

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



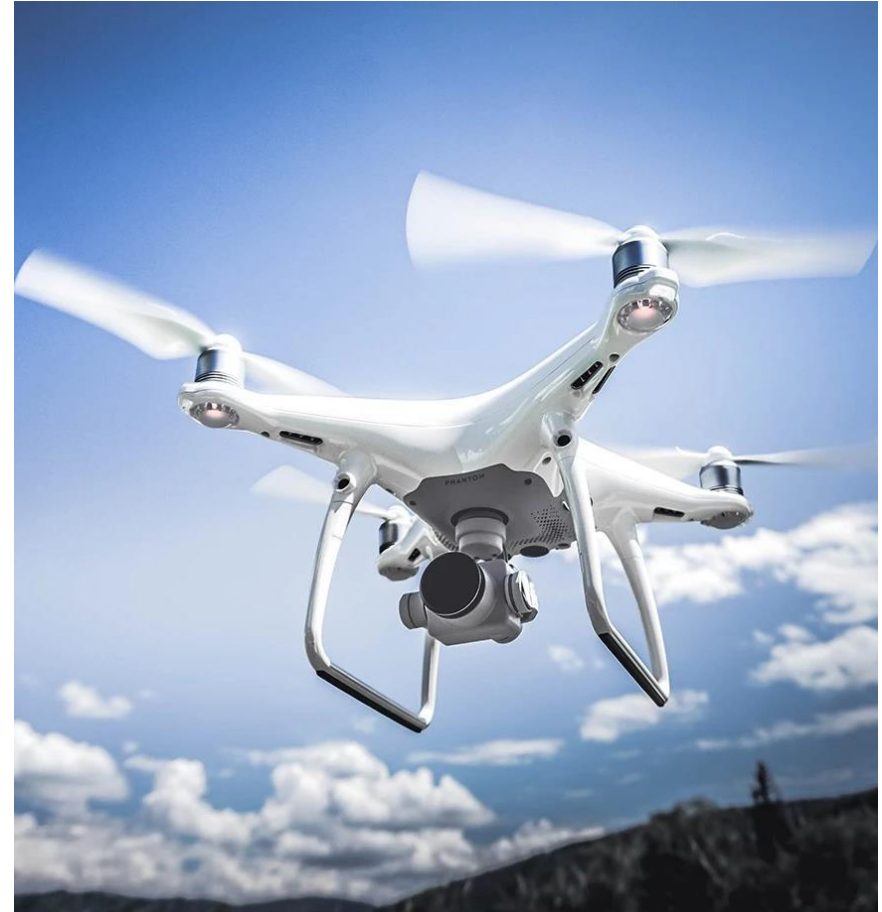
Top Ag Drone Manufacturers

- 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



A wide-angle photograph of a flat, open landscape under a sky filled with large, white, puffy clouds. The foreground is a lush green field densely populated with various wildflowers, including yellow and white blossoms. In the middle ground, the field continues towards a flat horizon. A few small, dark shrubs are scattered across the landscape. In the far distance, a single utility pole is visible on the right side of the horizon.

