

International Macadamia Symposium 2023



IMS'23

MOVING FORWARD TOGETHER

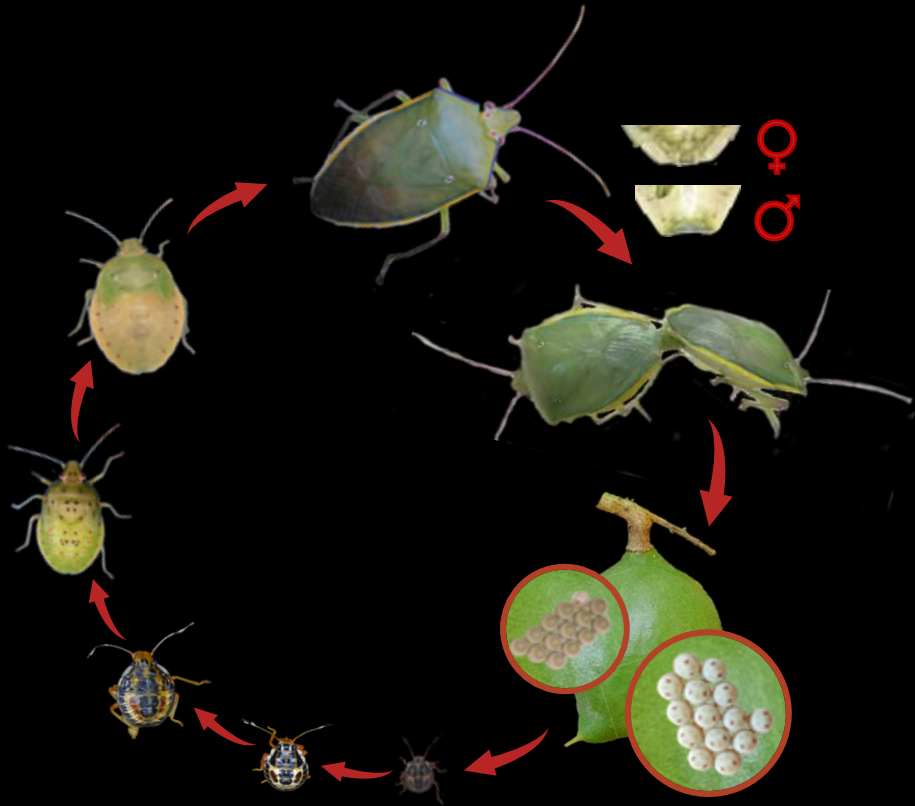
Macadamias South Africa (NPC)  
(SAMAC)



# Towards biological control of macadamia pest

Gerda Fourie

# Stink bugs (Pentatomidae)



Most damaging macadamia pest

*B. distincta* (two-spotted stink bug)

Increase in Pentatomidae species



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# Integrated pest management



