

Small Fruits section 12

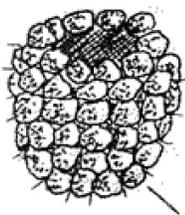
INTRODUCTION

Growing small fruit in the home garden can be extremely rewarding and an excellent way to get home-grown fruit. Where space is limited, small fruits give homeowners a way to grow fruit where a fruit tree is not an option. This chapter outlines practices and techniques that should be considered and used for home garden small fruit production. Determining whether or not berry crops are suitable for your location requires some consideration of soil conditions, water availability and microclimate, which is discussed in detail in the chapter on tree fruits.

CANEBERRIES

Raspberries and blackberries are the two major caneberry fruits grown in Utah. Caneberries are members of the rose family and of the genus *Rubus*. Most blackberry and raspberry cultivars are thorny, but several thornless cultivars are available. Both blackberries and raspberries have aggregate fruits that are composed of many small fruitlets called drupelets (Figure 1). When ripe, raspberry fruits easily separate from the receptacle tissue, leaving a hollow center. When blackberry fruits are harvested, the receptacle separates from the plant and stays in the fruit.

Aggregate Fruit



Drupelet

Figure 1. Aggregate fruit, composed of many drupelets.

General Botany

Blackberry and raspberry plants have a perennial root system. However, cane growth is biennial. This means that an individual cane typically lives only 2 years and then dies. New canes emerge from the crown or roots in the early spring and continue growth throughout the summer. Second-year canes do not grow taller, but each lateral bud produces a short lateral branch containing several leaves and a terminal flower cluster that leads to fruit formation. After producing fruit, the second-year canes die. A first-year cane is called a primocane, and the second-year cane is called a florican. While the floricanes are producing fruit, primocanes are developing in the patch and will become the next year's fruiting floricanes. In this way, the planting may produce fruit every year. There are some exceptions to the general growth pattern in both raspberries and blackberries. Some cultivars will produce flowers and fruit on the upper portion of the primocanes (first year canes) in the fall. For these "primocane-fruiting" types, the primocane ceases growth in mid-summer, with lateral buds opening to form fruiting side shoots, beginning at the tip and progressing down the cane. Typically, the buds in the top third to top half of the cane produce flowers and fruit before the plants go dormant for the winter. The remaining lower portion of the cane still has the potential to produce a florican crop during the following season. These primocane-fruiters are also referred to as fall-bearing, ever-bearing or double-cropping. Primocane-fruiting types require somewhat different management than the summer-bearing or florican-fruiting types, which will be discussed.

Raspberries

Raspberries have a fibrous root system that produces shoot buds that result in new canes. Cultivated raspberries can have red, black, yellow or purple fruit color. Raspberries are self-fruitful and are pollinated by insects or wind. Along the Wasatch Front and in the Dixie area, fall-bearing raspberries tend to be better adapted, as the fruit ripens after the hottest part of the summer is over. For higher elevations with colder climates, the growing season is typically too short for fall-bearing types, so summer-bearing raspberries are better adapted. For these locations, it is important to select cultivars with good cold hardiness, as winter injury to the canes will result in crop loss.

Summer-bearing Raspberries

Summer-bearing raspberries ONLY produce fruit on the second-year canes. Primocanes can grow 4 to 8 feet the first year under ideal conditions. The canes flower and produce fruit in the second year. The middle three-fifths of the canes usually produce the largest quantity of fruit. Fruit production starts in June and continues to the end of July, depending upon the cultivar and weather conditions.

Black Raspberries

Black raspberries have a different growth habit than summer-bearing red raspberries. Fruiting of black raspberries is better if the primocane is “pinched back” when the canes reach 24 to 40 inches tall to encourage side branching and increase yields. Pinching involves cutting off the top 2 to 3 inches of the cane. Winter pruning involves removing spent floricanes, and then heading the lateral branches back to 6 to 18 inches long, depending on the strength of the lateral (strong lateral branches are left longer).

