Guidelines for Responsible Herbicide Applications - ALIPC

Logan J. Martin
Territory Manager
AL, MS, & FL

4-29-2025

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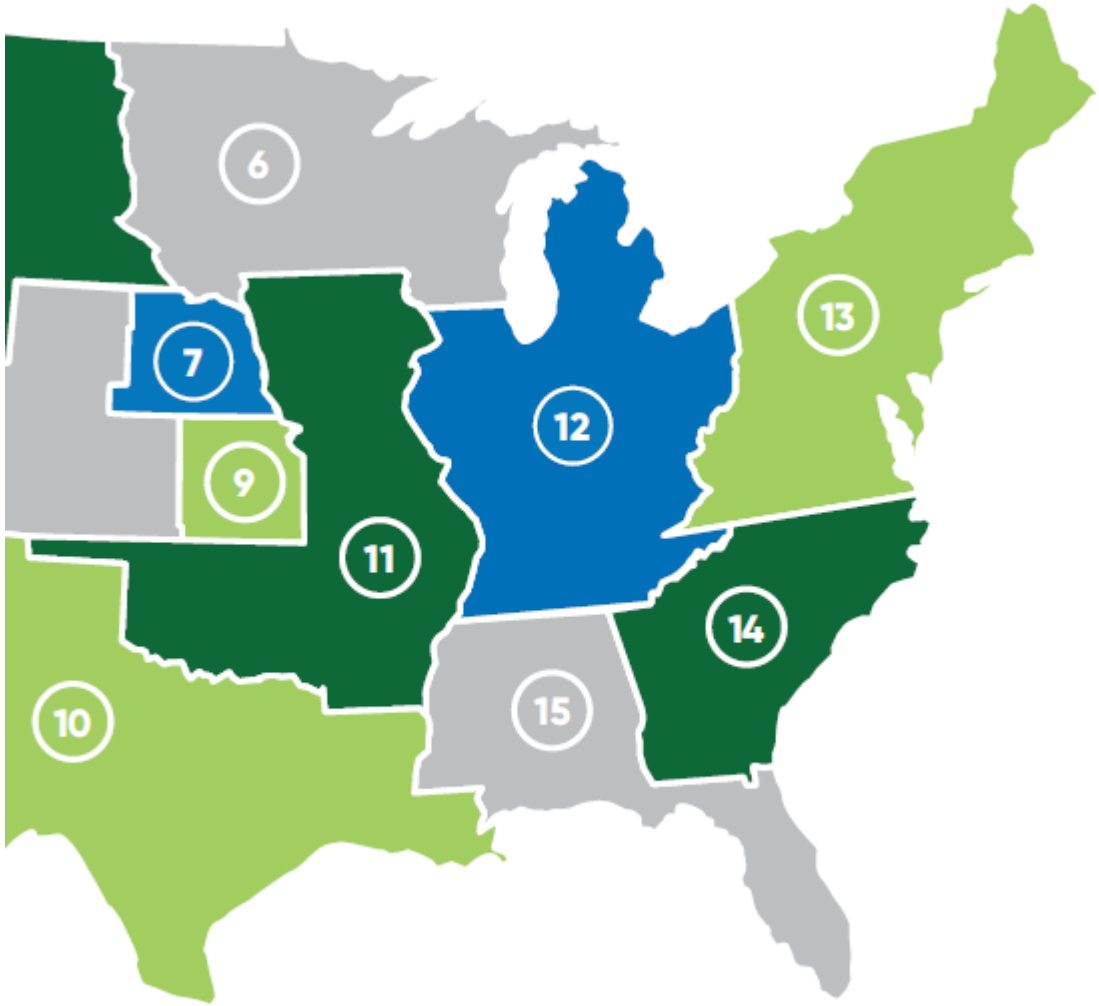
Vegetation Management™



