It's Easier in California Lecture Series - Session 1

Mark Gourley
Starker Forests, Inc.

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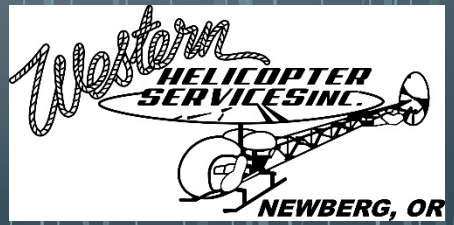


CHAIR
REP. WITT

Areas for Improvement

Rob Davis - Oregonian

28 comments

After weed killers drift, Oregon gets tough with helicopter sprayer

When the Oregon Department of Agriculture gets complaints from residents, it's supposed to determine which timber company was spraying, what chemicals were used and what the weather conditions were. It didn't when Reynolds called. An investigator said

7 / 11 | Fullscreen | Share | Caption

By Rob Davis | The Oregonian/OregonLive
Email the author | Follow on Twitter
on October 19, 2015 at 2:36 PM, updated October 19, 2015 at 2:43 PM

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OIL TRAINS

Rob Davis takes an in-depth look at oil trains in the Pacific Northwest

In 2013, 19,065 tank cars moved more than 11M barrels of oil through Oregon. ... More»

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bed, and wants to mix up 2 gals of spray solution. Therefore, applicator should mix 5 teaspoons of *SureGuard* Herbicide in 2 gals of water.

AERIAL APPLICATION

To obtain satisfactory weed control with aerial application of *SureGuard* Herbicide, coverage must be uniform. Do not spray when drift is possible or when wind velocity is more than 10 mph. Avoid spraying *SureGuard* Herbicide within 200 feet of dwellings, adjacent sensitive crops or environmentally sensitive areas. To obtain satisfactory application and drift, the following directions must be observed:

Volume Pressure

Apply *SureGuard* Herbicide in 5 to 10 gals of water per acre, with a maximum spray pressure of 40 PSI. Application at less than 5 gals per acre may not provide adequate weed control. Higher gallonage applications generally provide more consistent weed control.

Nozzles and Nozzle Operation

Use nozzles that produce flat or hollow cone spray patterns. Use non-drip type nozzles such as diaphragm type nozzles to avoid unwanted discharge of spray solution. The nozzle must be directed toward the rear of the aircraft, at an angle between 0 and 15° downward. Do not place nozzles on the outer 25% of the wings or rotors.

Adjuvants

Refer to the additive section or the tank mix partners label for adjuvant recom-mendation.

CALIBRATION TABLE

SUREGUARD HERBICIDE RATES OZ/A	*SUREGUARD* HERBICIDE RATES GRAMS/GAL	*SUREGUARD* HERBICIDE RATES PER GAL
8	2.3	3/4 tsp
10	2.8	1 level tsp
12	3.4	1-1/4 tsp

SPRAY DRIFT REDUCTION

on the upwind side, immediately prior to application.

- Do not make aerial or ground applications into areas of temperature inversions. Inversions are characterized by stable air and increasing temperatures with increasing distance above the ground. Mist or fog may indicate the presence of an inversion in humid areas. Where permissible by local regulations, the applicator may detect the presence of an inversion by producing smoke and observing a smoke layer near the ground surface.
- Low humidity and high temperatures increase the evaporation rate of spray droplets and therefore the likelihood of increased spray drift. Avoid spraying during conditions of low humidity and/or high temperatures.
- All aerial and ground application equipment must be properly maintained and calibrated using appropriate carriers.
- For ground boom applications, apply with nozzle height no more than 4 ft above the ground or crop canopy.

WEEDS CONTROLLED

When *SureGuard* Herbicide is applied preemergence or postemergence at recommended rates and weed stages, the following grasses and broadleaf weeds are controlled.

