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

Defining 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

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  - **Sticker, spreader, adsorption aid**
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- **Defoamer**
- **Drift Control Agent**
- Marker dye

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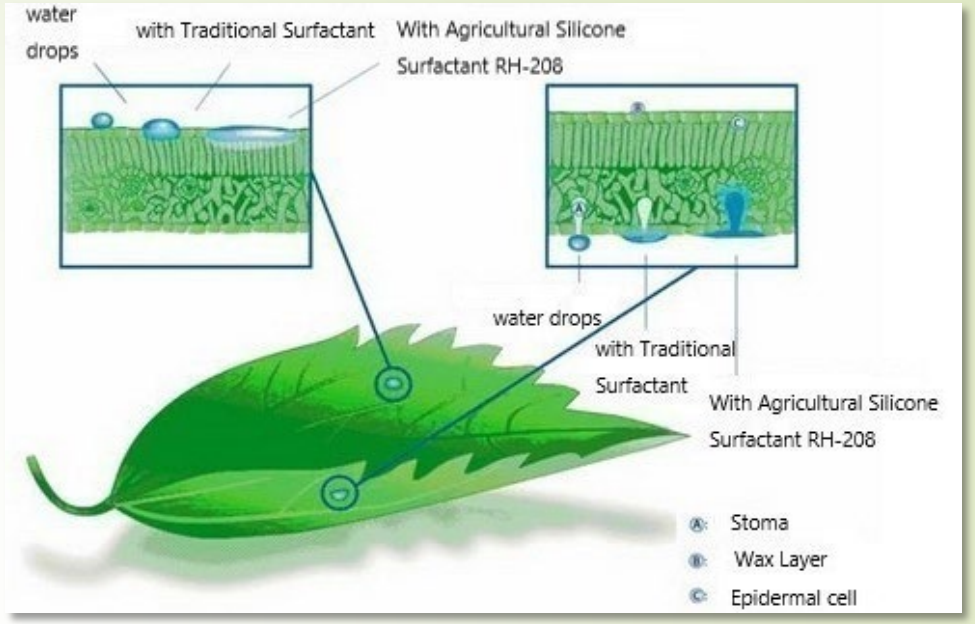

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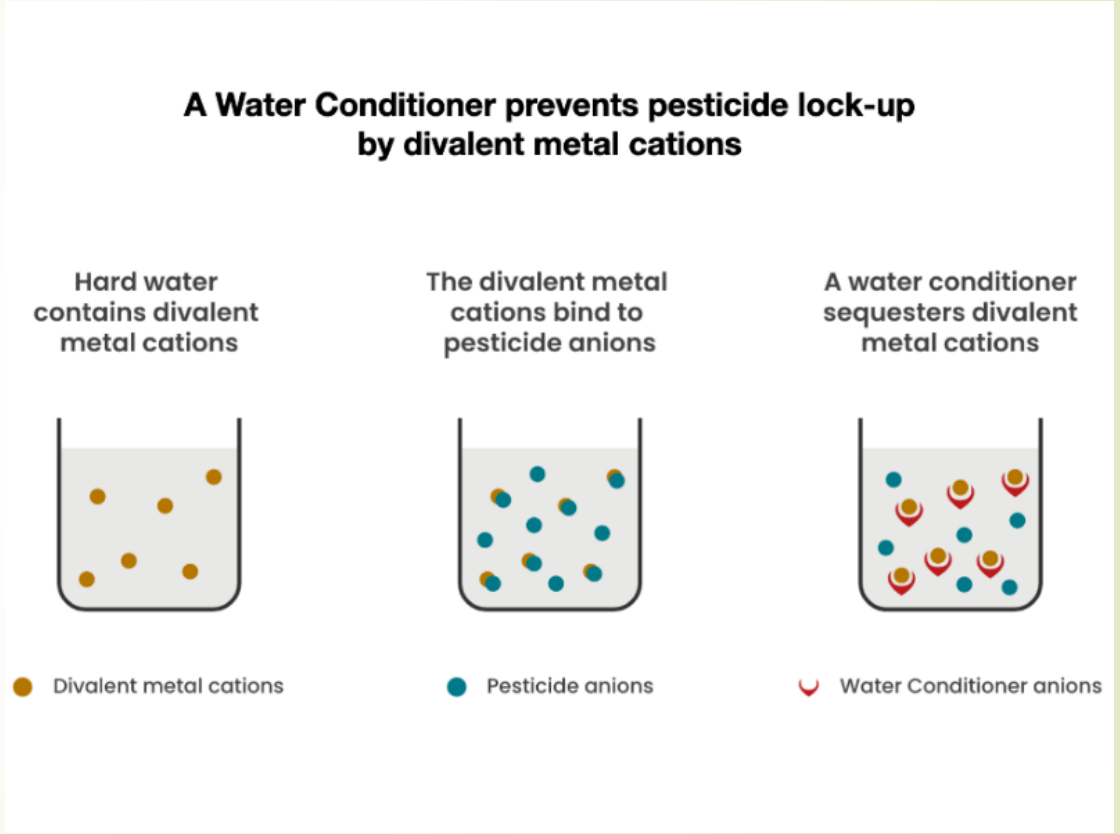

