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2019 Pesticide Safety - Adjuvants

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ADJUVANTS

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PESTICIDE SAFETY MEETING, APRIL 25, 2019
• Terminology
• What adjuvants do
• What we use
ADJUVANTS

ANY PRODUCT ADDED TO PESTICIDES TO IMPROVE PERFORMANCE

LOTS of types; LOTS of categories
“Other” Ingredients in Pesticide Formulations

- Adjuvants are ingredients that modify and enhance the performance of pesticides.
- Act as solvent, carrier, emulsifier, spreader, and drift control.
- Surfactants are another major “other” ingredient.
SHOULD YOU USE AN ADJUVANT??

FAILING TO CORRECTLY USE AN ADJUVANT ACCORDING TO LABEL IS AS MUCH A VIOLATION AS INAPPROPRIATE USE OF PESTICIDE
### SPRAY APPLICATION PROBLEMS

- Pesticide stability
- Solubility
- Incompatibility
- Suspension
- Foaming
- Evaporation

- **Surface Tension**
- **Coverage**
- **Penetration**
- **Adherence**
- **Drift**
- **Degradation**

- Pesticide stability
- Solubility
- Incompatibility
- Suspension
- Foaming
- Evaporation
ADJUVANTS....

- Are designed to combat these issues
- But, cannot single-handedly perform all these functions
- May need to combine different adjuvants to get the job done
• **EMULSIFIERS**: Used w/oil-based products to improve mixing

• **SPREADERS**: Improve distribution on target

• **STICKERS (~THICKENERS)**: Help resist rain, run-off, evaporation

• **THICKENERS**: Reduce drift

  Spreader-stickers are general-use products that include wetting agent and adhesive.
SPRAY ACTIVATORS

- **COC:** PENETRANTS FOR HERBICIDES
- **NIS:** BREAK WATER TENSION; SPREADER
- **OILS:** SMOOTHER INSECTS, SHATTER CHITIN, DISSOLVE WAX /CUTICLE
- **METHYLATED SEED OIL (MSO):** AGGRESSIVE PENETRANT
- **AMMONIUM SULFATE:** SOFTENS WATER

Enhance biological activity
SURFACTANT

ANY MATERIAL ADDED TO PESTICIDE FORMULATION DESIGNED TO MODIFY OR REDUCE SURFACE TENSION

SURFACTANT IS SHORT-HAND FOR:

SURFACE ACTIVE AGENT
SURFACTANTS

• MAY ALSO BE CALLED WETTING AGENTS OR SPREADERS
• USUAL JOB = BREAK SURFACE TENSION OF SPRAY DROPLET
• TOO MUCH = PESTICIDE RUNS OFF LEAF
• TOO LITTLE = BAD COVERAGE

ALL SURFACTANTS ARE ADJUVANTS BUT NOT ALL ADJUVANTS ARE SURFACTANTS!
What Happens To A Droplet Once Sprayed

Drift-able Droplets

Breeze
Breeze
What Happens To A Droplet Once Sprayed

22.5 °

22.5 °
Plant Cuticle
Barrier to Herbicide Uptake
Plant Cuticle

Barrier to Uptake
**Schismatoglottis neoguineensis:** upper leaf (a) side and detail in (b)

**Alocasia macrorhiza:** lower leaf side

**Rosa montana:** upper side flower leaf

**Viola tricolor:** upper side flower leaf

**Sarracenia leucophyta:** trap leaf

**Austrocactus patagonicus:** seed surface

**Aztekium ritteri:** seed cells with a partial removed cuticle (h) and a detail (i)
Difficult To Wet Leaves

Wax Surface
No Surfactant Added

Surfactant Added

Gene Gangwish, Loveland Products
Lateral View of Droplets

Left to Right: 0, 0.01, 0.1% Non-Ionic Surfactant

Cabbage Leaf

Courtesy: Bukovac - Michigan State University
Not all Beer is the same!
Adjuvants
not all the same

Wetter Spreader A

Wetter Spreader B

Spreader Activator

LI 700
TYPICAL ADJUVANTS

• NONIONIC SURFACTANTS (NIS):
  • LI-700, EXIT, INDUCE, ACTIVATOR 90

PENETRANTS: CROP OIL (HERBIMAX)
  • SYSTEMIC / AUXIN-TYPE HERBICIDES AND TRANSLOCATABLE FUNGICIDES CAN BENEFIT FROM USE OF PENETRANTS.

• SPREADER – STICKERS
  • BOND, STIK (ESP. WITH BT PRODUCTS)

• DRIFT RETARDANTS, MAYBE IF < 125 MICRONS
NEWER PRODUCTS FOR CB ??