TABLE 1. WEEDS CONTROLLED BY *SUREGUARD* HERBICIDE

COMMON NAME	SCIENTIFIC NAME
Alyssum, Hoary	*Berteroa incana*
Amaranth	
Palmer	*Amaranthus palmeri*
Spiny	*Amaranthus spinosus*
American Burnweed	*Erechetities hieracifolia*
Barnyardgrass*	*Echinochloa crus-galli*
Beggarweed, Florida	*Desmodium tortuosum*
Bittercress, Hairy	*Cardamine hirsuta*
Bluegrass, Annual*	*Poa annua*
Burclover, California	*Medicago polymorpha*
Carpetweed	*Mollugo verticillata*

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TABLE 1. WEEDS CONTROLLED BY *SUREGUARD* HERBICIDE

COMMON NAME	SCIENTIFIC NAME
Alyssum, Hoary	*Berteroa incana*
Amaranth	

Polaris® AC

PRECAUTIONARY STATEMENTS
HAZARDS TO HUMANS
CAUTION / PRECAUCION

Harmful if inhaled. Avoid contact with skin, eyes, or clothing. Avoid breathing spray mist.

Some materials are chemical resistant to this product are natural rubber ≥14 mils. If you want more options, follow the instructions for category A on the EPA chemical resistance category selection chart.

PERSONAL PROTECTIVE EQUIPMENT (PPE):
Mixers, loaders, applicators and other handlers must wear:
- Long-sleeved shirt and long pants,
- Shoes plus socks
- Chemical-resistant gloves for mixers and loaders, plus applicators using handheld equipment.

Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry. Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them.

Pilots must use an enclosed cockpit that meet the requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides [40 CFR 170.240(d) (6)].

USER SAFETY RECOMMENDATIONS

Users should:
- Wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Wash the outside of gloves before removing.
- User should remove clothing/PPE immediately if pesticide gets inside.

FIRST AID

IF INHALED	• Move person to fresh air. • If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. • Call a poison control center or doctor for further treatment advice.
IF IN EYES	• Hold eye open and rinse slowly and gently with water for 15-20 minutes. • Remove contact lenses, if present, after the first 5 minutes, then continue rinsing. • Call a poison control center or doctor for treatment advice.
IF ON SKIN OR CLOTHING	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15-20 minutes. • Call a poison control center or doctor for treatment advice.

HOT LINE NUMBER

Have the product container or label with you when calling a poison control center or doctor, or going for treatment.
You may also contact 1-877-325-1840 for emergency medical treatment information.

ENVIRONMENTAL HAZARDS

This product is toxic to plants. Drift and run-off may be hazardous to plants in water adjacent to treated areas. Do not apply to water except as specified in this label. Treatment of aquatic weeds may result in oxygen depletion or loss to decomposition of dead plants. Do not

Some materials are chemical resistant to this product are natural rubber ≥14 mils. If you want more options, follow the instructions for category A on the EPA chemical resistance category selection chart.

PERSONAL PROTECTIVE EQUIPMENT (PPE):
Mixers, loaders, applicators and other handlers must wear:

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application.

For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulation.

This product may be used only in accordance with recommendations and restrictions on the booklet label. Keep containers closed to avoid spills and contamination.

Polaris® AC

path of the application equipment (e.g. aircraft, ground) upwind. Swath adjustment distance should increase with increasing drift potential (higher wind, smaller droplets, etc.).

Wind: Drift potential is lowest between wind speeds of 3-10 mph. Do not apply at with wind speeds greater than 10 mph. However, many factors, including droplet size and equipment type, determine drift potential at any given speed. Application should be avoided below 3 mph due to variable wind direction and high inversion potential. NOTE: Local terrain can influence wind patterns. Every applicator should be familiar with local wind patterns and how they affect spray drift.

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Temperature and Humidity: When making applications in low relative humidity, set up equipment to produce larger droplets to

the treated area and to avoid spray drift.

