

International Macadamia Symposium 2023



Macadamias South Africa (NPC)  
(SAMAC)



# The macadamia pests of Brazil

Leonardo Moriya



# Find the Pest challenge



MOVING FORWARD TOGETHER

23



# Mimicry



MOVING FORWARD TOGETHER

Know the insects and mites  
from our environment

QueenNut  
MACADAMIA

Embrapa  
Meio Ambiente



1.600 Tissues collected

Insects & Mites  
forwarded to morphologic  
identification

- Taxonomists
- Molecular DNA id



MOVING FORWARD TOGETHER

23

# Objectives Project Insetonut

- 1 – The macadamia entomofauna in Brazil
- 2 – Knowledge of those pests in other crops
- 3 – What are the potential predators occurring
- 4 – Biological manages to control pests
- 5 – There are any other manages besides chemical control?

+500  
specimens  
in an  
insectary



MOVING FORWARD TOGETHER

# Website archive



MOVING FORWARD TOGETHER

23

# Mites



MOVING FORWARD TOGETHER

23

# Leaves & Fruits

13 specimens

- *Agistemus* sp.
- *Amblyseius* sp.
- *Euseius citrifolius*
- *Euseius concordis*
- *Iphiseiodes zuluagai*
- *Neoseiulus idaeus*
- *Neotropacarus* sp.
- *Parapronematus acaciae*
- *Proprioseiopsis cannaensis*
- *Proctolaelaps bickley*
- *Tetranychus* sp.
- *Diptilomiopus davisi* = 2%
- *Polyphagotarsonemus latus* = 97%



MOVING FORWARD TOGETHER

23

# Racemes

9 specimens

- *Aeroppia* sp.
- *Amblyseius* sp.
- *Euseius concordis*
- *Iphiseiodes zuluagai*
- *Neotropacarus* sp.
- *Polyphagotarsonemus latus*
- *Proctolaelaps* sp.
- *Proprioseiopsis* sp.
- *Tetranychus* sp.



MOVING FORWARD TOGETHER

23



# Racemes



99,61%

*Polyphagotarsonemus latus*



MOVING FORWARD TOGETHER

23





# Predatory mites - beneficials

- *Agistemus* sp.
- *Amblyseius* sp.
- *Euseius citrifolius*
- *Euseius concordis*
- *Iphiseiodes zuluagai*
- *Neoseiulus idaeus*
- *Proprioseiopsis cannaensis*
- *Proprioseiopsis* sp.



# Black aphid



MOVING FORWARD TOGETHER

23

# Toxoptera sp.

- Size of 2 – 3 mm.
- Aphids thrive by outnumber them.
- They are good at reproducing.
- By parthenogenesis
- Wings if food resources run low.



MOVING FORWARD TOGETHER

# Thrips



MOVING FORWARD TOGETHER

23



# Racemes

10 specimens

- *Frankliniella bicolor*
- *Frankliniella brevicaulis*
- *Frankliniella gardeniae*
- *Frankliniella occidentalis*
- *Frankliniella schultzei*
- *Frankliniella tritici*
- *Frankliniella sp.*
- *Karnyothrips merrilli*
- *Haplothrips gowdeyi*
- *Thrips australis*



MOVING FORWARD TOGETHER





# Racemes

88,5%

*Frankliniella gardeniae*



23

MOVING FORWARD TOGETHER



# Leaves

- *Scirtothrips dorsalis*
- *Frankliniella gardeniae*
- *Frankliniella schultzei*
- *Frankliniella* sp.
- *Leucothrips furcatus*
- *Hoplandrothrips* sp.
- *Neohydatothrips* sp.