Habitat Goal: Plant Biodiversity

Herbicide Drift and Volatility Facts

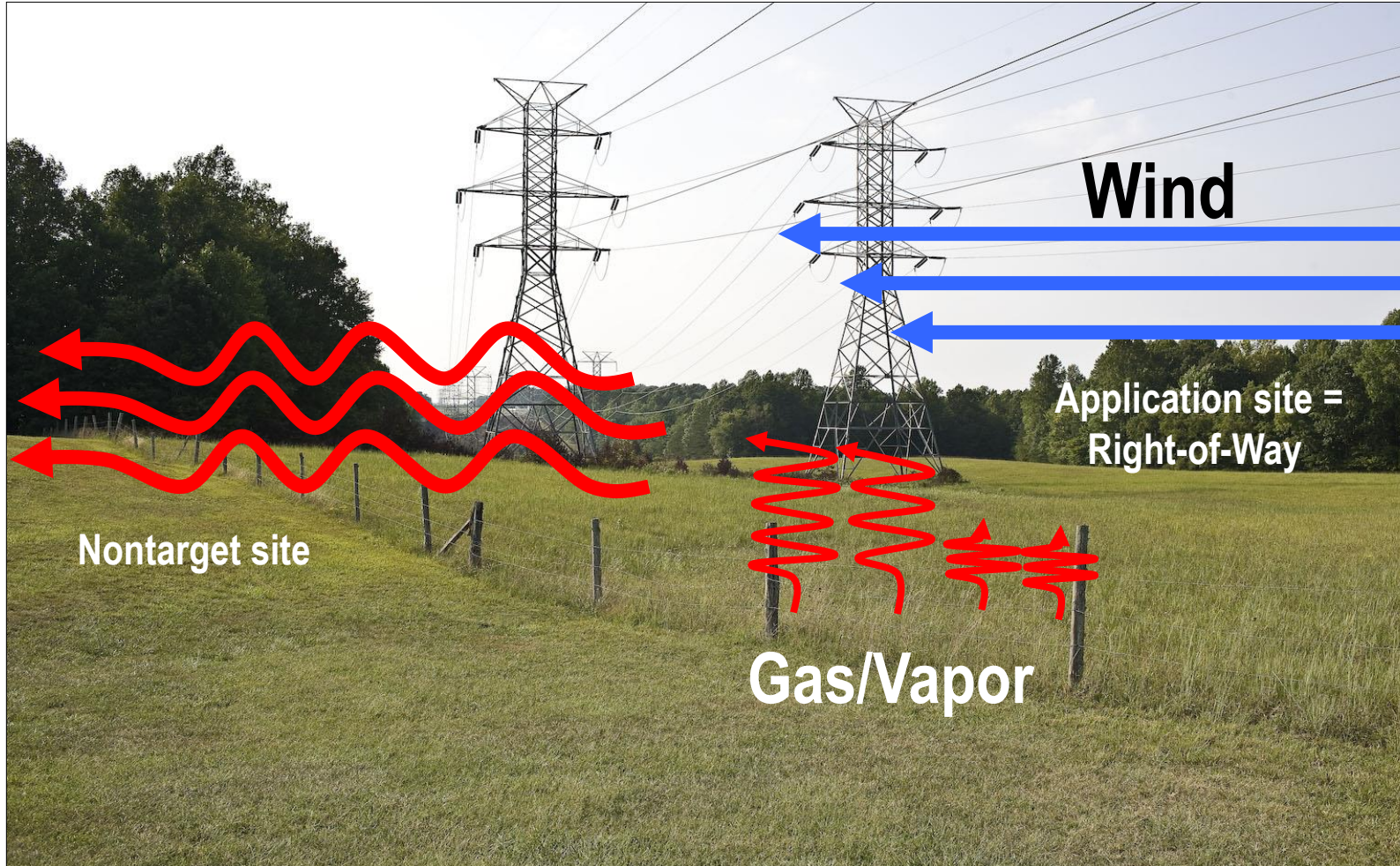


Off-Target Movement

- 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

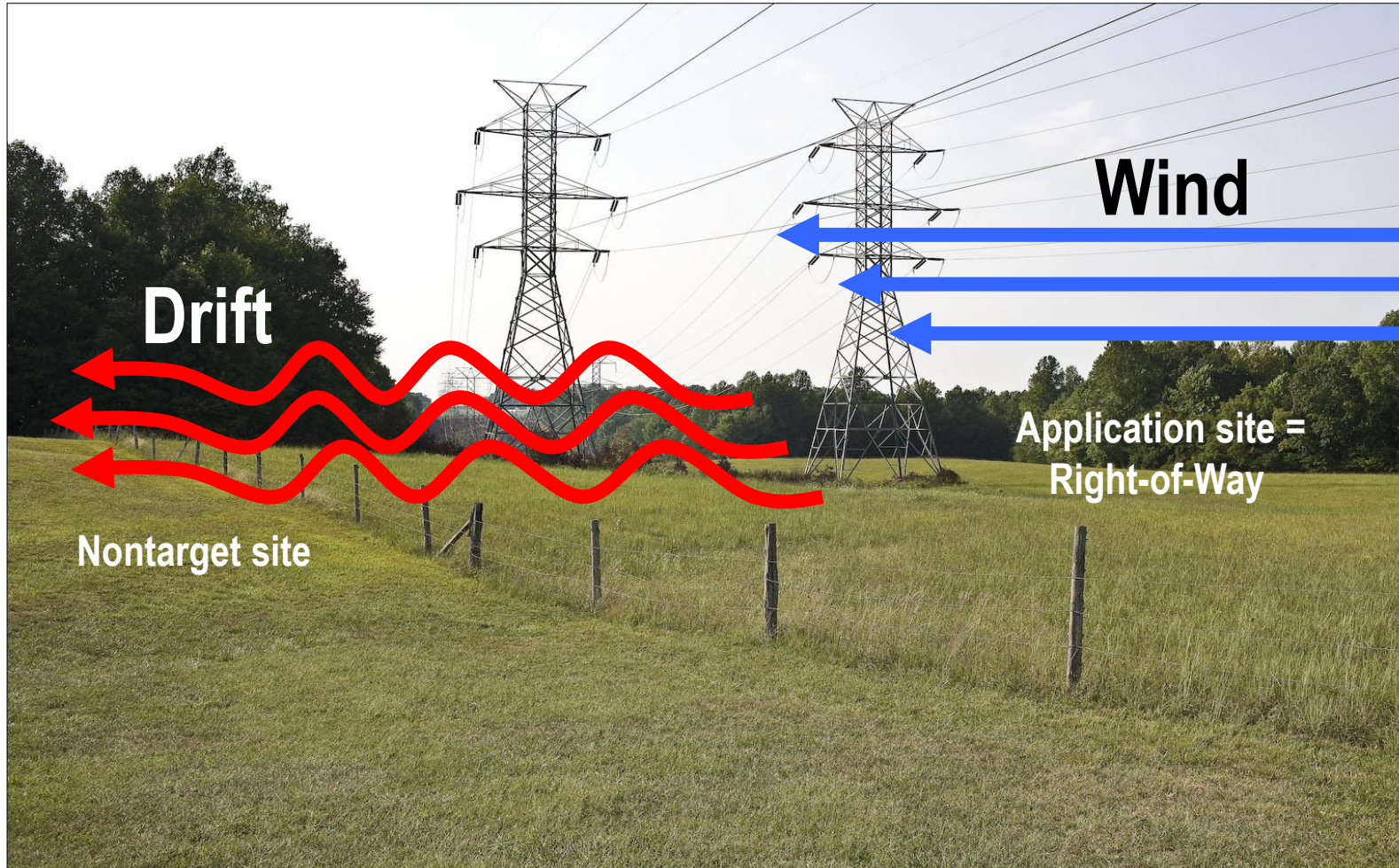
Volatility

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



Volatility

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

<u>Form</u>	<u>Vapor Pressure</u> <u>(μPa @ 25°C)</u>
2,4-D Acid	19
2,4-D Ethylhexyl Ester (EHE)	480

- 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

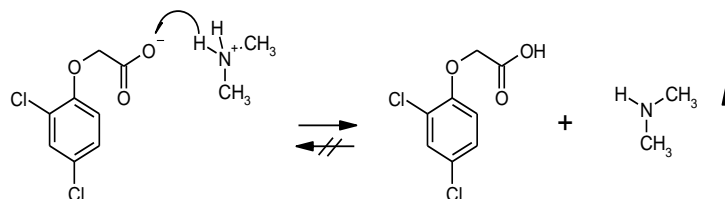


Choline Technology today changes the volatility game...

