Aquatic Adjuvants/Surfactants
What’s New?  What’s Available?
Where Do You Get Them?

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What's New?
Adjuvants & Surfactants

- Adjuvants are compounds that can be added to a spray solution to improve herbicide performance.
- Common adjuvants include crop oil concentrates, nitrogen sources, water conditioners, compatibility agents, drift control agents, defoaming agents and surfactants.
Surfactants (surface active agents) improve herbicide performance as a result of modifying one or more of the following spray solution characteristics:

- **mixing**, or emulsifying and dispersing oil-soluble and water-soluble molecules;
- **coverage**, or spreading and wetting on leaf surfaces;
- **spray retention**, or sticking on leaf surfaces; and
- **absorption**, or penetrating properties.

Colorado State University
In the United States, agricultural tank adjuvants are essentially unregulated except in a few isolated cases.

Washington and California require that adjuvants be registered before they can be sold.

Other states may or may not regulate adjuvants at some level.

There is no federal regulation of tank mix adjuvants.
WSU’s Pesticide Information Center On-Line (PICOL)

- 13,515 Pesticides
- 2,765 Herbicides
- 168 Special Local Need
- 632 Adjuvants
- 44 (43) Aquatic Adjuvants
Why So Many Adjuvants?

- There is no universal adjuvant that will improve performance of all herbicides for all weeds under any environmental condition.
Aquatic Adjuvant Approval

- WSDA - Pesticide Management, Registration Program
- WSDA - Natural Resource Assessment Section
- Ecology – NPDES Permits
Adjuvant Approval Criteria

The following criteria must be met to register a spray adjuvant for aquatic use in Washington:

- The adjuvant must fulfill all requirements for registration of a food/feed use spray adjuvant in Washington.
- The adjuvant formulation must contain less than 10% alkyl phenol ethoxylates (including alkyl phenol ethoxylate phosphate esters).
- The adjuvant formulation must not contain any alkyl amine ethoxylates (including tallow amine ethoxylates).
Adjuvant Approval Criteria

The adjuvant must be either slightly toxic or practically non-toxic to freshwater fish. Rainbow trout (*Oncorhynchus mykiss*) is the preferred test species.

The adjuvant must be moderately toxic, slightly toxic or practically non-toxic to aquatic invertebrates. Either *Daphnia magna* or *Daphnia pulex* are acceptable test species.
LC50 and EC50

- LC50 is the concentration of the chemical in water that kills 50% of the test organisms during a given observation period.
- EC50 is the concentration of the chemical at which a specific response (i.e., death or immobilization) would be elicited in 50% of the test organisms during a given observation period.
- Observation periods are 96 hours for Rainbow Trout and 48 hours for Daphnia.
## Ecotoxicological Categories

<table>
<thead>
<tr>
<th>Toxicity Category</th>
<th>Aquatic Organisms ppm* LC50/EC50</th>
<th>Avian (Acute Oral) mg/kg</th>
<th>Avian (Dietary) ppm</th>
<th>Mammalian (Acute Oral) mg/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practically non-toxic</td>
<td>&gt;100</td>
<td>&gt;2000</td>
<td>&gt;5000</td>
<td>&gt;2000</td>
</tr>
<tr>
<td>Slightly toxic</td>
<td>&gt;10-100</td>
<td>501-2000</td>
<td>1000-5000</td>
<td>501-2000</td>
</tr>
<tr>
<td>Moderately toxic</td>
<td>&gt;1-10</td>
<td>51-500</td>
<td>501-1000</td>
<td>51-500</td>
</tr>
<tr>
<td>Highly toxic</td>
<td>0.1-1</td>
<td>10-50</td>
<td>50-500</td>
<td>10-50</td>
</tr>
<tr>
<td>Very highly toxic</td>
<td>&lt;0.1</td>
<td>&lt;10</td>
<td>&lt;50</td>
<td>&lt;10</td>
</tr>
</tbody>
</table>

*Concentration in water
Exceptions to Criteria

- These criteria do not apply to adjuvants that are permitted for use under an aquatic EUP issued by WSDA (WAC 16-228-1460).

