

Raspberry Production for Texas and Southern Climates

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Raspberries are a promising new crop for Texas homeowners, hobby farmers, and small-scale commercial enterprises. They are a prolific and high-value crop with a low physical profile that can be grown with relatively low input. While raspberries have traditionally not fared well in the high temperature, intense solar radiation, and drying wind conditions found in most southern states, the use of newer shade technologies coupled with primocane fruiting varieties makes it possible to harvest fresh raspberries from late summer through the first freeze. This is advantageous to Texas growers as it is a time of year when most fresh fruit production has ceased.

There appears to be strong potential for raspberries to serve as a profitable option to fill the late-season gap in commercial fruit production. The relatively long and late harvest season in primocane production means this could be a welcome introduction for producers who are looking for a high-value crop to introduce into their operation during a time of year when harvest is completed in many other fruit crops. Mature stands have the potential to produce over 2,500 pounds per acre depending on variety with strong market potential that should be able to demand a greater price than blackberries or strawberries.

While primocane production can dramatically reduce the labor involved with production, harvesting is still done by hand, meaning that typical growers will need to restrict planting to smaller acreages or consider incorporating pick-your-own into their production plans (Fig. 1). The availability of at least one thornless variety ('Joan J.') with good fruit quality makes pick-your-own harvest a more appealing option than it may be for many of the higher-quality blackberry varieties.



Figure 1. Raspberries are an ideal choice for U-pick or pick-your-own operations.

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Benefits

- ▶ A relatively low cost of entry as compared to many other fruit crops;
- ▶ An achievable learning curve for beginners with manageable labor requirements for primocane production;
- ▶ A high-value, popular crop with an unsaturated market;
- ▶ Well-suited to small-scale producers and pick-your-own operations;
- ▶ A long production period means harvest availability into fall when most fruit harvests have ceased; and
- ▶ A relatively easy crop to introduce into existing operations looking to diversify.

Challenges

One of the greatest challenges to growing raspberries in Texas is the lack of long-term or region-specific information. While ongoing trials show reason to be optimistic, larger and longer-term studies are still needed to gain a deeper understanding of the longevity of plantings, as well as shading requirements and best varieties by region. Development of best practices for cultivation in Texas is ongoing. While early trials are promising, planting raspberries in Texas should still be considered experimental. It is recommended commercial producers limit the size of plantings and keep production expectations reasonable until they have a better understanding of what is required for this crop and what harvest expectations can be on their farm.

Other challenges include:

- ▶ Environmental challenges, such as high heat, solar irradiance, and drying winds;
- ▶ The availability of skilled labor for commercial production; and
- ▶ Protection from vertebrate pests, including birds and small mammals.

Growth habits

Raspberries, in general, can be described as perennial plants with a biennial fruiting habit, otherwise described as a perennial root system with a biennial vegetative growth habit. The above-ground or vegetative parts of the plant are referred to as “canes.” While the root system survives and produces canes for many years, each cane lasts for only two seasons. This is a growth pattern familiar to growers of other cane berry crops, such as blackberries.

Canes are referred to as primocanes in the first year of growth; these canes overwinter and are referred to as floricanes in the following year. New primocanes will sprout from the root system each spring. Floricanes die after bearing a crop to be replaced in the next season by the current year’s primocane growth.

While most available raspberry varieties were bred for floricanes production, primocane varieties are also available, often marketed as “ever-bearing.”

Floricanes-bearing

Raspberries primarily flower and set fruit on canes in their second year of growth. In a floricanes-bearing system, growers are forced to manage 2 years of fruit production simultaneously. While harvesting fruit from floricanes, one must also take care to manage next year’s crop with careful management of the current year’s growth of primocanes. This can be initially challenging for inexperienced growers.

