

JBPHH Joins the Team to Fight Coconut Rhinoceros Beetle

Invasive Insect Poses Real Threat to Hawaii's Palm Trees

ALMOST FROM THE moment the first coconut rhinoceros beetles (CRB) were found on a Joint Base Pearl Harbor-Hickam (JBPHH) golf course at the end of 2013, a team of local, state, and federal agencies has been working to remove the invasive insect, which feeds on palm trees. The Navy and Air Force play a major part in this work, particularly as the beetle's breeding grounds have been found predominantly on JBPHH.

Cooperation between the military and other government bodies is key to limiting the spread of the CRB as well as designing innovative ways to eliminate it entirely. While it is difficult to say how successful this effort will be, there is no question that collaboration has helped so far to check yet another invasive species in Hawaii.

"The state of Hawaii and the Navy are approaching this challenge as a team," said Rear Admiral Rick Williams, Commander Navy Region Hawaii and Naval Surface Group Middle Pacific. "We realized the potential effects this pest can have on our installations and on Oahu. So we joined forces quickly and took action

immediately with state and other federal agencies. We are providing manpower, resources, expertise and public awareness to stop the spread of the CRB on Oahu."

The ecology of Hawaii is fragile and the introduction of invasive species, whether accidental or otherwise, has been a major problem throughout its history. Many native organisms, having evolved in isolation from the rest of the world, cannot compete with or survive invasive species. Therefore, the state of Hawaii has had

to be vigilant in preventing new animals and plants from settling in and around the Islands. Some examples of other invasive species that Hawaii has struggled to stop are the coqui tree frog, the little fire ant, and the Australian tree fern. In many instances the introduced organisms have been destructive to local populations of native organisms, hazards to people, and nuisances in other ways. Ironically, the mongoose, introduced more than a century ago to control rats, is suspected of eating the CRB,



The coconut rhinoceros beetle (*Oryctes rhinoceros*).
Hawaii Department of Agriculture

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as remains of beetle shells have been found near nests with mongoose-size tooth marks in them.

The beetle has been found in various locations on JBPHH, which is adjacent to Honolulu International Airport, and in several places off-base since the initial discovery, but so far the nests have only been found on federal property.

The CRB (*Oryctes rhinoceros*) also known as the Asiatic rhinoceros beetle, is a member of the scarab family and originally comes from Southeast Asia. The beetle has a hard black shell with a horn on its head. Males have larger horns. Adult beetles are nocturnal and can grow to more than two inches long. The CRB feeds on coconut palm trees as well as oil palms and other palm species. The CRB can often kill a palm tree when feeding on it, which makes it very destructive for Pacific island ecosystems.

Guam has experienced a particularly extensive infestation of the CRB that has killed off about half of that island's coconut palm trees. In the case of Hawaii, the loss of coconut palm trees could affect tourism, which is Hawaii's primary industry. The iconic tree is widely recognized as a symbol for the state. The coconut itself is not a significant resource for the local economy, but its destruction would affect small businesses that sell locally harvested coconuts.



The adult CRB will dig holes into the base of palm tree branches to eat. Too much of this damage can kill the tree.

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Feeding damage in V-shaped pattern left on leaves by the CRB.



The coconut rhinoceros beetle was first discovered in a trap on JBPHH on December 23, 2013. In January 2014, CRB eggs, larvae, and adults were confirmed to be present in a large mulch pile on the Morale, Welfare and Recreation (MWR) Mamala Bay Golf Course on base. The first beetles were identified by a Cooperative Agricultural Pest Survey by the U.S. Department of Agriculture (USDA) Plant Protection and Quarantine (PPQ) program and University of Hawaii (UH). Shortly thereafter, incident responders met with military facility personnel from JBPHH and a unified command was formed by the Hawaii Department of Agriculture (HDOA) with PPQ to work on eradicating the beetle infestation. Navy Region Hawaii, which includes JBPHH, joined a coordinated effort to combat the CRB as part of a team, along with experts from USDA, Federal Fire Department Hawaii, and the Hawaii Department of Land and Natural Resources. The team from JBPHH includes military and civilian personnel from both the Navy and the Air Force.

