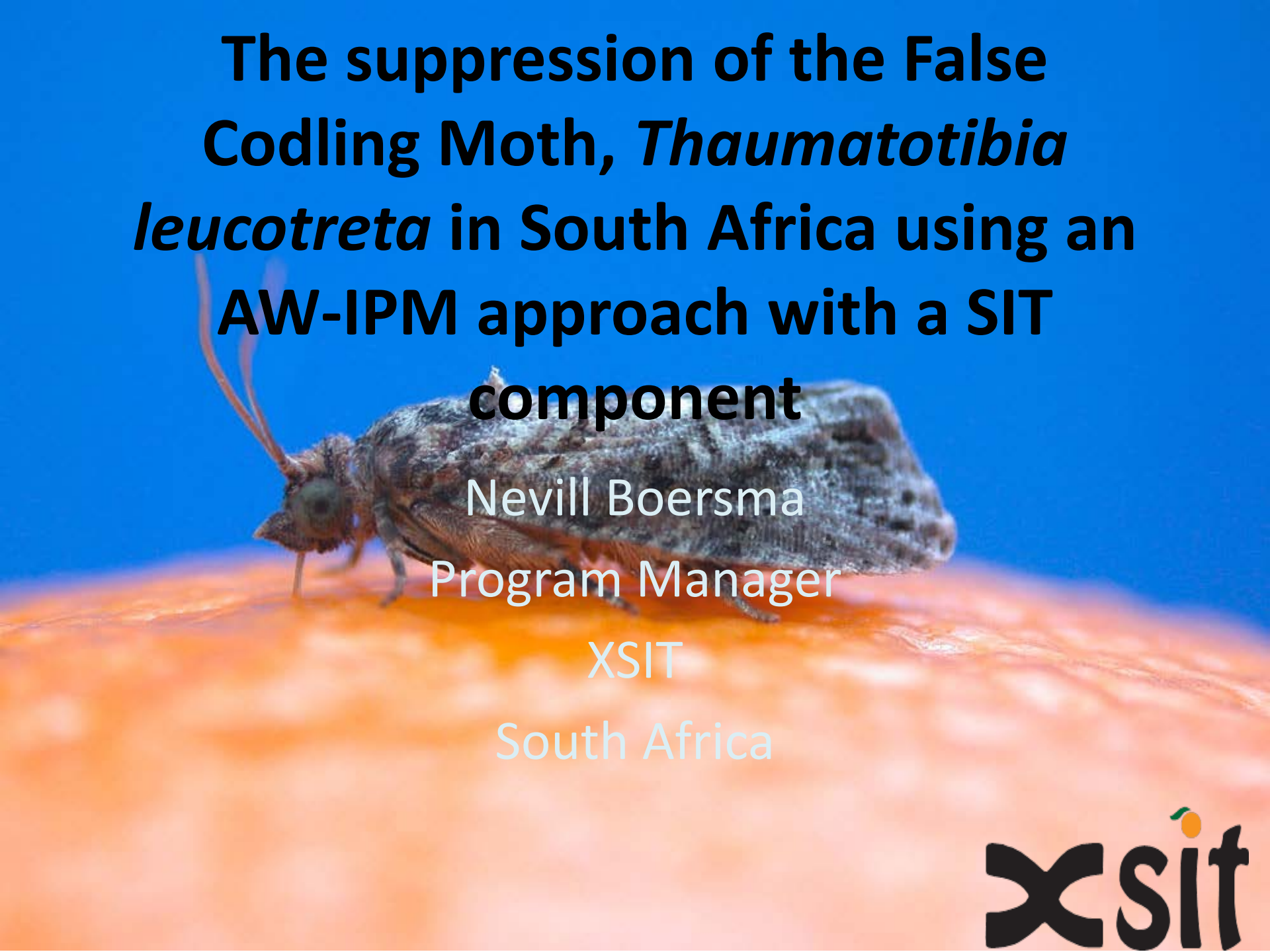
The suppression of the False Codling Moth, *Thaumatotibia leucotreta* in South Africa using an AW-IPM approach with a SIT component



