OSU Non-Crop Veg Mgt. Course
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Intro to Adjuvants & Water Quality And How They Affect Performance
Adjuvants/Surfactants

Why Are They Needed...
What Do They Do...
How Are They Different...
Adjuvant

• An adjuvant is a material added to a mixture to aid or modify the action of an agrichemical, or alter the physical characteristics of the mixture.

ASTM Definition
Adjuvant Types

- Spreaders
- Spreaders + AMS
- Spreader-Activators
- Penetrator-Activator
- Spreader-Stickers
- Sticker-Extenders
- Silicones
- Crop Oil Concentrates
- High Surfactant Oil Concentrate
- Modified Seed Oils
- Modified Seed Oil + Organosilicone Blend
- Modified Seed Oil + Nitrogen
- Acidifier/Buffers
- Alkaline/Buffers
- Water Conditioners
- Deposition and Drift Management

Ideas to Grow With®
Adjuvant Selection Factors

- Consider all factors and your experiences to make the proper adjuvant choice.

Proper Choice

- Contact, translaminar, systemic
- Water hardness, pH & solubility
- Grass, Broadleaf
- Hot & Dry
- Cool & Humid
- Ground, aerial air blast, chemigation backpack
- Equipment
- Weather
- Social/Political Concerns
- Drift Off-Target
- Crop Leaf Structure
- Target Leaf Structure
- Target or Pest
- Water Quality
- Miscellaneous
Surfactants

• Surfactant is a word derived from the term “surface-active agent." Surfactants are adjuvants that reduce the surface tension of water or increases its wettability. They aid the emulsifying, spreading, wetting or other surface-modifying properties of liquids.

**ASTM Definition**
Surfactant Types

**ANIONIC** - surfactant that has a negative (-) charge and **limited compatibility**.

**CATIONIC** - surfactant that has a positive (+) charge and **limited compatibility**.

**NON-IONIC** - surfactant that has no electrical charge and is generally **compatible with all pesticides**.
Functions of a High Quality Surfactant

- Good surfactant activities
- Increases spreading
- Reduces surface tension
- Solubilizes spray materials
- Improves retention
- Improves penetration

Better spray material PERFORMANCE!
Surfactants

• For Herbicide, Fungicide and Insecticide Enhancement

• Surfactants work to increase the spreading of spray material over the leaf surface.

• Surfactants work to improve coverage and increase adhesion of the spray material to the plant surface.
Spray Droplet Without Surfactant

- Surface tension of water is 72 dynes/cm
- Droplets sit on leaf hairs or leaf surface
- Little leaf contact
- Reduced spray activity
Surfactant Effects

- Surfactant reduces surface tension to 20-40 dynes/cm.
- Droplets spread over leaf, penetrate hairy surface
- Increased leaf contact
- Increased spray activity
Japanese Maple with and without ProNatural® Spreader-Sticker

With Surfactant

Without Surfactant
Key Factors in Surfactant Selection

• Key factors to consider when choosing surfactants for use with herbicides, fungicides and insecticides:
  – Water quality
  – Weather conditions
  – Leaf surface
  – Mode of action of spray material
    • Contact
    • Translaminar
    • Systemic
Surfactants

• For post emergence herbicide enhancement
• Surfactant works to increase the amount of herbicide reaching the targeted site of action
• Plant protective mechanisms must be overcome:
  – Wax barrier of leaf surface
  – Cuticle
  – Cuticle hairs
  – Leaf angles
Common Mullein
Hairs, trichomes, and glands
Differences Between Spreaders, Spreader-Activators and Penetrator-Spreader-Activators

• **Spreader** – reduces the surface tension and increase the surface area covered by the pesticide.

• **Spreader-Activator** – reduces surface tension, increases the surface area covered and **moves** pesticide around, under and into the water channels of the leaf.

• **Penetrator-Spreader-Activator** – Lifts and dissolves the wax on the leaf surface allowing the pesticide to enter the leaf.
Penetration vs Coating

- **Hasten®** is an Modified Seed Oil (MSO)
  - Very high KB value
  - Exceptional *penetration*

- **R-11®** is a nonionic surfactant (NIS)
  - Spreader-Activator

- **Mor-Act®** is a Crop Oil Concentrate (COC)
  - Coats versus penetrate
Where do you want the product?

