

# Establishment of Self-sustaining Biological Control of Coconut Rhinoceros Beetle Biotype G in Micronesia

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**GRANTEE:** Aubrey Moore, University of Guam

**GRANT YEAR:** 2020

**GRANT NUMBER:** 20-DG-11052021-229

**GRANT PROGRAM:** Forest Health Protection

**GRANT EXPIRATION DATE:** 2021-05-30

**DATES COVERED BY THIS REPORT:** 2020-06-17 through 2020-12-31

**GRANT STATUS:** Active

<https://github.com/aubreymoore/2020-FS-CRB-biocontrol-project/raw/master/FS-CRB-biocontrol-report1.pdf>

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**Note:** This grant (20-DG-11052021-229) is split between Moore for CRB work (\$98,240) and Dulla for LFA work (\$93,240) Total: \$191,523. This report refers only to the CRB portion of the grant.

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# **1 OBJECTIVES AND SPECIFIC ACTIVITIES**

## **1.1 Objective 1: Survey to Determine Background OrNV Incidence**

Our lab currently uses CRB-G adults collected from pheromone traps as test animals in bioassays evaluating OrNV isolates as biocontrol agents under the assumption that the Guam beetle population contains only the CRB-G biotype and is free from OrNV infection. In 2019 we gained the capacity to perform PCR in our lab began testing these assumptions. PCR results indicated that field-collected beetles were all CRB-G, but 18% of these tested positive for OrNV.

Based on these results, the PI decided to suspend bioassays until we had conclusive evidence of OrNV infection in the Guam CRB-G population. An experimental plan was developed and executed. One hundred beetles were collected from each of two trapping sites (Leo Palace Resort in southern Guam and the UOG Ag. Expt. Stn. in northern Guam). Gut samples were obtained from these beetles and tested using PCR in our lab and also in Sean Marshall's lab at AgResearch New Zealand. In PCR results from both labs all beetles tested positive for CRB-G biotype and negative for OrNV infection. We suspect that previous OrNV positive tests were the result of lab contamination (not false positives).

Bioassays aimed at discovering OrNV isolates which can be used as effective biocontrol agents will be resumed after we make some changes to our methodology to reduce risk of laboratory contamination.

## **1.2 Objective 2: Establish Sustainable CRB-G Biocontrol by Autodissemination of OrNV**

Work on this objective will be addressed after a promising biocontrol agent candidate is discovered.

## **1.3 Objective 3: Establish Island-wide Monitoring Systems for CRB and Coconut Palm Health**

Two roadside video surveys of CRB damage on Guam have been completed (the first in October 2020 and the second in December 2020). Video frames were automatically analyzed using custom-trained object detectors. For each coconut palm detected in a video frame, a damage index was assigned and v-shaped cuts to fronds were counted. Results of both surveys were made publicly available as interactive web maps (see the outputs section).

Equipment and instructions for roadside video surveys were provided to Rota to assist in their management of CRB.

## 2 OUTPUTS

Bimonthly automated roadside surveys of CRB damage on Guam have been initiated and results were made publicly available as interactive web maps (Figs. [1](#) and [2](#)).

The proportion of coconut palms damaged by CRB increased significantly from 19.2% in October 2020 to 21.5% in December 2020 ( $p < 0.001$ ; Fisher's exact test).

