

Gardening a berry good garden : Article by DAWN

Many of us dream of growing luscious soft fruits in our gardens, and the health-promoting raspberries, blueberries, goji berries and other vitamin-rich berries are way up on our 'must try some day' list.

These popular berries, however, generally require certain conditions for cultivation, which make them difficult to grow in our increasingly fickle climate but, whilst most of them are difficult, it doesn't mean they are impossible.

Take raspberries for instance: known as a cool-climate species they have been successfully cultivated around Malir (although I have no precise information as to exactly where and by whom). If this is true, then they can, with care, be grown elsewhere in Karachi, too. They do grow — and produce well — around Lahore, Rawalpindi/Islamabad, Peshawar and can be found both in cultivation and growing wild in odd spots in the Murree hills and around Nathia Gali. The canes, as the plants are known, are sometimes available in Islamabad and via an internet plant business in Lahore.

Growing berries is not impossible in our climatic conditions

Raspberries (*Rubus idaeas*) are members of the huge and surprisingly-varied Rosaceae family to which roses also belong. The berries can be red, yellow or even black. The short-lived canes continually reproduce themselves, so it is important to cut back and remove old shoots to prevent congestion and reduce the possibility of fungal diseases such as mildew. Raspberries like their roots to be cool and moist and their heads in the sun although, having said this, they thrive underneath shade netting as long as the sides/ends are open to allow a breeze. Soil should be rich in compost/manure with an acid to neutral pH value. In hot climates such as ours, laying a thick, moisture retentive, cooling mulch is highly recommended.

Blueberries (*Vaccinium* spp) are successfully being grown, on a small scale only so far, around Islamabad, Abbotabad, Mardan and other locations where the soil is highly acidic or where a specialised, acidic soil which is also very high in natural humus, has been provided. Tall growing blueberry species need moist conditions more than medium and dwarf ones. Ordinary tap water kills these plants, as does brackish water or water from an area where lime is present. They should only be irrigated with rainwater or naturally acidic water and, during the growing season, they become very thirsty plants. I believe that a number of people in and around Lahore are experimenting with blueberry cultivation but do not, as yet, know how they are doing. Plants can be purchased in specialist Islamabad and Lahore nurseries over winter months.

Blackcurrants (*Ribes nigrum*): Like their close relatives redcurrants and white currants (*Ribes sativum*), these delicious berries much prefer the cool climate of the Murree Hills, the Northern Areas and the uplands of Azad Kashmir to that of the far hotter and drier plains regions of the country. Their roots need cool, moist, humus-rich soil yet the bushes

themselves need sun and dislike shade/shade netting under which they are prone to mildew and a range of fungal/viral infections.

If anyone has succeeded with any of these outside the hills/mountains then please share details so that other would-be growers can follow suit.

Goji berries (*Lycium barbarum* and *Lycium chinense*): This increasingly popular berry is hailed as a superfood in the world of health fanatics and with good reason too, as it is bursting with vitamins, minerals and other good ‘stuff’. Simple to grow — take a cutting, stick it in a pot and off it should shoot — it isn’t fussy about soil or water type, can begin fruiting when it is just over a year old and is indigenous in various parts of the country from the far north right down to the mouth of the Indus delta. Plants shouldn’t be hard to find but ... for some strange reason ... nurseries rarely stock them.

Blackberries (*Rubus fruticosus*) are indigenous right across the northern regions, Murree Hills and Azad Kashmir, and have/are also successfully cultivated in private gardens around Lahore, Rawalpindi, Islamabad and Peshawar. Easily propagated from tip cuttings or by pegging growing tips into the ground, blackberries relish humus-rich growing conditions and, from flowering to end of fruiting, regular irrigation. A high percentage of wild blackberries here, are small and rather ‘seedy’ unless they are growing adjacent to a water source when they will be large, juicy and luscious. Sun-lovers, they produce much higher crops when grown in full sun than when located in partial shade where they may not crop at all.

Blackberry bushes/canes can be extremely invasive so it is best to prune the thorny branches and to restrict growth by pruning back extra long shoots as soon as they appear. Blackberries fruit heaviest on growth made the previous year, therefore, when it is time for serious winter pruning, cut out all stems older than one year or older than two years depending on plant vigour. In our climate, blackberries fruit anytime from June to October depending on localised climatic conditions. These shrubs require at least two months, preferably three months, of winter cold so these are not recommended for places such as Karachi although, of course, give them a try if you like.

Please continue sending your gardening queries to zahrahnasir@hotmail.com. Remember to include your location.

Attribute	Information
Seasons	Spring-Late Summer
Soil Requirement	Blackberries require well-drained sandy or loamy soils with a pH 5.5-6.5. A good supply of organic matter in the soil improves aeration and drainage and increases its water-holding capacity.
Environment	Almost 6-8 hours of full sun is required for healthy plants with good flowering and fruit production. Shady locations will produce good shrubs but very less fruit.
Watering	Blackberries require regular watering for its better production. Provide your blackberry plants 1-2 inches of water during the growing season.

