

Laws and Regulations - Pesticide Adjuvants

Krista Hoffmann, PhD, PCA, QAC
CDFW IPM Coordinator





Presentation

Defining Adjuvants

Deciphering the Adjuvant Label and SDS

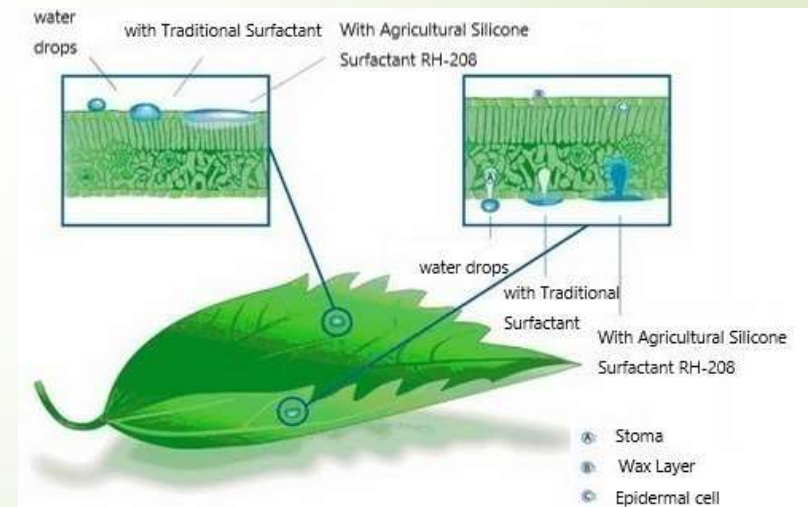
Reporting Requirements and NPDES

Pesticide Adjuvants



What is an Adjuvant?

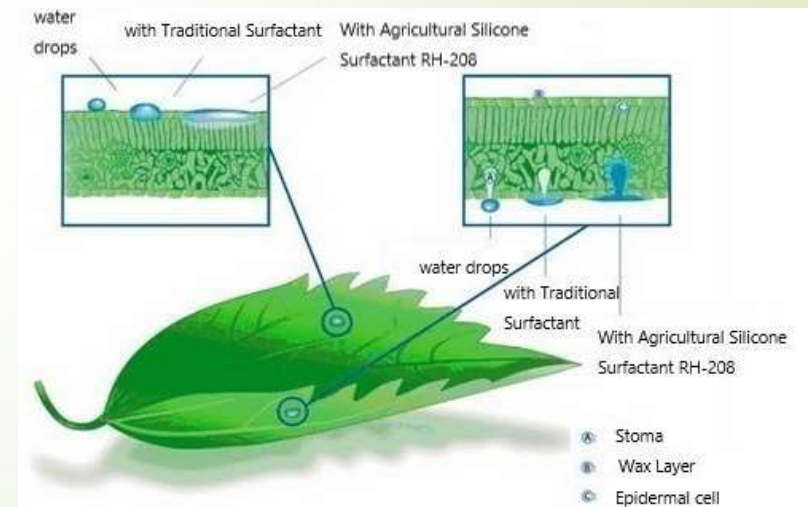
- Surfactant
 - Sticker, spreader, adsorption aid
- Water Conditioner or Acidifier
- Defoamer
- Drift Control Agent
- Marker dye

