# Resources for Applicators

# Adjuvants Resource and Carrier Water Testing

# Adjuvant Review

## Surfactant

- Non-ionic
- Organo-silicone

## Emulsifier

- Crop Oil (COC)
- Methylated Seed Oil

## Conditioners

- Ammonium Sulfate (AMS)
- Other Acids
- pH Buffers

## Others

- Volatility Reduction Agent
- Antifoam
- Drift Reduction Agent

High Surfactant Oil

Combination Mixtures

**Table 1.** Adjuvant rate unit conversions between percent volume per volume, pints per 100 gallon, quarts per 100 gallon, and gallon per 100 gallon. Rate units are converted to pints per acre at a carrier volume of 5, 10, and 15 gallons per acre.

| % V/V[1] | pt/100gal[2] | qt/100gal[3] | gal/100gal[4] | pt/a – 5 GPA[5] | pt/a – 10 GPA[6] | pt/a – 15 GPA[7] |
|---|---|---|---|---|---|---|
| 0.125 | 1 | 0.5 | 0.125 | 0.05 | 0.1 | 0.15 |
| 0.25 | 2 | 1 | 0.25 | 0.1 | 0.2 | 0.3 |
| 0.5 | 4 | 2 | 0.5 | 0.2 | 0.4 | 0.6 |
| 1 | 8 | 4 | 1 | 0.4 | 0.8 | 1.2 |
| 1.5 | 12 | 6 | 1.5 | 0.6 | 1.2 | 1.8 |
| 2 | 16 | 8 | 2 | 0.8 | 1.6 | 2.4 |
| 2.5 | 20 | 10 | 2.5 | 1 | 2 | 3 |

Legleiter, Travis; Butts, Thomas (Tommy); Essman, Alyssa; Ikley, Joe; Lancaster, Sarah; Werle, Rodrigo. Adjuvants with Herbicides. When and Why They Are Needed. 2024. Crop Protection Network.

# Adjuvant Calculators

Lots of apps to choose from – What is your opinion on a good one?

- Mix Tank by Precision Laboratories
- Tank Mix Calculator by Farm Logic

Older Calculators

- Tank Mix App by DuPont
- Spray Calc by Illinois Extension

- Numerous Company/Product Line Specific Apps

https://www.corteva.com/ca-en/resources/tools-and-apps/volume-to-volume-calculator.html

# Testing Your Carrier Water

- Source water can vary:
  - In cations (calcium, magnesium, potassium, and others)
  - In anions (sulfate, nitrate, chloride)
  - In pH
- Our source water comes from rivers, lakes, and aquifers.
  - All have different chemistry
  - All processed by different treatments plants and using different processes
  - Well-water can have salts, ferrous iron, and lots of other stuff

And all of this can effect herbicides and adjuvants

# How to test

1. Collect with a clean plastic container
2. Let water run for a minute or two. Rinse container out in water.

   (For wells, let run for at least 10 minutes)
3. Collect about a pint of water
4. Label the bottle (your name, phone number, and where it came from)
5. Fill out any info sheet provided and mail to testing lab

   -> If not mailing right away, keep sample in refrigerator

From SDK Labs: Irrigation Quality Analysis
Calcium Chlorides Chlorides as Salt Electrical Conductivity Hardness, Total Magnesium SAR - Sodium Absorption Ratio Nitrate-Nitrogen pH Sodium Sodium-% Sulfates Total Dissolved Solids Irrigation Quality Rating

Ward Labs: Irrigation Water Quality
Bicarbonate, Boron, Calcium, Carbonate, Chloride, Magnesium, Nitrate, Potassium, Sodium, Sulfate, Total Hardness (CaCo3), Total Alkalinity (CaCo3), Sodium Adsorption Ratio (SAR), Electrical Conductivity, Adj. SAR, pH, Est. Total Dissolved Solids, Cation/Anion Balance

