there was no increase in FCM trap catches. (Perhaps parasitoids were reduced by the high temperatures.) FCM trap peaks had appeared to be two weeks early this past season. Schoeman Boerdery had tried Last Call attract and kill but did not get good results (see below).

At Komatipoort, Hectorspruit, Karino and Nelspruit, FCM infestations had generally been lighter than in 2000. At IYSIS (Swaziland), there had first been an early peak, then the numbers had dropped until the end of the season. They had noticed that Marsh grapefruit and Delta Valencias were darker in colour when infested with FCM so these fruit were thrown out before going into the packhouse. Gerd Höppner considered sanitation throughout the season to be extremely important and less expensive than a single spray of Alsystin. Out of season fruit must be removed as it can be highly

infested with FCM. Sanitation of fruit in November appeared to lower the January peak.

Letaba Estates had had no significant problems with FCM in the packhouse or during the season and the average trap counts were lower than in 2000. Orchard staff concentrate sanitation in areas where trap counts are highest. They only sprayed their Star Rubies (25 000 trees) and a few navel plots with Alsystin.

Andrew Hadlow said that region wide trends did show lower numbers of FCM in 2001 than in 2000. The peak of moths in October or November did seem to be associated with the November fruit drop. Fruit drop in March was attributed to the flight peak in January or February. Hendrik Hofmeyr said that they had been having some unusual weather patterns in the Western Cape and that the 2001 season had been relatively quiet. He agreed that early orchard sanitation appeared to help.

Sean Moore said that in the Eastern Cape, FCM remained a minor problem. The pest status is slightly worse in the Sundays River Valley but few growers spray. The Gamtoos River Valley got their first FCM a few years ago and claimed to have had a severe FCM problem during 2001. Egg parasitism in the GRV is surprisingly low, even though the climate is more suitable for natural enemies than the SRV. Approximately 80% of the growers in the GRV use Meothrin early in the season and some growers have even sprayed two pyrethroids. As *Trichogrammatoidea cryptophlebiae* is much more sensitive to insecticides than *Aphytis* it is possible that natural population levels of this parasitoid are very low. In general, 25% of the drop of navels in the Eastern Cape during the past season could be attributable to FCM.

### **Feedback on research and new management strategies**

#### Post-harvest

Tony Ware reported on work that he and Bruce Tate have been doing at CRI with Controlled Atmospheres. All gas ratios used to date have resulted in poor fruit quality. Other alternatives should be investigated but according to the USDA, methyl bromide is likely to be used for many years to come. Hendrik Hofmeyr agreed that less emphasis should be placed on cold sterilisation as it does not favour fruit colour development and is logistically difficult for fruit going to Europe.

#### Insecticides

Trials at Crocodile Valley had included sprays of Steward (indoxacarb) from DuPont but results were inconclusive. Steward may have had a short term effect. Some trial work at Schoeman Boerdery had given promising results with emamectin benzoate, but this product is very expensive and unlikely to be registered.

### Attract and kill: Last Call

Gerhard Booyesen said results with Last Call had been variable and a bit disappointing. Rates of 1 500 or 3 000 drops per hectare in three applications did not reduce fruit drop relative to the control blocks at Crocodile Valley, Schoeman Boerdery and Citrusdal. However, an effect on trap catches was noticed at Citrusdal so the product was having an influence. At Letaba, fruit drop in Last Call treatments started low and remained low at harvest, whereas it increased just before harvest in the controls to 1.32 fruit per tree per week. Hendrik Hofmeyr found that the product suppressed trap catches in the Citrusdal region for four weeks only, whereas Gerhard Booyesen said it lasted six weeks in a subtropical climate. This difference may be due to lower humidity and more sunshine hours in the Western Cape summer. Working back from the harvest date, three or four applications may be required and perhaps as many as five in the Western Cape. Each application will cost approximately R500 per hectare. Obviously it should be aimed at the control of low populations or perhaps used in combination with parasitoid releases. Gerhard Booyesen has submitted data for the registration of Last Call on citrus. Sakkie Bruwer suggested that the lower rate of 1500 drops per hectare at three-week intervals may be more effective and requires investigation.