15 Logan Martin
MS, AL, FL
(979) 446-7118
logan.martin@corteva.com

Accord® XRT II
HERBICIDE

Capstone®
HERBICIDE

Cleantraxx®
HERBICIDE

DuraCor®
HERBICIDE

Freelexx®
HERBICIDE

Garlon® 4 Ultra
HERBICIDE

Garlon® 3A
HERBICIDE

Garlon® XRT
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Graslan® L
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Milestone®
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Opensight®
HERBICIDE

Pathfinder® II
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Pathway®
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Vista® XRT
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Spike® 80DF
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TerraVue™
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Tordon® 22K
HERBICIDE

Transline®
HERBICIDE

Vastlan®
HERBICIDE

Piper® EZ
HERBICIDE

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Visit us at **vegetationmgmt.com**

Vegetation Management™

Agenda

- New From Corteva
- Brush Control Options
- Application Guidelines

Product Highlight

Vastlan®
HERBICIDE

- Reduced risk
  - Lower odor, lower volatility, improved signal word
  - Improved eye safety for mixers/handlers/applicators
- More comprehensive labeling
  - Terrestrial, aquatic, landscape, and ornamental areas

TerraVue™
HERBICIDE

- Foundation for brush control
- Contains Milestone and Rinskor
- Low use rates
  - 2 to 5.7 oz/A
- Increased activity on pine and hardwoods

Product Highlight

Piper® EZ
HERBICIDE

- Total Vegetation Control (TVC)
  - Pre-emergent broadleaf and grass control
- Selective Ryegrass Control
  - Pre- and early post-emergent

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Guidelines for Responsible Herbicide Applications

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Steps for Proper Herbicide Application

Know what to do **before**, **during** and **after** application

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Applying Herbicides Responsibly…

Starts with the Applicator!

- Keeps herbicides on target for optimum results
- Prevents off-target movement
  - Ground or surface water
  - Sensitive crops
  - Other desirable vegetation
- Promotes product stewardship
  - Understands the herbicide label
  - Helps ensure long-term availability

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What to do Before an Application

What to do Before an Application

- Know the site and conditions
- Know the weather forecast
- Determine the best herbicide, equipment, and timing
- Understand the product label
- Calibrate spray equipment
- Herbicide Mixing

What to do Before Application

Know the site and conditions

- Survey the application site and adjacent area
- Identify the target species
- Identify management zones, susceptible crops, or non-target plants in and around the site

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What to do Before Application

Sensitive Crops and Plants

- Be aware of sensitive crops in the area
  - Grapes, tomatoes, cotton, soybeans, etc.
- Be aware of other desirable vegetation
  - Grasses, native forbs, wildflowers, ornamentals, etc.

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What to do Before Application

Know the site and conditions

- Most herbicides cannot be applied directly into water
  - Direct spray away from the water
  - Consider wind speed and direction
  - Follow buffer zones on label

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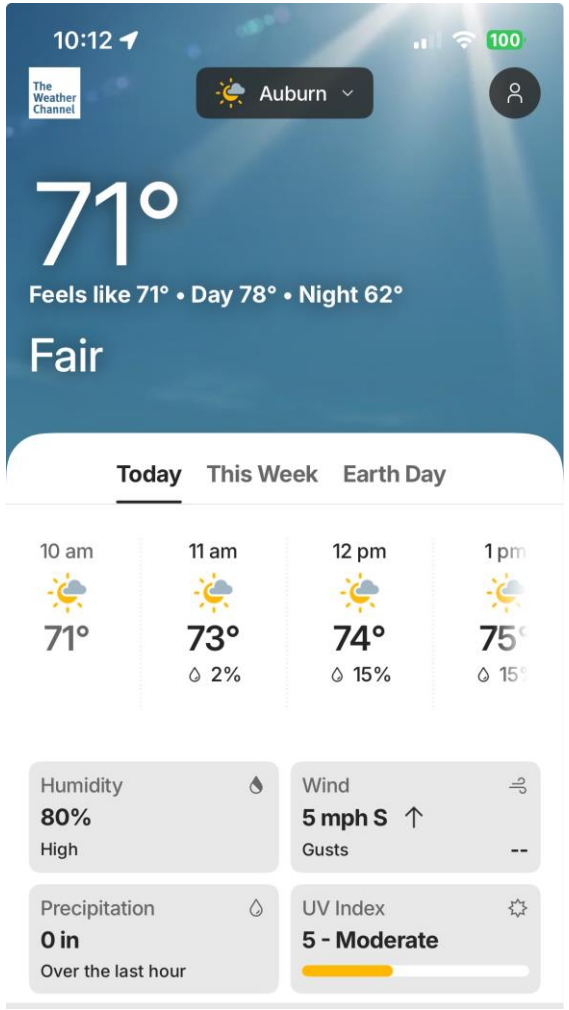
What to do Before Application