Aerial Applications:

- Applicators are required to use a coarse or coarser droplet size (ASABE S572) or, if specifically using a spinning atomizer nozzle, applicators are required to use a volume mean diameter (VMD) of 385 microns or greater for release heights below 10 feet; Applicators are required to use a very coarse or coarser droplet size or, if specifically using a spinning atomizer nozzle, applicators are required to use a VMD of 475 microns or greater for release heights above 10 feet; Applicators must consider the effects of nozzle orientation and flight speed when determining droplet size.
- Applicators are required to use upwind swath displacement.
- The boom length must not exceed 60% of the wingspan or 90% of the rotor blade diameter to reduce spray drift.
- Applications with wind speeds less than 3mph and with wind speeds greater than 10 mph are prohibited.
- Applications into temperature inversions are prohibited.

ADJUVANTS

Postemergence applications of this product may require the addition of a spray adjuvant for optimum herbicide performance. Only use spray adjuvants that are labeled for the specific use sites. When using for conifer release treatments, please refer to the conifer release section of this label. The addition of a Chemical Producers and Distributors Associations (CPDA) certified adjuvant may increase control. A CPDA certified drift control agent may also be used.

Nonionic Surfactants: Use a nonionic surfactant at the rate 0.25% v/v or higher (see manufacturer's label) of the spray solution (0.25% v/v is equivalent to 1 quart in 100 gallons). For best results, select a nonionic surfactant with a HLB (hydrophilic to lipophilic balance) ratio between 12 and 17 with at least 90% surfactant in the formulated product (alcohols, fatty acids, oils, ethylene glycol or diethylene glycol should not be considered as surfactants to meet the above requirements).

Methylated Seed Oils or Vegetable Oil Concentrates: Instead of a surfactant, a methylated seed oil or vegetable-based seed oil concentrate may be used at the rate of 1.5 to 2 pints per acre. When using spray volumes greater than 30 gallons per acre, methylated seed oil or vegetable based seed oil concentrates should be mixed at a rate of 1% of the total spray volume, or alternatively use a nonionic surfactant as described above. Research indicates that these oils may aid in product deposition and uptake by plants under moisture or temperature stress.

Silicone Based Surfactants: See manufacturer's label for specific rate recommendations. Silicone-based surfactants may reduce the surface tension of the spray droplet, allowing greater spreading on the leaf surface as compared to conventional nonionic surfactants. However, some silicone-based surfactants may dry too quickly, limiting herbicide uptake.

Invert Emulsions: This product can be applied as an invert emulsion. Consult the invert chemical label for proper mixing directions. Fertilizer/Surfactant Blends: Nitrogen based liquid fertilizers such as 28%N, 32%N, 1 0-34-0 or ammonium sulfate, may be added at the rate of 2 to 3 pints per acre in combination with the recommended rate of nonionic surfactant, methylated seed oil or vegetable/seed oil concentrate. The use of fertilizers in a tank mix without a nonionic surfactant, methylated seed oil or vegetable/seed oil concentrate is not recommended.

Other: An antifoaming agent, spray pattern indicator or drift reducing agent may be applied at the product labeled rate if necessary or desired.

Polaris® AC

path of the application equipment (e.g. aircraft, ground) upwind. Swath adjustment distance should increase with increasing drift potential (higher wind, smaller droplets, etc.).

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Temperature and Humidity: When making applications in low relative humidity, set up equipment to produce larger droplets to compensate for evaporation. Droplet evaporation is most severe when conditions are both hot and dry.

Temperature Inversions: Drift potential is high during a temperature inversion. Temperature inversions restrict vertical air mixing, which causes small suspended droplets to remain in a concentrated cloud, which can move in unpredictable directions due to the light variable winds common during inversions. Temperature inversions are characterized by increasing temperatures with altitude and are common on nights with limited cloud cover and light to no wind. They begin to form as the sun sets and often continue into the morning. Their presence can be indicated by ground fog; however, if fog is not present, inversions can also be identified by the movement of smoke from a ground source or an aircraft smoke generator. Smoke that layers and moves laterally in a concentrated cloud (under low wind conditions) indicates an inversion, while smoke that moves upward and rapidly dissipates indicates good vertical air mixing.