Fall-bearing Raspberries

Fall-bearing raspberry primocanes also emerge from the soil in early spring, but stop terminal growth and begin flowering in mid-summer, with fruit harvest beginning in late summer and continuing until the first fall freeze causes the plants to stop bearing fruit and begin dormancy. The height at which fruiting begins depends on the cultivar and the vigor of the plant. If canes are not completely removed during winter pruning, the lower portion of the remaining cane will produce a summer floricanes crop the following season. The yields for the primocane crop depend on earliness and when the first fall freeze comes. In areas with a short growing season, primocane yields may not be sufficient to justify planting these cultivars.

TABLE 1. SUMMER-BEARING RASPBERRY CULTIVAR RECOMMENDATIONS

Variety	Size	Flavor	Yield	Cold Hardiness
Canby	Medium	Excellent	Hlgh	Fair
Cascade Delight	Large	Excellent	Hlgh	Good
Cowichan	Medium	Good	Hlgh	Good
Killarney	Large	Good	Medium	Fair
Reveille	Large	Good	Hlgh	Good
Jewel (Black)	Small	Excellent	Hlgh	Fair
Royalty (Purple)	Large	Good	Hlgh	Excellent

TABLE 2. FALL-BEARING RASPBERRY CULTIVAR RECOMMENDATIONS

Variety	Size	Flavor	Yield	Season
Caroline	Large	Excellent	Medium	Mid
Josephine	Medium	Excellent	Medium	Late
Polana	Medium	Good	Medium	Early
Joan J	Large	Excellent	High	Early
Polka	Large	Excellent	Medium	Very Early

Blackberries

Blackberries also have biennial canes with nearly all of the commercial cultivars producing fruit only on the floricanes (summer bearing). Cultivars are classified by their general growth habit: erect, semi-erect and trailing. The trailing types are the least cold hardy and are not adapted to most areas of Utah. The erect types are generally more cold hardy than the trailing types, with some of these cultivars adapted to the Wasatch Front. The semi-erect types are typically the most cold hardy. There are thornless and thorny examples of each growth habit. Even the most cold hardy blackberries are typically not as cold hardy as raspberries and will show occasional winter injury along the Wasatch Front.

Plant Selection

To obtain plants that are true to name and that are free of known diseases, purchase certified virus-free plants from reputable nurseries. To prevent the spread of plant viruses and soil-borne diseases, do not obtain or share raspberries or blackberry plants with neighbors. Place catalog orders or reserve plants at local nurseries early in the season to get the best varieties. Specify a shipping date to allow planting at the right time. Planting bare-root plants in the spring is better than using potted plants later in the season, as potted starts are more expensive and the quality is often inferior. Dormant bare-root plants can be planted as soon as the ground can be tilled in the early spring. Selecting cultivars that perform well in your area is critical. Some cultivars cannot survive severe freezes, and significant winter damage can occur. Several USU fact sheets are available on selecting summer and fall-bearing cultivars appropriate for your location (available at <http://fruit.usu.edu>).

ESTABLISHMENT

Spacing

Caneberries have a tendency to spread if not kept in check. Raspberries spread by root suckering while blackberries will spread by tip layering. Raspberries should be strip cultivated or side pruned annually to maintain row widths. Rows should be no wider than 3 feet to allow for adequate light penetration. More narrow rows give higher yields and larger berries per square foot. Distance between the rows should be determined based on equipment width, but typically should not be less than 7 to 8 feet. Allow sufficient space for hand cultivation or tilling between the rows, as well as room to maneuver during harvest. For raspberries, initial in-row spacing should be 1.5 to 2 feet, to allow rows to fill in quickly. In-row blackberry spacing is between 3 and 8 feet, depending on variety and plant vigor.