*divalent metal cation = hard water cation like calcium and magnesium

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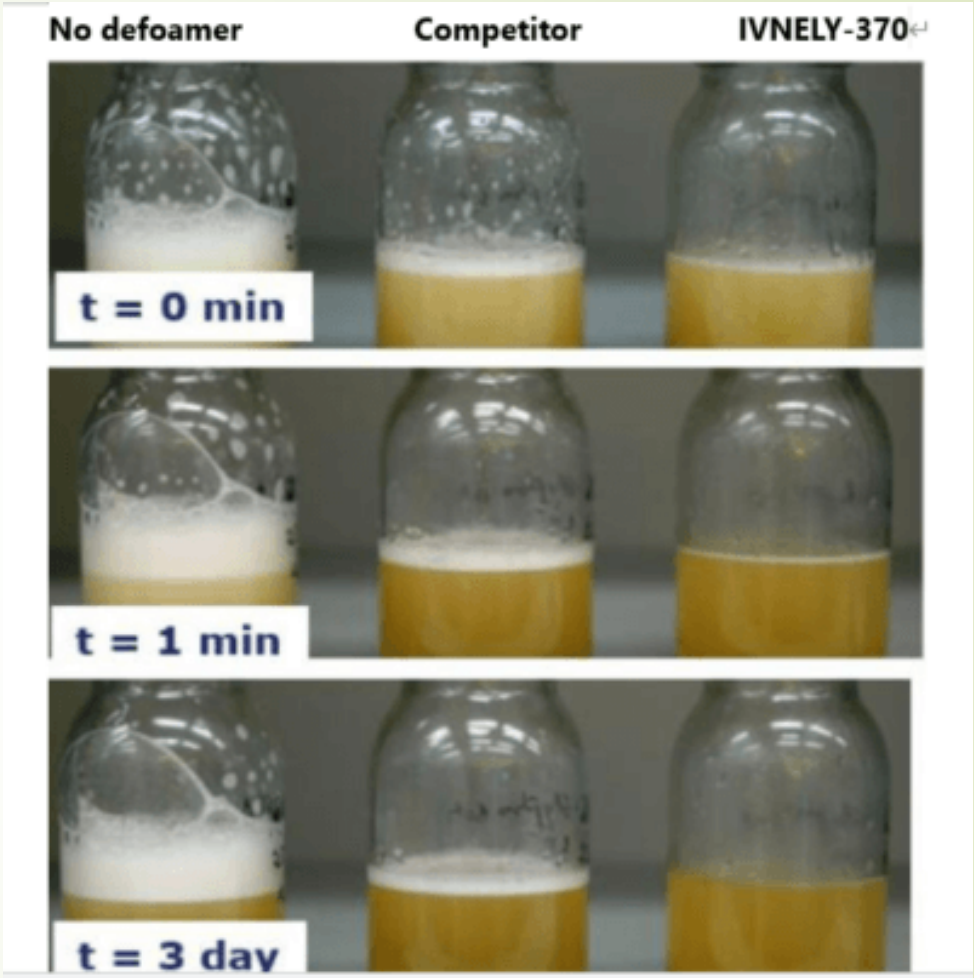