- Do want to spread and coat the outside of the leaf/plant?
- Do you want the product inside the leaf, so it can move throughout the leaf and entire plant?
  - Is it a **Contact** product?
  - Is it a **Translaminar** product?
  - Is it a **Systemic** product?
Super Spread™ MSO  R-11®  Mor-Act® 0 Minutes
Super Spread™ MSO  R-11®  Mor-Act®

0 Minutes
Super Spread™ MSO  
R-11®  
Mor-Act®

45 Minutes
Functions of a High Quality Surfactant

Reduces surface tension

Solubilizes spray materials

Increases spreading

Improves retention

Improves penetration

Better spray material PERFORMANCE!
Water Quality
It All Starts With The...

Water....
Why Is Water Important?

- Water is the carrier for 98% of all pesticides sprayed.

- Once you put pesticides into bad water, the damage is done and can't be reversed.
When Do You Treat?

- If you are conditioning your water for;
  - pH adjustment
    - up
    - down
  - water hardness

YOU MUST

Treat the water before adding any pesticide to the spray water !!!!
What Are The Problems?

- **pH Sensitivity**
  - Certain spray materials break down if spray water is either too **BASIC** (high pH) or **ACIDIC** (low pH).

- **Solubility of Pesticides**
  - Some pesticides increase in solubility as the spray water pH increases.

- **Mineral Antagonism**
  - Water Hardness (dissolved minerals) directly interfere with a broad range of spray materials.
    - Calcium
    - Magnesium
    - Iron
    - Sodium
What Is Your Spray Water pH?
pH of 5 - 6.5 is generally the optimum for most spray solutions.

- pH above 7 is considered basic.
- pH below 7 is considered acidic.
pH Sensitivity

- Generally, the ideal pH for water used in applying spray materials is slightly acidic (pH 5 to 6.5) but some exceptions exist. Read Labels.

- Sulfonylureas such as Ally®, Escort®, Amber®, Harmony®Extra, Express® and Accent® begin to degrade when left in spray solution that is below pH 7.

- Some herbicides, insecticides and fungicides, such as Topsin®, Captan™ & Imidan® break down in basic (pH above 7) ALKALINE HYDROLYSIS.
# Effects of pH on Imidan Half Life

<table>
<thead>
<tr>
<th>pH</th>
<th>Half Life</th>
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<tbody>
<tr>
<td>5.0</td>
<td>178 hours</td>
</tr>
<tr>
<td>5.5</td>
<td>92 hours</td>
</tr>
<tr>
<td>6.0</td>
<td>36 hours</td>
</tr>
<tr>
<td>6.5</td>
<td>14 hours</td>
</tr>
<tr>
<td>7.0</td>
<td>10 hours</td>
</tr>
<tr>
<td>7.5</td>
<td>2 hours</td>
</tr>
<tr>
<td>8.2</td>
<td>33 minutes</td>
</tr>
</tbody>
</table>

Effects of Field-Aged Residues on Efficacy J. Brunner, WSU. 1996.

From field studies conducted for Gowan Company
Maximum Performance

- To **maximize** the performance of **GLYPHOSATE** the spray water pH needs to be below a pH of **6.0**
Solubility vs Spray Water pH

• As the **spray water pH increases** some **products increase in solubility**.

• As solubility increases, **it increases the bioavailability of active ingredient for better and more consistent efficacy**.
# pH Sensitivity

## Spray Material SOLUBILITY Chart 2006

Adjusting the pH of the spray solution can increase spray material solubility in the spray tank solution and make the spray more effective.

The following chart shows spray material solubility as indicated by the HERBICIDE HANDBOOK Eight Edition 2002.

