Update on the Guam Coconut Rhinoceros Beetle Situation for the Guam Invasive Species Council

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Basic Biology

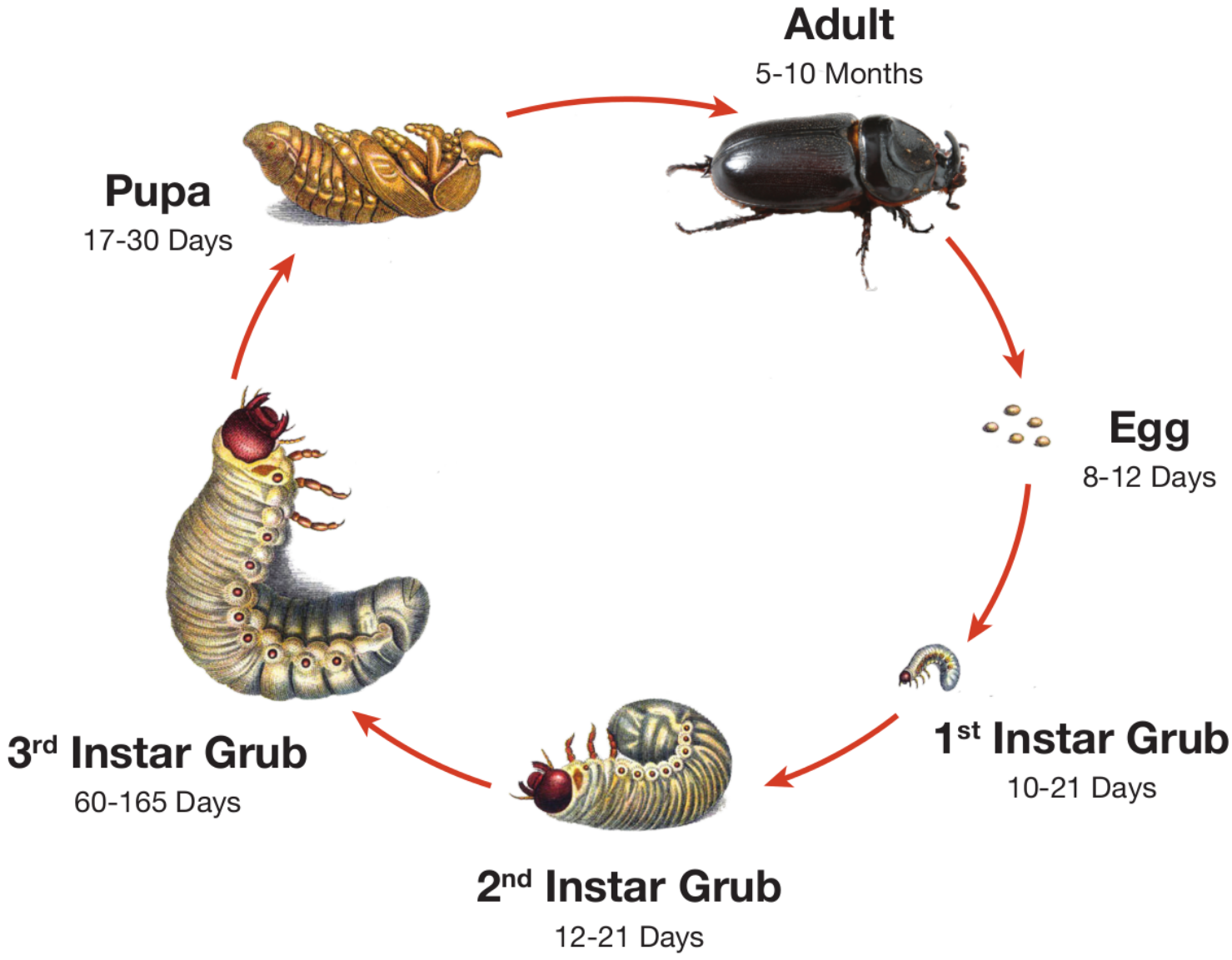


Figure 1:

