Understanding herbicide labels and drones better

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What we'll go over in this presentation

• Some current drones on the market that are specifically used for Agriculture and their costs
• Drone uses & herbicide drift concerns
• Understanding herbicide labels
• SLN labels and use reporting
• Why you should hire a licensed applicator...
• Questions
Top Ag Drone Manufacturers

- DJI
  - Most popular Drone Manufacturer in the world (Based in China)
  - Some of their most popular Drones are the **Phantom** series
- SenseFly (Parrot)
  - Based in Switzerland, they manufacture a popular fixed wing drone called the eBee SQ
- HSE
  - Based in the United States, they manufacture about 11 different Drones used for spraying chemicals
DJI Phantom Series

- The Phantom Series is probably what most people think of when they are talking about drones.
- Simple Quadcopter design that’s easy to set up and use
- Phantom 4 Pro version:
  - Cost: $1729
  - Max speed: 45 mph
  - Max flight time with one battery: approx. 30 minutes
  - Built in camera and Gimbal that can record 4K video
Homeland Surveillance & Electronics (HSE)

- is a large U.S. based manufacturer of spraying drones
- Benefits include:
  - Two day personal training with a representative
  - Customer support
So I bought a Drone, now what can I use it for?

• There are many ways that you can be using drone technology to help on the farm and new uses are being developed everyday

• Remote Sensing (Mapping/Scouting)
  • Looking for pests
  • Irrigation leaks
  • Assessing damage
  • Vegetation Health

• Spraying
  • Full fields
  • Targeted spraying
  • Even in orchards
Habitat Goal: Plant Biodiversity
Herbicide Drift and Volatility Facts
Off-Target Movement

- Two distinct factors can contribute to off-target movement:
  - **Volatilization** (vapor drift)
    - Vapor loss and migration of previously applied active ingredient
    - Inherent property of the molecule and formulation
  - **Physical Drift** (spray drift)
    - Movement of spray droplets during application
    - Applicators are responsible for reducing drift

- These factors involve completely independent mechanisms and require their own unique solutions for limiting off-target movement
Volutility

After the application if the herbicide dries on site and then converts to a gas and moves from the application site.
Physical Drift

Occurs during application: movement off-site before the spray hits the ground.
Volutility
Post-application Movement of the Active Ingredient

• The form of the active ingredient can have a major impact on volatility

• Example- 2,4-D acid vs. ester growth regulator

<table>
<thead>
<tr>
<th>Form</th>
<th>Vapor Pressure (µPa @ 25°C)</th>
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<tbody>
<tr>
<td>2,4-D Acid</td>
<td>19</td>
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<tr>
<td>2,4-D Ethylhexyl Ester (EHE)</td>
<td>480</td>
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• The 2,4-D EHE (ester) has an inherent volatility 25X greater than that of 2,4-D acid
Triclopyr

- Triclopyr = [(3,5,6-trichloro-2-pyridinyl)oxy]acetic acid
- Growth regulator, reacts to auxin receptor
- Systemic / Translocated in both phloem and xylem
- Immediate rainfast (injection, basal bark in oil)
  - 1 – 2 hr rainfast (foliar)
- Grasses safety with little residual
- Control over 100 species of woody plants & weeds
- Formulated as Ester (BEE), Amine (TEA), or Choline Salt
In the Beginning... 1944 discovery

2,4-D
Choline Technology today changes the volatility game…

Reduced Volatility Achieved with Triclopyr & 2,4-D Choline

Volatility of the amine affects the relative volatility of 2,4-D

Mechanistic Explanation of 2,4-D DMA Salt Volatility:

2,4-D DMA Salt thermally unstable  
DMA is highly volatile, leaving 2,4-D acid behind

Triclopyr choline salt dissociates into Triclopyr acid anion and choline cation,  
both have very low volatility

The new triclopyr choline technology changes how triclopyr reacts when it hits the leaf surface.  
It does not dissociate (leading to volatility) like traditional forms of triclopyr.
Choline Technology

Field volatility trials

Low Temps: 50’s – high 70’s
High Temps: mid 80’s – high 90’s
Relative Humidity lows: 24%-45%
Relative Humidity highs: 96% - 100%
Canopy: 0%, 15%, 40%, 80%

Cumulative 2,4-D Vapor Loss at 70 hours after treatment

Averaged across 4 sites

96% reduction vs ester
88% reduction vs amine

**Trademark of The Dow Chemical Company ("Dow") or an affiliated company of Dow**
Choline Technology

• New and innovative formulation technology

• Unlike traditional 2,4-D and triclopyr products

• Near Zero Volatility and reduced odor
  > Improved non-flammable formulation

• Same exceptional weed control

• Reduced signal word for applicator safety

• Same environmentally favorable profiles Aquatic
Garlon 4 Ultra, Garlon 3A, or Choline ??
Both these products have a grass release and aquatic use sites listed.
All uses of each of these products must be reported **monthly** to ag dept.
Cut Stump & Basal Treatment Recommendations

