

# Drones around the Farm

A small producers introduction to drones

**Disclaimer:** Any member of any regulatory agency that controls drone traffic please disregard the next twenty minutes. I have only used drones for pleasure and there has been no financial gain from the use of these drones or more recently, farming in general.

# About me: Allen Druffel

- ▶ Located in Eastern Washington and North Idaho
- ▶ Fields from 50 - 400 acres
- ▶ Farm spread over 50 miles
- ▶ Lots of different terrain and climates
- ▶ Diverse cropping system
- ▶ Raised to believe Direct Seed is conventional farming
- ▶ Rapid adopter of technology
- ▶ Not a drone expert



# Government Regulations

- ▶ Fly below 400 feet and remain clear of surrounding obstacles
- ▶ Keep the aircraft within visual line of sight at all times
- ▶ Remain well clear of and do not interfere with manned aircraft operations
- ▶ Don't fly within 5 miles of an airport unless you contact the airport and control tower before flying
- ▶ Don't fly near people or stadiums
- ▶ Don't fly an aircraft that weighs more than 55 pounds
- ▶ Don't be careless or reckless with your unmanned aircraft; you could be fined for endangering people or other aircraft



# Why I became interested?

## ▶ INPUT MANAGEMENT

- ▶ Fertility
- ▶ Water
- ▶ Canopy
- ▶ Mapping
- ▶ Lower Input Costs



# Costs of Drone



- ▶ You get what you pay for
- ▶ Very simple phone drone
- ▶ Complicated fixed wing platforms
- ▶ Parrot BeBop Drone \$430
- ▶ DJI Phantom 3 Professional \$1300
- ▶ DJI Phantom 3 Professional w/NDVI conversion \$2200
- ▶ AgEagle \$13,000



# Loss of Drones

- ▶ Be aware of drone location
- ▶ Watch for altitude
  - ▶ It doesn't know if you're flying into a hill
- ▶ Wind can affect distance of flight
- ▶ Mechanical problems
- ▶ Battery Life
- ▶ Don't drink and drone
  - ▶ I heard this from someone



# My First Drone

- ▶ DJI Phantom 2 with GoPro Hero 3
  - ▶ Manual Flight control
  - ▶ No base station monitor
  - ▶ Ready to fly out of the box
  - ▶ Price is right
  - ▶ Great drone to start with
- ▶ What I got
  - ▶ Great aerial photographs of fields
  - ▶ Lesson in flight



# What it took to succeed

- ▶ Autonomous flight
  - ▶ Guidance paths
- ▶ Base station monitor
  - ▶ Ability to stream video live





# First Information

- ▶ Seed your headlands last



# Experiment Check

- ▶ Side Dressed Nitrogen
  - ▶ 90 Lbs. applied with seed
  - ▶ 50 Lbs. applied during flag leaf
  - ▶ 15 Bushel yield Gain
    - ▶ More fertilizer = more yield
    - ▶ Cutting edge science
  - ▶ Plant health gain
  - ▶ Yellow spots on left



# Equipment Check

- ▶ 1890 Drill
- ▶ Did not switch Left and Right openers
  - ▶ I did after this photo



