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## N.C. State University develops portable plant pathogen test

"There are a lot of *Phytophthora* species (a genus of water molds) that can cause a lot of really devastating losses to agricultural, forest and nursery plants," said Amanda Mainello-Land, lead author of the published research and recent doctoral graduate at NCSU. "Having diagnostic tools that can find (pathogens) quickly can really help to prevent their spread over time. This test was designed for field-level detection of

Determining what pathogen plants are infected with is a lengthy and expensive process. Most traditional testing can take days to weeks in laboratories, delaying important decisions that need to be made to manage the spread of a pathogen. In the case of *P. ramorum*, the pathogen responsible for Sudden Oak Death, Ramorum Leaf Blight, and Ramorum Dieback, testing can take even longer because it is a quarantine pathogen. Quarantine pathogens are regulated by federal and/or state authorities because they pose significant threats to agriculture, natural ecosystems, and sometimes even the economy. These pathogens are subject to strict control measures to prevent their introduction, establishment and spread. The USDA's Animal and Plant Health Inspection Service (APHIS) is the primary

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**“Then and now, best thing we could have done!”**  
— Michelle Hasheider-Burianek



**Generations of success with Udder Comfort:**  
Michelle Hasheider-Burianek and daughter Teagan (above and at right)  
3rd and 4th generation at ELM FARMS, OKAWVILLE, ILLINOIS  
125 cows, 2 Robots, RHA 25,000, SCC average 180,000

**“We started using Udder Comfort™ 15 years ago. It was the best thing we could have done to make a tremendous difference. People try to get us to use other products, but they don’t ever stand up to the results with Udder Comfort,”** says third generation dairywoman Michelle Hasheider-Burianek of Elm Farms in southern Illinois.

**“We use this routinely on our fresh cows when they calve in. They are separated after going through the robot, and we apply the Udder Comfort at the head gates for 2 to 3 days; heifers 4 to 5 days. Udders milk out nice and evenly, and we save money by shipping more milk with less need for treatments. If we see a conductivity spike or hard quarter, we grease her up with Udder Comfort. Any animal in the sick pen also gets it,”** Michelle explains.

**“Our kids really enjoy showing, so we also use Udder Comfort on our show cows. I’ll even use it on a swollen hock, it’s that good,”** she adds.

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N.C. State

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agency responsible for regulating plant pathogens.

“APHIS is interested in faster diagnostics because right now, the problem is samples from the field are sent to state diagnostic labs and from there, to (a national diagnostic and reference lab) and it can take weeks to get the answer,” said Jean Ristaino, professor of plant pathology at NCSU. “(Our test) allows us to do in-field diagnostics and confirm first whether it’s a Phytophthora ramorum because not all Phytophthoras are quarantine pathogens. Some are more destructive than others, so we targeted the assay for P. ramorum.”

The test is designed to be easy to use so it can be handled by people with varying degrees of expertise. To use the test, an infected sample of leaf tissue is combined with reagents in a tube. The reagent’s properties can recognize DNA

segments characteristic of P. ramorum. The solution in the tube is purple to start, and the solution must be warmed up for about 30 minutes at 65°C or about 149°F. If the sample is positive for P. ramorum, the solution will change from purple to blue. The mix also contains a fluorescent dye that can be visualized using a smartphone. In some cases, the test can detect disease before visible symptoms appear.

Ristaino is interested in continuing to demonstrate the viability of the portable plant test. During a sabbatical, she took the test global, demonstrating its effectiveness in detecting P. ramorum in an Ireland forest in 20 minutes.

Already, Ristaino and collaborators have adapted the test to detect several pathogens that cause disease in tomatoes and potatoes, including late blight, Phytophthora root rot, early blight, tomato spotted wilt virus and bacterial spot. The test must be specific for the target pathogen, and in some cases, extraction methods differ. For example, a microneedle patch has been developed that works better for herbaceous plant tissue, like that of tomatoes. Ristaino believes the test can also be modified to work for other systems, like detecting viruses in animals.

“We’re at the point where we’re trying to get some companies to pick (the test) up and run with it,” Ristaino said.

Still, there are challenges in widespread implementation that will need to be overcome as the technology is shared with various stakeholders. In the case of quarantine pathogens that are federally regulated, decades-old processes for identification are likely to be favored. Additionally, nursery growers might be hesitant to adopt a technology that could reveal that their products are diseased, requiring them to cull plants.

“Stakeholder involvement in the deployment of these sorts of assays is important so they are used more widely,” Ristaino noted.



Above: Rhododendron leaves infected with P. ramorum.

# Customer Appreciation Days

**WHEN:**  
March 17<sup>th</sup> - 21<sup>st</sup>  
7:00 am — 5:00 pm each day

**WHERE:**  
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