Crop Profile for Blackberries in New York

Prepared: March, 2000

General Production Information

- **State Rank:** NA
- **% U.S. Production:** NA
- **Acres of Bearing Age:** <100
- **Acres Harvested:** <100
- **Cash Value:** $NA
- **Yearly Production Costs:** ~$3,500
- **Production Regions:** Long Island, along Finger Lakes, and in warmer areas of upstate NY

- **Production Methods**: Blackberries have the same life cycle as that described for red raspberries. A perennial root system and crown structure supports an annual renewal of biennial canes.

  Blackberries (subgenus Eubatus) are separated from raspberries (subgenus Idaeobatus) by the characteristic separation of the mature fruit from the plant. In blackberries, the torus remains inside the harvested fruit and is eaten along with the true fruit portion, the drupelets. In raspberries, the receptacle (torus) remains on the plant, and harvested fruits are thimble-shaped with a hollow center. Breeding and crossing of blackberries and raspberries has produced hybrid fruits, such as the Tayberry, with the drupelet appearance of the raspberry but the torus retention of the blackberry.

  Blackberries have more prominent flowers than raspberries and may have angular canes that are more heavily armored than raspberries, but these are not universal differences. There are thornless types in both groups, but thornless blackberries are currently of more commercial interest. Thornless blackberries are less hardy than most raspberries.

  Erect blackberries produce primocanes from crown buds and adventitious root buds in the same manner as red raspberries. Trailing blackberries produce primocanes only from crown buds, as do black raspberries. Thornless blackberries ripen in August and change from green to red to shiny black to dull black. Thorny blackberries ripen before thornless types.

- **Commodity Destination(s):**
  Fresh Market 100%
  Processing 0%

Insect Pests

Cane Borers

Biology: Raspberry Cane Borer: This beetle is slender, about 1/2 inch long, and black, except for a bright orange thorax that has two or three black spots. The long, black antennae are easily noticed.

These insects require two years to complete their life cycle. The adults appear in plantings in early June and may be

present until late August. They feed on the tender, green epidermis of cane tips and leave brownish patches or scars. Before laying an egg, the female punctures the stem with her mouthparts in a girdling fashion. She creates two puncture rings around the cane, about 1/2 inch apart and about 6 inches from the cane tip or lateral shoot. After puncturing, the female deposits an egg into the cane pitch in between the rings.

Upon hatching, larvae burrow down through the cane, reaching its base by the fall and down to the crown by the next summer. The larvae spend the next season underground, then pupation occurs the second spring, generally in an old stub from which adults emerge.

Biology: Flat-headed Cane Borers: These two species of borers burrow through the canes of raspberries, blackberries, and dewberries. Agrilus ruficollis, the red-necked cane borer, has a reddish-colored thorax that contrasts sharply with its black head and wing covers. A. rubicola, the bronze cane-borer, is similar except for its iridescent bronze or copper color. Adults of A. ruficollis are about 1/4-inch long, while A. rubicola may be much smaller.

The life cycles of the two species are nearly identical. Adults are present from late May to early August. They feed along leaf edges and can be most easily found on sunny days. Females deposit whitish, scale-like eggs along the bark of new growth in May and June. After hatching, the larvae construct long, winding tunnels which spiral around the cane several times in the sapwood, turn into the hardwood, and then end in the pith. A swelling usually develops where the tunneling occurs and is apparent by July or August. Once the tunnel reaches the pith, it straightens into a path through the pith. The larva is full-grown by fall, remains in the tunnel during the winter, and pupates in the spring. Adults emerge in the summer.

Symptoms: A number of borers burrow through the canes of brambles; their presence may be indicated by a generally symmetrical swelling in the cane, from 11/4 to 3 inches long and usually a few inches, but as much as 4 feet, above the ground. Some canes may wither and die; in other cases, the affected area is broken off or severed in the region of the swelling. With other borer species, no swelling is evident but the tips of new canes may wilt and blacken. Adults are active from June through August.