- ORGANOSILICATES: IMPROVE RAINFASTNESS, REDUCE SURFACE TENSION, IMPROVE WETTING
  - MAYBE W/ RU IF LABEL ALLOWS, RECOMMENDS
  - ON TOUGH WEEDS, 0.5-1% V:V (WI, PNW)

- ALKYL POLYGLUCOSIDES: NIS; ORGANIC/ENVT’L FRIENDLY, LOW TOXICITY, RESEARCH ON-GOING
  - USED IN COSMETICS, FOAM ENHANCERS DETERGENTS

- SOME PESTICIDES LOSE EFFICACY AT HIGH PH.
WHAT NOT USE.... ??

• **SOAPS**: MAY REACT BADLY; HAVE BOTH CATIONIC (+) AND ANIONIC (-) COMPONENTS
  - FOAMING ISSUES (+)
  - PLANT INJURY (-)

• **NATURAL SURFACTANTS**
  - COCONUT/PALM OIL, WHEAT AMINO ACIDS
  - JURY IS STILL OUT; NOT CURRENTLY RECOMMENDED
ADJUVANT GUIDELINES

• USE ONLY THOSE LABELED FOR AG OR HORT USE.
  • NO INDUSTRIAL PRODUCTS, HOUSEHOLD DETERGENTS

• THERE ARE NO “MIRACLE” ADJUVANTS.
  • BEWARE OF AWESOME CLAIMS

• LIMITED - AREA TESTING FIRST.

• USE RIGHT ADJUVANT WITH RIGHT PESTICIDE.

• READ AND FOLLOW THE LABELS.

• BE AWARE OF NEW FORMULATIONS; THEY MAY HAVE NEW ADJUVANT RECOMMENDATIONS.

• KNOW WHEN NOT TO USE ONE, TOO!
WHAT ABOUT TANK MIXES?

• NEW ADJUVANTS ON THE MARKET.

• GENERICS MAY NOT ALWAYS BE THE SAME AS ORIGINAL.

• TRY A SMALL TEST AREA FIRST.
  • GROWTH STAGE
  • WEATHER

Maximize entry into the plant
Compatibility Basics

- Do a jar test.
- Simple, quick, easy
- Saves money, time, crop
Combo with Discoloration

QuinStar with Exit
ADJUVANTS IN CRANBERRY

• ADJUVANTS NEEDED WITH MANCOZEB PRODUCTS; SPREADER-STICKERS TO IMPROVE DEPOSITION / DURABILITY

• BRAVO HAS SPREADER-STICKER IN IT!
  • USING EXTRA COULD CAUSE MORE RUN-OFF, REDUCE RETENTION, CAUSE INJURY
ADJUVANTS IN CRANBERRY

- RECOMMENDED WITH PROLINE
- “MAY BE ADDED” WITH ABOUND, INDAR
  - DO NOT USE PENETRANT (INDAR)
  - LABEL: 0.25% V:V NIS BUT ~1 PT/A SHOULD BE FINE
ADJUVANTS IN CRANBERRY

• ADJUVANTS RECOMMENDED WITH INTREPID, CONFIRM, AND DIPEL.
  • IMPROVES: DEPOSITION
  REDISTRIBUTION
  WEATHERABILITY

• DELEGATE, ALTACOR, AND AVAUNT:
  RECOMMENDED TO IMPROVED PERFORMANCE
  • DENSE CANOPY
  • WAXY LEAVES
HERBICIDES AND ADJUVANTS

• **CALLISTO** (*MESOTRIONE*): **SPOT-TREATMENT POST**

  • NIS (0.25%) = 2 TSP OR 0.3 OZ/GAL
  • COC (1%) = 2.5 TBSP OR 1.3 OZ/GAL;
    MAY CAUSE INJURY IN SOME CONDITIONS

• ADJUVANT RATES ARE THE SAME NO MATTER WHAT RATE OF CALLISTO IS USED!
HERBICIDES AND ADJUVANTS

**CALLISTO: CHEMIGATING POST**
- USE NIS OR COC AT 1-4 PT/A

**QUINSTAR (QUINCLORAC)**
- 2 PT/A COC; CHEMIGATION

**POAST (SETHOXYDIM)**
- 1% COC = 1.3 OZ OR 2.5 TBSP / GAL
- SPOT- TREATMENT ONLY
**SELECT** (CLETHODIM) – **NO CHEMIGATION ALLOWED!**

- NIS at 0.25% V:V for **SELECT MAX**
- COC at 1% V:V for **SELECT 2EC**

**INTENSITY/ONE** (CLETHODIM) – **24C FOR CHEMIGATION**

- 1-4 PT/A NIS (COC PREFERRED W INTENSITY)
NONE NEEDED WITH...

- **ROUNDUP** (GLYPHOSATE)
  - USUALLY NONE NEEDED
  - MANY GENERICS OUT THERE! CHECK LABELS!
- **STINGER** (CLOPYRALID)
- **WEEDAR 64** (2,4-D)
IF YOU HAVE QUESTIONS....

• CONTACT THE MANUFACTURER
  • MSDS; LABEL
  • PROMOTIONAL LITERATURE
• CALL YOUR AG SUPPLIER
• CALL THE CRANBERRY STATION
Questions ?
Questions ?