Cultural practices



Physical and/or Mechanical



Biological control

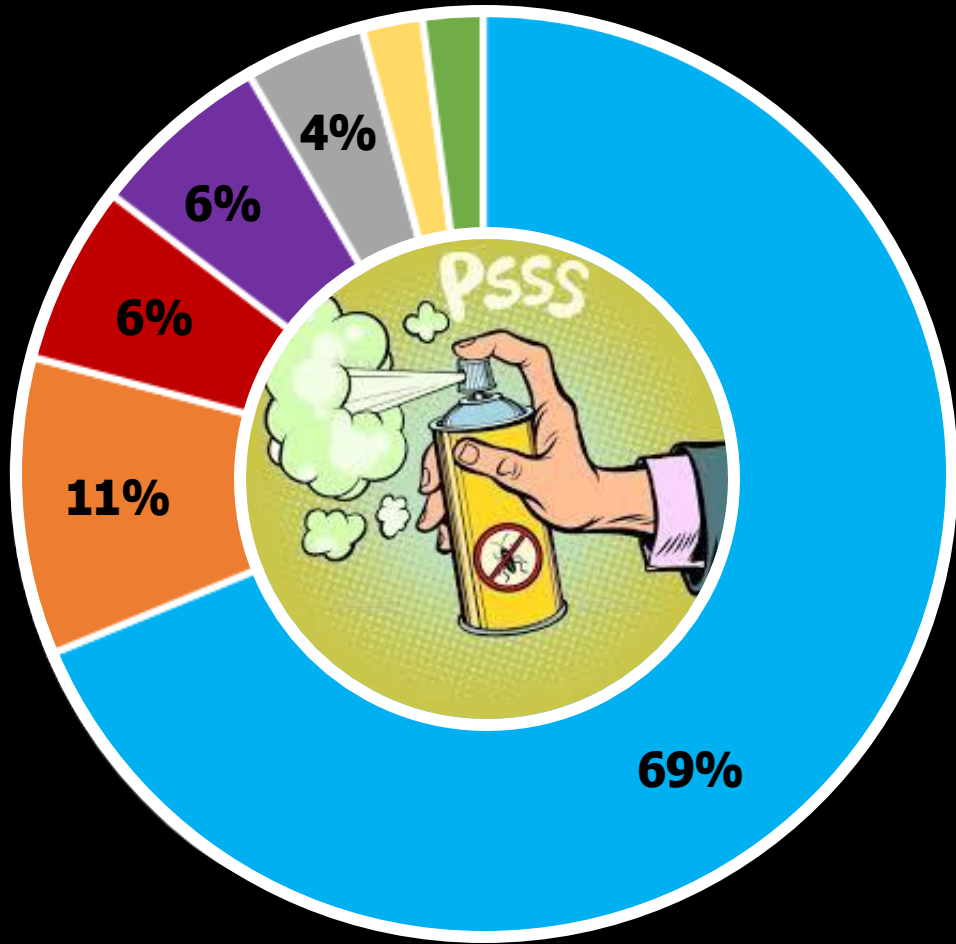


Chemical control



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# Management - Chemical control



- Pyrethroids
- Neonicotinoids
- Organophosphates
- Combination
- Pyremetrozine
- Pyridine azomethine derivatives
- Microbial

# Management - Chemical control



Lethal and sub-lethal effects on *B. distincta*

**WHY** study sub-lethal effects?

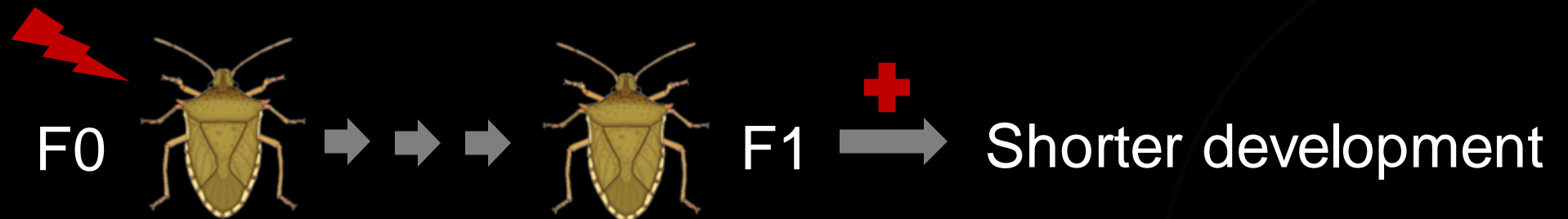
- temperature
- rainfall
- UV light
- metabolic processes of the host plant