Control: As a preventive measure, canes with swellings should be removed and burned during the dormant season. Canes showing withered tips should be clipped several inches below the affected portion and the damaged tissue destroyed. Methoxychlor is registered for control of red-necked cane borer. An insecticidal spray against the adult beetles is generally applied late prebloom for summer-bearing types or when primocanes are 18 inches tall.

Japanese Beetles

Biology: Adults are about 1/2 inch long and shiny metallic green. They emerge from pupal chambers in the soil from June to September and feed on ripe bramble fruit, in addition to hundreds of other kinds of plants. Eggs are laid on the ground, particularly in acidic soil. After hatching, the larvae feed on roots of grasses and other plants. The winter is spent as partially grown larvae. Growth and feeding continues in the spring. Pupation begins in June, with adult emergence following later in the month.

Symptoms: Beetle larvae are serious pests of lawns, vegetables, and nursery stock. Adult beetles chew holes in the fruit, making the fruit susceptible to infection. Beetles can cause significant leaf damage which appears as skeletonization.

Control: A chemical spray may be needed at late prebloom, just before the blossoms open or when primocanes of fall-bearing varieties are 18 inches long. Japanese beetles prefer Festival, Ruby, Heritage, Reveille, Liberty, Latham, Newburgh, Southland, Durham, Fallgold, and Skeena over other cultivars.

Potato Leafhopper

Biology: Leafhoppers are approximately 1/8 inch long, green and bullet-shaped insects that take flight quickly if disturbed. Their nymphs are light green, do not fly and move sideways when disturbed.

Symptoms: They feed mostly on the undersides of leaves. This feeding causes the upper leaves to curl upwards and growth is reduced.

Control: Apply carbaryl as insects appear.

Raspberry Fruitworm, Raspberry Sawfly

Biology: Raspberry Fruitworm: The fruitworm adult is a small, somewhat hairy, light brown beetle, about 1/8 inch long. Adults emerge in late April to early May from overwintered pupae in the soil, about the same time as raspberry leaves are unfolding. These beetles can be found along the midribs of leaves on which they feed. They also feed on flower buds and reduce fruit set.

The adult females lay eggs on or near the blossom buds or, later, on the flowers and green berries. After hatching, the larvae enter the blossoms or young fruit where they feed on the fleshy receptacles. The full-grown larva is yellowish-white, 1/4 inch long, and has two transverse (crosswise) rows of stiff hairs. Larvae are full-grown by mid-July, when they fall to the ground and change to pupae, which overwinter in the soil. The adults emerge the following year.

Biology: Raspberry Sawfly: The adult is a small, black, thick-bodied insect about 1/4 inch long, and appears about the time the leaves begin to unfold in early May. The female has a yellowish-white band across her abdomen. She deposits eggs singly between the upper and lower epidermis of the leaves. Eggs hatch into spiny, many-legged, pale green "worms". When fully grown, the sawfly larva is 1/2 inch long.

Symptoms: The fruitworm adult is a small, light brown beetle; the full-grown larva is yellowish white and 1/4 inch long. In early May the adults feed on the buds and young leaves, skeletonizing the foliage and hindering fruit development. The small larvae feed inside the flower buds and then bore into the young fruits, which may then dry up or decay and fall off. Fruitworms are most usually a problem in weedy fields.

Symptoms: Younger larvae usually feed on the outer edges of leaves but they chew irregular holes' throughout the leaf as they become older. In heavy infestations, all of the leaf surface is eaten, with the exception of the larger veins. Sawfly larvae may occasionally feed on the new bark, blossom buds, or young fruit.

Control: An insecticide should be applied when the insects or their damage is first noticed in the spring.

Sap Beetle

Biology: Adults are about 1/4 inch long and colored black, with four orange-red spots on their wing covers. Overwintered beetles emerge in May from organic matter in sheltered sites, generally after temperatures exceed 60-65F for several days. They feed, mate, and lay eggs in the organic matter. After larval and pupal development is completed, new adult beetles appear from July to September when they feed on the ripening fruits.

