
# 2025
# Cornell Pest Management Guidelines for Berry Crops

Cornell Cooperative Extension

*These guidelines are not a substitute for pesticide labeling. Always read and understand the product label before using any pesticide.*

# 2025 Cornell Pest Management Guidelines for Berry Crops


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## *Abbreviations and Symbols Used in This Publication*

A ..... acre
AI ..... active ingredient
D ..... dust
DF ..... dry flowable
DG ..... dispersible granule
E ..... emulsion, emulsifiable
EIQ..... Environmental Impact Quotient
EC ..... emulsifiable concentrate
F ..... flowable
FRAC... Fungicide Resistance Action Committee: Code
G ..... granular
IRAC .... Insecticide Resistance Action Committee: Mode of Action Classification
L ..... liquid
NA..... not available
OMRI ... Organic Materials Review Institute
P ..... pellets
PHI ..... pre-harvest interval
REI ..... restricted-entry interval
S ..... soluble
SP ..... soluble powder
UDH ..... up to day of harvest
ULV..... ultra-low volume
W ..... wettable
WDG.... water-dispersible granules
WP ..... wettable powder
WSP..... water soluble packet
WSSA.. Weed Science Society of America: Herbicide: Site of Action Classification List
* ..... Restricted-use pesticide; may be purchased and used only by certified applicators
† ..... Not for use in Nassau and Suffolk Counties



***Cover photo by:*** *Marvin Pritts, Section of Horticulture, School of Integrative Plant Sciences, Cornell University.*

**6 BRAMBLES (RASPBERRIES AND BLACKBERRIES)** *(continued)*

**7 STRAWBERRIES** *(continued)*

**8 RIBES (CURRANTS AND GOOSEBERRIES)** *(continued)*

# 1 Pesticide Information

## 1.1 Pesticide Classification and Certification

Pesticides can be classified as general use or restricted use. **General use pesticides** may be purchased and used by anyone. **Restricted use pesticides** can only be purchased and used by a certified applicator or used by someone under a certified applicator's supervision. In some cases, the pesticide label may limit use of a restricted use pesticide to only a certified applicator.

**Private applicators** use or supervise the use of pesticides to produce agricultural commodities or forest crops on land owned or rented by the private applicator or their employer. If a private applicator wants to use or supervise the use of restricted use pesticides, they need to be a **certified private applicator**. Certified private applicators are also allowed to purchase restricted use pesticides. Certification is not needed if a private applicator uses general use pesticides.

In New York State, a **certified commercial applicator**, **certified commercial technician**, or **commercial apprentice** working under the supervision of a certified commercial applicator is allowed to apply any type of pesticide on property that is not a private application (described above) or is a residential application. (A residential application is the use of general use pesticides on property owned or rented by the applicator, excluding establishments selling or processing food and residential structures other than where the applicator lives.) Certified commercial applicators are allowed to purchase restricted use pesticides.

Information on pesticide certification and classification is available from your Cornell Cooperative Extension office (cce.cornell.edu/localoffices), regional NYSDEC pesticide specialist (dec.ny.gov/about/contact-us/statewide-office-information), the Pesticide Applicator Training Manuals (www.cornellstore.com/books/cornell-cooperative-ext-pmep-manuals), or the Cornell Pesticide Safety Education Program (psep.cce.cornell.edu).

## 1.2 Use Pesticides Properly

Using pesticides requires the user to protect their health, the health of others, and the environment. Keep in mind "pesticide use" is more than just the application. It includes mixing, loading, transporting, storing, or handling pesticides after the manufacturer's seal is broken; cleaning pesticide application equipment; and preparing a container for disposal. These activities require thoughtful planning and preparation. They also require you to comply with state and federal laws and regulations intended to protect human health and the environment from the adverse effects pesticides may cause.

### 1.2.1 Plan Ahead

Many safety precautions should be taken *before* you begin using pesticides. Most pesticide accidents can be prevented with informed and careful practices. **Always read the label on the pesticide container before using the pesticide.** Make sure you understand and can follow all label directions and precautions. Be prepared to handle an emergency exposure or spill. Know the first aid procedures for the pesticides you use.

### 1.2.2 Move Pesticides Safely

Transporting pesticides carelessly can result in broken containers, spills, and contamination of people and the environment. Accidents can occur even when transporting pesticides a short distance. You are responsible for a pesticide accident so take every effort to transport pesticides safely. Be prepared for an emergency.

### 1.2.3 Personal Protective Equipment and Engineering Controls

**Personal protective equipment** (PPE) needs depend on the pesticide being handled. **Required PPE are listed on pesticide labels.** Any required PPE is based on the pesticide's toxicity, route(s) of exposure, and formulation. Label-listed PPE are the minimum that must be worn when using a pesticide. You can always use more than what's listed!

The type of PPE used depends on the type and duration of the activity, where pesticides are being used, and the user's exposure. For example, mixing/loading procedures often require more PPE than when applying a pesticide. Studies show you are at a greater risk of accidental poisoning when handling pesticide concentrates. Pouring pesticide concentrates is the most hazardous activity.

**Engineering controls** are devices that help reduce a pesticide user's exposure. An example is a closed transfer system that reduces the exposure risk when dispensing pesticide concentrates. Consult the product label for more information on using engineering controls in place of PPE.

### 1.2.4 Avoid Drift, Runoff, and Spills

Pesticides that move out of the target area can injure people, damage non-target areas, and harm the environment. Choose weather conditions, pesticides, application equipment, pressure, droplet size, formulations, and adjuvants to minimize drift and runoff potential. Product labels may have specific application and/or equipment requirements to reduce issues with drift and runoff.

# 2 General Information

## 2.1 Introduction

Cornell's 2025 Pest Management Guidelines for Berry Crops is intended to provide growers with general nutrient guidelines and information to aid with insect, mite, disease, and weed management decisions. Cultural, biological, and chemical management tools are identified whenever available.

In-depth information on commercial berry crop production may be found in the resources listed in Table 2.15.

Guidelines provided in this guide are consistent with label guidelines formulated for large-scale operations. Smaller scale producers may use the same guidelines by converting them to the appropriate unit (Table 2.1.1).

## 2.2 Site Selection and Preparation

Preparations for a berry planting must begin one to two years in advance. Select a site with good air and water drainage and have a preplant soil and a nematode analysis performed on representative soil samples. *Growers may wish to select a more broad-spectrum approach to preplant soil analysis at this time by opting for a comprehensive Cornell soil health assessment.*

### 2.2.1 Basic Soil Test

Agro-One provides soil and nutrient testing services previously available through the Cornell Nutrient Analysis Laboratory along with additional analytical services. Key input regarding analytical methods and quality control is provided by Cornell, and Cornell nutrient management guidelines are provided by Cornell through DairyOne.

**Table 2.1.1. Conversion factors to convert from one unit to another.**

| To convert from | To | Multiply by |
|---|---|---|
| lb/A | lb/100 sq ft | **0.0023** |
| tn/A | lb/100 sq ft | **4.6** |
| lb/A | kg/ha | **1.12** |
| kg/ha | lb/A | **0.893** |
| lb | oz | **16** |
| qt of fruit | lb of fruit | **1.5** |
| qt | pt | **2.0** |
| pt | qt | **0.5** |
| gal of liquid | lb of liquid | **8.3** |
| **Strawberries** | | |
| lb/A | lb/100 ft of row | **0.008** |
| Yield in lb/100 ft of row | lb/A | **125** |
| Yield in qt/100 ft of row | lb/A | **188** |
| **Raspberries and Blackberries** | | |
| lb/A | lb/100 ft of row | **0.0184** |
| lb/A | oz/plant | **0.009** |
| Yield in lb/100 ft of row | lb/A | **55** |
| Yield in pt/100 ft of row | lb/A | **73** |
| **Blueberries** | | |
| lb/A | oz/plant | **0.015** |
| Yield in lb/100 ft of row | lb/A | **44** |
| Yield in pt/100 ft of row | lb/A | **58** |
| **Currants and Gooseberries** | | |
| lb/A | oz/plant | **0.012** |
| lb/A | lb/100 ft of row | **0.0184** |
| Yield in lb/100 ft of row | lb/A | **55** |
| Yield in pt/100 ft of row | lb/A | **73** |