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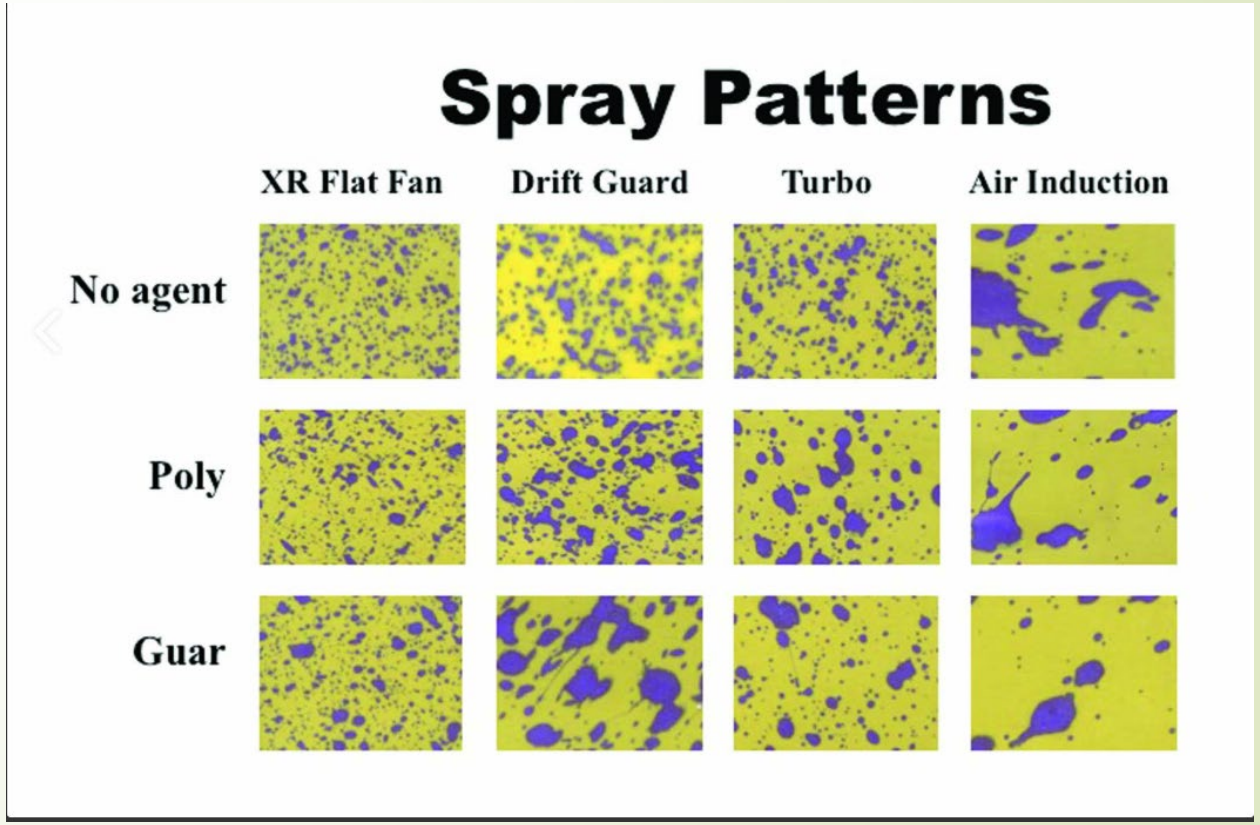

What is an Adjuvant?

