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Sunblotch Alert!

New, Faster Ways to Spot This Avocado Sneak Thief

Hey avocado folks! You know that sinking feeling when something's not quite right in your grove? Maybe the fruit isn't looking perfect, or the yields are a bit off. Well, one of the silent troublemakers that can cause these issues is the Avocado Sunblotch Viroid (ASBVd). It's a tiny, microscopic bugger that can lead to those frustrating scars and lower your profits.

For too long, finding ASBVd early was like searching for a dropped seed in the soil. The old tests just weren't good enough, especially when your trees looked healthy on the outside. This meant ASBVd could be quietly spreading, impacting your future harvests without you even knowing.

But good news is on the horizon! Here at UC Riverside, we've been busy developing some smart new tools to help you get the upper hand on this sneaky pest. Think of it as upgrading your old flashlight to a powerful spotlight. We've found a super-sensitive way to detect ASBVd, and we've been testing it right here in California avocado groves just like yours. This new tech can spot the viroid even when it's barely there, giving you an early warning system you've never had before.

Why Catching Sunblotch Early is Money in Your Pocket

- **Stop the Spread Fast:** Finding ASBVd early means you can act *before* it infects more of your valuable trees. That saves you time, money on treatments and a whole lot of stress down the line.

- **Healthy Trees = Bigger Bins:** By finding and removing infected trees (or making sure your new trees are clean), you're keeping the rest of your grove healthy and producing those bumper crops you rely on.

- **Protecting Our California Avocados:** ASBVd isn't just your problem; it's a threat to all of us who grow avocados in California. Early detection is key to keeping our industry strong and competitive.

So, what are these new "spotlights" we've been working on? Let's take a closer look.

Shining a Light on Sunblotch: dLAMP to the Rescue

We've been digging into some advanced science, and two techniques really stood out: **digital LAMP (dLAMP)** and **droplet digital PCR (ddPCR)**. Don't let the long names scare you. Think of them as super-detectives that can find even the tiniest clues of the ASBVd's presence in your trees (it's looking for its RNA, not DNA, but the idea is the same).

Why dLAMP Could Be Your New Best Friend

Imagine your old way of testing was like trying to see in a dimly lit room. dLAMP is like flipping on a super-bright light. It's a souped-up version of a technique called LAMP, and it's incredibly sensitive. Here's why it could be a game-changer for you:

- **Sees the Smallest Traces:** dLAMP can find ASBVd even when there are just a few particles hiding in the plant. This means we can potentially catch infections way earlier than before, even in trees that look perfectly fine.

- **Faster Results on the Horizon:** Right now it's a lab test, but the basic LAMP technology is known for being quicker than some older methods. We're working on making it even faster and easier to use in the future.

- **Only Looks for the Real Deal:** Our dLAMP test is designed to specifically find ASBVd, so you don't have to worry about getting false positives from other things in your avocado trees.