# Management - Chemical control

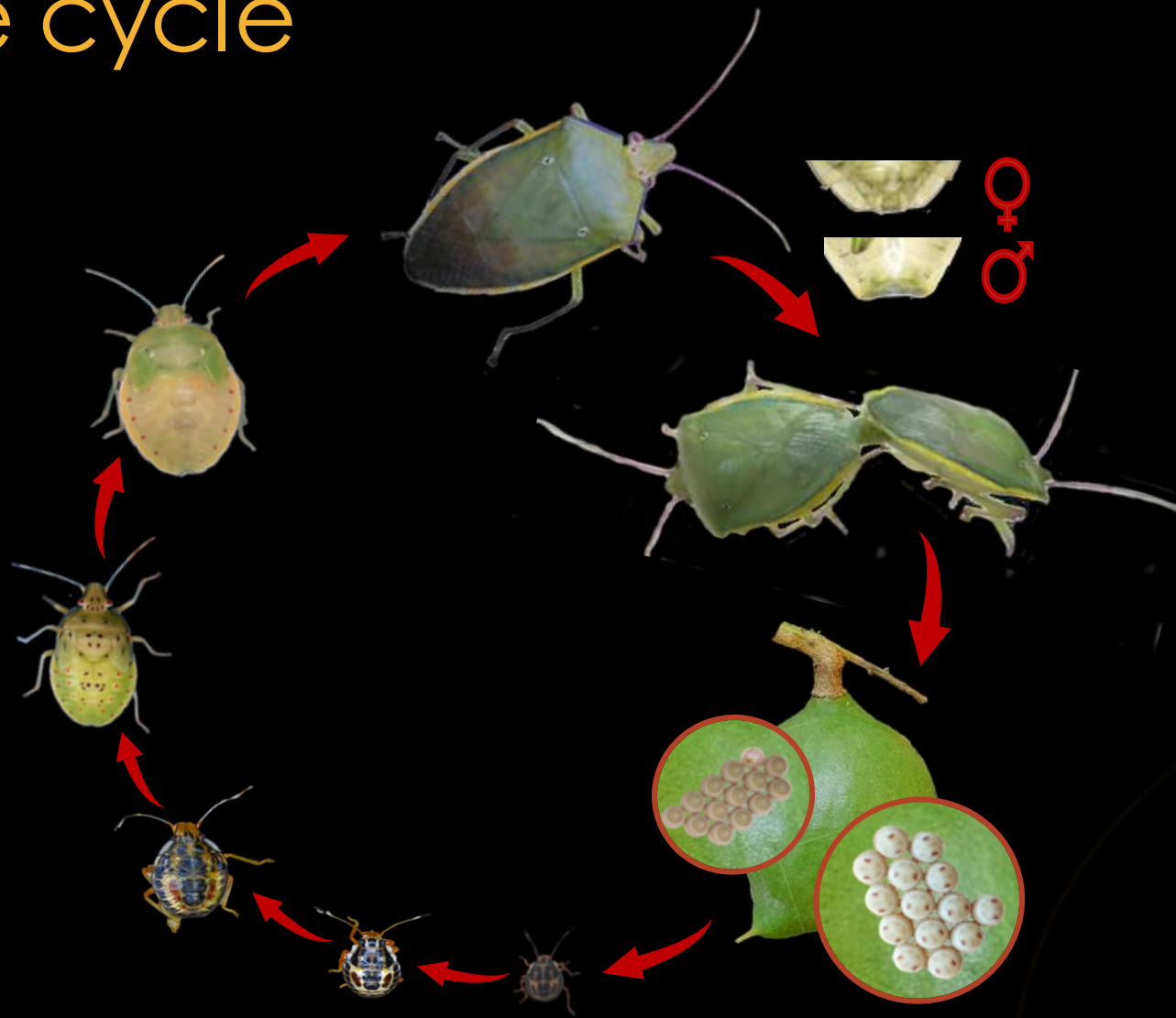


Reduced sensitivity to pyrethroids

Sub-lethal effects of Lambda-cyhalothrin



# Stink bug life cycle



# Stink bug adults - Pheromones



## Sex



- Not efficient
- Why?

## Alarm



- Attract & reward
- Push & pull

## Aggregation



- Attract & kill
- Push & pull





# Stink bug adults - Pheromones



## Sex



- Not efficient
- Why?

+ kairomones

## Alarm



- Attract & reward
- Push & pull

## Aggregation



- Attract & kill
- Push & pull

## Plant volatiles



- Attract & kill
- Push & pull



# Stink bug adults - Pheromone baited traps



PHEROCON® CSB lure

PHEROCON® GSB lure

PHEROCON® BMSB lure

PHEROCON® Dual lure (BMSB+GSB)