Nevill Boersma

Program Manager

XSIT

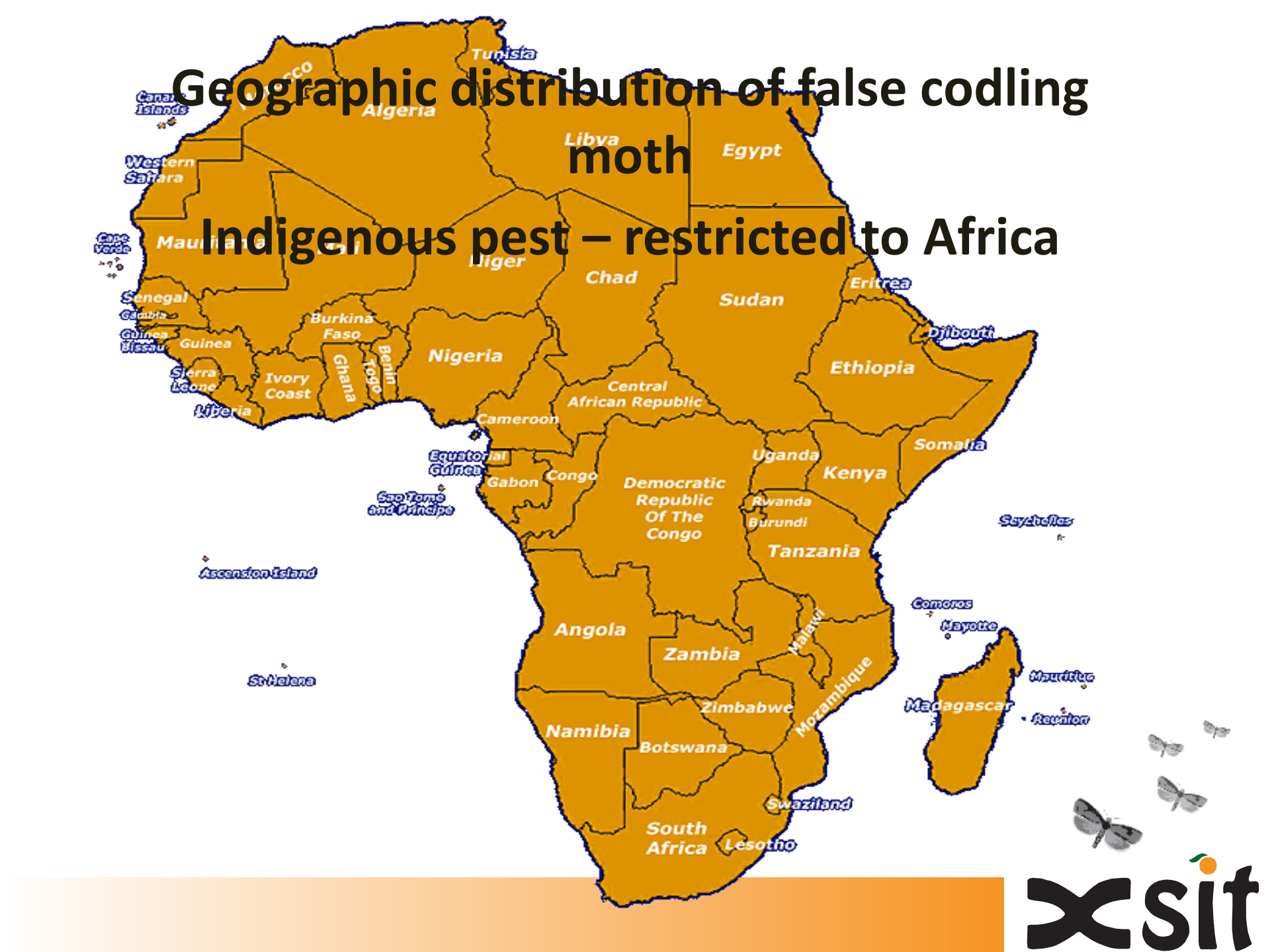
South Africa

Background

- FCM sub-Saharan African pest of cultivated crops
- Phytosanitary pest on citrus with more than 88 hosts
- 1976
- Situation became worst after *T. leucotreta* developed resistance against insecticides
- Various pyrethroids and growth inhibitors in the benzoyl urea group
- Time for a new sustainable approach
- Multi-institutional research project in 2002, the sterile insect technique (SIT) was launched in 2007
- CRI; USDA; TIA; IAEA
- Area wide control program

Geographic distribution of false codling moth

Indigenous pest – restricted to Africa



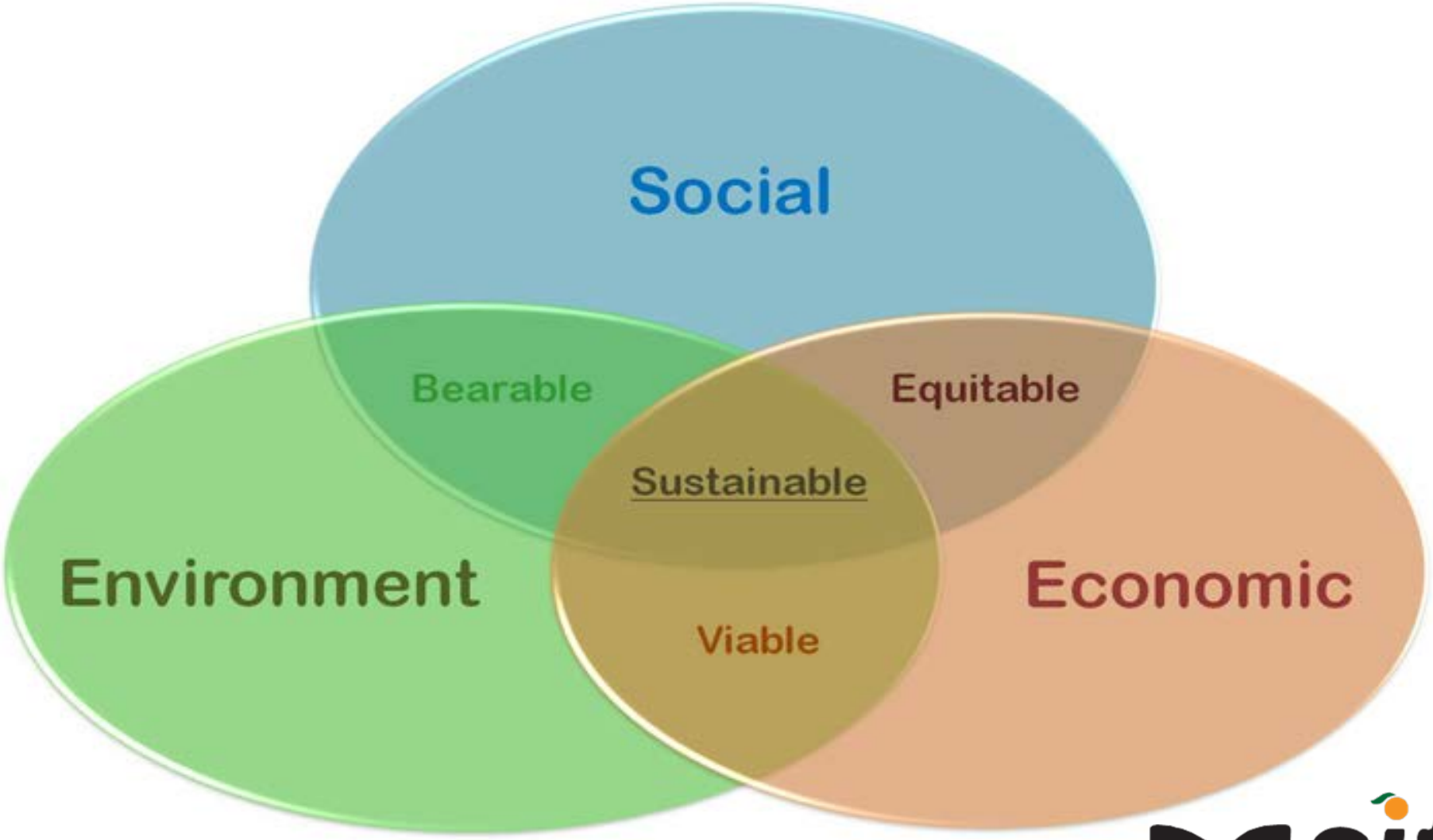
Thaumatotibia leucotreta

Fig. 1. Citrus fruit infested by false codling moth.
http://idtools.org/id/citrus/pests/factsheet.php?name=False+codling+moth

Fig. 2. Adult false codling moth.
http://www.export.biocontrol.ch/sites/products/bio-insecticides/baculovirus/cryptex.html

