

Bacillus Mosquito Control FAQ

Kaua'i Forest Bird Recovery Project & DLNR Forestry & Wildlife

August 2023

1. What is *Bacillus* or “Dunk”?
 - a. Dunk is a larvicide made from naturally occurring soil bacteria that kill mosquito larvae. The active ingredient in Dunk is the bacterial strain Bti, which stands for *Bacillus thuringiensis israelensis*. Here when we say *Bacillus* we mean both Bti and a related bacteria, *Bacillus sphaericus* or Bs, which is another bacterial strain that specifically controls mosquitoes.
2. How does *Bacillus* control mosquitoes?
 - a. *Bacillus* destroy the walls of the guts of mosquito larvae. This process only works on mosquitoes because of their unique gut chemistry that is not found in other insects, other wildlife, or people.
3. How is using *Bacillus* different from Mosquito Birth Control (Incompatible Insect Technique)?
 - a. They are separate tools that use different types of bacteria to control mosquitoes in different ways. *Bacillus* bacteria affect only mosquito and midge larvae. Mosquito birth control uses a different bacteria species (*Wolbachia*) to prevent mosquito eggs from hatching. While a proposal to use mosquito birth control on Kaua'i is currently in development, the August 2023 mosquito control operation is only using *Bacillus*. Using *Bacillus* can help reduce mosquitoes until the mosquito birth control tool is available. Using both tools together in the future can give the birds a better chance at survival.
4. Where on Kaua'i is *Bacillus* being applied?
 - a. Applications are taking place in a 270-acre area in the Northwest part of the Alaka'i, away from public trails.
5. Can I use Dunk in my yard?
 - a. Yes! Dunk is an organic product available at hardware stores and can be used to treat standing water around your home to kill mosquito larvae and prevent the emergence of biting adults. Make sure to follow the safety guidelines on the label.
6. How does *Bacillus* affect insects native to Hawai'i?
 - a. *Bacillus* does not affect native insects because only mosquitoes have the gut physiology that is susceptible to these bacterial strains.
7. How long does *Bacillus* last?
 - a. *Bacillus* stays active in the environment for up to 4 weeks. Treatments every 2-3 weeks during the mosquito breeding season are expected to keep populations down.
8. Why is *Bacillus* being applied aerially?
 - a. Mosquito larvae can live in tiny pools of water anywhere in the forest. It would be impossible to reach them all on foot, but aerial droplets can reach all water pools in the application areas.
9. Where else has *Bacillus* been used?
 - a. *Bacillus* products have been used to treat waterways worldwide for over 30 years in large-scale public health operations. In the US, it has been used in aerial applications in MA, PA, FL, and other states. *Bacillus* are approved for use in organic agriculture and approved by the WHO for use in drinking water.

10. How long do the applications of *Bacillus* take?
 - a. 5 applications are planned between August and October. Applications take place at dawn, and each application lasts less than 1 hour.
11. What does the application look like?
 - a. There may be a faintly visible spray for a few feet behind the aircraft. Droplets in the air are not visible from the ground. Droplets reach the ground within 20 minutes of application.
12. What if I or my dogs are in the area during an application?
 - a. Breathing in the droplets is safe, as the *Bacillus* does not affect human, mammal, bird, or fish health. The manufacturer's staff breathe it in frequently during applications and have no effects. Depending on conditions, the droplets may smell a little bit like yeast while they are in the air.
13. What happens if I/my child/my dog come into contact with *Bacillus*?
 - a. *Bacillus* is not toxic to humans or non-mosquito animals because we do not have the same gut physiology as mosquitoes, so touching or ingesting it will not cause a reaction.
14. Will *Bacillus* accumulate in the river?
 - a. No, it breaks down under UV light.
15. How does *Bacillus* application affect human health?
 - a. Contact with *Bacillus* is safe for humans, dogs, and other non-mosquito wildlife. Reducing mosquitoes will make using Kōke'e and the Alaka'i more enjoyable with fewer bites! Fewer mosquitoes on the island will also reduce the risk of spreading human mosquito-borne diseases.
16. What will happen to the forest birds without mosquito control?
 - a. Multiple native bird species on Kaua'i are expected to go extinct in the next 1-5 years due to mosquito-borne disease. These species are what make our forests uniquely Hawaiian. Without forest birds to sustain them many of our beautiful forest plant species will also suffer, leading to negative impacts on our watersheds.

If you have additional questions, please reach out to our partners at Kaua'i Forest Bird Recovery Project at info@kauaiforestbirds.org