How to Care for Blackberries

- [Mulching](#) is important throughout the season to conserve moisture and suffocate weeds. Keep a thick layer of mulch surrounding plants at all times.
- Blackberries require plenty of moisture, especially when growing and ripening. Ensure plants receive one inch of water per week and more in hot temperatures.
- Blackberries benefit from fertilizing in early spring with an all-purpose fertilizer such as 10-10-10, or a 16-16-8.

Pruning

We have provided detailed pruning information below, but do not be scared. The main idea is to simply remove the old canes that already bore fruit and let new ones take their place.

- **Trailing blackberries:** After the fruit harvest period, the old fruiting (floricanes) are removed to the ground. However, unless there is a lot of disease, it's best to delay removing the old fruiting canes until they have died back considerably. This allows the dying canes to move nutrients back into the crown and roots. After you remove the old

fruiting canes, you may train the primocanes up on the wires. Work with one or two canes at a time in a spiral around the trellis wires. Canes from adjacent plants may overlap a little. No pruning of primocanes is necessary.

In areas with low winter temperatures, it's fine to leave the primocanes on the ground for the winter, where they could be mulched for winter protection. In the spring, after the danger of extreme cold has passed, train the old primocanes (now considered floricanes) up on the wires. Avoid working with the canes in cold weather, as they are more prone to breaking.

- **Erect blackberries** produce stiff, shorter canes that come from the crown and from root suckering (often forming a hedgerow).

Erect blackberries benefit from summer pruning. Remove the top one to two inches of new primocanes when they are four feet tall. This causes the canes to branch, increasing next year's yields. Plants will require several pruning sessions to tip each cane as it reaches the four-foot height. Primocanes (suckers) that grow outside the hedgerow should be regularly removed.

In the winter, remove the dead floricanes (old fruiting canes) from the hedgerow. Also, shorten the lateral branches to about 1½ to 2½ feet.

- If you have **primocane-fruiting erect blackberries**, which are harvested in late summer/early autumn, cut all canes to the ground in the late winter (after the fall crop). In the summer, when the primocanes are 3½ feet tall, remove the top 6 inches. The primocanes will branch, thereby producing larger yields in the fall.
- If you have **semi-erect blackberries**, they are easier to manage on a Double T Trellis. Install four-foot cross arms at the top of a six-foot post. Install a three-foot cross arm about two feet below the top line. String high-tensile wire down the rows, connecting to the cross arms.

Semi-erect berries need to be pruned in the summer. When the primocanes are five feet tall, remove the top two inches to encourage branching. Several pruning sessions will be required as canes reach the appropriate height. In the winter, remove the dead floricanes (old fruiting canes). Spread the primocanes (new floricanes) out along the trellis. Canes do not need to be shortened. However, they can be if they are difficult to train.

Blackberries, [raspberries](#), and [strawberries](#) are very high in ellagic acid, which is an antioxidant that acts as a scavenger, helping to make potential cancer-causing chemicals inactive. Ellagic acid reduces the genetic damage caused by carcinogens like tobacco smoke and air pollution. Blackberries also contain other antioxidants that can help lower cholesterol and ward off cardiovascular disease.

Blackberries (*Rubus fruticosus*) are native to Louisiana. Many varieties are well adapted to growing conditions throughout the state. Blackberries can be grown in the home garden or on a commercial scale. The important fact to remember is you do not need large plantings of blackberry shrubs to make a substantial amount of fruit. In fact, there are many “pick your own,” farmers market and roadside stand blackberries produced on very small plots. A home garden with two or three shrubs will produce plenty of berries for most families.

Selecting an Ideal Planting Site

Blackberries will grow in most soil types as long as they have good drainage. Lack of proper drainage will lead to root death, plant stress and increased susceptibility to insects and diseases. If your soil holds water for a long period of time, consider building high rows or raised beds.

While blackberries can grow in almost any soil, the optimal conditions are loam or sandy loam soils that are high in organic matter with a pH of 5.5-6.5.

For optimal production and fruit quality, blackberries need regular watering. Installing an irrigation system or planting near a water source is essential. Blackberries require 1 to 2 inches of water per week.

Full sun (a minimum of eight hours of direct sunlight daily) is required for healthy plants with good flowering and fruit production. Shadier locations will produce nice shrubs but very little fruit.

Preparing the Soil, Planting and Spacing

Prior to planting your blackberry shrubs, clear the site of any weeds. See the weed management section on page 6.

Take soil samples from your newly cleared ground. Take a sample from the upper 12 inches of soil to determine the pH and nutrient availability. Add recommended amendments based on LSU AgCenter Soil Testing and Plant Analysis Lab soil test results and incorporate amendments into the soil prior to planting.

It is best if the soil can be tilled to a depth of 12 to 18 inches prior to planting because blackberries have deep roots. Blackberry plants are often planted in a hedge or row fashion, spacing the plants 2 to 4 feet apart. Actual spacing is dependent on the chosen variety. If you have more than one row, rows should be spaced about 6 feet apart.