Up to 17 larvae found on one grape bunch

Principles for sustainable (pest)management

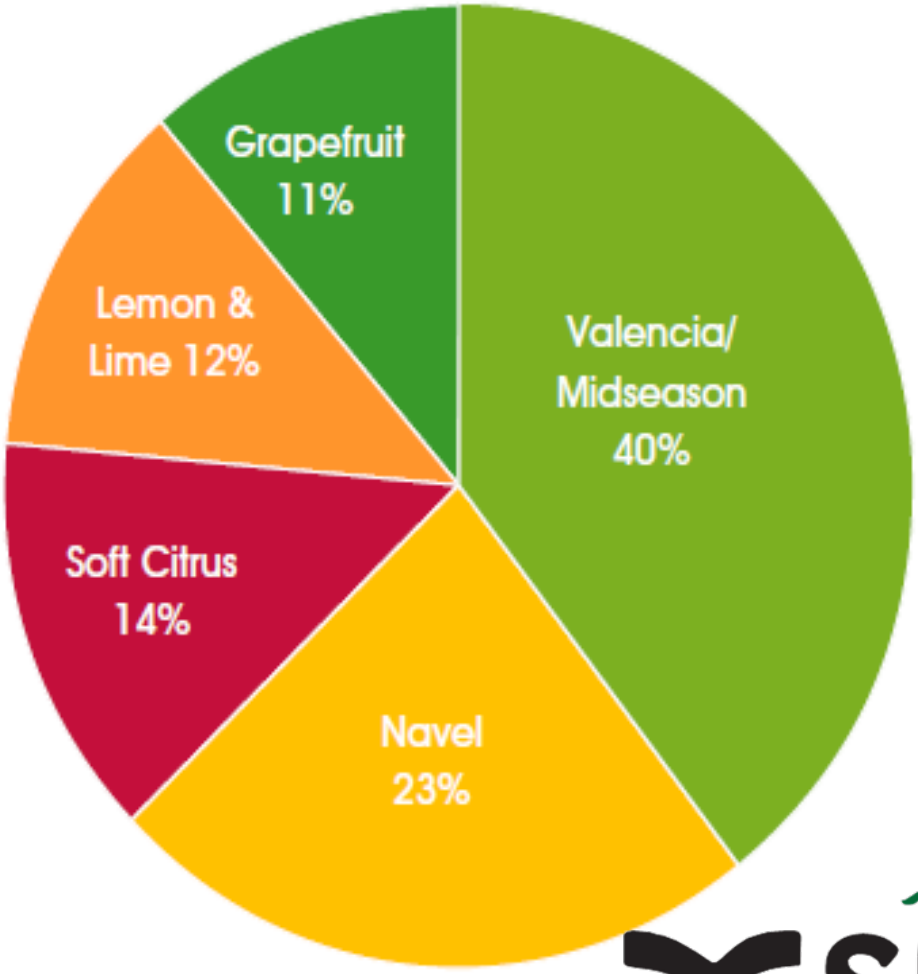


ECONOMICS

Area planted per citrus group

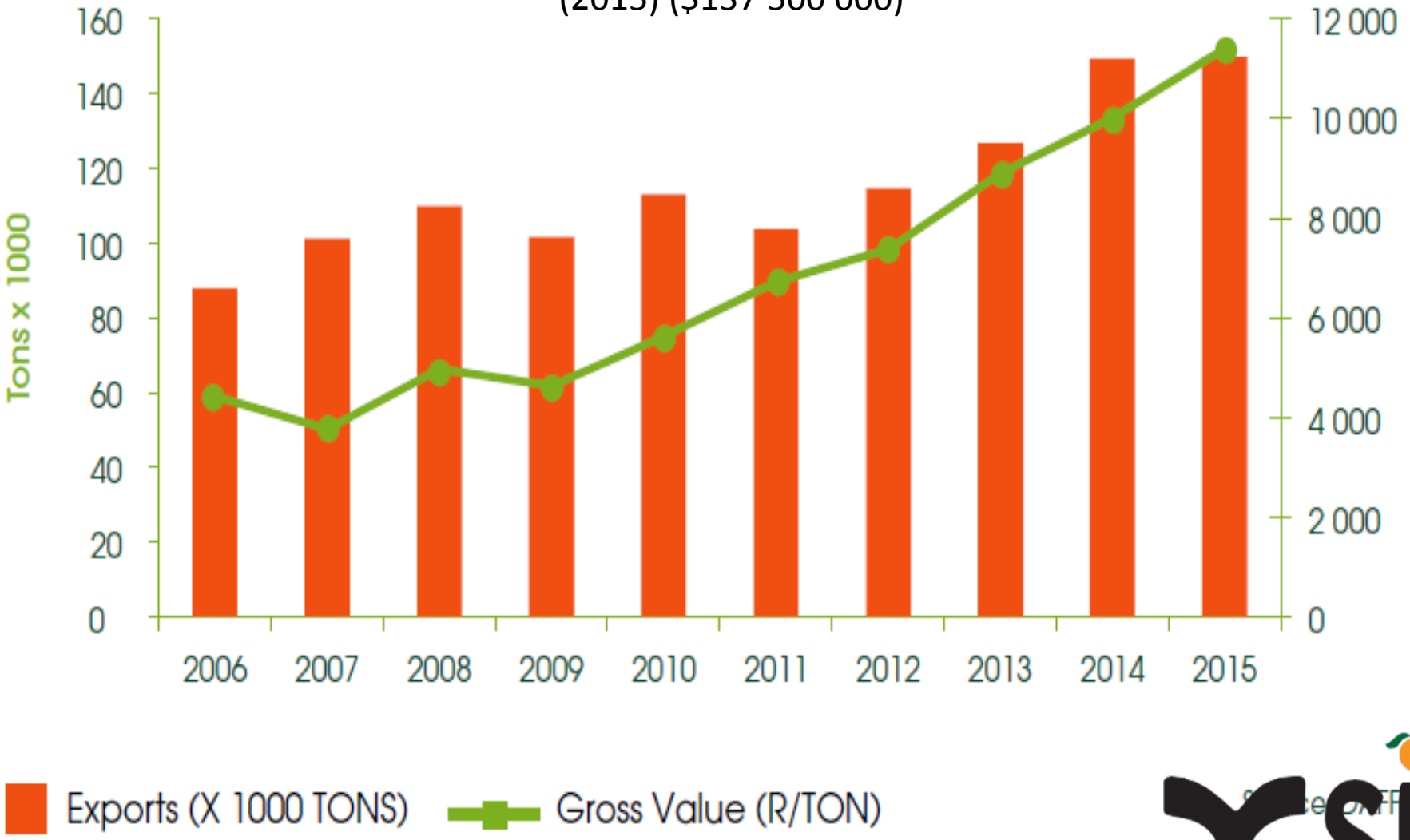
AREA PLANTED PER CITRUS GROUP

Variety Area	(ha)
Valencia/Midseason	27 056
Navel	15 930
Soft Citrus	9 335
Lemon & Lime	8 262
Grapefruit	7 678
Other	11
Grand Total	**68 272**