Putting dLAMP to Work in California Groves

Over the last couple of years (2023-2024), our team visited eight

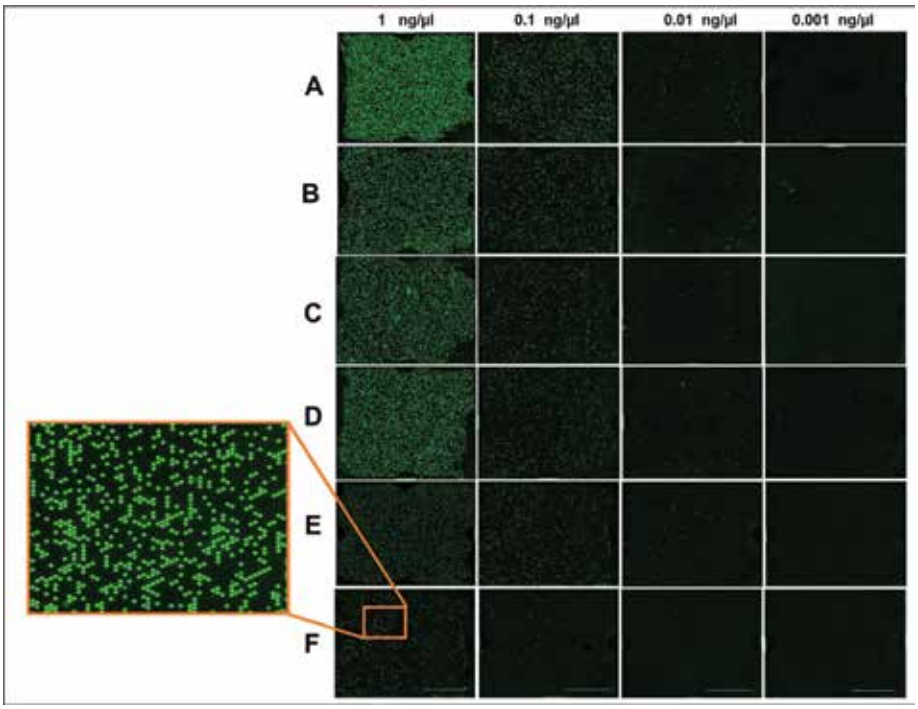

Figure 1: *Think of this picture like a close-up view from our super-sensitive dLAMP test. Each little dot shows a positive signal for ASBVd. We tested different amounts of the viroid from both fruits (A-C) and leaves (D-F) and also tried testing single samples versus groups of samples to see how well dLAMP could find it.*

avocado orchards right here in California – in Ventura, San Diego and Riverside counties. We took samples from all parts of the trees: leaves, fruits and even those tiny flowers. We looked at trees showing sunblotch symptoms and their healthy neighbors to see if the viroid was hiding silently.

We even tried putting multiple leaf samples together in one test – kind of like pooling your resources – to see if dLAMP could still find the viroid efficiently (Figure 1). This could save time and money on testing in the future.

What We Discovered with dLAMP

The results were exciting — dLAMP was really good at finding ASBVd, even when there were only tiny amounts in the lab. When we tested the samples from orchards, dLAMP was able to detect the viroid in about 31% of them. This shows it's a reliable tool for finding sunblotch in real-world conditions (Figure 2).