# Wedding Planning



# Fixed Wing or Quad

- ▶ Portable
- ▶ Easy Landing
- ▶ Widely Available
- ▶ Slow or Fast



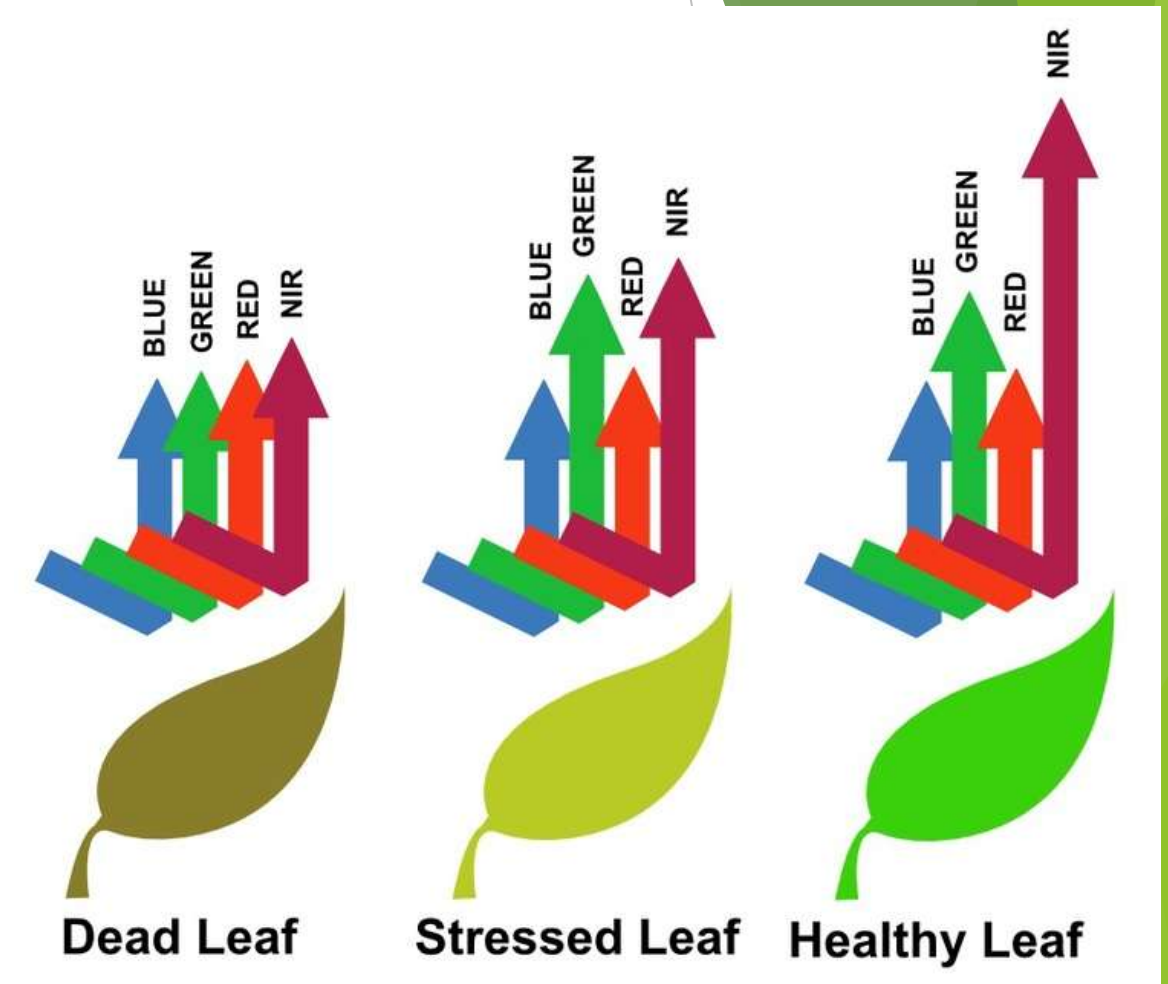
# Next Drone

- ▶ All in one
- ▶ Simple to Fly
- ▶ Inexpensive
- ▶ NDVI Adaptable
- ▶ Good batteries
- ▶ Compatible software package
- ▶ Georeferenced Pictures
- ▶ Fast moving technology
- ▶ Quick Deployment



# What is NDVI?

- ▶ Normalized Difference Vegetation Index (NDVI)
  - ▶ NDVI is simply a ratio of near infrared (NIR) reflectivity minus red reflectivity (VIS) over NIR plus VIS
- ▶ Why NDVI is important
  - ▶ Quickly identify which leaves are healthy
- ▶ Conjunction with tissue tests
  - ▶ What am I deficient in?