<table>
<thead>
<tr>
<th>Spray Material Product</th>
<th>Spray Material Chemistry</th>
<th>Optimum Solubility pH</th>
<th>3.0</th>
<th>4.0</th>
<th>5.0</th>
<th>6.0</th>
<th>7.0</th>
<th>Neutral</th>
<th>8.0</th>
<th>9.0</th>
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<tbody>
<tr>
<td>Accent (R) Gold</td>
<td>nicosulfuron+rimsulfuron+flumetsulam+clopyralid</td>
<td>Acidic</td>
<td>360 ppm</td>
<td>12,200 ppm</td>
<td>39,000 ppm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accent®</td>
<td>nicosulfuron</td>
<td>Acidic</td>
<td>360 ppm</td>
<td>12,200 ppm</td>
<td>39,000 ppm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Achieve®</td>
<td>tralkoxydim</td>
<td>Acidic</td>
<td>6 ppm</td>
<td>6.7 ppm</td>
<td>9,800 ppm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ally(R) Extra</td>
<td>metsulfuron+thiofensulfuron+tribenuron</td>
<td>Acidic</td>
<td>548 ppm</td>
<td>2,790 ppm</td>
<td>213,000 ppm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ally® Escort®</td>
<td>metsulfuron</td>
<td>Acidic</td>
<td>548 ppm</td>
<td>2,790 ppm</td>
<td>213,000 ppm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amber®</td>
<td>triasulfuron</td>
<td>Acidic</td>
<td>32 ppm</td>
<td>5,815 ppm</td>
<td>13,500 ppm</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Basis®</td>
<td>nicosulfuron+trifensulfuron</td>
<td>Acidic</td>
<td>223 ppm</td>
<td>2,240 ppm</td>
<td>8,830 ppm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basis® Gold</td>
<td>rimsulfuron+trifensulfuron+atrazine</td>
<td>Acidic</td>
<td>223 ppm</td>
<td>2,240 ppm</td>
<td>8,830 ppm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beacon®</td>
<td>primisulfuron</td>
<td>Acidic</td>
<td>&gt;8.0 ppm</td>
<td>2,000 ppm</td>
<td>15,000 ppm</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Callisto®</td>
<td>mesotrione</td>
<td>Acidic</td>
<td>3.3 ppm</td>
<td>243 ppm</td>
<td>5,280 ppm</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Canopy® Ex</td>
<td>chlorimuron ethyl+tribenuron</td>
<td>Acidic</td>
<td>11 ppm</td>
<td>450 ppm</td>
<td>1,200 ppm</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Canopy® Sp</td>
<td>chlorimuron ethyl+sulfentrazole</td>
<td>Acidic</td>
<td>&gt;7.0 ppm</td>
<td>1,200 ppm</td>
<td>18,300 ppm</td>
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<td></td>
<td></td>
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<td></td>
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<tr>
<td>Canopy® XL</td>
<td>chlorimuron+metribuzin</td>
<td>Acidic</td>
<td>&gt;7.0 ppm</td>
<td>1,200 ppm</td>
<td>18,300 ppm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cimarron®</td>
<td>metsulfuron</td>
<td>Acidic</td>
<td>548 ppm</td>
<td>2,790 ppm</td>
<td>213,000 ppm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cimarron® Max</td>
<td>metsulfuron+chloxsulfuron</td>
<td>Acidic</td>
<td>548 ppm</td>
<td>2,790 ppm</td>
<td>213,000 ppm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cimarron® Xtra</td>
<td>metsulfuron+weedmaster</td>
<td>Acidic</td>
<td>548 ppm</td>
<td>2,790 ppm</td>
<td>213,000 ppm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clarion®</td>
<td>nicosulfuron+rimsulfuron</td>
<td>Acidic</td>
<td>360 ppm</td>
<td>12,200 ppm</td>
<td>39,000 ppm</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Classic®</td>
<td>chlorimuron</td>
<td>Acidic</td>
<td>&gt;7.0 ppm</td>
<td>1,200 ppm</td>
<td>18,300 ppm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distinct®</td>
<td>diflufenzopyr</td>
<td>Acidic</td>
<td>63 ppm</td>
<td>5,850 ppm</td>
<td>10,546 ppm</td>
<td></td>
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</tr>
</tbody>
</table>

