Mass rearing and quality control for false codlingmoth SIT application

Presented by: Sampie Groenewald
General Manager: XSIT

Sterile Insect Technique for the control of False Codling Moth (FCM)

Thaumatotibia leucotreta

Background contd.

- False Codlingmoth (fcm) is the most important phytosanitary pest for the export of citrus from South Africa, affecting most of the important markets, with cold sterilisation of fruit needed for some markets and others adopting a zero tolerance to the pest.
- Chemical applications controlled the fcm numbers for a number of years, but fcm developed multiple resistance against these pesticides, especially the Organophosphates and Pirethroids.
- A suitable solution to the fcm problem was therefore imperative to the economic survival of the South African citrus industry.

Background XSIT?

- Field cage trials and field trials conducted by Hendrik and Marsheille Hofmeyr (CRI), with assistance from Drs. Jim Carpenter, Stephanie and Ken Bloem (USDA), established that the application of SIT on False Codlingmoth (fcm) was effective in the Olifants River valley in the Western Cape.
- Citrus Research International (CRI) initiated the commercialisation of the technology and Xsit (Pty) Ltd was established in November 2006, through the commercial entity of the South African Citrus Grower's Association: Riverbioscience (RB).
- The South African Government, via the Dept. of Science and Technology was successfully approached as a shareholder .

Rearing jars filled with diet

Jar lid preparation

Unidirectional oven

Maternity ward

Inoculating eggs into rearing jar

Incubation room

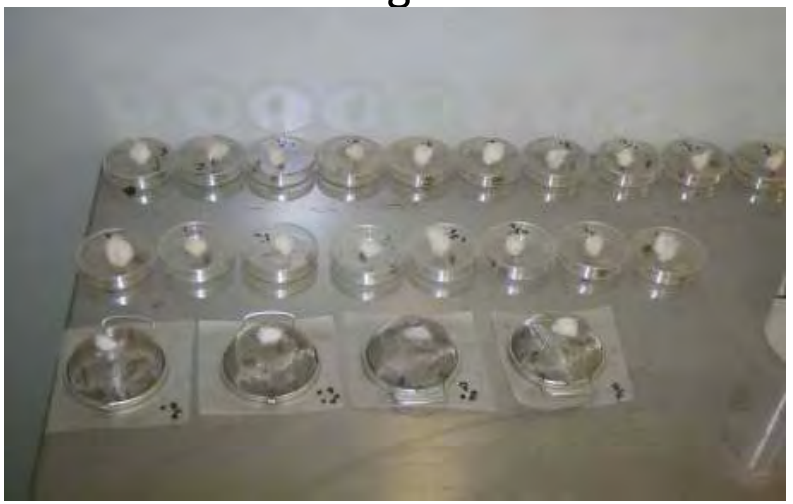
Larvae pupate in honeycomb substrate

Moth emergence cabinets

Release methods employed

1. Gyrocopter and quad bikes.
2. Release twice per week over the whole area.
3. Releases conducted for 10 months consecutively, from September to June.
4. Sterile moths are kept at 4C and then warmed up prior to release so that they can actively fly into the trees and avoid predation.
5. Warming up process is natural and not induced, with gyrocopter releases done far enough above the ground to allow the moths to heat up and fly prior to reaching the trees.
6. Release-rows are spaced evenly at 50 meters for quad bikes and 100 meters for the gyrocopter releases.