**Table 2.5.3. Nitrogen guidelines for berry crops.**

| Crop | Age of planting | Amount/*timings* (actual N) | N source | Comments |
|---|---|---|---|---|
| **Cranberries** | | | | |
| All varieties | 0 | 50 lb/A | Alternate N-only products with N-P-K products with a 1:1:1 ratio | Use frequent applications (every 2-3 weeks) of 5-10 lb/A until late summer to promote good runner growth. |
| Small –fruited varieties (i.e. 'Early Black', 'Howes') | 1+ | 20-30 lb/A*, split between roughneck (20-25%), bloom (30-35%), and fruit set (30-35%) growth stages | ammonium nitrate | Wait to make first split application until soil temperatures are between 50 to 70°F** |
| Large-fruited varieties (i.e. 'Stevens') | 1+ | 30-60 lb/A*, split between roughneck (20-25%), bloom (30-35%), and fruit set (30-35%) growth stages | ammonium nitrate | Wait to make first split application until soil temperatures are between 50 to 70°F** |
| **Juneberries** | | | | |
| | 0 | 25 lb/A, *4 weeks after planting* | calcium nitrate | Avoid touching plants with fertilizers after planting. |
| | 1 | 50-80 lb/A, *split between May and June* | urea or ammonium nitrate | Use higher amount on sandier soils or if irrigation is used. |
| | 2+ | 70-100 lb/A, *split between May and June* | urea or ammonium nitrate | Use higher amount on sandier soils or if irrigation is used. Adjust with leaf analysis. |

*Rates > 40 lb/A actual N should be used with caution to prevent vine overgrowth and reduced fruit set. Rates may need to be adjusted based on soil type and temperature, soil and tissue analysis results, and observations of plant growth and appearance.
**If soil temperatures exceed 70°F and air temperatures exceed 70°F, reduce, delay, or omit N applications.

For more information on cranberry fertilization or other aspects of cranberry production consult: "Cranberry Production A Guide for Massachusetts", available from the UMASS Cranberry Station, College of Natural Resources and the Environment, East Wareham, MA.

## 2.5.2 Potassium, Phosphorus, Magnesium and Boron

If preplant recommendations are followed, additional P and K likely will not be required unless the soil is very sandy. In the event that potassium is required, the maximum amount of K that one should apply in any one year in an established planting is 250 lb/A. At these high rates, potassium sulfate (50% $K_2O$) is a better choice than muriate of potash (60% $K_2O$), which contains chlorides.

Phosphorus requirements in berry crops are relatively low, and phosphorus is usually not required in established plantings. Follow the recommendations of the soil test when preparing a site for planting. There are at least 5 different soil extraction methods (Mehlich 1 & 3, Bray, Morgan and modified- Morgan) used by commercial labs. P is most affected by the extractant type. Mehlich-3 and Bray are similar in value; Mehlich P values are somewhat lower for low pH soils. Modified Morgan values are much lower than all three and are used by Cornell. Penn State and other mid-Atlantic universities use Mehlich-3. Most New England states use modified Morgan. If interpreting your own soil tests, it is important to know the P extraction method used by your analytical lab in order to get a proper recommendation.

Cranberries are the one berry crop shown to benefit from regular phosphorus applications. Low pH and high iron content of many cranberry soils lead to P being tightly bound in soil. Research has shown addition of P at planting at 20 lb/A (100 lb/A triple super phosphate) to be beneficial to plant growth and yield. Applications of higher rates of P showed no additional benefit in yield/growth. Phosphorus is applied again during the first season, usually in the form of a N-P-K fertilizer such as 18-8-18 or 13-13-13. The N-P ratio should be no higher than 1:2; rates of 1:1 or 1:<1 are preferred when high rates of nitrogen are needed. Note: Do not apply P to saturated soils.

Magnesium is frequently low in blueberry plantings. A typical amount to apply in low to deficient established plantings is 50-200 lb/A as magnesium sulfate (20% Mg), but follow recommendations of the leaf analysis.

# 3. Sprayer Technology

## 3.1 Introduction

The average berry planting in New York State is less than 5 acres. Selecting sprayers for small-size plantings can be challenging because it may not be possible to justify the expense of a full-sized sprayer. Larger growers may also use their sprayer for multiple crops, thereby justifying the expense. Sprayers for the small berry crop planting are discussed in sections 3.2 and 3.3.

Sprayers for larger plantings or multiple crops are discussed in sections 3.8 through 3.11.

Regardless of sprayer size, information presented on nozzles (sections 3.5, 3.6 and 3.9), drift reduction (sections 3.3 and 3.7), and solutions for safer spraying (section 3.13) is relevant for all types of sprayers.

## 3.2 Selecting a Small Sprayer for the Small Berry Crop Planting

There are many important points to consider before purchasing a sprayer, not the least of which is the area to spray, the proximity of the local supplier, standard of manufacture, etc. There are many growers with small plantings who need spraying equipment ranging from backpack sprayers to small truck- or ATV-mounted machines.

### 3.2.1 Canopy Sprayers

***Backpack sprayers.*** Small capacity (4-5 gallon) sprayers will produce up to approximately 100 psi pressure. Weight is an important consideration and growers should select a sprayer with good, wide, padded straps to ease the load on your shoulders. Correct nozzle selection according to the target is very important to ensure even coverage. A good-sized filling hole at the top is also important.

There are three factors affecting application rate - forward speed, pressure, and nozzle tip size. Unfortunately, most inexpensive backpack sprayers have no pressure gauge. Pay more money and purchase a backpack sprayer with a pressure gauge or, better still, purchase a constant flow valve as standard equipment or as an option. Normally output increases or decreases according to the pressure in the system, (which depends on how vigorous you pump the handle up and down). A constant flow valve ensures a constant output regardless of hand pump action.

An alternative to the hand-operated backpack sprayer is an battery-powered backpack sprayer, which utilizes a small rechargeable battery. Maximum pressure is relatively low and it is easier than using a traditional hand pump system, particularly if you have many rows to spray. Similarly, a small backpack sprayer fitted with a small gas engine is available. The battery-powered version is quieter to use, but you must remember to recharge the batteries.

***Portable mist and air blower backpacks.*** These are ideal where canopy penetration such as with denser canopies. A small gas engine drives a fan blower which creates an airstream which passes along a hand-held tube (similar to a leaf blower). The tube has a nozzle situated at the end so that liquid spray can be squirted into the airstream. The operator directs the spray cloud towards the canopy by pointing the hand-held tube. It is preferable to point the tube backwards to avoid walking into the spray. Engine speed can be reduced which enables a slower airspeed to match a smaller canopy in early season. They are very good at rustling the canopy and getting good penetration and deposition. They are heavy! Noise is a problem, so ear protection must be worn.

***Portable gas engine-driven sprayers.*** If weight is a problem, and ground conditions are relatively smooth, a number of manufacturers offer a sprayer with a small gas engine and a 10 to 12 gallon tank. Larger capacity tanks (14 to 100 gallons) are often trailed and can be pulled by a lawn tractor, ATV, Gator, or small tractor.

***Small, mounted sprayers.*** Ideal for mounting onto the carrier rack of an ATV, 15 to 25 gallons, they use a small electric pump to provide up to 70 psi. When used with a hand wand and a hose, they can be used to spray short length rows. The same system is ideal for weed control and spot spraying of weeds.

***Large, skid mounted sprayers.*** Ideal for fitting into the back of a pick-up truck, these sprayers have a tank capacity of 35 to 200 gallons, and an electric-start gas engine.

***Small, trailed airblast sprayers.*** Very small airblast sprayers, with tank capacities up to 110 gallons and a 5.5 to 20 hp gas engine, can be towed by an ATV or a small tractor. Larger tank capacities up to 300 gallons are also available but require larger tractors with weights and brakes for safe operation. Remember, the larger the gas engine, the more important it is to buy an electric start option. Small airblast sprayers are ideal in blueberry plantings with tall plants but suffer from a lack of air direction, therefore purchase sprayers with deflectors or towers to direct the air into the canopy.

***Small, mounted airblast sprayers.*** Three-point hitch, PTO-driven models with a 22- or 24-inch fan that can be mounted onto 25 plus horsepower tractors are available. Beware of drift so consider models that have air deflectors or towers.

The best way to measure travel speed is to pull a sprayer half full of water over the same type of terrain on which the actual sprayer will be operated.

Using a tape measure, set up a test course at least 100 feet long. Do not pace the distance. The longer the course, the smaller the margin of error.

