

# Benefits of Drones in Cranberry Farming



# My Experience

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- I've been flying drones for over 2 years
  - Started doing photography and now morphed into Aerial application
- Flew on over
  - 800 acres of fertilizer
  - 120 Acres of Seed
- Exciting to be starting applying Pesticides in these next few weeks once I get the approval from ODA
  - Future licensing coming down the line
    - Fungicide/insecticide
    - Forestry
    - Turf/Ornamental



# What I am going to share with you

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- Advantages of using drones in cranberries
- Requirements to use Drone Applicators like the Agras T40
- Drone Use in Fertilizing
  - What the T40 Agras has to offer
  - Results from the year
- Drone use in Spraying
  - Benefits of the T40 Agras
  - Potential benefits for Cranberries
- Other Future Drone Technologies coming down the line
- Different Types of Application

# A lot of Different brands

- Multiple Brands of Application drones
  - I fly the T40 Agras by DJI
  - XAG is probably their biggest competition
  - Then would be Hylio ( US brand)
  - There are a few others as well.



# Drone Application being used throughout Ag.

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- Up until 2023, the main source of spray drones in the US was for fungicide application on wheat, corn, and some soybean acres.
  - [ohioline.osu.edu/factsheet/fabe-540](https://ohioline.osu.edu/factsheet/fabe-540)
- Wisconsin Growers are starting to use drones as well
- Their being used throughout China and Japan on multiple different crops
- Other uses
  - Micro-nutrients
  - Seeding
  - Painting Green houses
  - More to come

# Advantages of Applying By Drones

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## Benefits for Cranberries

- Drones are able to apply with less damage than traditional ground sprayers
- Drones can efficiently spray and spread on small-irregular shape fields
- They also reduce the risk of applicators being contaminated by pesticides.
- Drones can distribute more evenly than chemigation.
- Propeller Wash helps push fertilizer and Pesticide deeper in canopy



Water being sprayed

# The Requirements To Fly

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- **FAA Requirements**

- **Part 107 Certificate-** Every Pilot must hold this Certificate (If you make money using a drone you must have this.)
  - Be at least 16 years old
  - Proves to FAA that you understand the basic Aircraft principles and requirements
    - Requires a test
  - Steep fines from FAA if you hire illegal drone pilots.
- **Part 137 Certificate-**
  - Allows you to apply pesticides and directly supervise those applying under you
  - In order to apply for the part 137
    - You must pass a third-class airman Medical certificate.
    - Submit Flight Operations and Procedure Manual to the FAA
- **Apply for the 44807- Heavy Drone Exemption.**
  - Must file if you fly a drone that weighs over 50 lbs.

# Do I just get the drone and fly?

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- **Oregon Department of Ag. Requirements (If your doing it for yourself)**
  - Required Private Applicator Licence (Each Pilot)
    - Requires a test
  - Become a Aerial Pesticide Applicator (Each Pilot)
    - At least 18 years old
    - Pass the APA Test
    - Requires proof of FAA Part 137
    - Proof of Passing FAA Medical Certificate
    - 50 Hours of in-flight time before applying actual pesticide.
      - <https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=2734>



# In Order To Do 1 Drone Application

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- Submit a NOTAM- Notice to Airman
  - You report: The who, What,Where, Why of your mission
  - With 24 hour notice to FAA
- Fill out your Log book
- Check Weather
  - Fertilizing can be done in wind up to 15 mph
  - Spraying should be done in wind not greater than 7-8 mph to make sure to avoid drift
    - Label is the law
- On Jobsite- FAA requires a Visual Observer(VO) to be present
  - VO let's the pilot know of any risks around the drone
- Then fly

# Fertilizing Opportunities With Drones



Image by: <https://flyingag.com/products/2023-flyingag-agras-t40-sprayer-drone-kit>

# Fertilizing With the T40

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- Agras T40- Granular Spreader
  - Works on a 3 Gate mechanism that after calibration opens to a percentage base on weight material left in
  - Has 3 real-time weight sensors on the drone letting you know how much you have left
  - Holds about 115lbs of material in one load