# *Scirtothrips dorsalis*



MOVING FORWARD TOGETHER

23





MOVING FORWARD TOGETHER

23

# *Leucothrips furcatus*



MOVING FORWARD TOGETHER

# Green planthopper



MOVING FORWARD TOGETHER

23

# *Empoasca* sp.



MOVING FORWARD TOGETHER

23

# Black stingless bee



MOVING FORWARD TOGETHER

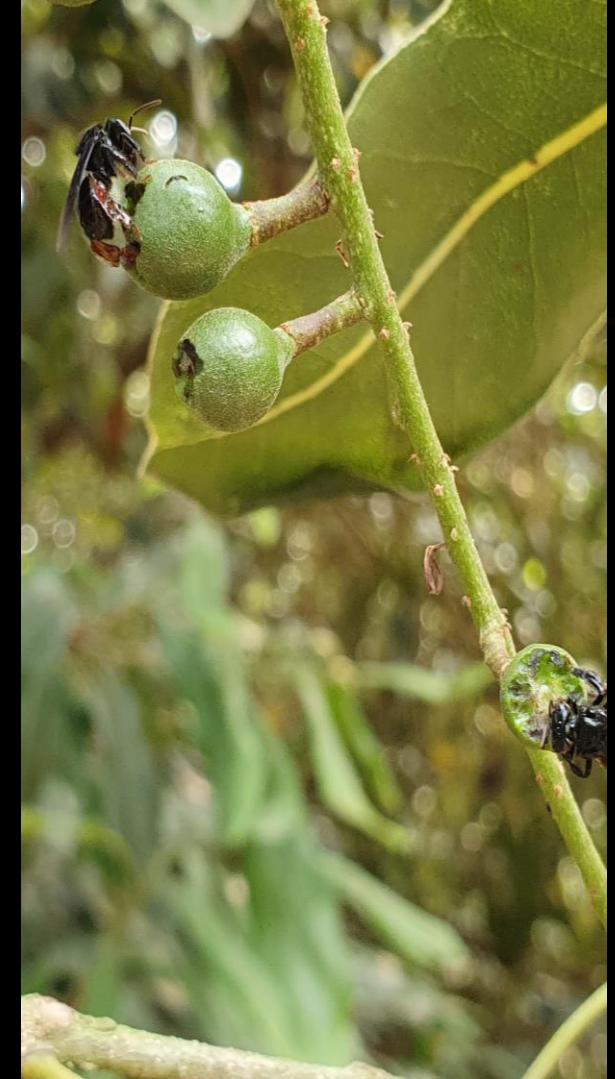
23



# *Trigona spinipes*



# *Trigona hyalinata*



MOVING FORWARD TOGETHER

# Black stingless bee

- Aggressive attack in younger trees
- Fiber + resin
- Block the tree development
- Can cut racemes and nutlets
- They are pollinators



# Nut Borer



MOVING FORWARD TOGETHER

23



# *Ecdytolopha aurantiana*



MOVING FORWARD TOGETHER

23



# *Ectomyelois muriscis*



MOVING FORWARD TOGETHER

# *Lophopoeum timbouvae*



MOVING FORWARD TOGETHER

# Leaf cutter ants



MOVING FORWARD TOGETHER

23

# 100% leaf cutted

- Aggressive attack in younger trees
- Action during nighttime
- They can cut 100% off a tree in a night
- Tree can't regrowth strongly
- Newly planted trees needs to be replanted
- Control previously to field planting



MOVING FORWARD TOGETHER

# Does the ants eat leaves?

***Leucoagaricus gongylophorus***



MOVING FORWARD TOGETHER

23

# Quenqué m ant

- *Acromyrmex crassispinus*
- *Acromyrmex laticeps*
- *Acromyrmex lobicornis*
- *Acromyrmex lundi*
- *Acromyrmex rugosus*
- *Acromyrmex striatus*
- *Acromyrmex subterraneus*



MOVING FORWARD TOGETHER

# Saúva ant

- *Atta sexdens*
- *Atta laevigata*
- *Atta capiguara*
- *Atta bisphaerica*
- *Atta cephalotes*



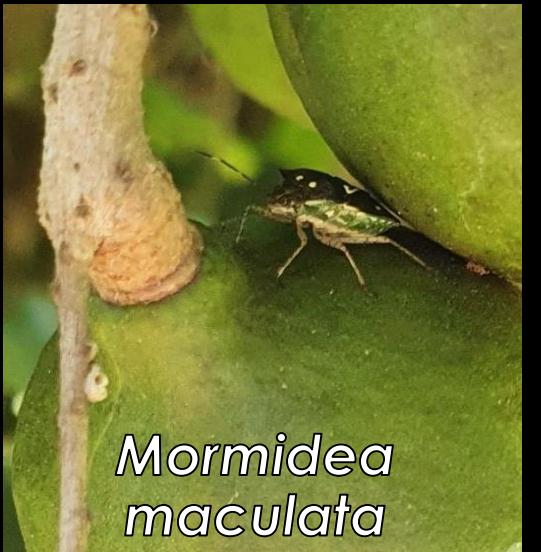
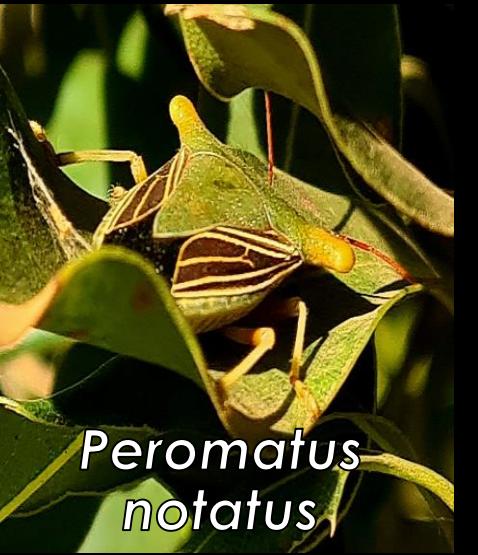
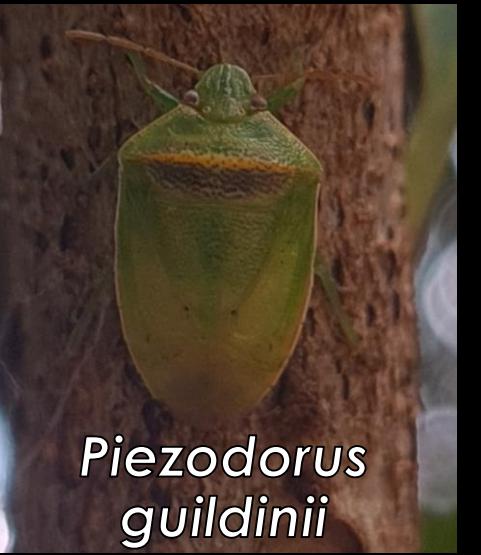
MOVING FORWARD TOGETHER

