

Extension Bulletin 0847 April 1982

# COMMERCIALY GROWN RASPBERRIES

**insect, disease, and  
weed control guide for  
Washington state**



**NOTE**

- Descriptions and biologies of raspberry pests are outlined in *Commercial Red Raspberry Production*, PNW 0176.
- Lists of chemicals in this publication indicate legally registered materials, and sequence of listing does not indicate better performance of one material over the other.
- Diseases and insects are listed according to relative occurrence: rarely encountered, occasionally encountered, or commonly encountered. These terms serve as a guideline in order to prevent or avoid continuous prophylactic or preventative sprays for pests that do not occur regularly.
- The materials marked with the following insignia (★) are materials that are very dangerous to applicators and should be handled with extreme caution.

**PESTS NOT ON PRODUCT LABEL**

Some suggested uses of pesticides in this publication are for pests not listed on product labels. These are indicated by the symbol  $\Delta$ . Such uses comply with the federal law (FIFRA) which says a use is consistent with label directions provided the crop or site is on the label and directions concerning rates and interval before harvest are followed.

**WHEN TO SPRAY**

*The purpose of this spray schedule is to help growers know when to be on the lookout for various diseases, insect pests, and weeds—not to recommend routine sprays for all the problems listed. Some diseases and other pests of raspberries occur almost every year and require routine preventative treatments. Examples are fruit rot, certain weevils, and annual weeds. However, other problems, e.g., twospotted spider mite, are sporadic in frequency and location and should be treated only as the need arises. This requires constant vigilance by the grower, so a problem, if it does occur, will not advance beyond remedy. However, the reward is a lower bill for pesticides and application, as well as protection of natural control agents which help to further reduce the "cost" of pesticides.*

**BEE POISONING**

Honey bees are necessary for complete pollination of raspberry flowers. Poor pollination results in lower yields, with small, crumbly berries.

Many of the insecticides recommended for the prebloom or postharvest periods are highly toxic to bees and should not be used during bloom. The chemicals methoxychlor and malathion may be used during bloom if they are applied in the following manner: methoxychlor, during late evening, night, or early morning; malathion EC, only during late evening. None of the recommended fungicides or herbicides applied during bloom are toxic to bees.

Contact nearby beekeepers whenever you plan to use a material that is hazardous to bees. This will prevent accidental bee kills and help establish better cooperation between growers and beekeepers.

**EXPLANATION OF FORMULATIONS**

Many of the materials listed are presented as EC or WP. EC means emulsifiable concentrate which contains a pesticide and an emulsifying agent in a suitable solvent. These are diluted with water to form an emulsion and applied as sprays. When preceded by a number, such as 2 EC, this means that there are 2 pounds of actual toxicant per gallon of formulation. WP means wettable powders which are dry forms of pesticides in which the toxicant is carried on powders that can be readily mixed with water because a wetting agent has been added. These form a suspension-type spray which must be kept agitated in a sprayer tank. When preceded by a number, such as 50 WP or 50 W, this means that there is 50 percent actual toxicant per pound of material.

All recommendations are made as formulations (the way it comes in the package); not to be confused with recommendations as active ingredient (actual pesticide) as may appear in other more technical publications.

**DISEASE AND INSECT  
CONTROL GUIDE**

Disease or Insect and Relative Occurrence	Pesticide (use one)	Amount of Formulation Per Acre*	Minimum Days Be- tween Last Application and Harvest	Remarks
<b>PREPLANT TREATMENT</b>				
Nematodes (occasional)	DD or Telone or Vidden D or Vorex	Follow manu- facturer's direc- tions	Preplant only	Have nematode analysis made and base fumigation on results. It is best to fumigate in late summer or early fall before anticipated planting in spring.
Strawberry root weevil Black vine weevil Rough strawberry root weevil (occasional)	There are no registered materials available that can be applied as a preplant or prebloom treatment.			
Woods weevil Obscure root weevil (occasional)				
<b>ESTABLISHED PLANTINGS</b> Prebloom Period				
Dryberry mite $\Delta$ (rare)	dicofol (Kelthane) $\Delta$  or  lime-sulfur	1 1/2 qt of 18 1/2% EC 1 1/2 lb of 35% WP	See remarks	Apply Kelthane in 100 gal water per acre in delayed-dormant period and repeat if needed.
		Follow manufac- turer's directions for <i>dormant</i> or <i>delayed-dormant</i> rates.	See remarks	Apply dormant spray in late winter when buds begin to swell. Apply delayed-dormant when blossom buds are out but are still tightly closed.
Powdery mildew (rare) Spur blight (common) <input type="checkbox"/> Cane blight (occasional) <input type="checkbox"/> Anthracnose (occasional) <input type="checkbox"/>	lime-sulfur	Follow manufac- turer's directions for dormant spray.	See remarks	Apply dormant spray in late winter when buds begin to swell. If anthracnose is severe, apply just before bloom at manufacturer's delayed-dormant rate.