Primocane-bearing or “ever-bearing”

Raspberries set fruit on the current year’s canes. In some instances, these canes can be allowed to persist and fruit in the following year. However, this is not typically recommended for new growers as the learning curve is a bit steeper and the phytosanitation and labor benefits associated with primocane production are lost. It is also anticipated that for most varieties, this will limit production on both types of canes and could negatively impact the longevity of the plants. When plants are allowed to fruit on the floricanes buds, primocane production is typically delayed. It may be possible to utilize this phenomenon to stagger production, but care should be taken as this may not only reduce the primocane crop but could push production on primocanes much later than expected. In colder areas of the state, this could mean a hard freeze will end the production season occurring before significant production has taken place. Another advantage to primocane production is small crops may be harvested in the first year of production, unlike floricanes varieties that will not bear their first crop until the year following planting.

Figure 2 shows a diagram of the fruiting production methods between primocanes and floricanes. The plants labeled “primocane” are modeling the expected maturity schedule when utilizing a primocane production method. This includes cutting all of the previous year’s growth to the ground each year in late winter. These canes will typically continue to produce fruit until dormancy is induced following a hard freeze. They should be cut back to the ground in late winter before buds on the floricanes begin to swell or new primocane growth is observed.

While raspberries are typically not well adapted to the high light and drying heat and winds found in most parts of Texas, a production strategy that combines protected cultivation in the form of shading and primocane-bearing varieties has been developed to assist in overcoming these challenges. Due in part to the availability of high-quality primocane-bearing varieties and poor understanding of chilling requirements for most floricanes-bearing varieties, only primocane-bearing varieties are currently recommended for Texas growers.

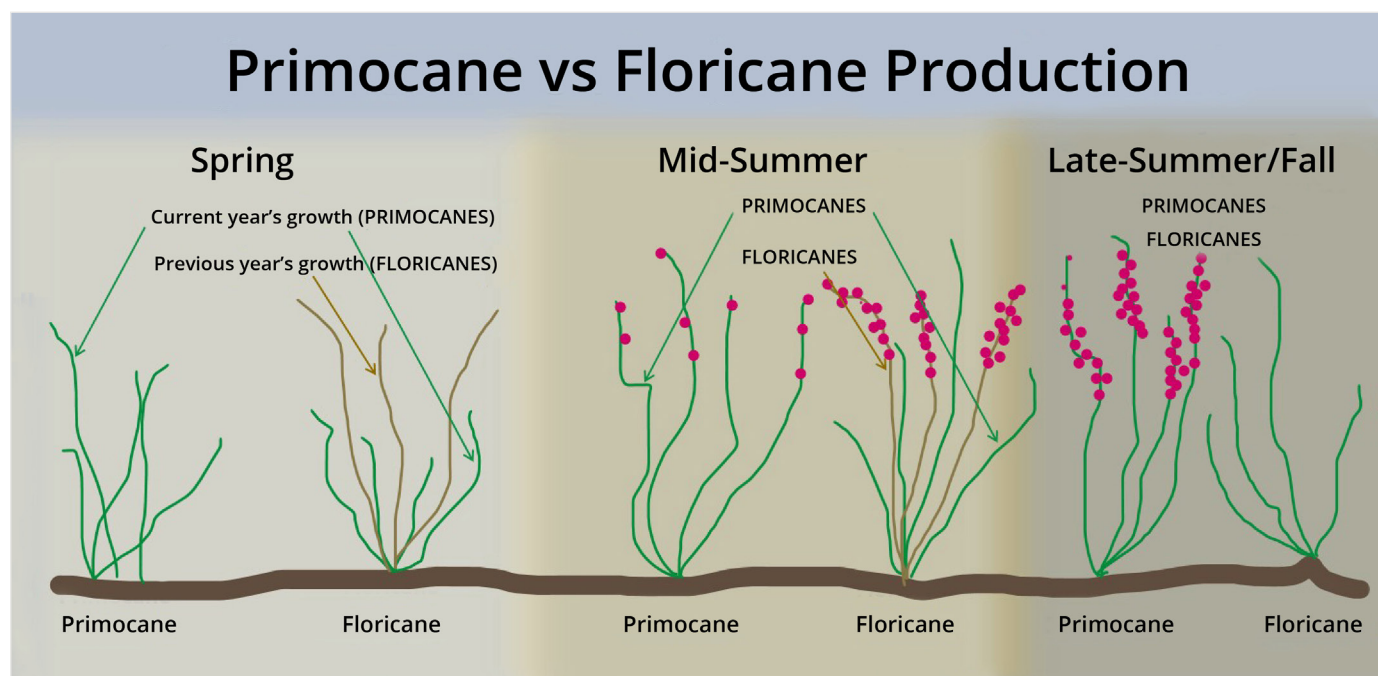


Figure 2. The plants labeled “floricane” model the expected maturity schedule when utilizing a more traditional floricanes production scheme. The brown canes identified as floricanes in the spring section of the image are canes that grew the previous year, were allowed to overwinter, and were left in place to fruit in the current year. After fruiting, the floricanes of these biennial plants die and should be cut back and discarded.