# Stink bugs



MOVING FORWARD TOGETHER

23



MOVING FORWARD TOGETHER

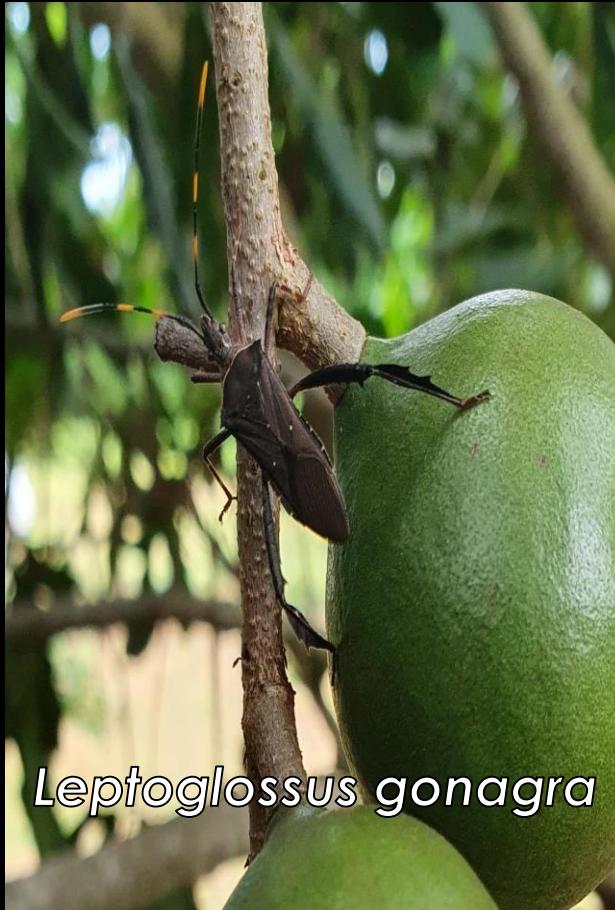




*Sphictyrtus chryseis*



*Crinocerus sanctus*



*Leptoglossus gonagra*



*Stenocoris tipuloides*



MOVING FORWARD TOGETHER

23



# Diverse Stink bug complex in Brazil



MOVING FORWARD TOGETHER

23

# Looper caterpillar



MOVING FORWARD TOGETHER

23

# A threat to nutlets

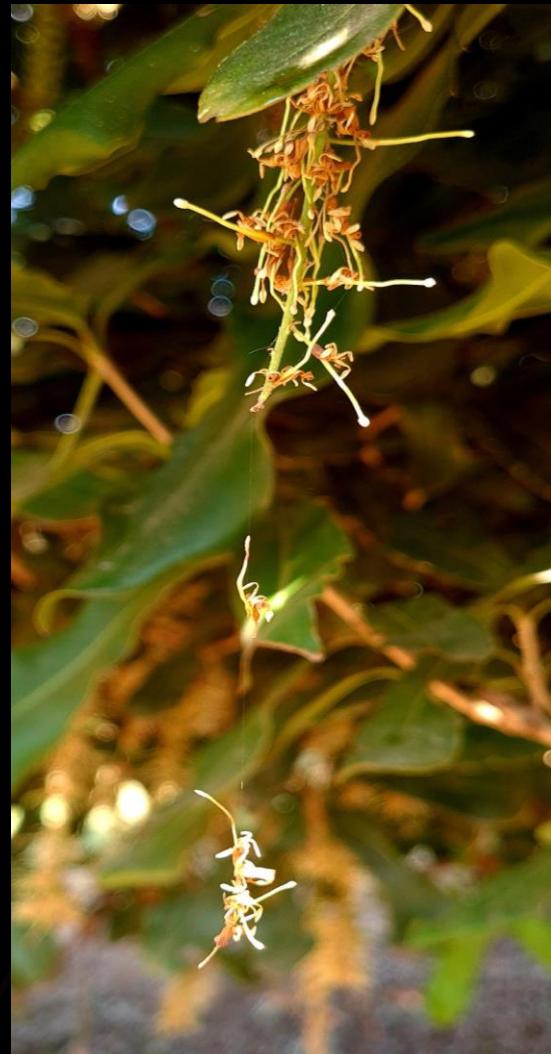
***Patalene hamulata***



MOVING FORWARD TOGETHER

# Flower caterpillar

*Pleuroprucha insularia*



MOVING FORWARD TOGETHER

# Mimicry



MOVING FORWARD TOGETHER

23

# Leafhopper



MOVING FORWARD TOGETHER

23



MOVING FORWARD TOGETHER

# Felted coccid



MOVING FORWARD TOGETHER

23