Iron add-on could be needed

# Questions....?

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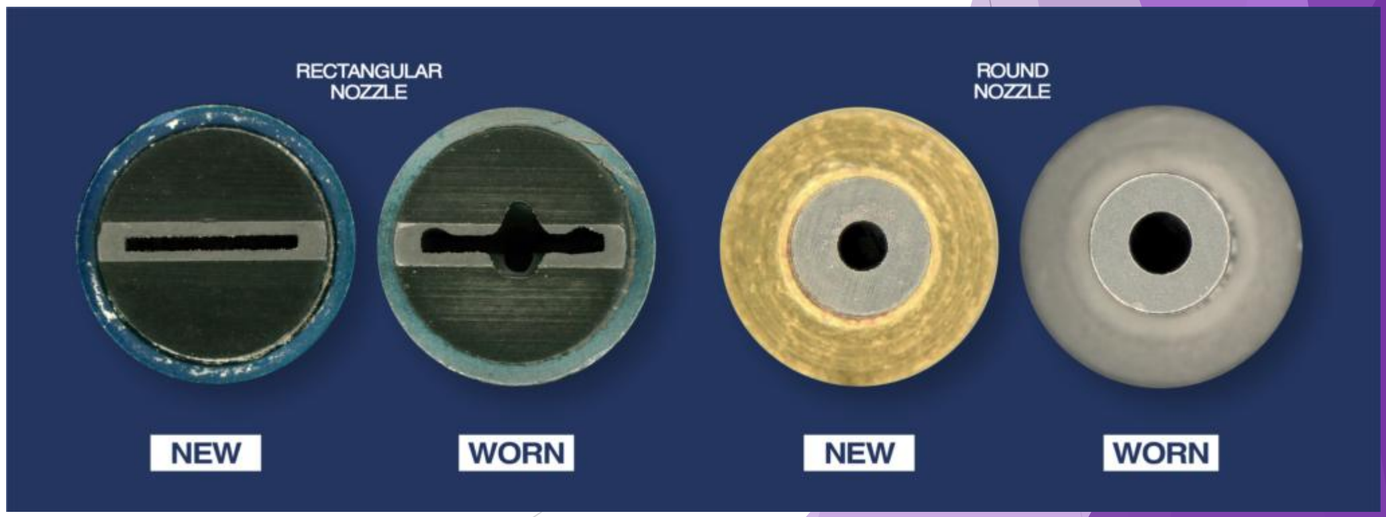
# Sprayer Calibration

Lonnie Mengarelli
Ag & Natural Resources Agent
Southwind Extension District

# WHY....?

- EFFICACY
  - Coverage
  - Carrier
- TIP WEAR
  - AMS
  - Herbicides
- MECHANICAL WEAR AND TEAR
- TECHNOLOGY *100%* ACCURATE?
- $$$$$$$$$$$!!!!!

| Weight of Solution (lb/gal) | Specific Gravity | Conversion Factor | 20gal/acre Adjustment |
|---|---|---|---|
| 7.0 | .84 | .92 | 18.4 |
| 8.0 | .96 | .98 | 19.6 |
| **8.4** | **1.00(water)** | **1.00** | **20** |
| 9.0 | 1.08 | 1.04 | 20.8 |
| 10 | 1.20 | 1.10 | 22 |
| **10.65** | **1.28(28% UAN)** | **1.13** | **22.6** |
| 11.0 | 1.32 | 1.15 | 23 |
| 12.0 | 1.44 | 1.20 | 24 |