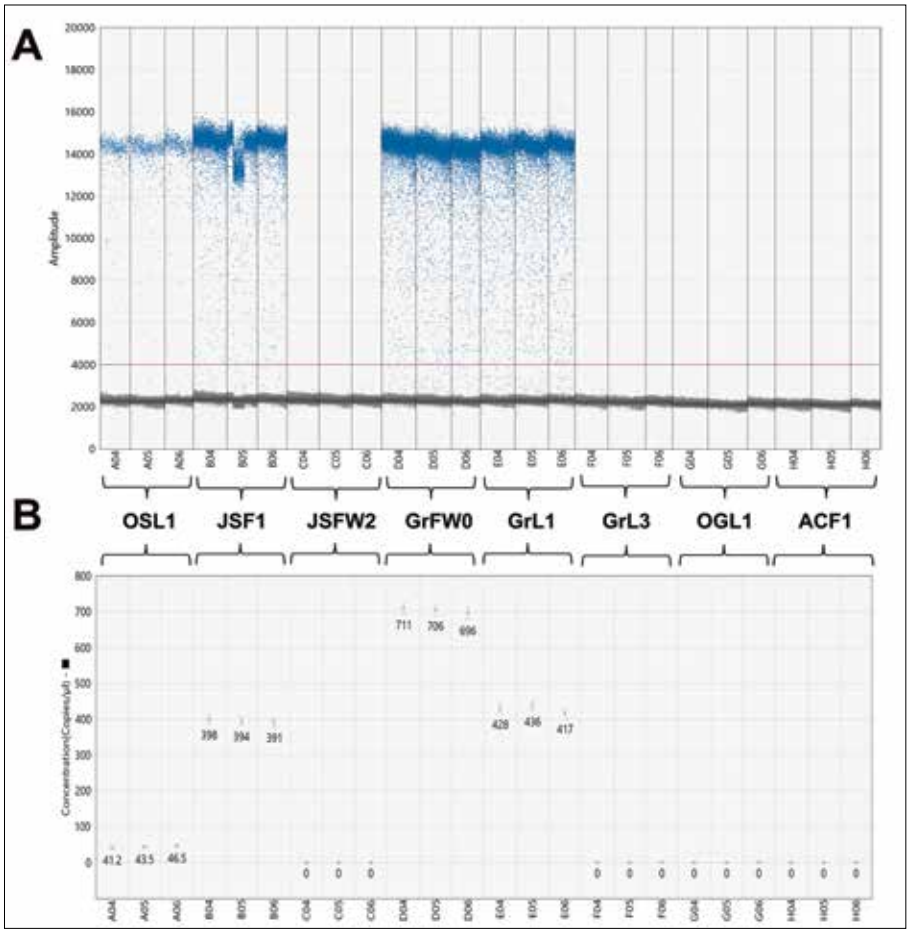

Figure 2: *This graph shows how sensitive our ddPCR test is. We tested different amounts of ASBVd from infected leaves (A) and fruits (B). The more of the viroid present, the stronger the signal. This helped us confirm that our dLAMP test also was working accurately.*

Comparing the New Detectives: dLAMP vs. ddPCR

We also used another powerful detective tool called **droplet digital PCR (ddPCR)**. Imagine ddPCR as counting every single tiny speck of dust to see how much dust is in a room. It's super accurate for measuring the exact amount of ASBVd in a sample.

ddPCR: The Super Counter

- **Counts Every Tiny Bit:** ddPCR can tell us not just *if* the viroid is there, but *exactly how much* is present. This can be useful for understanding how the infection is growing in a tree over time.

- **Our Trustworthy Helper:** We used ddPCR to double-check the results we got with dLAMP, making sure our new dLAMP test was giving us the right answers.

What We Learned Comparing the Detectives

Both dLAMP and ddPCR were excellent at finding ASBVd in the samples from your orchards. In fact, they gave us very similar results. This is great news because it means dLAMP has the potential to be an effective tool for regular testing in the future.

What This Means for Your Grove

- **More Accurate Testing is Coming:** You may soon have access to more accurate and sensitive tests for ASBVd, which means you can catch it earlier than ever before.

- **Understanding Sunblotch Spread:** These new tools can help us learn more about how ASBVd moves through your groves, even in trees that don't look sick. This knowledge will help us develop better ways to stop it.

- **Making Smarter Choices:** With more reliable testing, you can make better decisions about managing your orchard, like which trees need to be removed or which young trees you can trust are healthy.

A Brighter Future for Your Grove: What's Next in the Fight Against Sunblotch

Our research has shown that these new detection tools, especially dLAMP, are a big step forward in the fight against ASBVd in California avocado groves. We're really excited about the possibility of getting these technologies into the hands of you, the growers, and other agricultural professionals.

What We're Working on Right Now:

- **Making dLAMP Even Easier to Use:** We're exploring ways to simplify the dLAMP test so it could potentially be used right in your orchard for quick results. Imagine getting answers without having to send samples off to a lab!

- **Tracking Sunblotch's Movement:** Now that we have these super-sensitive tools, we can start to really understand how ASBVd spreads within and between groves. This will help us develop even better ways to prevent it.

- **Sharing Our Knowledge:** We're dedicated to keeping you informed through workshops, field days and articles like this one. We want to make sure you have the latest information and the best tools to protect your livelihood.

What You Can Do to Protect Your Grove:

- **Keep a Close Eye:** Regularly check your trees for any unusual signs. Remember, early symptoms can be easy to miss.

- **Start Clean, Stay Clean:** Always use certified, disease-free budwood and seedlings. This is still the most effective way ASBVd spreads.

- **Get Tested If You're Unsure:** If you suspect sunblotch, don't wait! Get your trees tested using reliable methods. Talk to your local farm advisor or reach out to us for information on testing options.

- **Stay Informed:** Keep up to date on the latest research and best practices for managing ASBVd.

By working together and using these new powerful detection tools, we can make real progress in protecting California's valuable avocado industry from the threat of Avocado Sunblotch Viroid and ensure healthy, productive groves for many years to come. Stay tuned for more updates, and don't hesitate to reach out if you have any questions.

(Editor's Note: The authors – Fatemeh Khodadadi and Mehdi Kamali Dashtarzhaneh of University of California, Riverside– can be reached at: fatemehk@ucr.edu)