



***POLLINATOR PROTECTION
REQUIREMENTS FOR SECTION 18
EMERGENCY EXEMPTIONS AND
SECTION 24(c) SPECIAL LOCAL
NEED REGISTRATIONS IN
WASHINGTON STATE***

***REGISTRATION SERVICES PROGRAM
PESTICIDE MANAGEMENT DIVISION
WASHINGTON STATE DEPARTMENT OF AGRICULTURE***

AGR PUB 631-225 (R/03/30/2010)

TABLE OF CONTENTS

- I. Introduction to WSDA Section 18 and SLN Pollinator Protection Requirements ... page 3
- II. WSDA Active Ingredient Requirements for Pollinator Protection Statements ... page 3
- III. WSDA Crop / Site Requirements for Pollinator Protection Statements ... page 5
- IV. Format of WSDA Pollinator Protection Statements ... page 7
- V. Background Information
 - a. Bee Pollination of Crops Grown in Washington State ... page 8
 - b. Bee Kills Reported in Washington State ... page 8
 - c. Selected References ... page 9

I. Introduction to WSDA Section 18 and SLN Pollinator Protection Requirements

Pollinator Protection Statements (PPS) are required for pesticides that (1) are highly or moderately toxic to adult bees (or adversely affect brood development), and (2) are applied to a crop or site that is attractive to bees or has been determined by WSDA to be associated with bee kills.

Insecticides are classified as being highly toxic (acute LD₅₀ less than 2ug/bee), moderately toxic (acute LD₅₀ 2ug/bee to 10.99ug/bee), slightly toxic (acute LD₅₀ 11ug/bee to 100ug/bee) or practically non-toxic (acute LD₅₀ more than 100ug/bee) to adult bees. Insecticides that are highly or moderately toxic to bees are further classified as having a long (more than 8 hours), intermediate (4 to 8 hours) or short (less than 4 hours) residual hazard to adult bees. The length of residual hazard depends on the active ingredient, formulation, species of bee, use rate, weather conditions, and repellency (e.g. certain pyrethroids when used under arid conditions).

PPS are not generally required for insecticides that are slightly toxic or practically non-toxic to adult bees, unless adverse effects on brood (larval and/or pupal) development have been reported (e.g. fenoxycarb, flubendiamide, novaluron, spirotetramat). PPS are not generally required for other types of pesticides (e.g. fungicides, herbicides). However, certain fungicides (e.g. boscalid, captan, iprodione, pyraclostrobin) require PPS, since adverse effects on brood development have been reported. PPS are based on toxicity, residual hazard and WSDA's experience with bee kill incidents. PPS are subject to revision by WSDA. Alternative PPS will be reviewed by WSDA to determine if they provide adequate pollinator protection.

II. WSDA Active Ingredient Requirements for Pollinator Protection Statements (PPS)*

- a. Do not apply to blooming crops or broadleaf weeds, PPS required by WSDA (highly or moderately toxic to adult bees):

Abamectin (more than 0.025 lb ai/ acre)	Fenvalerate (more than 0.1 lb ai/acre)
Acephate	Gamma-cyhalothrin (0.015 lb ai/acre)
Azinphos-methyl	Imidacloprid (0.25 lb ai/acre)
Bendiocarb	Lambda-cyhalothrin (0.03 lb ai/acre)
Bifenthrin (0.06 lb ai/acre or more)	Malathion ULV (8 fl oz/acre or more)
Carbaryl WP	Malathion WP
Carbaryl XLR (more than 1.5 lb ai/acre)	Methamidophos
Carbaryl 4F (2.0 lb ai/ acre or more)	Methidathion
Carbofuran F	Methiodicarb
Chlorpyrifos EC or WP	Methyl parathion EC or ME
Clothianidin	Naled
Cyfluthrin	Permethrin (Western Washington)
Cypermethrin (more than 0.025 lb ai/acre)	Phosmet
Diazinon EC or WP	Pirimiphos-methyl
Dimethoate EC or WP	Propoxur
DDVP (Dichlorvos)	Thiamethoxam
Esfenvalerate (0.0375 lb ai/acre)	Zeta-cypermethrin
Fenpropathrin	

- b. Do not apply to blooming crops or broadleaf weeds, PPS required by WSDA (adverse effects on brood development have been reported):