Weed Science Society of America 2002
Nicosulfuron WDG

*(Accent)*

Nicosulfuron WDG + pH Adjuster

*(Accent)*

Granule/particle formulation

Dispersion

Nicosulfuron WDG

*(Accent)*

Nicosulfuron WDG + pH Adjuster

*(Accent)*

Dr. Jerry Green, DuPont
<table>
<thead>
<tr>
<th></th>
<th>pH 5.0</th>
<th>pH 7.0</th>
<th>pH 9.0</th>
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</thead>
<tbody>
<tr>
<td><strong>Maverick</strong></td>
<td>18 ppm</td>
<td>1,627 ppm</td>
<td>482 ppm</td>
</tr>
<tr>
<td><strong>Amber</strong></td>
<td>32 ppm</td>
<td>815 ppm</td>
<td>13,500 ppm</td>
</tr>
<tr>
<td><strong>Peak</strong></td>
<td>30 ppm</td>
<td>3,580 ppm</td>
<td>n/a</td>
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<tr>
<td><strong>Glean</strong></td>
<td>587 ppm</td>
<td>31,800 ppm</td>
<td>n/a</td>
</tr>
<tr>
<td><strong>Finesse</strong></td>
<td>587 ppm</td>
<td>31,800 ppm</td>
<td>n/a</td>
</tr>
<tr>
<td><strong>(Glean + Ally)</strong></td>
<td>548 ppm</td>
<td>2,790 ppm</td>
<td>213,000 ppm</td>
</tr>
<tr>
<td><strong>Ally</strong></td>
<td>548 ppm</td>
<td>2,790 ppm</td>
<td>213,000 ppm</td>
</tr>
<tr>
<td><strong>Express</strong></td>
<td>48 ppm</td>
<td>2,040 ppm</td>
<td>18,300 ppm</td>
</tr>
<tr>
<td><strong>Harmony Extra</strong></td>
<td>223 ppm</td>
<td>2,240 ppm</td>
<td>8,830 ppm</td>
</tr>
<tr>
<td><strong>(Harmony GT + Express)</strong></td>
<td>48 ppm</td>
<td>2,040 ppm</td>
<td>18,300 ppm</td>
</tr>
<tr>
<td><strong>Harmony GT</strong></td>
<td>223 ppm</td>
<td>2,240 ppm</td>
<td>8,830 ppm</td>
</tr>
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</table>
# Spray Solution pH vs Solubility

<table>
<thead>
<tr>
<th></th>
<th>pH 5.0</th>
<th>pH 7.0</th>
<th>pH 9.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Olympus</td>
<td>2,900 ppm (pH 4.0)</td>
<td>42,000 ppm</td>
<td>42,000 ppm</td>
</tr>
<tr>
<td>Osprey</td>
<td>7 ppm</td>
<td>483 ppm</td>
<td>15,390 ppm</td>
</tr>
<tr>
<td>Everest</td>
<td>3,000 ppm</td>
<td>44,000 ppm</td>
<td>44,000 ppm</td>
</tr>
<tr>
<td>Rave</td>
<td>32 ppm</td>
<td>5,815 ppm</td>
<td>13,500 ppm</td>
</tr>
<tr>
<td>Ally Extra</td>
<td>548 ppm</td>
<td>2,790 ppm</td>
<td>213,000 ppm</td>
</tr>
<tr>
<td>Achieve</td>
<td>6 ppm</td>
<td>7 ppm</td>
<td>9,800 ppm</td>
</tr>
<tr>
<td>UpBeet</td>
<td>3 ppm</td>
<td>110 ppm</td>
<td>11,000 ppm</td>
</tr>
<tr>
<td>Poast</td>
<td>257 ppm</td>
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<td>Beacon</td>
<td>3 ppm</td>
<td>243 ppm</td>
<td>5,280 ppm</td>
</tr>
<tr>
<td></td>
<td>pH 5.0</td>
<td>pH 7.0</td>
<td>pH 9.0</td>
</tr>
<tr>
<td>----------------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td><strong>Cimarron</strong></td>
<td>548 ppm</td>
<td>2,790 ppm</td>
<td>213,000 ppm</td>
</tr>
<tr>
<td><strong>Cimarron Max</strong></td>
<td>548 ppm</td>
<td>2,790 ppm</td>
<td>213,000 ppm</td>
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<tr>
<td><strong>Cimarron Xtra</strong></td>
<td>548 ppm</td>
<td>2,790 ppm</td>
<td>213,000 ppm</td>
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<tr>
<td><strong>Outrider</strong></td>
<td>18 ppm</td>
<td>1,627 ppm</td>
<td>482 ppm</td>
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<tr>
<td><strong>OverDrive</strong></td>
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<td>5,850 ppm</td>
<td>10,550 ppm</td>
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<td><strong>Manage</strong></td>
<td>15 ppm</td>
<td>1,630 ppm</td>
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<td><strong>Patriot</strong></td>
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<td>213,000 ppm</td>
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## Spray Solution pH vs Solubility