Run the course in both directions. Use an accurate stopwatch to check the time required to travel the course in each direction. Average the two runs and use the following to calculate the speed in MPH.

$$\textbf{Formula:}\quad \frac{\text{Feet traveled}}{\text{Seconds traveled}} \times \frac{60}{88} = \text{MPH}$$

**Your figures:**

Tractor gear_____ Engine revs._____

$$\frac{\text{ft.}}{\text{sec.}} \times \frac{60}{88} = \text{____MPH}$$

## 3.11.2 Airblast Sprayer Calibration

**Note: Use clean water!**

**1. Pressure check**
Place the pressure gauge on the nozzle fitting farthest away from the pump and turn the sprayer on. If pressure is lower at the nozzle than specified, increase pressure at the regulator.

Pressure at nozzle _____psi

Pressure at sprayer gauge _____psi

**2. Nozzle output**
Use a flow meter (obtainable from Gemplers, Spraying Systems, etc.) attached to individual nozzles OR

a. Connect hoses to each of the nozzles and measure the flow from each nozzle into a calibrated jug. Record and total your results using Figure 3.4.1.
b. Replace all nozzle tips which are more than 5% inaccurate.
c. Calculate gallons per acre using the following formula.

$$\textbf{Formula:}\quad \frac{\text{Total GPM X 495}}{\text{mph X row spacing (ft.)}} = \text{GPA}$$

$$\textbf{Your figures:}\quad \frac{\text{____GPM X 495}}{\text{____mph X ____ft.}} = \text{_____GPA}$$

## 3.11.3 Calibrating an AgTec Sprayer

**Note: Use clean water!**

1. Calculate the gallons/minute/side:

$$\frac{\text{Speed x gallons/acre x row width}}{1000} = \text{gallons/minute/side}$$

e.g.

$$\frac{3 \times 50 \times 9}{1000} = 1.35$$

Your figures:

$$\frac{\text{____ mph x____gallons/acre x ____ ft}}{1000} = \text{gals/min/side}$$

2. Check AgTec tables for correct meter setting, select the gal/min as calculated above, and then find meter setting, e.g. meter #12 @30 psi gives 1.34 gallons/min.

3. Remove the hoses from the nozzles on the left or right side, tie together and place in a measuring jug

4. Run the sprayer for one minute at correct engine speed, collecting the output in a measuring jug

Remember 128 fl oz. in one gallon. Example: If the output of one side has been measured at 173 fl ozs, then output is divided by 128 = 1.35 gallons per minute.

5. Then check the output of the opposite side.

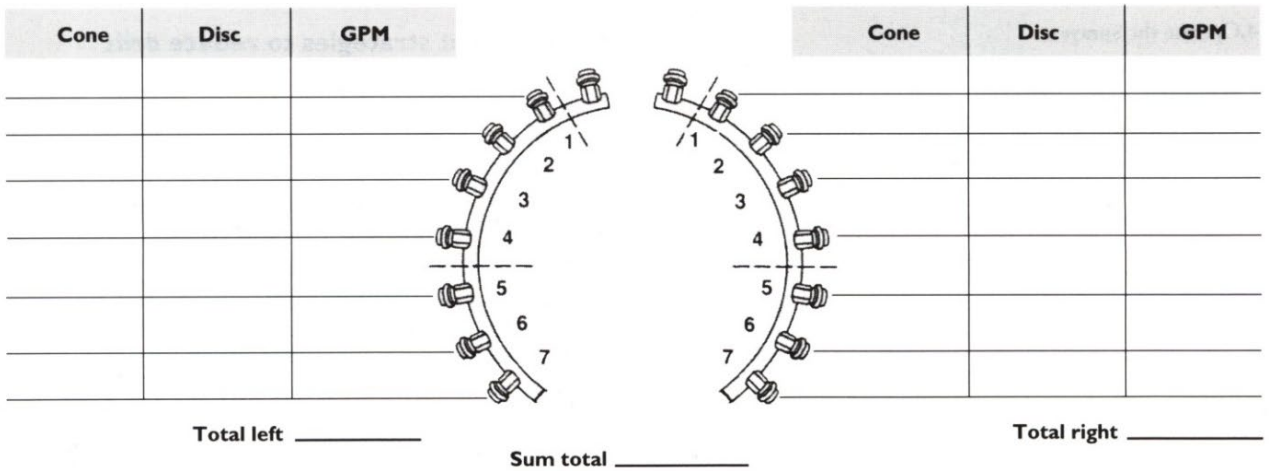


**Figure 3.4.1. Airblast Sprayer Calibration**

# 4 Emerging Pests

## 4.1 Introduction

Pests affecting a particular crop or group of crops is dynamic by nature. New pests (invasive species) are occasionally introduced into our country, state, or region from abroad. In addition, native species, perhaps previously considered minor pests of a berry crop, may become more prevalent or pervasive if their natural enemies are somehow impacted by their own set of pests. Environmental conditions during a particular season or successive seasons may be conducive for buildup and explosion of apreviously minor pest or disease, causing a high level of economic impact.

This chapter is designed to provide commercial berry growers with information and resources on how to recognize new and/or emerging pest issues in berry crops through pest alert pages for each pest or disease as they appear. Each pest alert page contains information on identification, monitoring, management strategies and resources for the particular pest or disease.

For assistance with diagnosing berry problems use the Berry Diagnostic Tool at https://blogs.cornell.edu/berrytool/ or contact your Cornell Cooperative Extension Office for assistance.

To submit samples for disease diagnosis, contact Plant Disease Clinic, Cornell University, Plant Pathology section, SIPS, 334 Plant Science Building, Ithaca, NY 14853-4203, (607) 255-7850, plantclinic.cornell.edu.

To submit samples for insect diagnosis or for phone consultations, contact Insect Diagnostic Laboratory, Cornell University, Department of Entomology, 4140 Comstock Hall, Ithaca, NY 14853-2601, (607) 255-3250, idl.entomology.cornell.edu.

The following resources are suggested to help with weed identification. If you are unable to identify your problem weed with the resources listed below please contact your Cornell Cooperative Extension Office for assistance.

1. Uva, R.H., Neal, J.C. and DiTomaso, J.M. 1997. Weeds of the Northeast. Cornell University Press, Ithaca, NY. 397 pgs.
2. Royer, F. and Dickinson, R. 1999. Weeds of Canada and the Northeastern United States. Lone Pine Publishing/University of Alberta Press. 434 pgs.

**Table 4.1.1. Emerging berry crop pests**

| Emerging pest | Berry crops potentially affected: | See section: |
|---|---|---|
| ***Arthropod Pests*** | | |
| Spotted Wing Drosophila | blueberries, brambles, day neutral strawberries, elderberries | 4.2 |
| Brown Marmorated Stinkbug | blueberries, brambles, possibly others | 4.3 |
| ***Diseases*** | | |
| Blueberry Scorch Virus | blueberries | 4.4 |
| Blueberry Shock Virus | blueberries | 4.5 |
| Currant Cane Blight | currants | 4.6 |
| White Pine Blister Rust | currants | 4.7 |
| ***Weeds*** | | |
| Wild Parsnip | all | 4.8 |
| Giant Hogweed | all | 4.9 |
| Herbicide-Resistant Weeds | all | 4.10 |

## 4.2 Spotted Wing Drosophila

| | |
|---|---|
| **Genus species:** | *Drosophila suzukii* |
| **Common name:** | Spotted wing drosophila |
| **Distribution:** | Becoming established throughout Northeast; first detected in NY in 2011 |
| **Background:** | Originally from Asia, spotted wing drosophila (SWD) first showed up in California in about 2008 and has spread north into Oregon, Washington, and western Canada, south into Florida and now has been found in much of the USA. SWD was first reported throughout the Northeast in the late summer of 2011. In 2012, adult SWD first appeared in late June/early July and caused wide-spread injury to some berry crops. |

# 5 Highbush Blueberries

## 5.1 Introduction

Numerous pests affect highbush blueberries, although the pest complex is much narrower than with many other fruit crops. For photographs of these pests and for detailed information on blueberry culture, obtain a copy of the Highbush Blueberry Production Guide (NRAES-55) from your Cornell Cooperative Extension Office or download a free fair use pdf copy (23.0 MB) of this publication at: http://www.hort.cornell.edu/fruit/ berry-guides/ blueberry.pdf. For approaches to organic pest management, download the 2021 Organic Production and IPM Guide for Blueberries at https://ecommons.cornell.edu/handle/ 1813/42887.2 For assistance with diagnosing highbush blueberry problems, use the online Berry Diagnostic Tool at: https://blogs.cornell.edu/berrytool/ or contact your Cornell Cooperative Extension Office for assistance.