Symptoms: The sap beetle is attracted to fruit and any fermenting material. At any time from the start of fruit coloring through harvest, these small beetles may be found feeding on ripe or injured berries. They either feed near the surface or they bore into the fruit where they can be found next to the receptacle.

Control: Although an insecticide can help reduce the incidence of this pest, controlling other damaging insects and

promptly harvesting ripe berries are recommended to minimize its occurrence.

Tarnished Plant Bug

Biology: Tarnished plant bug adults are about 1/4 inch long, oval, somewhat flattened, and greenish-brown with reddish-brown markings on the wings. A distinguishing characteristic is a small, yellow-tipped triangle on the back, behind the head. Nymphs are pale green when they first hatch and are very small, less than 1/16 inch long. Later, nymphal instars (a stage between molts) are successively larger, often brown in color, and have wing pads. Older nymphs have a characteristic pattern of five spots on their back.

Tarnished plant bugs overwinter as adults and become active from late April to mid-May when they lay eggs in crop and weed hosts. After hatching, nymphs feed on flowers and developing fruit. These nymphs molt to the adult stage by early summer, and the cycle is repeated; two to four generations occur annually.

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

Control: Tarnished plant bug pressure is often highest in weedy fields or in fields bordered by woody shrubs.

Tree Cricket

Biology: The tree cricket is a delicate-looking, greenish-white, slender-bodied insect. It has dark antennae which are usually longer than its body. During the summer, both nymphs and adults can be found on bramble canes. In late summer, females lay eggs in the canes, leaving several small punctures very close together and arranged in rows lengthwise on the cane. There may be only a few punctures or up to 50 in a row. These rows are usually 2-3 inches long and may be anywhere on the cane, but are most common within 2 feet of the tip.

Symptoms: In late summer, adults often lay eggs in the canes, leaving long rows of punctures and greatly weakening the cane above.

Control: Remove and burn infested canes, and eliminate wild brambles from the immediate area. An application of an insecticide in late August to mid-September also may be elected.

Twospotted Spider Mite

Biology: These mites vary in color from pale greenish-yellow to dark crimson red. As adults, they usually have two dark spots, one on each side of their bodies. The mites are barely visible to the unaided eye. Adults or late instar nymphs overwinter at the base of brambles or weeds. After moving onto the foliage, the adults lay eggs on the undersides of the leaves, which are the prime feeding areas of young and adult mites. As many as ten generations per year can occur.

Symptoms: Mites feed on the undersides of leaves, which may result in white speckling on the upper leaf surfaces. Later, discolored blotches develop. Damage is first seen and is most prevalent in dry areas of a field. Mild growing areas in New York (Hudson Valley and Long Island) experience problems with mites most frequently.

Control: No miticides are currently labeled for use; however, sulfur (80% WP) applied according to label directions for powdery mildew will provide some suppression. Predatory mites such as Amblysieusfallacis may promote some control

of spider mites, especially when released well before spider mite densities reach damaging levels. Predatory mites can be purchased from commercial suppliers.

Insecticides on Blackberries:

azinphos-methyl (Guthion)

Formulations: Guthion 50WP
Target pests: leafhopper
Percent crop treated: 5%
Average rate of most common formulation and frequency of application:
o Guthion 50WP ‹ 0.5-1.0lb/A, once
Preharvest interval: 14 days
Restricted entry interval: 96 hours
Efficacy issues: NA
Rationale for use: NA

carbaryl (Sevin)

Formulations: Sevin 50WP, 80WSP
Target pests: raspberry fruitworm, raspberry sawfly, tarnished plant bug, Japanese beetle, potato leafhopper, tree cricket
Percent crop treated: 80%
Average rate of most common formulations and frequency of application:
o Sevin 50WP ‹ 2-4 lbs/A, once
o Sevin 80WSP ‹ 2-2.25 lbs/A, once
Preharvest interval: 7 days
Restricted entry interval: 12 hours
Efficacy issues: NA
Rationale for use: Cost effective and IPM program component

malathion (Malathion)