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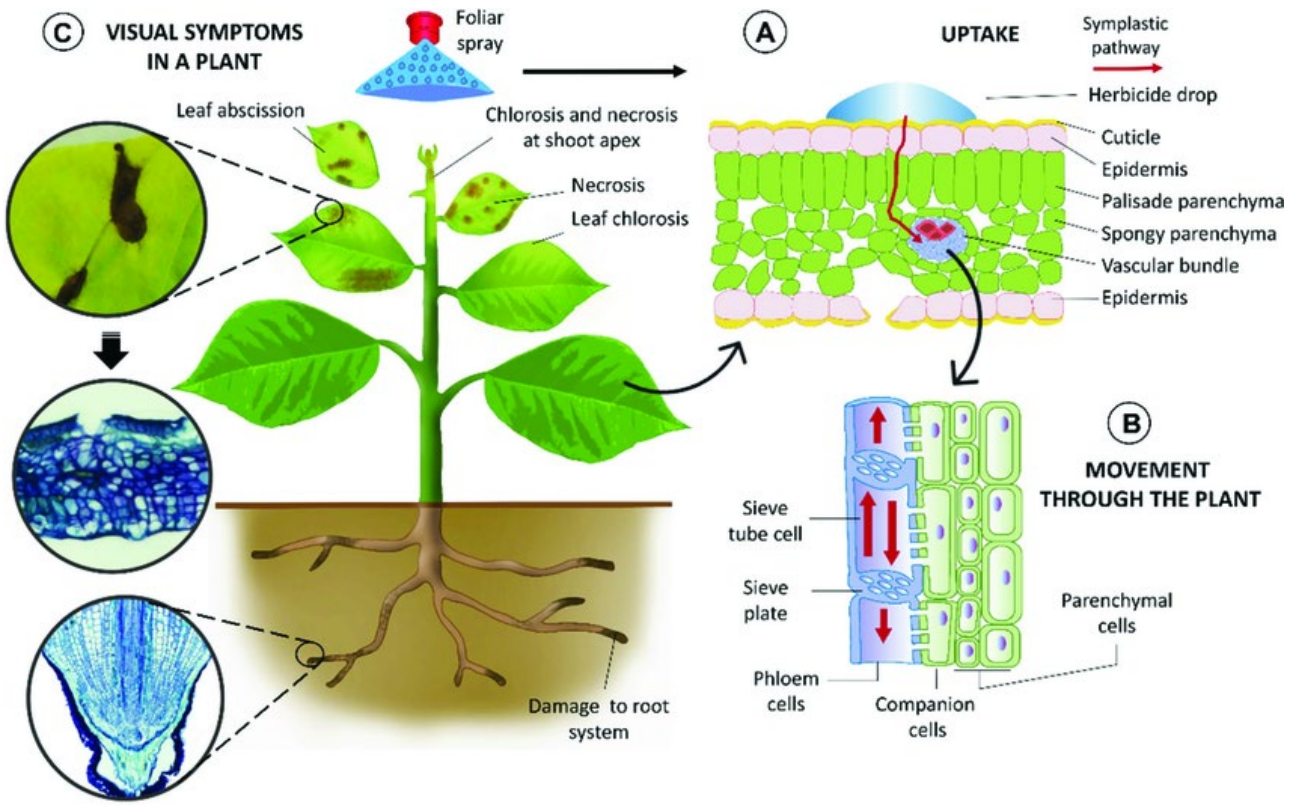
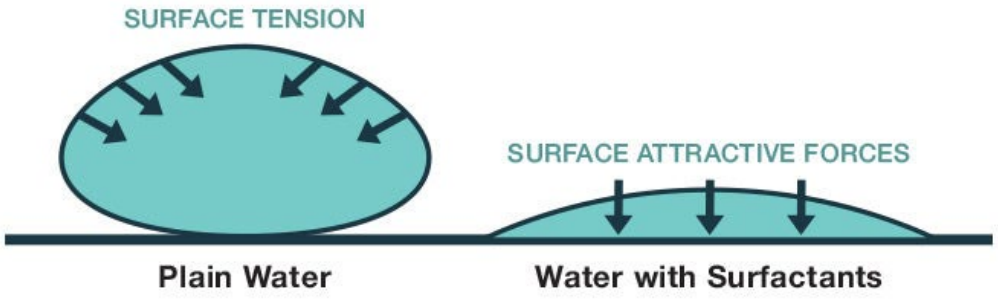
- Drift Control Agent
- **Marker dye**