Positive Feedback Cycle

Figure : Coconut palms killed by *Oryctes rhinoceros* in Fiji (photo by Bedford)

Figure 2:

CRB on Guam

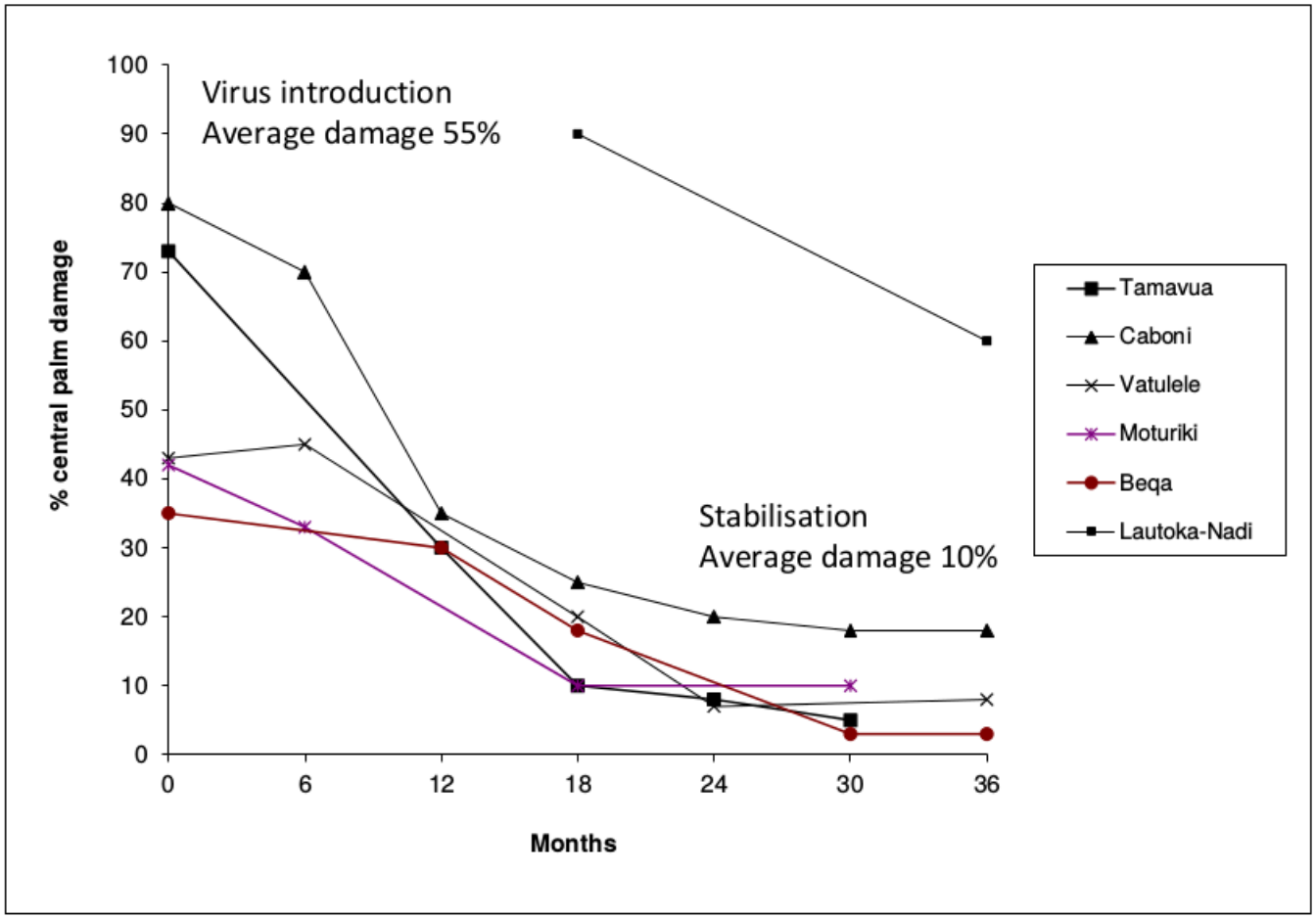
- First detected in Tumon, September, 2007
- Eradication attempt based on mass trapping and sanitation failed
- CRB spread island-wide by 2010
- Attempts at biological control using Oryctes nudivirus (OrNV) failed