Blackberries can be planted in the fall, winter or spring. Avoid late spring and summer plantings to reduce the stress that is brought on by the hotter weather. Blackberries are

usually purchased as containerized plants but can sometimes be purchased as bare-root plants.

Plant containerized plants in a prepared bed to the same depth as they are in the container.

If planting bare-root plants, dig a hole large enough for the roots to spread in the hole. The roots should be completely covered by soil. Thoroughly water in the new plantings.

Fertilization

Prior to planting, take a soil test to determine current soil pH, phosphorous (P) and potassium (K) conditions. The soil pH should fall within a range of 5.5 and 6.5 for blackberries. Use agricultural limestone to raise soil pH or use soil sulfur to lower pH if needed.

If your soil test indicates you are low in either phosphorous or potassium, you do not need to use a complete fertilizer to add these nutrients. Fertilizers are available that add only phosphorous or potassium. For instance, super phosphate (0-17-0) and muriate of potash (0-0-60) are two examples of fertilizers that provide phosphorous and potassium individually. With adequate soil levels of phosphorous and potassium, nitrogen is the only nutrient applied year after year. Nitrogen is often applied annually because it is not stable.

In late winter and again after harvest, apply nitrogen in the form of ammonium sulfate (21-0-0) at 0.75 pounds per 10-foot row (8 ounces per plant) or use 33-0-0 at one-third of a pound per 10-foot row (1.6 oz. per plant). Apply fertilizer in 12- to 18-inch circles around the shrubs' drip line (area where the edge of the foliage lines up with the soil) or apply parallel to the row 12 to 18 inches from the center.

If a soil test is not available, fertilize newly planted blackberries with one-half pound of 8-8-8 fertilizer per 10-feet of row or 2.5 tablespoons of 8-8-8 per plant. For the second and subsequent years, follow recommendations from a soil test.

Blackberry Variety Selection

Blackberries, like most fruit crops, require a period of cold temperature to produce fruit. The amount of cold required varies by variety. The cold period necessary to make fruit is often referred to as a chilling requirement and is measured in chill hours. Chill hours are any hours below 45 degrees Fahrenheit that occur after the plants have gone dormant — when the plants have lost their leaves for the cool season. You can visit your local weather station to determine the number of chill hours accumulating, or you can visit MSU Cares app (https://webapps.msucares.com/chill_hours/). Insert your zip code and the start and end month you'd like to see accumulated chill hours in. Weather forecasters often record these just as they do relative humidity, air temperature and precipitation. In general, gardeners living in south Louisiana should select varieties that require 250 or

fewer chill hours. Gardeners residing in central Louisiana should select varieties requiring 300 to 600 chill hours. And gardeners living in north Louisiana should select varieties requiring 500 to 800 chill hours. Of course, very cold or very warm winters will interfere with normal weather patterns and may affect fruit produced that season.

Types of Blackberries

Primocane fruiting is a type of blackberry that has recently been developed by the University of Arkansas. Primocane blackberries produce berries on the current-season growing cane. This differs from standard blackberries that produce on 2-year-old canes.

Floricanes bear fruit on 2-year-old canes. The new growth that is produced in the spring and summer will not bear fruit that year but will produce berries the following year.

Knowing if your shrubs are primocane- or floricanes-fruiting will affect how you prune.

Recommended Varieties

Erect Types: Thorny Varieties

Brazos (200 ch) is an erect blackberry released by the Texas Agricultural Experiment Station in 1959. It is early bearing and has very large, fair-quality fruit that are maintained over the entire fruiting season. The fruit is slightly sour and rather seedy. In Louisiana, it is very susceptible to rosette (double blossom disease) but resistant to anthracnose. The fruit is not extremely firm but holds its shape well when processed. Brazos has generally been replaced by the University of Arkansas varieties that are named after Indian tribes.



Double blossom.



Double blossom; Gina Fernandez, Department of Horticulture Sciences N.C. State University.

Kiowa (200 ch) is a 1996 release from the University of Arkansas with erect canes and very large fruit. The fruit is the largest of the Arkansas varieties, and their storage and handling qualities are good. Kiowa blooms just after Choctaw and Shawnee. It is susceptible to rosette disease. Kiowa is recommended for commercial and home use throughout Louisiana.

Choctaw (300-400 ch) is a 1989 release from the University of Arkansas that has erect canes and medium-size fruit. It is a very early bearing variety with small seeds. The fruit is soft with handling and storage qualities similar to Shawnee. It is susceptible to rosette disease.

Shawnee (400-500 ch) is a consistent high yielder with medium-large fruit. This University of Arkansas 1983 release ripens about one week later than Cheyenne. Shawnee produces heavily for several consecutive weeks, making it an excellent variety. The soft berries do not store or ship well. Shawnee is highly susceptible to double blossom disease.

Chickasaw (500-700 ch) is a 1998 release from the University of Arkansas with erect canes and a fruit-ripening rate comparable to Shawnee. Storage and handling are better than Shawnee. Plants are high yielding. Chickasaw is susceptible to rosette disease.