Wind Erosion: Avoid treating powdery dry or light sandy soils when conditions are favorable for wind erosion. Under these conditions, the soil surface should first be settled by rainfall or irrigation.

Aerial Application Methods and Equipment: Use 2 or more gallons of water per acre. The actual minimum spray volume per acre is determined by the spray equipment used. Use adequate spray volume to provide accurate and uniform distribution of spray particles over the treated area and to avoid spray drift.

Aerial Applications:

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Other: An antifoaming agent, spray pattern indicator or drift reducing agent may be applied at the product labeled rate if necessary or desired.

DuPont™ Oust ® XP

- **Pressure** – Selecting the pressure that produces the coarsest droplet spectrum for a particular nozzle and airspeed reduces spray drift potential. For some nozzle types such as solid streams, lower pressures can produce finer droplet spectra and increase drift potential

BOOM LENGTH (AIRCRAFT) AND APPLICATION HEIGHT

- **Boom Length (aircraft)** - Using shorter booms decreases drift potential. Boom lengths are expressed as a percentage of an aircraft's wingspan or a helicopter's rotor blade diameter. Shorter boom length and proper positioning can minimize drift caused by wingtip or rotor vortices.
- **Application Height (aircraft)** - Applications made at the lowest height that are consistent with pest control objectives and the safe operation of the aircraft will reduce the potential for spray drift.
- **Application Height (ground)** - Applications made at the lowest height consistent with pest control objectives, and that allow the applicator to keep the boom level with the application site and minimize bounce, will reduce the exposure of spray droplets to evaporation and wind, and reduce spray drift potential.

WIND

Drift potential is lowest when applications are made in light to gentle sustained winds (2-10 mph), which are blowing in a constant direction. Many factors, including droplet size and equipment type also determine drift potential at any given wind speed. AVOID GUSTY OR WINDLESS CONDITIONS.

Local terrain can also influence wind patterns. Every applicator is expected to be familiar with local wind patterns and how they affect spray drift.

TEMPERATURE AND HUMIDITY

Setting up equipment to produce larger droplets to compensate for droplet evaporation can reduce spray drift potential. Droplet

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Local terrain can also influence wind patterns. Every applicator is expected to be familiar with local wind patterns and how they affect spray drift.

Air assisted field crop sprayers carry droplets to the target via a downward directed air stream. Some may reduce the potential for drift, but if a sprayer is unsuitable for the application and/or set up improperly, high drift potential can result. It is the responsibility of the applicator to determine that a sprayer is suitable for the intended application, that it is configured properly, and that drift potential has been minimized.

Note: Air assisted field sprayers can affect product performance by affecting spray coverage and canopy penetration. Read the specific crop use and application equipment instructions to determine if an air assisted field crop sprayer can be used.

SENSITIVE AREAS

Making applications when there is a sustained wind moving away from adjacent sensitive areas (e.g., residential areas, bodies of water, known habitat for threatened or endangered species, non-target crops) is an effective way to minimize the effect of spray drift.

DRIFT CONTROL ADDITIVES

Using product compatible drift control additives can reduce drift potential. When a drift control additive is used, read and carefully observe cautionary statements and all other information on the additive's label. If using an additive that increases viscosity, ensure that the nozzles and other application equipment will function properly with a viscous spray solution. Preferred drift control additives have been certified by the Chemical Producers and Distributors Association (CPDA).

UPWIND SWATH DISPLACEMENT

When applications are made with a crosswind the swath will be displaced downwind. An adjustment for swath displacement is made on the downwind edge of the application site by shifting the path of the application equipment upwind.