To submit samples for disease diagnosis, contact Plant Disease Clinic, Cornell University, Plant Pathology section, SIPS, 334 Plant Science Building, Ithaca, NY 14853-4203, (607) 255-7850, online at: plantclinic.cornell.edu. To submit samples for insect diagnosis or for phone consultations, contact Insect Diagnostic Laboratory, Cornell University, Department of Entomology, 4140 Comstock Hall, Ithaca, NY 14853-2601, (607) 255-3250, online at: idl.entomology.cornell.edu.

The following information is provided for management of highbush blueberry pests. If a pesticide is used, it must be registered with the state and federal governments. Use Tables 5.1.2 (insecticides and miticides), 5.1.3 (fungicides), 5.1.4 (herbicides) and 5.1.5 (other highbush blueberry pest management products) to determine legal pesticides, their brand names, and any restrictions that may apply. Unless otherwise noted, use 100 gal water per acre. Always read the label before applying any pesticide.

**Table 5.1.1. Highbush blueberry pests and the associated stage of plant development.**

| Stage of development | Scout for: | See section: |
|---|---|---|
| **Dormant** | Insect stem gall, | 5.2.1.1 |
| | Botrytis blossom and twig blight | 5.2.1.2 |
| | Cankers (Fusicoccum and Phomopsis) | 5.2.1.3 and 5.2.1.4 |
| | Scale insects | 5.2.1.5 |
| **Green tip** | Mummyberry | 5.2.2.1 |
| | Botrytis blossom and twig blight | 5.2.2.2 |
| | Phomopsis canker | 5.2.2.3 |
| **Pink bud** | Mummyberry | 5.2.3.1 |
| | Botrytis blossom and twig blight | 5.2.3.2 |
| **Bloom** | Mummyberry | 5.2.4.1 |
| | Botrytis blossom and twig blight | 5.2.4.2 |
| | Anthracnose fruit rot/blossom blight | 5.2.4.3 |
| | Blueberry leaf rust | 5.2.4.4 |
| | Powdery mildew | 5.2.4.5 |
| | Double spot | 5.2.4.6 |
| **Petal fall/Post bloom** | Cranberry fruitworm | 5.2.5.1 and 5.2.6.1 |
| | Cherry fruitworm | 5.2.5.2 and 5.3.6.2 |
| | Leafrollers | 5.2.5.3 and 5.3.6.3 |
| | Blueberry tip borer | 5.2.5.4 and 5.2.6.4 |
| | Plum curculio | 5.2.5.5 |
| **Summer preharvest** | Blueberry maggot | 5.2.7.1 |
| | Japanese beetle | 5.2.7.2 |
| | Anthracnose fruit rot | 5.2.7.3 |
| | Blueberry stem borer | 5.2.7.4 |
| | Spotted wing drosophila | 5.2.7.5 |
| **Harvest** | Spotted wing drosophila | 5.2.8.1 |

**Table 5.1.1. Highbush blueberry pests and the associated stage of plant development.**

| Stage of development | Scout for: | See section: |
|---|---|---|
| **Special pests** | Brown marmorated stink bug | 5.2.9.1 and 4.3 |
| | Ants | 5.2.9.2 |
| | Witches' broom | 5.2.9.3 |
| | Crown gall | 5.2.9.4 |
| | Blueberry viruses | 5.2.9.5 and 4.4, 4.5 |
| | Armillaria root rot | 5.2.9.6 |

**NOTE:** For purposes of slowing resistance development in pest populations growers should alternate use of products with different modes of action (indicated by number/letter codes in the last column of the following tables) whenever possible. Product trade names are provided but other products with the same active ingredient may be labeled for the same purposes. Note: With most pesticides, reentry is not allowed until spray material has dried. Read the label.

**Table 5.1.2. Selected insecticides and miticides registered for use on highbush blueberries.**

| Active Ingredient | Trade Name | EPA Reg. Number | PHI (days) | REI (hrs) | IRAC Code |
|---|---|---|---|---|---|
| **acetamiprid** | *Assail 30SG | 8033-36-70506 | 1 | 12 | 4A |
| **azadirachtin** | Aza-Direct | 71908-1-10163 | 0 | 4 | UN |
| | AzaGuard | 70299-17 | 0 | 4 | UN |
| | *AzaSol | 81899-4-74578 | 0 | 4 | UN |
| | Ecozin Plus 1.2% ME | 5481-559 | 0 | 4 | UN |
| | Molt-X | 68539-11 | 0 | 4 | UN |
| | Neemix 4.5 | 70051-9 | 0 | 4 | UN |
| **azadirachtin, pyrethrins** | Azera | 1021-1872 | 0 | 12 | UN |
| **Bacillus thuringiensis, subsp. kurstaki** | Dipel DF | 73049-39 | 0 | 4 | 11A |
| | Leprotec | 89046-12-88847 | 0 | 4 | 11A |
| | Deliver | 70051-69 | 0 | 4 | 11A |
| | Javelin WG | 70051-66 | 0 | 4 | 11A |
| | Biobit HP | 73049-54 | 0 | 4 | 11A |
| **Bacillus thuringiensis, var. aizawai** | XenTari | 73049-40 | 0 | 4 | 11A |
| **Beauveria bassiana strain GHA** | Mycotrol ESO | 82074-1 | 0 | 4 | |
| **bifenthrin** | *Brigade WSB | 279-3108 | 1 | 12 | 3A |
| | *Bifenture 10DF | 70506-227 | 1 | 12 | 3A |
| **bifenthrin, zeta-cypermethrin** | *Hero | 279-3315 | 1 | 12 | 3A |
| **cedar oil** | Cedar Gard | 25(b) pesticide | - | - | |
| **chlorantraniliprole** | *†Altacor | 279-9607 | 1 | 4 | 28 |
| **Chromobacterium subtsugae str. PRAA4-1** | Grandevo WDG | 84059-27 | 0 | 4 | |
| **cyantraniliprole** | *†Exirel | 279-9615 | 3 | 12 | 28 |
| **cyclaniliprole** | *†Verdepryn 100 SL | 71512-34-88783 | 1 | 4 | 28 |
| **fenpropathrin** | *Danitol 2.4EC | 59639-35 | 3 | 24 | 3A |
| **flupyradifurone** | *†Sivanto Prime | 264-1141 | 3 | 4 | 4D |
| | *†Sivanto HL | 264-1198 | 3 foliar, 30 soil | 4 | 4D |
| **imidacloprid** | *Admire Pro Systemic Protectant | 264-827 | 7 (soil), 3 (foliar) | 12 | 4A |
| | *Alias 4F | 66222-156 | 7 (soil), 3 (foliar) | 12 | 4A |
| **indoxacarb** | Avaunt 30WDG | 279-9587 | 7 | 12 | 22A |
| | Avaunt eVo | 279-9629 | 7 | 12 | 22A |
| **kaolin clay** | Surround WP | 61842-18 | UDH | 4 | |
| **malathion** | Malathion 5EC | 19713-217 | 1 | 12 | 1B |
| | Malathion 57 EC | 34704-108 | 1 | 12 | 1B |
| | Malathion 8 Aquamul | 34704-474 | 1 | 12 | 1B |

*Table continues on next page.*

# 6 Brambles (Raspberries and Blackberries)

## 6.1 Introduction

For information on cultivar selection, cultural practices, or photographs of pest damage, obtain a copy of the Raspberry and Blackberry Production Guide (NRAES-35) from your Cornell Cooperative Extension Office or download a free fair use pdf copy of this publication (4.3 MB) at: http://www.hort.cornell.edu/fruit/berry-guides/bramble.pdf.

If interested in organic and IPM practices, information can be found in the 2021 Organic Production and IPM Guide for Raspberries & Blackberries at: https://ecommons.cornell.edu/handle/1813/42889.

For assistance with diagnosing bramble problems, use the online Berry Diagnostic Tool at: https://blogs.cornell.edu/berrytool/ or contact your Cornell Cooperative Extension Office for assistance.

To submit samples for disease diagnosis, contact Plant Disease Clinic, Cornell University, Plant Pathology section, SIPS, 334 Plant Science Building, Ithaca, NY 14853-4203, (607) 255-7850, online at: plantclinic.cornell.edu.