<table>
<thead>
<tr>
<th></th>
<th>pH 5.0</th>
<th>pH 7.0</th>
<th>pH 9.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distinct</td>
<td>63 ppm</td>
<td>5,850 ppm</td>
<td>10,550 ppm</td>
</tr>
<tr>
<td>Callisto</td>
<td>2,000 ppm</td>
<td>15,000 ppm</td>
<td>22,000 ppm</td>
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<tr>
<td>Option</td>
<td>37 ppm</td>
<td>3,293 ppm</td>
<td>94,577 ppm</td>
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<tr>
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<td>360 ppm</td>
<td>12,200 ppm</td>
<td>39,000 ppm</td>
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<tr>
<td>Basis</td>
<td>360 ppm</td>
<td>12,200 ppm</td>
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<td>Clarion</td>
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<td>Steadfast</td>
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<td>39,000 ppm</td>
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<td>Steadfast ATZ</td>
<td>360 ppm</td>
<td>12,200 ppm</td>
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<tr>
<td>Matrix</td>
<td>135 ppm</td>
<td>7,300 ppm</td>
<td>5,560 ppm</td>
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## Spray Solution pH vs Solubility

<table>
<thead>
<tr>
<th>Product</th>
<th>pH 5.0</th>
<th>pH 7.0</th>
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<tbody>
<tr>
<td>Oust</td>
<td>10 ppm</td>
<td>300 ppm</td>
<td>n/a</td>
</tr>
<tr>
<td>Telar</td>
<td>587 ppm</td>
<td>31,800 ppm</td>
<td>n/a</td>
</tr>
<tr>
<td>Escort</td>
<td>548 ppm</td>
<td>2,790 ppm</td>
<td>213,000 ppm</td>
</tr>
<tr>
<td>Landmark (Oust + Telar)</td>
<td>10 ppm</td>
<td>300 ppm</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td>587 ppm</td>
<td>31,800 ppm</td>
<td>n/a</td>
</tr>
<tr>
<td>Weststar</td>
<td>10 ppm</td>
<td>300 ppm</td>
<td>n/a</td>
</tr>
<tr>
<td>Oust Extra (Oust + Escort)</td>
<td>10 ppm</td>
<td>300 ppm</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td>548 ppm</td>
<td>2,790 ppm</td>
<td>213,000 ppm</td>
</tr>
</tbody>
</table>

What Is Your Spray Water Hardness?
Mineral Antagonism

- Water hardness (dissolved minerals) directly interfere with a broad range of spray materials.
Mineral Antagonism

Calcium [Ca++]
Magnesium [Mg++]
Iron [Fe++]
Sodium [Na+]
Mineral Antagonism

- **Dissolved minerals** specifically interfere with the performance of some herbicides such as: 
  - Glyphosate, Achieve®, Poast®, Pursuit®, Raptor®, Beyond®, Select®, Dicamba, Liberty®, Rely®, 2,4-D Amine and MCPA Amine.

  2,4-D is completely deactivated at **500 ppm** water hardness.

  Glyphosate less effective noticeably as low as **150 ppm** hardness.
Hardness Levels

0 - 125 – Yellow
126 - 250 – Red
251 - 375 – Turquoise
375 - 500 – Blue
501 - 625 – Green
626 - 750 – Purple
751 - 875 – Black
876 - 1000 – White

Washington State Water Hardness Map 11/8/07
Addition of Ammonium Sulfate...Why?

The Sulfate ion "blocks" the mineral cation.

The Ammonium ions attach and "escort" the glyphosate into the plant.
Mineral Antagonism
Time of Application | 85° F
Evaporation of Spray Droplet
Effects on Salt Concentration

Time of Application:  Hardness = 100 ppm = Low
7.5 % Glyphosate antagonism
50% Evaporation: Hardness = 200 ppm = Low
15% Glyphosate antagonism
Mineral Antagonism

4 Minutes Post-Application | Note Formation of Salt Deposits
90% Evaporation: Hardness = 900 ppm = **Extremely High**

67.7 % Glyphosate antagonism
Why Add Ammonium Sulfate to Your Spray Water...