Growth habits

There exists a great deal of variability in the growth habits and trellising needs of recommended raspberry varieties. Habits include sprawling, semi-erect, and erect types (Fig. 3). It is important to take this into consideration when choosing varieties, as this factor will impact cultivation practices, including trellis requirements and harvest.

It is also important to note growth habits in our climate may not match the habits described by nurseries for some varieties when grown in cooler climates in unprotected field conditions. Refer to Table 1 at the end of this publication and reach out to a local Extension horticulturist, agent, or specialist for variety- specific information.

Production of lateral shoots is also variety-dependent but generally not as numerous as is seen in blackberries. It is important to refrain from “tipping” primocane fruiting raspberries to induce lateral growth. Tipping in raspberries is a method used to prevent primocanes from fruiting to conserve the cane for increased floricanes production the following year. Tipping can dramatically reduce or even eliminate the primocane crop.

Growers experienced in blackberry production will notice a difference in how raspberries grow and spread (Fig. 4). While blackberries typically increase by crown expansion with some production of root shoots, raspberry plantings expand by root shoots almost exclusively. This means vigorous varieties will quickly fill in the spaces between plantings into a hedge row. It is common that 2 years after the initial planting, it may not be possible to identify the original plant.

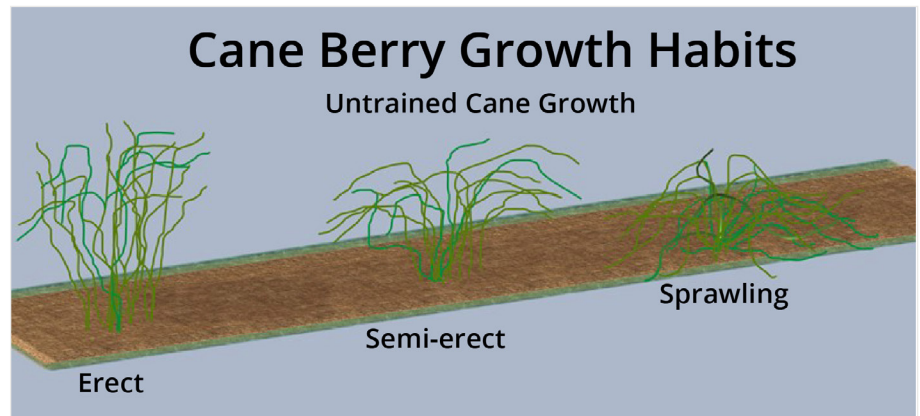


Figure 3. Early summer canes with no crop load. Heavy crop loads can pull the most erect varieties to the ground if not properly trellised.