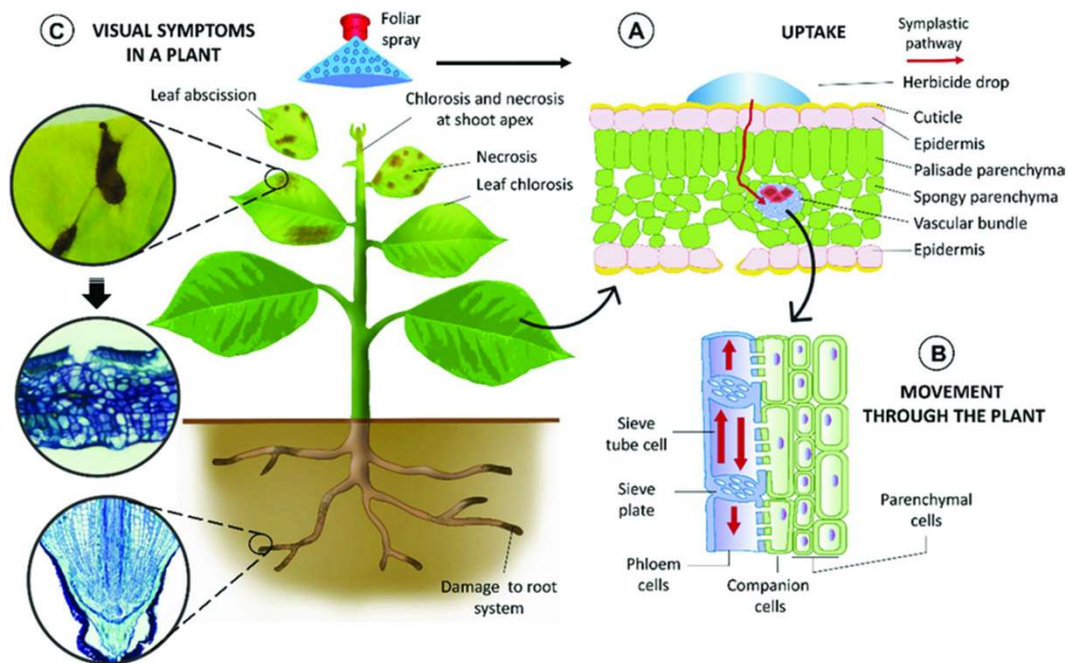


What is an Adjuvant?

Pesticide in CA

- **Surfactant**
 - Sticker, spreader, adsorption aid
- **Water Conditioner or Acidifier**
- **Defoamer**
- **Drift Control Agent**
- **Marker dye**

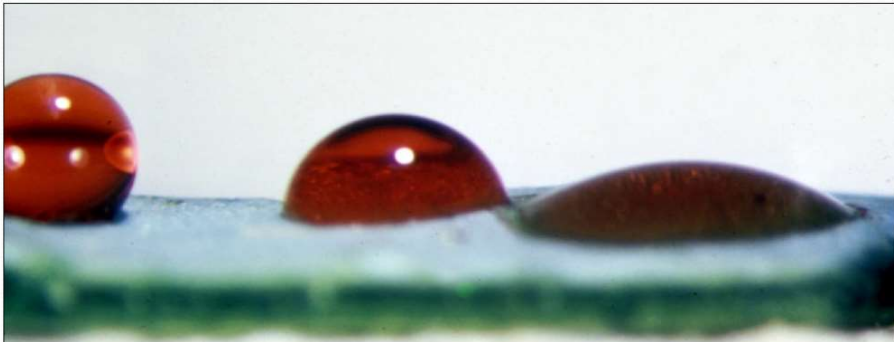




Common Surfactants

- Non-ionic
- Crop Oil Concentrate
- Modified Seed Oil

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



THE EFFECT OF SURFACTANTS



Untreated



Herbicide Only



Herbicide & Surfactant

Non-ionic Surfactants

- ▶ Alkylphenol ethoxylates
- ▶ Alcohol ethoxylates
- ▶ Silicone-based



- Dissolve leaf wax and cuticle
- Enhances absorption and translocation
- Reduce evaporation
- Good for woody/waxy targets
- Good for drought stressed conditions
- Note that oil-based adjuvants will antagonize Roundup

Crop Oil Concentrates





- Made from plant seed oils chemically altered to attach methanol/ethanal units.
- Similar action to COCs, but more effective at dissolving leaf wax and cuticle
- Reduce evaporation
- Good for woody/waxy targets
- Good for drought stressed conditions
- Note that oil-based adjuvants will antagonize Roundup

Methylated/Ethylated Seed Oil

Compatible Adjuvants Summary



Pesticide	Active Ingredient	Surfactant(s)	Other
Roundup Custom	Glyphosate	NIS	Water conditioner(s)
Roundup (terrestrial)	Glyphosate	None (w/in formulation)	Water conditioner(s)
2,4-D	2,4-D	NIS	Water conditioner(s)
Milestone	Aminopyralid	NIS, COC, MSO	
Garlon 4	Triclopyr-ester	NIS (or oil carrier)	
Vastlan	Triclopyr-choline	NIS, COC	
Habitat/Polaris	Imazapyr	NIS, COC, MSO	
Telar	Chlorsulfuron	NIS	Do not use acidifying agent