# Drone Deploy

- ▶ App compatible with DJI and AgEagle
- ▶ Software compatible with any geo referenced image
- ▶ Stitches photos through the cloud
- ▶ Continue mission capability
- ▶ Terrain following ability

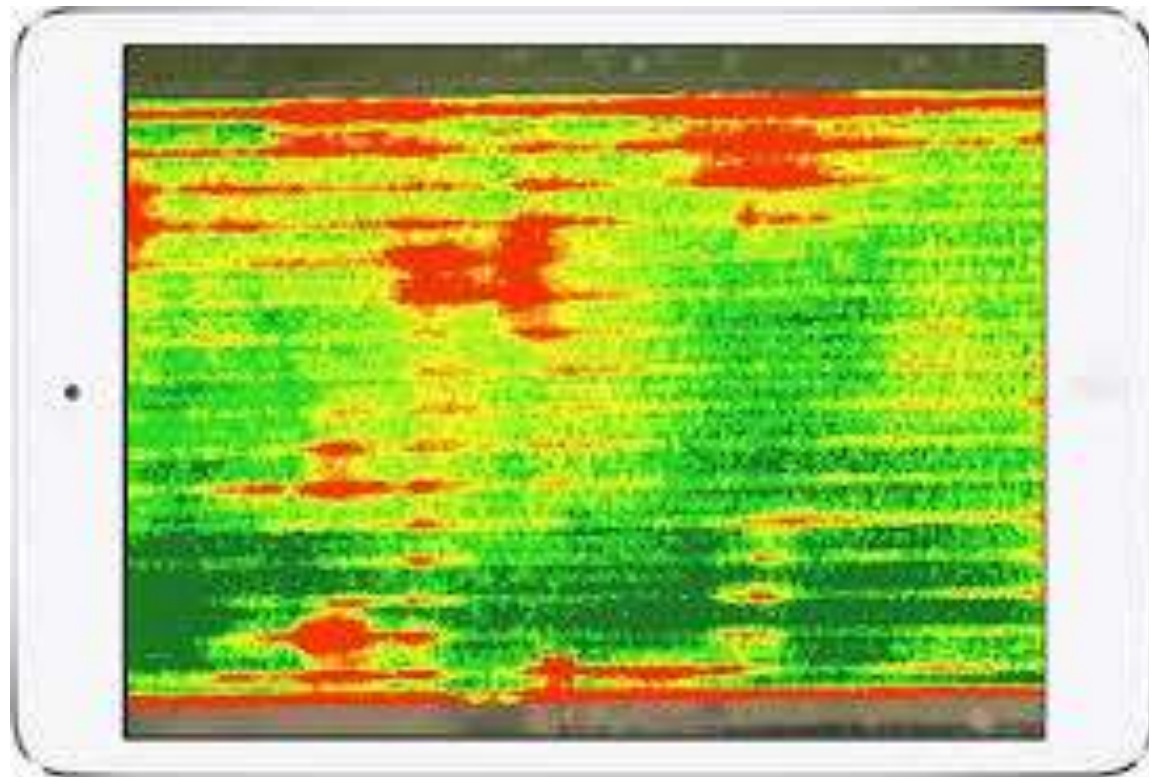
What if I crash my drone into the cloud?





# Drone Deploy

- ▶ NDVI Map
  - ▶ Identifies Areas in need of inputs



# Weed Scouting

- ▶ Identify Problem areas
- ▶ Print Maps for Employee
- ▶ Target problem areas
  - ▶ Make a Morning Glory Map?



# Future of Drones?

- ▶ Weed Identification and Removal
- ▶ Precision Nutrient Placement
- ▶ Fully Autonomous
  - ▶ Base station
  - ▶ Pre planned and timed flights
  - ▶ Automatic Upload



# Autonomous Farms

- ▶ R2Plant2
- ▶ Lots of small robots
- ▶ Operate together
- ▶ 24 hours a day
- ▶ Little to no compaction
- ▶ The technology to operate drones could control these robots
- ▶ Soil samples
- ▶ Tissue tests



# My Drone video

- ▶ Snubbed at Golden Globes
- ▶ Aerial views give you a whole new perspective





Questions?