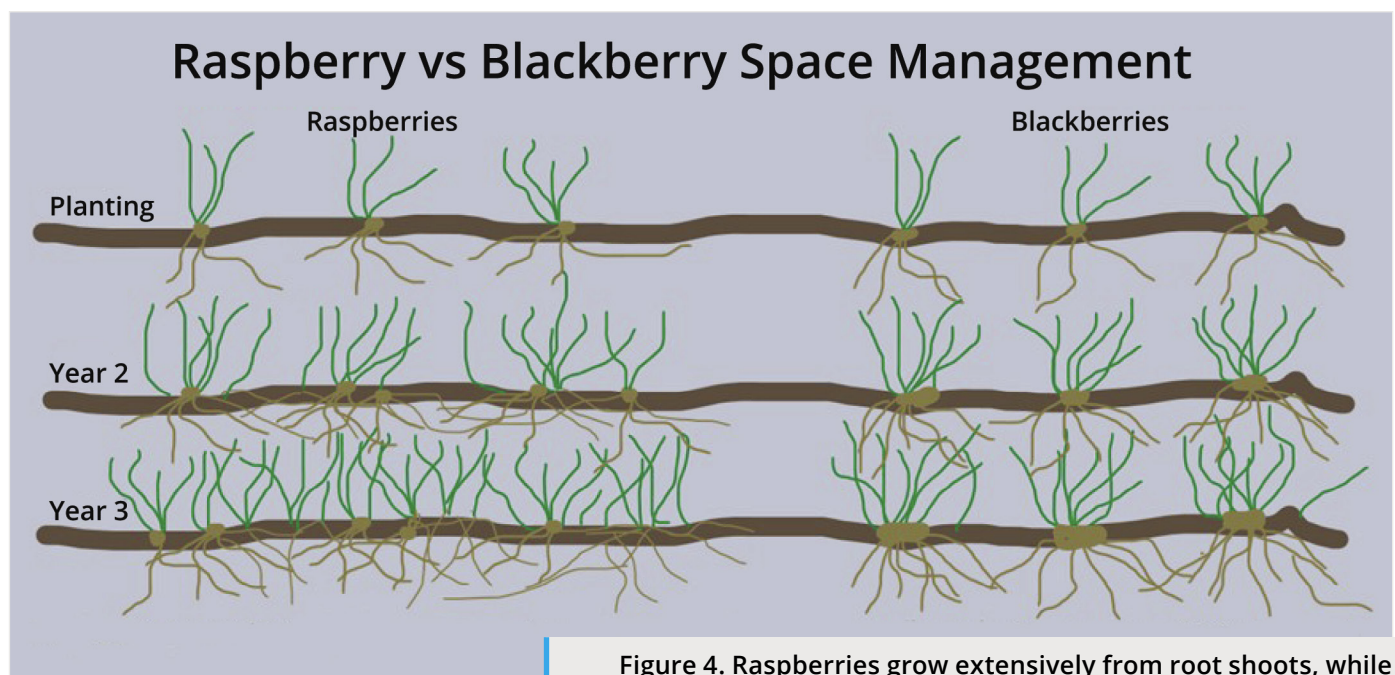


Figure 4. Raspberries grow extensively from root shoots, while blackberries more typically produce shoots from crown expansion.

Shade

Commercial growers and serious hobbyists should plan to plant raspberries under 50 percent shade. For this reason, shaded tunnels are recommended. This shade system provides not only protection from high light and temperatures but by blocking the wind, it aids in producing a microclimate that is less drying and more conducive to good production. Cooler ground temperatures may also promote an increased dormancy period. Finally, shade fabric surrounding the planting may reduce the incidence of insect and vertebrate pests (Fig. 5).



Figure 5. An example of a small, 50-foot tunnel at a study site. This tunnel was designed to test two different shade factors in the same color. Half of the tunnel is covered in 50 percent shade, while the other half is 30 percent. Tunnels like this can be erected and covered in shade to accommodate most sites and planting areas.

Current shade recommendations are for 50 percent shade in most areas. This is an area of ongoing research, and it is possible some varieties may benefit from slightly more or less shade. There could be variations by geographic location as well, but at this time, 50 percent is a good place for most growers to start. For commercial producers, there are a variety of options for shade material and color, which may impact vigor and fruiting. Contact a local Extension horticulturist, agent, or specialist for more information.

For home growers, the options are fewer and, therefore, simpler. It is possible to utilize natural shade that mimics the 50 percent shade obtained from standardized shade fabric. If trying this method, it is advised to attempt to locate the plant in an area that offers some shelter to protect it from wind and exposure to direct light in the summer. When utilizing shade cloth, 50 percent black shade is recommended, remembering to provide some side protection with the cloth or ensure plants are located in a protected area. Direct light and drying winds are not well tolerated by raspberries in southern climates.

Site preparation and weed control

Raspberries, like most plants, grow best in well-drained soils and can suffer from root pathogens when allowed to sit in wet soils for prolonged periods. These plants benefit from planting on raised berms that will allow water to run down the sides of the planting bed, avoiding the pooling of water near the crowns. Incorporation of well-cured compost can increase the friability of both heavy clay and sandy soils. The relatively shallow-rooted nature of raspberry plants increases the capacity of this type of soil amendment to positively impact plant health.