# Boom Height

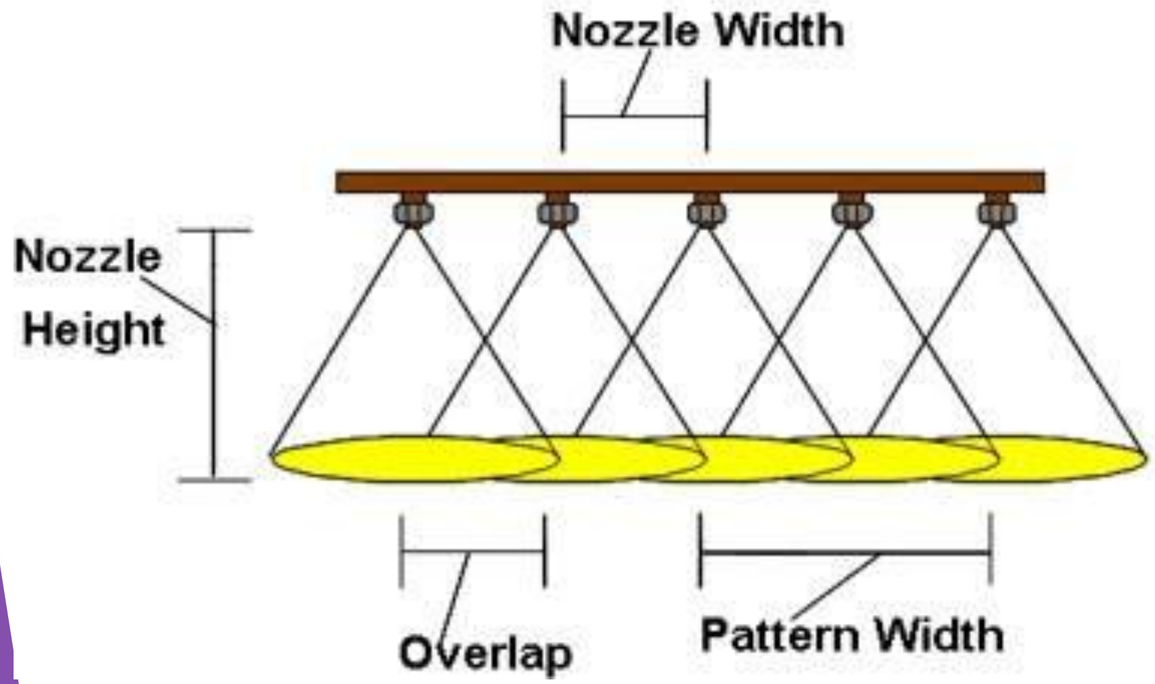
**Table 3.** Suggested minimum spray heights.

