PEST MANAGEMENT FOR THE FUTURE: ARE ALTERNATIVE OPTIONS REALISTIC OR JUST "PIE-IN-THE-SKY"?

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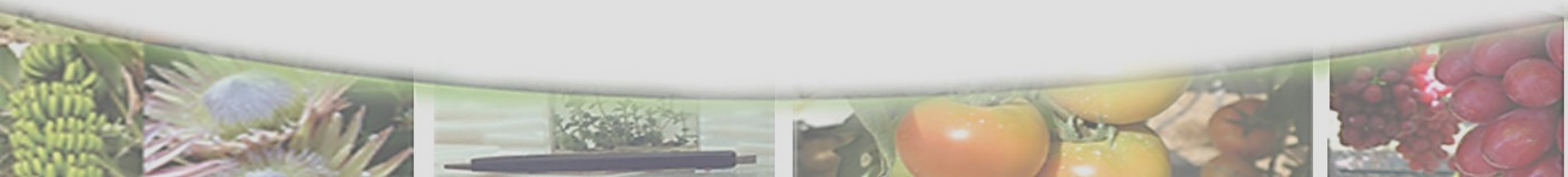

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BACKGROUND

- Rapid development of synthetic pesticides after WWII
- Highly toxic organo-phosphate and organo-chlorine pesticides widely used on crops and in households
- During the 1960's scientists & the public became aware of the harmful effects of pesticides on humans and the environment (Carson, 1962 & others)

BACKGROUND

- Stern *et al*. (1959) proposed concept of Integrated Control = pest control which combines and integrates biological control and chemical control
- Smith & Reynolds (1966) defined Integrated Pest Management (IPM) as a pest population management system that utilizes all suitable techniques in a compatible manner to reduce pest populations and maintain them at levels below those causing economic injury
- IOBC definition of IPM (1973): a pest control system that uses a set of methods that satisfy economic, ecological and toxicological requirements by giving priority to natural control and by respecting tolerance thresholds

Deguine *et al*. (2021)

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BACKGROUND

Search for alternatives to chemical control driven by

- Market demands for residue free fruit & sustainable fruit production
- Regulatory pressure: products banned
- Pest resistance to chemicals

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ALTERNATIVES TO CHEMICAL CONTROL

Resistance breeding

- Conventional and GMO technology – consumer resistance to GMO's
- No plant is resistant to all pests and diseases
- Resistance features at odds with consumer demands; thick skins & higher tannin levels

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ALTRENATIVES TO CHEMICAL CONTROL

Biological control options available commercially

- Pheromones used in mating disruption and attract & kill
- Predators
- Parasitoids
- Insecticidal viruses & bacteria

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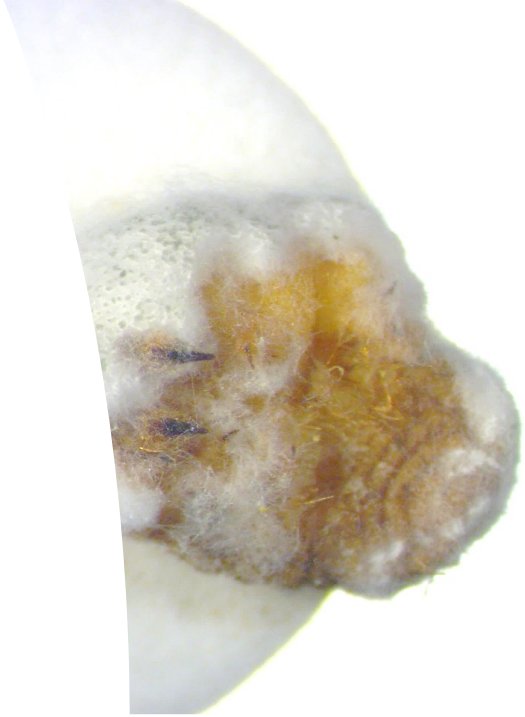
ALTERNATIVES TO CHEMICAL CONTROL

Potential biological control options

- Entomopathogenic fungi (EPF) and nematodes (EPN)
- Deterrents, repellents & attractants for “push-pull” (plant essential oils) – need research on formulation



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RESEARCH FUNDED BY SA TABLE GRAPE INDUSTRY OVER LAST 15 YRS

- Determining the efficacy of foliar applications of EPNs to control the vine mealybug, *Planococcus ficus*.
- The biology, behaviour, and control of Trimen's False Tiger Moth on South African grapevines.
- Implementation of biological control options against false codling moth in laboratory and field trials.
- Mass culture and formulation of entomopathogenic nematodes for improved field application against key insect pests in vineyards.
- The efficacy of entomopathogenic biocontrol agents against *Scirtothrips aurantii*.
- Developing an IPM strategy for *Margarodes prieskaensis* in table grapes.
- Biocontrol of two sporadic pests — banded fruit weevil and Katydids — in vineyards and orchards.
- Integrated management of the control of False Codling Moth (*Thaumatotibia leucotreta*).
- In vitro liquid culture of entomopathogenic nematodes to be used for field trials against False Codling Moth.
- Exploration of orchard sanitation and the potential of parasitoid wasps for the biological control of fruit flies in South Africa.