Boscalid	Novaluron
Captan	Pyraclostrobin
Fenoxycarb	Spirodiclofen
Flubendiamide	Spirotetramat
Iprodione	Ziram

- c. When crops or broadleaf weeds are blooming apply in late evening only (between 6PM and Midnight), PPS required by WSDA:

Abamectin (0.025 lb ai/ acre or less)	Gamma-cyhalothrin (0.01 lb ai/acre)
Bifenthrin (0.04 lb ai/acre)	Imidacloprid (0.1 lb ai/acre)
Carbaryl XLR (1.5 lb ai/acre or less)	Lambda-cyhalothrin (0.02 lb ai/acre)
Carbaryl 4F (1.0 lb ai/ acre or less)	Malathion EC
Disulfoton EC (1.0 lb ai/acre)	Oxamyl (1 lb ai/acre or more)
Endosulfan (more than 0.5 lb ai/acre)	Permethrin (Eastern Washington)
Esfenvalerate (0.025 lb ai/acre)	Tebufenozide
Fenvalerate (0.1 lb ai/acre or less)	Trichlorfon
Fipronil	

- d. When crops or broadleaf weeds are blooming apply between late evening and early morning only (between 6PM and 7AM), PPS required by WSDA:

Acetamiprid	Malathion ULV (3 fl oz/acre or less)
Azadirachtin	Methomyl
Bifenazate	Oxamyl (0.5 lb ai/acre or less)
Bifenthrin (less than 0.04 lb ai/acre)	Oxydemeton-methyl
Chlorfenapyr	Petroleum oil / horticultural mineral oil
Chlorpyrifos ULV (0.05 lb ai/acre or less)	Pirimicarb
Cypermethrin (0.025 lb ai/acre or less)	Propoxur ULV (0.07 lb ai/acre or less)
Cyromazine	Pymetrozine
DDVP (Dichlorvos) ULV (0.1 lb ai/acre or less)	Pyrethrins
Deltamethrin	Pyridaben
Diatomaceous earth	Rotenone
Disulfoton EC (0.5 lb ai/acre)	Spinetoram
Emamectin benzoate	Spinosad
Endosulfan (0.5 lb ai/acre or less)	Thiacloprid
Fluvalinate	Thiodicarb
Formetanate hydrochloride	Tralomethrin
Indoxacarb	

e. PPS not required by WSDA:

Acequinocyl	Ethoprop granular
Aldicarb granular – Applied at least 4 weeks before bloom	Etoxazole
Allethrin	Fenbutatin-oxide
Amitraz	Fenpyroximate
Ammonium thiosulfate	Flonicamid
<i>Bacillus thuringiensis</i>	Garlic
<i>Beauvaria bassiana</i>	Hexythiazox
Buprofezin	Kaolin clay
Capsaicin	Lime-sulfur (calcium polysulfide)
Carbaryl bait or granular	Malathion granular
Carbofuran granular	Metaldehyde bait
Chlorantraniliprole	Methoxyfenozide
Chlorpyrifos granular	NAA (1-Naphthaleneacetic acid)
Clofentezine	Phorate granular
Cryolite	Potassium salts of fatty acids
<i>Cydia pomonella</i> granulosis virus	Potassium silicate
Cyhexatin	Propargite
Diazinon granular	Propoxur granular
Dicofol	Pyriproxyfen
Diflubenzuron	Sulfur
Disulfoton granular	Triazamate
Ethephon	

*Products which will not contact bloom (e.g. soil-applied products, seed treatment products) do not require PPS.

III. WSDA Crop / Site Requirements for Pollinator Protection Statements (PPS)

- ***Alfalfa hay or Alfalfa grown for seed:*** PPS required due to concern with blooming crop. There are some exceptions to the active ingredient requirements noted above, due to different sensitivities of alkali bees and alfalfa leafcutting bees (compared with honey bees).
- ***Apple:*** PPS required due to concern with blooming crop and broadleaf weeds.
- ***Apricot:*** PPS required due to concern with blooming crop and broadleaf weeds.
- ***Aquatic site:*** PPS not required.
- ***Asparagus or Asparagus grown for seed:*** PPS required due to concern with blooming crop.
- ***Barley:*** PPS not required.
- ***Bean:*** PPS required due to concern with ***blooming lima beans only***. PPS not required for other species of beans.
- ***Blueberry:*** PPS required due to concern with blooming crop and broadleaf weeds.
- ***Buckwheat or Buckwheat grown for seed:*** PPS required due to concern with blooming crop.