# *Planococcus sp.*



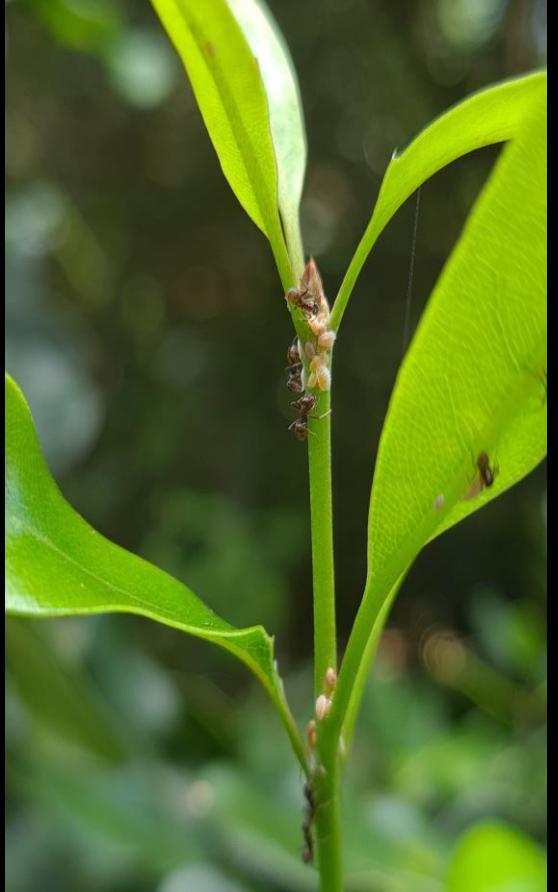
MOVING FORWARD TOGETHER

# Difficult control



MOVING FORWARD TOGETHER

# Azteca chartiflex



MOVING FORWARD TOGETHER

# Mealybug



MOVING FORWARD TOGETHER

23

# *Pseudococcus sp.*



MOVING FORWARD TOGETHER



MOVING FORWARD TOGETHER



# Post Harvest beetle

***Carpophilus sp.***



# *Hypotenemus obscurus*



MOVING FORWARD TOGETHER

# Pest suppression



- Understand the pest habit and life cycle
- Right diagnosis of their damage
- Monitoring
- Level of control x economic damage
- Integrated Pest management

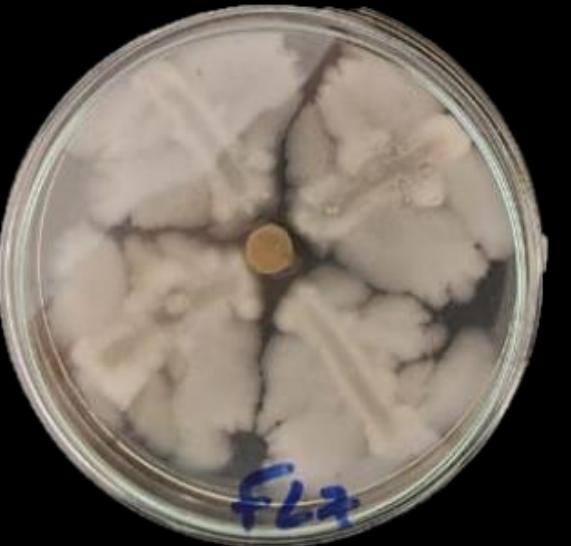


MOVING FORWARD TOGETHER



MOVING FORWARD TOGETHER

# Opportunities



MOVING FORWARD TOGETHER

23

# QUESTIONS ?