Know the weather forecast

- Wind speed and direction
- Rainfall, predicted timing and amount
- Relative humidity
- Air temperature



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What to do Before Application

Determine the best herbicide, equipment, and timing

- Best-spectrum herbicide for target vegetation
- Choose correct nozzles and pressures
- Consider the growth stage and growing conditions of target species
- Keep a spill kit handy
- Consult with your Corteva Agriscience representative

What to do Before Application

Understand the product label

- Use sites, specific directions, and restrictions
- Personal protective equipment (PPE)
- First-aid instructions
- List of species controlled

Specimen Label

AMINOPYRALID	GROUP	4	HERBICIDE
FLORPYRAUXIFEN-BENZYL	GROUP	4	HERBICIDE

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TerraVue™
with Rinskor™ active
HERBICIDE

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For control of annual and perennial broadleaf weeds including invasive and noxious weeds, certain annual grasses, and certain woody plants and vines, on:

- rangeland, permanent grass pastures (including grasses grown for hay*), and Conservation Reserve Program (CRP);
- non-crop areas for example, airports, barrow ditches, communication transmission lines, electric power and utility rights-of-way, fencerows, gravel pits, industrial sites, military sites, mining and drilling areas, oil and gas pads, non-irrigation ditch banks, parking lots, petroleum tank farms, pipelines, roadsides, railroads, storage areas, dry storm water retention areas, substations, and
- natural areas (open space) for example, campgrounds, parks, prairie management, trailheads and trails, recreation areas, wildlife openings, and wildlife habitat and management areas including seasonally dry flood plains, deltas, marshes, prairie potholes, or vernal pools;
- including grazed areas in and around these sites.

* Hay from grass treated with TerraVue within the preceding 18 months can only be used on the farm or ranch where the product is applied unless allowed by supplemental labeling

For the control of woody plant species and annual and perennial broadleaf weeds on

- **range and permanent grass pastures, grasses grown for hay, Conservation Reserve Program (CRP) sites;**
- **forest sites, conifer and tree plantations, and Christmas tree plantations;**
- **non-crop areas for example, airports, barrow ditches, communication transmission lines or structures, manufacturing and storage sites, electrical power and utility rights-of-way, fencerows, gravel pits, industrial sites, military lands, mining and drilling areas, non-irrigation ditch banks, oil and gas pads, parking lots, petroleum tank farms, pipelines, railroads, roadsides, storage areas, storm water retention areas, substations, unimproved rough turf grasses, vacant lots and other non-crop residential areas, and around farm buildings;**
- **natural areas (open space) for example, campgrounds, parks, prairie management, trails and trailheads, recreation areas, wildlife openings and wildlife habitat and management areas;**
- **including grazed areas on these sites; and**
- **aquatic sites**

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What to do Before Application

Calibrate spray equipment

- Measure and adjust sprayer output
  - Don’t waste herbicide
  - Minimize environmental impact
  - Monitor throughout the application and the season

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What to do Before Application

Mix herbicides correctly

- Wettable powders and water dispersible granules
- Agitate tank mix thoroughly
- Liquid flowables and suspensions
- Emulsifiable concentrate formulations
- Surfactants/Solutions

What to do Before Application

What formulation type is this herbicide?

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What to do Before Application

What formulation type is this herbicide?