Drift Mitigation


9:25
AERIAL SPRAY
USDA
ARS
BEGIN
SIMULATOR
VIEW
RESULTS


9:26
ARS Results
DV0.1 (µm): 153
DV0.5 (µm): 343
DV0.9 (µm): 579
% Spray Volume < 100 µm: 7.5
% Spray Volume < 200 µm: 13.4
Droplet Size Class: MEDIUM
Orifice: 10
Angle: 0
Pressure (psi): 45
Speed (mph): 140
Solution: Active Blank
SEND
SAVE

USDA ARS Aerial Application Technology Research Unit Low Speed Spray Nozzle Models

Aerial Application Technology

STEP 1: SELECT NOZZLE MODEL USING PULL DOWN MENU

Rotary Wing - Disc Orifice Straight Stream

VALID FOR AIRSPEEDS FROM 30 to 100 MPH

Model developed following methods detailed by Kirk, I.W., 2007. Measurement and prediction of atomization parameters from fixed-wing aircraft spray nozzles. Trans. ASABE 50(3): 685-703.

Aerial Application Technology Research Unit, Agricultural Research Service, U. S. Department of Agriculture, 3103 F&B Road, College Station, TX 77845, USA

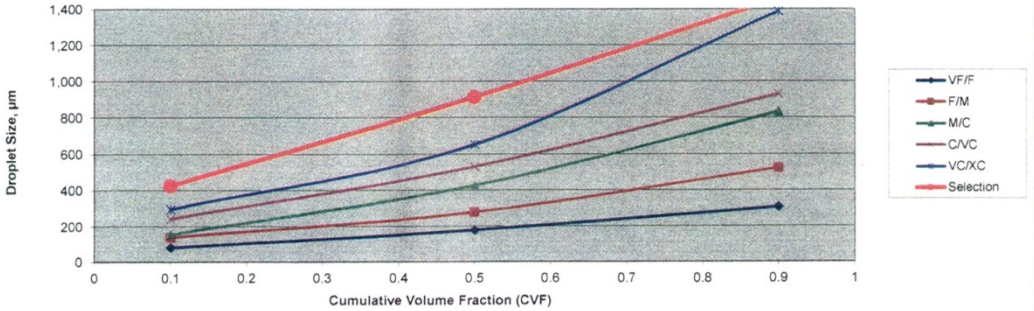
STEP 2: SELECT NOZZLE OPERATING PARAMETERS FROM PULLDOWN MENUS BELOW.

Acceptable Ranges:	Orifice Size	Nozzle Angle	Pressure	Airspeed
	4 to 12	0 to 20	20 to 60 psi	30 to 100 MPH
	7	15	20	45

CAUTION: Do not enter or clear data in the cells in this box!

$D_{V0.1}$ =	427 µm	= Droplet size such that 10% of the spray volume is in droplets smaller than $D_{V0.1}$.
$D_{V0.5}$ =	911 µm	= Volume median diameter
$D_{V0.9}$ =	1464 µm	= Droplet size such that 90% of the spray volume is in droplets smaller than $D_{V0.9}$.
RS =	1.14	= Relative Span
%V<100µm =	0.93 %	= Percentage of spray volume in droplets smaller than 100 µm diameter.
%V<200µm =	1.64 %	= Percentage of spray volume in droplets smaller than 200 µm diameter.
$DSC_{V0.1}$ =	EXT. COARSE	= Droplet Spectra Classification based on $D_{V0.1}$.
$DSC_{V0.5}$ =	EXT. COARSE	= Droplet Spectra Classification based on $D_{V0.5}$.
$DSC_{V0.9}$ =	MEDIUM	THE $D_{V0.9}$ CLASSIFICATION SHOWN IS FOR REFERENCE ONLY, DOES NOT IMPACT DSC RATING.
DSC =	EXT. COARSE	= ASABE S572.1 Droplet Spectra Classification

The Red Curve Shows Data for the Selected Nozzle Operation.
The Other Curves are for the ANSI/ASAE S572.1 MAR 2009 Reference Nozzles



Values and classification provided here are least-squares best estimate predictions from experimental data collected in a wind tunnel. Values reported from other laboratories may not yield the exact same values, but similar trends would be expected.
The ASAE droplet spectra classification category is based on droplet sizes in the mid-60% of the spectrum and not a single data point.

Legal Considerations

Neighbor Concerns

Relationships…

Relationships…

Relationships…

It's Coming
Read the Label
Know your Applicator