Adjuvant name	Adjuvant Type	Rainbow Trout	Brook Trout	Other Fish	Daphnia spp.	Other Species (mg/L)
		96-hour LC50 (mg/L)	96-hour LC50 (mg/L)	96-hour LC50 (mg/L)	48 hour EC50 (mg/L)	
R-11	Alkylphenol ethoxylates	3.8-6	4.2		5.7-19	0.7 - 3.9
Activator 90	Alkylphenol ethoxylates	2	1.4		2-5.2	5.8-12.7
Induce	Alkylphenol ethoxylates	7.5	9		18	N/A
Denali EA	Alcohol ethoxylate	11.25	N/A		9.7	N/A
Rainier-EA	Alcohol ethoxylate	82.6	N/A		218.8	N/A
Liberate	Alcohol ethoxylate	17.6	N/A		9.3	N/A
Kinetic	Silicone-based wetter/spreader	N/A	19.8		111	N/A
Entry II, POEA	Cationic Surfactants - Ethoxylated Fatty Amines	4.2	1.3		2	3.7-4.5
Competitor	Vegetable-based oils	>50	N/A		>50	N/A
MSO Con'c	Vegetable-based oils	35	N/A		18	N/A
Hasten-EA	Vegetable-based oils	375	N/A		84.6	N/A
MSO with Leci-Tech	Vegetable-based oils	35	N/A		17	N/A
Syl-Tac-EA	Vegetable oil + silicone-based blends	45	N/A		137.5	N/A
Phase	Vegetable oil + silicone-based blends	85	N/A		>100	N/A
Dyne-Amic	Vegetable oil + silicone-based blends	23.2	N/A		60	N/A
Agri-Dex	Crop Oils and Concentrates	1000	1000		1000	N/A
LI-700	Non-ionic surfactant and acidifier	130	210		190	N/A
In-Place	Drift Reduction Agent	>162	N/A		40.12	N/A
InterLock	Drift Reduction Agent	>100	N/A		>100	N/A
Bronc Max	Water Conditioner	>=100	N/A		>100	N/A
Mark-It Blue	Colorant or Dye	N/A	N/A		N/A	9890 (unspecified)

Deciphering the Label and SDS





R-11[®]

SPREADER ACTIVATOR - NONIONIC SURFACTANT



PRINCIPAL FUNCTIONING AGENTS

Alkylphenol ethoxylate, butyl alcohol, Dimethylpolysiloxane % BY WT. .90%

CONSTITUENTS INEFFECTIVE AS SPRAY ADJUVANTS 10%

Total 100%

Surfactant Content.....80%

WA Reg. No. 2935-50142

KEEP OUT OF REACH OF CHILDREN



WARNING

What is the Active Ingredient?

CHECK THE LABEL FOR
"ALKYLPHENOL
ETHOXYLATE"



AGRI-DEX®

A Crop Oil Concentrate



***PRINCIPAL FUNCTIONING AGENTS:**

Heavy range paraffinic oil, Polyol fatty acid esters, and Polyethoxylated derivatives thereof	99.0%
CONSTITUENTS INEFFECTIVE AS SPRAY ADJUVANTS	1.0%
TOTAL	100.0%

Surfactant Content:	17.0%
Unulfonated Oil Residue (UR) Value	95.0% minimum

*All ingredients are accepted for use under CFR 40, 180.
CONTAINS PETROLEUM DISTILLATES

KEEP OUT OF REACH OF CHILDREN

WARNING

- May be harmful if swallowed
- May be harmful in contact with skin
- Harmful if inhaled
- Causes mild skin irritation
- Causes eye irritation



5005-50094-AA



COMPETITOR®

MODIFIED VEGETABLE OIL

PRINCIPAL FUNCTIONING AGENTS:	% BY WT.
Ethyl Oleate, Sorbitan Alkylpolyethoxylate Ester, Dialkyl Polyoxyethylene Glycol.....	98.0%
CONSTITUENTS INEFFECTIVE AS SPRAY ADJUVANT	2.0%
TOTAL	100.0%

CA Reg. No. 2935-50173

WA Reg. No. 2935-04001

KEEP OUT OF REACH OF CHILDREN
PRECAUTIONARY STATEMENTS
Irritant to skin and eyes. Avoid breathing mist or spray.