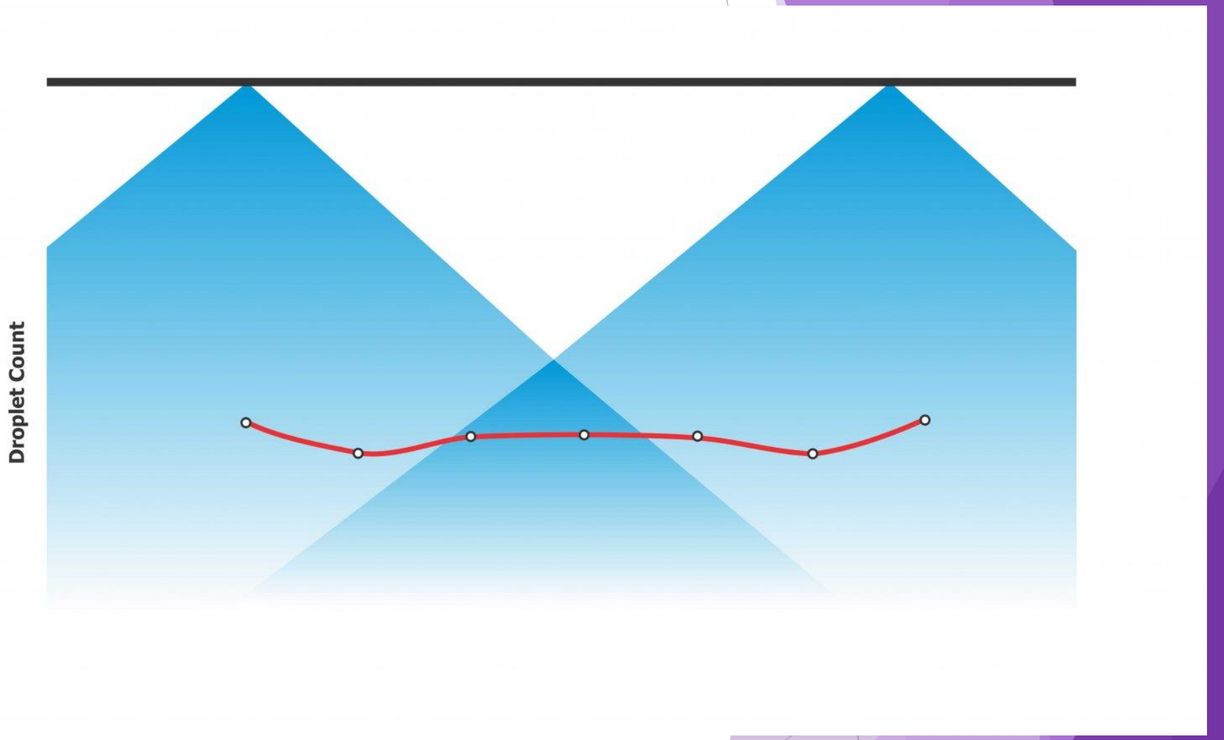
| | Nozzle spray angle | Nozzle height in inches to achieve proper overlap | | |
|---|---|---|---|---|
| | | 20-inch spacing | 30-inch spacing | 40-inch spacing |
| Narrow angle flat-fan* | 65 degrees | 22-24 i es | 33-35 inches | Not recommended |
| Common angle flat fan* | 80 degrees | 17-19 | 26-28 inches | Not recommended |
| Wide angle flat-fan* | 110 degrees | 16-18 inches | 20-22 inches | Not recommended |
| Flooding flat-fan ** | 120 degrees | 14-16 inches | 15-17 inches | 18-20 inches |

*50 to 60 percent overlap required to achieve uniform coverage

**100 percent overlap required to achieve uniform coverage

# Boom Height Cont.



# Math...

K-STATE
Research and Extension

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**Iola Office**
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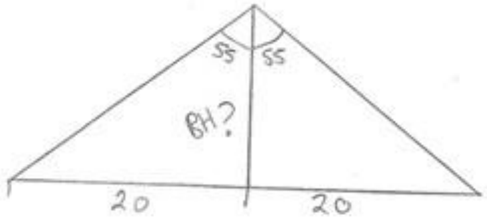
Fax: 620-365-7944

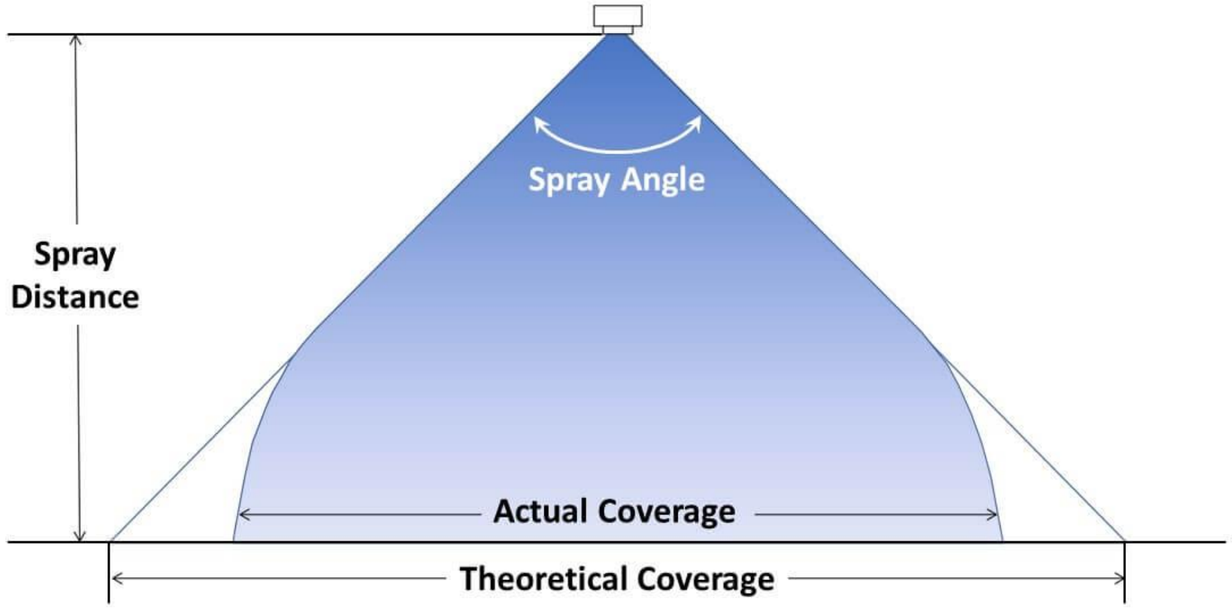
**Yates Center Office**
211 W. Butler St.
Yates Center, KS 66783
620-625-8620
Fax: 620-625-8645