Site Selection

Caneberries require a location with at least 8 hours of direct sunlight during a summer day. Although some air movement is important for keeping disease occurrence low, provide protection from strong winds to minimize damage to leaves and reduce berry drop. It is a good idea to avoid planting in a site that has recently had caneberries, solanaceous crops (tomatoes and peppers) or fruit trees. This is to reduce potential infection by soil-borne pathogens. In the hot summer conditions of the Wasatch Front, fruit sunburn is a common problem that shows up as a bleached appearance on the sun-exposed portion of the fruit. This damage can be minimized by planting the patch where it receives some afternoon shade, such as on the east side of a fence or building.

TABLE 3. THORNLESS BLACKBERRY CULTIVAR RECOMMENDATIONS

Variety	Flavor	Type	Size
Hull	Good	Semi-Erect	Large
Chester	Fair	Semi-Erect	Large
Triple Crown	Good	Semi-Erect	Medium
Navajo	Good	Erect	Small
Arapaho	Excellent	Erect	Medium
Natchez	Excellent	Erect	Large

Soil Preparation

Soil is one of the most important factors to consider before planting blackberries or raspberries. All caneberries require well-drained soils. The majority of caneberry roots grow in the top 20 inches of soil and are easily damaged by overwatering. Before planting caneberries, add organic matter to improve soil drainage and nutrient holding capacity. In heavy soils, planting into raised beds can also help improve water drainage out of the top of the bed. A bed about 10 to 12 inches high is sufficient. Control perennial weeds before planting. It is much easier to remove weeds through cultivation or chemical control before the plants are there.

Planting

It is important to never let bare-root plants dry out. Immediately before planting, soak the roots in water for 1 to 2 hours. Plant them at the same level they were planted at before (a soil line should be visible), taking care to cover the crown of the plant with soil. Spread roots out laterally along the row and water immediately.

Care

Water management is critical for the first 6 weeks after planting. Keep the soil moist but not waterlogged. Most soils need water every 5 to 7 days during establishment. Do not add fertilizer when planting, as excess fertilization damages the roots or can stimulate excessive top growth before the roots develop. Control weeds since they will compete for nutrients and can harbor pests. Planting grass alleyways or mulching between rows can help control annual weed problems. Avoid excessive cultivation around young plants to protect developing roots. Herbicides can help control weeds, but take extreme care when using systemic herbicides, as caneberries are very sensitive and can easily be damaged by unintended drift (see section on weed management).

Fertilization

Nitrogen is the most critical nutrient for caneberries. Sandy soil needs more nitrogen than clay soil. Use

soil tests and evaluate plant vigor to determine needs. Plants with sufficient nitrogen will produce longer, stronger canes. A general recommendation for an established planting is to apply 35 pounds of actual nitrogen per acre (0.8 pounds per 1,000 ft²) per year, which equates to 2/3 cup of ammonium sulfate per 10 feet of row. Apply fertilizer in the early spring. Add other nutrients if soil tests indicate a need or if deficiency symptoms become visible.

Iron Chlorosis

Iron chlorosis is a symptom of iron deficiency. It is common in many Utah berry crops and is characterized by interveinal yellowing. In severe cases, the entire leaf can turn a yellow-white color and then begin browning on the edges. Although Utah soils contain iron, the high pH makes the iron unavailable to plants. To minimize iron chlorosis occurrence, it is important to use proper management techniques. Avoid over-fertilizing with nitrogen. Large amounts of nitrogen will stimulate excessive vegetative growth, and the plant cannot take up enough iron to meet the need of the new growth. Over-irrigation, especially in the early spring, also induces iron deficiency. Cold, waterlogged roots are not effective in iron uptake. Wait to begin irrigation until the top foot of soil is dry. More information on iron chlorosis in berry crops is available at <http://fruit.usu.edu> (publication #Horticulture Fruit 2009-02pr.pdf).