To submit samples for insect diagnosis or for phone consultations, contact Insect Diagnostic Laboratory, Cornell University, Department of Entomology, 4140 Comstock Hall, Ithaca, NY 14853-2601, (607) 255-3250, online at: idl.entomology.cornell.edu.

All pesticides used for bramble production must be registered with the state and federal governments. Consult Table 6.1.2 (insecticides and miticides), 6.1.3 (fungicides), 6.1.4 (herbicides) and 6.1.5 (other pest management products for brambles) to determine legal pesticides, their brand names, and any restrictions that may apply. Unless otherwise noted, use 100 gal water per acre.

**Table 6.1.1. Bramble pests and the associated stage of plant development.**

| Stage of development: | Scout for: | See section: |
|---|---|---|
| **Bud break** | Anthracnose | 6.2.1.1 |
| | Spur blight (red raspberries) | 6.2.1.2 |
| | Cane blight | 6.2.1.3 |
| **Early prebloom** | Raspberry fruitworm | 6.2.2.2 |
| | Raspberry sawfly | 6.2.2.2 |
| **Late prebloom** (just before blossoms open) | Raspberry fruitworm | 6.2.3.1 |
| | Raspberry sawfly | 6.2.3.1 |
| | Tarnished plant bug | 6.2.3.2 |
| | Japanese beetle | 6.2.3.3 |
| **Early bloom** (5-10% of the blossoms open) | Powdery mildew | 6.2.4.1 |
| | Gray mold (Botrytis fruit rot) | 6.2.4.2 |
| **Full bloom** | Gray mold (Botrytis fruit rot) | 6.2.5.1 |
| | Powdery mildew | 6.2.5.2 |
| **Petal fall to fruit ripening** | Spotted wing drosophila | 6.2.6.1 |
| | Sap beetle | 6.2.6.2 |
| | Tarnished plant bug | 6.2.6.3 |
| **From petal fall through the beginning of harvest** | Spotted wing drosophila | 6.2.7.1 |
| | Sap beetle | 6.2.7.2 |
| | Tarnished plant bug | 6.2.7.3 |
| | Gray mold (Botrytis fruit rot) | 6.2.7.4 |
| **Harvest** | Spotted wing drosophila | 6.2.8.1 |
| **Special pests** | Mosaic virus complex | 6.2.9.1 |
| | Crumbly berry (Tomato Ringspot Virus) | 6.2.9.2 |
| | Verticillium wilt | 6.2.9.3 |
| | Orange rust | 6.2.9.4 |
| | Raspberry leaf and cane spot | 6.2.9.5 |
| | Phytophthora root rot | 6.2.9.6 |
| | Late leaf rust | 6.2.9.7 |
| | Fire blight | 6.2.9.8 |

*Table continues on next page.*

### 6.2.2.2 Raspberry Fruitworm (Byturus rubi), Raspberry Sawfly (Monophadnoides geniculatus)

| *Management Options* | *Guideline* |
|---|---|
| **Cultural management** | None established. |
| **Conventional and Organic product notes** | An insecticide should be applied when the insects or their damage is first noticed in the spring (just before blossoms open). |

***6.2.2.2 Raspberry Fruitworm (Byturus rubi), Raspberry Sawfly (Monophadnoides geniculatus)***

| Pesticide Options | Active Ingredient | Trade Name | Product Rate | Field Use EIQ | Comments |
|---|---|---|---|---|---|
| **Conventional** | **spinetoram** | Delegate WG | 3-6 oz/acre | 2.1 - 4.3 | |
| **Organic** | **azadirachtin** | *AzaSol | 6 oz/acre | 0.9 | |
| | **azadirachtin** | Molt-X | 8 fl oz/acre for fruitworm; 10 fl oz/ac sawfly | 0.6 | Plus 0.25 to 1.0% non-phytotoxic crop oil. |
| | **mineral oil** | SuffOil-X | 1-2 gal/acre | NA | Sawflies only. |
| | **spinosad** | Entrust | 1.25-2 oz/acre | 4.3 - 6.8 | Sawflies only. |
| | **spinosad** | Entrust SC | 4-6 fl oz/acre | 4 - 6 | |

* Restricted-use pesticide.

## 6.2.3 LATE PREBLOOM

### 6.2.3.1 Raspberry Fruitworm, Raspberry Sawfly

Refer to information given under EARLY PREBLOOM (section 6.2.2), but note additional chemical options below.

| *Management Options* | *Guideline* |
|---|---|
| **Conventional product notes** | An insecticide should be applied when the insects or their damage is first noticed in the spring. |

***6.2.3.1 Raspberry Fruitworm, Raspberry Sawfly***

| Pesticide Options | Active Ingredient | Trade Name | Product Rate | Field Use EIQ | Comments |
|---|---|---|---|---|---|
| **Conventional** | **fenpropathrin** | *Danitol 2.4EC | 10.67-16 fl oz/acre | 10.9 - 16.4 | Fruitworm only. |
| | **spinetoram** | Delegate WG | 3-6 oz/acre | 2.1 - 4.3 | |
| **Organic** | **pyrethrins** | PyGanic EC 5.0 II | 4.5-15.6 fl oz/acre | 0.5 - 1.7 | Fruitworm only. |
| | **spinosad** | Entrust | 1.25-2 oz/acre | 4.3 - 6.8 | Sawflies only. |
| | **spinosad** | Entrust SC | 4-6 fl oz/acre | 4 - 6 | |

* Restricted-use pesticide.

### 6.2.3.2 Tarnished Plant Bug (Lygus lineolaris)

**Symptoms-** These insects appear when fruit buds form and plants begin to bloom. Their feeding on buds, blossoms, and developing berries results in deformed and crumbly fruit.

| *Management Options* | *Guideline* |
|---|---|
| **Scouting/thresholds** | For effective tarnished plant bug control, scout for nymphs after petal fall. Suggested threshold = 10-20% of canes infested. |
| **Resistant cultivars** | None known. |
| **Cultural management** | Minimize proximity to preferred habitat. Tarnished plant bug pressure is often highest in weedy fields or in fields bordered by woody shrubs. |

# 7 Strawberries

## 7.1 Introduction

For information on strawberry cultivar selection, cultural practices, or photographs of strawberry pest damage, obtain a copy of the Strawberry Production Guide (2nd edition) at https://scholars.unh.edu/extension/1670/.

For information on organic management and IPM, obtain a free copy of the 2021 Organic Production and IPM Guide for Strawberries at: https://ecommons.cornell.edu/handle/1813/42890.2

For assistance with diagnosing strawberry problems, use the online Berry Diagnostic Tool at https://blogs.cornell.edu/berrytool/ or contact your Cornell Cooperative Extension Office for assistance.

To submit samples for disease diagnosis, contact Plant Disease Clinic, Cornell University, Plant Pathology section, SIPS, 334 Plant Science Building, Ithaca, NY 14853-4203, (607) 255-7850, online at: plantclinic.cornell.edu.

To submit samples for insect diagnosis or for phone consultations, contact Insect Diagnostic Laboratory, Cornell University, Department of Entomology, 4140 Comstock Hall, Ithaca, NY 14853-2601, (607) 255-3250, online at: idl.entomology.cornell.edu.

Pesticides used for strawberry production must be registered with the state and federal governments. Consult Tables 7.1.2 (insecticides and miticides), 7.1.3 (fungicides), 7.1.4 (herbicides) and 7.1.5 (other pest management products for strawberries) to determine legal pesticides, their brand names, and any restrictions that may apply. Unless otherwise noted, use 100 gal of water per acre.