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

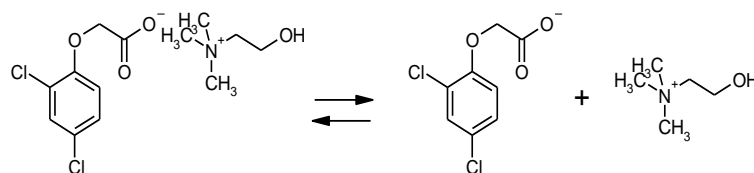
Volatility of the amine affects the relative volatility of 2,4-D

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

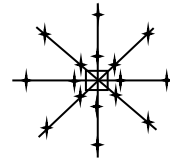


Triclopyr choline salt dissociates into Triclopyr acid anion and choline cation,
both have very low volatility

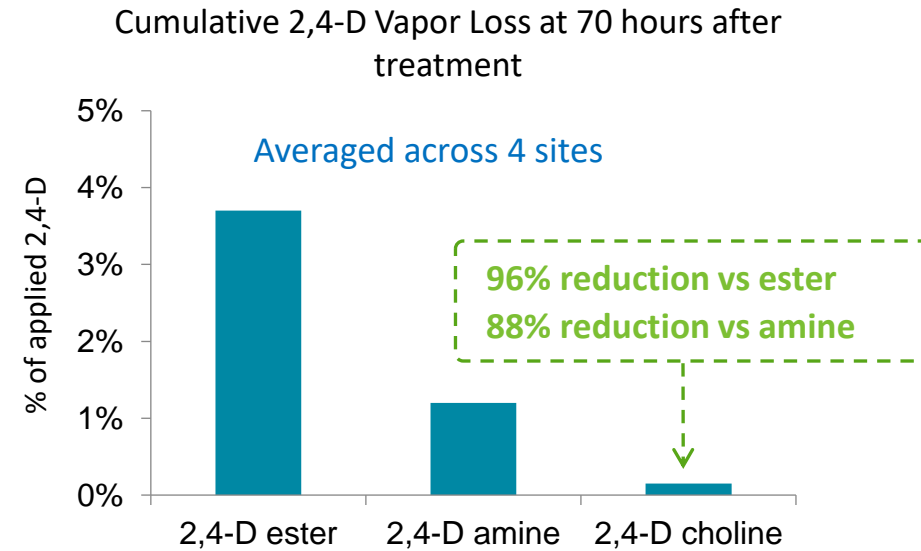
The new triclopyr choline technology changes how triclopyr reacts when it hits the leaf surface.
It does not dissociate (leading to volatility) like traditional forms of triclopyr.