## CONTROL GUIDE (continued)

Disease or Insect and Relative Occurrence	Pesticide (use one)	Amount of Formulation Per Acre*	Minimum Days Between Last Application and Harvest	Remarks
Spur blight (common) Anthracnose (occasional)	captan plus spreader-sticker	Follow manufacturer's directions	0	Apply just before bloom. Repeat application in 10 to 14 days if severely diseased.
Strawberry root weevil Black vine weevil Rough strawberry root weevil (occasional)	There are no registered materials available that can be applied as a preplant or prebloom treatment.			
Orange tortrix and other leafrollers (common)	azinphos-methyl (Guthion)	1 pt of 2 EC 1/2 lb of 50% WP	14	Apply only if larvae are present. Apply in 200 gal water per acre.  Apply Guthion <i>two times</i> , once on May 1 and once on May 15. These dates are based on an estimated first-bloom date of May 20, so if bloom begins earlier or later in your area, adjust spray date proportionately.  <i>Highly toxic to bees</i> —do not apply if blossoms are present.
<i>Note:</i> Instructions for chemical sprays are based on preventive measures where populations are either unknown or historically heavy. If pheromone traps are used as a survey tool then applications are based on levels of approximately 25 moths/trap/week with application commencing 10 days after peak moth flight. Some years have shown very low leafroller populations in some areas and hence no applications were necessary for this pest. Check with your county agent for instructions on use of this technique.				
Western raspberry fruitworm (occasional)	diazinon	1 qt of 4 EC 2 lb of 50% WP	7	Apply in 100 gal water per acre when bloom buds separate and again just before blossoms appear. Apply only if beetles are present. Do not apply to bloom— <i>highly toxic to bees</i> . Also controls leaf-rollers.
<b>Bloom and Harvest Periods</b>				
Leafrollers (common) □	methoxychlor	50% WP	14	Apply 3 1/2 lb per acre in sufficient water to thoroughly cover foliage and fruit, at least 100 gal. Begin applying when small larvae are present and repeat as necessary on 10-14 day schedule. Apply in <i>late evening</i> to avoid bee poisoning.
	Note survey technique discussion above in "Prebloom" section.			

## CONTROL GUIDE (continued)

Disease or Insect and Relative Occurrence	Pesticide (use one)	Amount of Formulation Per acre*	Minimum Days Between Last Application and Harvest	Remarks
Fruit rot (occasional—common if moist conditions persist)	captan	Follow manufacturer's directions	0	Apply first spray during the bloom period (10% bloom) and again 7 to 10 days later. Sprays may also be applied 3 to 5 days before harvest, at mid-harvest, and 8 to 10 days after second harvest application if the weather is cool and damp.
	or			
	benomyl (Benlate) or benomyl (Benlate) plus captan	3/4 lb of 50% WP  3/4 lb of 50% WP  Follow manufacturer's directions.	3  3	Apply at early bloom and full bloom, then at 14-day intervals as needed.  If benomyl is used, make alternate sprays with captan or use a tank mix of benomyl plus captan to help avoid buildup of benomyl-tolerant strain of fungus.
Western raspberry fruitworm (occasional)	rotenone	2 lb of 5% WP	1	Apply in 100 gal water per acre 7 days after first bloom and repeat twice at 10-day intervals. Do not use if diazinon was used prior to bloom unless beetles (adults of the fruitworm) are still seen in the field.
Spider mites (occasional—common in prolonged hot, dry weather)	dicofol (Kelthane)	1 1/2 qt of 18 1/2% EC 1 1/2 lb of 35% WP	2	Apply in 100 gal water per acre. Apply only if needed, which is rare before the end of harvest.
Obscure root weevil Black vine weevil $\Delta$ Strawberry root weevils $\Delta$ (occasional)	malathion  or  azinphos-methyl (Guthion) Guthion may only be partially effective against Black vine weevil.	2 qt of 5 EC   2 lb of 50 WP	1	Apply Malathion in 300 gal water per acre. Apply to foliage. If blossoms are present, apply in late evening when bees are not foraging. Repeat if necessary.  Apply Guthion only to the soil in the crown area. Do not apply to foliage. <i>Highly toxic to bees.</i>  It is best to apply these chemicals during the first week of June and repeat 10-14 days later to kill adults before egg deposition begins. Apply only if the species has been identified as a problem in the field.

