

# Blackberry Production in New Mexico

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For over 2,000 years, people have grown blackberries (*Rubus* spp.) for their edible fruit, for medicinal purposes, and as hedges to keep out intruders. Though more popular in New Mexico as a backyard small fruit crop, commercial plantings can yield as much as 6,000



pounds per acre under good management, and high tunnel/hoop house production can double the field yield. A planting can produce fruit for 15 years or more, but optimal production occurs between the third and eighth years.

## BOTANY

The blackberry, like the raspberry (also in the genus *Rubus*), belongs to a group of small fruit crops called brambles. Brambles have perennial root systems and biennial canes. Canes (primocanes) formed/grown during the first growing season produce fruit (floricanes) the following summer. The canes then die back to ground level during the winter. Blackberry canes are generally prickly with small to large thorns, although some thornless cultivars have been cultivated for many years and some newly developed thornless cultivars have been released recently.

The blackberry has an aggregate fruit composed of numerous small fruitlets (called “drupelets”) that are fleshy with hard seeds. Blackberry fruit differ from raspberry fruit in that the core (receptacle) of the berry becomes part of the edible berry when picked. In raspberry, the receptacle remains on the cane when picked, resulting in a hollow berry.



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## TYPES OF BLACKBERRIES

There are three types of blackberry plants: erect, semi-erect, and trailing. Erect blackberries tend to have square-like stems, while trailing types tend to be more round. Erect cultivars have arched, self-supporting canes that can generally be grown without support, particularly if they are topped during the summer (see the *Training and Pruning* section below). Trailing types need to be trained to a trellis. Semi-erect cultivars fall in between, but generally respond best to trellising.

Trailing blackberries are more drought-tolerant and produce greater yields than erect cultivars. Erect blackberries, however, tend to be more cold-hardy. Trailing blackberries tend to flower and ripen earlier than erect cultivars, which makes them more susceptible to late frosts. Therefore, trailing blackberries are not suitable for production in central and northern New Mexico.

Historically, all blackberry cultivars have a 2-year production cycle (“floricane-fruiting” cultivars) in which the non-fruiting “primocane” occurs during the first year and fruit production occurs during the second year. In 2004, the University of Arkansas released the first two “primocane-fruiting” blackberry cultivars (sometimes called “fall blackberries”), ‘Prime-Jan’ and ‘Prime-Jim’, which produce fruit on the current season’s canes and finish their production cycle in one year. Later, three more primocane-fruiting cultivars were released (see the *Cultivars* section below). Primocane-fruiting type cultivars can be treated as floricane-fruiting type and produce two crops in the same year—a normal summer crop on floricanes plus a fall crop on primocanes. So far, all primocane-fruiting cultivars are erect type (see the *Cultivars* section below).

Most blackberry cultivars are self-pollinated, but yields and quality tend to improve with cross-pollination. At least two or more colonies of bees per acre are recommended for optimal pollination.

## CULTIVARS

The following well-established and recently released cultivars have shown promise in cultivar evaluations at Alcalde, New Mexico:

### Erect cultivars

‘**Ouachita**’: Released in 2009 from the University of Arkansas. Mid-season cultivar, very productive. Well adapted to high-pH soils in New Mexico. The best-selling and most widely adapted and planted cultivar from the University of Arkansas.

‘**Natchez**’: Released in 2007 from the University of Arkansas. Matures earlier than ‘Ouachita’. Large berry, good flavor, and early ripening.

‘**Osage**’: The newest release from the University of Arkansas (not included in the Alcalde trial). A complement to ‘Ouachita’ in size and season. Medium in size, very good flavor, produces comparable or higher yield than ‘Ouachita’.

‘**Navajo**’: Released in 2006 from the University of Arkansas. Produced small plants and small fruit at the Alcalde trial. Not recommended for New Mexico.

### Semi-erect cultivars

‘**Triple Crown**’: Thornless, large berry, very productive, and matures earlier than ‘Chester’ in New Mexico.

‘**Chester**’: Thornless, semi-erect. Berries are smaller but firmer fruit than ‘Triple Crown’. Less productive than ‘Triple Crown’.