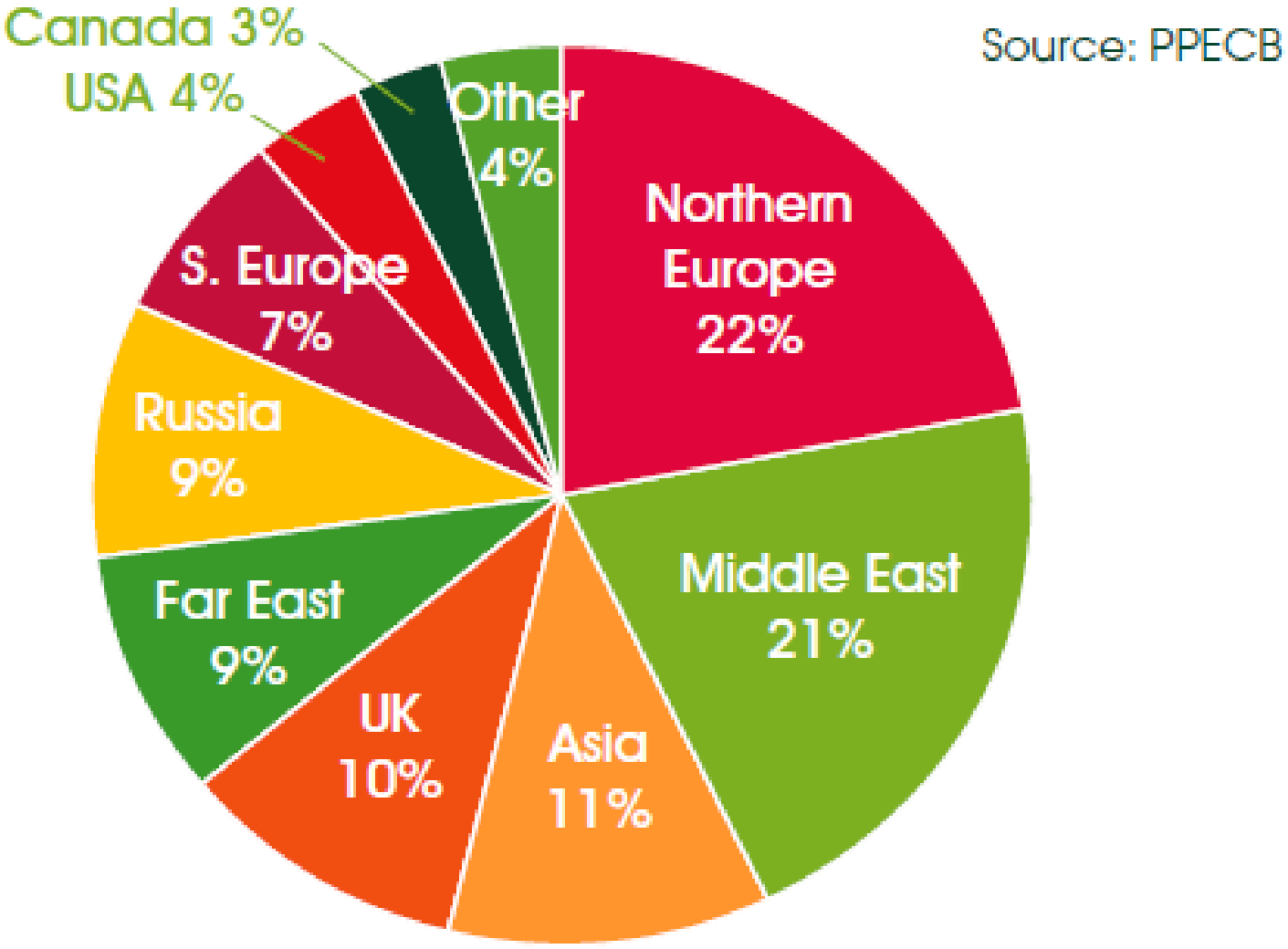


HISTORICAL EXPORT VOLUMES

From 90 000 t (2006) ($ 63 000 000) to 150 000 t (2015) ($137 500 000)



MAJOR EXPORT DESTINATIONS 2015



Source: PPECB

Economic risk

- Phytosanitary pest (USA, Far East and EU)
- Zero tolerance
- Main insect pest on Citrus
- Economical Threats

Socio Economic impact

- Complement of workers have increased from 45 in 2010 to 160 in 2017 as programme expanded.

- The worker dependent ratio is 1:4, which means approximately 650 people financially benefit directly from the operations.

- Apart from increased economic activity stimulated by the insectary itself, SIT also contributes to economic security of citrus farming operations by retaining export markets and thereby ensuring continued employment of farm workers..

Environment

must be bearable

NON IPM pest management

- Treadmill effect
- Not responsible
- Destroying of biodiversity
- Reactive approach

Systems approach

- IPM systems to control pest and preserve environment
- Supports beneficial organisms
- Pro active
- Nurtures and promote environment/diversity

Pest management

	Chemical	vs	Biological/SIT
• Sustainable on long term?	NO		YES / NO
• Impact on non-target species?	YES		NO
• Impact on predators?	YES		NO
• IPM/area wide?	NO		YES
• Negative Effect on environment?	YES		NO/ YES
• Short term solution	YES		NO

What is SIT

- SIT (or SIR) is the mass-release of partially-sterile insects to reduce the effective population of the species through competition and subsequent mating.
- Released insects are not necessarily 100% sterile.
- Males and Females are radiated and released.
- SIT is designed to work as an area-wide suppression technique.

What is SIT not?

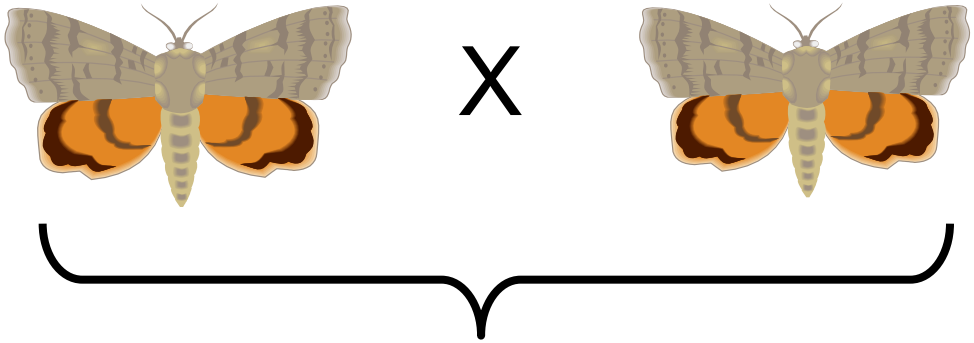
- SIT is not a “silver bullet”.
- SIT will not eradicate the pest within a season.
- SIT is not meant to be a “stand-alone” control practice.
- SIT does not mean we can get complacent.

Radiated Lepidoptera (moths)

radiated female
(100% sterile)

Wild male
(fertile)

Parents
(P)



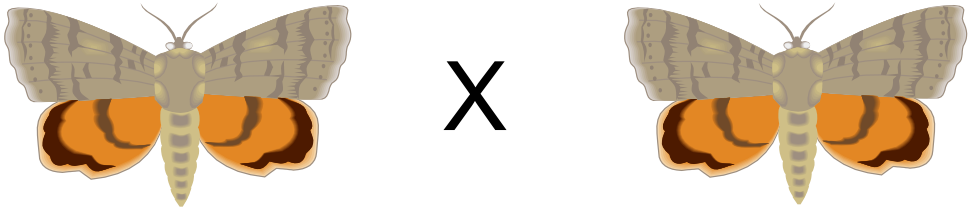
No offspring

Radiated Lepidoptera (moths)

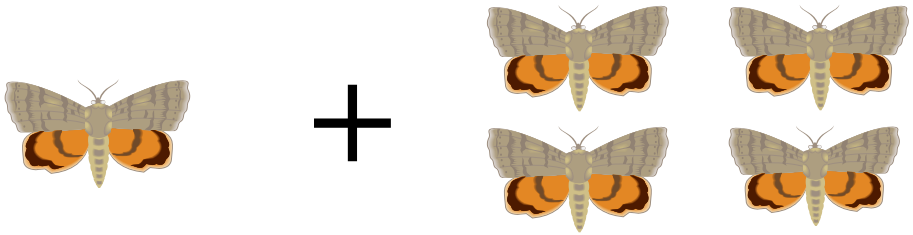
Wild female (fertile)

radiated male (partially sterile)