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%

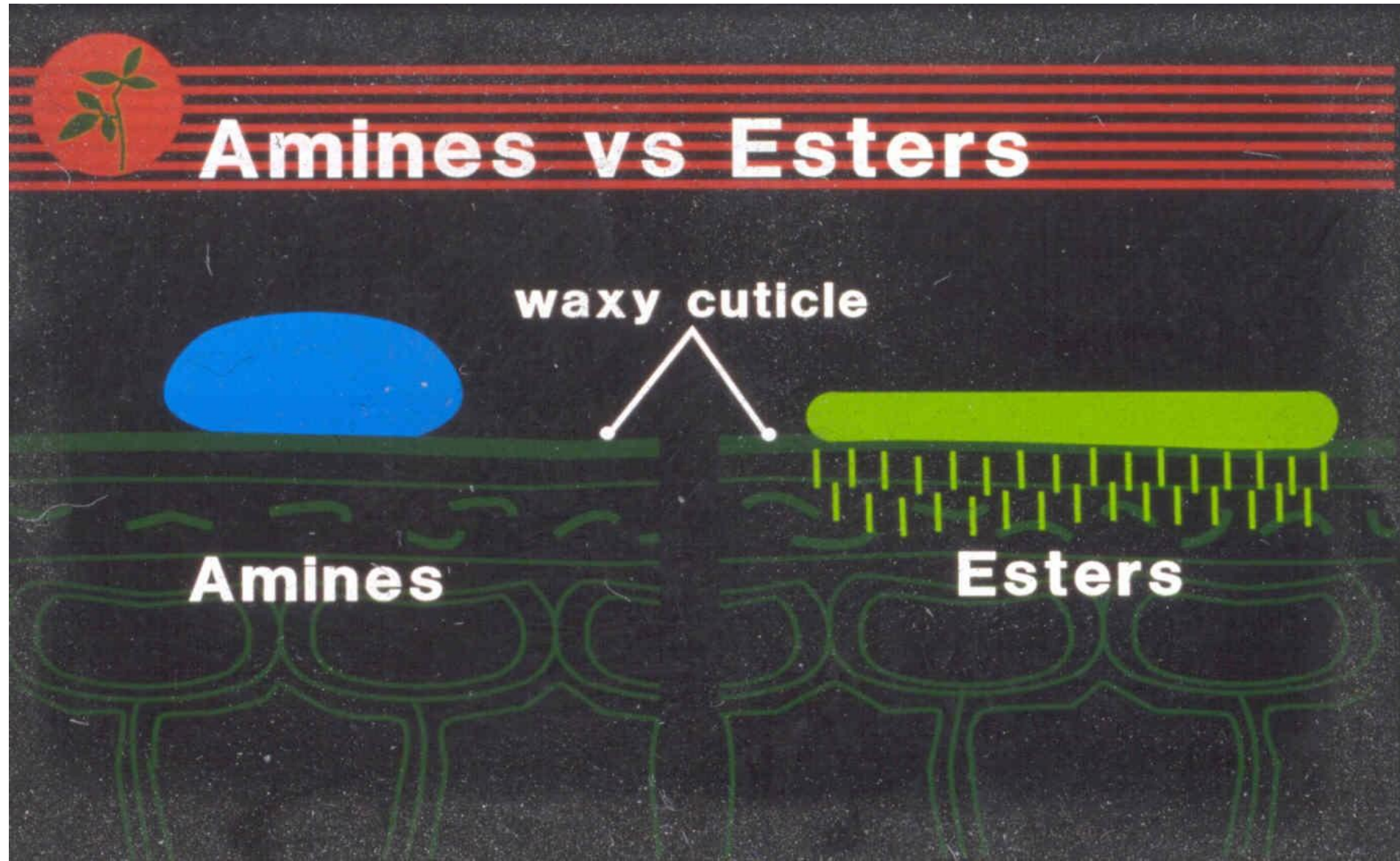


® TM Trademark of The Dow Chemical Company ("Dow") or an affiliated company of Dow

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
- Translocate's through out the plant
- Gives root stock reduction
- Show stopping results!!!



