ADJUVANTS AND WEED CONTROL

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Adjuvant

- A substance added to the formulation or the spray tank in order to modify herbicide activity or application characteristics
Adjuvants

• A substance that is added to the formulation or the spray tank in order to modify herbicide activity or application characteristics

  • Utility
    • Do not affect weed control
    • Modify application characteristics
    • Example: Drift reduction agent, defoamer

  • Activator
    • Improve herbicide effectiveness
    • Modify spray characteristics
    • Example: Nonionic surfactant, crop oil concentrate
Why adjuvants are needed

• Spray droplets must stay on the leaf surface

• Leaf surfaces repel water

• Herbicides must be dissolved to be absorbed

• Many herbicides are weak acids – they change in response to pH
Adjuvants DO NOT have herbicidal activity when applied alone
Factors affecting activator adjuvant selection

- Herbicide chemistry
- Water chemistry
- Weed characteristics
- Concern for crop response
- Environment
What is a quality adjuvant?

- Adjuvants do not require the same testing as herbicides

- Council of Producers and Distributors of Technology
  - Adjuvants and Inerts Committee formed 1993

- CPDA certified adjuvants
  - Meet functionality claims indicated on the label
  - Meet EPA regulations for food safety
  - Meet OSHA human health requirements

- CPDA.com
Surfactants

- Improve dispersal, spreading, wetting, or other properties of a liquid by modifying surface characteristics

<table>
<thead>
<tr>
<th>Surfactant concentration</th>
<th>Weed Control</th>
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</thead>
<tbody>
<tr>
<td>0%</td>
<td>45%</td>
</tr>
<tr>
<td>0.12%</td>
<td>60%</td>
</tr>
<tr>
<td>0.25%</td>
<td>85%</td>
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<tr>
<td>0.50%</td>
<td>98%</td>
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</tbody>
</table>

https://crops.extension.iastate.edu/encyclopedia/role-spray-adjuvants-postemergence-herbicides
Oils

- Soften waxes in cuticle

- Potential for increased crop injury

- Little research on mechanisms of action

Tan et al, 2005
AMS Alters pH

- AMS decreases pH of leaf surface
- Weak acid herbicides more lipophilic at low pH

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AMS inactivates Water impurities

- Presence of cations (hard water) or particulate matter can reduce herbicide effectiveness:
  - May cause active ingredient to precipitate out of spray solution, reducing quantity available for plant uptake
  - May bind with herbicide, slowing rate of absorption by plant
Jar test for physical incompatibility

- Start with 1 pint of carrier in a 1-quart jar
  - Use the same water source

- Add products according to ratio and order you will use in spray tank
  - 1 pt product = 0.5 t (2.5 mL), 1 lb product = 1.5 t

- Cap the jar and invert to mix. Let stand for 30 min

- Observe
  - Did the mixture separate, thicken, or precipitate?
  - Did the reaction produce heat?
Tank mix order

• W – Wetables
• A – Agitation
• L – Liquids
• E – Emulsifiable concentrates
• S - Surfactants

It’s not so simple any more...