- ***Cabbage***: PPS not required.
- ***Cabbage grown for seed***: PPS required due to concern with blooming crop.
- ***Canola***: PPS required due to concern with blooming crop.
- ***Carrot***: PPS not required.
- ***Carrot grown for seed***: PPS required due to concern with blooming crop.
- ***Cherry***: PPS required due to concern with blooming crop and broadleaf weeds.
- ***Chickpea (Garbanzo bean)***: PPS not required.
- ***Christmas trees***: PPS not required.
- ***Clover hay or Clover grown for seed***: PPS required due to concern with blooming crop.
- ***Corn***: PPS required due to concern with pollen-shedding corn.
- ***Cottonwood / Poplar plantations***: PPS required due to concern with blooming broadleaf weeds. In addition, trees may be visited by honey bees as a source of propolis.
- ***Cranberry***: PPS required due to concern with blooming crop and broadleaf weeds.
- ***Cucumber***: PPS required due to concern with blooming crop.
- ***Currant***: PPS required due to concern with blooming crop and broadleaf weeds.
- ***Evening primrose***: PPS required due to concern with blooming crop.
- ***Flower bulb (Daffodil, Iris, Lily, Tulip)***: PPS not required.
- ***Garlic***: PPS not required.
- ***Grape (wine or juice)***: PPS required due to concern with blooming broadleaf weeds.
- ***Grass hay or Grass grown for seed***: PPS not required (unless grass hay is grown with a legume, such as alfalfa or clover, that is attractive to bees).
- ***Holly***: PPS required due to concern with blooming crop.
- ***Hops***: PPS not required.
- ***Lentils***: PPS not required.
- ***Mint***: PPS required due to concern with blooming crop.
- ***Mushroom***: PPS not required.
- ***Nectarine***: PPS required due to concern with blooming crop and broadleaf weeds.
- ***Onion***: PPS not required.
- ***Onion grown for seed***: PPS required due to concern with blooming crop.
- ***Pea***: PPS required due to concern with ***blooming Austrian winter peas (Lathyrus spp.) only***. PPS not required for other species of peas.
- ***Peach***: PPS required due to concern with blooming crop and broadleaf weeds.
- ***Pear***: PPS required due to concern with blooming crop and broadleaf weeds.

- **Pepper:** PPS not required.
- **Plum:** PPS required due to concern with blooming crop and broadleaf weeds.
- **Potato:** PPS required due to concern with drift onto adjacent blooming seed crops.
- **Pumpkin:** PPS required due to concern with blooming crop.
- **Radish:** PPS not required.
- **Radish grown for seed:** PPS required due to concern with blooming crop.
- **Raspberry:** PPS required due to concern with blooming crop and broadleaf weeds.
- **Rhododendron:** PPS required due to concern with blooming crop.
- **Spinach or Spinach grown for seed:** PPS not required.
- **Strawberry:** PPS required due to concern with blooming crop and broadleaf weeds.
- **Timothy/alfalfa hay or timothy/clover hay:** PPS required due to concern with blooming legume crop.
- **Tomato:** PPS not required.
- **Watermelon:** PPS required due to concern with blooming crop.
- **Wheat:** PPS not required.

IV. Format of WSDA Pollinator Protection Statements (PPS)

PPS shall consist of a description of the hazard to bees, followed by a statement consistent with WSDA requirements for the active ingredient and the crop / site. Here are several examples of PPS that have been approved by WSDA:

1. Insecticide with intermediate residual hazard to bees (disulfoton) used on **asparagus**: *“This product is toxic to bees exposed to direct application. Do not apply this product to blooming asparagus if bees are visiting the treatment area. Applications to blooming asparagus must be timed to coincide with periods of minimum bee activity, between late evening and midnight.”*
2. Insecticides with a long residual hazard to bees (acephate, chlorpyrifos) used on **carrot grown for seed**: *“This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or broadleaf weeds. Do not apply this product to blooming carrot seed during the pollination period: apply as a pre-bloom spray, or apply at the end of the pollination period. Bee colonies used for pollination should be removed from the field being treated prior to the application. Notify beekeepers pollinating crops within ¼ mile of the field to be treated at least 48 hours prior to the application.”*
3. Insecticide with long residual hazard to bees (phosmet) used on **apple, hawthorne, pear, plum and prune**: *“This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or broadleaf weeds. Do not apply this product or allow it to drift to blooming trees or broadleaf weeds. Broadleaf weed bloom must be controlled prior to the application.”*