Perfect application on Black Berry: Spray to glisten

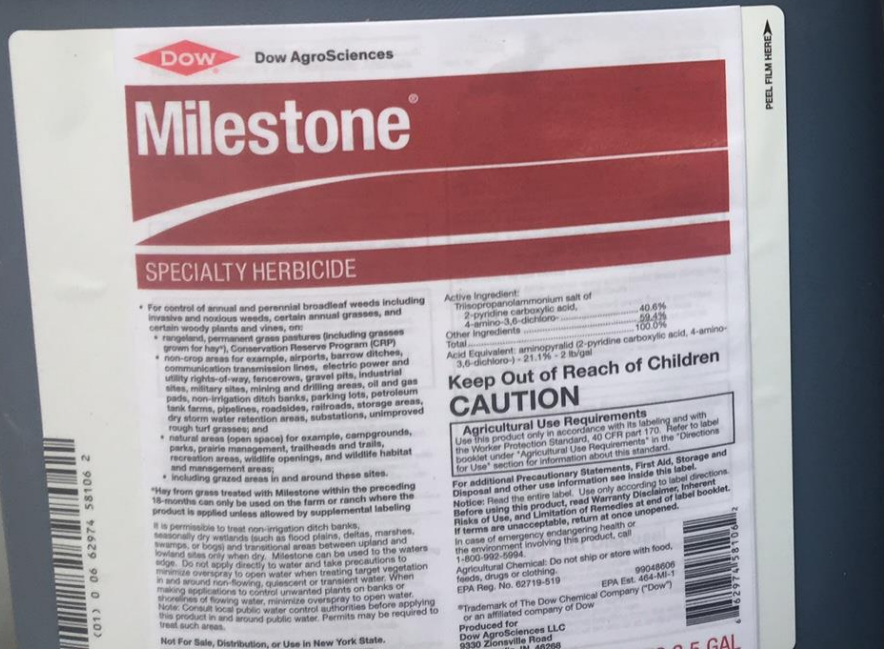
Water based formulation shine 2% Vastlan + .5% NIS



Timing of Applications by Month

Treatment Method	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Cut stump - water based	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Basal Cut stump - oil based	No	No	No	No	No	No	No	No	No	No	No	No
Basal bark	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dormant Stem	Yes	Yes	Yes	No	No	No	No	No	No	Yes	Yes	Yes
Foliar Treatment	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No

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

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Figure 47. Control with aminopyralid

A dense medusahead infestation in an untreated plot (left) contrasts with a good stand of eye grass in a plot treated with 24 oz acre⁻¹ of Milestone in fall (right). (Photo: Josh Davy)

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

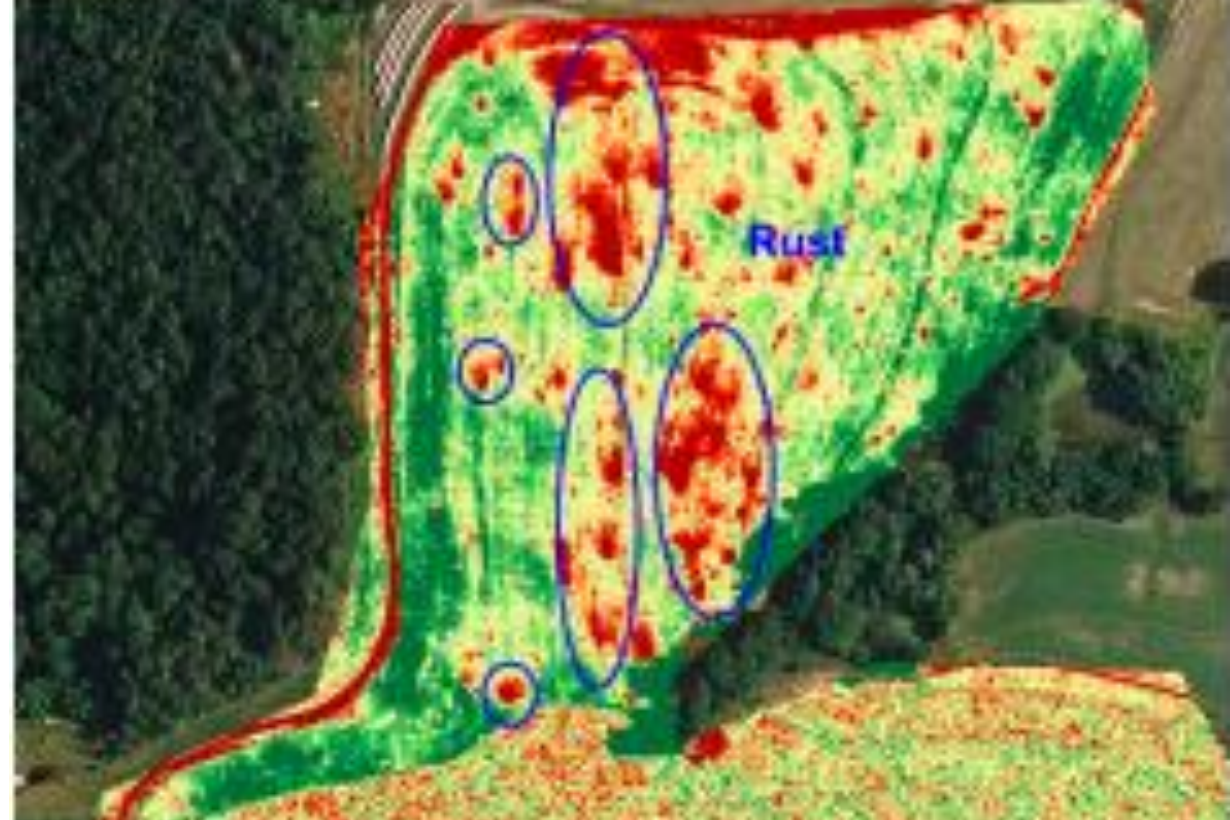
[†] This recommendation is permitted under FIFRA 2(ee) and has not been submitted to or approved by the EPA.