## CONTROL GUIDE (continued)

Disease or Insect and Relative Occurrence	Pesticide (use one)	Amount of Formulation Per Acre*	Minimum Days Between Last Application and Harvest	Remarks
<b>MACHINE-HARVESTED RASPBERRIES</b>				
Aphids, leaf-hoppers, gnats, and other insect contaminants (common)	malathion	2.4 qt of 5 EC	1	Use as a spray in at least 100 gal of water per acre. Thorough coverage is important. Some insects, particularly large cutworms, will not be adequately controlled by this material.
Slugs (occasional)	metaldehyde (bait formulation only)	Follow manufacturer's instructions		Scatter bait on soil surface around plants. <i>Do not</i> contaminate berries or foliage.
<i>Note:</i> Many insects, slugs, and spiders are shaken from plants in machine-picked berries and are potential contaminants of berries going into trays. Correct adjustment of air-blast or vacuum-suction cleaner systems can lessen insect contamination of machine-picked berries. Careful timing of <i>prebloom</i> , <i>before</i> , and <i>during harvest</i> sprays will help diminish insect contamination. A high percentage of culls may occur from fruit rot. It is not practical to separate rotten berries once they are picked and in the trays. This means an adequate fungicide spray program (during bloom and preharvest) to control rot becomes more important than ever.				
<b>Postharvest Period</b>				
Spider mites (common)	Plictran <sup>□</sup>	2 lb of 50% WP	See remarks	Apply only <i>once</i> in 100 gal water per acre. <i>Postharvest</i> treatment only. Do not apply later than the end of September following harvest. Make applications only if needed, which appears to be rarely in western Washington. After September 1, high population will not damage plant enough to affect yield the subsequent year.
Crown borer (common)	diazinon	1 qt of 4 EC 2 lb of 50% WP	See remarks	Apply in 100 gal water per acre to bottom 3 feet of canes and to crowns between October 1 and March 1. October is the preferred month.
	or parathion <sup>□</sup>	1 qt of 4 EC 4 lb of 25% WP	See remarks	
	or azinophos-methyl (Guthion)	4-8 pts 2S or 2L 2-4 lb 50% WP		Same as for diazinon and parathion but using 200 gal of water.
Spur blight (common)	captan plus spreader-sticker	Follow manufacturer's instructions		Apply immediately after harvest.

\* EC=emulsifiable concentrate; WP=wettable powder (see page 2). S and L mean essentially the same as EC.

\*\* Registration of heptachlor and chlordane has been suspended for this use by EPA; however, existing stocks with these uses on the label can be used according to label directions. No substitute is registered for this use.

△ Pest does not appear on product label. See explanation on page 2.

□ A special local needs registration has been granted for this use in Washington under Section 24 (c), FIFRA.

**SPRAY COMPATIBILITY (ABILITY TO MIX) CHART  
FOR FUNGICIDES AND INSECTICIDES**

It may be to your advantage to control several problems with one spray by combining several chemicals. *Read the label* and follow the manufacturer's directions when making these mixtures. This compatibility chart is provided to help you in preliminary planning only. Compatibilities can vary from those indicated on this chart because of change in solvents and emulsifying agents, etc. It is a good idea before making a tank mixture to mix the chemicals in a jar of water at approximately the recommended dilution rate and look for any reactions that would cause solids to form and separate out of the solution. Some mixtures may create phytotoxicity problems (plant injury), so unless a label specifies otherwise, either experiment on a few plants or avoid doing it.