Parents (P)



Offspring (F_1)



Sterile females and males = F1 sterility


RADIOACTIVE
RADIOACTIEF

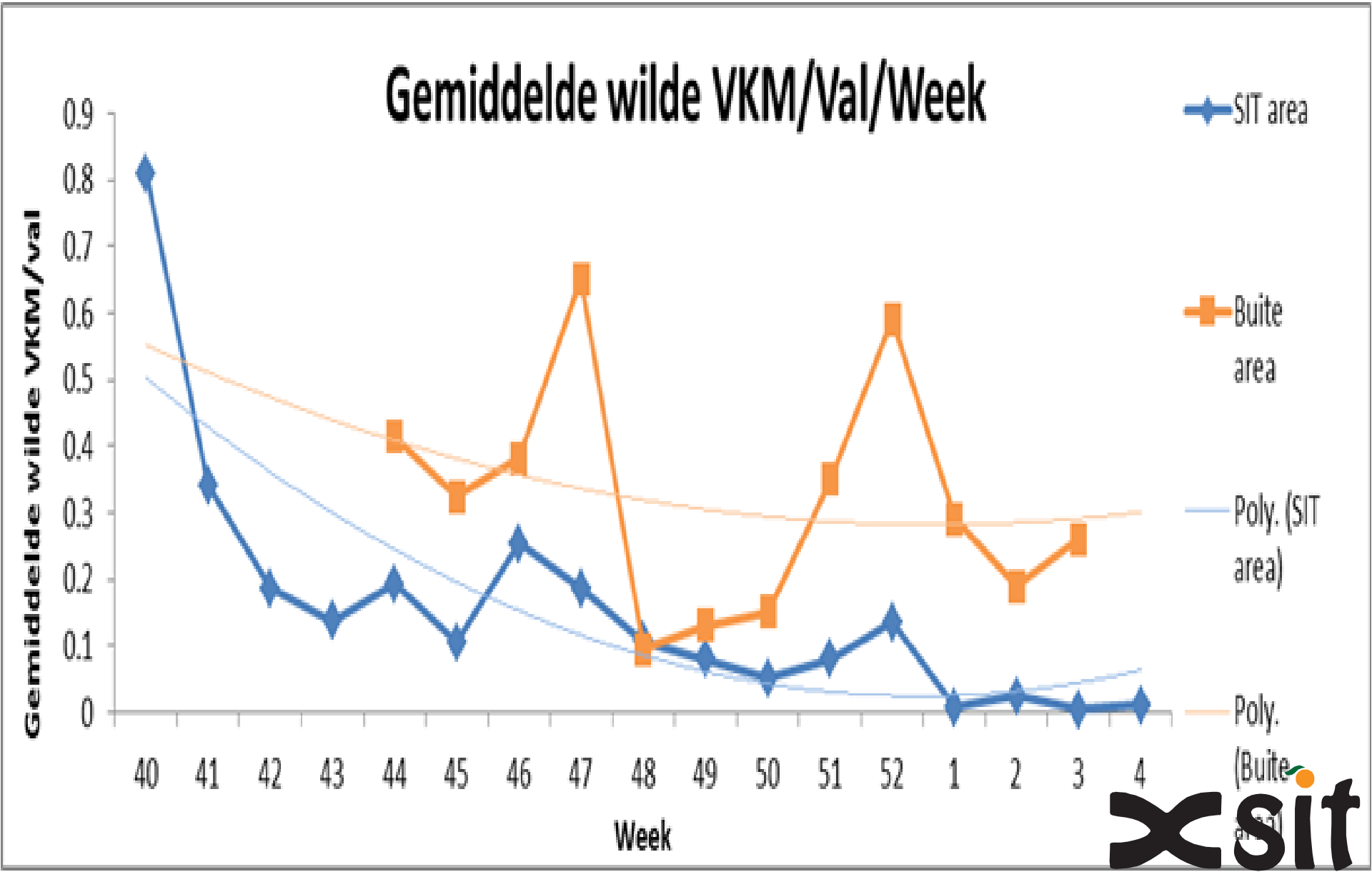
Program overview

- 18 000 ha
- 3 provinces
- 5 offices

The Program

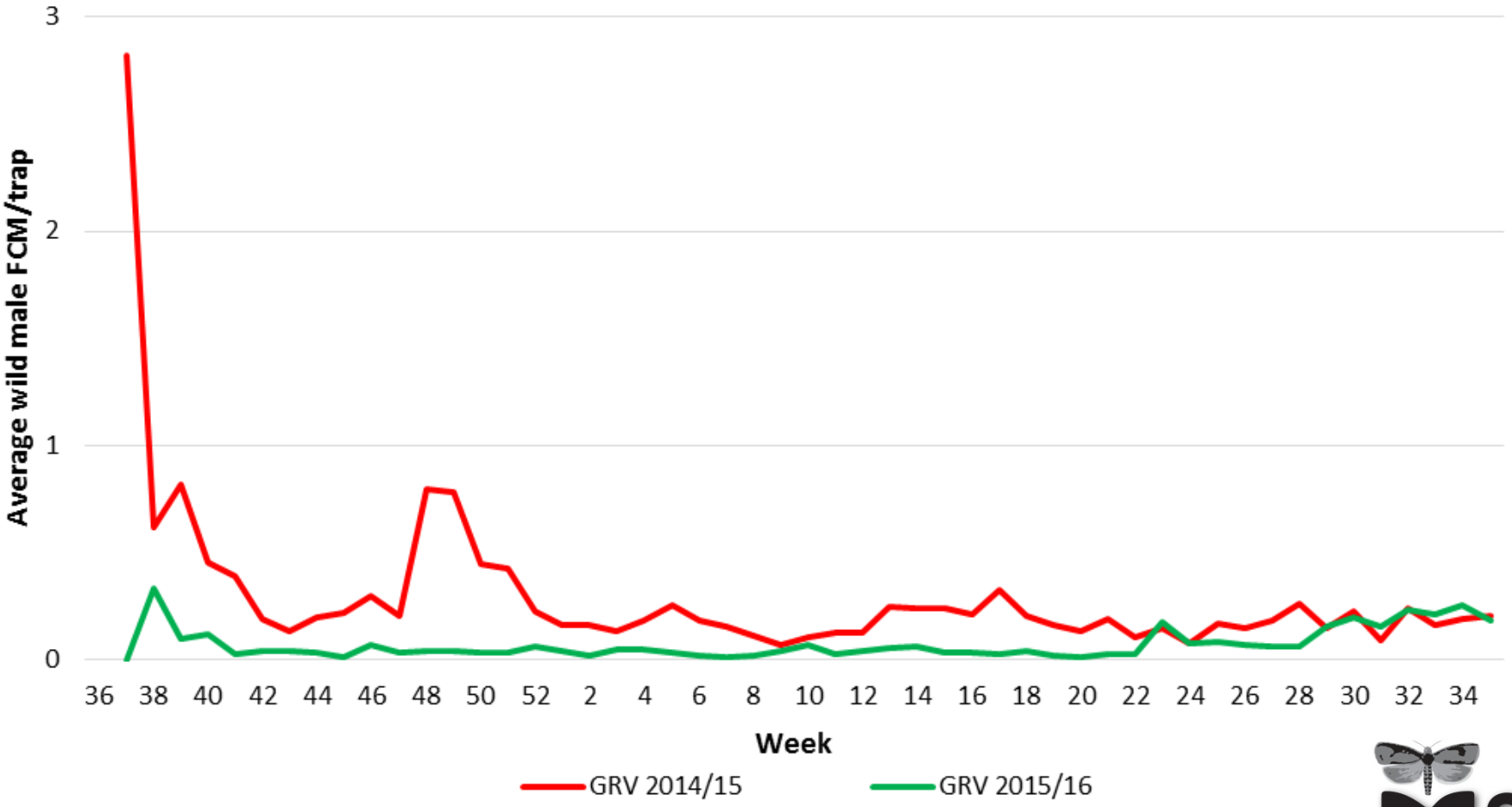
- Ratios of 1:10 is maintained to ensure that the technique is effective.
- 1000 moths per ha are released twice a week in summer
- 2000 moths per ha are released once a week in winter.
- The graphs below, comparing results on a season-to-season base, illustrates how efficient this strategy has been and is an excellent indication of future success