Soil and nutrition

While raspberries will tolerate slightly heavier soils, ideal soils are sandy loams with high organic matter. It is vital that soils be well-drained, as most raspberry varieties are susceptible to a number of root pathogens, including *Phytophthora* root rot. As raspberries are relatively shallow-rooted plants, and many disease issues related to “wet feet” can be avoided by protecting the crown area, raised beds or berms can be utilized to facilitate better drainage in heavier soils and can be modified to make soils more amendable to healthy growth and high productivity.

Amending planting beds with well-cured chicken and vegetable compost can add needed organic matter. This may increase the friability of heavier soils and the water-holding capacity of sandy soils while enhancing the potential to add some nutrient components. In some soils, compost can also improve cation exchange capacity, improving nutrient availability. For the greatest impact, compost should be worked into the top 18 inches of the planting bed. Top dressing in the spring with this compost can offer some benefits as well.

As is the case with most plants, raspberries prefer soil and water pH in the neutral (7.0) to slightly acidic (6.0) range. This being said, raspberries are successfully grown in Texas with soil and water pH up to 8. Higher-pH soils will make plants more susceptible to a variety of nutrient deficiencies, so it is important to choose varieties less prone to these deficiencies as well as to plan for amending with appropriately chelated amendments.

When developing a fertility program, commercial producers are encouraged to collect leaf samples for nutritional analysis. Soil analysis, along with observation of visible symptoms of deficiencies, is the best way to determine what, if any, fertility inputs are required on the site. It has been observed that yearly topdressing with compost has met most fertility requirements, with the exception of iron, on high-pH sites. While some nitrogen needs may be met by regular use of compost, plants should be observed for signs of both macro and micronutrient deficiencies. This will vary by site, so mid-summer leaf analysis and fall soil analysis are encouraged for precision nutrient management in raspberry plantings. Raspberries require less nitrogen and fewer nutrients in general than many other crops, so care should be taken in nutrient management. Blindly adding nitrogen and other nutrients should be avoided to reduce problems associated with nutrient leaching and excessive vigor.

Irrigation

Irrigation requirements will vary by site and by year. Sites that are sandy and very well drained will require shorter and more frequent waterings. In contrast, the more slowly the site drains, the less frequent irrigation should be to allow the soil to become somewhat dry between waterings. Raspberries should never be allowed to sit in completely dried-down soils during the growing season, nor should they sit in saturated soils for periods longer than a day.

The goal is to maintain soils that are evenly moist (not saturated) to a depth of 8 to 10 inches. Keeping an eye on the plant foliage and watching for signs of water stress, along with periodically checking soil moisture by hand, is the best way to determine when it is time to irrigate. The most vital period for close irrigation management is during fruit-sizing periods, which continue until frost once harvest has commenced. Too little water can lead to fruit abortion and small fruit. Too much water can lead to fruit with diluted sugars and little flavor. Winter watering is only required during extended periods of no moisture.

Ideally, irrigation should be accomplished with drip irrigation lines laid out 6 inches to the side of plant crowns. Allowing irrigation water to run alongside the plant and soak the area from the side can aid in preventing pathogen—including soilborne pathogens, which thrive in wet conditions—transmission through sitting water. This system also keeps the irrigation line visible and accessible to recognize and easily repair any problems quickly. It is important irrigation water not be allowed to run directly onto the crown of the plant. When installing irrigation, it is wise to plan for mature stands by utilizing a split-T that will allow for a double line of irrigation to be laid in the future. These lines would be offset 6 inches from the middle of the plant row on either side of the canes to prevent oversaturation of the crown, reducing the risk of fungal pathogens while meeting the water requirements of a mature stand.

Finally, a 1- to 2-inch layer of wood mulch or compost can help modulate both soil moisture and temperature. Keeping this layer of mulch at a 1- to 2-inch depth, applied yearly in the spring once new growth begins to show, can reduce water use and help keep soil and root temperatures cool.

