

INSECTICIDE RESISTANCE IN MOSQUITOES: PRACTICAL GUIDANCE AND TIPS FOR PERFORMING YOUR OWN ASSAYS



Webinar Question & Answer Session 1 April 2020

What information is there in regards whether mosquito adulticides affect resistance if pyrethroids are ubiquitous? In other words, if we stop spraying pyrethroids, the public and other industries may continue using them.

- (James Burtis)** There is some information about the effect of agricultural pesticides on resistance in mosquito populations. From early studies it does appear that, yes, when pesticides are deployed broadly by agriculture or by people who are not in mosquito control, it's possible that resistance can emerge in mosquito populations, even if they are not targeting them. This is one of the reasons it's really important to get an idea of the baseline susceptibility of your population. It's not always under your control to manage it. You have to work around what resistance, if any, is already in the population, and then, of course, you have to also work around what is available in your state. This is why our guidelines are broad. You have to figure out what is going to work in your specific region or state or your county.

Does John have any advice on avoiding pathogens in insectary (e.g. epibiont)

- (John Shepard)** We haven't had too many issues in terms of having any types of pathogens, you know, any fungal contaminants or things of that nature. The only thing you want to make sure you're doing is we do clean things down, wipe things down on a weekly basis. We don't use any type of disinfectant in our labs. We just usually tend to clean things with water and scrubbing and let them dry out. Again, sometimes you might have issues with getting some things, if you have some pathogens, if you're using food for a long period of time. We will change those sugar wicks or sugar sources on a weekly basis so we don't have any mold issues in the insectary. I guess you could have issues with the food if it's not fresh. That's one of the things we do, we make it up fresh. We go through a lot of material on a weekly basis, so we always have relatively fresh material going in. So I think that's often helpful for us.

What life stage and species is sent to you most frequently for resistance testing?

- (James Burtis)** Last season, I'd say the bulk of our samples were *Culex pipiens* testing for larvicides *Bti* and methoprene. That being said, we're trying to encourage people to test *Aedes albopictus* as well, and we know that testing for adulticides is really important for reporting to MosquitoNET. We want to push people to request more tests for organophosphates especially, so we can know what the general susceptibility in the population in the Northeast looks like, considering how widely spread pyrethroid use is in our region.

When drying *Aedes* eggs, are there any other precautions we need to take to make sure the eggs dry out correctly (such as temperature or humidity)?

- (John Shepard)** With *Aedes* eggs, we dry them down so that the filter paper is barely damp to the touch, and then store it in those sealed bags. If you had it where the eggs were too dry or the paper started to get

too dry, you can make a humidity chamber by having a wet cotton ball in the corner of a closed container, away from the filter paper. You can segregate them that way. But basically, in an air-tight container with a little bit of humidity, you can bring up the humidity on those eggs so they don't dry out too much and cause mortality to the eggs.

Our *Culex* are likely a changing mix of *pipiens*, *molestus*, *quinqs*, and hybrids. Any suggestions for creating a baseline?

- (Laura Harrington)** There are good molecular diagnostics for those species, and there are also really good taxonomic features for the larvae, at least for some of the species. And, of course, where you are in the country depends on what you are going to get regarding *Culex*. There are some ways that you can identify those. We usually check our colonies to confirm they are indeed what they are. Understandably, it may be difficult for some folks who do not have access to PCR or the ability to do that.

Is there a website that you publish the resistance testing results to? Is it available to access to the public?

- (James Burtis)** In our initial survey, we asked about sharing the resistance results publicly, and most of our collaborators expressed that they wished us not to. We are working on a publication right now that's based on our survey from last year where we are offering co-authorship to people who have sent us specimens so that they can weigh in on how we report the results as well. We have to be careful in how we report them, and we are working with the community so we don't overstep and make them uncomfortable with releasing results that they don't necessarily want to share publicly.

Regarding the mosaic method of pesticide application, do you have to factor in the flight range of different populations? How much does flight range vary by mosquito species?

- (James Burtis)** I am actually going to ask Laura to answer the flight range questions, but you do have to account for flight range. You also have to account for geographic isolation. Physically, how connected can the mosquitoes be of those two populations?
- (Laura Harrington)** Typically, flight range for mosquitoes is really short. Typically, a couple hundred meters maximum. The one exception are some of the salt marsh mosquitoes, which are known to travel up to a mile or more. But, for most of the mosquitoes that you'd be focusing on, the flight range is going to be pretty small.