Mating trials



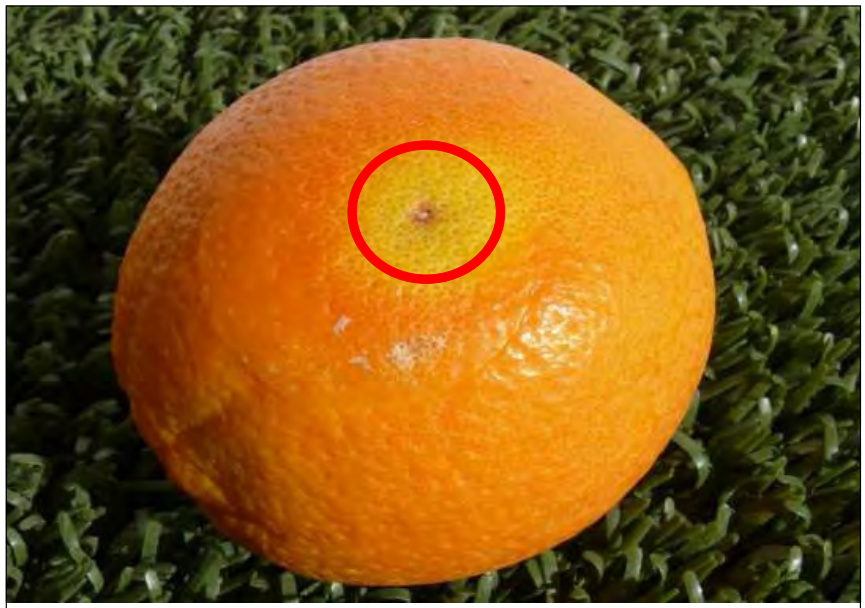
F1 Sterility

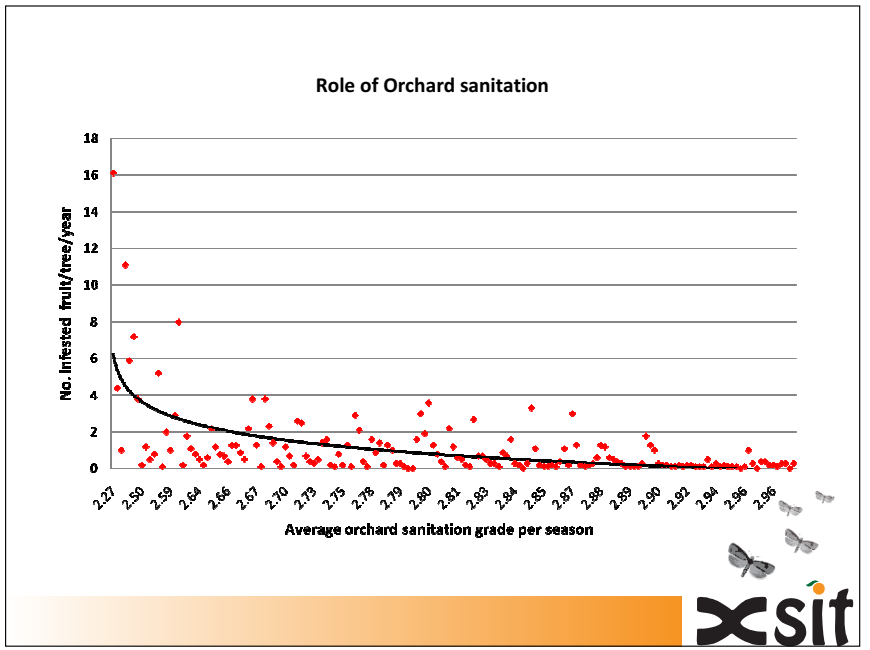
Rollout of the fcm SIT program

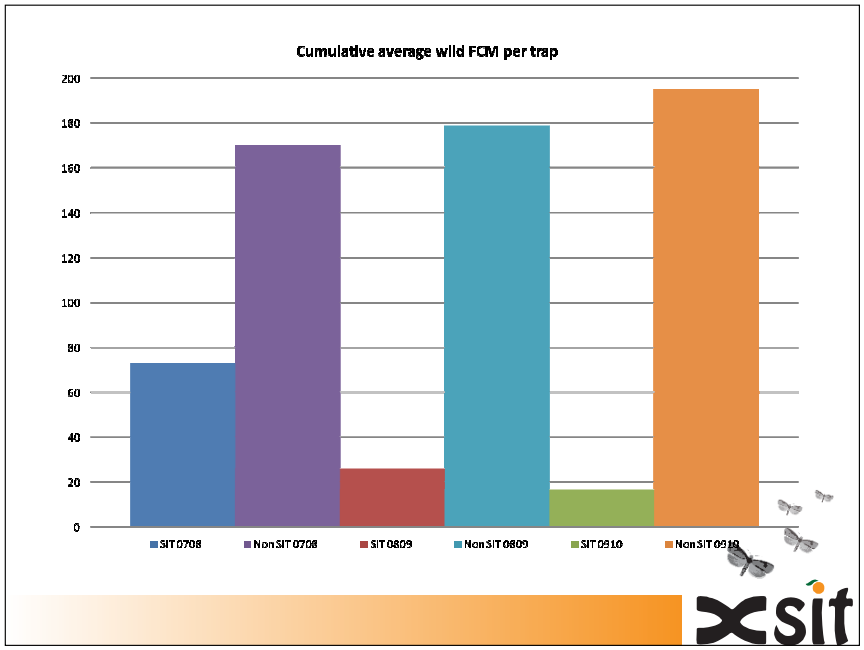
- 200708 season: 1500 hectares
- 200809 season: 3000 hectares
- 200910 season: 3500 hectares
- 201011 season: 4800 hectares