Formulations: Malathion 57 EC, 5EC
Target pests: raspberry fruitworm, raspberry sawfly, Japanese beetle, sap beetle
Percent crop treated: 80%
Average rate of most common formulations and frequency of application:
o Malathion EC ‹ 1.5-3.0 pts/A, late prebloom through beginning of harvest
Preharvest interval: 1 day
Restricted entry interval: 12 hours
Efficacy issues: NA
Rationale for use: NA

methoxychlor (Methoxychlor)

Formulations: Methoxychlor 50WP
Target pests: tree cricket, cane borer
Percent crop treated: <5%
Average rate of most common formulations and frequency of application:
o Methoxychlor 50WP ‹ 2-3 lbs/A, late prebloom for cane borer; late August to mid September for tree crickets
Preharvest interval: 14 day
Restricted entry interval: 12 hours

Efficacy issues: growers feel it is poor.
Rationale for use: NA

pyrethrin (various)

Formulations: Pyrethrin 0.5EC
Target pests: raspberry fruitworm, raspberry sawfly, tarnished plant bug, Japanese beetle, sap beetle
Percent crop treated: <5%
Average rate of most common formulations and frequency of application:
o Pyrethrin 0.5EC ‹ 2-12 oz/A, late prebloom through beginning of harvest
Preharvest interval: 0 days
Restricted entry interval: 12 hours
Efficacy issues: NA
Rationale for use: NA

Diseases

Anthracnose

Disease Cycle: The anthracnose fungus overwinters within infection sites that developed during the preceding spring and summer. Spores produced from overwintered infections are spread by splashing rain. The spores germinate and infect young canes when they emerge in the spring. The severity of an infection period is proportional to both the temperature and the number of hours canes remain wet after rain starts.

New spores are produced from new infections. The disease will spread throughout a planting following rainy periods, as long as succulent, susceptible tissue is available. Disease risk is greatest between bud break and the preharvest period since infection appears to attack mainly young, actively growing parts of the plant.

Symptoms: Anthracnose first appears on young canes as small, slightly sunken purple spots. As these spots enlarge, they become oval in shape and turn gray in the center, and develop dark raised borders. The sites continue to sink into the woody portion of the cane, sometimes causing it to crack. Many individual infection sites (about 1/8 inch in diameter) may grow together to form large, irregularly-shaped diseased regions. Many small surface infections may fuse together on primocanes during the late summer or early fall. This produces a graying of the bark, especially on the side most exposed to the sun. Such infections do not directly harm canes, but may provide spores for more serious infections of susceptible bramble types planted close by.

Control: Prune and burn or remove diseased canes before new canes emerge in the spring. Maintain good air circulation by controlling weeds and narrowing fruiting rows. Apply a delayed dormant spray of lime sulfur or copper hydroxide.

Botrytis Fruit Rot (Gray Mold)

Disease Cycle: The fungus overwinters in decaying leaves and fruit on the ground and in infected tissue on the cane. Masses of spores are produced during wet or humid periods the following spring and are spread throughout the planting by air currents. Flowers may become infected if they remain wet during bloom, either blighting completely during long rainy periods or having limited, "dormant" infections during more moderate wet periods. These dormant infections may not resume activity until humid weather when they cause ripening fruit to rot. Ripening fruit may also become infected by

(1) spores which blow onto them from overwintering infections, (2) spores produced upon recently infected fruit and flowers, or (3) direct contact with rotting berries in the same cluster.

Ultimate disease severity will depend on a combination of factors, including (1) the number of spores present, (2) the number and duration of individual wetting periods, including mists and dews, and (3) the temperature -- upper 60s and 70s are most damaging if accompanied by wetness. The tremendous number of spores produced upon each infected fruit can cause an epidemic "explosion" of this disease if prolonged wet conditions occur during harvest.