Erect Types: Thornless Varieties

Ouachita (300-500 ch) is a 2003 erect thornless blackberry released by the University of Arkansas. The fruit is large and has good fruit storage and handling qualities. Fruit ripens with Kiowa and extends for about five weeks. Research trials indicate that yields are comparable to Apache. Ouachita is resistant to rosette disease.

Osage (350-450 ch) is a 2012 erect thornless blackberry released by the University of Arkansas. The fruit is medium-sized and has good post-harvest handling and packs well in smaller clamshells. Ripens between Natchez and Ouachita and is a good complement to Ouachita. Yields are consistently good and comparable to Ouachita. Lower acid content offers a consistently good taste.

Arapaho (400-500 ch) is the earliest ripening erect thornless variety. Fruit is medium-sized, and yields are about 60% of those of Shawnee. Fruit begins ripening a few days ahead of Shawnee. Arapaho is a 1993 release from the University of Arkansas that appears to be resistant to orange rust and rosette diseases. Arapaho is recommended for commercial and home use.

Natchez (500 ch) is a semierect thornless blackberry released from the University of Arkansas. The fruit is elongated and slightly blocky with excellent flavor. It is an early ripening variety with high yields and good post-harvest handling potential. Natchez has strong disease resistance and it is recommended to grow it on a trellis.

Navaho (800 ch) is an erect blackberry with thornless canes. It has medium-sized fruit with high sugar content and excellent flavor. It has firm berries with an excellent post-harvest shelf life. Yields are 60-75% of Shawnee. Navaho is tolerant of rosette but susceptible to orange rust. It is a 1989 release from the University of Arkansas. Navaho has an extended ripening season, beginning one week after Shawnee and continuing two weeks later than the last Shawnee harvest.

Apache (800 ch) is an erect thornless blackberry release in 1999 by the University of Arkansas. It has the largest fruit and highest yield of the Arkansas thornless blackberries. Fruit ripening is approximately five days after Navaho. Plants appear to be resistant to rosette disease and orange rust. White drupelets or sunburn have sometimes been noted as a problem. Apache is believed to have chill hour requirements similar to Navaho and is recommended for north Louisiana.

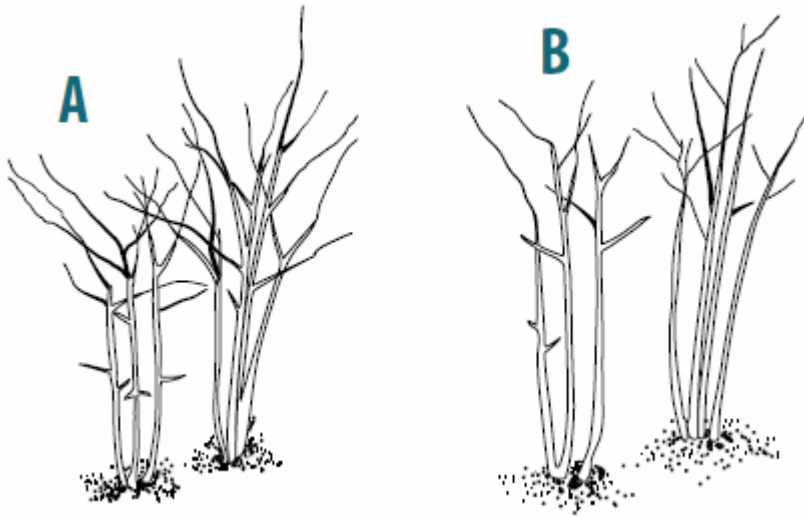
Ch = required chill hours to produce berries.

Pruning

Proper and regular pruning will greatly increase fruit yield. Proper pruning encourages new growth and reduces insect and disease pressure. Always prune shrubs with sharp hand pruners and loppers. Dull blades will tear the stems, leaving ragged edges. A sharp blade will make clean, precise cuts. There are two main seasons to prune blackberries: winter and summer. Follow the guides and reference pictures below.

Winter Pruning Techniques

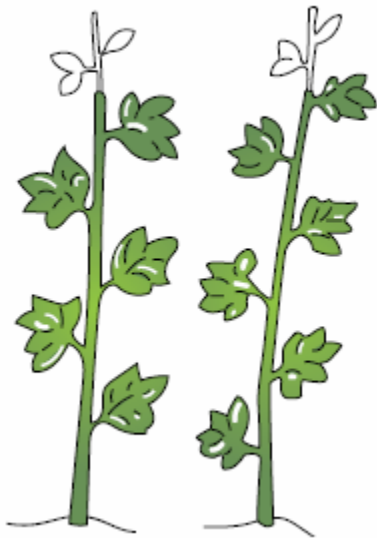
Inspect your blackberry plants for any dead or injured canes and remove those. Floricanes (canes that produced berries) die after harvest. They are biennial and only live for two years. After removing spent floricanes, you should cut back any other growth until four to five healthy canes remain (Figure A). Cut lateral branches back to about 12 inches in length (Figure B). Do this pruning prior to new growth emerging in the spring. Remove all pruned canes and debris from the orchard. These canes may have disease or insects and should not be left near healthy plants.