	Rotenone	Plictran	Parathion	Methoxychlor	Malathion	Lime-Sulfur	Kelthane	Heptachlor	Guthion	Ferbam	Diazinon	Chlordane	Captan	Benlate
Benlate	C					X		C				C		
Captan			1	1	1	X	1	1	1			1		
Chlordane													1	C
Diazinon						C								
Ferbam						X								
Guthion						X							1	
Heptachlor													1	C
Kelthane													1	
Lime-Sulfur	X	?	X	2	X				X	X	C		X	X
Malathion						X							1	
Methoxychlor		?				2				1			1	
Parathion						X							1	
Plictran				?		?								
Rotenone						X								C

Blank=Normally compatible, however, newer compatibility charts suggest not to mix unless approved by manufacturer.

C=Caution

X=Incompatible

1=Use wettable or soluble powder forms

2=Decomposes after standing when mixed with water

## WEED CONTROL GUIDE

Most weeds in raspberry fields can be controlled with herbicides. Information about safe, effective use of the herbicides is on the label. Read it. Failure to follow label directions is illegal besides causing possible crop damage or poor weed control. Among the factors that influence weed control are weed species present, stage of growth, soil moisture and texture, organic matter, and rainfall or irrigation. This weed control guide is intended to help you obtain good weed control with maximum crop safety.

Remember, herbicides are plant killers. The safety of the raspberry plants depends on applying the proper material at the correct time and rate of application. Weak, unhealthy, or cold-injured plants sometimes are damaged. Unusually wet, dry, or hot weather following application also may cause injury. Be careful. Adjust your herbicide program to meet your own particular needs.

### Wettable Powder Precautions

Many of the herbicides used for raspberries are wettable powders. They go into suspension, not solution. Therefore, constant agitation is required to keep them in suspension. Mechanical agitation is better than hydraulic agitation. The line and nozzle strainers should be at least 50 mesh. Since wettable powders are abrasive, sprayers should be re-calibrated frequently.

### Controlling Weeds Before Planting

The best time to control perennial weeds is before planting. The land can be fallowed with or without herbicides, or it can be planted to a crop that allows the use of herbicides that will control perennial weeds. Examples of this method are corn with glyphosate (Roundup) and cereals with 2,4-D, MCPA, glyphosate, or dicamba (Banvel). Time and money spent to control perennial weeds before planting will prevent using more costly weed control methods during the establishment year.

### Controlling Weeds During Establishment

Be sure the raspberry roots are well covered and the soil settled around the plants before applying any herbicide. If weeds have germinated, hoe or cultivate before application. Rainfall or sprinkler irrigation soon after application will greatly improve weed control.

Rates of application are for total acre coverage. For band application, reduce the amount of herbicide applied per acre but keep the rate of application per square foot the same. Follow wettable powder precautions (see page 7).

1. Napropamide (Devrinol) 4 pounds active ingredient (8 pounds of 50 W Devrinol) per acre. Can be applied within a few days of planting.

*Susceptible weeds.* Annual bluegrass, barnyardgrass, wild oats, chickweed, common fiddleneck, knotweed, little mallow, purslane, common sowthistle, filaree, groundsel, lambsquarter, pineapple-weed, prickly lettuce, red root pigweed.

*Resistant weeds.* Shepherdspurse, species of mustard, henbit, minerslettuce, black nightshade, smartweed, all established perennial weeds.

*Precautions.* At least 1 inch of rainfall or irrigation within a week after application is necessary for weed control, otherwise the material is degraded by sunlight. Do not use on soils with over 10% organic matter. Do not apply more than once per season.



2. Diphenamid (Enide) 6 pounds active ingredient (6.66 pounds of 90 WP Enide) per acre within a few days after planting.

*Susceptible weeds.* Annual grasses including annual bluegrass, ryegrass, barnyardgrass, foxtail, and crabgrass; common chickweed, corn spurry, redroot pigweed, mouseear chickweed, lambsquarter, smartweed, and knotweed.

*Resistant weeds.* Mustard spp., wild radish, nightshade, and wild lettuce.

*Precautions.* Moisture following application or shallow cultivation is necessary for effective weed control.

3. Simazine (Princep) 1 pound active ingredient (1.25 pounds of 80 W Princep) per acre.

*Susceptible weeds.* Annual bluegrass, chickweed, groundsel, lambsquarter, nightshade, redroot pigweed, mustard spp., and smartweed.

