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)*

- 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
Control Methods of the Pineapple Mealybug

<table>
<thead>
<tr>
<th>Natural enemies</th>
<th>If 10+% of the plants have the wilt virus, do not use the paddock for planting material</th>
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</thead>
<tbody>
<tr>
<td>e.g. ladybird beetles (coccinellid), wasps (encyrtids)</td>
<td>Keep borders free of weeds that may harbour the mealybug</td>
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<tr>
<td>Remove affected plants as soon as the symptoms appear and burn them</td>
<td>Do not plant on land on which the wilt virus previously occurred</td>
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<td>Quarantine</td>
<td>Chemical control</td>
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<td>After harvest, burn plant residues and plough the paddock (Jackson, 2017)</td>
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Future Directions For Controlling the Pineapple Mealybug

- Insecticide Development
- Genetic Modification
- Biological Control
- Changing Farm Practices
<table>
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<tr>
<th>Pineapple Black Rot</th>
<th>(Ceratocystis paradoxa)</th>
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<tr>
<td>Is a wound fungus</td>
<td>Found worldwide</td>
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<td>Causes severe loss of planting material</td>
<td>Affects the leaves, fruit and butt</td>
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<td>Does not occur in the field</td>
<td>Occurs in storage when refrigeration is not available</td>
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<td>Is worst when the harvest is in a wet and warm climate</td>
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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 & Liebregts, 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 & Liebregts, 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**
- Parasitoid 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
References


Fay, H., & Halfpapp, K. (52-57). Baits for Fruitpiercing Moths - The State of Play., (p. 1998). Retrieved May 26, 2020, from: https://d1wqxts1xze7.cloudfront.net/27796454/tb288.pdf?1347564359=qrespone-content-disposition=inline%3B+filename%3DINSECT_FAUNA_SURVEYS_ON_RAMBUTAN_DURIAN.pdf&qExpress=15929753458&Signature=tbrOKSfdFglnSY5KprotiC7ESnnHEnIzV-AvW6jCbnLmmNiJ86plFitbVlhxZq2Wam-165rJxUbol1Xew-0DJT7w4uZcTiZd665QGelZI44W6tKNGWu43qVidH7ozdZTykh19PRwGROwDozZGfsRdCjw2yOa2zbAK9-VPVauWh5tC-JYzUwe4PpLx78bB0RLLyhw3-AVQccY25TaQ1zGBHrd-JRqxWusC7r4bpRcpCWI4A7cTP5d1MHXBqi7-Lm1h1PfdjXWd6p-mN18jnXqCcpd04umMURlzQp12MYk8bqnskwaaaxyAYvbztfyM8M7G5yDACxJFyg___tKey-Pair-Id=APKAJLOHF5GGSLRBV4ZA#page=52


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