Tank Mixing
Before using any recommended tank mixtures, read the directions and all use precautions and restrictions on all labels in the tank mix. Prior to large scale batch mixing, conduct a "jar test" for spray mixture compatibility by mixing each component in the required order and proportion in a clear glass jar. **Note:** If tank mixing with glyphosate herbicides, mix the Vastlan with at least 75% of the total spray volume desired and ensure that Vastlan is well mixed before adding the glyphosate herbicides to avoid incompatibility. When using Vastlan in combination with Freelexx, 2,4-D amine (like DMA 4 IVM) or low volatile ester herbicides, generally the higher rates should be used for satisfactory brush control.

Mixing Directions for all use sites

Garlon 4 Ultra may be foliarly applied by diluting with water or by preparing an oil-water emulsion. For woody plant control, an oil-water emulsion performs more dependably under a broader range of conditions than a straight water dilution and is recommended for aerial applications.

- Wettable powders and water dispersible granules
- Agitate tank mix thoroughly
- Liquid flowables and suspensions
- Emulsifiable concentrate formulations
- Surfactants/Solutions

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What to do Before Application

What formulation type is this herbicide?

TerraVue™
HERBICIDE

- Wettable powders and water dispersible granules
- Agitate tank mix thoroughly
- Liquid flowables and suspensions
- Emulsifiable concentrate formulations
- Surfactants/Solutions

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What to do Before Application

What formulation type is this herbicide?

Active Ingredient:
triclopyr: 2-[(3,5,6-trichloro-2-pyridinyl)oxy]
acetic acid, butoxyethyl ester 60.45%
Other Ingredients..... 39.55%
Total..... 100.00%
Acid equivalent: triclopyr – 43.46% - 4 lb/gal

Garlon® 4 Ultra
HERBICIDE

- Wettable powders and water dispersible granules
- Agitate tank mix thoroughly
- Liquid flowables and suspensions
- Emulsifiable concentrate formulations
- Surfactants/Solutions

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What to do Before Application

What formulation type is this herbicide?

Active Ingredient:
Triclopyr choline: 2-[(3,5,6-trichloro-2-pyridinyl)oxy] acetic acid, choline salt 54.72%
Other Ingredients 45.28%
Total 100.0%

Acid equivalent: triclopyr – 39.02% - 4 lb/gal

Vastlan®
HERBICIDE

- Wettable powders and water dispersible granules
- Agitate tank mix thoroughly
- Liquid flowables and suspensions
- Emulsifiable concentrate formulations
- Surfactants/Solutions

What to do Before Application

Mix herbicides correctly

- Are your herbicides compatible?
  - Perform a jar test
- How do you add them to the tank?
  - Use the W.A.L.E.S method
- Only mix what you need

- **W**ettable powders and water dispersible granules
- **A**gitate tank mix thoroughly
- **L**iquid flowables and suspensions
- **E**mulsifiable concentrate formulations
- **S**urfactants/Solutions

What to do Before Application

Notify adjacent landowners

- Increases awareness of project and educates landowners
- Increases landowner compliance
  - More productive and efficient
  - Builds trust

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What to do During Application

What to do During Application

- Continue to use appropriate PPE
- Monitor changing weather conditions
- Evaluate equipment performance
- Keep spray solution on target

What to do During Application

Appropriate PPE

- Long-sleeved shirts and long pants
- Protective eyewear
- Chemical-resistant gloves
- Rubber/vinyl boots
- Hat/helmet
- Be conscious of spill notification plan

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What to do During Application

Specimen Label

AMINOPYRALID	GROUP	4	HERBICIDE

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Milestone®

HERBICIDE

Personal Protective Equipment (PPE)

Applicators and other handlers must wear:

- Long-sleeved shirt and long pants
- Shoes plus socks

Mixers, loaders, applicators, and other handlers must wear:

- Long-sleeved shirt and long pants
- Chemical-resistant gloves made of any waterproof material
- Shoes plus socks

What to do During Application

Monitor changing weather conditions

- Wind speed and direction
- Rain forecast
- Air temperature/relative humidity

What to do During Application

Monitor the equipment performance

- Maintain proper pressure
- Tank agitation
- GPS equipment
- Use appropriate spray nozzle and monitor for clogging or correct spray pattern

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What to do During Application

Keep the spray solution on target and avoid

- Spray drift
- Volatility
- Surface temperature inversion
- Runoff
- Over application

Keep the Spray Solution on Target

- **Spray drift**: The movement of airborne spray particles during the application that never settle on the target vegetation.