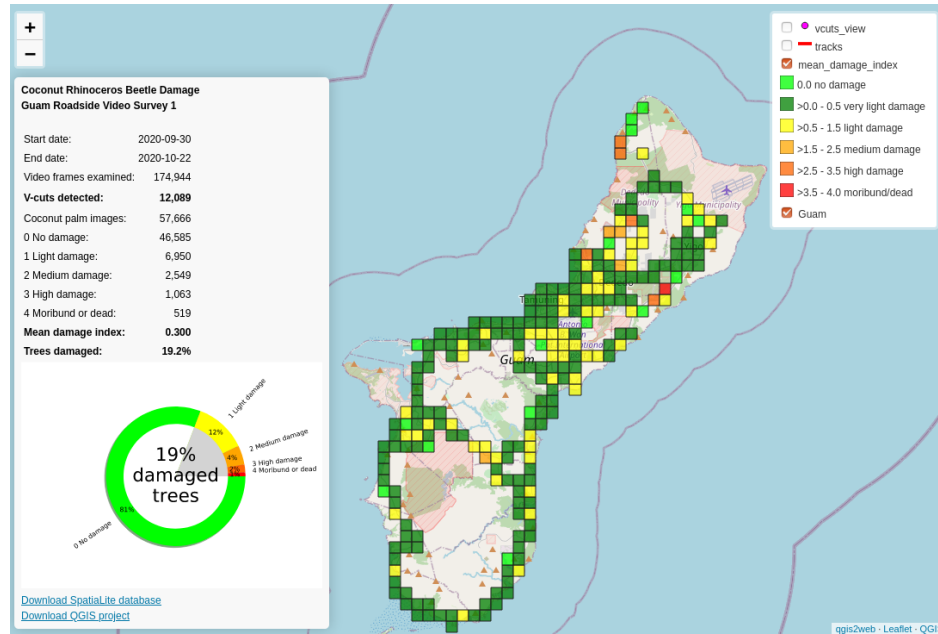


Figure 1: Screenshot of an interactive web map of results from a roadside video survey of CRB damage on Guam in October 2020 URL: <https://aubreymoore.github.io/new-crb-damage-map>.

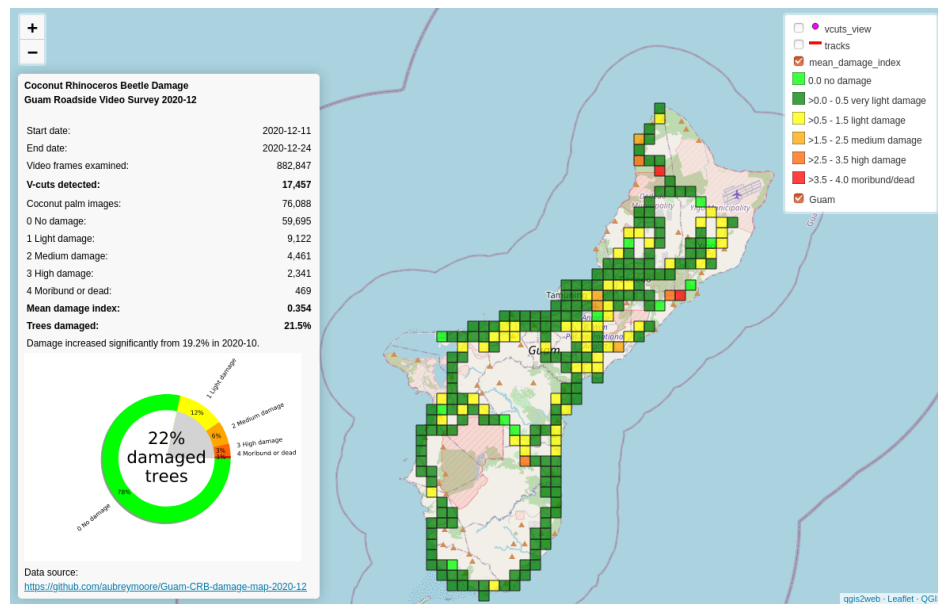


Figure 2: Screenshot of an interactive web map of results from a roadside video survey of CRB damage on Guam in December 2020 URL: <https://aubreymoore.github.io/Guam-CRB-damage-map-2020-12/webmap/v1/>.

### 3 MONITORING & EVALUATION

Please see the Outputs section.

### 4 BUDGET EXPENDITURES

Progress during this reporting period was funded by alternate sources.

Category	Budget	Spent	Note
Personnel	\$66,200	\$0	
Benefits	\$14,720	\$0	
Travel	\$4,000	\$0	
Admin. fee	\$12,738	\$0	

### 5 PROBLEMS ENCOUNTERED THIS REPORTING PERIOD

Progress on this project was impeded by COVID-19 travel restrictions which prevented collaborators from visiting Guam to participate in field work.

Further delay was caused by Government of Guam *stay at home* orders. The University of Guam was officially closed from March 20 to May 10 2020 and again from August 16 2020 to January 15 2021.

### 6 CHANGES PLANNED

Nothing to report.

### 7 CIVIL RIGHTS

Nothing to report.

### 8 ATTACHMENTS

None.

### 9 PLANS

Nothing to report.