# What We Control During Application?

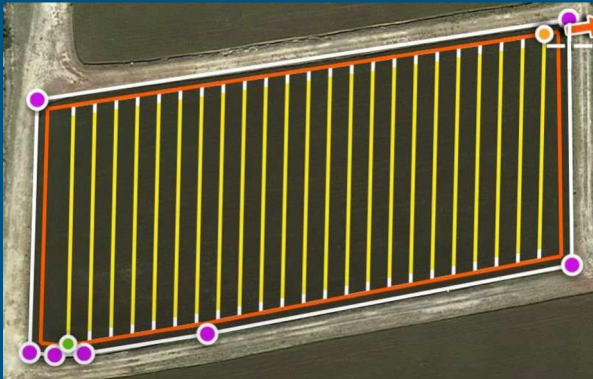
- Adjustments that can be made on fertilizing application
  - **Height above crop**- 10 ft above crop
    - In Wisconsin growers are flying at 15 ft above no difference
  - **Speed** (Depending on weight)
  - **Route spacing**
    - We did trial runs between 10 ft spacing and 20 ft spacing and saw no difference.
  - **RPM of Spinner**-Adjusts swath width (Max rpm gives 20 ft swath)
  - **Lbs Per Acre.**
    - Can be programmed to put out between 1-644 lbs per acre
  - **Direction of Application**



# Rotational Patterns

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- Rotation patterning- Agras T40 allows Pattern Changes
  - Helps change up how your previous patterns to provide even coverage across the bog



# Bog Segmentation

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- Avoid fertilizing spots that you'd like to avoid getting overgrowth.
- We're able to do the opposite and hit certain areas twice if they needed a little boost



# Fertilizing Cranberries

- **Fertilizing Process**
  - Map the field
    - Through walking with controller
    - Satellite (Depends on age of bog)
    - These maps stay in the controller
  - Calibrate Material
    - Runs the material through calibration process where the drone creates a specific program base on weight of product vs. hopper gate percentage to determine right setting
  - Create the Mission
    - You pick-
      - The direction of flight
      - Rate you'd like to apply
      - Then we fly





# Results from Fertilizing 2023

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## Best times for last year

- Applying 200lbs/ac- 40 acres a Day
- Applying 120lbs/ac and below I could do 60 Acres a day

## Notable Findings

- Was used multiple times to help fertilize new bogs
- Multiple growers mentioned that their yields responded well and showed improvement from previous years
- We also didn't see any streaking or overgrowth too.

# Spraying With Drones



# Agras T40 and Spraying Opportunities

- Dual Atomized centrifugal Sprinkler
  - Ensures even droplets and efficient pesticide Usage- Cuts the droplets
  - Droplet size can be adjusted on the fly during the mission
    - Very fine-50 microns to Very coarse-500 microns to help dial in the coverage. Can create very coarse droplet sizes that will help with the wind here on the coast.
  - Swath width @ 10 ft above crop is around 25-27 ft depending on substance
- Other adjustments to spraying can be height, speed and route spacing.
- 1 Tank holds 10.56 gallons of water
  - Can be set to apply between .23- 27.48 Gallons per acre in a mission
  - Most cranberry products are between 3 GPA and 10 GPA so this is a perfect too
- Can apply many different ODA approved pesticides for cranberries



Water being sprayed

# Rotational Patterns/ Area Specific Spraying Available

- Rotation patterning- Agras T40 allows Pattern Changes
  - Helps change up how your previous patterns- Even out coverage across the bog.



# Potential Benefits from Spraying with Drone

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- A more complete distribution of pesticide than chemigation
- Potential Money saving with Pesticide Cost
- The ability to treat the places that need it the most.
- Excited to share more about spraying next Cranberry School

# New Technology Coming to the field

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- Use of Multi-spec Drones.
  - These drones use multiple different cameras that can monitor certain light reflections from crops which shows in general crop health
- Use of Variable Spreading
  - Using Multi-spectral imagery we will be able to do variable spreading on bogs and other surround crops.

## Other areas drones can be used

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- Seeding hillside
- fertilizing Pastures
- Seeing is believing. Sign up for a demo.
- Feel free to come find me during lunch if you have any questions.



# Summary

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Drones are going to be a great addition to IPM programs and fertilizing plans for cranberries and beyond.

If you have questions about my talk or services feel free to give me a call

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