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4-27-2021

## **2021 Pesticide Safety April 27: Tank Mixing and Adjuvants**

Hilary A. Sandler

Follow this and additional works at: [https://scholarworks.umass.edu/cranberry\\_extension](https://scholarworks.umass.edu/cranberry_extension)

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# Tank Mixes & Jar Tests

**Hilary Sandler**

Pesticide Safety Meeting  
April 27, 2021

**UMass**  
**Amherst**

**Cranberry Station**

**Many slides, thanks to:**

Gavin Graham (GG)  
IPM Weed Management Specialist  
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# Tank Mixing

- Putting more than one formulated product in solution tank at one time
- Efficiency: reduced passes and trampling
  - Saves time and labor
- Resistance management: Effective MoA
- Improved performance: Broader pest control

# Tank Mixing: The Bad

- Synergy
  - Good/bad depending on where it happens
  - Higher injury 'good' on pest but bad on crop
- Antagonism
  - Reduced performance
- Physical incompatibility
  - Gel
  - Foam
  - 'clumps'



# How To Avoid Problems?

- More things in the tank, the higher the risk
- Avoid the last minute 'add-in'; do the homework
- Contact manufacturer, sales reps, advisor, other growers
  - Usually know what's caused problems before
- Pesticide Label
  - PDF version, <ctrl> + F, text search
  - 'Tank Mix' , 'Do not mix', 'agitate'
  - Minor use crops – harder for specifics

# Mixing Order

## WALES

- **W**ettable powders
- **A**GITATE
- **L**iquid flowables
- **E**mulsifiable concentrates
- **S**urfactants
- Works 95% of the time

Don't "welsh" on your due diligence as a pesticide applicator

**CHECK  
THE  
LABEL!**

**KEEP  
RECORDS**

# Mixing Order

**WALES – maybe a bit simplistic**

BASF's **W.A.M.L.E.G.S.**

**W**ettable powders, **A**gitate, **M**icroencapsulated suspensions, **L**iquid flowables, **E**mulsi<sup>f</sup>iable concentrates, high-load **G**lyphosates, **S**urfactants)

**A.P.P.L.E.S.** (Agitate, Powders soluble, Powders dry, Liquid flowables and suspensions, Emulsifiable concentrates, Solutions)

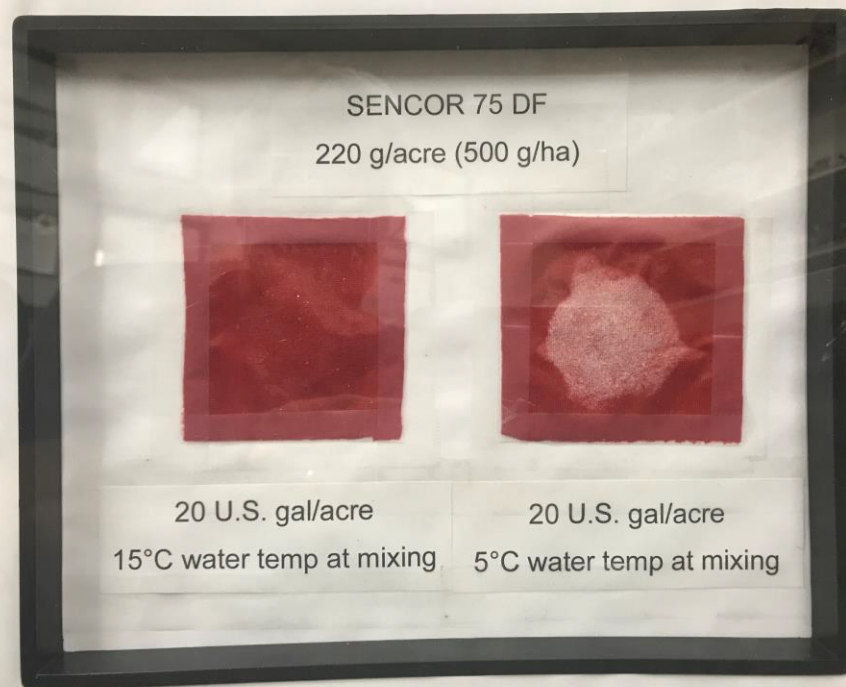
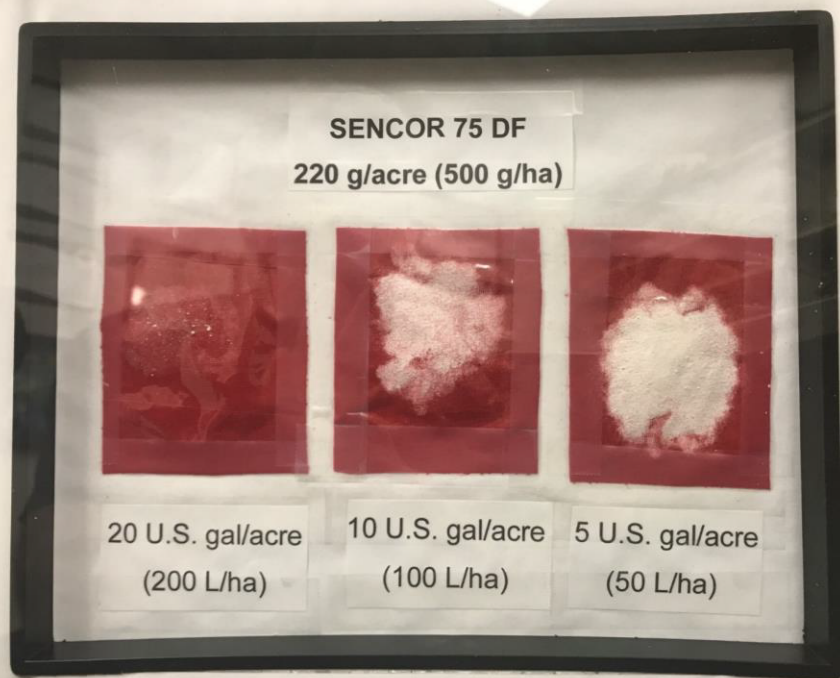
# Sprayers101.com Full List