Keep the Spray Solution on Target

Spray drift

- Small spray droplets can physically move off-site
  - Equipment
  - Wind speed and direction
- Recommend using larger than 400 micron droplet size
  - Small droplets (less than 400 micron, unseen by our eyes) can be carried off-site

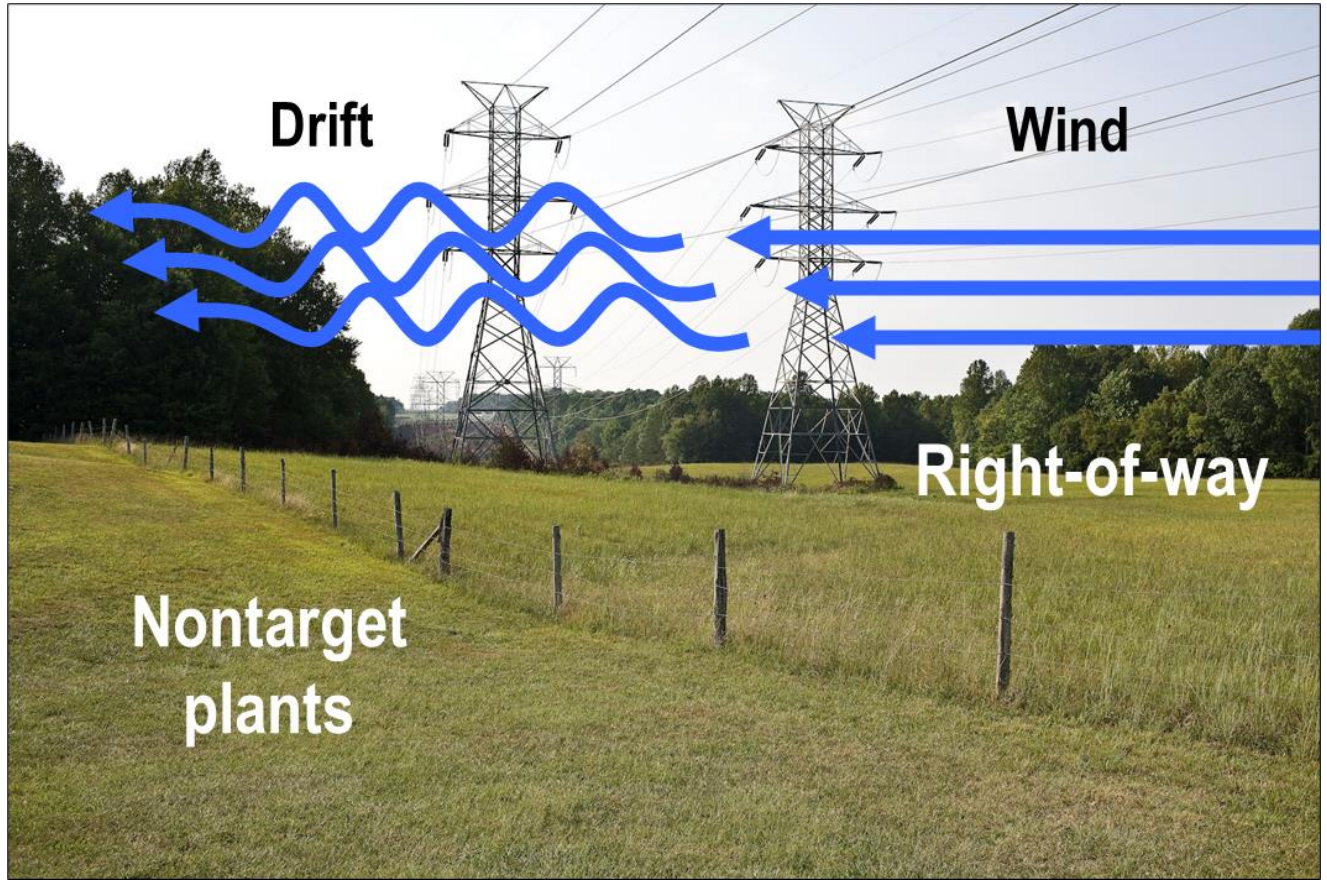
Keep the Spray Solution on Target

Spray drift

- Wind is efficient at moving small droplets considerable distances
- When wind speed is less than 2 mph, wind direction is highly variable and can change direction suddenly
  - With aerial applications and broadcast foliar treatments, give yourself a buffer zone in all directions when wind speed is less than 2 mph
  - Winds blowing away from susceptible crops can be better
  - Off-target damage potential increases when wind blows toward susceptible crops
- Use state regulations as the guide to wind speeds during applications

Keep the Spray Solution on Target

- Spray drift can occur during application



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Keep the Spray Solution on Target

- **Herbicide volatility**: The tendency of a chemical to vaporize into the atmosphere from a treated surface where it may move away from the treated area.

Keep the Spray Solution on Target

Herbicide volatility

- Spray solution settles on the target site, and then evaporates, becomes a gas, and moves off-site
  - Level of volatility varies by herbicide and can occur off any surface
  - Air temperature and relative humidity