**Table 7.1.1. Strawberry pests and the associated stage of plant development.**

| Stage of development: | Scout for: | See section: |
|---|---|---|
| ***FIRST GROWING SEASON*** | | |
| **Summer months after planting** | Greenhouse whitefly | 7.2.1.1 |
| | Twospotted spider mite | 7.2.1.2 |
| ***DURING FRUITING YEARS*** | | |
| **Early Spring** | Twospotted spider mite | 7.3.1.1 |
| | Bud weevil (clipper) | 7.3.1.2 |
| | Leaf spot | 7.3.1.3 |
| | Leaf scorch | 7.3.1.4 |
| | Leaf blight | 7.3.1.5 |
| | Angular leaf spot | 7.3.1.6 |
| **Prebloom** | Bud weevil (clipper) | 7.3.2.1 |
| | Tarnished plant bug | 7.3.2.2 |
| | Spittlebug | 7.3.2.3 |
| | Powdery mildew | 7.3.2.4 |
| **Early bloom** (10-20% of flower buds open) | Gray mold (Botrytis fruit rot) | 7.3.3.1 |
| | Leaf spot, Leaf scorch, Leaf blight | 7.3.3.2 |
| **Full Bloom** | Gray mold (Botrytis fruit rot) (Do not apply insecticides during bloom) | 7.3.4.1 |
| **Fruit set through harvest** | Anthracnose | 7.3.5.1 |
| | Leather rot | 7.3.5.2 |
| | Sap beetle | 7.3.5.3 |
| **Postharvest** | Rhizopus rot | 7.3.6.1 |
| | Leaf spot, Leaf scorch, Leaf blight | 7.3.6.2 |
| | Twospotted spider mite | 7.3.6.3 |
| **Special Pests** | Spotted Wing Drosophila | 7.3.7.1 |
| | Brown Marmorated Stink Bug | 7.3.7.2 |
| | Strawberry rootworm | 7.3.7.3 |
| | Root weevils | 7.3.7.4 |
| | Cyclamen mite | 7.3.7.5 |
| | Garden slugs | 7.3.7.6 |

### *7.3.5.3Strawberry Sap Beetle (Stelidota geminata) Picnic Beetle (Glischrochilus fasciatus) (continued)*

| *Management Options* | *Guideline* |
|---|---|
| **Scouting/thresholds** | None established. |
| **Resistant cultivars** | None known, although cultivars that tend to hold fruit off the ground may be less vulnerable to adult feeding and larval contamination. |
| **Cultural management** | Keep the field free of ripe and over-ripe fruit. |

***7.3.5.3 Strawberry Sap Beetle (Stelidota geminata) Picnic Beetle (Glischrochilus fasciatus)***

| Pesticide Options | Active Ingredient | Trade Name | Product Rate | Field Use EIQ | Comments |
|---|---|---|---|---|---|
| **Conventional** | **acetamiprid** | *Assail 30SG | 4-6.9 oz/acre | 2.2 - 3.7 | Sap beetle only. |
| | **bifenthrin** | *Brigade WSB | 6.4-32 oz/acre | 1.8 - 8.9 | *See comments below.* |
| | Bifenthrin is a broad-spectrum pyrethroid insecticide that also kills beneficial arthropods, so use with caution. Frequent use may disrupt biological control of spider mites resulting in mite outbreaks. Sap beetle only. | | | | |
| | **bifenthrin** | *Bifenture 10DF | 6.4-32 oz/acre | 1.8 - 8.9 | *See comments below.* |
| | Bifenthrin is a broad-spectrum pyrethroid insecticide that also kills beneficial arthropods, so use with caution. Frequent use may disrupt biological control of spider mites resulting in mite outbreaks. Sap beetle only. | | | | |
| | **fenpropathrin** | *Danitol 2.4EC | 16 fl oz/acre | 8.1 | *See comments below.* |
| | No aerial application allowed in NYS. Maximum 16 fl oz/A (0.3 lb AI/A)/application and maximum of 32 fl oz (0.6 lb AI)/A/year. Sap beetle only. | | | | |
| **Organic** | none available | | | | |

* Restricted-use pesticide.

## 7.3.6 POST HARVEST

### *7.3.6.1 Rhizopus Rot (Rhizopus stolonifer, R. sexualis)*

**Symptoms-** Also known as 'leak', Rhizopus rot symptoms in infected fruit begin as slight discolorations that gradually turn light brown. Fruits rapidly soften and collapse, and their juices leak out. Under humid conditions greater than 90%, fruits become covered with a dense, fluffy, white mycelium bearing long sporangiophores ending in large black sporangia.

| *Management Options* | *Guideline* |
|---|---|
| **Scouting/thresholds** | None established. |
| **Resistant cultivars** | None known. |
| **Cultural management** | Rapidly cool harvested fruit and maintain storage temperatures below 6°C (45°F) to limit growth and sporulation of the pathogen.<br>Remove and destroy fruit showing visible symptoms immediately. Carefully observe remaining fruit for initial symptoms and vigilantly manage storage environmental conditions. |

### *7.3.6.2 Leaf Spot, Leaf Scorch, Leaf Blight*

Refer to information given under EARLY SPRING (section 7.3.1).

### *7.3.6.3 Twospotted Spider Mite (Tetranychus urticae)*

Refer to information given under SUMMER MONTHS AFTER PLANTING (section 7.2.1). See additional cultural note below.

| | |
|---|---|
| **Cultural management** | Mow and incorporate leaves at renovation. |

# 8 Ribes (Currants and Gooseberries)

## 8.1 Introduction

For information on cultural practices for Ribes, the following references are suggested:

*Currants, Gooseberries, and Jostaberries-A Guide for Growers, Marketers, and Researchers in North America*, available online from at: www.amazon.com

*Uncommon Fruits for Every Garden,* available online from Timber Press at: www.timberpress.com

*Cornell Guide to Growing Fruit at Home* (IB-156) available from your local Cornell Cooperative Extension Office or online at https://ecommons.cornell.edu/handle/1813/67

*Currants and Gooseberries in Massachusetts* https://ag.umass.edu/fruit/ne-small-fruit-management-guide/currants-gooseberries

*Currants and Gooseberries in Wisconsin* https://cdn.shopify.com/s/files/1/0145/8808/4272/files/A1960.pdf

To submit samples for disease diagnosis, contact Plant Disease Clinic, Cornell University, Plant Pathology section, SIPS, 334 Plant Science Building, Ithaca, NY 14853-4203, (607) 255-7850, online at: plantclinic.cornell.edu

To submit samples for insect diagnosis or for phone consultations, contact Insect Diagnostic Laboratory, Cornell University, Department of Entomology, 4140 Comstock Hall, Ithaca, NY 14853-2601, (607) 255-3250, online at: idl.entomology.cornell.edu.

Pesticides used for Ribes must be registered with the state and federal governments. Use Table 8.1.2 (insecticides and miticides), 8.1.3 (fungicides), 8.1.4 (herbicides), and 8.1.5 (other pest management products for Ribes) to determine legal pesticides, their brand names, and any restrictions that may apply. Unless otherwise noted, use 100 gal water per acre. The products listed include only those labeled for pests of concern in New York State.

**Table 8.1.1. Ribes pests and the associated stage of plant development.**

| Stage of development | Scout for: | See section: |
|---|---|---|
| **Dormant** | San Jose scale | 8.2.1.1 |
| **Burst to leaf** | Powdery mildew | 8.2.2.1 |
| | Currant aphid | 8.2.2.2 |
| | Currant stem girdler | 8.2.2.3 |
| **Early grape to bloom** | White pine blister rust | 8.2.3.1 |
| | Powdery mildew | 8.2.3.2 |
| | Currant aphid | 8.2.3.3 |
| **Bloom to petal fall** | White pine blister rust | 8.2.4.1 |
| | Powdery mildew | 8.2.4.2 |
| | Leaf spots | 8.2.4.3 |
| | Currant aphid | 8.2.4.4 |
| | Gooseberry fruitworm | 8.2.4.5 |
| | Imported currant worm | 8.2.4.6 |
| **Summer preharvest** | White pine blister rust | 8.2.5.1 |
| | Powdery mildew | 8.2.5.2 |
| | Leaf spots | 8.2.5.3 |
| | Gooseberry fruitworm | 8.2.5.4 |
| | Currant borer | 8.2.5.5 |
| | Twospotted spider mite | 8.2.5.6 |
| | Imported currant worm | 8.2.5.7 |
| | Japanese beetles | 8.2.5.8 |
| **Special pests** | Slugs and snails | 8.2.6.1 |
| | Spotted wing drosophila | 8.2.6.2 |