- **Water-Soluble Bags (WSB)** – Allow them to fully dissolve and disperse.
- **Wettable Powders (WP)**
- **Water Dispersible Granules (WDG, WG, SG)**
- **Agitation** to allow dry products to mix and disperse
- **Liquid Flowables (F, FL):** Including, in order, Suspension Concentrates (SC), Suspo-emulsions (SE), Capsule Suspensions (CS/ZC), Dispersible Concentrates (DC), Emulsions in water (EW)
- *In order:* Emulsifiable Concentrates (EC): Microemulsifiable Concentrates (MEC) and Oil Dispersions (OD)
- *In order:* Solutions (SN), Soluble Liquids (SL), Liquid Fertilizers and Micronutrients (when not already premixed with fertilizer).
- *NOTE:* Compatibility agents and anti-foamers should be added before pesticides. Adjuvants like Non-Ionic Surfactants (NIS), Crop Oil Concentrates (COC), Drift Retardants (DR), and spreader/stickers should be added based on specific label direction or based on their formulation, just like pesticides.



# Suspension Issues: Dry Products

- Agitate: Not enough or leaving sit too long
- Low water volumes
- Temperature



# Other Points

- Use WSB (soluble bags) first to make sure they 'open'
- Products may need time to 'mix' after addition
  - Take your time when adding products
- Could use a separate tank to pre-mix
  - Watch water volumes
- If you have no experience or guidance, do a **jar test – Are materials COMPATIBLE?**

# Jar Test

- Filling a sprayer in miniature
  - Same ratios as sprayer
  - Easier to clean up if things go wrong
- Small scale and/or syringe
- Follow safety recommendations on label (PPE)
- Leave sit and monitor for issues
- Shows only **physical compatibility**
  - Not efficacy



# Jar Test Basics

- Need CLEAR, CLEAN 1-quart glass jar with good-fitting lid
  - Avoid cardboard, metal lids, if possible
- Always wear PPE!
- Do the test in a safe work space.

# Jar Test Basics

- Add 1 pint (16 oz) of spray water
  - Use the source you will spray with
- Check spray water pH
- Add materials starting with those most difficult to disperse & shake vigorously. Observe!