# Stink bug adults - Entomopathogenic fungi

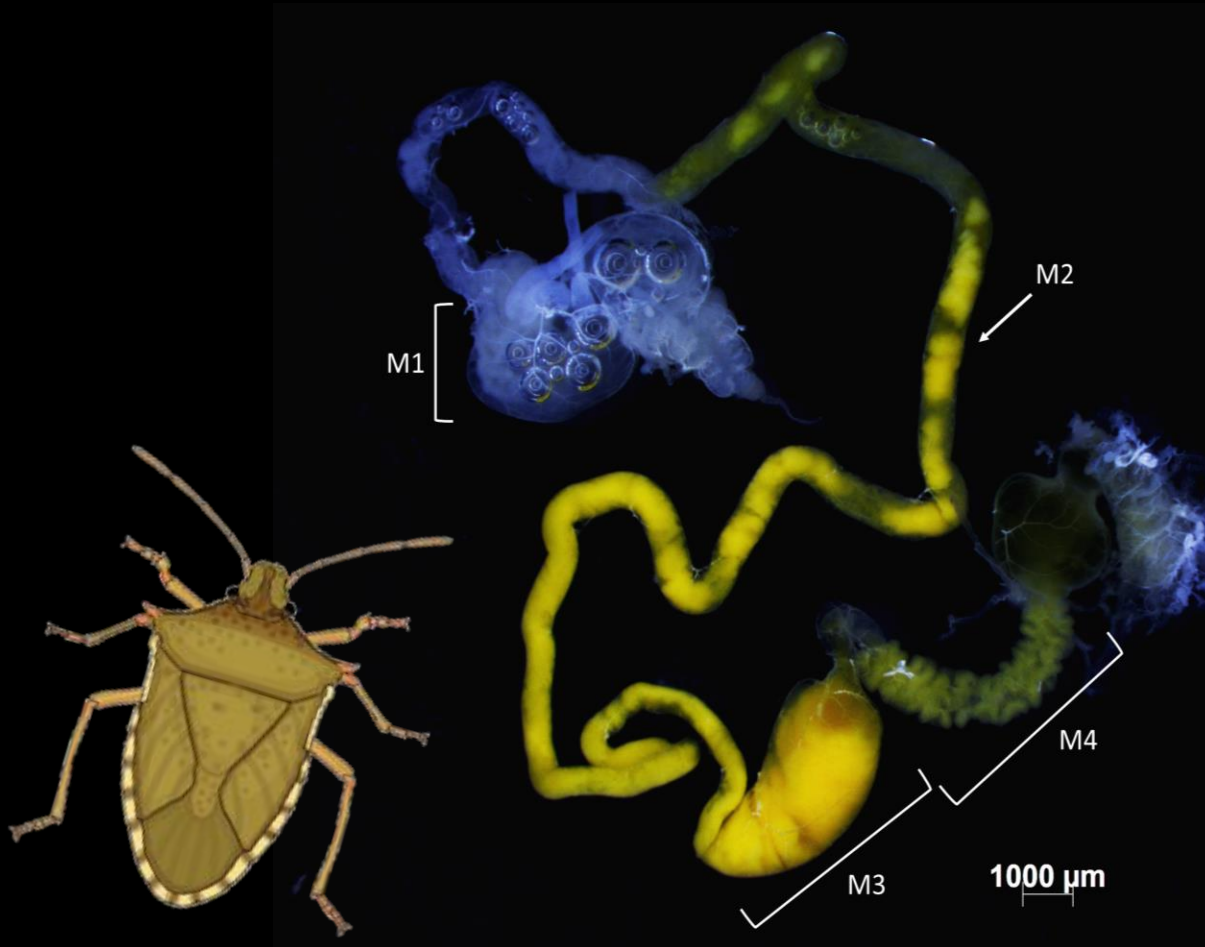


Lungile Linda – ARC Nelspruit

Products tested:

- Boveril
- Bio-Insek
- Broadband
- Real Beauveria

# Adults – Alternative plant hosts



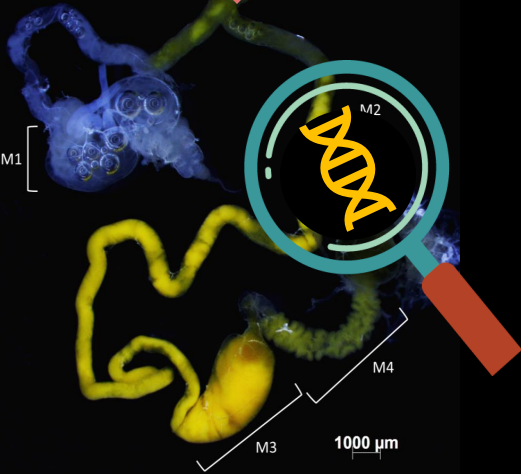
\* 48 hours detection limit

# Adults – Alternative plant hosts



*trnL* gene

- *Macadamia* sp. (Macadamia)
- *Pinus* sp. (Pine)
- *Urtica radicans* (Stinging nettle)
- *Persa americana* (Avocado)
- *Platanus orientalis* (oriental sycamore)
- *Quercus stellata* (Post oak)
- *Lycopersicon esculentum* (Tomato)



*trnF* gene

- *Macadamia* sp.
- *Pinus* sp.
- *Brassica oleracea* (Cabbage)
- *Fraxinus velutina* (Velvet ash)
- *Broussonetia papyrifera* (Paper mulberry)

