



drone facts



Agricultural Spray Drones

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Unmanned aircraft, also known as drones, have several uses in farming operations. One use that continues to increase is the application of pesticides and plant growth regulators. Drones can apply crop products precisely in areas where aircraft travel is difficult. There are regulations governing the use of drones in agriculture.



An agricultural spray drone applies ripener to sugarcane.

REGULATIONS

Aircraft weighing less than 55 pounds when loaded

- Spray drone must be registered with the Federal Aviation Administration (FAA).
- Operate under 14 Code of Federal Regulations (CFR) Part 107 Small Unmanned Aircraft Systems.
- Must obtain a certification under 14 CFR Part 137 to dispense chemicals and agricultural products.
- Must petition and obtain an exemption to Section 107.36 Carriage of hazardous material and several Part 137 regulations.
- Obtain a commercial pesticide applicator license with the Louisiana Department of Agriculture and Forestry (LDAF). Additionally, LDAF requires a drone operator license for farmers who own and operate their spray drone on their farm, solely. The application of agricultural spray for hire by a drone requires an aerial applicator license.

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Aircraft weighing 55 pounds or greater when loaded

- Spray drone must be registered with the FAA.
- Operate under 14 CFR Part 91 General Operating and Flight Rules or under a Special Airworthiness Certificate.
- Must obtain a certification under 14 CFR Part 137 to dispense chemicals and agricultural products.
- Must petition and obtain an aircraft weight exemption for 14 CFR Part 11. Special authority for certain unmanned aircraft systems is granted to the secretary of transportation by 49 U.S. Code § 44807.
- Must petition and obtain an exemption to several parts of 14 CFR Part 61, 14 CFR Part 91 and 14 CFR Part 137 regulations.
- Obtain a commercial pesticide applicator license with LDAF. Additionally, LDAF requires a drone operator license for farmers who own and operate their spray drone on their farm, solely. The application of agricultural spray for hire by a drone requires an aerial applicator license.

In both cases, business insurance is necessary for drift claims and property loss.

OPERATION

Operators must be aware of several factors that influence the effectiveness and limitations of a spray drone. Like spraying with a tractor, spray nozzles can impact pesticide drift and effectiveness for targeting a potential pest. It is important to conduct pattern testing prior to pesticide application to evaluate the effective spray width of the spray drone, which varies from model to model, application height, application rate per acre, nozzle type and weather conditions. Some drones have rotary or centrifugal nozzles that spin a serrated disk below a liquid outlet and create an adjustable droplet size depending upon rotation speed of the disk and the disk design (double cutter, etc.). These nozzles have more concise, smaller droplet sizes (<300 um) than standard nozzles but may require higher flying altitudes (10 to 15 feet above the crop surface) to create uniform coverage. It is recommended to fly crosswind, if possible, to preserve application patterns.

Long-distance drift (>300 feet) seems to be negligible with drones, but they can have quite significant side drift (20 to 50 feet) dependent upon wind conditions and nozzle type. Lowering the travel speed around borders can help reduce this effect.

A limitation of spray drones is battery life. Batteries typically last for 10 to 12 minutes per flight before needing to be recharged. Extra batteries and a generator that is appropriately sized to recharge the batteries is important. To gain maximum efficiency with spray drones, spray the longest distances possible at the fastest speeds, which still allows timely returns (i.e., large fields may need to be broken into smaller sections, etc.). Research has shown faster speeds create wider swath widths. Some refills may require driving to the drone on the turn row or headland, as opposed to flying the drone to a distant refilling location. Chargers need 220 to 240 volts at 30 to 50 amps to provide fast 10-minute charging. For sugarcane and other tall crops, an elevated platform may be necessary to visually observe the drone during use. The elevated platform can also be used for landing and take-off, which saves energy to climb up and over the crop. Every turn or unnecessary flight movement decreases the amount of time the aircraft can fly.



An agricultural spray drone sits on the bedcover of a truck.



A drone sits on a headland prior to flying a mission.



An agricultural spray drone applies ripener to sugarcane.



Drone with florescent dye sprayed on the soil.

PATTERN TESTING

If you have any questions or need help pattern testing a spray drone, Randy R. Price can be reached at the LSU AgCenter Dean Lee Extension and Research Center, 8105 Tom Bowman Drive, Alexandria, Louisiana. Price can also be emailed at rprice@agcenter.lsu.edu.

BEST MANAGEMENT PRACTICES BEFORE STARTING AN APPLICATION

- Check the FAA's website for Temporary Flight Restrictions (TFRs) and Notice to Airmen (NOTAMS).
- Read and follow the pesticide label.
- Inspect drone's components and follow the manufacturer's maintenance schedule.
- Be aware of the potential for drift and develop and implement a plan to minimize it.
- If mixing tank loads near the drone take-off and landing area, a large amount of debris can be kicked up during the take-off and landing procedure, contaminating the tank loads. Lids may be necessary.



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