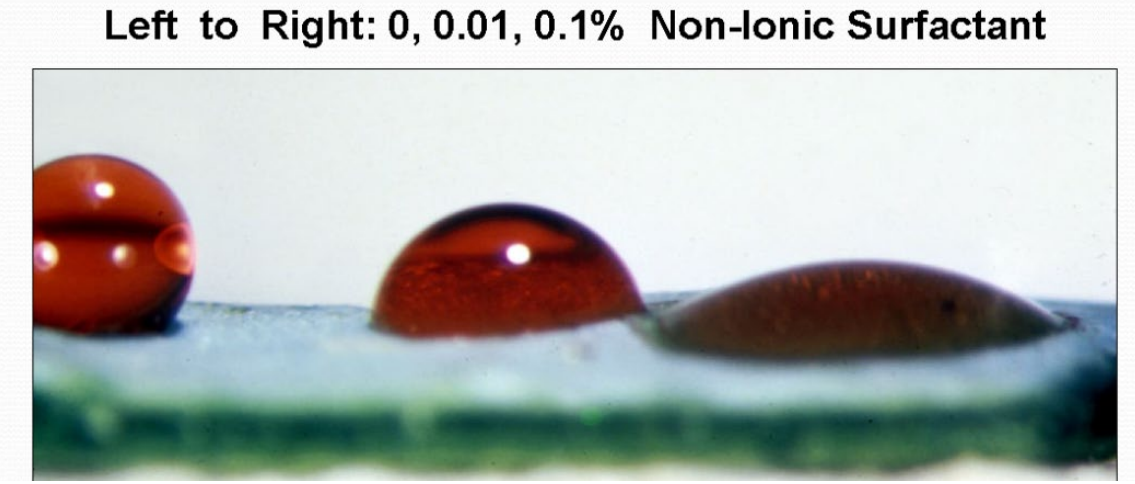
Types of surfactants and their uses



Common Surfactants

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





Non-ionic Surfactants

- Alkylphenol ethoxylates
- Alcohol ethoxylates
- Silicone-based

- Reduce surface tension
- Increase absorption
- Enhance penetration
- Reduces runoff

- 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 may antagonize Roundup
- Note can cause phytotoxicity in non-target plants

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 may antagonize Roundup
- Note can cause phytotoxicity in non-target plants

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

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

Adjuvant name	Adjuvant Type	Rainbow Trout 96-hour LC50 (mg/L)	Bluegill or other fish species 96-hour LC50 (mg/L)	Daphnia spp. 48 hour EC50 (mg/L)	Other Species (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	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/spreadder	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

ADJUVANTS Surfactant

R-11®

SPREADER ACTIVATOR - NONIONIC SURFACTANT

CPDA Certified

PRINCIPAL FUNCTIONING AGENTS

	% BY WT.
Alkylphenol ethoxylate, butyl alcohol, Dimethylpolysiloxane	90%
CONSTITUENTS INEFFECTIVE AS SPRAY ADJUVANTS	10%
Total	100%

Surfactant Content.....80%

WA Reg. No. 2935-50142

KEEP OUT OF REACH OF CHILDREN

WARNING

Specimen

What is the Active Ingredient?

CHECK THE LABEL FOR "ALKYLPHENOL ETHOXYLATE"

CALIFORNIA DEPARTMENT OF FISH & WILDLIFE

Crop or Vegetable Oil Alternatives

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%
Unsulfonated 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
...s eye irritation

