NORTHWEST CENTER FOR ALTERNATIVES TO PESTICIDES

Best Management Practices to Protect Water and Fish

BIFENTHRIN

Broad-spectrum insecticide/miticide
Sold in 200+ products. Selected products include:[1]

Restricted Use: Aceto, Aloft, Avalon, Bifen, Bifender, Bifenture, Brigade, Capture, Discipline, Fanfare, Firebird, Menace, Onyxpro, Ruckus, Sniper, Talstar, Up-Star SC, Wisdom, Xpedient **General Use:** Avalon, Attain, Baseline, BFN, Bisect, Cross X Check, Compare-n-Save Indoor/Outdoor, Duraturf, Farmworks Indoor/Outdoor, Grants Kills, Hi-Yield (various), Max-Pro, Maxxpro, Maxxthor, Menace, Onyx, Ortho Home Defense, Permatek, Snap Pac, Talstar, Totality, Up-Star, Wisdom

Bifenthrin is a Problem in Oregon's Willamette Valley Streams

- Concentrations of bifenthrin are very high in some areas. Average concentrations in water samples collected from 2010-2015 exceeded levels set to protect aquatic life in the Clackamas subbasin and approached these levels in the Yamhill subbasin. In sediments, pilot monitoring conducted in 2014 showed levels of bifenthrin in some watersheds exceeding benchmarks by 1,000-10,000 times.[2]
- Bifenthrin moves into streams easily from a number of urban/residential uses, such as pet shampoos and drain treatments, runoff from impervious surfaces, and runoff from rights-of-way. Agricultural uses of bifenthrin result in stream depositions primarily through drift and soil erosion.

The Chemical Properties of Bifenthrin Predispose It to Be a Water Pollutant

Chemical Property	Bifenthrin Rank[3]	Why it Matters for Pollution
Soil Persistence (half-life)	Persistent	More persistent pesticides stick around, with more opportunities to get carried to streams.
Breakdown in Water	Resistant	Once in streams, pesticides can break down by reacting with water (hydrolysis), light (photolysis) or interacting with live organisms (metabolic). Bifenthrin is resistant to hydrolysis and photolysis and only slowly metabolized.
Bioconcentration	High	Pesticides that concentrate in fish or wildlife may harm the animal or create a hazard when eaten. Such pesticides are typically lipophilic (fat-loving) and may also accumulate (magnify) in the food chain.

Rank: red – yellow – green shading above indicates relative risk of pollution (red high).

Average Concentrations Exceed Levels Set to Protect Aquatic Life in Some Areas

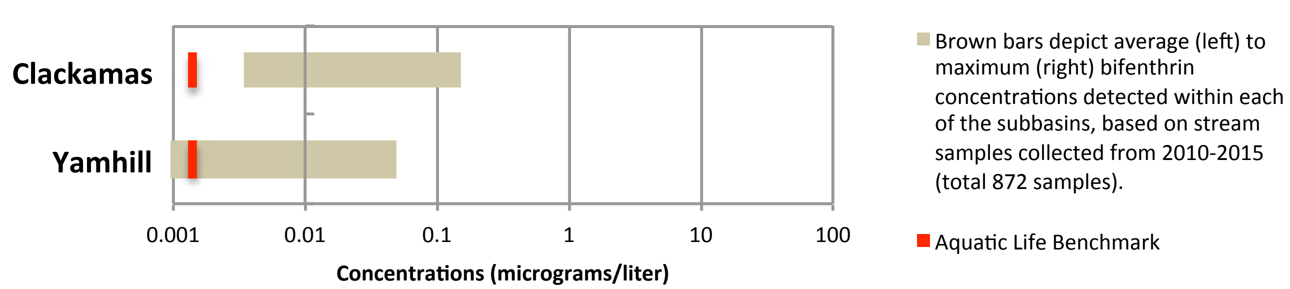


Photo: United States Fish and Wildlife Service

Harmful Effects of Bifenthrin to Salmon, Steelhead or Their Habitat

- Salmon, steelhead and their habitat are quite vulnerable to this pesticide. EPA concluded that most uses of bifenthrin will result in aquatic concentrations that could cause lethal and sublethal impacts to freshwater invertebrates (salmon and steelhead prey), while nursery, turf, residential, and agricultural uses will result in aquatic concentrations that could cause sublethal impacts to freshwater fish.[4]
- Bifenthrin has been documented concentrating in aquatic invertebrates and fish at 4,600 times[5] to 28,000 times[6] levels in the surrounding water.