# Stink bug eggs – Egg parasitoids

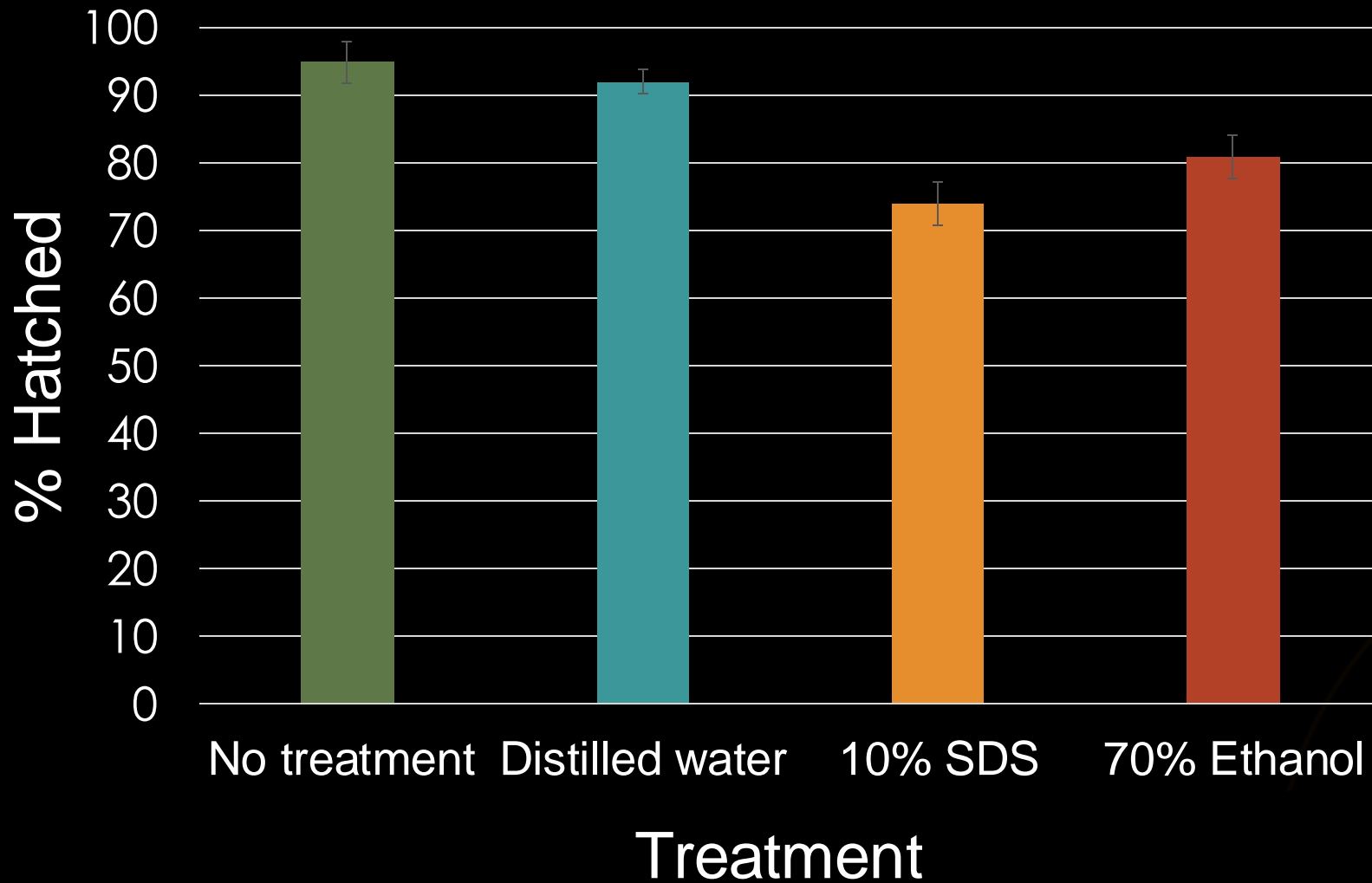
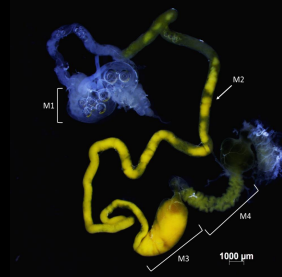


*Trissolcus basalis*  
*Trissolcus* sp 1.  
*Trissolcus* sp 2.  
*Trissolcus* sp 3.