Crop or Vegetable Oil Alternatives





RAINIER-EA™

Nonionic Surfactant – Activator – Spreader

PRINCIPAL FUNCTIONING AGENTS:	% By W
Polyoxyethylene polyol fatty acid ester, butyl lactate and alcohol ethoxylate phosphate ester	98.0%
CONSTITUENTS INEFFECTIVE AS SPRAY ADJUVANT	2.0%
TOTAL	100.0%

Surfactant Content.....88%

CA Reg. No. 2935-50200

WA Reg. No. 2935-15001

Formulated with ECO ADVANTAGE™, a patented eco-friendly deli low foaming technology to improve horticultural spray application wetting and deposition characteristics of the spray mixture, result spray deposit. Ideal for use with pesticides applied to Crop and Aquatic, Non-Crop Vegetation, and Turf and Ornamental.

KEEP OUT OF REACH OF CHILDREN
CAUTION
PRECAUTIONARY STATEMENT
HAZARDS TO HUMANS AND DOMESTIC ANIMALS

Alcohol Ethoxylates are Safer Non-ionic Alternatives

- Do not break down into nonylphenol:
- Are readily biodegradable
- Perform similarly to NPEs, and in some cases outperform them.
- Have a better environmental profile than NPEs.





R-11[®]

SPREADER ACTIVATOR - NONIONIC SURFACTANT



PRINCIPAL FUNCTIONING AGENTS

Alkylphenol ethoxylate, butyl alcohol,	% BY WT.
Dimethylpolysiloxane90%

CONSTITUENTS INEFFECTIVE AS SPRAY ADJUVANTS10%
Total	100%

Surfactant Content.....80%

WA Reg. No. 2935-50142

KEEP OUT OF REACH OF CHILDREN

**CHECK THE
SIGNAL WORD**



WARNING



Global Harmonized Standard

- “Warning” and “Danger” signal words only
- “Caution” labeled products now “Warning”
- Pesticide labels not required to change → SDS’s do not always match Label
- Cal/OSHA revised it’s standard first and US OSHA followed

GHS PICTOGRAMS



Health Hazard

- Carcinogen
- Mutagenicity
- Reproductive Toxicity
- Respiratory Sensitizer
- Target Organ Toxicity
- Aspiration Toxicity



Flame

- Flammables
- Pyrophorics
- Self-Heating
- Emits Flammable Gas
- Self-Reactives
- Organic Peroxides



Exclamation Mark

- Irritant (skin and eye)
- Skin Sensitizer
- Acute Toxicity
- Narcotic Effects
- Respiratory Tract Irritant
- Hazardous to Ozone Layer (Non-Mandatory)



Gas Cylinder

- Gases Under Pressure



Corrosion

- Skin Corrosion / Burns
- Eye Damage
- Corrosive to Metals



Exploding Bomb

- Explosives
- Self-Reactives
- Organic Peroxides



Flame Over Circle

- Oxidizers



Environment

- Aquatic Toxicity



Skull and Crossbones

- Acute Toxicity (fatal or toxic)

HELENA AGRI-ENTERPRISES, LLC
225 SCHILLING BOULEVARD, SUITE 300
COLLIERVILLE, TENNESSEE 38017
(901) 761-0050

PRECAUTIONARY STATEMENT

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

WARNING

BEFORE USING THIS PRODUCT, READ ALL PRECAUTIONS, DIRECTIONS FOR USE, CONDITIONS OF SALE—LIMITED WARRANTY AND LIMITATIONS OF LIABILITY AND REMEDIES.

May be harmful if swallowed. May be harmful in contact with skin. Harmful if inhaled. Causes mild skin irritation. Causes eye irritation. Avoid contact with skin, eyes or clothing. Avoid breathing spray mist. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum or smoking tobacco. Remove and wash contaminated clothing before reuse. Keep out of reach of children.