...5905-50094-AA

ADJUVANTS Oil

WILBUR-ELLIS
Ideas to Grow With

COMPETITOR®

MODIFIED VEGETABLE OIL

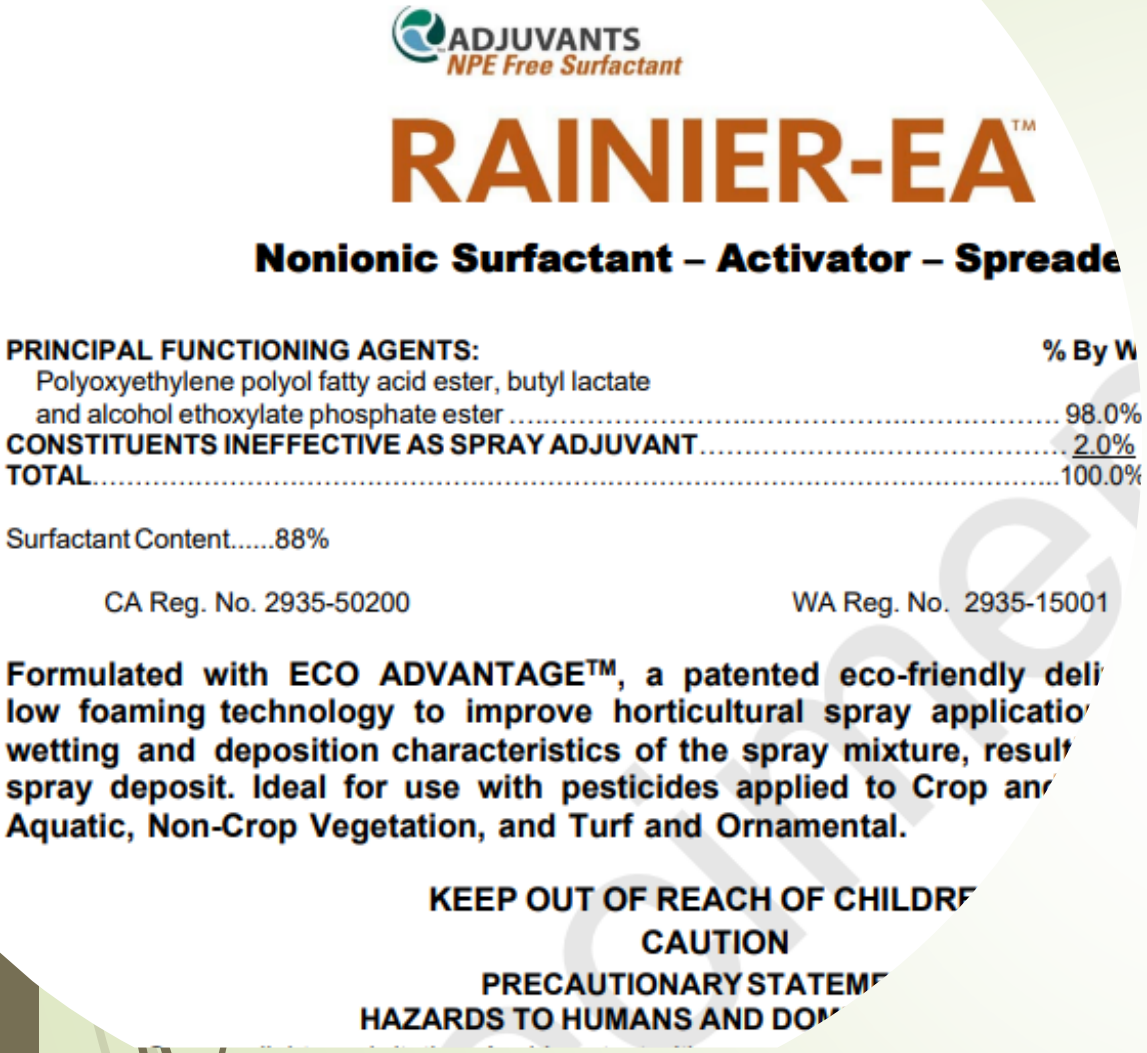
PRINCIPAL FUNCTIONING AGENTS:	**% BY WT.**
Ethyl Oleate, Sorbitan Alkylpolyethoxylate Ester, Dialkyl Polyoxyethylene Glycol	98.0%
CONSTITUENTS INEFFECTIVE AS SPRAY ADJUVANT	2.0%
TOTAL	100.0%

CA Reg. No. 2935-50173 WA Reg. No. 2935-04001

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

Specimen

CALIFORNIA DEPARTMENT OF FISH & WILDLIFE


ADJUVANTS
NPE Free Surfactant

RAINIER-EA™

Nonionic Surfactant – Activator – Spreade

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 applicatio wetting and deposition characteristics of the spray mixture, resul spray deposit. Ideal for use with pesticides applied to Crop an Aquatic, Non-Crop Vegetation, and Turf and Ornamental.