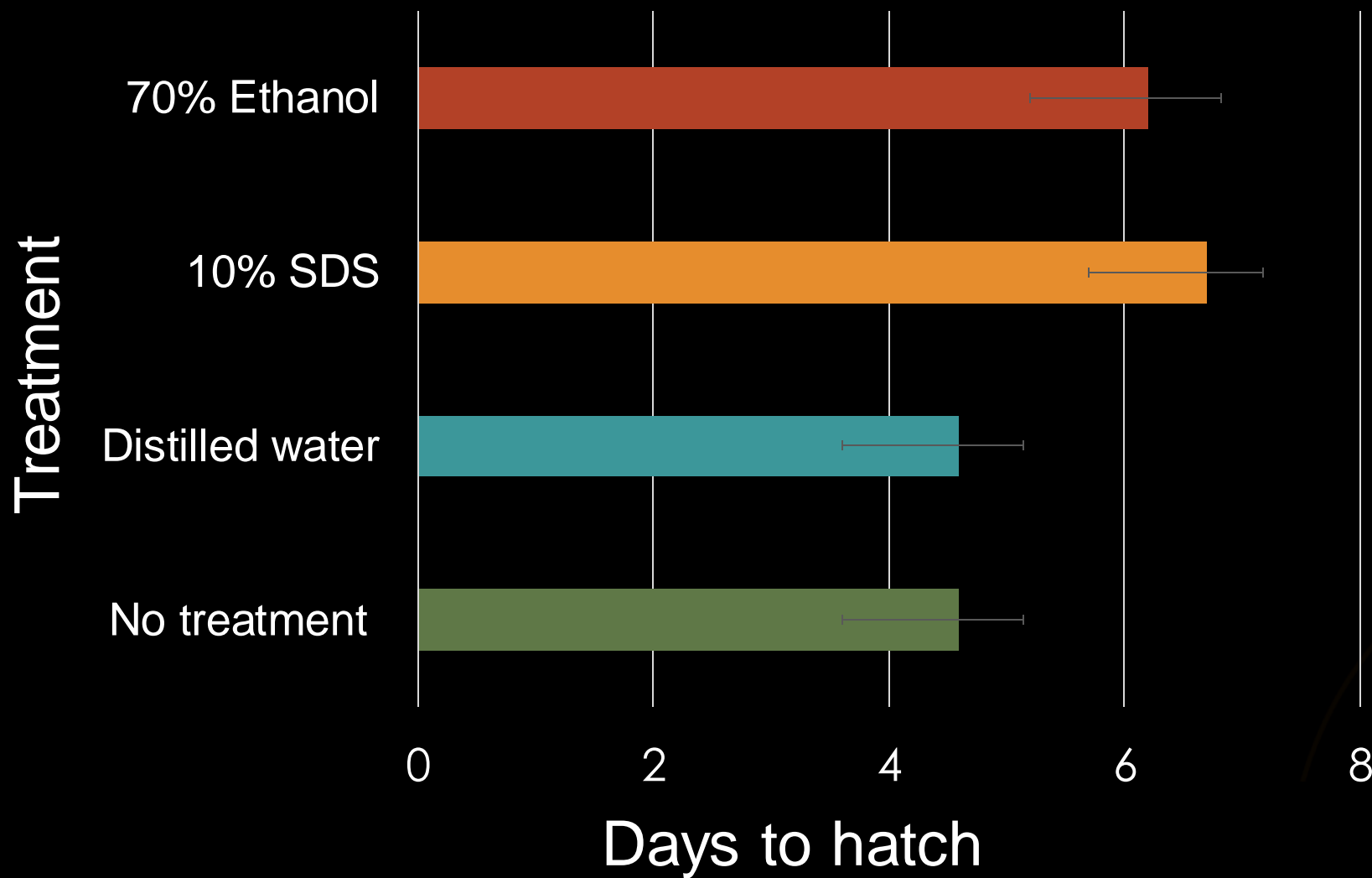
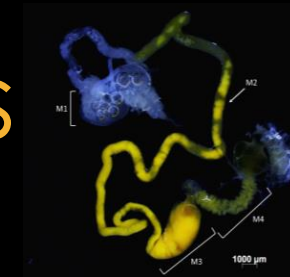


