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TRACE GENOMICS IS BRINGING new technology to Yuma that allows growers to test their fields for diseases using genome sequencing. A newly developed test can analyze thousands of microbes with a single soil sample.

FIGHTING FUSARIUM

Genetic testing may ID lettuce disease quicker

BY MARA KHAUB
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With some local fields already infected by the lettuce-killing Fusarium wilt, the Yuma Center of Excellence for Desert Agriculture is working with Trace Genomics of San Francisco, Calif., to provide growers with a testing tool that identifies the fungal disease in soil quicker.

The new test, developed by Trace Genomics, allows growers to assess their fields for diseases using genome sequencing. The test can analyze hundreds of thousands of microbes with a single soil sample.

There is currently nothing else like this, according to Dr. Poornima Parameswaran, co-founder of Trace Genomics. She introduced the testing method to a room full of growers Aug. 8 as part of the Center of Excellence Seminar Series presented by the Yuma Center of Excellence for Desert Agriculture and Western Growers.

Noting that some growers might be losing — or worried about losing — productivity, the YCEDA and Western Growers told growers the tool might help them “make critical planting decisions to maximize your yield and improve your bottom line.”

The YCEDA recently

learned it would be receiving another \$50,000 grant for Fusarium wilt of lettuce research, which has been identified by the center’s private and public partners as a high-priority issue, YCEDA Executive Director Paul Brierley said.

The grant, along with additional funding from the Arizona Department of Agriculture’s Specialty Crop Block Grant Program, allows YCEDA to continue efforts to mitigate this “serious problem.” The center will conduct two years of expanded field trials with the new grant. To date, the YCEDA has obtained more than \$150,000 for Fusarium

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DR. POORNIMA PARAMESWARAN co-founded Trace Genomics, a San Francisco startup company that has developed a test that tells growers whether their soil has harmful pathogens.



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wilt research with the objective of finding solutions.

In 2015, the center held the first symposium on Fusarium wilt and field trials and conducted research on the lettuce killer with the goal of helping farmers decide on what to plant. The center saw some results during the second year of field trials in 2016.

The center is continuing to expand field trials as well as working on research to see how farmers can identify the disease quicker.

"We're working to get predictive tools in your hands," Brierley told growers at the presentation.

Western Growers Senior Vice President Hank Giclas noted that both

the YCEDA and Western Growers are "interested in solving problems" and "realized some can only be solved with genetics. We saw the promise of genetic sequencing early on."

Parameswaran explained that the test uses genome sequencing, computational analysis and data science tools to deliver an unprecedented view into soils.

The focus of Trace Genomics is "bugs in the soil," Parameswaran said, noting that soil contains "some harmful, some beneficial" microbes.

Measuring health and disease "below ground" informs "above ground decisions," providing growers with critical input that helps them make decisions, such as which varieties of crops to plant and/or what fungicides to use.

With this first-of-its-kind soil genetic test, "we capture the entire fingerprint, both the good and the bad," she said.

Each sample contains hundreds of thousands of microbes, all identified by the test. This generates a lot of data, and the challenge is interpreting what those microbes mean for soil health and how to use that information to increase soil health and yield.

Software interprets the soil health and disease with an "extremely" specific-broad survey of 100,000-plus microbes.

"Not just yes or no, but how much is in that soil," Parameswaran said. She likened it to going to the doctor, who checks a patient's vital signs. Because the technology is still new, Trace Genomics

still validates results with extended testing.

Fusarium oxysporum is part of a large family of pathogens; strains are genetically similar and infect different crops. Diagnosis is extremely difficult, Parameswaran said.

A special strain of Fusarium oxysporum, Fusarium oxysporum f.sp. Lactucae, infects lettuce. Traditional culture testing can't distinguish this strain from other strains.

Parameswaran demonstrated test results using real data taken from six different ranches in Yuma, using both romaine and iceberg lettuce fields.

The company has been working with growers to come up with a report that makes sense. The "easy to read" form tells growers whether they need to worry and identifies the

high-risk microbes in their fields.

The test can be used in different ways. The grower can test the soil before planting to identify disease pressure on every block or at-risk blocks. They can use the results to strategize operations based on the soil data.

Or growers can test the soil before and after product application to evaluate efficacy and help them choose products and practices.

The test has a three-week turnaround period and costs \$199 per sample test. If a grower tests per acre, then that's \$199 per acre. The company offers bulk discounts.

Steve Finnell, a consultant who works with farmers, attended the presentation.

So far, none of his

clients' crops have become infected. "We think it's because of the rotation," he said, referring to the practice of rotating the crops that are planted on fields and/or letting the fields rest.

However, they're keeping a close eye on Fusarium wilt, which has the capability of wiping out entire crops.

"We know it's going to happen. It'd be good to get ahead of this," Finnell said.

He called the genetic test "some of the most eye-opening technology I've seen ... We're now in the stone age. We look at (pathogens) one at a time."

For more information on Trace Genomics, go to www.tracegenomics.com.

To learn more about the YCEDA, go to desertagsolutions.org.