Symptoms: Ripening fruit becomes moldy, and some or all of the individual fruitlets are covered with a gray mass of fungus spores.

Control: Maintain good air circulation and apply fungicide sprays when needed. Gray mold can cause extensive crop losses in years when wet weather prevails during the harvest period. Because initial infections often occur during the blossom period, it is recommended that growers apply protective sprays during bloom if the weather is wet. Follow-up sprays before harvest may or may not be necessary to control secondary spread, depending on the weather. Harvesting all ripe fruit promptly and using training practices that promote air circulation around the berries also minimize disease spread. Red raspberries are generally more susceptible than blacks.

Cane Blight

Disease Cycle: Spores from fruiting bodies in old infected or dead canes are released during rainy periods, beginning in the spring. The spores are dispersed by wind currents or splashing rain, and they germinate and infect new canes if wound sites are available. New fruiting bodies are produced from these infection sites as the season progresses, providing many more spores for further disease spread.

Additional infections may occur any time during the growing season if wounds are present, and are particularly favored by extended periods of warm, wet weather. The fungus eventually overwinters within the infected canes, then produces new fruiting bodies the following spring, completing the disease cycle. The fruiting bodies produced from overwintering infections can continue to release infective spores for up to four years if the cane debris is not destroyed.

Symptoms: The disease is indicated by weak growth of some or all of the fruiting laterals, followed by wilting of the leaves. Dark brown or purple cankers appear on the main cane or the branches below the wilted branches, often extending several inches along the cane. Cane tissue in the infected region is weak and bends easily. Infection sites are usually associated with pruning wounds or other injuries, although these are not always obvious. Cane blight is more likely than spur blight to involve whole stems and is not as definitely confined to the areas surrounding buds.

Control: Follow the recommendations for anthracnose. Time pruning and tipping operations to allow 4 or 5 days of healing before a rain. If the disease appears on red varieties, determine and try to eliminate the source of injury.

Orange Rust

Disease Cycle: The orange rust fungi overwinter within infected plants which they colonize systemically (throughout the plant). Thus, new shoots arising from the roots or crowns of plants infected the previous year are already infected. The rust-colored spores produced upon the leaves of these shoots early in the growing season are spread by wind currents. The spores can infect the leaves of healthy plants under the proper environmental conditions. These conditions are not well-defined, but are presumed to be relatively stringent.

On blackberries, direct infection of healthy young shoots occurs by the rust-colored spores that are liberated in the spring,

then the fungus spreads into the below-ground portions of the new plant. Infected shoots that arise the following year produce a new crop of spores, and the cycle continues. Disease spread may also occur through natural root grafting of adjacent infected and healthy plants.

Symptoms: This disease occurs only on black and purple raspberries and blackberries. New canes arising from infected plants in the spring are weak, spindly, and thornless and have misshapen, pale leaves. They usually arise in bunches rather than singly, in contrast with new canes arising from a healthy plant. The lower surfaces of new leaves are covered first with orange pustules and, several weeks after the leaves unfold, with a powdery orange-colored mass of spores.

Control: Do not establish new plantings next to wooded areas or fence rows unless wild brambles are eradicated first. Examine new plants about one month after planting, and check them each succeeding year when new canes are 12 to 18 inches tall. It is important to identify infected plants before infectious spores are discharged from the orange pustules on the undersides of the leaves. Dig up and burn all infected plants immediately, taking care to remove the roots as well. Once infected with orange rust, a plant will never recover; it will just spread the disease to healthy neighboring plants.

Powdery Mildew

Disease Cycle: The fungus overwinters within infected buds near the tips of heavily infected canes. Shoots that emerge from these buds the following spring are infected, and spores produced upon them are distributed by air currents to spread the disease. Repeat cycles of infection can continue throughout the summer. Unlike most fungal diseases, powdery mildew infections do not require periods of wetness in which to develop. However, they are more likely to become severe during humid weather conditions.