$\text{Tan}(\ ) = \frac{O}{a}$

$BH = \frac{20_{in}}{\text{Tan}(55)}$

$BH = 14 \text{ inches}$



# WHEN….?

- PRE
- DURING
  - Weather
  - UAN
  - Equipment Wear
- POST?

# TERMINOLOGY & EQUATIONS

Key terms:

**gpa** = gallons per acre

**gpm** = output per nozzle in gallons per minute

**mph** = ground speed in miles per hour

**opm** = ounces per minute

**W** = effective width sprayed per nozzle in inches

**5,940** = a constant to convert measurement units

Equation 1: $gpa = \frac{gpm \times 5{,}940}{mph \times W}$

**Equation 2: $gpm = \frac{gpa \times mph \times W}{5{,}940}$**

**Equation 3: opm = gpm × 128**
**(1 gallon = 128 ounces)**

Equation 4: ml/min = opm x 29.6
(1 ounce = 29.6 milliliters)

Equation 5: $MPH = \frac{Distance(feet) \times 60}{Time(seconds) \times 88}$

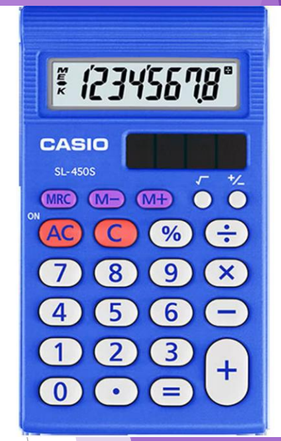
(1mph = 88ft per 60s)

**calibrating-boom-sprayers_MF2894.pdf**

# Equipment


Farm Safety
Always Wear
Protective Clothing
When Working With Chemical Sprays
Wide Brim Hat
Face Visor
Mask or Respirator
Long Sleeved Shirt
Chemical Resistant Apron
Nitrile Gloves
Rubber Boots plus Socks
Long Pants
PPE must be washed and dried after each day's use.
Change gloves and respirator per manufacturer's specifications.


ON/OFF
SPLIT RESET
FOXJTU
START STOP
STOPWATCH
YS-802C


CASIO
SL-450S


SpotOn
Sprayers101


SpotOn

# Steps to calibrate for basic Speed and Pressure System

1. Determine a comfortable speed.
    a. 4.5mph
2. Measure out a 100ft and time it.
    a. (100x60)/(4.5x88) = 15.15sec
3. Record engine rpm and gear
    a. 5400 JD is ii/3rd 1750rpm
4. Add water to tank and start with a psi in the middle of the range of the tip
    a. 30psi
5. Calculate GPM and OPM
    a. (20gpm x 4.5mph x 20in)/5940 = .30
    b. .30 x 128oz/gal = 38.4oz
    c. 38.4oz x 29.6ml/oz = 1,136.64ml

6. Turn on sprayer
7. Wait for even flow
8. Place container under nozzle completely and start timer at same time.
9. Remove container at 1min mark (or 30 seconds)
10. Read measurement (x2 if 30sec)
11. Increase/Decrease pressure if needed.
12. Repeat on multiple nozzles.