- These criteria do not apply to adjuvants that are labeled and intended only for the aquatic uses listed in WAC 16-228-1231(2).

- On a case-by-case basis, WSDA may register spray adjuvants for aquatic use that do not meet one or more of the above criteria if the registrant provides additional data (such as chronic aquatic toxicity studies, product physical characteristics and/or use site characteristics) which demonstrate that the proposed use will not cause unreasonable adverse effects to desirable aquatic species (including fish, aquatic invertebrates, shellfish and amphibians).
WSU's Pesticide Information Center On-Line (PICOL)
Approved Aquatic Adjuvants

- Agri-Dex
- AgriSolutions Inergy
- Atmos
- Bond
- Brandt Magnify
- Breeze
- Bronc Max
- Bronc Plus Dry
- Bronc Plus Dry-EDT
- Cide-Kick II M
- Class Act NG
- Competitor
- Cut-Rate
- Cygnet Plus
- Denali-EA
- Destiny HC
- Droplex
- Dyne-Amic
- Fast Break
- Forge
- Fraction
- Hasten-EA
- InterLock
- Kinetic
- Level 7
- LI 700
- Liberate
- NIS-EA
- One-AP XL
- Pro AMS Plus
- Rainier-EA
- Renegade-EA
- Sinker
- Sphere 7
- Spray-Rite
- Superb HC
- Syl-Tac-EA
- Tactic
- Trail Blazer
- Tronic
- Turbulence
- Winfield Solutions
- Inergy
- Yardage
# Registered Adjuvant List

## Spray Adjuvants Registered for Use on Aquatic Sites in Washington (Revised December 9, 2015)

These spray adjuvants are registered for use on aquatic sites in Washington, as of December 9, 2015. Before distributing or using an adjuvant, please verify that it is currently registered in Washington.

Spray adjuvants are listed in alphabetical order. No discrimination or endorsement is intended. The aquatic acute toxicity data are from studies that were submitted by the registrants.

<table>
<thead>
<tr>
<th>Product Name / State Registration Number</th>
<th>Registrant</th>
<th>Principal Functioning Agents</th>
<th>Acute Toxicity - Rainbow Trout</th>
<th>Acute Toxicity - Daphnids</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agri-Dex / 5905-50094</td>
<td>Helena Chemical Company</td>
<td>Petroleum oil, polyoxyethylene sorbitan fatty acid ester, sorbitan fatty acid ester</td>
<td>LC50 (96 hour) &gt;1000 mg/l, Practically non-toxic</td>
<td>LC50 (48 hour) &gt;1000 mg/l, Practically non-toxic</td>
</tr>
<tr>
<td>AgriSolutions Inergy / 1381-13001</td>
<td>Winfield Solutions</td>
<td>Modified vegetable (seed) oil, polysiloxane polyether copolymer, alkyl phenol ethoxylate</td>
<td>LC50 (96 hour) 37.5 mg/l, Slightly toxic</td>
<td>EC50 (48 hour) 127.27 mg/l, Practically non-toxic</td>
</tr>
<tr>
<td>Atmos / 1381-13006</td>
<td>Winfield Solutions</td>
<td>Modified vegetable (seed) oil, saccharides, sorbitan fatty acid ester</td>
<td>LC50 (96 hour) 21.71 mg/l, Slightly toxic</td>
<td>EC50 (48 hour) 28.63 mg/l, Slightly toxic</td>
</tr>
<tr>
<td>Bond / 34704-04003</td>
<td>Loveland Products</td>
<td>Synthetic latex, alcohol ethoxylate</td>
<td>LC50 (96 hour) 190 mg/l, Practically non-toxic</td>
<td>LC50 (48 hour) 614 mg/l, Practically non-toxic</td>
</tr>
</tbody>
</table>
## Approved Aquatic Adjuvants