Average wild moth per trap /week: N Cape

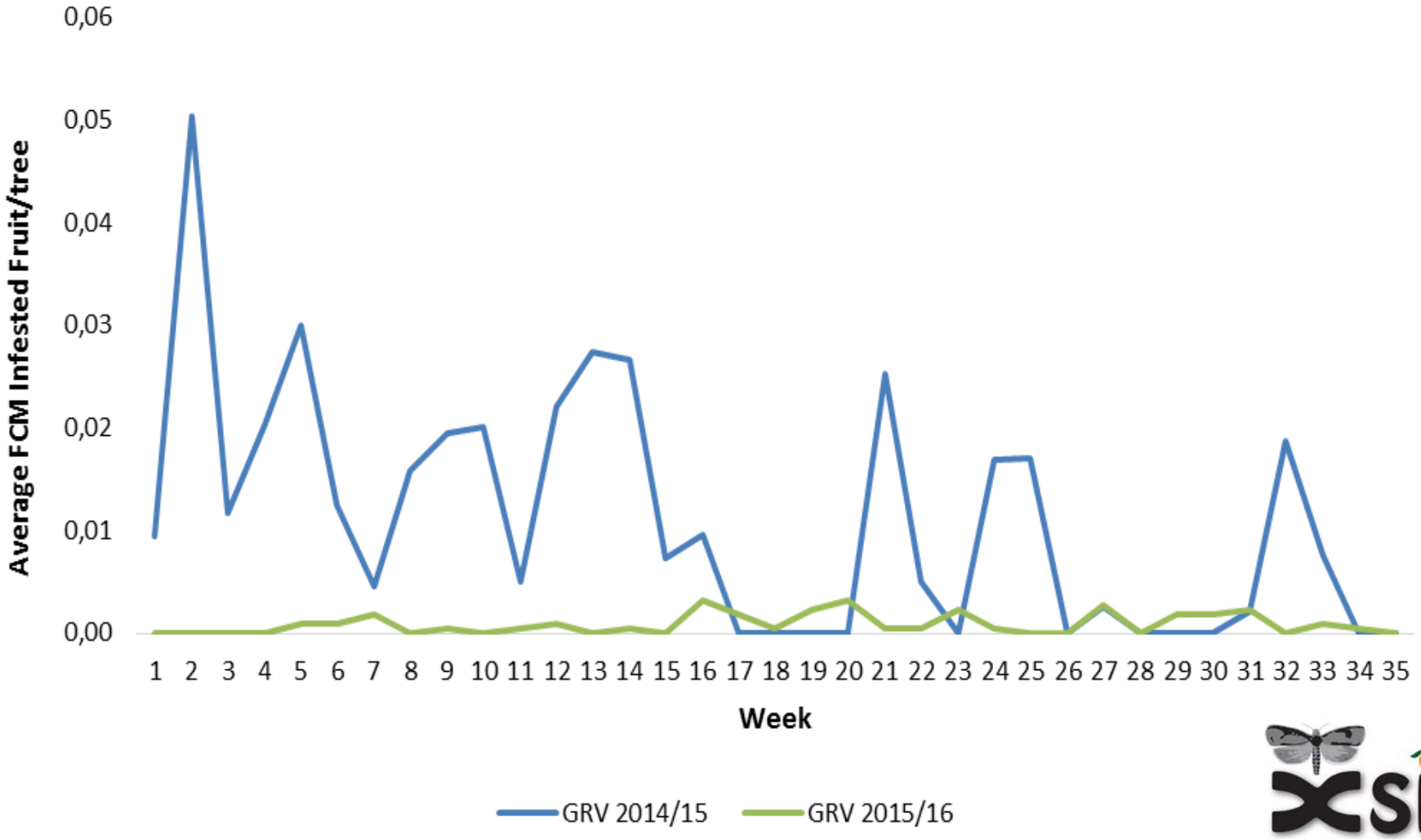


Results: Gamtoos

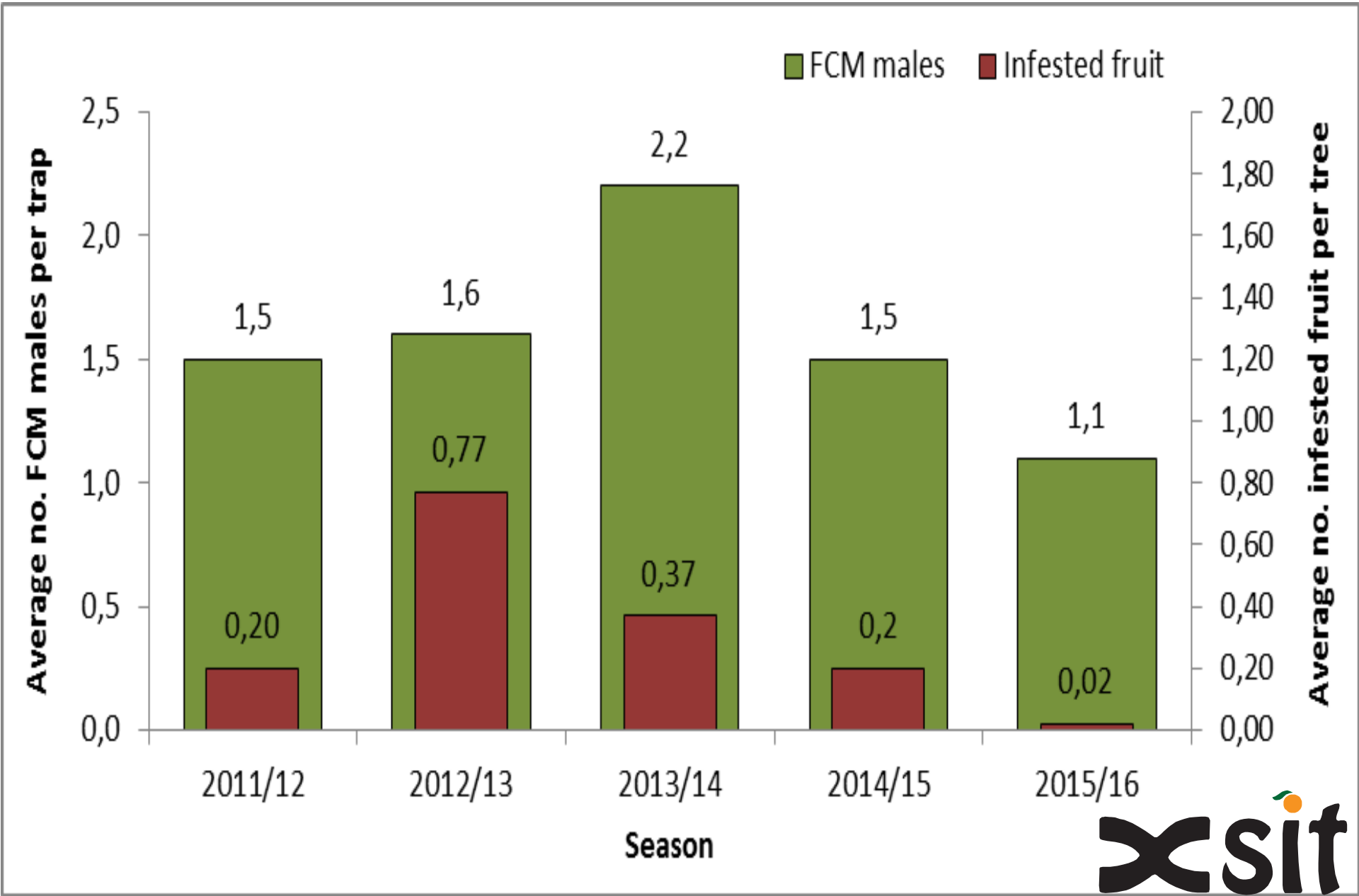