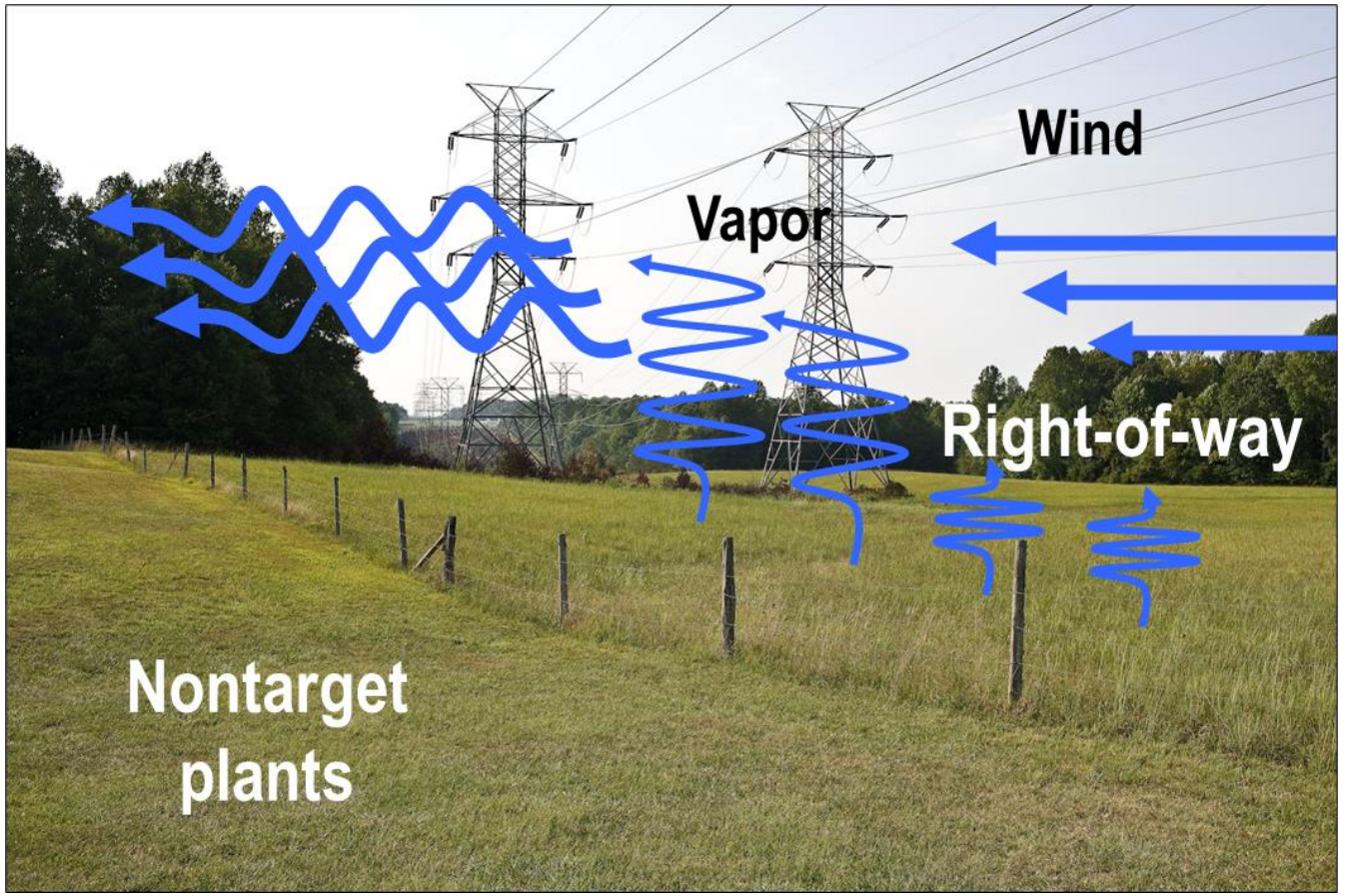
Keep the Spray Solution on Target

Herbicide volatility

- Air temperature is not the only factor
  - Temperatures of surfaces can be higher than ambient air temperatures
- LOW volatility does not mean NO volatility
  - High temperatures and low humidity causes more rapid evaporation
  - Calm conditions can contribute to volatility
- Vegetation can intercept spray and greatly reduce volatility

Keep the Spray Solution on Target

- Herbicide volatility can occur during or after application



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Keep the Spray Solution on Target

Surface temperature inversion

- Air temperature at ground level is cooler than the air above
  - Cooler air trapped by warmer air above
- Layered air reduces normal air mixing
- Spray solution may stay suspended in the air in the inversion and not settle on-site