*Figure A shows an unpruned blackberry.
Figure B shows a properly pruned blackberry plant.*

Summer Pruning Techniques

Primocanes (new growth) are topped off in the summer at a height of 3 to 4 feet. Tipping the canes will encourage the blackberry plants to grow fuller instead of growing tall and lanky (especially if never pruned). After pruning, the plant will send out lateral shoots and eventually will bear fruit next year.



*Summer tipping in June and July at top.
36 to 40 inches at bottom.*

Supporting Blackberry Shrubs

Not all blackberries need support. Erect blackberries, if pruned properly, do not require a trellis at all. If erect blackberries are not pruned, a one-wire trellis is beneficial. Semitrailing blackberries may benefit from a two-trellis support. Posts are generally set 15 to 20 feet apart in a row. Make sure to set the post at least 1 foot into the ground. For one-wire trellis systems, run the wire 30 to 48 inches off the ground. For the two-wire trellis, run the lower wire about 36 inches off the ground and the upper wire about 60 inches off the ground. Use sturdy wire; gauges 10 to 16 are generally sufficient.

Trellising System Examples

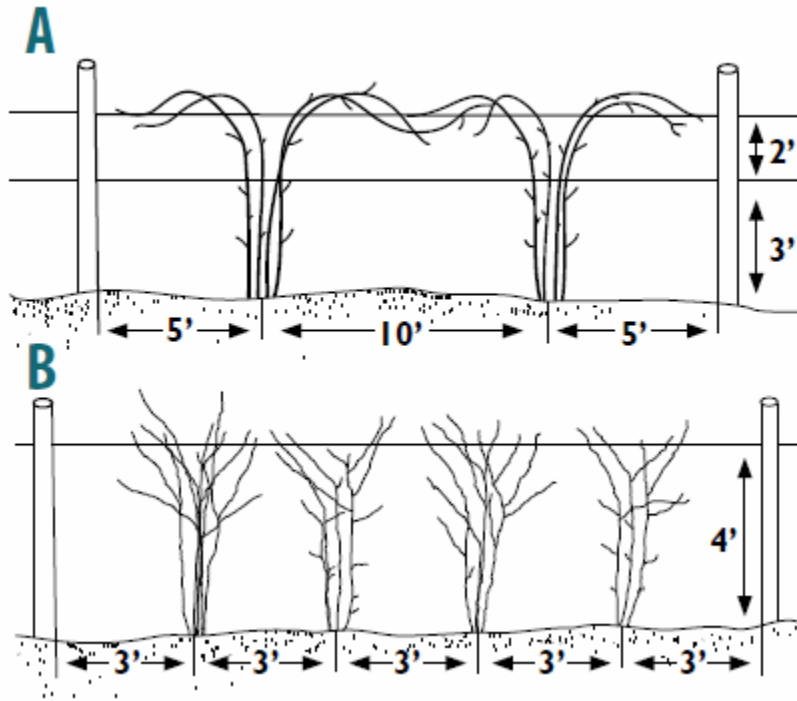


Figure A represents training blackberry shoots on a two-wire trellis system. Figure B represents a one-wire trellis system.

Weed Management

Weeds are a common pest infesting blackberry stands. At the soil level, weeds are in direct competition with the plants for essential nutrients, water and light. Ultimately, weed competition reduces crop yields. When developing weed control strategies, it is very important to have a basic understanding of the biology of weed types that commonly infest small fruit crops such as blackberries.

Types of Weeds

Weed species may be grouped into broadleaves, grasses, and sedges or rushes. Another basic division of weeds is by their life cycle into annuals and perennials.

Broadleaves — Broadleaves, or dicotyledonous plants, have two seed leaves when emerging from the soil. Mature plants have netlike veins on their leaves and flowers that are usually showy. Broadleaf weeds, as the name implies, have a relatively wide leaf compared with grasses. Some common troublesome broadleaf weeds are morningglory (*Ipomoea* spp.) and pigweed (*Amaranthus* spp.).

Grasses — Grasses are monocotyledonous plants with one seed leaf and parallel leaf veins that lack showy flowers. Some common grassy weeds that infest blackberries are crabgrass (*Digitaria* sp.), goosegrass (*Eleusine indica*) and barnyardgrass (*Echinochloa crus-galli*).

Sedges — Sedges are grasslike plants that are common in blackberry plantings. Sedge stems are usually triangular and solid. Many sedges, such as yellow nutsedge (*Cyperus esculentus*) and kyllinga (*Kyllinga* spp.), prefer moist conditions. However, the most problematic sedge infesting blackberries is purple nutsedge (*Cyperus rotundus*), the number one weed problem in the world.

Weed Management Options

The most common method of weed control is hand removal. Mulch can also be used to suppress weeds. Recommended mulch materials include: pine straw, pine bark, leaves or weed fabric. Mulches should be applied at least 4 inches thick. If using weed cloth, be sure that the blackberry has a large enough opening to send up new primocanes.

Herbicides

Herbicides can be a very effective tool for managing weeds in blackberries. Herbicides are chemicals that kill or injure susceptible plants. There are two basic types of herbicides, preemergence and postemergence.