Training and trellising

While raspberry varieties vary significantly in growth habit, all raspberries will require some trellising. The simplest system is a basic double-wire trellis system, with two or three double sets of wires running approximately 1 foot apart (Fig. 6). The height of the wires will vary with variety, but a typical system might place the first wire at 2-foot and at 2- or 3-foot intervals depending on the number of wires.

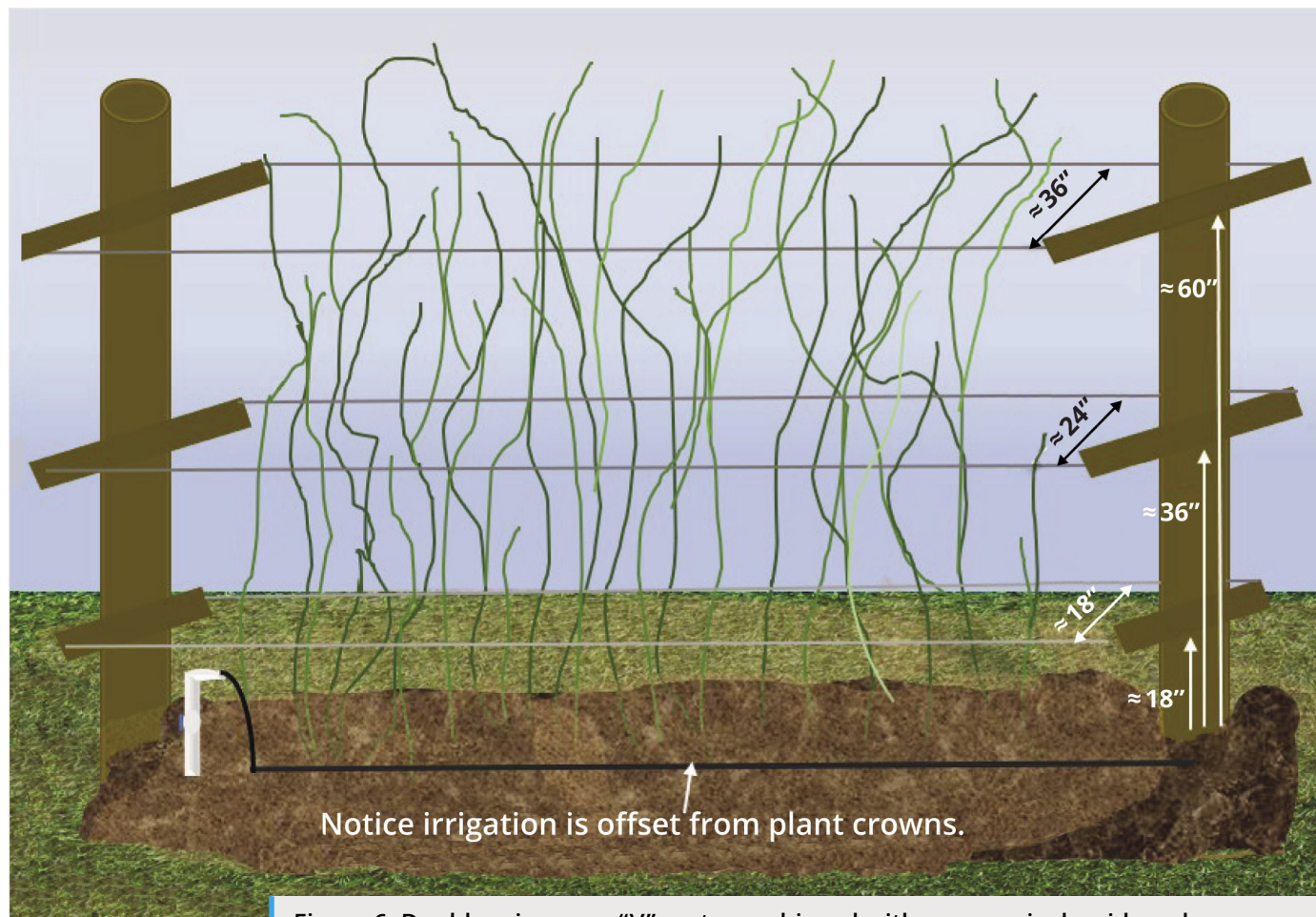


Figure 6. Double-wire open "V" system achieved with progressively widened cross arms.