KEEP OUT OF REACH OF CHILDR

CAUTION

PRECAUTIONARY STATEM

HAZARDS TO HUMANS AND DO

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.

CALIFORNIA DEPARTMENT OF FISH & WILDLIFE

WILBUR-E
Ideas tr

ADJUVANTS
Surfactant

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SPREADER ACTIVATOR - NONIONIC SURFACTANT

CPDA Certified

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Total	100%

Surfactant Content.....80%

WA Reg. No. 2935-50142

KEEP OUT OF REACH OF CHILDREN

WARNING

CHECK THE SIGNAL WORD

CALIFORNIA DEPARTMENT OF FISH & WILDLIFE

Specimen

Global Harmonized System

- "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

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.

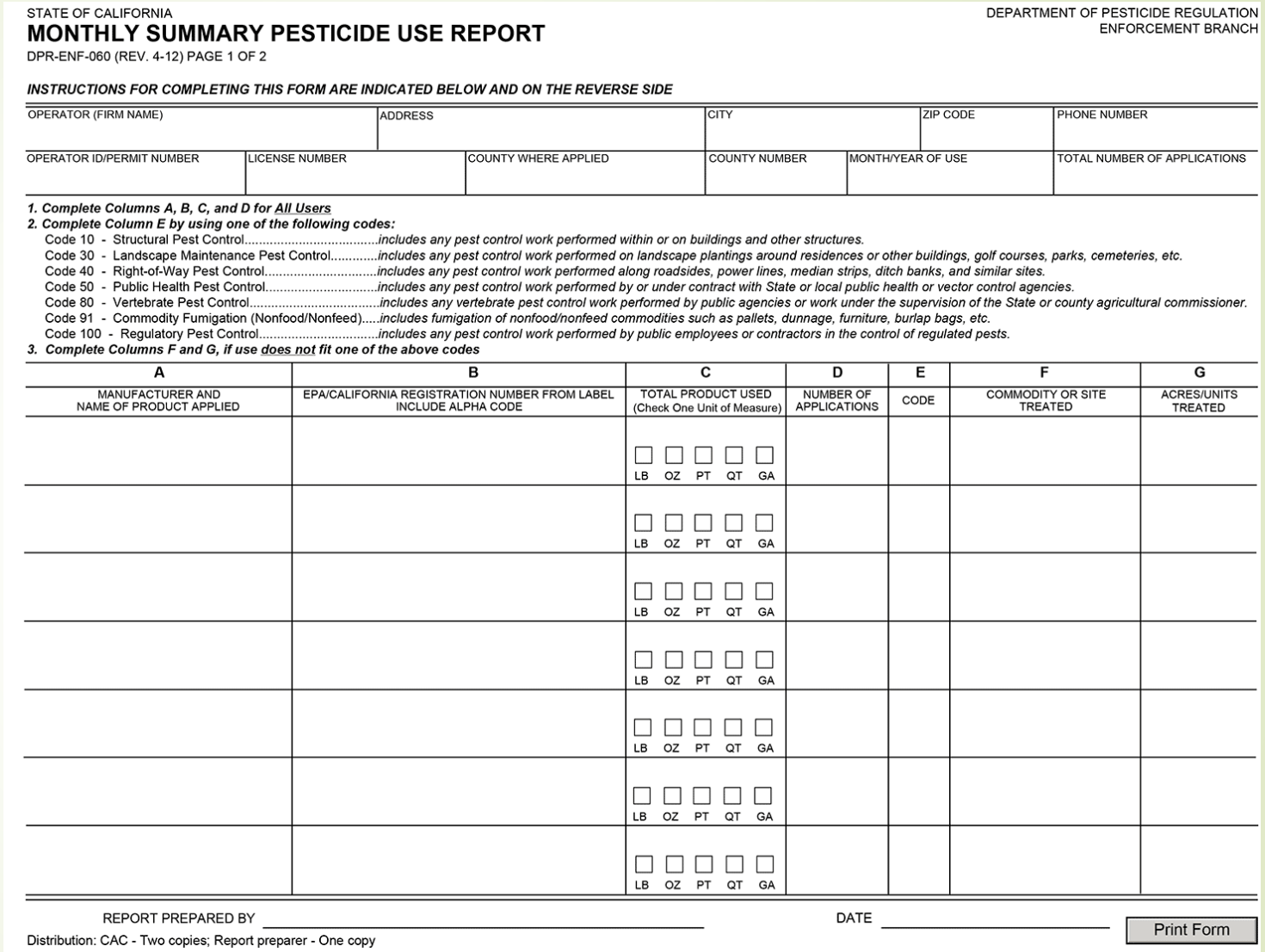
The addition of an adjuvant to some pesticides or pesticide tank mix combinations may cause phytotoxicity to the foliage and/or fruit of susceptible crops. Prior to the addition of **AGRI-DEX®** to spray tank mixes or prior to the use of **AGRI-DEX®** with a pesticide or fertilizer where an oil concentrate 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	B	C	D	E	F	G
MANUFACTURER AND NAME OF PRODUCT APPLIED	EPA/CALIFORNIA REGISTRATION NUMBER FROM LABEL INCLUDE ALPHA CODE	TOTAL PRODUCT USED (Check One Unit of Measure)	NUMBER OF APPLICATIONS	CODE	COMMODITY OR SITE TREATED	ACRES/UNITS TREATED
		☐ LB ☐ OZ ☐ PT ☐ QT ☐ GA				
		☐ LB ☐ OZ ☐ PT ☐ QT ☐ GA				
		☐ LB ☐ OZ ☐ PT ☐ QT ☐ GA				
		☐ LB ☐ OZ ☐ PT ☐ QT ☐ GA				
		☐ LB ☐ OZ ☐ PT ☐ QT ☐ GA				
		☐ LB ☐ OZ ☐ PT ☐ QT ☐ GA				
		☐ LB ☐ OZ ☐ PT ☐ QT ☐ 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 **still** coming!