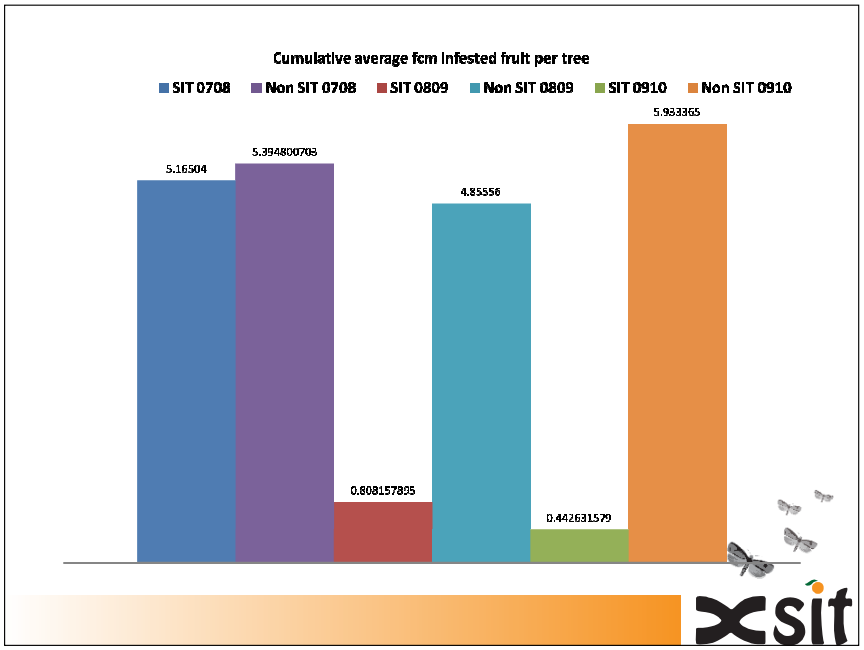
Factors instrumental to successful implementation

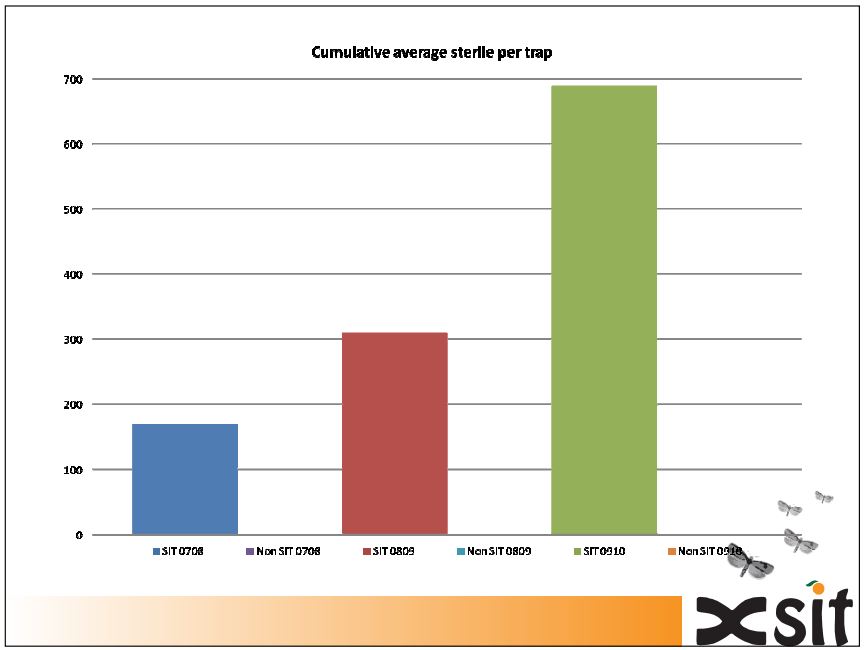
1. Area wide coverage of all susceptible hosts in the application area.
2. Determining and managing the presence of alternate host plants.
3. Non-conformance:
   - Initially negative for SIT participant.
   - Later to the benefit of non-conformant.
4. Ratio of sterile to wild moths.
5. Improved cold tolerance of facility reared fcm.
6. Farm management:
   - Orchard sanitation
   - Spraying on moth peaks, etc.