*Psix striaticeps*

# Stink bug eggs – Removal of gut symbionts

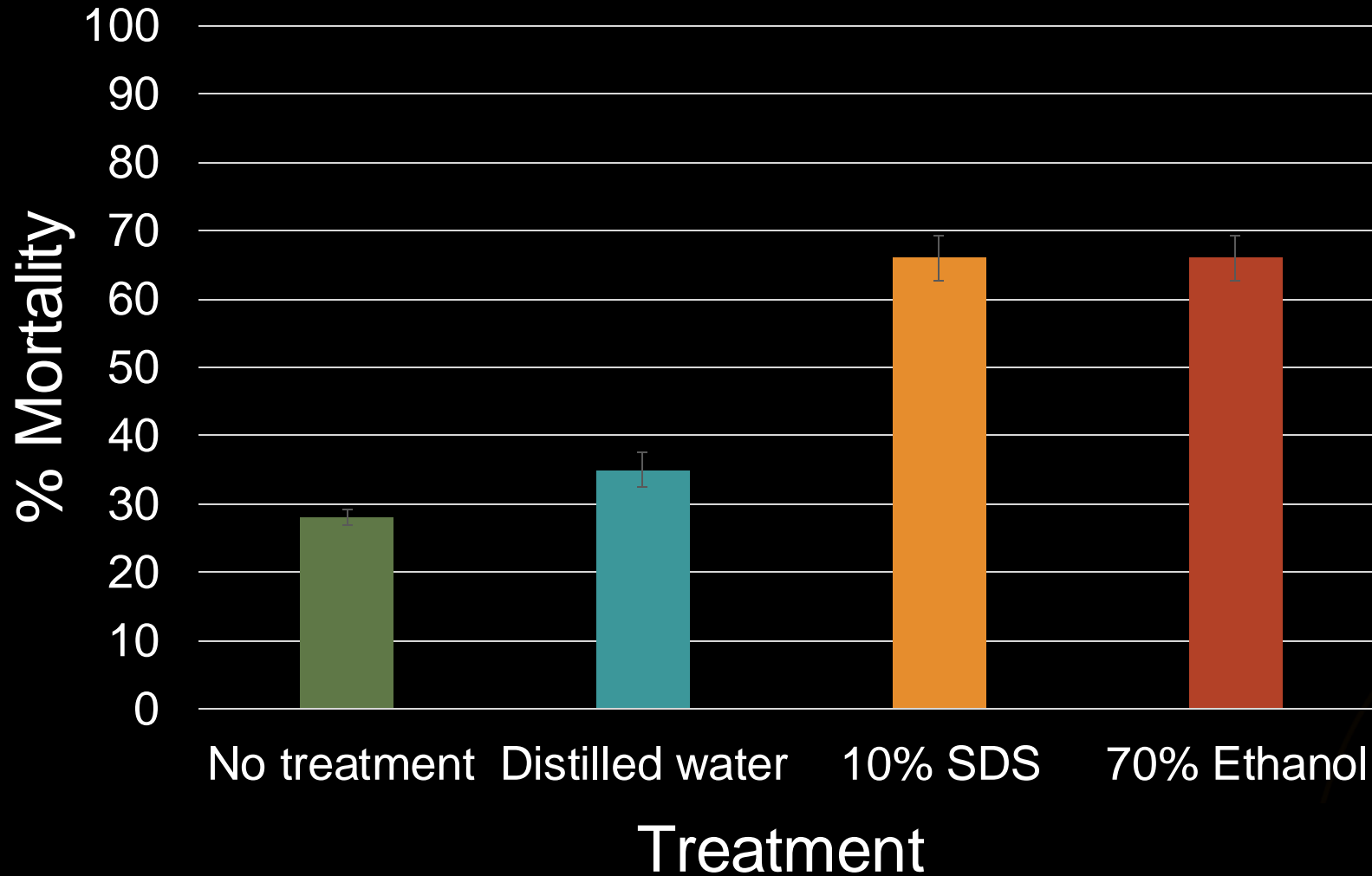
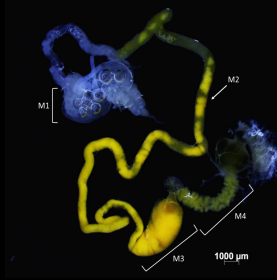