Pre-emergence Herbicides — Pre-emergence herbicides kill weeds as they germinate prior to their emergence from the soil; therefore, timing the pre-emergence herbicide application before weed seed germination is critical for their success. Oryzalin (Surflan) and trifluralin + isoxaben (Snapshot) are examples of pre-emergence herbicides labeled for blackberries. These pre-emergence herbicides can be effective in preventing small-seeded broadleaves and annual grasses.

Post-emergence Herbicides — Post-emergence herbicides kill or injure existing weeds. Generally, weeds are more easily controlled shortly after emergence and while actively growing. Glyphosate is a nonselective herbicide that is an effective control for both grasses and broadleaves. Care should be taken to avoid spraying the canes and foliage.

Emerged grasses can be selectively removed without injuring blackberries with over-the-top applications of grass control herbicides, such as sethoxydim, fluazifop, and clethodim. Clethodim and fluazifop are generally more effective on perennial grasses than sethoxydim.

Always consult herbicide labels regarding rates and application procedures. Herbicides can be safe and effective weed management tools when used correctly and in conjunction with mulches.



Fruit Rot; John Hartman, University of Kentucky, Bugwood.org.

Blackberry Diseases and Their Management

Anthracnose (*Elsinoe veneta*)

Anthracnose is a common fungus disease that can attack both the canes and leaves. Circular, light gray spots form on canes. As the disease progresses, the spots become sunken with a dark purple margin. Leaf spots start off yellow, turn gray with a purple border and eventually dry up and drop out, resulting in shot holes. Fruit may ripen abnormally and have an “off” flavor. Premature defoliation of diseased leaves may occur. Severe infections can reduce growth and yield. The fungus overwinters on bark and cane lesions. In the spring spores are produced, released and spread to new canes by splashing rain and wind. Providing good air circulation around plants and removing old and diseased canes can reduce anthracnose infections. Do not compost canes. Remove and destroy wild brambles. Immediately after harvest remove floricanes to reduce overwintering fungus. Follow a fungicide spray program. Do not use lime sulfur. Apply fungicides that are labeled to control anthracnose. Spray fungicides when the blossoms

are in bud and the young canes are 8-10 inches long. A second application should be made 10-14 days later. Some blackberry varieties are more resistant to anthracnose than others.



Anthrachnose; Charles Drake, Virginia Polytechnic Institute and State University, Bugwood.org.

Botrytis Fruit Rot and Cane Blight (*Botrytis cinerea*)

Botrytis fruit rot and cane blight is a foliar fungal disease. Symptoms appear as white lesions (bleaching effect) on new canes and floricanes. The pathogen causes flowers to shrivel and turn brown. As the fruit develops and ripens, the fruit becomes soft and covered with grey tufts of fungal spores. The fungus survives as sclerotia (overwintering structure) on infected canes and dead leaves and as spores on mummified fruit. During wet and cool conditions, sclerotia germinate and the fungus begins to sporulate. Spores are dispersed by wind, rain and overhead irrigation. Promote good air circulation in the planting by pruning and trellising plants. Minimize the use of nitrogen fertilizer. Minimize fruit damage during harvest. Follow a fungicide spray schedule.

Cane and Leaf Rust (*Kuehneola uredines*)

Cane and leaf rust can cause defoliation and some fruit reduction in severe cases, but this disease is not devastating like orange rust. If this type of rust is found on your plants, you do not need to remove the entire plant like you would with orange rust. The pathogen produces small yellow pustules on the lower surface of leaves on the floricanes may lead to premature defoliation. Wet conditions favor disease development. The fungus

overwinters on infected canes and spores are wind-dispersed. Prune out old diseased canes after harvest. Begin fungicide applications at bud break and continue at a 10-14 day interval.

Crown Gall (*Agrobacterium tumefaciens* and *A. rubi*)

Plants affected by this bacterial disease have large swellings at the crown and on the roots. Galls have a more or less spongy texture. Remove and destroy affected plants. When planting a new blackberry plant, do not plant in the same spot as the diseased plant. The bacteria can survive for years in the soil. Crown gall is spread by splashing rain, pruning tools, insects, wind or farm machinery. Plants become infected via injury wounds on the canes or root crown. Do not cultivate around infected plants as this can spread the bacteria to uninfected plants. Crown gall appears on fruiting canes as small rough ridges or elongated overgrowths. Galls can cause the canes to split open.



Crown gall; Eric Coombs, Oregon Department of Agriculture, Bugwood.org.

Orange Rust (*Gymnoconia nitens*)

Orange rust is one of the most important diseases of blackberries. This disease is potentially a very serious problem because the causal fungus becomes systemic within the roots and crown of the plant and cannot be controlled by sprays or dusts after infection. Disease is evident on new growth in spring as many weak, spindly shoots are

formed rather than one strong shoot. Bright orange pustules form on the undersides of infected leaves, and no blooms are produced on the floricanes. The fungus overwinters within systemically infected canes. Spores are wind-dispersed. Remove and burn infected plants, including the roots as soon as the disease is observed. A number of varieties appear to be resistant to orange rust. Navaho is the variety that is most affected. Fungicide applications from bud break through harvest are recommended. Sprays should generally be made every 10-14 days if dry and every 8-10 days if wet weather is present.