Irrigation

Caneberries are very sensitive to excess soil moisture and develop root rot, iron chlorosis and other problems if over-watered. Apply 1-2 inches of water per week throughout the hot part of the growing season. Avoid over-watering in the spring, as over-watering before the plant develops a full canopy of leaves will stimulate iron chlorosis. During fruiting, plants may need additional water to promote larger berries. Actively growing raspberry roots will die if submerged in water for 24 hours or more. Because caneberries are shallow rooted, regular watering is critical to prevent soil drying. During the hottest part of the summer, twice-weekly irrigation may be needed.

Mulches

Apply organic mulch after the soil has warmed in the spring to conserve moisture, reduce weed growth and improve the soil. Common mulches include straw, sawdust, bark chips, paper and compost. For raspberry production, plastic mulches or weed barrier fabrics are not recommended because they prevent new primocane emergence from the roots. However, weed barrier fabric can be used in some blackberry production systems if there is a large enough hole around the plant crown for adequate primocane emergence.

Trellising

Trellising is required to reduce cane breakage, to keep fruit off the ground and make harvesting easier. Raspberries can be trellised in many different ways, so it is important to build trellises to fit your needs and your budget. A simple T-trellis system works well for raspberry production and can also be used for erect blackberries (Figure 2). Semi-erect blackberries can be attached to a vertical trellis.



Figure 2. Raspberry T-trellis

Pruning Summer-bearing Red Raspberries

Summer-bearing red raspberries can be pruned in the fall after most of the leaves have dropped, or in the early spring before they start growing. Some growers prune in the fall as they believe this reduces winter injury to the remaining canes. Pruning involves four steps: (1) Remove all spent floricanes at ground level. (2) Narrow the rows by cultivation. (3) Thin the remaining canes, removing weak and damaged or broken canes with no more than 4 to 6 canes for every foot of row. (4) Top or cut back the remaining canes. Topping the canes reduces the total amount of fruit that will be produced, but the remaining fruit will be larger. If the primary interest is in processing the fruit into jams and jellies, then leaving the canes untopped will produce the greatest amount of fruit, but fruit size will tend to be smaller. Commercial producers that want large fruit for fresh market sales will often cut the canes back leaving only 3 to 5 feet of cane, depending on cultivar and plant vigor.

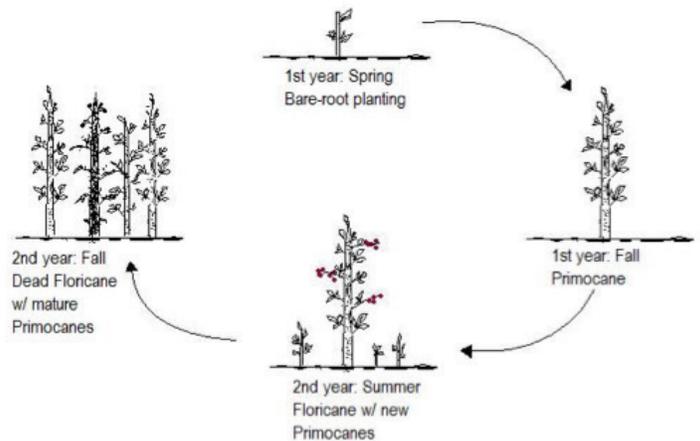


Figure 3. Summer-bearing raspberry life cycle.

Pruning Fall-bearing Red Raspberries

Fall-bearing (primocane-fruiting) raspberries have two acceptable pruning methods. If you are only interested in a fall crop, the canes can be cut off at the ground each year during the dormant season. Rows should also be narrowed to 2 to 3 feet by cultivation, although rows for fall bearers are typically left wider than for summer-bearing types. If both a summer and a fall crop are desired, then prune as recommended for summer bearers

(remove spent canes and thin remaining canes). Canes should be topped just below the lowest flower cluster from the previous year. Typically, double cropping results in a smaller fall crop than would result if the canes were cut to the ground each year.