### Attractants

Gerhard Booyesen is in search of a female attractant for FCM and is working with Simon-Fraser University in Canada. They have some promising results. Sean Moore mentioned that Tr  c   had patented a female attractant for codling moth. Hendrik Hofmeyr said that Christo Smit had found a synergist for the FCM pheromone that increased its attractiveness to male moths by over 300%.

### Mating disruption (MD)

The BASF product Quant that contains Oriental Fruit Moth pheromone has been shown to reduce fruit drop but the product Isomate which contains FCM pheromone is apparently more effective. Hendrik Hofmeyr evaluated the latter product last season but FCM populations were relatively low so the research must be repeated. Hendrik said that one treatment of Quant or Isomate was much easier than having to apply Last Call three to five times.

### Viruses

In the Eastern Cape, the granulovirus gave promising results as far as reducing FCM fruit drop, being similar to Alsystin efficacy (59% reduction in fruit drop). By combining virus applications with parasitoid releases, FCM fruit infestation was reduced by 70%. This is perhaps the perfect combination for control in IPM. Sean Moore said that the advantage of the virus was that results are obtained over a much shorter period than with parasitoid releases.

### Dispenser

Hendrik Hofmeyr said that there was an urgent need for a pheromone dispenser that was less labour intensive to construct. Scentry had let him down last year but he would give them one last chance to provide a practical alternative to evaluate.

### Egg parasitoids

These are only being produced by Stefan Honiball in Citrusdal. Research was conducted by Sean Moore and Hendrik Hofmeyr of CRI. Sean conducted work in the Eastern Cape and Nelspruit (Crocodile Valley). The levels of FCM at Crocodile Valley had been low and results were variable in a large block on a slope. Releases of 150 000 parasitoids had been made per hectare in total and appeared to be effective at the top of the orchard but not at the bottom near the river. In the Eastern Cape, the natural level of parasitoids is relatively high due to a good climate and relatively soft spray programme (*T. cryptophlebiae* is very sensitive to pesticides and high temperatures). A more temperature-tolerant biotype would be beneficial in the Western Cape. One of the better results from the Eastern Cape had 66% effective parasitism in the release blocks compared to 44% in the control. The releases resulted in 61% less fruit drop. Sean stressed that it was important to monitor the level of parasitism and not to initiate sprays based on trap counts alone as every orchard is different. By doing this, unnecessary parasitoid releases could also be avoided. Parasitoid releases should start in October. Sean recommends 25 000 per hectare per month. The Cederberg Insectary recommends a total of 100 000 per hectare at a cost of approximately R800 per hectare. Topping up relatively high natural levels of parasitoids is much easier than trying to restore depleted levels. Hendrik Hofmeyr thinks that the six to eight years of parasitoid releases in the Citrusdal area were largely responsible for changing the FCM situation there from a crisis to one that was manageable. Some of Hendrik's releases were effective while others were not. Gerhard Booyesen said that Brian Trollip's releases appeared to be more effective when releases were made early in the season. Sean said it was important to learn more about alternate hosts for FCM.

### **Future research requirements**

The following possible research topics were identified either by growers at regional meetings earlier in 2001 or by researchers. Some requirements such as "All control methods" cover various research strategies. Research proposals addressing most of these topics have now been submitted to the CRI for funding from the research levy this year.

Research Requirement	Existing or New research
All control methods	E
Attract and kill	E
Prediction model (being investigated by DFPT)	N
SIT* feasibility study	N
Confirmation that irradiation will work for SIT	N
Alternate host plants (SIT/MD requirement)	N
Trap thresholds questionable	E
Biocontrol augmentation	E
Evaluation of granulovirus	E
Mating disruption with FCM pheromone	E
Mating disruption with electrostatic pheromone	E
Development of a new pheromone dispenser	E
Shorter post harvest treatment	E
Alternative post harvest treatments	E+N
Survey of larval parasitoids of FCM	N
Introduction of new association larval parasitoids (from related <i>Cryptophlebia</i> spp.)	N
<i>In vitro</i> rearing of egg parasitoid for augmentation	E
Population dynamics (average flight distance)	N
Further evaluation of indoxacarb and emamectin benzoate	E

Sterile Insect Technique

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