State Water Resources Control Board
1001 I Street, Sacramento, California, 95814

(http://www.waterboards.ca.gov/)

WATER QUALITY ORDER 20XX-XXXX-DWQ
NPDES NUMBER. CAG0000XX

STATEWIDE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) GENERAL PERMIT FOR DISCHARGES FROM PEST CONTROL APPLICATIONS TO WATERS OF THE UNITED STATES

The following Dischargers may apply for coverage under this Order in compliance with the waste discharge requirements set forth in this Order:

2.5. Adjuvants Covered

This General Permit allows for the discharge of adjuvants containing the active ingredient represented by the surrogate nonylphenol.

This General Permit also allows for the discharge of other adjuvants that are not represented by the surrogate nonylphenol so long as the adjuvant product meets all the following use criteria:

1. Approved for use by the California Department of Pesticide Regulation. If an adjuvant becomes unregistered, the Discharger is no longer allowed to use the previously registered adjuvant product.
2. Clearly designated for use in aquatic settings per the manufacturer's pesticide product label as approved by the California Department of Pesticide Regulation.
3. Approved for use by the State Water Board's Deputy Director of the Division of Water Quality after review of aquatic toxicity data submitted by the Discharger as part of the permit application. Applicable adjuvant Receiving Water Monitoring Triggers or monitoring and reporting requirements will be specified in the Notice of Applicability provided to the Discharger.

- How to reasonably cover other pesticide adjuvants?
- Public comment period closed 11/12- may still consider informal comments
- **Gurgagn.Chand@Waterboards.ca.gov**

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]
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Glyphosate (Roundup Custom, Rodeo)	>1 - 10	0.1 - 1	0.70 ppm
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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

Did you know?

Wildland Applicators now require **Category D (Plant Agriculture)** on their certificates/licenses

Thank you!

Krista Hoffmann, PhD

IPM Coordinator, PCA, QAC

Lands Program, CDFW

Krista.Hoffmann@Wildlife.ca.gov