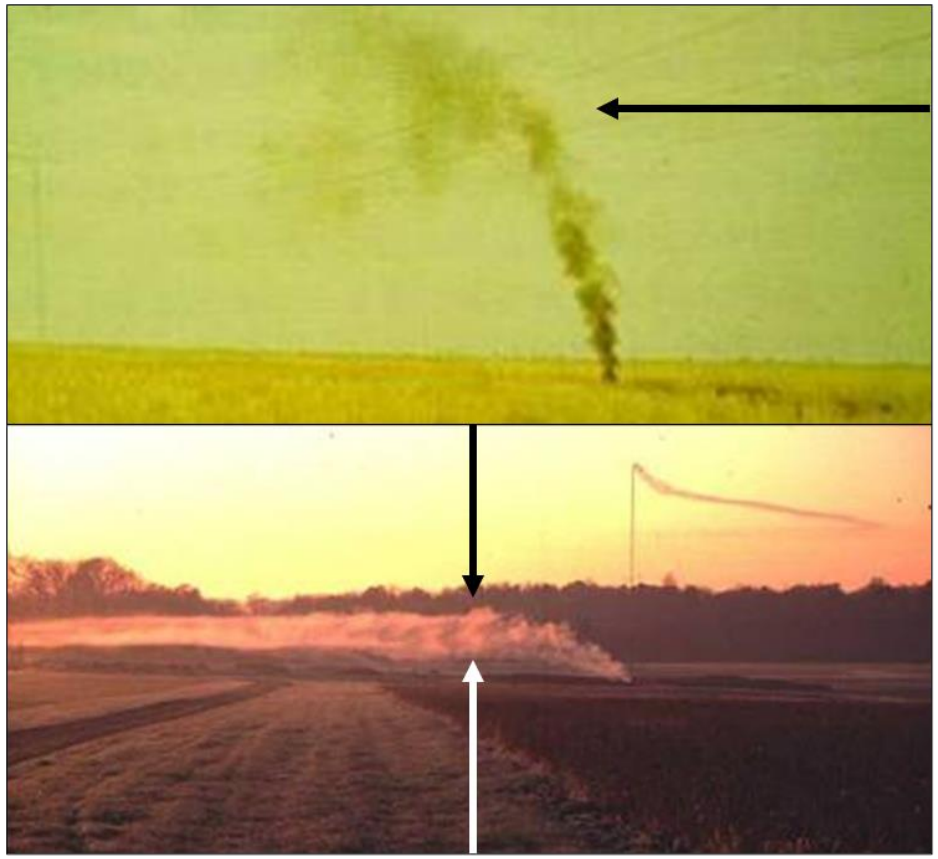
Keep the Spray Solution on Target

Surface temperature inversion

- Recognizing and avoiding inversions
  - Windless or low wind conditions (less than 2 to 3 mph)
  - Usually occurs around sunset and sunrise
  - Local, low-level inversions occur in air drainage pockets
  - Indicators
    - Ground fog
    - Hanging dust or smoke
    - Presence of dew or frost

Keep the Spray Solution on Target

Surface temperature inversion



Unstable air; good air mixing and good for spraying if other conditions are acceptable

Layered, cooler air trapped below warmer air; indicates an inversion

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Keep the Spray Solution on Target

Runoff

- Water that moves along the soil surface and off the application site
  - The potential for herbicides to move with runoff is determined by several factors:
    - Length of time between application and runoff event
    - Rainfall intensity and duration
    - Slope and terrain
    - Application rate
    - Soil saturation
    - Characteristics of the herbicide
      - Soil adsorption
      - Degradation rate — the soil half-life
      - Solubility in water

Keep the Spray Solution on Target

Runoff

- Factors of runoff
  - Rainfall intensity and duration
  - Soil conditions (permeability, texture, organic matter, level of saturation)
  - Slope and terrain
  - Application timing
  - Vegetative cover
    - Mowed roadsides are characterized by short vegetation, with less biomass to:
      - Intercept rain as it falls
      - Slow down the movement of runoff across the right-of-way

Keep the Spray Solution on Target

Know rain forecast during and after the application

- Amount of rainfall expected
- Intensity of rainfall

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What to do After Application