Personal Protective Equipment: Wear chemical-resistant gloves, long-sleeved shirt and long pants, shoes plus socks when mixing or applying AGRI-DEX®.

FIRST AID

IF IN EYES:

- Hold eye open and rinse slowly and gently with water for 15-20 minutes.
- Remove contact lenses, if present after the first 5 minutes, then continue rinsing eye.
- Call a poison control center or doctor for treatment advice.

IF SWALLOWED:

GENERAL INFORMATION

AGRI-DEX® is a non-ionic blend of special surfactants and a highly refined spray oil and is designed for use with a broad range of pesticides where an oil concentrate adjuvant is recommended. Subject to the cautionary statements set forth in the Directions for Use, AGRI-DEX® may be used with other pesticides and/or fertilizer products. The addition of AGRI-DEX® to a spray tank improves pesticide application by modifying the wetting and deposition characteristics of the spray solution resulting in a more even and uniform spray deposit. AGRI-DEX® can positively affect pesticide spray application and pesticide efficacy. Optimum application and effects, however, can be influenced by the crop, pest, spray equipment, spray volume, pressure, droplet size, spray mixture and environmental factors. Consequently, it is recommended that careful observations of the spray deposit be made and adjuvant concentrations be adjusted accordingly.

DIRECTIONS FOR USE

FOR USE WITH PRODUCTS REGISTERED FOR: AGRICULTURAL, AQUATIC, FORESTRY, INDUSTRIAL, MUNICIPAL, NON-CROPLAND, ORNAMENTAL, RIGHTS-OF-WAY, AND TURF.

The addition of an adjuvant to some pesticides or pesticide tank mix combinations may cause phytotoxicity to the foliage and/or fruit of susceptible crops. Prior to the addition of AGRI-DEX® to spray tank mixes or prior to the use of AGRI-DEX® with a pesticide or fertilizer where an oil concentrate adjuvant is not specifically recommended but not prohibited by the manufacturer, the user or application advisor must have experience with the combination or must have conducted a phytotoxicity trial.

AGRI-DEX® may be applied by Ground, CDA, Aerial or Aquatic spray equipment and any other type spray equipment recommended by pesticide labels. In most

Reporting Requirements and NPDES (National Pollutant Discharge Elimination System)



Adjuvants are “Pesticides”

► Report all applications by the 10th day of the month following treatments

STATE OF CALIFORNIA
MONTHLY SUMMARY PESTICIDE USE REPORT
 DPR-ENF-060 (REV. 4-12) PAGE 1 OF 2

DEPARTMENT OF PESTICIDE REGULATION
 ENFORCEMENT BRANCH

INSTRUCTIONS FOR COMPLETING THIS FORM ARE INDICATED BELOW AND ON THE REVERSE SIDE

OPERATOR (FIRM NAME)		ADDRESS		CITY	ZIP CODE	PHONE NUMBER
OPERATOR ID/PERMIT NUMBER	LICENSE NUMBER	COUNTY WHERE APPLIED	COUNTY NUMBER	MONTH/YEAR OF USE	TOTAL NUMBER OF APPLICATIONS	

1. Complete Columns A, B, C, and D for All Users
2. Complete Column E by using one of the following codes:
 Code 10 - Structural Pest Control.....includes any pest control work performed within or on buildings and other structures.
 Code 30 - Landscape Maintenance Pest Control.....includes any pest control work performed on landscape plantings around residences or other buildings, golf courses, parks, cemeteries, etc.
 Code 40 - Right-of-Way Pest Control.....includes any pest control work performed along roadsides, power lines, median strips, ditch banks, and similar sites.
 Code 50 - Public Health Pest Control.....includes any pest control work performed by or under contract with State or local public health or vector control agencies.
 Code 80 - Vertebrate Pest Control.....includes any vertebrate pest control work performed by public agencies or work under the supervision of the State or county agricultural commissioner.
 Code 91 - Commodity Fumigation (Nonfood/Nonfeed).....includes fumigation of nonfood/nonfeed commodities such as pallets, dunnage, furniture, burlap bags, etc.
 Code 100 - Regulatory Pest Control.....includes any pest control work performed by public employees or contractors in the control of regulated pests.
3. Complete Columns F and G, if use does not fit one of the above codes