Symptoms: Infected leaves are covered with a white powdery growth, usually on their undersides, and may curl upwards. Some cultivars simply develop light green blotches on the leaf surfaces. Infected shoots may be long and spindly and have dwarfed leaves.

Control: Maintain good air circulation around the planting and remove late-developing primocanes that may be infected. Fungicidal control is generally not effective or practical.

Spur Blight

Disease Cycle: Spores produced in fruiting bodies on overwintered canes start the disease cycle the following growing season. These spores escape into the air during rainy periods from mid-spring through early summer. They are carried by air currents to newly emerging canes where they germinate and cause infection if the canes remain wet long enough. A second type of spore is produced within new infection sites during the summer. This type is spread by splashing rain, and can help cause an epidemic spread of disease during excessively wet years.

Symptoms: Chocolate brown or purple blotches centered around individual buds appear on canes in mid- to late summer. Buds within the discolored areas either fail to grow or produce weak shoots the following year.

Control: Prune and burn or remove diseased canes before new canes emerge in the spring. Maintain good air circulation by controlling weeds and narrowing fruiting rows. Apply a delayed dormant spray of lime sulfur or copper hydroxide.

Verticillium Wilt

Disease Cycle: The fungus persists in the soil in an actively growing state or as dormant resting structures. Infection occurs when roots come in contact with the active fungus or a germinating resting structure. The disease is probably favored by cool, wet spring weather. The fungus can infect through either healthy or wounded roots and root hairs. After initial penetration, the fungus grows into the water-conducting cells of the root (xylem). There, it produces spores that help spread the infection upward into the cane xylem with the normal flow of water. Infected xylem cells develop constrictions and become plugged by the growth of the fungus within them. Eventually, the flow of water is so restricted that the canes wilt and die. Fungal structures are then returned to the soil as the dead roots decompose and spores become available to infect new plants.

Symptoms: Leaves wilt, turn yellow, and fall off, starting from the bottom of the cane and progressing toward the top. Symptoms frequently appear on only one side of a cane or on only one or two canes out of several in a hill

Control: The disease is caused by a soilborne fungus which also attacks a number of other crops, most particularly potato, tomato, eggplant, and pepper. Strawberry, cherry, squash, and cucumber are also common hosts. Before planting berries where these crops have been grown, nonhost crops such as wheat or corn should be grown for at least 2 years, or the soil should be treated before planting with a broad-spectrum fumigant such as Vapam or *methyl bromide plus *chloropicrin. Many weeds, particularly nightshade, horse nettle, groundcherry, redroot pigweed, and lambsquarters, are also hosts of the Verticillium fungus. These weeds should be strictly controlled in current and future planting sites to keep the Verticillium population low.

Fungicides on Blackberries:

benomyl (Benlate)

Formulations: Benlate 50WP
Target pests: powdery mildew
Percent crop treated: <5%; potentially high percentage when disease incidence is high.
Average rate of most common formulation and frequency of application:
o Benlate 50WP ‹ 12 oz/A
Preharvest interval: 3 days
Restricted entry interval: 24 hours
Efficacy issues: Fair
Rationale for use: Use in a resistance management program

copper hydroxide (various)

Formulations: Blue Shield 50WP, Kocide 61DF, 2.4L, 4.5L, 77WP, Champ 4.6F
Target pests: anthracnose, spur blight, cane blight
Percent crop treated: occasional; potentially 80% if outbreak occurs.
Average rate of most common formulation and frequency of application:
o Blue Shield 50WP, Kocide 61DF, 77WP ‹ 4 lbs/A, delayed dormant
o Champ 4.6F ‹ 2.66 pts/A
Preharvest interval: NA
Restricted entry interval: 48 hours
Efficacy issues: NA
Rationale for use: Only registered spray for use in brambles for anthracnose, spur blight, and cane blight control.