- It is 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



Eye-Level



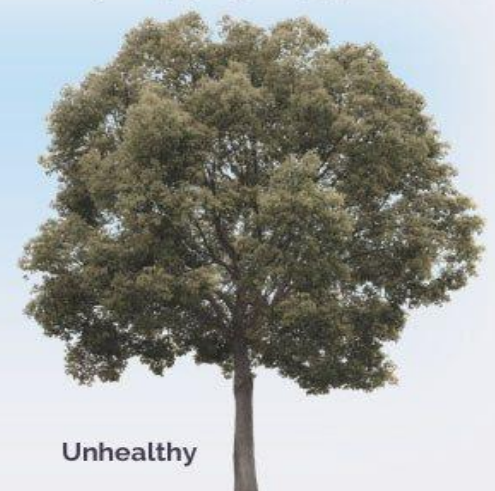
Aerial View

Near Infrared
50%
Visible Red
8%



Healthy

Near Infrared
40%
Visible Red
30%



Unhealthy

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...**



Capstone herbicide label = Milestone + G3A

GROUP	4	HERBICIDE
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Active Ingredient:

Triisopropanolammonium salt of 2-pyridine carboxylic acid, 4-amino-3,6-dichloro-.....	2.22%
Triethylamine salt of [(3,5,6-trichloro-2-pyridinyl)oxy]acetic acid).....	16.22%
Other Ingredients	81.56%
Total	100.0%

Acid Equivalents:

aminopyralid (2-pyridine carboxylic acid, 4-amino-3,6-dichloro-) –	1.15% (0.1 lb/gal)
triclopyr (3,5,6-trichloro-2-pyridinyloxyacetic acid) –	11.63% (1 lb/gal)

Precautionary Statements

Hazards to Humans and Domestic Animals

EPA Reg. No. 62719-572

CAUTION

Harmful if Swallowed • Causes Moderate Eye Irritation
Avoid contact with eyes, skin or clothing.

Personal Protective Equipment (PPE)
Some of the materials that are chemical-resistant to this product are listed below. If you want more options, follow the instructions for category C on an EPA chemical-resistance category selection chart.

Do not apply to persons, especially in the area of water or Tribe, community.