A MANUFACTURER AND NAME OF PRODUCT APPLIED	B EPA/CALIFORNIA REGISTRATION NUMBER FROM LABEL INCLUDE ALPHA CODE	C TOTAL PRODUCT USED (Check One Unit of Measure)	D NUMBER OF APPLICATIONS	E CODE	F COMMODITY OR SITE TREATED	G ACRES/UNITS TREATED
		<input type="checkbox"/> LB <input type="checkbox"/> OZ <input type="checkbox"/> PT <input type="checkbox"/> QT <input type="checkbox"/> GA				
		<input type="checkbox"/> LB <input type="checkbox"/> OZ <input type="checkbox"/> PT <input type="checkbox"/> QT <input type="checkbox"/> GA				
		<input type="checkbox"/> LB <input type="checkbox"/> OZ <input type="checkbox"/> PT <input type="checkbox"/> QT <input type="checkbox"/> GA				
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		<input type="checkbox"/> LB <input type="checkbox"/> OZ <input type="checkbox"/> PT <input type="checkbox"/> QT <input type="checkbox"/> GA				

REPORT PREPARED BY _____ DATE _____

Distribution: CAC - Two copies; Report preparer - One copy

[Print Form](#)

Surface water applications

- If: Application may result in discharges to waters of the United States
- Then: National Pollutant Discharge Elimination System (NPDES) – General Permit.



Updated General Permit coming!

- ▶ How to reasonably cover other pesticide adjuvants?
- ▶ Draft updated General Permit expected first quarter of 2025
- ▶ If you have ideas contact:

Gur Chand
Gurgagn.Chand@Waterboards.ca.gov

**STATE WATER RESOURCES CONTROL BOARD
1001 I STREET, SACRAMENTO, CALIFORNIA 95814**

[State Water Resources Control Board Pesticide Permit page](https://www.waterboards.ca.gov/water_issues/programs/npdes/pesticide)

https://www.waterboards.ca.gov/water_issues/programs/npdes/pesticide

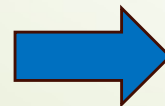
WATER QUALITY ORDER 2013-0002-DWQ

AMENDED BY ORDERS 2014-0078-DWQ, 2015-0029-DWQ, AND 2016-0001-DWQ (EXEC)

GENERAL PERMIT NO. CAG990005

NATIONWIDE GENERAL NATIONAL POLLUTANT DISCHARGE ELIMINATION ACT (NPDES) PERMIT FOR RESIDUAL AQUATIC PESTICIDE DISCHARGE TO WATERS OF THE UNITED STATES FROM ALGAE AND AQUATIC VEGETATION CONTROL APPLICATIONS

AQUATIC TOXICITY DATA



Active Ingredient	Toxicity Category		NPDES Maximum Limitation
	Fish* (ppm)	Inverts* (ppm)	
Imazamox (Clearcast)	>100	>100	none
Triclopyr triethylamine (Garlon, Vastlan)	>100	>100	13.0 ppm ^a
Imazapyr (Habitat, Polaris)	>100	>100	11.2 ppm ^a
Fluridone (Sonar)	>1 - 10	>1 - 10	0.56 ppm
Flumioxazin (Clipper, Propeller)	>1 - 10	>1 - 10	none
Carfentrazone (Stingray)	>1 - 10		none
Glyphosate (Roundup Custom, Rodeo)	>1 - 10	0.1 - 1	0.70 ppm
Endothall (Aquathol K)	0.1 - 1	0.1 - 1	0.10 ppm
Diquat (Reward)	>1 - 10	<0.1	0.02 ppm
2,4-D	<0.1	<0.1	0.07 ppm
Acrolein (Magnacide)	<0.1	<0.1	0.021 ppm
Copper (Harpoon)	<0.1	<0.1	0.015 - 0.020 ppm
Nonylphenol	<0.1	<0.1	0.0066 ppm



Overview

Defined Adjuvants

Deciphered the Adjuvant Label and SDS

Reviewed Reporting Requirements and NPDES



Thank you!

Krista Hoffmann, PhD

IPM Coordinator, PCA, QAC

Lands Program, CDFW

Krista.Hoffmann@Wildlife.ca.gov