- Fantastic start-up, suppressing wild FCM population from the word ‘GO’



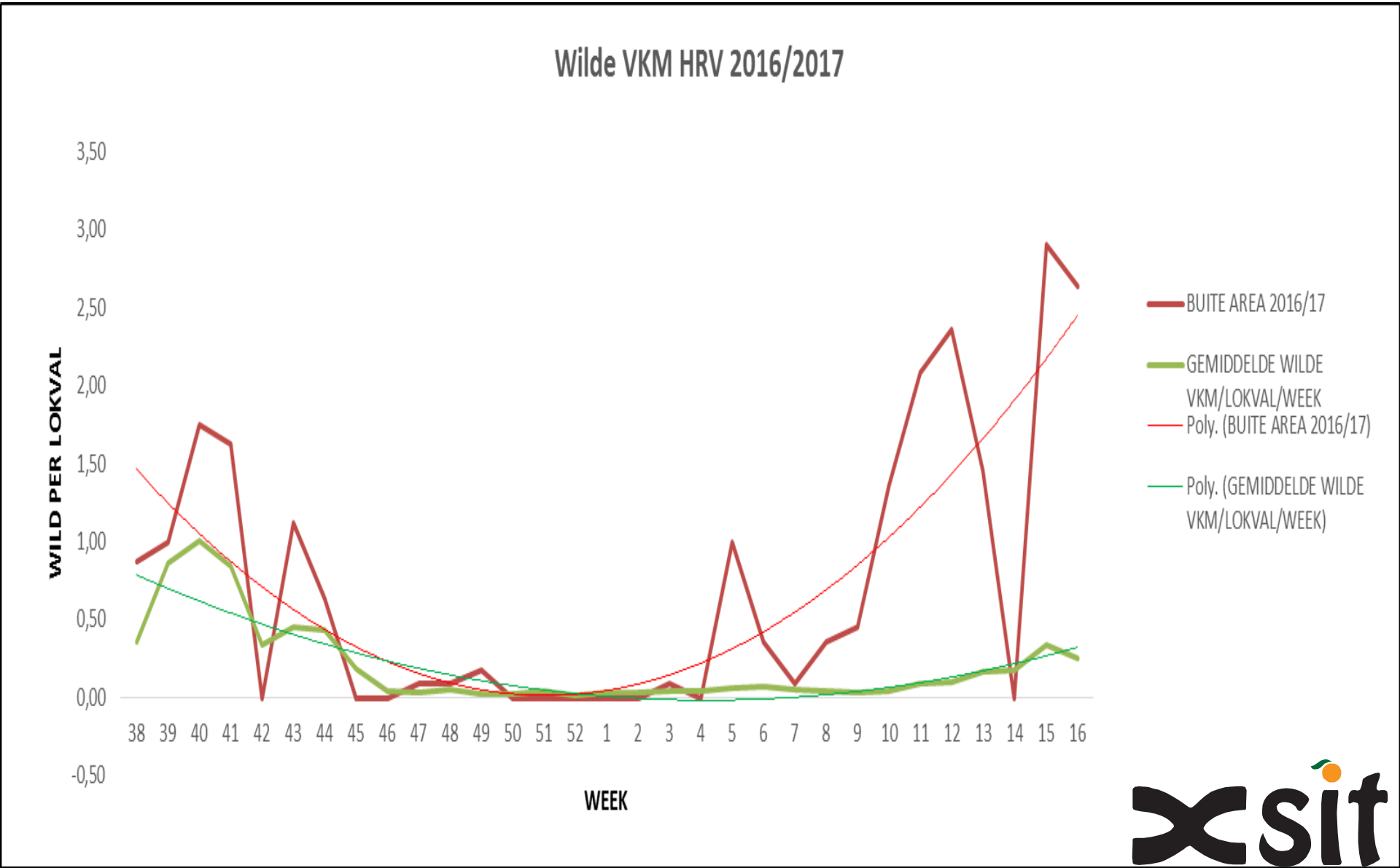
Average infested fruit per tree: GAMTOOS