This team has been working to prevent the spread of the CRB and eventually remove it from the island of Oahu completely. Rob Curtiss, HDOA acting Plant Pest Branch control manager, says the work is being shared by all agencies involved. “HDOA and USDA are operating in a unified command structure, with HDOA as the lead agency. The other agencies are serving a variety of functions (DLNR is acting as project liaison. UH is provide research support. OISC is providing survey support while JBPHH are playing many different roles.)” Curtiss explains. He continues, “This level of collaboration is unique, but not unprecedented. This is the first time that I am aware of that HDOA, JBPHH, and USDA have worked so closely to combat an invasive species problem, though there have been tabletop exercises preparing everyone for this exact thing. HDOA also has a multi-agency response to the little fire ant on Oahu and on Maui.”

Naval Facilities Engineering Command (NAVFAC), Hawaii experts have been assisting the rest of the team to remove the CRB by constructing traps to place in areas where the



Boring holes made by the CRB on the trunk of a coconut tree.



More than 1,300 panel traps have been placed around the island of Oahu to catch adult CRB.
Hawaii Department of Agriculture

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—Rob Curtiss

CRB has been observed. There are two main types of traps being used—panel traps and barrel traps. The panel traps, by far the more common type, were purchased and put together by USDA and the Animal and Plant Health Inspection Service (APHIS) and can be seen hanging from large tree limbs. Many of the barrel traps were constructed by Seabees from the Construction Battalion Maintenance Unit (CBMU) 303 Detachment at JBPHH. Barrel traps are larger than the panel traps and placed on military or state land to avoid theft.

Dr. Cory Campora, a natural resources specialist at NAVFAC Hawaii, has been a part of this team from the start.

“The panel traps are basically a design that USDA APHIS uses for agricultural pest surveys, with the addition of an aggregating pheromone and ultraviolet (UV) light,” Campora said.

The barrel traps were designed by CRB researchers on Guam.

“The barrel traps actually have decaying green waste in the bottom to help attract adult beetles, in addition to the UV light and the pheromone lure. The UV lights are solar powered and help to draw the beetles into the trap similar to how moths are drawn to lights at night,” said Campora.

Campora added, “NAVFAC is committed to continue assisting the CRB effort. We are working on procuring air curtain burners to miti-

gate solid green waste such as palm and other tree logs, palm fronds, branches and other green waste that has not yet been mulched or chipped. NAVFAC is also working on contracting additional labor to assist with trap monitoring and maintenance, and is working on methods to address all potential CRB breeding areas on JBPHH.”

Several ideas were first considered to mitigate the problem of the CRB infestation. Some insecticides were tested, including Talstar, cypermethrin, and bromomethane. However, when these were used on the CRB adults and larvae they were all found to be ineffective, so treatment of nests with the insecticides was halted.

Nests containing CRB larvae have been discovered in a variety of mulch piles composed of materials such as tree trimmings, grass cuttings, and wood chippings. An initial measure that was devised to limit the growth of the CRB population was to grind the mulch being used as nesting material in a tub grinder. While this would not be an efficient means of destroying the eggs, it would kill all larvae and a significant number of adults—essentially buying time for the team, as CRB can spend several months in these early life stages. Not all adults are killed in this process, as the disturbance of the nest causes some adult beetles to fly away from the mulch pile and return after grinding is complete. Once the mulch

Utilitiesman 2nd Class (SCW) Justin McNairn from Construction Battalion Maintenance Unit (CBMU) 303 Detachment at JBPHH builds a CRB barrel trap.
Denise Emsley





Mulch containing CRB larvae is ground twice in a tub grinder to kill later life stages of the beetle.
 CAPT Mike Williams

is ground twice, it is covered with a tarp to guard against beetles reestablishing a nest. When new CRB nests are discovered on base, they are quickly ground twice and covered to await further treatment.