Orange rust; Bruce Watt, University of Maine, Bugwood.org.



Orange rust; Clemson University, USDA Cooperative Extension Slide Series, Bugwood.org.

Phytophthora Root Rot (*Phytophthora* spp.)

Infected primocanes may rapidly wilt and die in the spring, or they (and the floricanes) may slowly become chlorotic, wilt and die in the summer. Infected roots exhibit a reddish-brown discoloration of the cortex. The pathogen can be introduced on infected planting material but it also survives in soil. The pathogen spreads primarily in water. Use disease-free transplants, improve drainage and avoid low spots. Rogue out infected plants and treat surrounding plants with fungicide.

Rosette (*Cercospora rubi*)

Rosette disease, also called double blossom disease, is a destructive disease of blackberries. The fungus attacks primocanes in the spring, overwinters in dormant buds, and the infected canes then develop symptoms the following year on the floricanes. Spores of the fungus are dispersed from infected flowers to the young buds of primocanes by wind and insects. Flowers on diseased fruiting canes are more red or pink in color than healthy flowers and have distorted petals and enlarged sepals, which gives them the appearance of a double flower. Infected plants produce multiple branches with abnormal leaf production. Young leaves are light green and eventually turn yellowish-brown, giving the leaves a bronzing appearance. Diseased canes do not produce berries, and berry production on noninfected canes is small and of poor quality. Rosette can be successfully managed through a combination of resistance, cultural practices and chemical treatments.

Most of the thorny, erect blackberry varieties are very susceptible to rosette and require careful and extensive attention to management. The thornless varieties Arapaho, Apache, Navaho and Ouachita are moderately resistant to resistant to rosette and also grow well in the south. Remove wild blackberry plants as these can serve as a source of infection. Heavy pruning out diseased stems with rosettes early in the spring, before diseased buds open, can effectively prevent the occurrence of new infections on the plant and prevent the spread of the disease throughout the crop. Severely diseased plants should be mowed to 12 inches immediately following harvest. Remove and discard diseased material and follow a fungicide spray program beginning at bud break through petal fall.

Septoria Leaf Spot (*Septoria rubi*)

With Septoria leaf spot, Frogeye lesions with whitish centers and brown to purple margins are produced on leaves. Similar lesions are found on canes and petioles. As the disease progresses, tiny black dots appear inside the lesions. The fungus overwinters in dead leaves and stems. Spores are wind-dispersed. Remove old fruiting canes after harvest. Follow a fungicide spray schedule for leaf spots.



Septoria leaf spot; Paul Bachi, University of Kentucky Research and Education Center, Bugwood.org.

Spur Blight (*Didymella applanata*)

Symptoms appear in primocanes in late spring. Brownish-purple lesions appear just below on the lower portion of the stem just below the leaf or bud. In late fall, the bark of infected canes splits longitudinally. Leaflets may have v-shaped brown lesions with chlorosis. The fungus survives the winter in lesions on diseased canes. Spores are carried to new growth in the spring by splashing rain and wind. Remove and destroy old fruiting canes after harvest. Promote good air circulation in the planting by pruning and trellising plants. Avoid excessive nitrogen applications, which promote rapid and excessive growth of new tissue. Remove and destroy wild brambles. Follow a fungicide spray schedule.

Detailed information including fungicidal spray program, list of fungicides labeled for blackberry disease management and resistant varieties can be found in the LSU AgCenter Disease Management Guide, publication 1802. See pages 155-163 for information on blackberries.

Insect Management

Blackberry Crown Borer

The blackberry (raspberry) crown borer is a serious pest of blackberry plantings and causes loss of plant vigor, loss of yield and plant destruction. The adult is a thick-bodied, clear-winged moth resembling a yellow jacket because of its black and yellow coloring. The larvae are soft, thick-bodied, dirty white and reach a length of more than 1 inch. The pupae are reddish brown, and pupation occurs in the crown or in the canes just above the crown. Initial indication of the girdling by the larvae is the wilting or dying of all foliage on the primary canes in May or June. Cane tips may form a shepherd's crook and are easily broken at the base by strong winds. To check for infestations, scout fields during mid- to late summer for wilting or dying canes. Inspect stressed and wilted plants for presence of holes with sawdust at the base of affected canes and for hollow or tunneled canes. Dig out affected canes and roots, and burn them in late fall or early spring. In addition, insecticidal sprays, such as permethrin and rotenone, can be used to manage this pest. During the first year of infestation, apply during mid- to late October to kill larvae as they crawl down the canes to overwinter in the crowns. The following spring, apply in April to kill larvae as they become active. Apply a full spray to completely drench plants and saturate the soil around the base into the root zone. Because of the two-year life cycle of the insect, successful management requires both fall and spring applications for at least two or more consecutive years. Once management has been achieved, apply once a year as a preventive measure.



Crown borer; University of Georgia Plant Pathology, University of Georgia, Bugwood.org.

