

Drone Applicator Technology

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Drones are an important technology that have become a useful tool in agriculture in a variety of ways and have created thousands of jobs across rural America. Besides their beneficial uses in mapping and scouting, larger versions have been engaged in the application of either liquid or solid materials to the agricultural field. In many cases, these drones are being used to apply pesticides or solid, dry materials such as fertilizers or seeds. This fact sheet will discuss these drone applicator technologies and the certifications and registrations that are needed to fly them.

Applicator examples

Drone applicators can be useful in areas where the cost or availability of a traditional “crop duster” allows for its use. Also, the terrain or the presence of small, irregularly shaped fields, such as those found to a large extent in Tennessee, can make these applicators very useful as they can hover and pivot along these kinds of fields. The vortex that is created by the drone propellers help to create disturbances across the plant canopy and allow for greater coverage. Solid materials, like fertilizers and seeds, can also be applied by substituting a liquid solution tank for a dry spreader tank.

One example of a drone applicator is the DJI AGRAS T40 which sells for \$25,000 to \$35,000 (Fig. 1). According to the manufacturer’s website, this drone has a maximum payload capacity of 110 lbs, contains a 10.5 gallon tank, and is about 9 ft x 10 ft in size when arms are fully extended and propellers are attached. The manufacturer also identifies a spray width of 36 feet and a spray rate up to 3.2 gallons/minute. This will vary based on different products, rates, densities, height, speed, and droplet size. The applicator is listed to cover 52.5 acres/hour, however, this is under ideal conditions and will likely cover a smaller area under normal conditions. The tank for spreading solid materials is 18.5 gallons in size, can



Fig. 1. The DJI AGRAS T40 weighs 110 lbs and is 9 ft x 10 ft.

hold 110 pounds, and provides a spreading width of 23 feet. Again, the spreading width will vary based on a number of factors. The battery life is about 6 to 7 minutes with a full payload and 18 minutes when empty. There is an inverter generator that can be purchased which will recharge a battery in 9 to 12 minutes. The drone also contains sensors to help it avoid obstacles.

A similar system is the XAG P100 Pro which has a slightly larger capacity and coverage and costs between \$30,000 and \$40,000 (Fig. 2).



Fig. 2. The XAG P100 Pro, pictured here, has slightly larger capacity and coverage than the DJI AGRAS T40.

In addition to XAG and DJI, there are other drone manufacturers such as Leading Edge, Hyllo, and Guardian.

Drone certifications and registrations

There are a number of certifications and registrations at the state and federal levels that must be received before using these drones as applicators.

State: Operators must have an aerial applicator license and proof of insurance for their drone for up to at least \$100,000. There is also a decal that must be purchased through the Tennessee Department of Agriculture and attached to the drone.

For more information: TN Pesticides Inspector Staff, currently John Ewell, 615-837-5340, john.ewell@tn.gov

Federal: Currently, operators must have a current Federal Aviation Administration (FAA) medical certificate or current U.S. driver's license, the Part 107 (remote pilot certification) and their drone must be registered prior to receiving a Part 137 (agricultural aircraft operations) certificate. It is also a good idea to purchase a drone that is listed on the FAA list of approved drones (<https://www.regulations.gov/docket/FAA-2023-1271/document?sortBy=postedDate>). The FAA is constantly updating this approved list and the regulations so it is important to keep checking relevant FAA websites. We recommend using an attorney that specializes in drone law to assist with the Part 137 certification and exemption process.

The Part 107 certification consists of a 60 multiple choice question exam where 70% or more correct answers will result in certification. Free videos that teach the material for the Part 107 exam are available through TSU Extension at: <https://www.tnstate.edu/faculty/jdekoff/drone.aspx>

Drones that weigh >55 lbs, including payload, which is typical for a drone sprayer or spreader, require a special registration process. This involves submitting the registration application along with a notarized statement identifying the drone specifications, drone ownership and affirmation that the drone is not registered in another country (https://www.faa.gov/licenses_certificates/aircraft_certification/aircraft_registry/ua).

Once there is an operator with a Part 107 certification, and a registered drone, a Part 137 exemption can be applied for (https://www.faa.gov/uas/advanced_operations/dispensing_chemicals). The exemption is there because the original rule focused on crewed aircraft rather than drones. Once the exemption is approved, you can apply for the Agricultural Aircraft Operator Certificate (https://www.faa.gov/documentLibrary/media/Form/FAA-Form_8710-3.pdf).

Drone applicator checklist

- Choose drone type
- Current FAA medical certificate or valid US drivers license
- Obtain a TN Aerial Applicator License from TDA
- Insure drone for at least \$100,000 and obtain decal from TDA
- Register drone with FAA
- Complete Part 107 Remote Pilot Certification
- Apply for a Part 137 exemption
- Complete Part 137 – Agriculture Aircraft Operator Certificate

For more information

<https://jrupprechtlaw.com/faa-drone-spraying-exemption/>

<https://ohioline.osu.edu/factsheet/fabe-540>

<https://site.extension.uga.edu/precisionag/2022/08/spray-drones-regulations-and-operational-considerations/>

<https://publications.ca.uky.edu/sites/publications.ca.uky.edu/files/AEN174.pdf>

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