Oryctes Nudivirus

- a naturally occurring virus which attacks only rhino beetles
- discovered in Malaysia during the 1960's
- quickly became the preferred biological control agent for managing CRB on Pacific islands
- prevents population explosions
- is persistent once introduced into a CRB population

Oryctes Nudivirus

Damage reduction after virus introduction – Fiji 1970s



(Adapted from Bedford 1981)

Figure 3:

CRB Attacking Guam is a Novel Biotype (CRB-Guam)

- genetically different
- resistant to all available isolates of OrNV
- more invasive

CRB-Guam is Genetically Different

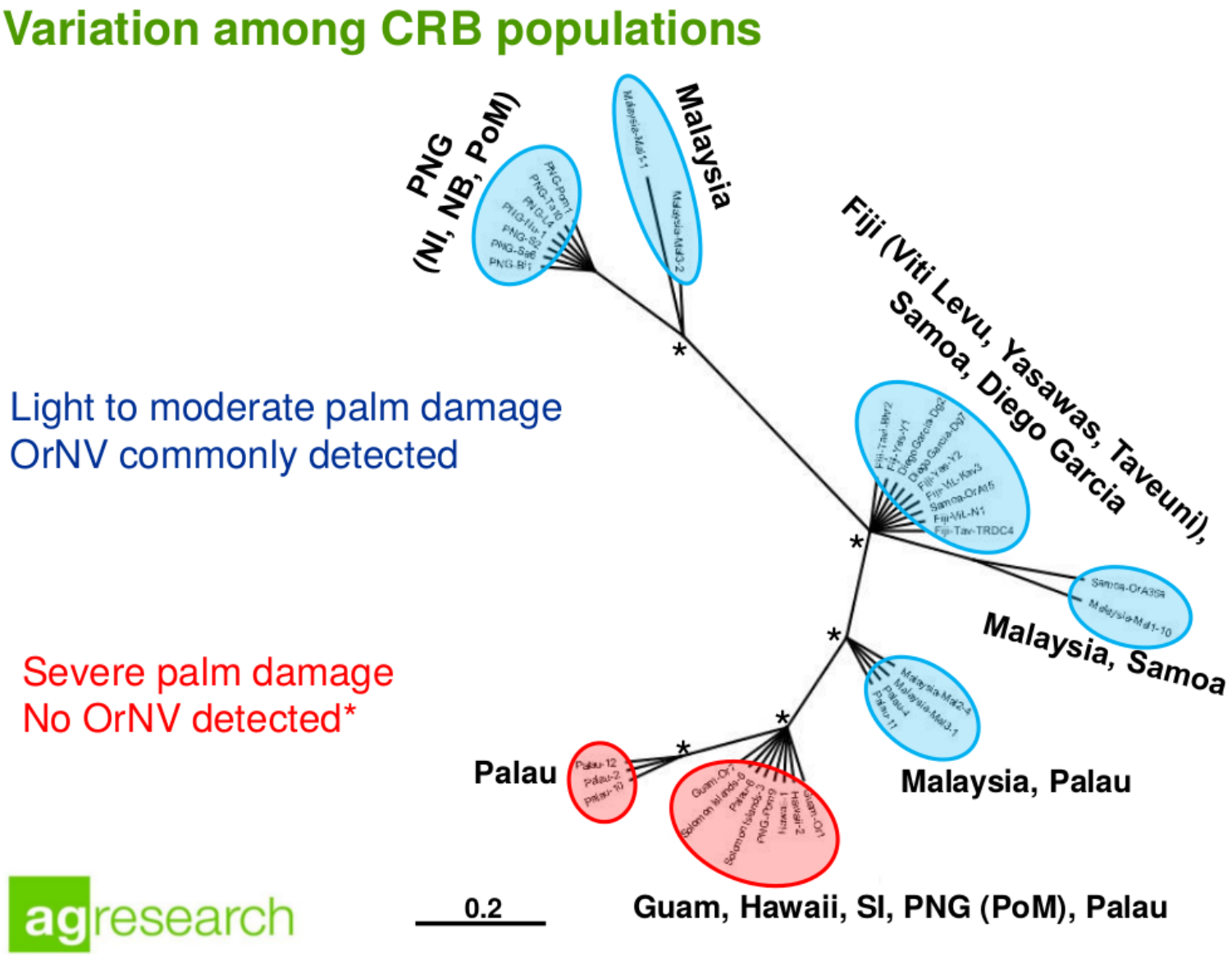


Figure 4:

CRB-Guam is More Invasive

- Following 30 years without range expansion, CRB has recently invaded Guam, Oahu (Hawaii), Guadalcanal (Solomon Islands), and Port Morseby (PNG). All new invasions involve CRB-Guam.

Discovery of the CRB-Guam Biotype

- Marshall, Sean, Maclean Vaqalo, Aubrey Moore, Roland Quitugua, and Trevor Jackson (2015). **A new invasive biotype of the coconut rhinoceros beetle (Oryctes rhinoceros) has escaped from biological control by Oryctes rhinoceros nudivirus.** Presented at the International Congress on Invertebrate Pathology and Microbial Control and the 48th Annual Meeting of the Society for Invertebrate Pathology, Vancouver, BC, August 2015. Available on-line at `http://www.sipmeeting.org/van1/SIP2015-Full%20Program.pdf`

Discovery of the CRB-Guam Biotype

- Jackson, Trevor (2015). **Need for emergency response for a new variant of rhinoceros beetle (Guam biotype).** International Association for the Plant Protection Sciences Newsletter (XI). November, 2015. Available on-line at `https://www.plantprotection.org/portals/0/documents/newsletters/2015/iapps%2011-2015.pdf`

Discovery of the CRB-Guam Biotype

- Vaqalo, Maclean, Sean Marshall, Trevor Jackson, Aubrey Moore (2015). **An Emerging Biotype of the Coconut Rhinoceros Beetle Discovered in the Pacific.** Secretariat of the Pacific Community, Land Resources Division. Available on-line at `http://www.spc.int/lrd/plant-health-publications/doc_download/2374-ph-agalertno51`