Aphids

Aphids are probably the most important insect pest of blackberries in Louisiana. They reproduce quickly, requiring only about a week to complete the life cycle. These pests not only sap the juice from the plant foliage, but they transmit several virus diseases that cause the plant to die. Therefore, an intense spray program must be followed to manage these insects.



Aphid; Eugene E. Nelson, Bugwood.org.

Thrips

These small insects can damage the blossom and cause deformed fruits. They also may cause a surface discoloration on the fruit when numbers are high. Thrips feed on flower pollen and are usually hidden within plant parts, making them difficult to see or treat with insecticides.

Spider Mites

Spider mites can be serious pests of the foliage, especially in dry weather, when moisture is already a critical factor. These pests reproduce rapidly but are not known to transmit disease. Plants may be stunted and severe yield reductions may occur if mites are left uncontrolled.



Spider mite; Eric Coombs, Oregon Department of Agriculture, Bugwood.org.

Red Necked Cane Borer The adult insect is a slender, metallic black beetle about one-quarter inch long with short antenna and a reddish thorax or neck. Adult cane borers feed on the foliage, often leaving irregularly shaped holes in the leaves. The larvae are white, legless flat-headed grubs about three-quarters of an inch long. Infested canes develop galls at the site where larvae are tunneling. The galls are symmetrical swellings usually 1-3 inches long and can be found at the bottom portion of the cane. Infested canes should be removed and burned during the winter or at the time old canes are removed after fruiting. This will reduce damage to the next crop. Also, wild berry plants in the area should be destroyed to help reduce numbers of the borer.



Red necked cane borer; University of Georgia Plant Pathology, University of Georgia, Bugwood.org.



Red necked cane borer damage; James Solomon, USDA Forest Service, Bugwood.org.

Scales

Scales are about the size of a pencil eraser and are usually hard and immobile. Scales are usually found on the stem or canes of blackberries. Heavily infested canes should be removed during the dormant period. Apply sprays of oil during the dormant stages, after bloom and after harvest. At each period, two sprays should be applied at 14-day intervals.

Harvest and Handling

Fruit should be harvested at least twice per week once ripening begins. Blackberries are ready to harvest when fruit are fully colored to a deep dark purple or black and still firm. You can pick the fruit while they are still shiny black for acceptable flavor and longer shelf life. For best flavor and sweetness, pick the fruit when it changes to a dull appearance. But remember, the shelf life will be less. Pick blackberries early in the morning while temperatures are at their lowest. Avoid picking in the rain or if plants and fruit are wet. Doing so may spread disease.

Use shallow containers when harvesting. Berries should be layered no more than two to three berries deep to avoid bruising and fruit damage. Cool the berries as soon as possible to preserve the high sugar content. Ideal storage temperature is 35 degrees Fahrenheit. Fresh blackberries are extremely perishable and easily bruised. They should be used or processed within four to five days after harvest if refrigerated.

Do not wash your blackberries after harvesting, this will damage the berries and reduce their shelf life. If you must wash your berries, it is best to wash your berries just prior to use or freezing. To avoid bruising the berries when washing: place the berries in a colander and dip into cold water, swish around in the colander and then drain. Spread the berries out in a single layer on paper towels and pat dry.

Blackberry Cheesecake Squares

Crust:

- 11 ounces vanilla wafer crumbs
- ½ cup pecans
- ½ cup butter, melted

Filling:

- 3 8-ounce packages cream cheese
- 1 ½ cup pecans
- 1 ½ cups sugar
- 1 ½ teaspoons vanilla
- 4 eggs
- ½ cup sour cream

Topping:

- 4 cups blackberries
- 1 cup sugar

- 1 tablespoon cornstarch

Preheat oven to 350 degrees Fahrenheit.

Directions for crust: Line a 9-by-13-inch baking pan with foil and spray with cooking spray. Place the vanilla wafers and pecans in bowl of a food processor and pulse until mixture becomes crumbs. Add the melted butter and pulse again until combined. Pour into the prepared pan and press the crumbs into the bottom of the pan.

Directions for the filling: Beat the cream cheese, sugar and vanilla together in a medium bowl with an electric mixer until smooth. Add eggs one at a time, beating after each addition. Add the sour cream and mix again.

Pour the filling into the crust, smooth the top and bake for 50 minutes. Turn oven off and open the oven door and allow the pan to sit in the open oven for 15 minutes. Remove and set aside to cool.

Directions for the topping: Add the blackberries, sugar and $\frac{1}{4}$ cup water to a saucepan or skillet. Bring to a boil over medium-high heat and cook until the juices thicken slightly — 4 to 5 minutes.

In a small bowl, stir together the cornstarch and 2 tablespoons water until smooth. Add this mixture to berries. Return to boil and cook for another 1 to 2 minutes. Turn off the heat and cool.

Pour the blackberries over the cheesecake and place the pan into the fridge to cool and set for at least 2 hours. When ready to serve, remove the cheesecake from the pan by lifting the edges of the foil. Slice into 15 pieces with a serrated blade knife.