As a substitute for burning the ground mulch, NAVFAC Hawaii proposed the idea of using composting to exterminate all life stages of the CRB. Two 40-cubic-yard roll-off containers were simply configured as in-vessel composting reactors. This included using 4-inch perforated pipe attached to electrical fans which provide atmospheric air during the composting process. As the material is loaded into the container, it is sprayed with a nitrogen rich fertilizer to promote rapid thermophilic bacteria growth. The temperatures within the container reach as high as 170 degrees Fahrenheit (°F) within 70 to 80 hours. Laboratory research indicated that at a temperature of 140°F for one hour, a mortality rate of 100 percent was achieved for both larval and adult CRB. Live CRB larvae and adults were placed on top of the mulch in an active in-vessel reactor and all were found dead within two

hours. Composting of infested mulch is presently continuing and is being used as the treatment for green waste. Burning of larger green waste such palm tree fronds and trunks using an air-curtain burner is being pursued. Different methods of burning the mulch will be explored to supplement the current in-vessel composting program.

The Navy and Air Force continue to provide support to the CRB project in various ways.

Campora said, “The NAVFAC Environmental Services Pest Control Shop, Naval Environmental and Preventive Medicine Unit 6 (NEPMU-6), and MWR staff at Mamala Bay Golf Course are working closely with HDOA to assume the responsibility of checking and maintaining all CRB traps on JBPHH. The NAVFAC Hawaii Environmental Department provides technical expertise in various areas, including solid waste disposal (green waste management), air (burning permits),



Mulch is covered after it has been ground twice to prevent beetles from re-establishing a nest.
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and natural resources (invasive species response). NAVFAC Hawaii also works closely with landscaping contractors to ensure that necessary contract modifications are completed for changes in green waste handling and disposal practices and provides oversight to confirm that proper green waste procedures are being followed.”

On April 4, 2014, the USDA devoted \$2.4 million from the Agricultural Act of 2014 for the CRB program in Hawaii. The Hawaii Invasive Species Council received \$500,000 for Fiscal Year 2015 to support the program. Additionally,

the Navy has contributed \$190,000 for monitoring the CRB. In May 2014, the Navy approved a two million dollar supplement for the CRB program.

The organizations working together have apparently managed to prevent the beetle from nesting beyond the borders of federal property. The Navy and Air Force have been major players on the CRB team and their contribution has facilitated the state and federal agencies to perform their pest management work, in addition to the manpower and resources the military has provided.

The Navy, Air Force and the state of Hawaii have been working to raise public awareness of the CRB issue since it first arose. New nests are frequently discovered on military land, but the people of Hawaii are encouraged to check their own properties for potential nesting sites.

“We are still in the discovery phase, so it is too early to measure true success,” Curtiss said. “We have placed 1,358 traps, and surveyed 66,311 palm trees. We need to continue to survey and destroy breeding sites, and we need everyone’s help. A breeding site could be as simple as someone’s backyard compost pile with grass clippings and other decaying organic material.”

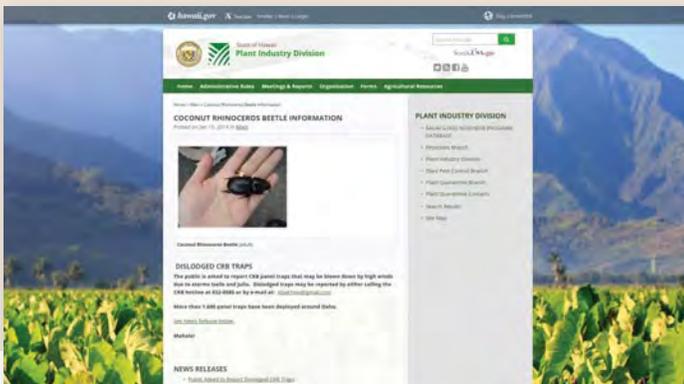
While the effort is ongoing to prevent the CRB from establishing a permanent presence in Hawaii, the outlook is positive. “We are optimistic that we can eradicate CRB from Hawaii, but it will require all of our effort and expertise,” said Curtiss.

New ideas to remove the infestation are being proposed and tested, while those in place have been effective in clearing nests of the later life stages of the beetle.

An invasive species is nothing new to the islands of Hawaii, but it is hopeful that the work of the CRB team will result in the complete eradication of the latest pest on the island. 

For More Information

FOR MORE INFORMATION about the CRB, visit the State of Hawaii’s Plant Industry Division web site at <http://hdoa.hawaii.gov/pi/main/crb>. Weekly updates on activities to eradicate the CRB on Oahu are posted by the Hawaii Invasive Species Council can also be found on this site.



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