DRONES IN AGRICULTURE

Drone farming has now become a game changer in the way farmers evaluate, spray, and plan for future crop growth. Drones can save farmers time and money. Drone farming technology is more than just a bird's-eye view. In fact, use of advanced software can capture images from drones to create 3D models that help identify variables such as crop stress. Healthy plants can be distinguished and soil analysis is used for pinpointing the best areas to plant the next batch of seeds. Farming has become more efficient thanks to drones, which in turn translates to lower maintenance costs and higher yields in the long run.

WHAT IS A DRONE?

The terms unmanned aerial vehicle (UAV), and drone are used interchangeably. A UAV is an aircraft without an onboard human pilot, controlled either autonomously or by remote control. The term unmanned aircraft system (UAS) refers to the unmanned aircraft and all of its components including, but not limited to: control stations and software, remote controls (if necessary), control links, payloads, launch and recovery equipment.

METHODS OF DRONE FARMING

Mapping or surveying are the most common use of agricultural drones. From an aerial standpoint, using a drone to map or survey reduces the need to go row by row to check crop health. Configured data from drone flights can show the number of crops to even a plant's height. Thanks to the advancements in technology, chlorophyll levels can even be captured with use of the field infrared and thermal cameras.

KNOW BEFORE YOU FLY

Remote Pilot requirements:

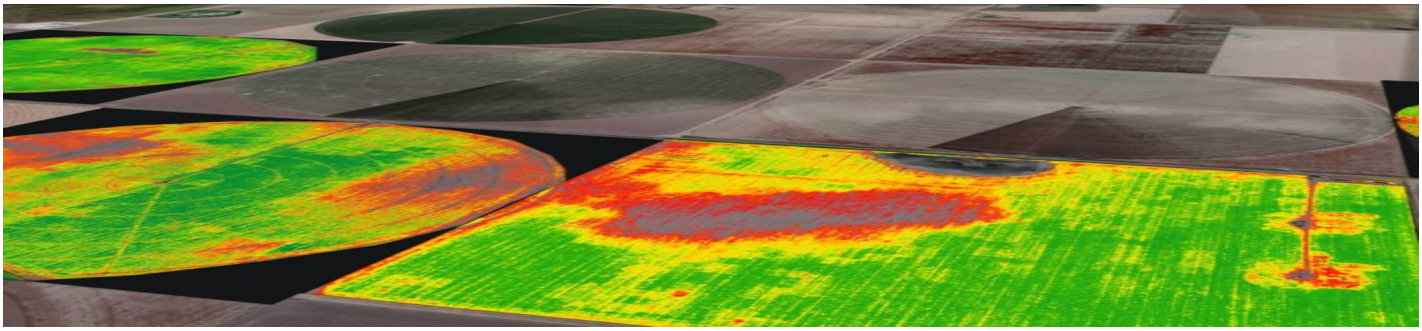
- Must be at least 16 years of age.
- To operate a drone for commercial purposes, the operator must have a valid UAV pilot's license, which requires the person to be 16 years old and pass an exam issued by FAA.

UAS Requirements:

- Must weigh less than 55 lbs.

Operating Rules:

- Must fly under 400 feet above ground level (AGL) or, if flying at an altitude higher than 400 feet AGL, stay within 400 feet of a structure.
- Must keep the UAS in sight (i.e. visual line of sight), either by the remote pilot in command or a visual observer.
- Must fly during daylight hours.
- Must fly at or below 100 mph.
- Must yield right of way to manned aircraft.
- Must not fly over people.
- Must not fly from a moving vehicle unless you are in a sparsely populated area.



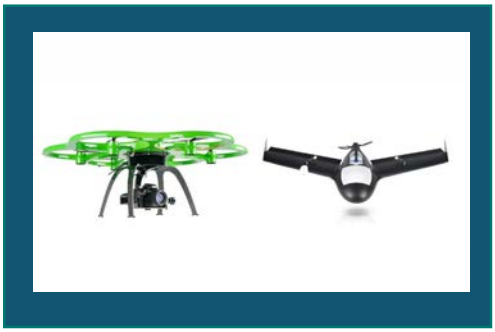
WHAT CAN THEY BE USED FOR?

Think of a drone as similar to an agricultural tractor. The tractor by itself it cannot do any useful field work unless coupled with some kind of implement. The most common application for drones is collection of aerial imagery with platform mounted cameras. This imagery can be simple visible-light photographs or more scientific multi-spectral imagery that can be used to assess different aspects of plant health. Larger and more sophisticated drones have the capabilities of actually applying agricultural inputs such as seeds, fertilizers, or chemicals. Drones will help with data collection, but the data interpretation is left to the user. It's easy to visually scout for areas with problems, but direct diagnosis is one of the biggest challenges with using any aerial technology.

IMPACT ON THE ENVIRONMENT

Drones control where and when to spray fertilizers, herbicides, or pesticides and can minimize excessive fertilizer use. The increased accuracy of fertilizer spray with drones decreases the chances of fertilizer runoff into local streams and rivers, in return less contamination from fertilizers is good for the environment as a whole.

WHAT DO THEY LOOK LIKE?



There are many different kinds of UAS platforms, broadly categorized as fixed wing, rotary wing, lighter-than-air (LTA), or tethered. Fixed wing platforms have some form of a non-movable wing and a propeller or other propulsion device that provides forward movement. They are easy to control, and must always be moving relative to the air around them to stay aloft. Rotary wing platforms are the fastest growing technology in unmanned aircraft systems (UAS) applications, and have the ability to hover, which can help improve the quality of collected images. They can be vertically deployed and retrieved, so special runways or launch areas are generally not needed. LTA and tethered systems are rarely used in agriculture, and include dirigibles (blimps), and any other helium-filled craft.

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