### Trailing cultivars

Compared to erect and semi-erect cultivars, trailing cultivars are less hardy and more susceptible to late spring frosts. They are not recommended for north and central New Mexico.

### Primocane-fruiting cultivars (fall blackberries)

‘**Prime-Ark Traveler**’: Newest introduction from the University of Arkansas in 2015. First released thornless primocane-fruiting blackberry for commercial production from the University of Arkansas. Medium-large fruit, good yields with good plant health. Matures 7–12 days earlier than ‘Prime-Ark 45’, which is more promising for field planting in northern New Mexico. Fruit is firmer than ‘Prime-Ark 45’ and ships well as its name implies. Yield is not as high as the yield of ‘Prime-Ark 45’.

**‘Prime-Ark Freedom’:** Released in 2013 as the first thornless primocane-fruiting blackberry in the world. Very big fruit, very early maturation. Not suitable for shipping, mainly for home production.

**‘Prime-Ark 45’:** Released in 2009. Thorny cultivar with very big fruit, high yield in high tunnels. In general, ‘Prime-Ark 45’ performed much better than ‘Prime-Jan’ and ‘Prime-Jim’ with better flavor and bigger fruit size. Because of its late maturation, growers in northern New Mexico should be cautious with field planting of ‘Prime-Ark 45’. The season will be terminated by early frosts, with lots of green fruit on the plant. Dominant primocane-fruiting cultivar in the U.S.

**‘Prime-Jan’ and ‘Prime-Jim’:** Released in 2004 by the University of Arkansas as the first thorny primocane-fruiting blackberry cultivars in the world. Fruit is small and yield is not as high as ‘Prime-Ark 45’. They are not recommended for New Mexico.

## SITE SELECTION

Blackberries grow best in the backyard in full sun, but will tolerate partial shade. Do not grow in heavy shade.

Blackberries planted on the side of a hill are less susceptible to late spring frosts than those planted in a valley. Blossoms may be injured at temperatures below 26°F. Temperatures below 20–24°F can injure fruiting canes in the spring. Winter low temperatures of 0°F—and especially below -5°F—could cause cane damage or flower bud damage. Selecting a protected location is critical for reliable blackberry production.

Dry, hot winds in the spring can also damage fruiting canes and berries. Windbreaks on the southwest side of the planting may be helpful in commercial operations.

Selection of a commercial site should also be based on your potential market and labor supply. Pick-your-own operations should be located near larger population areas.

## FIELD PLANTING VS. HIGH TUNNELS

The NMSU Sustainable Agriculture Science Center recently evaluated and compared cultivar performance in a blackberry field planting and a high tunnel (hoop house, unheated greenhouse) planting

at Alcalde, NM. The yield of semi-erect cultivars doubled in high tunnels compared to those in field planting. High tunnels also advanced the ripening period by 2–3 weeks. Canes also survived winter better in high tunnels. Primocane-fruiting cultivar ‘Prime-Ark 45’ produced well each year in high tunnels. Commercial growers can consider combining both field and high tunnel planting/production systems. For information on constructing a high tunnel/hoop house, see NMSU Extension Circular 606, *Hoop House Construction for New Mexico* ([http://aces.nmsu.edu/pubs/\\_circulars/CR606.pdf](http://aces.nmsu.edu/pubs/_circulars/CR606.pdf)).

## SOIL AND SITE PREPARATION

Blackberries can be grown in most types of soils, but grow best in deep, well-drained sandy loams with a pH of 6.5–7.5. In soils with pH above 7.5, plants can develop leaf iron chlorosis (yellowing) symptoms (see the *Fertilization* section below). Avoid sandy soils that do not hold water well. Good drainage, however, is important because standing water can do permanent damage to blackberry roots.

Blackberries respond well to soils with organic matter added before planting. Livestock manure can be incorporated into the soil in the fall at a rate of 10–15 tons per acre (2.5–3.75 cubic feet per 100 square feet). Chicken manure can be applied in the fall at rates of 2–3 tons per acre. Large amounts of organic matter can be added the year before planting by incorporating green manure crops like Sudangrass in the fall, or winter wheat, barley, rye, or oats in the spring. Soils should be plowed about 9 inches deep, disked, and harrowed before planting. Fields should be irrigated before planting to ensure good soil moisture.