*8.2.6.2 Spotted Wing Drosophila (Drosophila suzukii)*

| Pesticide Options | Active Ingredient | Trade Name | Product Rate | Field Use EIQ | Comments |
|---|---|---|---|---|---|
| **Conventional** *(continued)* | **zeta-cypermethrin** | *Mustang MAXX | 4 fl oz/acre | 1.6 | *See comments below.* |
| | Do not apply more than 24 fl oz (0.15 lb AI) per acre per season. Do not make applications less than 7 days apart. | | | | |
| **Organic** | **azadirachtin** | *AzaSol | 6 oz/acre | 0.9 | |
| | **Burkholderia spp. str A396** | Venerate XC | 2-4 qt/acre | NA | *See comments below.* |
| | Suppression only. Rotation or tank-mixing with other insecticides labeled for spotted wing drosophila is recommended. In New York State, application is prohibited within 100 feet of any surface water. | | | | |
| | **spinosad** | Entrust | 1.25-2 oz/acre | 4.3 - 6.8 | *See comments below.* |
| | 2(ee) recommendation. User must have a copy of the 2(ee) recommendation in their possession at time of application. Do not make more than 6 applications per calendar year or 3 applications per crop. Do not make applications less than 6 days apart. Do not apply more than a total of 9 fl oz of Entrust/A/crop. Do not make more than 2 consecutive applications of Group 5 insecticides (spinetoram and spinosad). If additional treatments are required after 2 consecutive applications of Group 5 insecticides rotate to another class of effective insecticides for at least one application. | | | | |
| | **spinosad** | Entrust SC | 4-6 fl oz/acre | 4 - 6 | *See comments below.* |
| | Do not make more than 6 applications per calendar year. Do not make applications less than 6 days apart. Do not apply more than a total of 29 fl oz /A/crop for all application methods. Do not make more than 2 consecutive applications of Group 5 insecticides (spinetoram and spinosad). If additional treatments are required after 2 consecutive applications of Group 5 insecticides rotate to another class of effective insecticides for at least one application. | | | | |

* Restricted-use pesticide.

† Not for use in Nassau and Suffolk Counties.

## 8.3 Ribes Weed Management

A 4-inch layer of bark or sawdust mulch, or a combination of the two, greatly aids in weed control. Additional weed suppression maybe achieved by using commercial landscape fabric under mulch. Cultivation should be minimized because the root system is very shallow in currants and gooseberries. Grasses can be planted between rows to minimize weeds within the planting. Mulches and herbicides are generally applied in a 4-foot band under the row. Herbicides should be selected based on the types of weeds present; not all herbicides are effective against all weed species. With respect to preemergence herbicides, soil type should also be factored in to herbicide selection. Crop sensitivity to herbicides can vary based on genetics, age, and vigor and should be considered before engaging in a chemical weed control program.

**Table 8.3.1. Application details for herbicides labeled for use on Ribes in New York State.**

| Herbicide | Formulation | Amount of product per sprayed acre | lb active ingredient |
|---|---|---|---|
| **ammonium nonanoate** | Axxe | 6-15% v/v. See label for details. | |
| • Potentially acceptable in certified organic production programs. | | | |
| **d-limonene** | Avenger AG Optima Burndown | 7-10% v/v. See label for details. | |
| • Potentially acceptable in certified organic production programs. | | | |
| **PREEMERGENT** | | | |
| **benefin, oryzalin** | Surflan XL 2G | 300 lb/acre | 6 lbs/acre |
| • Pre-emergence control of annual grasses and some broadleaf weeds. | | | |
| • Use a drop or rotary type spreader designed to apply granular herbicides or insecticides. A single rainfall or sprinkler irrigation of ½ inch or more is required to activate Surflan XL 2G. | | | |
| • Minimum time between applications is 2 months. Do not apply more than 600 lb/A per year. Do not apply to plants that will bear fruit within 12 months. | | | |

*Table continues on next page.*

# 9 Elderberries

## 9.1 Introduction

Small commercial plantings of elderberry exist in NYS. For information on cultural practices for elderberries, the following references are suggested:

*Growing and Marketing Elderberries*
http://www.centerforagroforestry.org/pubs/2014GrowingElderberryGuide.pdf

*Elderberry Culture in New York State,* available online from: https://ecommons.cornell.edu/handle/1813/5098

*Growing Currants, Gooseberries, and Elderberries in Wisconsin*, available online at https://learningstore.extension.wisc.edu/products/growing-currants-gooseberries-and-elderberries-in-wisconsin-p752

*Cornell Guide to Growing Fruit at Home* (IB-156) available from your local Cornell Cooperative Extension Office or online at https://ecommons.cornell.edu/handle/1813/67

To submit samples for disease diagnosis, contact Plant Disease Clinic, Cornell University, Plant Pathology section, SIPS, 334 Plant Science Building, Ithaca, NY 14853-4203, (607) 255-7850, online at: plantclinic.cornell.edu.

To submit samples for insect diagnosis or for phone consultations, contact Insect Diagnostic Laboratory, Cornell University, Department of Entomology, 4140 Comstock Hall, Ithaca, NY 14853-2601, (607) 255-3250, online at: idl.entomology.cornell.edu.

Pesticides used for elderberries must be registered with the state and federal governments. Use Tables 9.1.2 (insecticides and miticides), 9.1.3 (fungicides), 9.1.4 (herbicides), and 9.1.5 (other pest management products for elderberries) to determine legal pesticides, their brand names, and any restrictions that may apply. Products listed in this table include only those labeled for pests of concern in New York State.

**Table 9.1.1. Elderberry pests and the associated stage of plant development.**

| Stage of development: | Scout for: | See section: |
|---|---|---|
| **Bloom** | Powdery Mildew | 9.2.1.1 |
| **Fruit ripening through Harvest** | Spotted Wing Drosophila | 9.2.2.1 |
| **Special Pests** | Verticillium Wilt | 9.2.3.1 |
| | Elder shoot borer | 9.2.3.2 |
| | Other Insect Damage | 9.2.3.3 |

**NOTE:** For purposes of slowing resistance development in pest populations growers should alternate use of products with different modes of action (indicated by number/letter codes in the last column of the following table) whenever possible. Product trade names are provided but other products with the same active ingredient may be labeled for the same purposes. Note: With most pesticides, reentry is not allowed until spray material has dried. Read the label.

**Table 9.1.2. Selected insecticides and miticides registered for use on elderberries.**

| Active Ingredient | Trade Name | EPA Reg. Number | PHI (days) | REI (hrs) | IRAC Code |
|---|---|---|---|---|---|
| **acetamiprid** | *Assail 30SG | 8033-36-70506 | 1 | 12 | 4A |
| **azadirachtin** | *AzaSol | 81899-4-74578 | 0 | 4 | UN |
| | Molt-X | 68539-11 | 0 | 4 | UN |
| **bifenthrin** | *Bifenture 10DF | 70506-227 | 1 | 12 | 3A |
| | *Brigade WSB | 279-3108 | 1 | 12 | 3A |
| **cyantraniliprole** | *†Exirel | 279-9615 | 3 | 12 | 28 |
| **cyclaniliprole** | *†Verdepryn 100 SL | 71512-34-88783 | | | 28 |
| **fenpropathrin** | *Danitol 2.4EC | 59639-35 | 3 | 24 | 3A |
| **spinetoram** | Delegate WG | 62719-541 | 1 or 3 (see label) | 4 | 5 |
| **spinosad** | Entrust | 62719-282 | 3 | 4 | 5 |
| | Entrust SC | 62719-621 | 1 | 4 | 5 |
| **zeta-cypermethrin** | *Mustang MAXX | 279-3426 | 1 | 12 | 3A |

* Restricted-use pesticide.

† Not for use in Nassau and Suffolk Counties.

# 10 Juneberries/Saskatoons

## 10.1 Introduction

Many small commercial plantings of Juneberries (known in Canada and the Midwest as "saskatoons") are established in New York State. Juneberries (*Amelanchier alnifolia*) are pome fruits in the family Rosaceae, which includes apples and roses and so they are likely to show similar pest and disease susceptibility. Observations from Canada and Michigan show that diseases are most often fungal (e.g. Entomosporium spot) or bacterial (e.g. fireblight) rather than viral.

For information on cultural practices for Juneberries, the following references are suggested:

*Saskatoon Berry Production Manual*, published by the Alberta, Canada provincial government https://open.alberta.ca/dataset/9780773261013

*Growing Saskatoons* available online at: https://www.uidaho.edu/extension/publications/publication-detail?id=bul0866

Juneberries require good air circulation, moderate soil fertility, full sun exposure, and supplemental irrigation to reduce stress.

Insect pests of commercial Juneberries in New York are uncommon, since crop prevalence is very low. As more berries are planted, pest and disease pressure will increase. Growers must plan for a pest management program that includes cultural controls as well as the application of fungicides and insecticides.

New York has a widespread population of a closely-related native plant species in the *Amelanchier* genus. Pests and diseases that affect *Amelanchier spp.* may also infect *Amelanchier alnifolia*.

