



EXTENSION CONNECTION

By Matt Smith

Scouting from the skies

Scouting is one of those things Extension agents are going to continue drilling you about until the heat death of the universe. While the tried-and-true practice of walking the field will probably always have a place in agriculture, new technological developments have made it easier than ever to supplement your current strategy with precision agriculture hardware.

Unmanned aircraft systems (UAS), commonly referred to as drones, are of particular interest to many growers and researchers. (Note: This article pertains only to UAS weighing less than 55 pounds and more than 0.55 pounds for imagery purposes only. Drones that spray pesticides are a whole other article.)

The speed and efficiency of drones have proven extremely helpful with citrus tree counts in HLB-affected groves. New University of Florida Institute of Food and Agricultural

Sciences (UF/IFAS) research on plant health diagnostics using drone imagery has shown promising results. Drones excel at big-picture scouting, helping to identify large problem areas, but can even be used to spot smaller-scale issues like irrigation leaks, which show up as cool zones in infrared. If you are curious about starting a drone scouting program, there are a few things you need to consider first.

LICENSE REQUIREMENTS

The Federal Aviation Administration (FAA) requires that all commercial drone pilots hold a Part 107 Remote Pilot Certificate. Unlike with the Florida Department of Agriculture and Consumer Services restricted-use pesticide license, the FAA defines “commercial” as pertaining to operations at your own grove as well as any other groves that may hire you for drone services. While new special rules for agriculture are being

considered, if you are currently using a drone as a tool for work, the FAA sees you as a commercial operator and you need a license.

To be eligible to get a drone pilot license, you must be at least 16 years old, be able to read and write in English, and be physically and mentally able to safely fly a drone. If you meet these criteria, you must score at least a 70% on the Unmanned Aircraft System Initial Aeronautical Knowledge Test. The exam is comprehensive and covers several areas that are also required for a manned pilot license, including FAA regulations, airport communications, reading airspace maps, aerial navigation and weather.

Since the cost of the exam is \$175, I recommend you take the time to study. Both online and in-person preparation classes are available, including one that I and a team of other Extension agents teach.

The Part 107 Remote Pilot Certificate is good for two years. Previously you could only renew by retaking the original exam, but earlier this year the FAA debuted a free online recurrent training course. Take the course, pass an exam on what was covered, and your license is renewed.

The drone doesn't need a license, but it does need to be registered. Registration is available through the FAA's drone website (faadronezone.faa.gov). Registration costs \$5 per drone and is good for five years.

DRONE TYPES

Drones are commonly divided into two categories: multirotor and fixed wing. Multirotor quadcopters are probably what come to mind whenever you think of a drone. They perform similarly to a helicopter and can hover in a fixed position. Fixed-wing drones are the high-tech versions of the classic RC airplanes we grew up with.

Modern multirotor drones are quite easy to fly. They are stable, require little space to take off and land, and are extremely portable. They are often less expensive than fixed-wing drones. However, they are less efficient flyers and generally have flight times lasting less than half an hour.

Fixed-wing drones require more skill to pilot. They require a runway to take off and land, though that runway

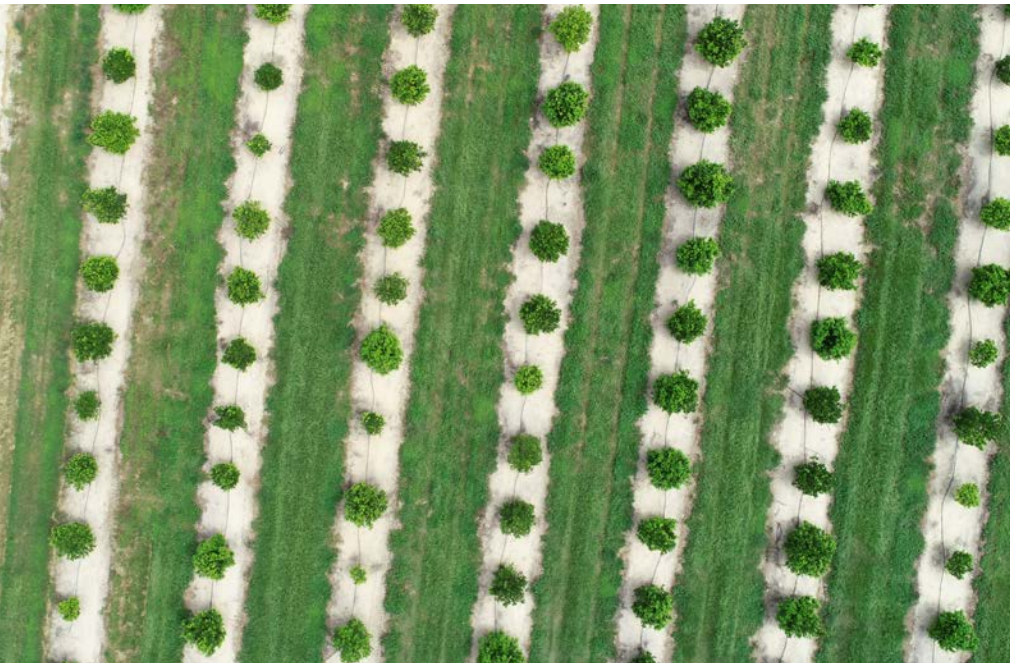


Figure 1. Drones-eye view of a young grove in Pasco County

doesn't necessarily need to be paved. There is no hovering a fixed-wing drone, but they can cover large distances much more efficiently than a multirotor drone.

Probably the biggest single factor in determining if you should use a rotary or fixed-wing UAS is your acreage. How many acres you can cover in a single flight depends on the drone speed, battery life and drone altitude. As you increase altitude, the amount of land that can be covered in a single image increases, but the amount of information you can get out of those images decreases.

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My last flight with a quadcopter was at a citrus grove in Pasco County (Figure 1, page 8), and it took a little under half an hour — and two batteries — to map an 11-acre section of the grove. On the other hand, my colleague's fixed-wing drone can map between 200 and 1,000 acres per hour. The quadcopter cost about \$2,000, while the fixed-wing drone costs nearly 10 times as much.

If the purpose is agricultural scouting, you want a drone with a camera that can capture light beyond the visual spectrum. While technology is improving in the realm of visual spectrum plant diagnostics, the really cool stuff is happening in the infrared and near-infrared spectrum. Drones that capture both visual and near-infrared spectrums, called multispectral, are required for plant vigor diagnostics. These cameras might not make for the best videography and advertising shots, but they're your best bet if your goal is a drone scouting program. 🍊

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