****With SpotOn Sprayer Calibrator You can omit steps 5b, 8, & 9

# Questions....?

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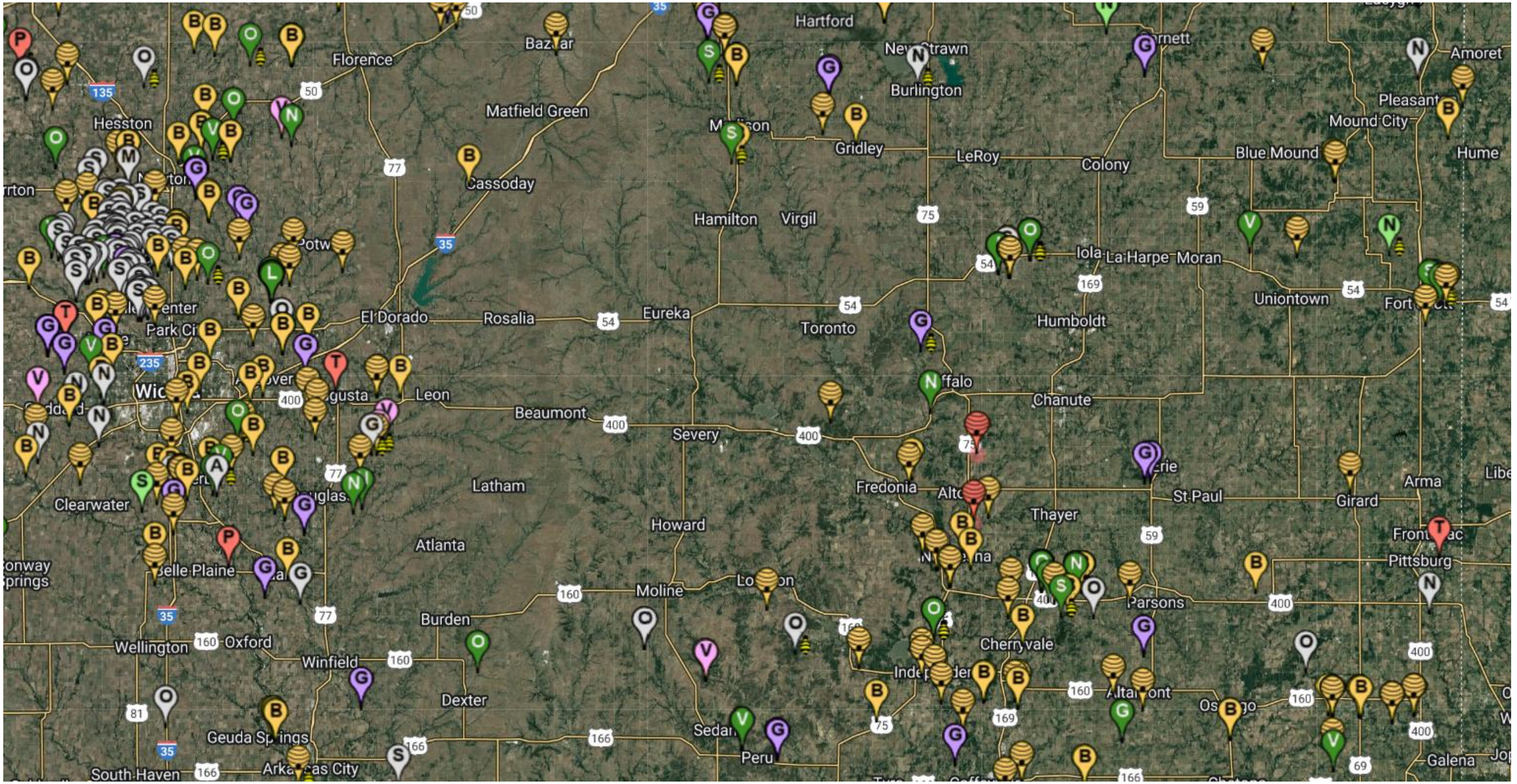
# Sensitive Crops Registry