iprodione (Rovral)

Formulations: Rovral 50WP, 4F
Target pests: gray mold

Percent crop treated: 30%
Average rate of most common formulation and frequency of application:
o Rovral 50WP ‹ 1-2 lbs/A
o Rovral 4F ‹ 1-2 pts/A
Preharvest interval: 0 days
Restricted entry interval: 12 hours
Efficacy issues: Good control
Rationale for use: NA

lime sulfur (Orthorix)

Formulations: Orthorix, Miller Lime Sulfur
Target pests: anthracnose, spur blight, cane blight
Percent crop treated: 80%
Average rate of most common formulation and frequency of application:
o Miller ‹ 10-12 gal/100 gal water, delayed dormant
Preharvest interval: Dormant
Restricted entry interval: 48 hours
Efficacy issues: Good control
Rationale for use: NA

sulfur (various)

Formulations: Microthiol 80WP, Thiolux 80WP
Target pests: powdery mildew
Percent crop treated: <5%
Average rate of most common formulation and frequency of application:
o Microthiol 80WP ‹ 6-15 lbs/A, at first bloom throughout fruit set
o Thiolux 80WP ‹ 6-15 lbs/A, at first bloom throughout fruit set
Preharvest interval: NA
Restricted entry interval: 24 hours
Efficacy issues: NA
Rationale for use: NA

vinclozolin (Ronilan)

Formulations: Ronilan 50WP, 4L
Target pests: gray mold
Percent crop treated: 80%
Average rate of most common formulation and frequency of application:
o Ronilan 50WP ‹ 1-2 lbs/A; during bloom if wet weather, follow-up sprays before harvest may be necessary depending on weather.
o Ronilan 4L ‹ 1-2 pts/A; during bloom if wet weather, follow-up sprays before harvest may be necessary depending on weather.
Preharvest interval: 9 days
Restricted entry interval: 12 hours
Efficacy issues: Good control
Rationale for use: NA

Weeds

Mulches (straw and plastic) can be used for weed control in the planting year on sites that are not at risk for Phytophthora, but they are not recommended for mature plantings because they interfere with primocane emergence and increase the risk of Phytophthora. Cultivation can be used to control weeds, although grassy row middles will minimize weeds within the planting.

Herbicides should be selected on the basis of particular weed problems. Not all herbicides are appropriate for all fields. Tissue-cultured plants in the first few weeks after planting are sensitive to high rates of herbicides.

Herbicides on Blackberries:

terbacil (Sinbar)

	Amount of Product per Sprayed Acre	
Herbicide	**Formulation**	**lbs active ingredient**
PREEMERGENT		
dichlobenil (Casoron)	4G (100 lb)	4
Apply in late fall when the temperature is under 45 F or late winter before basal buds open. For new plantings, apply 4 wks after transplanting and incorporate immediately. Uniform application is essential. Must use a device specifically designed for spreading Casoron, or apply by hand-held shaker. % usage: 30% PHI: NA REI: 12 hours		
napropamide (Devrinol)	50DF (8 lb), 10G (40 lb)	4
Apply in late fall or early spring before seedling weeds emerge. Incorporate within 24 hrs of application with cultivation or water. % usage: <5% PHI: 42 days REI: 12 hours		
norflurazon (Solicam)	80DF (2.5-5 lb)	2-4

Apply as a directed spray from fall to early spring before weeds emerge and when plants are dormant. Make only 1 application per yr. Do not use on plantings less than 12 months old. % usage: <5% PHI: NA REI: 12 hours		
oryzalin (Surflan)	75 WSP (2.5-5.0 lb)	2-4
Apply late fall or early spring before weed emergence. Do not apply to newly transplanted bushes. Not recommended on highly organic soils. One inch of water is required within 21 days of application. May be tank mixed with Gramoxone, Princep or Solicam. % usage: 50% PHI: NA REI: 12 hours		
simazine (Princep)	90WDG (2.2-4.4 lb), 4L (2-4 qt)	2-4
Apply in fall or spring before weed emergence. Use lower rate on plantings less than 6 months old. For quackgrass suppression, apply lower rate in fall and spring, or high rate in fall. Not recommended for use on Royalty or on first-year tissue-cultured plants. % usage: 80-90% PHI: NA REI: 12 hours		
80WP (1-2.2 lb)	0.8-1.6	

