

# PSHB Research Update

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**A**lthough we haven't seen the rapid expansion of the polyphagous shot hole borer (PSHB) infestation in San Diego County that was feared, it doesn't mean that our researchers have been any less active in trying to find solutions. Significant, positive advancements have been made in the search for chemical control solutions for PSHB and Fusarium Dieback, as well as in the refinement of the trap and lure being used to monitor for the beetle.

## **Section 18 Emergency Exemption Application**

Since PSHB emerged as a threat three years ago, one of the Commission's primary goals has been to develop management tools for avocado growers. This includes both chemical (pesticides, fungicides) and non-chemical (chipping, solarization) approaches. As every grower knows, getting new pesticides registered—even in emergency situations—is a long and tedious process. After carefully considering the pesticides currently registered on avocado, evaluating information from Israeli scientists about their experience with PSHB, and discussing redbay ambrosia beetle strategies used in Florida, the decision was made to pursue two section 18 applications—one for a pesticide and the other for a fungicide.

The pesticide chosen for a section 18 is Hero®, which contains the active ingredients bifenthrin and zeta-cypermethrin. This product was selected for several reasons. First, zeta-cypermethrin is already registered for use on California avocados in the form of Mustang® so we didn't need to seek permission for use of one of the active ingredients. Second, Hero® is likely a couple of years away from full EPA registration—it is currently in the IR-4 process for full registration and all of the residue analyses have been completed. Lastly, and of critical importance, the section 18 request has strong support from Hero's® registrant, FMC.

Over the past year, a small team led by Drs. Joe Morse and Frank Byrne at UC Riverside has been working diligently to acquire the necessary efficacy data to submit with the section 18 application. To say this has been a challenging process is an understatement. These beetles are difficult to work with and many of the trials had high control mortality, often masking the pesticide effects. However, the team persevered and got the job done. We are happy to report that the completed Hero® section 18 packet arrived at DPR's

office in Sacramento on September 3 and is under review. Without any unforeseen pitfalls, the process should take about three months, so we are cautiously optimistic that we will have a positive outcome by year's end.

Our focus will now shift toward developing the section 18 packet for Tilt® fungicide. Tilt® has been selected because it, too, is already in the IR-4 program and has strong support from Syngenta. Dr. Akif Eskalen is heading the efficacy trials on Tilt® and other fungicides, and as soon as he has assembled the necessary efficacy data the Commission will proceed with the section 18 application.

## **New Names for Fungi and San Diego Beetle**

The Commission held two shot hole borer update meetings in Escondido and Santa Paula on September 1 and 2, respectively. Dr. Stouthamer, who has been working on determining the origins of the shot hole borer populations in California and their correct identification, proposed a new common name for the San Diego population of the beetle. According to DNA analysis, the San Diego beetle is probably a distinct, but closely related, species from the L.A. population. Dr. Stouthamer has named the San Diego beetle the Kuroshio Shot Hole Borer (KSHB). The name comes from the Kuroshio Current that flows between the beetle's native islands of Taiwan and Okinawa.

Dr. Eskalen also reported that the *Graphium* and *Acremonium* species of fungi associated with PSHB have been formally named. The two fungi are now known as *Graphium euwallaceae* and *Acremonium pembeum*. Not to be outdone by Dr. Stouthamer's creativity, Dr. Eskalen chose to name the *Acremonium* species for its pink color using his native Turkish language—pembe.

While these official names are of relatively minor importance to growers, officially naming new species is important scientifically. A new species name cannot be proposed until a detailed description of the species and its biology has been completed. Thus, the official naming of these species means the researchers have a fairly detailed understanding of the beetle and fungi and have collected a lot of data integral to understanding how to control them.

## **Trap and Lure Improvements**

At the early September meetings, Dr. Stouthamer presented new information concerning the traps and lures we have



Figure 1. The distribution of the Kuroshio shot hole borer (San Diego population) remains relatively confined to the Escondido and Bonsall areas of northern San Diego County.

been using to detect PSHB. The Commission has been funding Dr. Stouthamer to test various trap designs and lures and he has made some important discoveries, especially if you have invested in a trap and are checking it yourself.

Quercivorol, a chemical that is produced by the beetle's fungal symbionts and serves as an attractant, is used as the lure. Currently, one lure is used per trap, but Dr. Stouthamer ran tests to determine whether multiple lures would be even more attractive. He discovered that trap capture actually declined when two or three lures were placed on a trap compared with one lure. He is now working with the lure manufacturer to produce a half strength lure to see if it will be more effective than the current full strength lure.

Because many bark beetles are attracted to ethanol, Dr. Stouthamer also examined whether adding ethanol to the traps in combination with the lure would increase their effectiveness. He found that ethanol actually reduces the efficacy of the traps, acting to detract the beetles rather attract them. In addition, he discovered that some formulations of antifreeze (particularly those used for RV winterization),

which is used in the bottom of the traps to preserve the captured beetles, contain ethanol. To maximize trap efficacy, it is very important to make sure that the antifreeze being used in traps does not contain ethanol.

Lastly, the lure currently being used is produced by a company from Canada. However, a Costa Rican company has contacted Dr. Stouthamer to ask him to test their version of a quercivorol lure. In his initial trials, the Costa Rican lure appears to be as effective as the Canadian lure currently used. The hope is that having some competition in the market will bring down the cost of the lures.

### **Current Beetle Distribution**

One of the points of discussion at the recent PSHB meetings was the distribution of the beetle and the apparent lack of spread that was widely expected to happen this summer. The KSHB (San Diego beetle) remains relatively confined to the Escondido area with a second, smaller area of infestation near Bonsall.

A couple of explanations are possible for the lack of



Figure 2. The polyphagous shot hole borer (L.A. population) has continued to move steadily northwest, and is now within 1.5 miles of the Ventura County border.

spread. There may be some native beneficials feeding on the beetle or fungi and slowing their spread. It may also be that the beetle is spreading within groves, but is not moving out of those groves since there are plenty of host trees within the groves.

There is a third possibility that is even more alarming – that growers are not reporting possible infestations. If this is true, it would be extremely detrimental to the industry as a whole. Growers are strongly encouraged to communicate with the Commission or Drs. Eskalen and Stouthamer if they suspect the beetle is in their grove. The Commission has been working extremely hard to garner support from the state and federal governments — both financially and from a pesticide registration standpoint — to combat this pest. However, we cannot make a strong argument if we don't know the full extent of the problem.

On the northern front, the PSHB (L.A. beetle) has con-

tinued its slow, steady movement toward Ventura County. The closest known infestation is just north of the 101 freeway between Calabasas and Woodland Hills, and puts the beetle within about 1.5 miles of the Ventura County line. The Commission, in cooperation with the Ventura County Agricultural Commissioner's office, has increased the number of traps along the Ventura County border with the hope of detecting the pest as early as possible.

That said, growers are reminded that the traps and lures being used are not 100 percent effective and have a limited range of attraction. It is of the utmost importance that growers remain vigilant and actively survey their own groves for any sign of this pest. Dr. Eskalen's website (<http://eskalenlab.ucr.edu/avocado.html>) includes numerous resources to help you identify this pest and provides information on how to submit a sample from a suspect find. 🥑