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Rainbow Trout</th>
<th>Toxicity - Rainbow Trout</th>
<th>Daphnids</th>
<th>Toxicity - Daphnids</th>
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</thead>
<tbody>
<tr>
<td>Agri-Dex</td>
<td>&gt;1000</td>
<td>Practically non-toxic</td>
<td>&gt;1000</td>
<td>Practically non-toxic</td>
</tr>
<tr>
<td>Fast Break</td>
<td>&gt;1000</td>
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<td>&gt;100</td>
<td>Practically non-toxic</td>
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<tr>
<td>Spray-Rite</td>
<td>782.2</td>
<td>Practically non-toxic</td>
<td>223.6</td>
<td>Practically non-toxic</td>
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<tr>
<td>Fraction</td>
<td>782.2</td>
<td>Practically non-toxic</td>
<td>223.6</td>
<td>Practically non-toxic</td>
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<tr>
<td>Cut-Rate</td>
<td>782.2</td>
<td>Practically non-toxic</td>
<td>223.6</td>
<td>Practically non-toxic</td>
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<tr>
<td>Sinker</td>
<td>750</td>
<td>Practically non-toxic</td>
<td>&gt;1000</td>
<td>Practically non-toxic</td>
</tr>
<tr>
<td>Class Act NG</td>
<td>447</td>
<td>Practically non-toxic</td>
<td>377</td>
<td>Practically non-toxic</td>
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<tr>
<td>One-AP XL</td>
<td>382.9</td>
<td>Practically non-toxic</td>
<td>223.6</td>
<td>Practically non-toxic</td>
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<tr>
<td>Brone Plus Dry-EDT</td>
<td>382.9</td>
<td>Practically non-toxic</td>
<td>223.6</td>
<td>Practically non-toxic</td>
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<tr>
<td>Brone Plus Dry</td>
<td>382.9</td>
<td>Practically non-toxic</td>
<td>223.6</td>
<td>Practically non-toxic</td>
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<tr>
<td>Bond</td>
<td>190</td>
<td>Practically non-toxic</td>
<td>614</td>
<td>Practically non-toxic</td>
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<tr>
<td>LI 700</td>
<td>130</td>
<td>Practically non-toxic</td>
<td>190</td>
<td>Practically non-toxic</td>
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<tr>
<td>Tactic</td>
<td>&gt;100</td>
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<td>310</td>
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<td>Level 7</td>
<td>&gt;100</td>
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<tr>
<td>InterLock</td>
<td>&gt;100</td>
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<td>&gt;100</td>
<td>Practically non-toxic</td>
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<tr>
<td>Droplex</td>
<td>&gt;100</td>
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<td>&gt;100</td>
<td>Practically non-toxic</td>
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<tr>
<td>Breeze</td>
<td>&gt;100</td>
<td>Practically non-toxic</td>
<td>&gt;100</td>
<td>Practically non-toxic</td>
</tr>
</tbody>
</table>
Resources

- WSU - PICOL Database: [http://picol.cahe.wsu.edu/LabelTolerance.html](http://picol.cahe.wsu.edu/LabelTolerance.html)
- WSDA – Pesticide Registration Website [http://agr.wa.gov/PestFert/Pesticides/ProductRegistration.aspx](http://agr.wa.gov/PestFert/Pesticides/ProductRegistration.aspx)
State Contracts

- Washington State Purchasing Cooperative (Co-op) ended 6/30/2013
- Master Contracts Usage Agreement (MCUA)
- Currently 1,274 users
- Vegetation Management Master Contract #04611
Eligible Organizations

- State Agencies
- State Boards
- State Commissions
- Higher Education Institutions
- Offices of Separate Elected Officials
- Local Government Agencies
- Federal Agencies
- Washington State Tribal Entities
- Public Benefit Non-profit (PBNP)
# Search Contracts

Search results for keywords: **herbicide**

--- Select Contract List --- or

herbicide

Enter 1 - 5 keyword(s), contract # or partial vendor name.
Click on column heading to sort search results.