Blackberry planting sites should be totally free of perennial weeds like bindweed. Bindweed seed can remain dormant in the soil for 20 to 30 years and is very difficult to control. Other perennial weeds like Bermudagrass and Johnsongrass should be controlled the year before planting.

## PLANTING

New blackberry plantings should be established from certified nematode- and virus-free plants purchased from a reputable nursery. Plants should be planted between late February and early April as



**Figure 1.** End posts for the trellis should be 4–6 inches in diameter and well anchored in the soil (2 feet deep). Stakes between the ends can be made of fence posts at least 18 inches deep in the ground. Treat all wood posts with a wood preservative. For organic growers, metal posts can be used for trellis.

soon as they are delivered. In bad weather, plants can be stored at 36–38°F for up to a month if they have not broken dormancy. Do not let the roots dry out. Plants can also be “heeled in” for storage in the garden until the weather is good for planting. In a shaded area of the garden, dig a trench deep enough to contain the roots. Spread plants along the trench with the roots down and cover the roots with moist soil. Keep the soil in the trench moist.

If the plants are dry when they arrive, soak the roots in water for several hours before planting. Plant tops should be cut back to 6 inches long before planting. The remaining top growth can be used as handles when planting and to mark the location of the plants in the field or garden. Prune off any broken roots before planting. Individual planting holes can be made with a shovel or mattock. Commercial growers may wish to open a 4- to 6-inch-deep furrow in the field with a tractor. Furrows should be made just before planting to avoid loss of soil moisture. Set new plants at the same depth or slightly deeper than they were in the nursery. Cover roots with moist soil, firm the soil around plants, and irrigate immediately.

The best spacing between rows varies between 8 and 12 feet, depending on the training technique, width of equipment, and personal preference. The best plant spacing within rows for semi-erect cultivars varies between 4 and 5 feet, depending on the vigor of the cultivar. Erect blackberry cultivars trained to a hedge should be planted 2–3 feet apart. Vigorous erect or semi-erect cultivars that are trained as individual plants to a trellis or stake should be planted 4–8 feet apart.

Erect blackberries can be propagated from either suckers or root cuttings. Root cuttings should be 3–6 inches long and slightly less than 1/2 inch in diameter. Plant in trenches 2–3 inches deep in heavy soils, and 4–6 inches deep in sandier soils. Space plants 1–2 feet apart for hedge rows. Firm the soil over the cuttings and water immediately. Root cuttings can be gathered from established erect blackberry plants early in the spring by digging up roots 2–3 feet away from the plants. Suckers can also be dug and transplanted in late fall or early spring without adversely affecting production of the parent plant.

Thornless blackberries should be propagated by “tip layering” in order to retain their thornless nature. Trailing thornless cultivars are often “chimeras,” meaning the outer tissue of cane and roots are thornless but the inner tissues retain thorniness characteristics. Injuring the roots will result in thorny suckers.

Tip layering is accomplished by digging a hole or trench 3–4 inches deep near the plant during the fall and inserting the tips of primocanes (first year’s growth) vertically into the hole or trench, leaving the growing tip upside down in hole. Cover the tips with soil, firming the soil around the tips, and then water. The following spring, rooted tips 6 inches long can be severed from the mother plant and transplanted to a new location.

## **TRAINING AND PRUNING**

Both erect and trailing blackberries should be trained to a trellis. Although erect cultivars can

be grown without support, trellising will make cultivation and harvesting easier. Trellises for trailing blackberry cultivars should be erected the year plants are established in the field. Canes should be attached to the trellis during late winter or early spring. Handle canes carefully to avoid breaking or forming right angles, which could inhibit the flow of nutrients and water. The ends of canes can be removed without significantly reducing yields. Berry size may increase when half or more of the cane is cut off, but the number of berries may be reduced.

Trailing blackberries are often trained to a vertical two-wire trellis. Set support posts 16–24 feet apart in the row. Stretch two galvanized wires between the posts at a height of 5 feet (#9 gauge) and 3 feet (#10–11 gauge) above the ground. Staple the wires loosely to posts to allow for contraction during cold weather. The most common training system involves distributing individual canes along the wires in the shape of a fan (Figure 1). For semi-erect cultivars, growers can pinch the tip when the new canes reach the top wire to stimulate branches to increase fruit area.