In Juneberry production areas of North America, the following pests and diseases have been observed:

1. Saskatoon sawfly (*Hoplocampa montanicola*),
2. Saskatoon budmoth (*Epinota bicordana*)
3. Wooly elm aphid (*Eriosoma americanum*)
4. Entomosporium spot (*Argyrotaenia quadrifasciana*)
5. Saskatoon juniper rust (*Gymnosporiangium* spp.)
6. Powdery mildew (*Podosphaera clandestina*)
7. Fire blight (*Erwinia amylovora*)

To submit samples for disease diagnosis, contact Plant Disease Clinic, Cornell University, Department of Plant Pathology, 334 Plant Science Building, Ithaca, NY 14853-4203, (607) 255-7850, online at: plantclinic.cornell.edu.

To submit samples for insect diagnosis or for phone consultations, contact Insect Diagnostic Laboratory, Cornell University, Department of Entomology, 4140 Comstock Hall, Ithaca, NY 14853-2601, (607) 255-3250, online at: idl.entomology.cornell.edu.

Pesticides used for Juneberries must be registered with the state and federal governments. Use Tables 10.1.2 (insecticides and miticides), 10.1.3 (fungicides), 10.1.4 (herbicides) and 10.1.5 (other pest management products for Juneberries) to determine legal pesticides, their brand names, and any restrictions that may apply. Products listed in this table include only those labeled for pests of concern in New York State.

**Table 10.1.1. Juneberry pests and the associated stage of plant development.**

Information taken from production regions with 5 or more years of Juneberry cropping. These pests have not necessarily been observed on Juneberry plantings in NYS.

| Month | Stage of development: | Scout for: | See section: |
|---|---|---|---|
| **Late April / May** | **Flower bud break** | Entomosporium spot | 10.2.1 |
| | | Saskatoon juniper rust | 10.2.2 |
| | | Powdery mildew | 10.2.3 |
| **May** | **White tip/Balloon/Bloom** | Entomosporium spot | 10.2.1 |
| | | Saskatoon juniper rust | 10.2.2 |
| | | Saskatoon sawfly | 10.3.1 |
| **May / June** | **Petal drop/fruit set** | Entomosporium spot | 10.2.1 |
| | | Saskatoon juniper rust | 10.2.2 |
| | | Fireblight | 10.2.4 |
| | | Saskatoon sawfly | 10.3.1 |

**Table 10.1.4. Selected herbicides registered for use on Juneberries.**

| Active Ingredient | Trade Name | EPA Reg. Number | PHI (days) | REI (hrs) | WSSA Group Number |
|---|---|---|---|---|---|
| **flumioxazin** | Chateau SW | 59639-99 | 7 | 12 | 14 |
| **glufosinate-ammonium** | †Cheetah | 71368-112 | 14 | 12 | 10 |
| **glyphosate**[2] | Roundup WeatherMax | 524-537 | 14 | 4 | 9 |
| **sethoxydim** | Poast | 7969-58 | 45 | 12 | 1 |

[1] Application on Long Island, New York is restricted to no more than 0.25 lb AI of clethodim per acre per season.
[2] Other glyphosate products may be labeled for the same purposes.
* Restricted-use pesticide.
† Not for use in Nassau and Suffolk Counties.

**Table 10.1.5. Other selected pest management products for use on Juneberries.**

| Active Ingredient | Trade Name | EPA Reg. Number | PHI (days) | REI (hrs) | Uses |
|---|---|---|---|---|---|
| **azadirachtin** | Molt-X | 68539-11 | 0 | 4 | Nematicide |
| **dried blood** | Plantskydd | 25(b) pesticide | – | – | deer and rabbit repellent |
| **iron phosphate** | Sluggo Slug and Snail Bait | 67702-3-70051 | 0 | 0 | slug & snail bait |
| **iron phosphate + spinosad** | Bug-N-Sluggo | 67702-24-70051 | 3 | 4 | slugs, snails, earwigs, cutworms, sowbugs, pillbugs, crickets |
| **kaolin** | Surround WP | 61842-18 | Apply up to 3 weeks after fruit set | 4 | broad spectrum protectant |
| **metaldehyde** | *Deadline Bullets | 5481-507 | 0 | 12 | slug and snail bait |
| **neem oil** | Trilogy | 70051-2 | UDH | 4 | broad spectrum protectant |
| **paraffinic oil** | JMS Stylet Oil | 65564-1 | | 4 | broad spectrum protectant |
| **petroleum oil** | SuffOil-X | 48813-1-68539 | 0 | 4 | broad spectrum protectant |
| **potassium salts of fatty acids** | M-Pede | 10163-324 | 0 | 12 | broad spectrum protectant |

* Restricted-use pesticide.

## 10.2 Diseases of Juneberries and Management Options

This section contains guidelines for several diseases already observed in commercial Juneberry plantings in New York.

### *10.2.1. Entomosporium Leaf and Berry Spot (Entomosporium mespili)*

**Symptoms-** The disease first appears as small brown spots developing on lower leaves, leading to extensive chlorosis (yellowing) as the season progresses. Lesions may form on petioles and can lead to severe defoliation. Infected fruit will develop small, grey lesions, which causes the fruit to become disfigured and crack during development.

Entomosporium leaf spot is an increasingly common fungal disorder of juneberries in New York. Weather and cultural practices that cause extended leaf wetness (greater than 6 hours) in moderate temperatures (55 – 70 degrees F) lead to increased numbers of leaf lesions and possibly leaf loss and a reduction in photosynthetic activity. Severe epidemics can lead to fruit infections (skin spotting, cracking, and drying out) and loss of marketability. Symptoms that occur on plants post-harvest may impact plant vigor in subsequent seasons.

Fungicide applications to control Entomosporium leaf spot are suppressive at best. Due to a wide range of wild host species, growers should assume this pathogen is present in the surrounding environment.

# Tips for Laundering Pesticide-Contaminated Clothing

## Pre-Laundering Information

Remove contaminated clothing **before** entering enclosed tractor cabs.

Remove contaminated clothing **outdoors** or in an entry. If a granular pesticide was used, shake clothing outdoors. **Empty pockets and cuffs.**

Save clothing worn while handling pesticides for that use only. Keep separate from other clothing **before, during, and after** laundering.

Wash contaminated clothing after **each** use. When applying pesticides daily, wash clothing **daily**.

**Clean** gloves, aprons, boots, rigid hats, respirators, and eyewear by scrubbing with detergent and warm water. Rinse thoroughly and hang in a clean area to dry.

Take these **precautions** when handling contaminated clothing:

- Ventilate area.
- Avoid inhaling steam from washer or dryer.
- Wash hands thoroughly.
- Consider wearing chemical-resistant gloves.
- Keep out of reach of children and pets.

## Air

Hang garments outdoors to air.

## Pre-rinse

Use one of three methods:

1. Hose off garments outdoors.
2. Rinse in separate tub or pail.
3. Rinse in automatic washer at full water level.

## Pretreat (heavily soiled garments)

Use heavy-duty liquid detergent.

## Washer Load

Wash garments separate from family wash.

Wash garments contaminated with the same pesticide together.

**Never** use the “sudsaver” feature on your machine when laundering pesticide-soiled clothes.

## Load Size

Wash only a few garments at once.

## Water Level

Use full water level.

## Water Temperature

Use **hot** water, as hot as possible.

## Wash Cycle

Use **regular** wash cycle, at least 12-minutes.

## Laundry Detergent

Use a **heavy-duty** detergent.

Use amount recommended on package or more for heavy soil or hard water.

Remember to use high-efficiency (HE) detergents in HE and front-loading washers.

## Rinse

Use a **full** warm rinse.

## Rewash

**Rewash** contaminated garments **two or three times** before reuse for more complete pesticide removal.

## Dry

**Line drying** is preferable to avoid contaminating dryer.

## Clean Washer

Run complete, but empty, cycle.
Use **hot water and detergent.**

*Prepared by Charlotte Coffman, College of Human Ecology, Department of Fiber Science and Apparel Design, Cornell University*

## PESTICIDE EMERGENCY NUMBERS

***Emergency responder information on pesticide spills and accidents…***

CHEMTREC .....800-424-9300

***For pesticide information…***

National Pesticide Information Center .....800-858-7378

***To Report Oil and Hazardous Material Spills in New York State…***

NYS Spill Hotline .....800-457-7362

***Poison Control Centers***

Poison Control Centers nationwide .....800-222-1222

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