<table>
<thead>
<tr>
<th>Contract #</th>
<th>Contract Title</th>
<th>Award Date</th>
<th>Exp. Date</th>
<th>WTO</th>
<th>Diversity</th>
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</thead>
<tbody>
<tr>
<td>02413</td>
<td>ANALYTICAL LABORATORY SERVICES</td>
<td>10-24-2013</td>
<td>10-31-2016</td>
<td>N</td>
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<td>02811</td>
<td>HERBICIDE/ANTI-ICER SPRAYERS</td>
<td>07-28-2011</td>
<td>07-31-2017</td>
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<td>04611</td>
<td>VEGETATION MANAGEMENT</td>
<td>02-08-2012</td>
<td>02-07-2018</td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>
State Contract - Herbicides

Vegetation Management

Contract#: 04611  Replaces: 08205
This contract is for pesticides and herbicides.
This contract is awarded by regions as established by the Washington State Department of Transportation. The awarded contractors are Wilbur-Ellis Company (WEC) and Crop Production Services, Inc. (CPS). Delivery location will determine which contractor to utilize.

Note: If restrictions of any kind prohibit use of certain products in an area, it is the purchaser's responsibility to be familiar with such restrictions and purchase accordingly.

Current Term Start Date: 02-08-2016  Award Date: 02-08-2012  Est. Annual Worth: $1,387,691
Diversity: 0% WBE 0% MBE  # of Bids Received: 4
Contact Info: Master Contracts & Consulting – Melanie Williams at (360) 407-9399 or melanie.williams@des.wa.gov

Who can use this contract?
- Organizations with Master Contract Usage Agreements
- Oregon Coop Members

Current Documents
- Contract & Amendments
- Pricing & Ordering Information

Historical Documents
- Original Solicitation
- Original Solicitation Amendment
- Bid Tab

Resources
- Contract Comments
- Vendor and Contract Performance Feedback
- Best Buy Form

Contractors

<table>
<thead>
<tr>
<th>Contractors</th>
<th>OMWBE</th>
<th>Veteran</th>
<th>Small Business</th>
</tr>
</thead>
<tbody>
<tr>
<td>CROP PRODUCTION SERVICES INC. - W8553</td>
<td></td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>WILBUR-ELLIS COMPANY - W8525</td>
<td></td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>
Washington State Herbicide Purchasing Contract

Contractors by Region

Updated: 6/10/2016

Contractor

- **Blue**: Wilbur Ellis
- **Red**: Crop Production Services

No warranty is made by WSDA as to the accuracy, reliability, or completeness of this data for individual or aggregate use with other data. Data was compiled from county noxious weed control board staff, WSU Cooperative Extension and other sources. This product may be updated without notification. Information use only. Not for legal use.
SePro - Procellacor

- controlling Eurasian Milfoil and hybrids at rates under a part per billion with very short contact exposure time.

- It should have it’s US EPA registration between April and September of 2017.
Dow – Vastlan Herbicide

- Vastlan™ is a herbicide developed by Dow AgroSciences for the control of woody plant species and annual and perennial broadleaf weeds on industrial vegetation management, aquatic, Conservation Reserve Program (CRP), range and permanent grass pastures sites and grasses grown for hay.

- Vastlan herbicide is formulated as a soluble liquid (SL) and contains 4 pounds acid equivalent per gallon (lbs ae/ gallon) of triclopyr choline, Garlon 3A contains 3 pounds ae/gallon.

- The choline formulation of triclopyr reduced the signal from “Danger” on Garlon 3A to “Warning”. This reduced toxicity and higher concentration sets Vastlan herbicide apart from its predecessor Garlon® 3A. Grass tolerance and weed control spectrum of Vastlan herbicide is the same as Garlon 3A.

- Received registration in Washington State a few weeks ago.