For erect blackberries, two single-wire, 3- to 3.5-foot-tall trellises 2–3 feet apart can be used to confine the canes and ease the management and harvesting. Whether using erect or trailing blackberries, rows should not be over 300 feet long to allow pickers easy access in and out of the fields.

Remove all old canes at ground level after fruiting during the summer. Removing canes from the field or garden will help control many insects and diseases. Canes can be burned, or shredded and composted.

Erect blackberry cultivars should be topped during the summer when canes are 3 feet tall or slightly higher. Optimal height depends on the cultivar and vigor of the plant. Topping (also referred to as tipping) the canes forces out lateral branches, which bear fruit the following growing season. Topped canes will also grow stouter and are able to support greater fruit loads than un-topped canes.

Laterals should be cut back in the spring to 12–18 inches. This will result in larger, better-quality fruit than from unpruned laterals. Pruned laterals are also easier to pick from.

When pruning trailing blackberries in the spring, leave 6–12 strong canes per plant. Erect blackberries trained to a hedge should be thinned to 5–6 canes per linear foot of row.

For primocane-fruiting (fall) blackberries, if you want only the fall crop, canes can be pruned down to the ground in the spring before the season starts. If growers want both a summer crop and fall crop, you should prune out the fruited portion of the canes and keep the bottom part for a summer crop.

## CULTIVATION

In young plantings, cultivation should be shallow (2–3 inches deep) but frequent to control weeds without disturbing the root systems of the plants. Unwanted suckers in alleys between hedge rows should be removed.

## FERTILIZATION

During the latter phases of land (or garden) preparation, preplant phosphorous fertilizer should be broadcast and rototilled or banded into the center of potential hedgerows at a rate of 50–80 pounds per acre of  $P_2O_5$  (1–2 pounds per 1,000 square feet). Potassium should be applied only if a soil analysis indicates there is low potassium present. For more information on soil testing, see NMSU Extension Guide A-114, *Test Your Garden Soil* ([http://aces.nmsu.edu/pubs/\\_a/A114.pdf](http://aces.nmsu.edu/pubs/_a/A114.pdf)).

As new plants start to develop the first year, nitrogen fertilizer should be applied at a rate of 10–20 pounds per acre of elemental nitrogen (1/4 to 1/2 pound per 1,000 square feet). Nitrogen should only be applied after the plants have had sufficient time to establish themselves (4–6 weeks). Earlier or heavier applications of nitrogen may burn young developing roots. Nitrogen fertilizers should be applied in a band 9–12 inches away from the plants and slightly incorporated into the soil (2–4 inches deep). Soluble fertilizers can also be applied through a drip irrigation system.

Phosphorous should be applied annually in the spring at a rate of 50–80 pounds per acre. Nitrogen should be applied at a rate of 50–100 pounds per acre (1 to 2 1/4 pounds per 1,000 square feet) in split applications: two-thirds in early spring before bud break and a third after harvest. Incorporate all fertilizers into the soil in a band 2–4 inches deep and 12–16 inches away from the outside edge of the hedgerow. Soluble fertilizers also can be applied through a drip irrigation system.

Plants that show symptoms of iron chlorosis should be treated with foliar or soil applications of chelated iron products with FeEDDHA as the active ingredient. If drip irrigation is used for irrigation, chelated iron products can be easily applied through fertigation. Foliar applications of these materials should not be applied during flowering because flowers may be burned. Growers and gardeners should follow the label rates for best results. For more information on iron chlorosis, see NMSU Extension Guide H-171, *Iron Chlorosis* ([http://aces.nmsu.edu/pubs/\\_h/H171.pdf](http://aces.nmsu.edu/pubs/_h/H171.pdf)).

## IRRIGATION TECHNIQUES

Blackberries can be irrigated with flood, furrow, sprinkler, or drip systems. Furrow and flood irrigation are generally the cheapest ways to irrigate, but are not appropriate for fields or gardens that are not level.