*Resistant weeds.* All established perennial weeds, groundsel, triazine resistant biotypes of lambsquarter, and redroot pigweed.

*Precautions.* Do not apply to loose, gravelly, or very sandy soils. This rate of application is marginal for control of many weed species and it will remain effective for only 1-3 months.

### Controlling Weeds in Established Plantings

The higher rates of application may be necessary during the early life of plantings to obtain good weed control. Later, after the weed population is decreased, reduce the rate of application to prevent buildup of the residual herbicides. Alternate the residual herbicides for one year to the next to prevent buildup and to maintain better weed control. Reduce the rate of application in loose, gravelly, or very sandy soils. Late spring applications will often cause crop injury. Heavy stands of quackgrass may require two different herbicides during the same year to obtain complete control. The first gives partial control and makes the stand more susceptible to the second. Such a combination might be simazine at the high rate of application plus paraquat during October followed by pronamide, or pronamide followed by dichlobenil.

### Controlling Annual Weeds in Established Plantings

1. Napropamide (Devrinol) 4 pounds active ingredient (8 pounds of 50 W Devrinol) per acre. Spring application to weed-free soil during March through May may be most practical.

*Susceptible weeds.* Annual bluegrass, barnyardgrass, wild oats, chickweed, common fiddleneck, knotweed, little mallow, purslane, common sowthistle, filaree, groundsel, lambsquarter, pineapple-weed, prickly lettuce, red root pigweed.

*Resistant weeds.* Shepherdspurse, species of mustard, henbit, minerslettuce, black nightshade, smartweed, all established perennial weeds.

*Precautions.* At least 1 inch of rainfall or irrigation within a week after application is necessary for weed control, otherwise the material is degraded by sunlight. Do not use on soils with over 10% organic matter. Do not apply more than once per season.

2. Simazine (Several trade names) 4 pounds active ingredient (5 pounds of 80 W Princep) per acre during October or November or a split application of:

2 pounds active ingredient (2.5 pounds of 80 W Princep) per acre during October or November and again in March or April.

2 pounds active ingredient (2.5 pounds of 80 W Princep) per acre during March or April.

*Susceptible weeds* and *resistant weeds* are the same as listed in “Controlling Weeds During Establishment section.”

*Precautions.* Reduce rate of application in very gravelly, sandy, or loose soils.

3. Diuron (Karmex) 1.6 pounds active ingredient (2 pounds of 80 W Karmex) per acre during October or November and again in March or April.

*Susceptible weeds.* Annual grasses, corn spurry, dogfennel, redroot pigweed, chickweed, fiddleneck, shepherdspurse, wild buckwheat, smartweed, mustard spp., purslane, and lambsquarter.

*Resistant weeds.* Most perennial broadleaf weeds.

4. Terbacil (Sinbar) 0.8 to 1.6 pounds active ingredient (1 to 2 pounds of 80W Sinbar) per acre during March through early April or October through November. Use the higher rate on fine soil types and on high organic soils.

*Susceptible weeds.* Most annual and perennial weeds.

*Precautions.* Do not use on sandy or gravelly soils or on soils with less than 1% organic matter. Do not apply around weak plants.

5. Paraquat (Paraquat CL) 1 pound active ingredient (0.5 gallons of 2 EC Paraquat CL) per acre plus 8 ounces non-ionic surfactant per 100 gallons during October through March.

*Susceptible weeds.* Will kill all top growth back to ground level. Does not kill perennial weeds, but will delay their development.

*Precautions.* Do not apply after new shoots emerge in the spring.

6. Dinoseb (Dow General) 2.5 pounds active ingredient (0.5 gallon of 5 pounds active ingredient Dow General) plus 2 gallons of Summer Spray oil in 50 or more gallons of water per acre.

*Susceptible weeds.* Will kill all top growth back to ground level. Does not kill perennial weeds but will delay their development.

*Precautions.* Thorough coverage of weeds is necessary. Use as a directed spray and keep as much off the crop as possible. Do not apply after shoots emerge in the spring.

### **Controlling Perennial Weeds in Established Plantings**

1. Pronamide (Kerb) 2 pounds active ingredient (4 pounds of 50 W Kerb) per acre during November.

*Susceptible weeds.* Annual and perennial grasses including quackgrass.