An open "V" system can be beneficial when bed sizes are wider or for more vigorous varieties, allowing for better air and light penetration into heavy canopies. This can aid in fruit production as well as foliar disease management. A "V" system can be accomplished by setting two posts at an angle to the ground or utilizing cross arms that progressively widen the gap between the trellis wires.

Large-statured and highly vigorous varieties should be pruned to approximately four canes per linear foot in the spring. Smaller-statured and less vigorous varieties can benefit from tighter spacing, up to six canes per foot for a 2-foot-wide bed. Extending the bed to 3 feet will allow for approximately 20 percent more canes per foot while still maintaining good spacing.

Select the straightest and most vigorously growing canes. To stagger production in regions with very long growing seasons, cane numbers per foot can be halved early on. When the second flush of canes begins to fill in, prune these to the desired total number of canes per linear foot.

Tipping of primocanes is not typically recommended when a primocane crop is desired. Primocanes fruit starting at the tip of the cane, and flowers break in a pattern that moves down the cane (Fig. 7). Primocanes can be tipped before floral initiation to reduce height and encourage lateral growth to facilitate harvest, but care should be taken as it can dramatically reduce harvest if done after floral initiation. Even before flower production is obvious, this will protract time to fruiting, possibly by several weeks. This practice in primocane production can be used to help stagger or push back harvest windows but should be approached with extreme caution. A safer practice for extending the time for primocanes to set fruit is to allow some floricanes to fruit in the spring. If a floricanes crop is desired, then the practice of tipping will set up the canes for a larger crop the following year by eliminating or reducing fruit production in the primocane year.

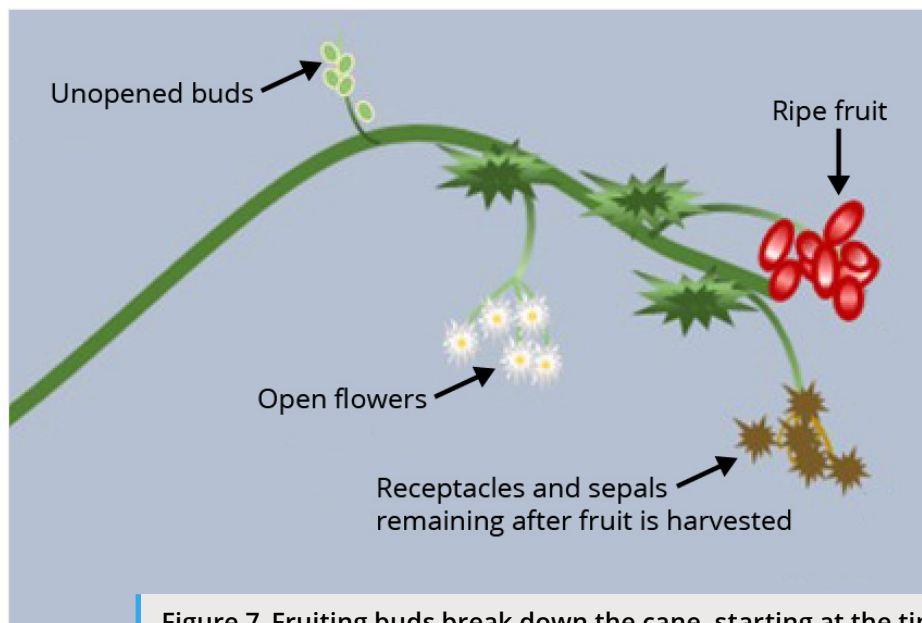


Figure 7. Fruiting buds break down the cane, starting at the tip.

1. Prune out the floricanes in late winter before carbohydrates begin to move from the roots into the canes. This means that before seeing buds swell on last year's canes, mid-winter and preferably after canes have been completely dormant for several weeks.
2. Once new primocanes emerge, thin the stand to the desired number of canes per linear row foot. For most varieties, this is four to six canes per linear foot on a 2-foot-wide row.
3. Do not prune again until these canes are pruned out as floricanes late the following winter. Allowing some of these canes to remain and fruit can provide a small spring/early summer crop while pushing back the harvest window on primocanes at the risk of a smaller primocane crop.