# Jar Test Mixing

- After adding each ingredient, shake and observe
- Use chart (fact sheet, Sprayers101 website, others) to figure how much to add
  - [https://scholarworks.umass.edu/cranberry\\_extension/153/](https://scholarworks.umass.edu/cranberry_extension/153/)

# Rates to Use

- If label says less than 1 lb/A, still add 1 TBsp.
- If using high spray volume, still add same amt pesticide to jar.
  - If compatible under concentrated conditions, should be fine in more dilute (chemigation), field conditions.

# Jar Test Observations

- Stir mixture. Feel sides of jar.
  - **Warmth** or **Cold** indicates chemical reaction has occurred; may Reduce Efficacy or Increase Phytotoxicity!
  - No clumping should be seen.
  - Mixture should look smooth.



# Combos with NO reaction

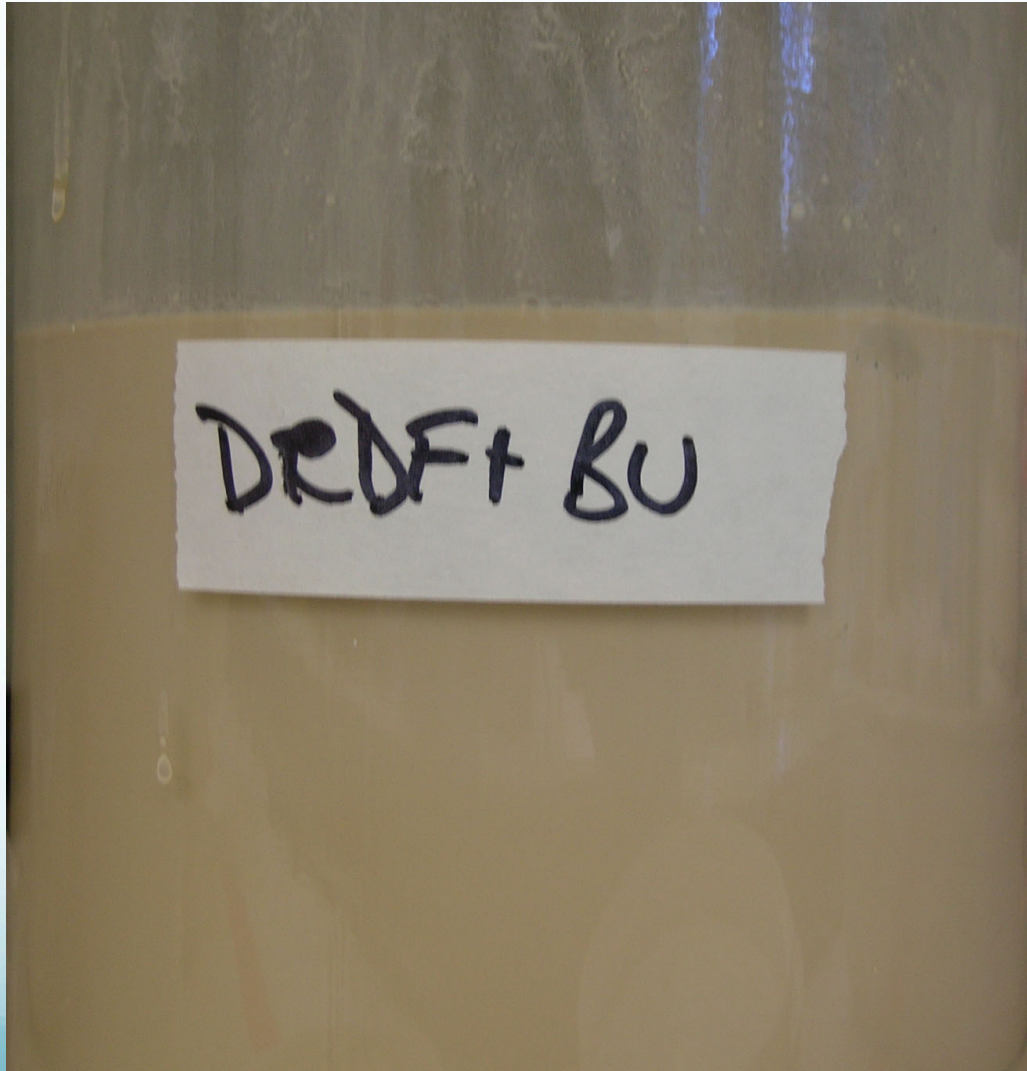