Not For Sale
Not for use
New Hampshire
are permitted
these sites

Vermont
New York

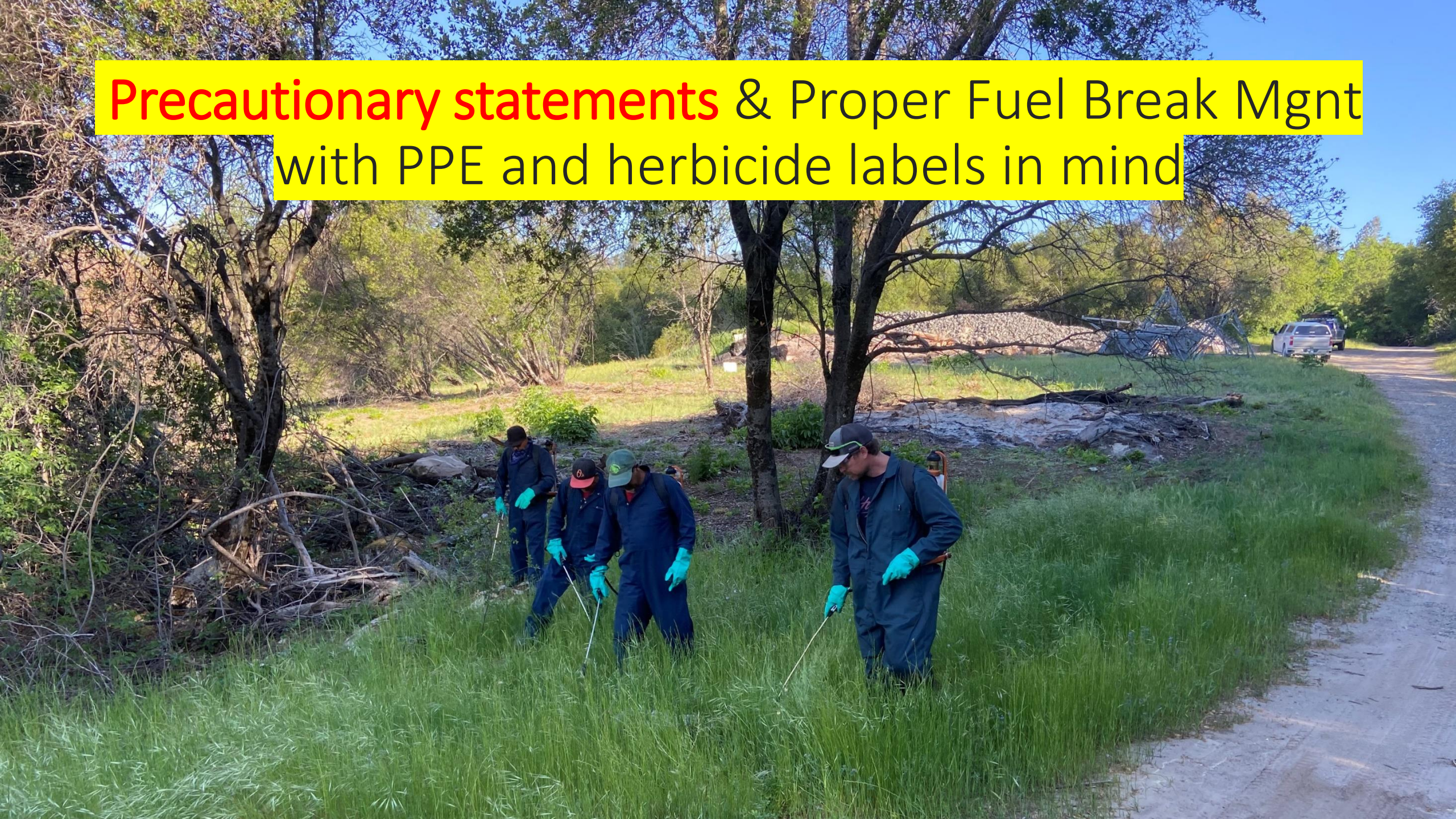
Entry Restriction
or allow other

Agriculture
Use this product

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 Mgnt
with PPE and herbicide labels in mind





**We also take great care in our
sustainable mountain meadows**

Question? Who besides me likes cool planes?