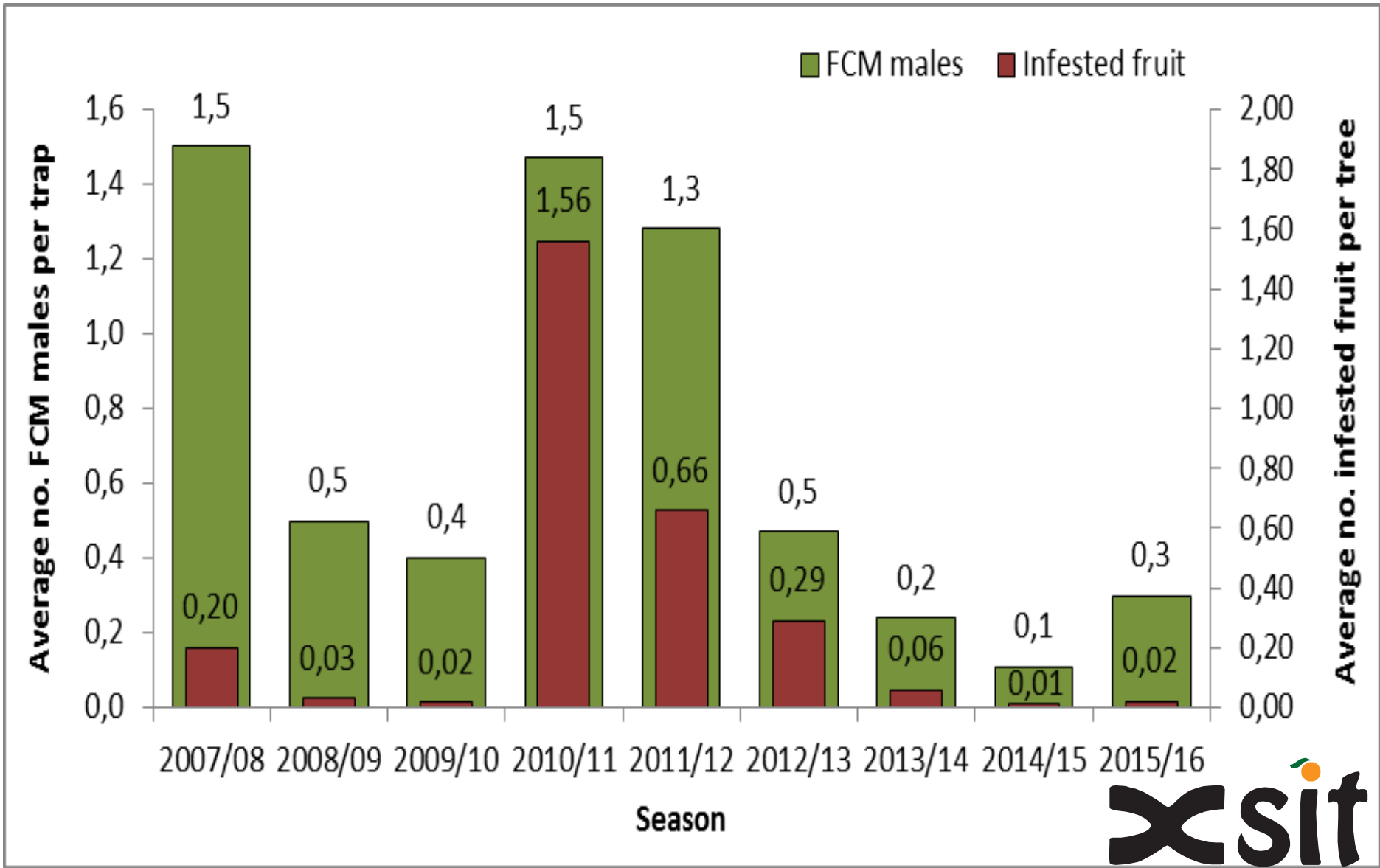
Wild FCM/Infestation SRV



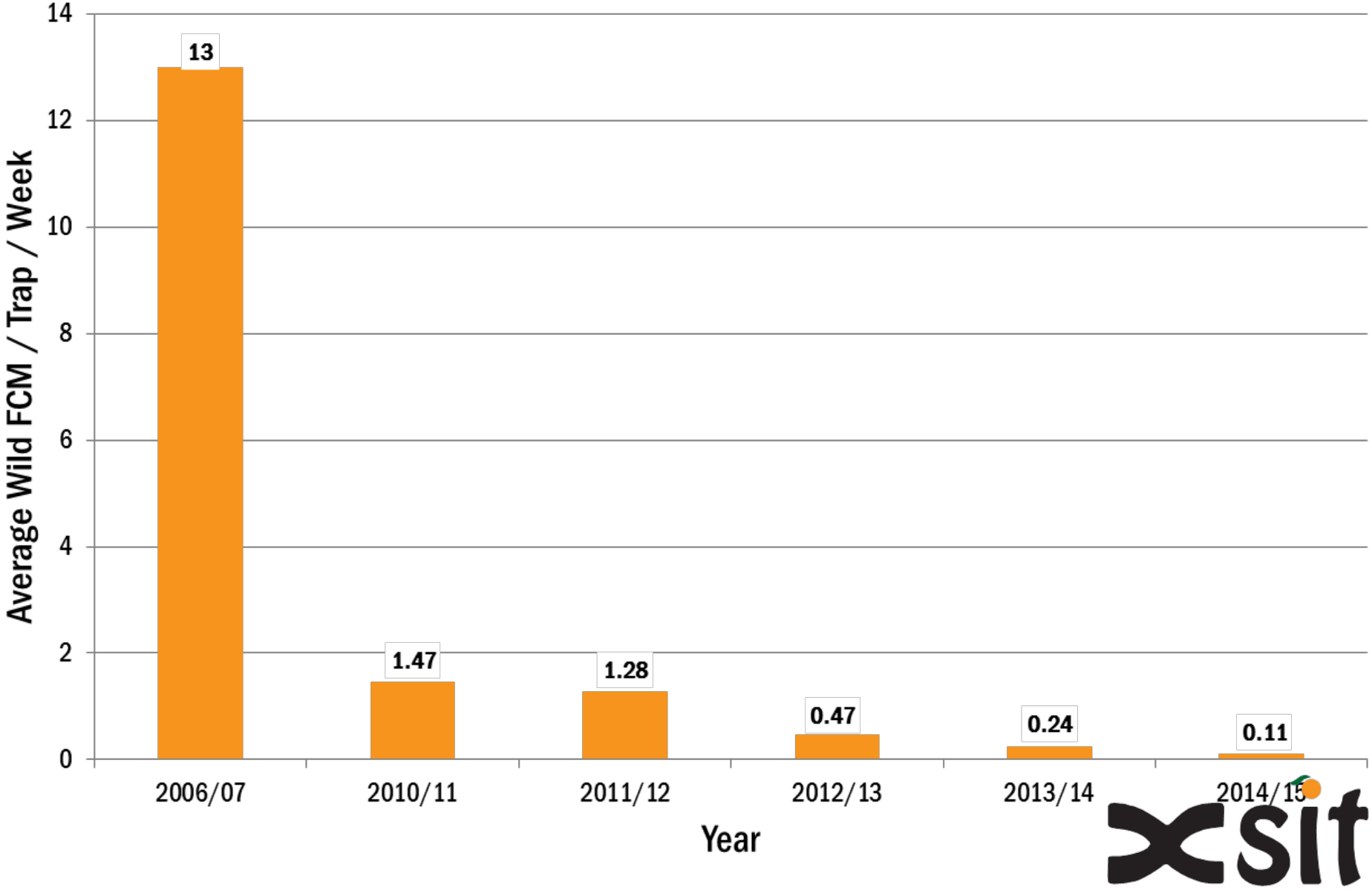
Average wild moth trap/ week Hex Valley



Wild FCM/Infestation ERV



Effect of SIT in ERV W-Cape: Pre SIT



Future Plans

- Become an centre of excellence for FCM management.
- Double our capacity.
- Investigate the use of alternative biological products , not only for FCM , but other phytosanitary pests.
- Become the number 1 choice for area wide biological control of pests in South Africa.

SPECIAL THANKS

- IAEA
- XSIT