Identify sensitive crop locations -> minimize the potential for drift

- Crop is grown for commercial purposes
- Legitimate source of income
- Crop is known to be sensitive
- Organic crops in certification program
- Request for publication

driftwatch™
Specialty Crop Site Registry
by FieldWatch


Florence
Matfield Green
Cassoday
Hesston
Hartford
Burlington
Gridley
LeRoy
Colony
Blue Mound
Mound City
Pleasant
Amoret
Hume
Hamilton
Virgil
Iola
La Harpe
Moran
Uniontown
Fort
El Dorado
Rosalia
Eureka
Toronto
Humboldt
Leon
Beaumont
Severy
Chanute
Fredonia
St Paul
Girard
Arma
Thayer
Clearwater
Latham
Howard
Atlanta
Belle Plaine
Moline
Burden
Parsons
Pittsburg
Cherryvale
Wellington
Oxford
Winfield
Dexter
Sedan
Peru
Geuda Springs
South Haven
Galena

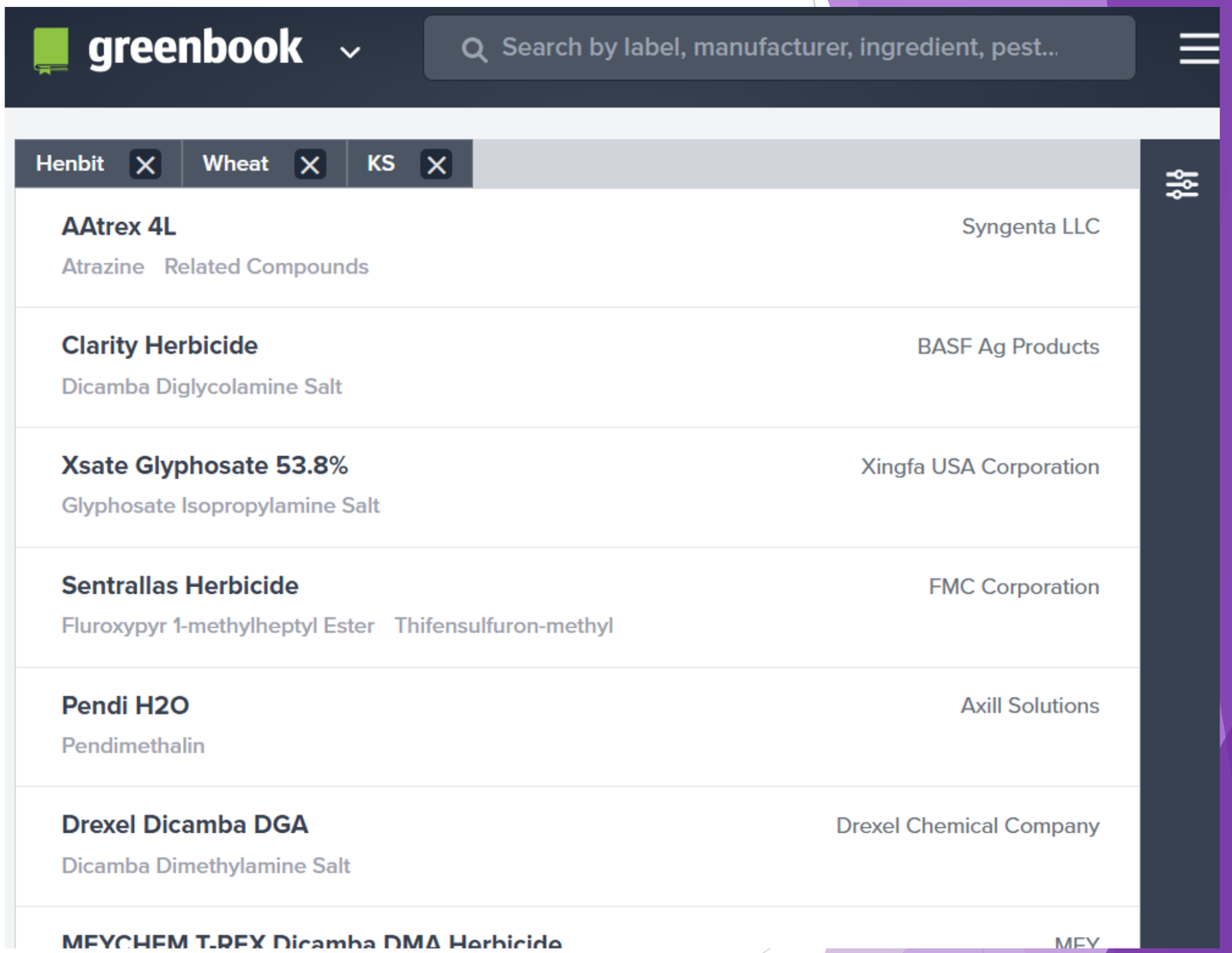
# ks.driftwatch.org/maps

# WSSA Pesticide Label Updates

- Standardized Table of Contents for any label over 4 pages
- More tables, less text
- Label highlights near the front
- Conversion table of product/acre relative to pounds active ingredient per acre
- List of individual crops, NOT crop groups
- Tables of pest efficacy by product rate (especially for pre-mixes)
- More defined tank-mix instructions
- Color coded Mode of Action box
- Consistent language
- Clear descriptions for endangered species

# Herbicide Resources

- www.greenbook.net
- Search with filters



# Herbicide Resources

- 2026 Chemical Weed Control
- Easy to read format
- Hard copies available!

