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Using Unmanned Aerial Systems in Specialty Crops

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Using Unmanned Aerial Systems in Specialty Crops Owning and Flying: Resources to get started

If you are totally new to using unmanned aerial vehicles (UAV) or systems (UAS), also known as drones, you may find it very helpful to speak with people who have experience flying these vehicles prior to buying one and/or obtaining your Part 107 Pilot's License.

Much information is available through search engines and videos. It is suggested to talk with a professional before making any substantial purchase for your farm.

Part 107 Pilot's Exam

Many companies offer classes, on-line training, or books to help you prepare for the exam. It is highly recommended to prepare for the exam to increase your chances of obtaining your license the first time around. Exam fees are currently \$150.

UMassAir offers self-paced, on-line training

<http://www.umasstransportationcenter.org/umtc/Education.asp> (scroll to bottom)

Federal Aviation Administration (FAA) web site

https://www.faa.gov/uas/commercial_operators/become_a_drone_pilot/

Visit the FAA website and familiarize yourself with its rules, regulations and policies. Licenses are valid for 2 years. Tests are usually offered at local airports. You must be at least 16 years old to hold a license and must pass the exam before you can legally fly a drone for any type of operation on your farm.

Types of Drones or Unmanned Aerial Vehicles (UAV)

Many types of UAV are available on the market, ranging from less than \$100 to more than \$10,000. Most UAVs are either fixed-winged aircraft or quadcopters (4 propellers). If you are spending more than a few hundred dollars on a UAV, you should consider buying directly from the manufacturer to ensure you are getting the most recent model and the best warranty for the product.

Once you purchase a drone for use on your farm, register it with the FAA. Go to: registermyuas.faa.gov. All UAVs that weigh more than 0.55 lb (and less than 55 lb) must be registered as such with FAA. It is inexpensive and easy to register your UAV.

Common Terms you might see when shopping:

RTF: Ready to Fly. Ready to go, but may need to do a few simple tasks like charge the batteries, attach the propellers, etc..

BNF: Bind and Fly. UAV comes assembled but without a controller. You may already have a controller but you will need to make sure your controller is compatible with the UAV or buy one that is compatible.

ARF: Almost ready-to-fly. This category can mean a lot of things, so read the description carefully so that you know what you are (or are not) getting.

FPV: First-Person Video. The drone can stream footage from a first-person perspective to a phone, virtual reality (VR) headset, or other device.

LiPo: Lithium Polymer, the material found in many drone batteries.

Flight time: the length of time the drone can stay in the air on a single charge.

Charge time: the length of time needed to recharge the battery.

Battery Time is a key shopping consideration for most pilots when buying a UAV. The time listed by the manufacturer is their “best estimate”. Battery time (life) is affected (i.e., usually decreased) by wind, temperature, and payload. Also, battery estimates normally do not include power needed for take-off. In addition, you need to make sure you have enough battery to get your drone “back home” before it runs out of power. Consider buying additional batteries and a charger so that you always have batteries “ready to go.”

Cameras

RGB: Red-Green-Blue visible light; reproduces what the eye sees.

Thermal: translates temperatures into visible light spectra.

Multispectral: usually 3 to 10 wavelength bands in the electromagnetic spectrum; visible light plus near infrared (NIR), others. More data-intensive than RGB but can detect reflectance outside visible spectra (important for plant stress).

Hyperspectral: uses many narrow wavelength bands (100-200 or more) to increase sensitivity to detect subtle variations of reflectance. Highly data-intensive.

Other Important Points and Reminders:

- Many drones are controlled by mobile devices rather than drone-specific controllers. Drone software works with newer smartphones running modern operating systems.
- Sometimes, cheaper UAVs may actually be harder to fly (especially for beginners) since they may have fewer sensors and/or less flight controller functionality.
- If you are a beginner, you may wish to veer, at least initially, from UAVs that are designed for high-precision maneuvers and tasks. These UAVs usually need agile manual control and implementing this skill may be challenging for new pilots.
- Be prepared to spend money for accessories. Depending on what you buy and your expected typical use, you may want to buy extra batteries, propellers, traveling case, insurance, charging unit, special gimbals, mounting platforms, etc.

Important guidelines from FAA:

Make sure you can see your drone at all times.

Fly below 400 feet.

Remain well clear of and do not interfere with manned aircraft operations.

Do not intentionally fly over unprotected persons or moving vehicles.

Remain at least 25 feet away from individuals and vulnerable property.

Contact the control tower before flying within 5 miles of an air/heliport.

Do not fly in strong weather conditions.

Do not fly under the influence of alcohol or drugs.

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