What to do After Application

- Complete necessary paperwork
- Clean equipment
- Store remaining herbicide(s)
- Dispose of empty containers

What to do After Application

Complete necessary paperwork

- Record-keeping of applications
  - Location
  - Date and time
  - Weather conditions at time of application
  - Amount and type of herbicide used

What to do After Application

Clean equipment

- Refer to the label
- Clean away from places where potential groundwater contamination could occur
- Use water-supply equipment with anti-back siphon valves
- Clean equipment thoroughly before using it to apply other herbicides with different modes of action or control spectrums
- Handle rinsate appropriately

What to do After Application

Store remaining herbicide(s)

- Storage instructions on label
- Do not store containers in direct sunlight
- Be aware of state and local regulations
- Minimize chance for theft, fire, etc.

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What to do After Application

Dispose of empty containers

- Refer to the label
- Improper disposal is a federal violation
- If unsure, contact your state pesticide or environmental control agency, or the nearest EPA regional office for guidance
- Recycle if available

Summary

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Read and follow label directions

- The label is the law
- It is the user's responsibility to know and understand the label directions and precautions
- Applicators can get into trouble if they make assumptions about herbicide similarities
  - Every herbicide label is unique
  - Herbicide label directions do change over time, so check for updates regularly

THANK YOU!

Logan J. Martin
Territory Manager (AL, MS, and FL)
M. 979.446.7118
E. logan.martin@corteva.com

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