Pay Attention to the Label

Bifenthrin product labels warn that the product is **extremely toxic to fish and aquatic invertebrates** and warn against making applications when weather favors drift from treated areas. Labels for products meant for urban uses prohibit allowing the pesticide to runoff into storm drains, ditches, gutters, or surface waters.

Many bifenthrin labels warn that use is prohibited in areas that may result in exposure of endangered species.

Many bifenthrin product labels require a 10-ft (25-ft on some products) vegetative filter strip between field edges and down gradient aquatic habitat. Many labels also prohibit ground application within 25 feet of aquatic habitats and prohibit aerial applications within 150 feet to 450 feet (ultra-low volume applications).

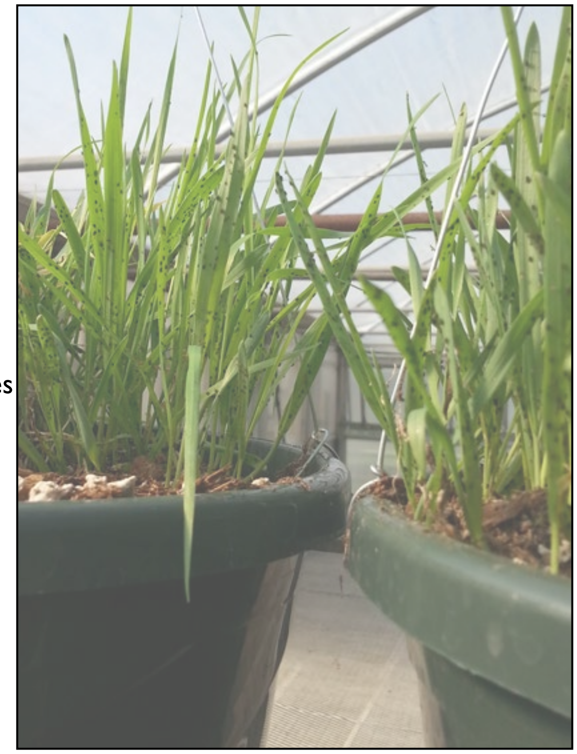
Many labels contain mandatory drift reduction measures.

Registered Uses in Oregon

Foods: A wide range of vegetables, berries and herbs; hazelnuts, hops, tree fruit
Grasses and Forage/Fodder: Field corn, grass seed, hay, pasture, rangeland, sudangrass
Nurseries and Ornamental: Nursery, greenhouse, container, plant growth media
Other: Asphalt, buildings, industrial sites, food processing areas, cats, dogs, bird cages, animal quarters, mosquito breeding sites, rights-of-way (railroad, roadside and utility), fencerows, wood treatment
Tree Crops: Conifers, Christmas trees
Residential/Urban: Indoor and outdoor residential uses, schools, hospitals, sewers, houseplants

Alternative Strategies to Reduce Insect Pressure

- Promote plant vigor by maintaining healthy soil[7] and plant pest-resistant cultivars if available.
- Prevent or suppress pests with cultural strategies, where possible and recommended, to make the area less hospitable to the pest. For example, delaying planting dates can inhibit pests such as flea beetles and cabbage maggots. Certain crop rotations interrupt the life cycle for corn rootworm, wireworms, Colorado potato beetle, and symphylans.[8] Removing known alternate hosts reduces pest resources. Pests such as spider mites thrive under dusty or dry conditions, so employ dust control methods and provide adequate water.
- Treat the cause of the problem first. For example, in structures, prevent or fix wood moisture issues and don't allow ants or cockroaches to access food.
- Use exclusions or barriers. For example, trees that drip sticky "honeydew" can be base-coated with a sticky barrier to prevent ant access and reduce aphid honeydew production.
- Avoid perimeter sprays around buildings for pests such as ants. Seal openings and use baits instead.
- Pheromones (chemicals produced by an insect to communicate) can be used in many crops for monitoring–or for mass trapping or mating disruption, suppressing insect populations. Mating disruption for codling moth is currently used on 90% of the apples and pears grown in Washington State.[9]
- Mass-trap pests using trap crops, pheromone technology or baits. Mass-trapping with the aid of a pheromone was found to significantly reduce western flower thrip in strawberries.[10] In Washington and Idaho, trap crop designs including mustard, rape and pak choi were found to reduce populations of flea beetles on broccoli more effectively than trap crops with only one species.[11]
- Support biological pest control by natural enemies (predators or parasites on the pest). Many biocontrols can be purchased from commercial providers. Conserving or creating on-farm or garden habitats (such as beetle banks, cover crops, alley cover crops or hedgerows) also supports native natural enemies (conservation biocontrol).[12] Such habitats also provide habitat for native pollinators, important to many Oregon crops. Research appropriate plants to ensure the biocontrol habitats don't increase host plants for pests of concern.
- Systems such as banker plants in greenhouses allow ongoing rearing of natural enemies (predators or parasites) of the pest.
- Check with Oregon State, Washington State or University of California extension for advice on specific pests.