Gardeners often prefer sprinkler irrigation due to ease of use. Sprinklers, however, often result in plants with more foliar diseases. Furrow, flood, and sprinkler irrigation techniques increase weed populations between hedgerows compared to drip irrigation.

Although drip irrigation is somewhat expensive, it's the most efficient way of applying water and fertilizer. Because water is generally confined to the root area, weeds are not as prolific in the alleys. Drip irrigation systems apply water more uniformly and require less labor, but can be damaged by rodents and cultivation.

## PEST CONTROL

We trialed blackberry for five years at Alcalde, NM, and noticed winter cane damage especially in the field planting, but rarely found any pest/disease problems except for spotted wing drosophila in later years. Listed below are some possible blackberry diseases/pest problems that may occur in New Mexico.

**Verticillium wilt** is a soil-borne fungus that can be a problem in some areas of New Mexico. Fruiting canes often turn bluish-black when severely affected. Leaves turn yellow, and canes eventually die just before fruiting. To control this disease, plant certified, disease-free plants in a Verticillium wilt-

free soil. Growers may also choose to use pre-plant fumigation or plant resistant cultivars.

**Anthracnose** attacks both canes and leaves. It is characterized by small, purplish, slightly raised spots on new shoots. The oval-shaped spots eventually enlarge and develop grayish, sunken centers and raised purplish edges. The spots may later assume an irregular shape as they run together. Control it by using good sanitation practices (pruning out diseased plants and burning them) and making applications of liquid lime sulfur in the late winter while the plants are still dormant.

**Fruit rots** are generally caused by the Botrytis fungus. Symptoms may range from discoloration of individual drupelets to a complete breakdown of the berry. Rotted berries are often covered with a gray or black mold. Berries may shrivel and become hard if they are left on the canes. Control fruit rot by using good sanitation (removing diseased fruit) and approved fungicides.

**Crown gall** is a bacterial disease resulting in warty galls on the roots or base of the plant crown. The disease is generally spread by mechanical injury to the plant through pruning and cultivation. Remove infected plants from the garden and avoid replanting blackberries in the same area. Pruning tools and other equipment should be disinfected routinely with a 10% solution of chlorine bleach.

**Nematodes** are microscopic parasitic worms that can occasionally be a problem, particularly in sandy soils. Nematodes cause weak cane growth, small leaves, and reduced fruit size. The foliage may also turn yellow and drop in hot weather. Fumigating the soil in the summer before planting is the most effective means of control.

**Insects** occasionally cause problems on blackberries. The most common are mites, thrips, aphids, leafhoppers, cutworms, and stink bugs. Most controls involve the application of a labeled insecticide. Check with your county Extension agent (<http://aces.nmsu.edu/county/>) for proper identification and appropriate control measures.

**Spotted wing drosophila** is a fruit fly. The adults lay eggs inside the fruit and the maggots infest the fruit. It was found in Los Lunas, NM, in 2013 and in Alcalde in 2014. Growers should be cautious with this pest. As the name suggests, the male adults have a spot on each wing. It mainly attacks soft fruit, so growers should pick fruit rela-

tively early and pick them all without any overly mature fruit left. Once these flies are spotted in the field, a spray program should be put in place. For more details, visit <http://spottedwing.org>.

Leaf chlorosis is normally caused by iron deficiency in high-pH soils. Foliage application or soil application of chelated iron product with FeEDDHA as the active ingredient can keep it under control.

## HARVESTING AND STORAGE

Begin picking early in the morning before air temperatures become too high. Pick uniformly firm, ripe berries with good color. Blackberries become fully black 2–3 days before they are fully mature. Shiny blackberries turn a dull black color when they are fully mature. With the wide spread of spotted wing drosophila, no overly mature berries should be left in the field to avoid SWD infestation. Berries should be picked every day or at least three times per week. Harvest containers may be tied to the waist or hung around the picker's neck to free both hands for picking.

Handle berries carefully when picking. Use shallow picking containers to avoid mashing the berries. Cool the berries as soon as possible because their quality deteriorates rapidly when they are held at temperatures of 75°F or higher for more than 24 hours. Berries may be stored reasonably well for 4–5 days at 32–35°F with a relative humidity of 90%.

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