**Water based mixture** – spray ASAP
- Capstone used undiluted
- Vastlan mixed 50/50 with water

**Oil based mixture** - 1-4 day window for treatment
- Pathfinder II if < 10 gallons needed (15% Garlon 4)
- 30% Garlon 4 Ultra + 2% Milestone + 68% MSO
Power of oil based Garlon 4 Ultra

• Penetrates the stems and leaves
• Translocates through the plant
• Gives rootstock reduction
• Show stopping results!!!
Perfect application on Black Berry: Spray to glisten

Water based formulation shine  2% Vastlan + .5% NIS
## Timing of Applications by Month

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<th>Treatment Method</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
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<tr>
<td>Cut stump - water based</td>
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<td>Dormant Stem</td>
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Know your legal label and your use site...

**Signal words** indicate acute toxicity for humans
Medusa head: Burn it, eat it, or spray it???

*IPM is all three...*
Medusahead Management Guide for the Western States

Figure 47. Control with aminopyralid
A dense medusahead infestation in an untreated plot (left) contrasts with a good stand of ryegrass in a plot treated with 14 oz acre⁻¹ of Milestone in fall (right). (Photo: Josh Ovary)
Supplemental Label 2(ee) for Medusahead Control with Milestone

Product Bulletin

Dow AgroSciences LLC 9330 Zionsville Road Indianapolis, IN 46268-1054 USA

Milestone®
EPA Reg. No. 62719-519
2(ee) Recommendation†

For Distribution and Use in the States of Arizona, California, Colorado, Idaho, Oregon, Nevada, Utah, Wyoming

For Control or Suppression of Medusahead Rye and Other Winter Annual Grasses

ATTENTION
† This recommendation is permitted under FIFRA 2(ee) and has not been submitted to or approved by the EPA.
• It as a violation of Federal law to use this product in a manner inconsistent with its labeling.
• Read and follow all applicable directions for use, precautions and limitations on the product label attached to the container for Milestone® herbicide.

Refer to Milestone® herbicide product package label for further use directions including requirements for...
Remote Sensing pixels

- Drones can help efficiently identify problem areas within restoration sites where there are deficiencies, disease and pest pressures present.
- How can imagery collected with a drone tell you this?
  - Healthy plants reflect light differently than unhealthy plants
  - Plants that are healthier reflect more light in the near-infrared and green wavelengths than the red
Spraying

• Using drones for spraying chemicals and fertilizers is becoming more common
• Extremely good at spot treating areas in a field.
  • Can detect unhealthy areas of a field with cameras and sensors
  • Precisely treat problem areas, helping reduce costs
• Allows restoration applicator to spray fields when weather conditions are not optimal
• Helps limit human contact with fertilizers, pesticides and other chemicals
• Can handle spraying tasks faster and more efficiently than vehicles and airplanes in some cases
Zone 2 grass release program
Spot Spray
4% Capstone
4% Glyphosate
.5% NIS

This removal of ladder fuels bought us the valuable time needed to save this national forest.

This is our forest as public land...
Direction for use section on label tells about what the product controls

- Do not use grasses treated with Capstone in the preceding 18 months for seed production.
- It is permissible to treat non-irrigation ditch banks, seasonally dry wetlands (such as flood plains, deltas, marshes, swamps, or bogs) and transitional areas between upland and lowland sites only when dry.
- Minimize overspray to open water when treating target vegetation in and around non-flowing, quiescent or transient water. When making applications to control unwanted plants on banks or shorelines of flowing water, minimize overspray to open water. Note: Consult local public water control authorities before applying this product in and around public water. Permits may be required to treat such areas.
- Avoiding Injury to Non-Target Plants: Do not aerially apply Capstone within 50 feet of a border downwind (in direction of wind movement), or allow spray drift to come in contact with, any broadleaf crop or other desirable broadleaf plants, including, but not limited to, alfalfa, cotton, dry beans, flowers, grapes, lettuce, potatoes, radishes, soybeans, sugar beets, sunflowers, tobacco, tomatoes or other broadleaf or vegetable crop, fruit trees, ornamental plants, or soil where sensitive crops are growing or will be planted. Avoid application under conditions that may allow spray drift because very small quantities of spray may seriously injure susceptible crops. Follow Precautions for Avoiding Spray Drift and Spray Drift Advisory under General Mixing and Application Instructions to minimize the potential for spray drift.
Precautionary statements & Proper Fuel Break Mgmt with PPE and herbicide labels in mind
We also take great care in our sustainable mountain meadows
Question? Who besides me likes cool planes?