Banker Plants | Photo: Kelly Vance

Protect Fish – Keep it Out of the Water

Suggested Best Management Practices

Especially adjacent to permanent water bodies or on bare soils

Reduce Drift:

In agriculture, drift is a more common route for bifenthrin to enter streams than erosion.[13]

1. Apply by ground rather than air.
2. Apply only when wind speeds are between 2-8 mph and only when winds are blowing away from streams.
3. Adjust nozzles to coarse droplet sizes. For airblast sprayers, airflow adjustment is important. Studies in grapes show airflow adjustments resulting in 82% improvement in spray deposition, with a corresponding spray drift reduction of 70%.[14] Also, use shields, precision or "smart" sprayers or other drift reduction technology. Tunnel sprayers designed to contain and recycle spray over berry and vineyard rows also result in far less drift than conventional airblast sprayers, reducing drift by up to 95% and reducing chemical usage by 40%.[15]
4. Increase untreated setbacks (no-spray buffers) next to streams, especially for aerial applications or if no windbreak or drift barrier is present.

Reduce Erosion and Runoff:

1. Reduce application rates, spot spray or conduct banded or bait applications instead of broadcast.
2. Avoid application on impervious (hardened) or saturated surfaces, especially when significant rainfall is expected. Avoid application to hardened sites in urban or residential areas. For containerized crops, take care to ensure pesticide is applied only to pots.
3. Bifenthrin will bind tightly to soil and is transported more easily to streams if erosion occurs. Use sprinkler or drip irrigation to prevent sediment suspension, rather than rill or flood irrigation. Mulching furrows or using polyacrylamide (PAM) can also reduce sediment-bound pesticides from leaving the field.[16] Other techniques include:
   -Strip cropping (strips of perennial vegetation alternated with cultivated strips on contours),
   -"Perms" (grass strips) or cover crops between rows of conifer plantations, berries, orchard crops, or grapes,[17]
   -Reduced-tillage, which helps maintain organic material on site, holding soil in place,
   -Straw ropes, laid across the contour on sloped sites, to runoff and erosion.[18]
4. Infiltrate concentrated, channeled runoff leaving the treated sites using grassed waterways.[19] Sediment-control measures such as grass-filter strips or sediment-retention ponds can be helpful. Such techniques trap sediment and promote infiltration, reducing pesticide loading to adjacent ditches and streams. While large variability exists, a review found, on average:[20]
   -a 17 ft. wide vegetative strip reduces pesticide loading by 50%,
   -a 33 ft. wide vegetative strip reduces pesticide loading by 90%,
   -a 67 ft. wide vegetative strip reduces pesticide loading by 97%.

Pesticide Selection:

1. Use a product that is less toxic (check SDS sheets or talk to your crop consultant or extension specialist). Botanical extracts and microbials are effective against many pests and widely available, and these products can be less toxic to non-targets.
2. Avoid tank mixes and formulations containing multiple active ingredients, which may cause additive or synergistic effects.

1 This list includes product names that are formulated with no other active ingredients and contain bifenthrin concentrations >1%.
2 Oregon Pesticide Stewardship Partnership Program data, 2010-2015. Samples collected 7-14 days apart during growing season. Sampling sites may not represent first-order streams and small, static, water bodies adjacent to bifenthrin use areas, thus sampling data may underestimate true peaks and averages.
3 Ranking based on reported values in U.S. EPA, 2016 (Endnote 5). Persistence ranking follows National Pesticide Information Center (NPIC) classification. Bioconcentration ranking follows McBrien, S. [and others]. 1987. Hazard Ranking System Issue Analysis: Classification of Hazardous Substances for Potential to Accumulate in the Food Chain.
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