4. Insecticides with long residual hazard to bees (carbofuran, phosmet, thiamethoxam) used on **potato**: *“NOTE: Severe bee kills have resulted from insecticides that were applied to potatoes, but drifted onto blooming seed crops. Do not allow this product to drift onto blooming seed crops.”*
5. Insecticide with a long or intermediate residual hazard to bees, depending on use rate (endosulfan), used on **alfalfa grown for seed**: *“This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or broadleaf weeds. Do not apply the 1.33 quarts per acre (1 lb ai/A) rate of this product to blooming seed alfalfa: apply at that rate as a pre-bloom or post-bloom spray only. Application of the 1.33 pints per acre (0.5 lb ai/A) rate of this product to blooming seed alfalfa must be timed to coincide with periods of minimum bee activity, between late evening and midnight.”*

V. Background Information

a. Bee Pollination of Crops Grown in Washington State

In 2005, the value of bee pollinated crops in the state of Washington was in excess of \$1.8 billion.

Bees are commercially managed for the pollination of a variety of crops in the state of Washington, including tree fruits (e.g. apple, apricot, cherry, peach, pear, plum, prune), berries (e.g. blueberry, cranberry, raspberry, strawberry), cucurbits (e.g. cucumber, pumpkin, squash, watermelon), and seed crops (e.g. alfalfa, cabbage, carrot, clover, onion, radish). Bees also pollinate a variety of fruit and vegetable plants in home gardens, as well as native plants.

The honey bee is the most widely used pollinator, although several other species of bees also pollinate crops. These include the alfalfa leafcutting bee, alkali bee, bumble bee (several species) and orchard mason bee.

b. Bee Kills Reported in Washington State

Highly toxic insecticides with a long residual hazard to bees (either applied to or allowed to drift onto blooming crops or broadleaf weeds) are responsible for the majority of the bee kills reported in the state of Washington.

From January 1, 1992, to December 31, 2005, there were approx. 176 bee kill incidents investigated by the Washington State Department of Agriculture (WSDA). The **insecticides** involved in the majority of these incidents were acephate, carbaryl, carbofuran, chlorpyrifos, dimethoate, methamidophos, methyl parathion and thiamethoxam. The **crops** involved in the majority of these incidents were apple, bean, canola, carrot seed, cherry, mint, pear and potato. In some cases, it appears that drift from the target crop onto an adjacent blooming crop was responsible for the incident. The **species of bee** involved was usually the honey bee, but there were approx. 4 incidents involving the alfalfa leafcutting bee.

In addition, there were approx. 3 incidents investigated by the WSDA that involved the intentional misuse of an insecticide (amitraz, formic acid and permethrin) by a beekeeper.

Prior to 1992, WSDA documented honey bee kills from insecticide applications to other crops, including: alfalfa hay, asparagus, clover seed, corn, holly and timothy hay. A WSU Cooperative Extension publication indicates that bumble bees have been killed by insecticide applications to

cranberry. Johansen and Mayer (1990) indicate that alkali bees were killed by insecticide applications to alfalfa hay.

c. Selected References

How to Reduce Bee Poisoning from Pesticides. Riedl, H., E. Johansen, L. Brewer and J. Barbour. 2006. Oregon State University, Corvallis, OR.
(<http://extension.oregonstate.edu/catalog/pdf/pnw/pnw591.pdf>)

Nectar and Pollen Plants of Oregon and the Pacific Northwest. Burgett, D.M., B.A. Stringer and L.D. Johnston. 1989. Honeystone Press, Blodgett, OR.

Pollinator Protection: A Bee and Pesticide Handbook. Johansen, C.A. and D.F. Mayer. 1990. Wicwas Press, Cheshire, CT.

For Additional Information, Please Contact:

Erik W. Johansen / Special Pesticide Registration Program Coordinator
Washington State Department of Agriculture
Pesticide Management Division
1111 Washington Street SE, Second Floor
PO Box 42560
Olympia, WA 98504-2560
Phone: 360-902-2078
FAX: 360-902-2093
E-mail: ejohansen@agr.wa.gov