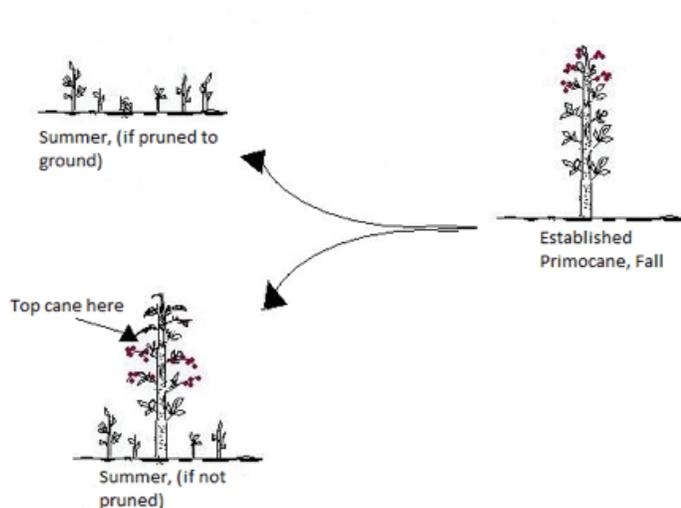


Figure 4. Fall-bearing raspberry life cycle.

Pruning Floricane-fruiting Blackberries (Erect and Semi-Erect Types)

Semi-erect blackberries should be pruned similar to black raspberries. Allow primocanes to grow to be 5 feet tall, then pinch off the tips to promote lateral branching and reduce excessive cane growth. Tipped canes will grow to be more stout and are better able to support a heavy fruit crop. Untipped canes can grow very long and droop down to come in contact with the soil, where they will produce roots forming a new plant (tip layering). During summer tipping, primocanes can also be thinned to four to five healthy canes per foot of row. If proper summer pinching and thinning is carried out, winter pruning involves just two steps: (1) Remove all of the old canes that fruited the previous year; and (2) prune the lateral branches on the primocanes to be 2 feet long. This will make harvesting more convenient and encourage larger berries.

Pruning Primocane-fruiting Blackberries

Like primocane-fruiting raspberries, primocane-fruiting blackberries will fruit on current year's growth during the late summer or fall. Allow canes to grow

to be about 3 feet long and then tip the cane. Branching will occur and flowers will form in the late summer. After the canes are dormant, remove all canes down to the ground. One major advantage of primocane-fruiting types is that winter hardiness of the canes does not matter as the canes are all removed during the winter. Unfortunately, currently available primocane-fruiting varieties are all thorny and tend to be somewhat late. Typically, little of the fall crop is harvested in northern Utah before killing frosts. Fruiting season would be similar to that of later fall-bearing raspberries. It is not yet known if primocane-fruiting blackberries can be double-cropped in Utah by carrying canes through the winter, as the cold hardiness of the floricanes is unknown.

STRAWBERRIES

General Botany

Strawberries are one of the most popular berry crops raised in Utah home gardens. They can be grown in containers, in small gardens, or used as ornamental plants. They are short-lived perennials and the best production for most strawberry varieties comes in the second through fifth year. There are hundreds of strawberry cultivars, but not all are adapted to Utah's growing conditions. Selecting adapted cultivars helps ensure good results.

The three types of strawberries are June bearing, ever-bearing and day-neutral. All three types grow and produce abundantly in Utah. June-bearing strawberries need the short fall days to form flower buds. All the flowers that are going to open the following summer are initiated in the fall. They produce one abundant crop in the spring, usually beginning production in late May or early June. Plant these types for a larger but more concentrated harvest, because they produce more fruit in a shorter time period than the other two types. Because the flower buds are produced in the fall, some cultivars need extra protection from winter cold. In cold climates, cover the plants with organic mulch, such as clean straw, in December. Once the weather warms in the spring and growth begins, remove the mulch.