University of Idaho
June 16, 2005

Check

Buccaneer™ 4 oz/ac

1100 PPM Water Hardness

Buccaneer™ 4 oz/ac + Bronc Plus Dry EDT 10 #/100
University of Idaho Trials 2005 - Dr. Donn Thill
Using sub-lethal rates of Buccaneer™ - Water Hardness of 1100 ppm
Water Hardness Test Strips
Wilbur-Ellis
Water Quality
Hardness Test Strip

Water Quality Test Strip for Hardness
www.kinetico.com
Use immediately after opening.

Pass test strip under a stream of water for 1 second, remove. Shake off excess water. **Wait 15 seconds.** Compare color change on test pad to color chart.

<table>
<thead>
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<th>ppm (gpg)</th>
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<tr>
<td>0 (0)</td>
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<td>50 (3)</td>
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<td>120 (7)</td>
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Soft → Hard → Very Hard

Open here.
Herbicides That May Be Susceptible To Hard Water Tie Up

- 2,4-D (amine)
- 2,4-DB (amine)
- MCPA (amine, WIL-POWER®, Vengeance® Plus)
- Dichlorprop (amine)
- Mecoprop (amine)
- Dicamba (Banvel®, Clarity®, Vanquish®)
- Picloram (Tordon®)
- Triclopyr (Garlon®, Crossbow™, WIL-POWER®, Vengeance® Plus)
- Clopyralid (Stinger®, Curtail®, Curtail® M, Transline®, Lontrel®, Confront®, Redeem®, WideMatch™)
- Aminopyralid (Milestone™)

- Quinclorac (Facet®)
- Sethoxydim (Poast®)
- Clethodim (Select®, Select Max™, Envoy®, Volunteer™)
- Tralkoxydim (Achieve®)
- Imazamethbenz (Assert®)
- Imazapyr (Arsenal®, Chopper®, Sahara®, Stalker®, Habitat®)
- Imazaquin (Scepter®)
- Imazamox (Raptor®, Beyond®, ClearCast™)
- Imazethapyr (Pursuit®)
- Glufosinate (Liberty®, Rely®, Ignite®, Finale)
- Glyphosate (Roundup®, Touchdown®)

Revised 2/19/07
How Many Different Places Do You Get Water From???

They are not all the same......
Your Water Can Change

Hardness and pH can change during the spray season depending on your water source.

Is your water source from a municipal source or from a well?

Municipal water doesn’t mean that you have good water. They don’t adjust pH or hardness.

As well depths and aquifers change so does the water quality.

Water should be checked.
  • At start of spray season
  • Mid summer
  • Late fall
One More Reason We Use Adjuvants……..

Drift and DRT...Drift Reduction Technology
“Target on our back”

- The general public is uninformed/uneducated upon the knowledge of our industry

- Society is basing their decisions off of an “emotional feeling” rather than “facts”

- We have to EDUCATE, and be PRO-ACTIVE
Drift

• Oust® (herbicide) damage in Idaho 2000
  – BLM had 17,000 acres sprayed after a burn to control cheat grass
  – Made the application in the Fall of 1999.
  – There wasn’t adequate rainfall in late fall and winter to incorporate.
  – Spring of 2000 very windy. Oust damage was found downwind 15-20 miles.
  – $95 million in crop damage
Drift

- **Manzate® 200 (fungicide) on Alfalfa**
  - Applicator was spraying potatoes and the product drifted across road and onto the alfalfa.
  - There was no visual damage on alfalfa
  - There was no tolerance for alfalfa and the crop was not saleable.
  - The applicator bought the crop.

- **Organic Dill crop (insecticide)**
  - WFS/CPS in 2006 sprayed chlorpyrifos and diazinon on a field with no problems.
  - An organic dill field close by was rejected because of insecticides.
  - Even though the CPS application was good they are found at fault. Appellate court upholds $1 million in damages from volatilization (fog).
DRIFT REDUCTION TECHNOLOGY: INPLACE
Encapsulation Demo

IN-PLACE
Encapsulation of Trifluralin + Water

Trifluralin + Water
Questions??

Thank You!!!

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