

Media Relations

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UNH Researchers Develop Drones for Orchard Management



Caption: University of New Hampshire doctoral student Matt Wallhead (left) and assistant professor of plant pathology Kirk Broders with the unmanned aerial vehicle they're developing to help apple farmers survey for disease and fungus. Credit: Rachel Rohr

DURHAM, N.H. – A University of New Hampshire plant pathologist and his doctoral student are using a remote-controlled helicopter to help apple farmers in the Northeast battle the persistent scourge of apple scab. [Kirk Broders](#), assistant professor of plant pathology, and Ph.D. student Matt Wallhead are working to bring precision agriculture to orchard management in the Northeast by developing a low-cost unmanned aerial vehicle (UAV).

With a camera loaded with GPS and infrared technology, the UAV can “see” pests, nutrient stress, or early infections caused by the apple scab fungus.

“You and I can only see a small percentage of the light spectrum,” Broders says. “We see chlorophyll as green, but it can also be seen as red at different wavelengths.” The multi-

spectrum images produced by the camera on their UAV shows chlorophyll in variations of red, the interpretation of which can lead to a clearer understanding of what problems, like apple scab, may be present in the crop and enable farmers to take targeted intervention.

Apple scab, persistent in the damp Northeast, is a major concern among farmers and orchard managers. It causes dark “scabs” on the leaves and the skin of apples; while they’re harmless and have no effect on the flavor, the blemishes render the apples unmarketable.

A farmer can easily spend a full day scouting an orchard for pests, fungi, and nutrient stress on foot, a task that goes from time-consuming to impossible on larger orchards. The researchers’ UAV – they shy away from calling it a “drone” because of its military implications – could do daily surveillance of an entire orchard, helping farmers pinpoint problems and target the use of fungicides and protectants for maximum impact and minimal environmental damage.

Broders and Wallhead are collaborating with Massachusetts-based [Rotary Robotics](#) to build the craft, which has six propellers for precision lift, hover, and zoom, at a price point of \$2,500. “We aim to create a UAV that an independent researcher or grower could afford,” says Broders, who also envisions multiple farmers having joint ownership of a single machine. Currently fine-tuning their prototype and mastering flying it over orchards at UNH’s Woodman and Kingman farms, they estimate their product is five years away from the marketplace.

Broders and Wallhead are one of the first research groups to work on such a project with apples, although drones have been increasingly used for nonmilitary purposes, such as monitoring vineyards in France and tracking endangered animals, in recent years. The researchers expect their UAV—designed for the regular

surveying of smaller orchard production-scale systems as well as for large row crops like corn, soybean, rice, and wheat—will detect disease outbreaks, determine fertility requirements, and assess overall crop health and yield potential, says Broders.

The [New Hampshire Agricultural Experiment Station](#) of the [College of Life Sciences and Agriculture](#) (COLSA) at UNH funded this project.

The [University of New Hampshire](#), founded in 1866, is a world-class public research university with the feel of a New England liberal arts college. A land, sea, and space-grant university, UNH is the state's flagship public institution, enrolling 12,300 undergraduate and 2,200 graduate students.

Photographs available to download:

<http://www.unh.edu/news/releases/2013/11/images/broderswallhead-8929.jpg>

Caption: University of New Hampshire doctoral student Matt Wallhead (left) and assistant professor of plant pathology Kirk Broders with the unmanned aerial vehicle they're developing to help apple farmers survey for disease and fungus.

Credit: Rachel Rohr

<http://www.unh.edu/news/releases/2013/11/images/applescab-2827.jpg>

Caption: Apple scab, a persistent fungus in the Northeast, does not affect apples' flavor but makes them difficult to sell.

Credit: Rachel Rohr

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