

# Three Key Constraints to the Plant Health of Pineapples in Papua New Guinea and Suggested Directions for Future Research

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## Pineapples in Papua New Guinea

- ▶ Grown by over half of the rural population of PNG, as a subsistence crop (World of Information, 2003)
- ▶ Ideal to transport to other markets as it is not as easily damaged as some fruit (Bourke & Harwood, 2009)
- ▶ The only organic fruit produced in PNG (Food and Agriculture Organisation, 2001).
- ▶ Has become a popular fruit in urban areas, so production has increased
- ▶ Mainly sold in markets in the lowlands (Sam, 2015)
- ▶ Total production in 2018 was 22,980 tonnes (Knoema, n.d.).

# Three Problems That PNG Farmers Are Facing:



Citrus Fruit  
Piercing  
Moth

Pineapple  
Mealybug



Pineapple  
Black Rot



# Pineapple Mealybug

(*Dysmicoccus brevipes*)



The pineapple mealybug.

- ▶ Found worldwide
- ▶ Known to spread viruses like pineapple mealybug-associated wilt virus
- ▶ Feeds on the sap
- ▶ Reduces photosynthesis because sooty moulds grow on their waste



Pineapples with the pineapple mealybug wilt disease.



Pineapples with the wilt virus.

# Control Methods of the Pineapple Mealybug

Natural enemies  
e.g. ladybird beetles  
(coccinellid),  
wasps (encyrtids)

If 10+% of the plants  
have the wilt virus,  
do not use the  
paddock for planting  
material

Keep borders free of  
weeds that may  
harbour the  
mealybug

Remove affected  
plants as soon as the  
symptoms appear  
and burn them

Do not plant on land  
on which the wilt  
virus previously  
occurred

Chemical control

Quarantine

After harvest, burn  
plant residues and  
plough the paddock  
(Jackson, 2017)



# Future Directions For Controlling the Pineapple Mealybug



INSECTICIDE  
DEVELOPMENT



GENETIC  
MODIFICATION



BIOLOGICAL  
CONTROL



CHANGING FARM  
PRACTICES



# Pineapple Black Rot

(*Ceratocystis paradoxa*)

Is a wound fungus

Found worldwide

Affects the leaves, fruit and butt

Causes severe loss of planting material

Does not occur in the field

Occurs in storage when refrigeration is not available

Is worst when the harvest is in a wet and warm climate



# Control Methods of the Pineapple Black Rot

Careful  
handling to  
prevent bruising

Dipping fruit  
and tops in  
fungicide

Burying  
rejected fruit

Cool storage of  
fruit

(Jackson, 2017)

# Future Directions For Controlling the Pineapple Black Rot

Genetic modification - antifungal genes

Farming methods

Storage methods

Fungicide development

Not harvesting in the wet season to reduce the severity



# Citrus Piercing Fruit Moth

(*Eudocima fullonia*)

- ❖ Found in Asia, Africa, North America and Oceania
- ❖ Moth uses its proboscis to make a small hole in the fruit to suck out juices
- ❖ Bacteria and fungi enter via this hole, making the fruit rot
- ❖ Other moths are attracted by the rotting smell
- ❖ Moth lays eggs on *Erythrina* species.



# Control Methods of the Citrus Piercing Fruit Moth

- The moth has natural enemies in most countries (Jackson, 2017)
- In New Guinea, the egg parasitoids *Telenomus lucullus* and the *Ooencyrtus* species are natural enemies of the moth (Sands & Liebrechts, 2002)
  - A parasitoid is an organism that always lives inside or on a host and kills the host at some stage of the parasitoid life cycle (Osborn, 2020)
  - One study found *Telenomus lucullus* to be specific to *Eudocima* spp (Sands & Liebrechts, 2002)
- Insecticides cannot be applied when the fruit are ripe, making control of the moth difficult
- The adult moths are not attracted to light, and wait till night to attack the fruit

# Future Directions For Controlling the Citrus Piercing Fruit Moth

## Biological control

- Parasatoid wasps (e.g. *Telenomus lucullus*)

## Farming methods

### Create lures using damaged fruit or fruit baits

- One study showed that banana fruit baits effectively attracted the fruit moths (Reddy, Cruz, & Muniappan, 2007)

### Managing the *Erythrina* species

- Use of insecticides to control the fruit moth larvae
- Remove *Erythrina* species from the area

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