

Pesticide Inert Ingredient Use In Spray Adjuvant Applications

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Spray Adjuvants

Materials added to spray mixtures of Agrichemicals that enhance their efficacy or reduce application problems



Adjuvants Optimize Spray Application And improve Agrichemical efficacy by:

- (1) Increasing spray *deposition*
- (2) Reducing *bounce and run-off*
- (3) Minimizing *evaporation*
- (4) Enhancing *absorption and uptake*
- (5) Resisting *spray deposit wash-off*
- (6) Fixing spray *mixing & application problems*



Crop Protection Products Dependent on Spray Adjuvants for Performance

- Glyphosate
- Sethoxydim
- Atrazine (Post uses)
- Paraquat
- Glufosinate (In-can)
- Imazapyr
- Imazaquin
- Aciflourofen
- Sulfonyl-Urea herbicides (all post)
- Fluazifop
- Aerial applications of strobilurian fungicides
- Acephate applications in high pH water
- Numerous Others



Advantages of Crop Protection Products With “In-can” Adjuvants

- User convenience
- Reduced container disposal and handling / storage issues
- Reduced mixing errors
- Prevention of efficacy and crop injury problems due to incorrect adjuvant use or omission
- Resolution and/or prevention of spray mix compatibility problems



Disadvantages of Crop Protection Products with “in-can” Adjuvants

- Inability to deliver enough adjuvant to cover variations in spray application volume
- Chemical and/or physical formulation stability problems
- Impact of adjuvant system on Signal word classification
- Increased product use rate requirements due to lower a.i.



Spray Adjuvant Classification



Organic (C)
Silicone (Si)
80 / 20
90 / 10

• Spreader
Stickers

De-foamers
Cmp. Agents
Foam Markets
Drift Reduction
Deposition Agents
Water Conditioners

Crop Oil
Concentrate
(COC)
Methylated
Seed Oil
(MSO)
Seed Oils

Terpenes
Pinene Polymers
Latex
Synthetic Resins
Polyvinyl Polymers



Adjuvant functions that may Improve or Maintain Pesticide Efficacy:

- Improved degree and rate of Absorption / Uptake
- Spreading / coverage
- Wetting (droplet adhesion)
- Sticking (spray deposit adhesion)



Adjuvant functions with no impact on Pesticide Efficacy:

- Compatibility
- Drift reduction
- Water Quality issues (pH and hard-water)
- Suspension enhancement
- Foam Control / prevention



Most Adjuvants are Made From Pesticide “Inerts”

- “Inert” and Adjuvant raw material components are usually supplied by the same manufacturer
- Pesticide manufacturer recommendations and/or requirements
- Reduced field application testing needs due to established uses
- ***State Registration Requirements***



State Spray Adjuvant Regulatory Requirements

- Eight States currently have registration requirements for spray adjuvants (CA, WA, ID, KY, TN, AR, MS & UT)
- CA & WA have specific composition, safety, environmental, & safety regulations required for registration
- ***Adjuvant components must be listed in 40 CFR 180 (Both active ingredient and non-functional formulation components)***



Components

- Mineral Oil (Paraffin)
- Esterified Plant Seed oils
- Ethoxylated Tallow Amines
- Polyacrylamides
- Nonyl Phenol Ethoxylates
- Aliphatic Alcohol Ethoxylates
- Fatty Acids (Tallow derived)
- Phosphoric, Citric, & Propionic acids
- Glycerin / Glycols

Spray Adjuvant Function

- Crop Oil Concentrates (COC)
- Methylated Seed Oil (MSO)
- Glyphosate enhancement
- Drift reduction / Deposition
- Spreading / Wetting
- Spreading / Wetting
- Sticking / anti-evaporation
- Water conditioning and pH modification / buffering
- Evaporation reduction



Components

- Polyethoxylated aliphatic and aromatic phosphate esters
- Pine Tree resins (Terpenes)
- Latex & Alkyd Resins
- Sorbitan Fatty acid esters
- Polythoxylated Sorbitans
- Ammonium Sulfate (AMS) and UAN Fertilizers
- Organosilicone Surfactants

Spray Adjuvant Function

- Compatibility, buffering, and pH modification agents
- Sticking Agents
- Sticking Agents
- Emulsifiers
- Emulsifiers / wetting agents
- Water conditioning and herbicide enhancers
- Foam control, spreaders, wetters & absorption agents



Pesticide Inert Regulatory Impacts on Spray Adjuvants

- Pesticide “inerts” are actually the functional (active) ingredients of adjuvants
- Reduced availability of new functional components and/or the option of making improvements in existing formulations
- Inert concentration limits in pesticides result in lower functional limits in adjuvants (e.g. ethoxylated aliphatic amines)



Pesticide Inert Regulatory Impacts on Spray Adjuvants (II)

- Options for substituting non-flammable components for those that are flammable are limited or made unavailable
- Options for replacing acute hazardous components (usually from eye & skin irritation) are limited or made unavailable
- Fertilizers are often used as adjuvants – and many are not listed as approved “inerts”