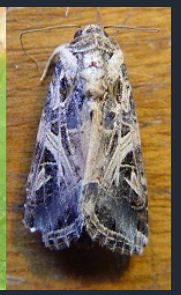
CHALLENGES WHEN DEVELOPING ALTERNATIVES

Previously unimportant insects suddenly reaching economic pest status ⇐ climate change, introduction of crops into new areas and fewer board-spectrum insecticides used

Outbreaks of sporadic pests due to erratic weather patterns – difficult to manage because growers do not routinely monitor for their presence and can be caught off guard





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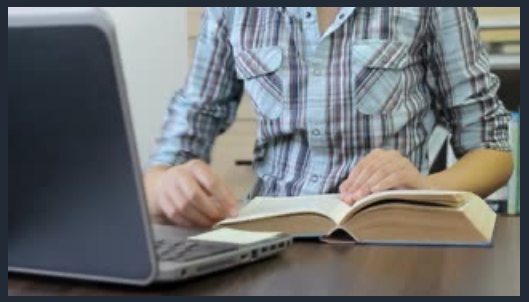
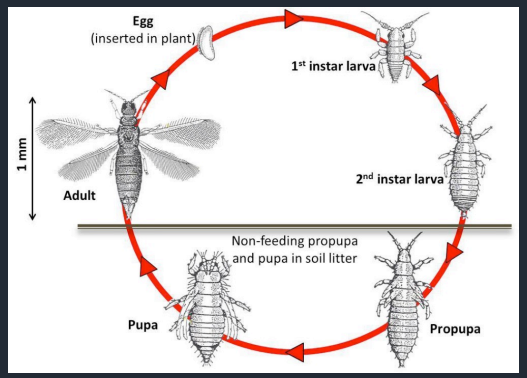
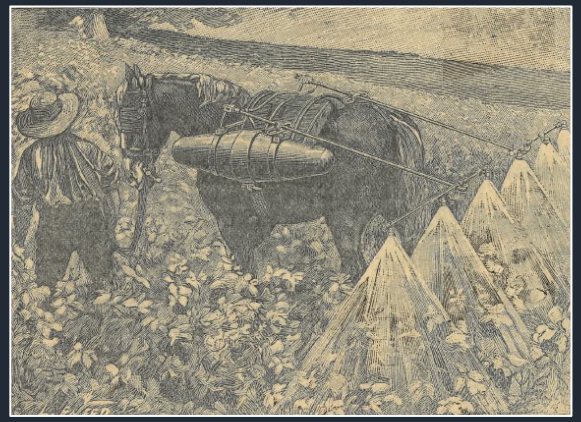
CHALLENGES WHEN DEVELOPING ALTERNATIVES

- Evaluate efficacy of local EPN and EPF in field trials: research to date mostly lab screening and pot/semi-field trials
- Protocols for mass-production of EPN and EPF on commercial scale
- Formulation of EPN and EPF to protect against adverse environmental conditions
- Legislative – exploiting biodiversity for commercial gain





OBSTACLES TO DEVELOPMENT AND ADOPTION OF IPM



IPM is

- Knowledge-driven
- Management intensive
- Site/situation specific; no one-size-fits-all recipe
- Requires massive paradigm shift from farmers

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OBSTACLES TO DEVELOPMENT AND ADOPTION OF IPM

- Vested interests from Agchem industry
- Lack of independent pest management advisors with knowledge of IPM
- Most pest control advisors in farming industry affiliated to chemical distribution companies

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OBSTACLES TO DEVELOPMENT AND ADOPTION OF IPM

- Consumers demand residue & pesticide free fruit, and no blemishes like scarring or halo spotting from thrips
- No tolerance for presence of natural enemies on fruit
- Phytosanitary regu-lations imposing mandatory pesticide applications

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IS IPM JUST PIE-IN-THE-SKY?

HOW DO WE MAKE IPM A REALITY?

- Drive commercialization of local EPF and EPN – field evaluations, formulation and mass production
- Train future farmers more thoroughly in IPM at university and agricultural colleges
- Co-opt farmers practicing IPM to sell the concept to others
- Train and support independent IPM advisors
- Consumer education; tolerate minor blemishes, understand and accept GMO techniques (grape to grape)

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THANK YOU GRACIAS GRAZIE MERCI DANKIE