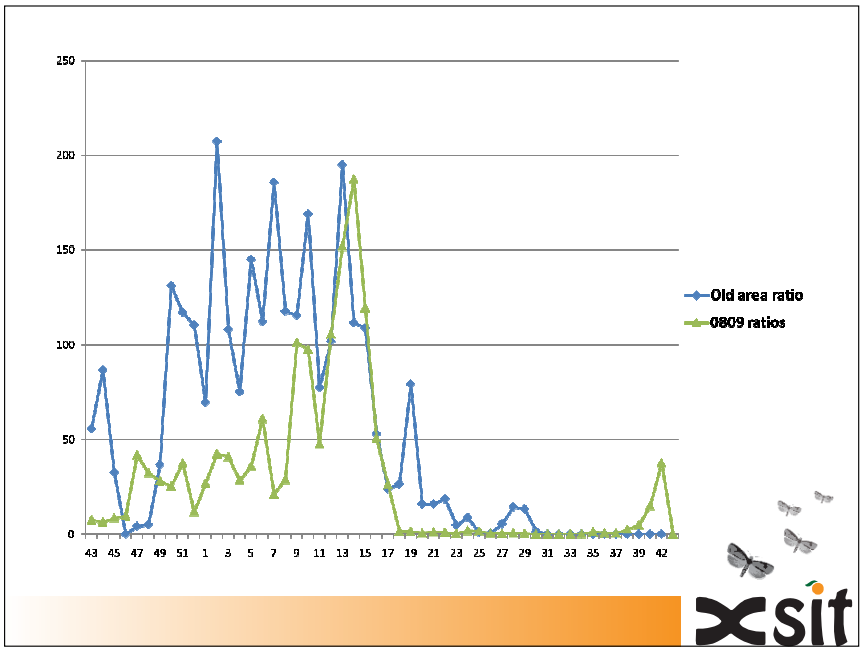


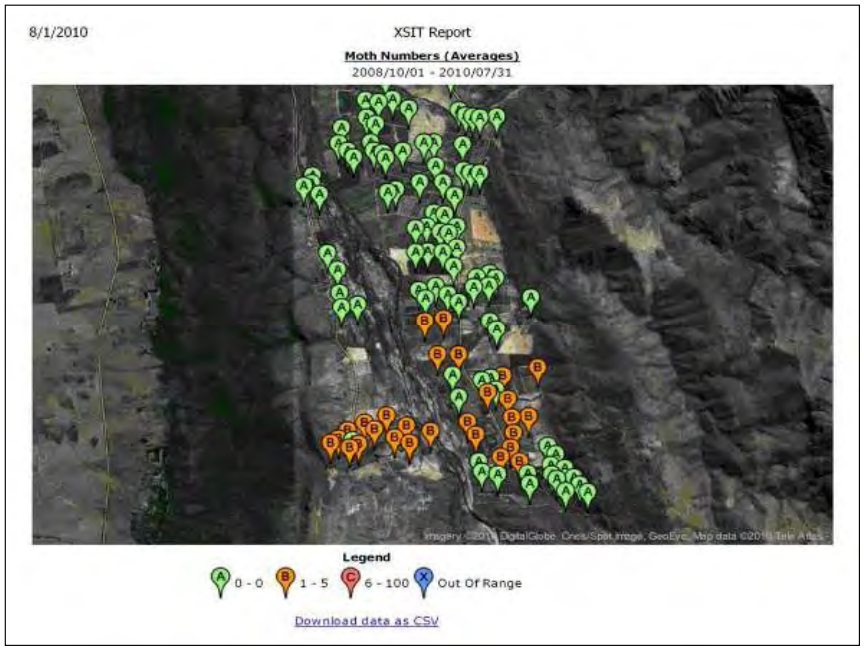



Cumulative average wild FCM per trap
200
180
160
140
120
100
80
60
40
20
0
SIT 0708
Non SIT 0708
SIT 0809
Non SIT 0809
SIT 0910
Non SIT 0910


Cumulative average fcm infested fruit per tree
SIT 0708
Non SIT 0708
SIT 0809
Non SIT 0809
SIT 0910
Non SIT 0910
5.16504
5.394800708
0.808157805
4.85556
0.442631579
5.933365


Cumulative average sterile per trap
700
600
500
400
300
200
100
0
SIT 0708
Non SIT 0708
SIT 0809
Non SIT 0809
SIT 0910
Non SIT 0910


250
200
150
100
50
0
43 45 47 49 51 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41
Old area ratio
0809 ratios



QC summary

- Every part of production process.
- Sterility and virility.
- Flight ability.
- Release quality:
  - Temperature control
  - General practices
- Recaptures and fruit monitoring
  - Ratio of sterile to wild population
  - Actual damage at orchard level