UAV’s: The Guinea Pig Year

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Agriculture, Natural Resources & Community Development
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17 Extension Educators

Several Specialists

2 Coordinators
33% of the farmers are using drones by themselves or by the third party whereas 31% are thinking of using drones in 2018.
CHECKED ON MY CROPS TODAY
SO FAR SO GOOD!
August 29, 2016


Part 107 addresses:

a) small UAS classification,
b) certification, and
c) operational limitations
Remote Pilot Certification Requirements

- Be at least 16 years old
- English proficiency
- Pass TSA background check
- Pass written (multiple choice) aeronautical knowledge exam at an FAA approved testing center
- Pass a recurrent aeronautical knowledge test every 24 months
- No aeronautical experience of flight proficiency required
- No airman medical certificate required
Hardware

Phantom 4 Pro by DJI
Features:
- Obstacle avoidance sensors
- RGB 4K camera
- ~30 minute flight time/battery
- MicroSD card slot
Other Options

Can get $$ with additional sensors!
Imagery & Sensors
Orthomosaic – 2 dimensional imagery

- Requires standard RGB camera as the sensor
- Takes standard earth images (like Google Maps)
- Useful for finding trends from the “eye in the sky”
- Easily uploaded to most farm software
NDVI – Normalized Difference Vegetation Index

- Uses reflected light in the green, red, and near infrared light (NIR) spectrum to produce images
- The near-infrared (NIR) light spectrum can be defined as the region between 750 nm and 2,500 nm
- NDVI is beneficial for plant health
- NDVI can be calculated by finding the percentage difference between the near infrared and visible red light spectrums

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NDVI = \frac{(\text{NIR} - \text{Red})}{(\text{NIR} + \text{Red})}
\]

Image courtesy of NASA
The difference in each map is a result of the difference in light spectrum the original images were captured in. The bottom left was captured in standard red, green, and blue light spectrum which creates a good plant health map. The picture on the bottom right is a true ndvi which requires near infrared light spectrum to be captured (top right).
• Don’t have to wait until harvest for map

• Variation of each row
Software, Apps
Manual Flights
DJI Display:
- Battery level
- Radio signal strength
- Camera settings
- Launch/Return to home
- Distance from obstacles
- Distance from remote
- Elevation
- Speed
- Camera/video record
Manual Flights

Good for identifying weeds and inspecting problem areas
Automated Flights
As easy as drag and drop
Inspect nozzles, pivot path
Identify tile lines
Automated vs Manual

2018 sulfur study, 2019 study to expand to boron
• 230 images for 130 acre field
  • 1.7 GB of raw image data

• No regulation to retain raw images, but good for insurance
• Multiple 32-64GB+ micro SDs
• External or internal hard drive
• Flash drives, cloud storage for sharing imagery with consultant, partners
• Good internet!
Questions?

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Union Township:
Field mixed SCN sample = 0

Hotspot SCN sample = 12 cysts and 2244 SCN eggs per 100 cc soil
Jackson Township:
Field mixed SCN sample = 9 cysts and 1683 eggs / 100 cc soil

Hotspot SCN sample = 10 cysts and 2040 SCN eggs per 100 cc soil
UASs are small unmanned aerial systems.
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Corn planted into Red Clover plots