Propagation

For commercial producers, propagation options are limited to dormant bare-root and small tissue-cultured plants. Currently, tissue-cultured varieties are limited, though this may be the best choice for obtaining the highest quality, disease-free planting material where desired varieties are available. Healthy stands of raspberries have been grown in Texas utilizing dormant bare-root plants. The challenge may be availability during ideal planting times, as the best times for planting in Texas fall outside the typical shipping windows for most commercial nurseries.

Bare-root plants should ideally be planted as early in spring or late winter as possible to allow some root growth to take place before warm temperatures begin to release the plants from dormancy. Any top growth on these plants should be cut back to the ground to promote the production of primocanes and limit the translocation of available nutrients to floricanes buds from the previous year's growth.

Harvest

Ripe raspberries are delicate and require hand harvest for fresh market sale. During peak season, raspberries should be harvested daily to ensure berries are picked when at the ideal level of maturity. This will maximize harvests and reduce losses due to over-ripening and pests. Ripe berries pull away from the plant easily, leaving the receptacle behind (Fig. 8).

Color varies by variety, but most red varieties should be bright and evenly colored. Ripe raspberries should be firm and hold together when picked. The need to tug or a berry that does not slip away from the receptacle is a sign the fruit is not overly soft with a deep color is likely over-ripe and not suitable for fresh consumption.



Figure 9. Five raspberry varieties harvested from a test plot in Fredericksburg, Texas.

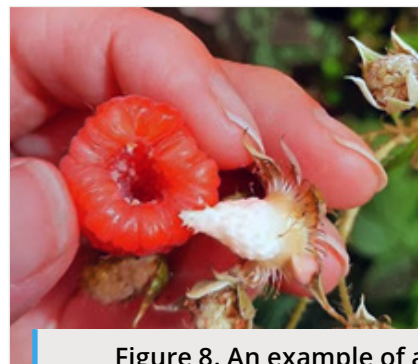


Figure 8. An example of a raspberry that is ripe and ready for harvest. Notice how it has easily slipped away, leaving the receptacle behind.

Harvest time varies by variety and season to season but typically starts in mid to late summer for primocanes and continues until the first hard frost, with production steadily decreasing starting around late September for most varieties. Raspberries intended for fresh market consumption must be hand-harvested (Fig. 9).

More variety information is available in Table 1.

Table 1. Variety information

Fruit Color	Variety	Thorns	Height/Vigor	Planting Spacing Recommendations	Description
Red	'Joan J.'	No	High	3-foot centers	Thornless variety, great for "pick-your-own." Moderate plant size with typical trellising requirements. Very vigorous spreader that will quickly fill a hedge row and will require heavy spring pruning for best results. High-quality, medium-sized red fruit. Increased spacing on planting will take best advantage of its quick-spreading habit.
	'BP-1'	Yes	Moderate	3-foot centers	Moderate trellising requirements. Medium to large red berries. Excellent choice for a traditional red raspberry, may be difficult to locate this in nurseries but is a solid performer if available.
	'Himbo Top'	Yes	High	4-foot centers	Very erect, large plants. Trellising should focus on strong top wires to hold the weight of this plant when mature and holding a crop. Medium to large red berries with good flavor.
	'Caroline'	Yes	Moderate	3-foot centers	Moderate trellising requirements. Medium to large red berries with excellent flavor. Traditional size, flavor, and color.
Blush	'Double Gold'	Yes	Moderate	3-foot centers	Moderate trellising requirements. Small- to medium-sized blush pink berries with outstanding flavor. Moderate to heavy producer.
Gold	'Anne'	Yes	Low	2-foot centers	Tends to sprawl in the shade and has a high need for trellising. Produces substantial crops of high-quality, large golden berries. Low vigor, benefits from tighter spacing on planting.

These descriptions are specific to the performance of these varieties under 50 percent shade and high heat and light conditions found in Texas and other southern climates. This may differ from descriptions based on open-field production in cooler climates.