Recommended Action

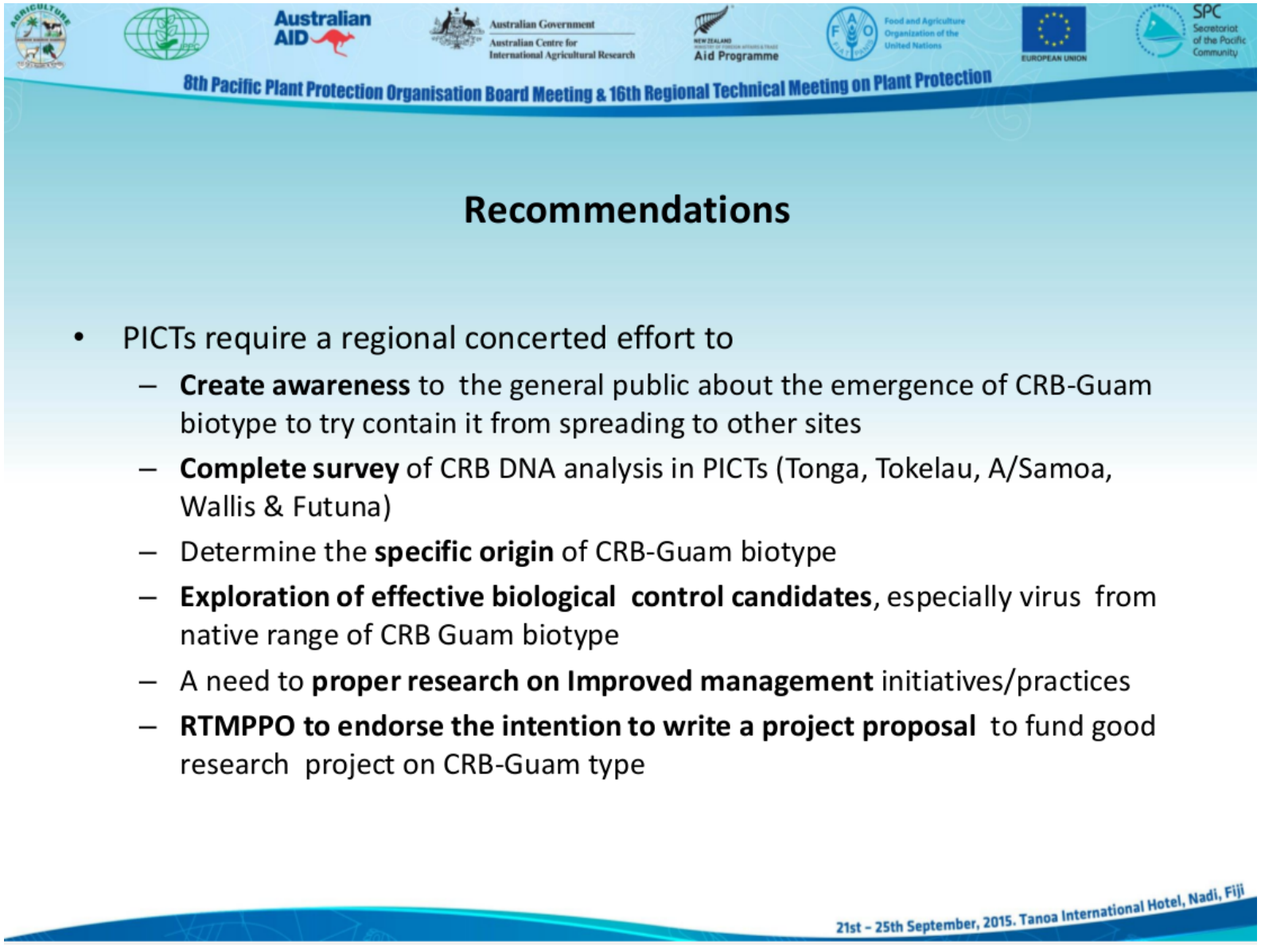


Figure 5:

Recent Changes on Guam

- CRB adults emerging from abundant typhoon generated breeding sites could trigger a positive freedback where CRB adults kill palms which become breeding sites which generate even more adults.
- Current tactics of trapping, sanitation, and application of *Metarhizium* may reduce local damage, but will do little to prevent an island-wide population explosion because most breeding sites are inaccessable (in jungle and/or on military bases).

Figure 6:

Recent Changes on Guam

- A CRB population explosion triggered by Typhoon Dolphin was predicted in the following press release.
- Anonymous. **Pacific Island Entomologists are Worried About a New Type of Coconut Rhinoceros Beetle Discovered on Guam.** University of Guam, College of Natural and Applied Sciences Press Release, September 2, 2015. `http://guaminsects.net/anr/sites/default/files/CRBpressRelease.pdf`

Recent Changes on Guam

- Recent trapping data indicate that a CRB population explosion was initiated by Typhoon Dolphin which visited Guam in May 2015, leaving many new breeding sites in its wake.