*Resistant weeds.* Most broadleaf weed species.

*Precautions.* Pronamide is root absorbed so the application must be followed by enough rainfall or irrigation to leach it into the root zone of the grass. Excessive rainfall after application may reduce effectiveness.

2. Dichlobenil (Casoron 4G) 4 pounds active ingredient (100 pounds of Casoron 4G) per acre during December or January to cold, wet soil.

*Susceptible weeds.* Quackgrass, thistle, field horsetail, and most annual weed species.

*Precautions.* Use the granular formulation only. The herbicide loses its effectiveness rapidly if exposed to dry, warm conditions. On coarse, loose, or sandy soils reduce the rate to 2 pounds active ingredients (50 pounds of Casoron 4G) per acre. This rate is low for effective quackgrass control but will control field horsetail and most annual weeds.

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## APPROXIMATE METRIC WEIGHTS AND MEASURES

### COMMON EQUIVALENTS

<b>Metric</b>	<b>U.S.</b>	<b>U.S.</b>	<b>Metric</b>
Millimeter	0.039 inches	Inch	2.54 centimeters
Centimeter (10 mm)	0.39 inches	Foot (12 in)	30.5 centimeters
Meter (100 cm)	39.4 inches	Yard (3 ft.)	0.91 meters
Kilometer (1,000 m)	0.62 miles	Mile (5,280 ft.)	1.6 kilometers
Square Centimeter	0.155 square inches	Square Inch	6.5 square centimeters
Square Meter	1.2 square yards	Square Foot (144 sq. in.)	930 square centimeters
Hectare (10,000 sq m)	2.47 acres	Square Yard (9 sq. ft.)	0.84 square meters
Square Kilometer (100 ha)	247 acres	Acre—43,560 sq. ft.	0.405 hectares
Gram	0.035 ounces	Square Mile—640 acres	259 hectares
Kilogram (1,000 g)	2.2 pounds	Ounce	28.3 grams
Ton (metric) (1,000 kg)	1.1 tons (US)	Pound—16 oz.	0.454 kilograms
Milliliter	0.034 fluid ounce	Ton (US)—2,000 lb.	0.907 tons (metric)
Liter (1,000 ml)	1.056 quarts	Tablespoon—3 teaspoons	14.79 milliliters
Cubic Meter (1,000 l)	264.17 gallons (US)	Fluid Ounce—2 tablespoons	29.6 milliliters
		Cup—8 fl. oz.	0.237 liters
		Pint—2 cups	0.473 liters
		Quart—4 cups	0.946 liters
		Gallon (US)—4 qts.	3.8 liters
		Cubic Foot	28.3 liters

### PROPORTIONS

<b>Metric</b>	<b>U.S.</b>	<b>U.S.</b>	<b>Metric</b>
100 g/ha	1.4 oz./acre	1 oz./acre	70 g/ha
1 kg/ha	0.9 lb./acre	1 lb./acre	1.12 kg/ha
1 ton (metric)/ha	0.446 tons (US)/acre	1 ton (US)/acre	2.24 tons (metric)/ha
1 l/ha	0.4 qt./acre	1 fl.oz./acre	73 ml/ha
1 kg/1000 l	1 lb./100 gals.	1 gal./acre	9.39 l/ha
1 g/1000 kg	1 ppm	1 lb./100 gals.	1 kg/1000 l
1 km/hr	0.6 mph	1 ppm	1 g/1000 kg
		1 mph	1.6 km/hr

### TEMPERATURES

<b>Celsius (Centigrade)</b>	<b>Fahrenheit</b>	<b>Fahrenheit</b>	<b>Celsius (Centigrade)</b>
-30	-22	0	-18
-20	-4	10	-12
-10	14	20	-7
0	32	30	-1
10	50	40	4
20	68	50	10
30	86	60	16
40	104	70	21
		80	27
		90	32

To convert: Celsius to Fahrenheit — multiply by 9/5 (1.8) and add 32.  
 Fahrenheit to Celsius — subtract 32 and multiply by 5/9 (0.56).

### ABBREVIATIONS

mm — millimeter, cm — centimeter, m — meter, km — kilometer, ha — hectare, mg — milligram, g — gram, kg — kilogram, l — liter, ml — milliliter