# Stink bug eggs – Removal of gut symbionts

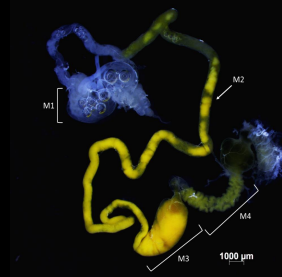




# Stink bug eggs – Removal of gut symbionts



# Stink bug eggs – Removal of gut symbionts



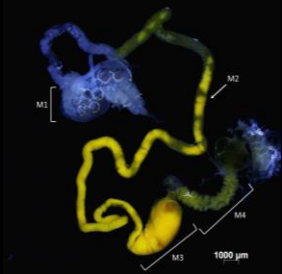
No treatment

10% SDS

70% Ethanol



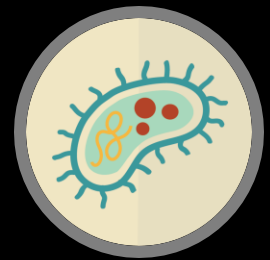
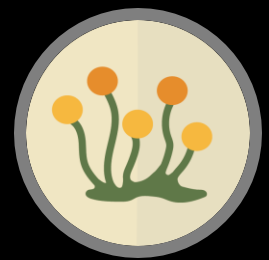
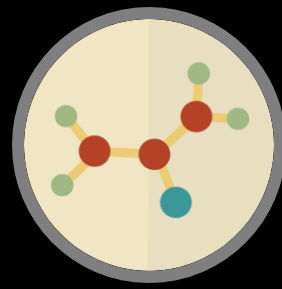
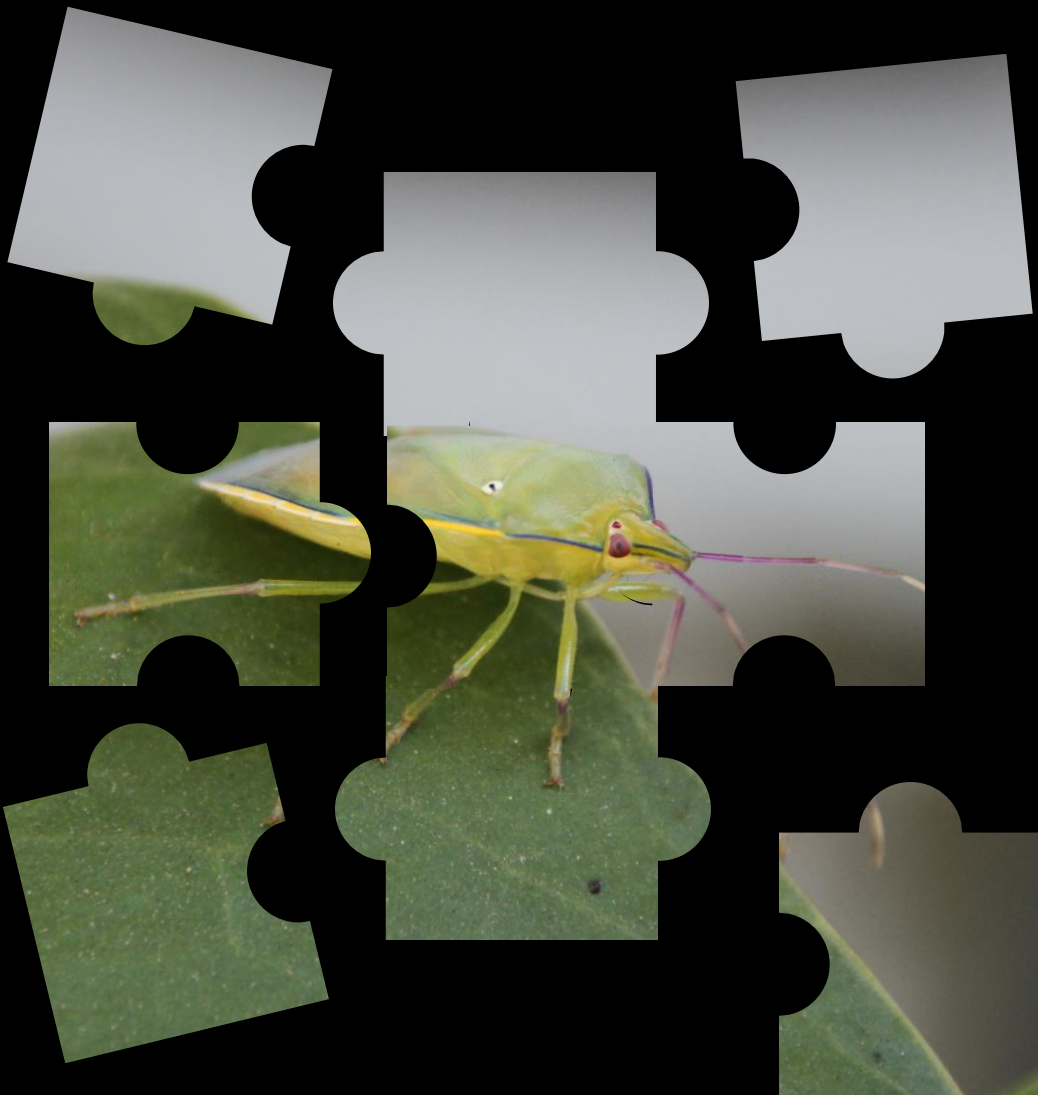
# Stink bug eggs – Removal of gut symbionts



# verno™

## Micronutrients

	<b>Copper as Cuprous Oxide</b>	<b>Zinc as Zinc Oxide</b>	<b>Manganese as Manganese Carbonate</b>
Verno Copper+ Zinc	300g/kg	300g/kg	-
Verno Trio	150g/kg	150g/kg	160g/kg



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# Acknowledgements



**Dr. Elisa Pal**



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**Thembeka Mkhize**





QUESTIONS ?