## Herbicides for Brush and Trees on Rangeland

| Brush or tree | Formulated product/acre[1] | Herbicide and lb active ingredient needed/acre | Comments and limitations[2] |
|---|---|---|---|
| **FOLIAR APPLICATION** | | | |
| Buckbrush<br>Plum, sand and American<br>Smooth sumac | 1 to 2 qt<br>of 4 lb/gal<br>**2,4-D** | 2,4-D* amine, LVE, or mixed formulations (4)<br>1.0 to 2.0 | Apply to foliage in spring when brush is nearing full-leaf stage and growing actively. Repeat applications may be necessary in following years. Normal treatment time: buckbrush (May 1-15), sand plum (May 20-June 10), and sumac (June 10-25). |
| | 1 to 2 qt<br>**Grazon P+D** | Picloram (4) + 2,4-D (4)<br>0.135 to 0.27 +<br>0.5 to 1.0 | A restricted-use pesticide. Apply according to label directions. Follow directions, grazing limitations, and precautions on label. |
| | 1 gal<br>**Grazon P+D** +<br>1 to 2 pt<br>**Remedy Ultra**<br>or 1.5 to 3 pt<br>**Trycera** in 100 gal water | [Picloram (4) + 2,4-D (4)] + Triclopyr (4)<br>[0.54 + 2.0] +<br>0.50 to 1.0 | A restricted-use pesticide. Apply according to label directions. Follow directions, grazing limitations, and precautions on label. |
| Blackberry<br>Roughleaf dogwood | 16 fl oz + 16 fl oz<br>**DuraCor +**<br>**Remedy Ultra** | [Aminopyralid (4) + Florpyrauxifen (4)] + Triclopyr (4)<br>[0.08 + 0.008] + 0.52 | Apply once leaves have fully expanded in late spring. Applications can be made into mid-September as long as leaves are healthy and green. |

# Questions....?

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