## 2 Combos with BAD reaction



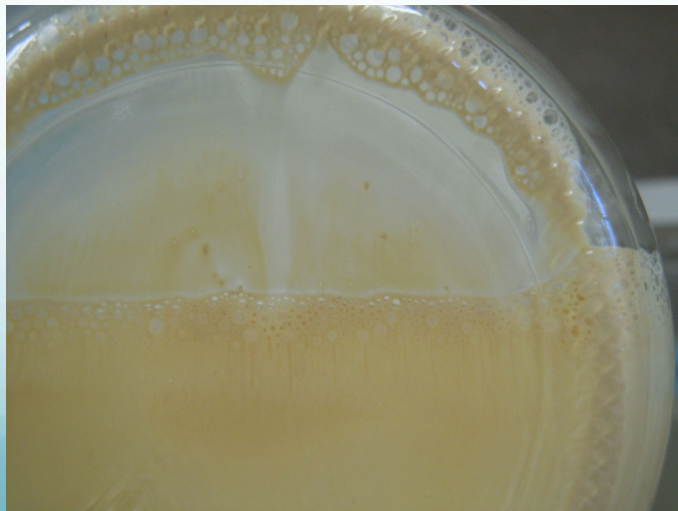
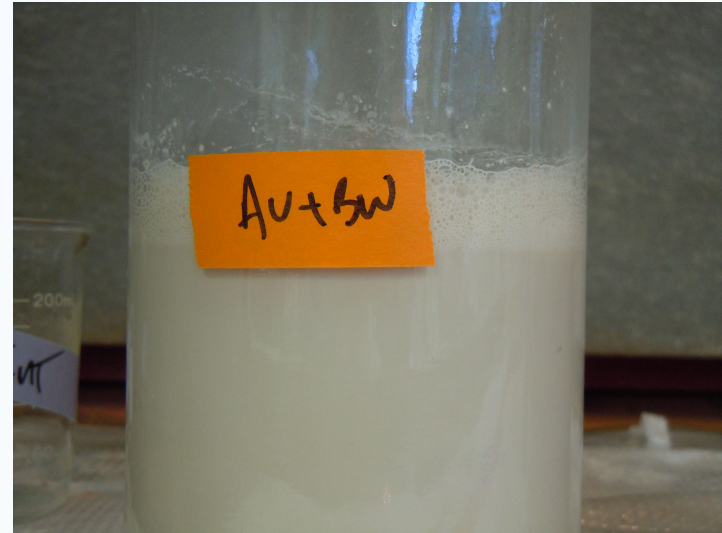
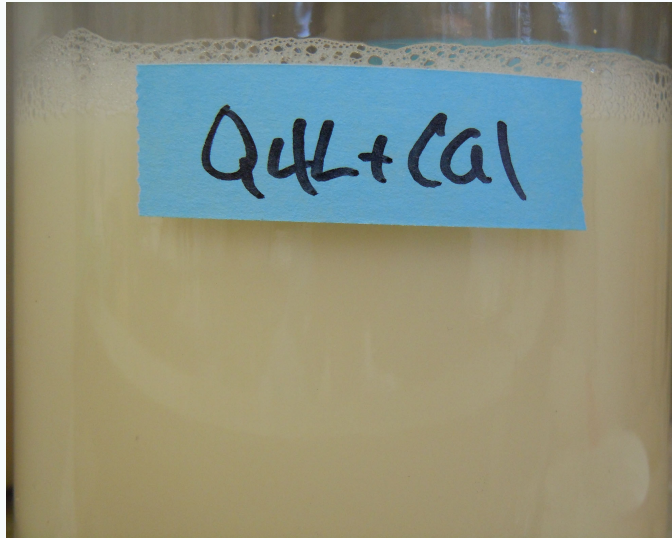


# Devrinol + Ultrex



Solution  
looked fine  
but when  
emptied,  
it was  
clumpy

# Combos with Minor reaction





# Combo with Discoloration

## QuinStar with Exit



Full Details on UMass ScholarWorks

Search: UMass + Cranberry + pesticide compatibility

[scholarworks.umass.edu/cranberry\\_factsheets/31](https://scholarworks.umass.edu/cranberry_factsheets/31) (2012)

# Disposal

- Triple-rinse container and properly dispose of jar test contents



# For More Information

## *Sprayers 101*

- Tank Mixing
- Jar Test
- Many things spray related....

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