Electric Water Kills Plant, Food Pathogens

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A University of Georgia scientist has found an environmentally friendly product nurserymen can use to kill plant diseases. What is it?

Water. But this fungus-killing water doesn't flow from just any faucet. It's electrolyzed water created by a machine that combines water, electricity and a salt solution that enhances the water's properties. The water-and-salt solution flows through a machine called an electrolyzed oxidizing water unit. The result is two types of water: one very acidic and one highly alkaline. "I've tried the acidic electrolyzed water on everything from begonias to geraniums," said James Buck, a plant pathologist working in the UGA College of Agricultural and Environmental Sciences. "It's very safe for the plants. And it kills fungi in a matter of seconds."

Hundreds of ornamental plants are grown in nurseries across the Southeast. And nurserymen constantly fight to control diseases that reduce their plant yields. "Typically, in just one year, 10 percent of the crop will be lost to plant diseases," Buck said. To test the effectiveness of the electrolyzed water, Buck selected two diseases to work with: powdery mildew and gray mold. "In a greenhouse operation, you're going to have these two diseases," Buck said. "They're foliar fungi that attack the leaves and flowers of plants." Buck applied the electrolyzed water as a spray and found it killed fungi much faster than traditional fungicides. "We're not trying to replace fungicides," he said. "But we are looking for alternatives and additional tools for growers to use. On top of its effectiveness, the electrolyzed water is also environmentally friendly."

The water kills bacteria and fungi almost immediately. But it loses its properties over time. "That's another reason it would be a popular choice," he said. Buck expanded his tests to include 25 fungi. And each time the electrolyzed water killed the fungus in "usually 10 to 30 seconds." Over the next two years, he plans to broaden his research into electrolyzed water's use as a contact fungicide. He'll do so with the help of a $123,000 Pest Management Alternatives grant from the U.S. Department of Agriculture. He now plans to find out how much and how often the water should be sprayed, which ornamentals it works best on and how its cost compares to that of traditional fungicides.

Buck's research may lead to EO water replacing or reducing the use of chemical fungicides in commercial greenhouses. "The electrolyzed oxidizing water unit won't be an affordable option for mom-and-pop nurseries," he said. "But large nursery operators should find the cost well worth the benefit." For the past four years, CAES food scientists have been using the electrolyzed water to kill bacteria on food and sanitize surfaces and equipment used in food preparation. "We're focusing on finding safe, effective, economical and practical means of controlling food-borne pathogens as food moves from the farm, through postharvest operations and onto the table at home," said Yen-Con Hung, a CAES food scientist.

"EO water has many applications," he said, "from nonthermal food washing and sanitization to water treatment and general household cleaning applications." Hung has tested electrolyzed water's effectiveness for controlling food-borne pathogens on plastic kitchen cutting boards, fresh poultry and lettuce. "This water drastically cuts down the levels of salmonella and Campylobacter on chicken carcasses," Hung said. "It would be a very effective addition to chicken processing plants." He has found the water effective, too, at removing pathogens on foods like lettuce that can't be heated to kill bacteria.

Questions:

1. How can scientists use water to treat plant disease?
2. What is the advantage in electric water?
3. What ways can scientists use electric water?