Apply in fall or early spring in at least 20 gal/A. Spray under bushes established 1 year or longer. Spray will burn opened berry leaves. With fall-bearing cultivars, apply only in autumn. % usage: 50% PHI: 70 days REI: 12 hours		
POSTEMERGENT		
fluazifop-butyl (Fusilade)	2L (16-24 oz)	0.5-0.3752 +1% crop oil concentrate
Apply to actively growing grasses less than 8 inches tall. Do not apply to plants that will be harvested within one year. % usage: <5% PHI: 365 days REI: 12 hours		
glyphosate (Roundup)	4L (1-3 qt)	0.25 – 0.75
For site preparation, may use repeat applications but no more than 8 qts/yr. May use a wiper application in established plantings. Avoid contact with green foliage or canes. % usage: 80-90% PHI: 30 days REI: 12 hours		
*paraquat (Gramoxone)	2.5L (2-3 pt)	0.6 – 0.9
Spray on emerged weeds in 50 gal/A, with added nonionic surfactant. Apply in early spring before new canes emerge. % usage: <5% PHI: NA REI: 12 hours		

pelargonic acid (Scythe)	3-5% soln. for annuals	2.25 - 20 gal 5-7% soln. for perennials 7 - 10% for maximum burndown
To avoid damage to bramble foliage, apply before new canes emerge in spring or after they become woody. Do not contact foliage unless excessive cane growth is to be controlled, then application should be applied when new canes are 4 to 6 inches tall. Use highest rate for primocane suppression. % usage: <5% PHI: 24 hours REI: 24 hours		
sethoxydim (Poast)	1.5EC (0.75-2.5 pt) + 2 pt. Oil concentrate	0.14 – 0.47
For perennial grasses, apply higher rates in spring when grasses are 6 inches tall. Cultivation between 14 and 21 days after application will aid in control. A second application may be necessary if regrowth occurs. Do not mix with other chemicals. Do not use more than 5 pints per season. % usage: <50% PHI: 45 days REI: 12 hours Restricted-use pesticide.		

NOTE: Herbicides are usually sprayed in a 3-4 ft band under the plants.

Vertebrate Pests

Bird Control: Damage to fruit by birds is a serious problem in many areas of New York. Visual scare devices such as whirlers, streamers, reflectors, and plastic hawk and owl models are used in combination with sound devices such as exploders, alarms, or recorded devices. For sound devices to be effective, their location and the frequency of sounds arechanged daily. They also are in place before the fruit ripens. Some towns have passed ordinances regulating the use of sound devices. The most effective sound devices are those with species-specific bird distress calls programmed into the device.

Several types of netting, such as plastic, nylon, cotton, and polyethylene, are marketed for protecting fruits. A light-

weight acrylic netting that can be draped directly over plants is available. It does not require support and it does not interfere with sunlight, pollination, or growth. Most netting is expensive, and can be reused for many years.

Methyl anthranilate formulations for bird repellency are labelled for use but have not proven to be effective.

Rodent Control: Various rodents can damage a small-fruit planting, especially as they feed under bark in the winter. Closely mowing the area around the planting and between the aisles in early November will reduce the habitat for voles and mice. The habitat (woodlots) of predators that feed on rodents (hawks, owls, foxes) should be protected around the area. A number of poisonous baits are labeled for use in agricultural areas. To be most effective, baits should be placed in feeding stations that exclude large animals and are replenished throughout the winter.

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NA: Information not available

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