Ever-bearing strawberries initiate flowers under long days and generally produce a crop in the spring and the fall. Most true ever-bearing plants are being replaced with day-neutral varieties. Day-neutral strawberries flower independently of day length. They start to produce once they reach a determined maturity level, typically 3 months after planting. They produce a larger crop in the late spring and late fall, and a sporadic crop throughout the summer, depending on temperature. Flower buds are initiated only when temperatures are below 72°F. As a result, day-neutral fruit production along the Wasatch Front is minimal during the hot summer months. However, day-neutrals would be a good choice for some of the cooler, high-elevation areas in the state.

SITE SELECTION

Location

Strawberries require a minimum of 8 hours of direct sunlight to produce a good crop. They will grow in shady locations, but fruit production and plant vigor are reduced. Strawberries prefer well-drained soils with abundant organic matter and do best in loamy or sandy soils. They are susceptible to root rot in heavy, wet soils such as clay and should not be planted in areas of the garden that recently had solanaceous plants (tomato, potato, pepper or egg-plant). The plants are particularly sensitive to salty

soils. Do not plant into a location with high salt content.

Frost Protection

Strawberries bloom early in the spring, when frost events are still fairly common. To avoid killing the flowers, frost protection is often necessary. Covering the plants with a frost blanket or tarp on cold nights will help reduce frost damage. It is important to remove the cover during the day.

Soil Preparation

Soil should be prepared in advance of planting. Incorporate 2 to 6 inches of organic material such as well-aged compost into the soil 2 to 4 weeks before planting. Manure-based compost can have high salt levels that could negatively affect the plants, and care should be taken with compost selection. Apply nitrogen fertilizer to ensure organic matter decomposition. Raised beds improve drainage and raise soil temperatures in the spring, and make picking easier. Ideally, beds are 8 to 12 inches tall and 18 to 36 inches wide. Although raised beds improve drainage, they are not required. Strawberries can also be planted on flat ground. Determine the distance between the rows by the cultivating equipment and desired working space, but keep a minimum of 18 inches between rows.

TABLE 4. JUNE-BEARING STRAWBERRY CULTIVAR RECOMMENDATIONS

Variety	Size	Flavor	Yield	High pH Tolerance
Earliglow	Medium	Excellent	Medium	Medium
Chandler	Large	Excellent	High	Low
Honeoye*	Large	Good	High	Medium
Allstar	Large	Excellent	Medium	Low
Jewel	Large	Excellent	Medium	Medium
Kent	Large	Excellent	High	High

*Low heat tolerance, most suitable for cool areas of the state

TABLE 5. EVERBEARING AND DAY-NEUTRAL STRAWBERRY CULTIVAR RECOMMENDATIONS

Variety	Type	Size	Flavor	Yield	High pH Tolerance
Ogallala	E.B.	Medium	Excellent	High	Medium
Seascape	D.N.	Large	Excellent	High	High
Tribute	D.N.	Medium	Fair	Medium	Unknown
Evie 2	D.N.	Medium	Good	High	Unknown
Albion	D.N.	Large	Excellent	Low	Unknown

Plant Selection

Strawberries can be purchased as bare-root plants in the spring. Purchase plants at a reputable nursery. Doing so ensures your plants are true to name and disease free. If ordering from a catalog or online retailer, it is wise to order early in the year to ensure cultivar availability. Plants are normally sold in bundles of 25. Make sure the plants have been kept moist and the roots are still healthy, and plant them into soil as soon as possible to avoid having the roots dry out. Dormant bare-root plants can be planted outside as soon as the ground can be worked in early spring. Strawberries are available later in the season as potted plants. These are more expensive and are not any more productive than less expensive bare root plants.

Establishment

The most practical method for growing strawberries in the home garden is as a “matted row.” To establish matted rows, bare root plants are spaced 1 to 2 feet apart down the center of each row and rows are spaced 30 to 40 inches apart. The planting depth should cover all the roots, but leave as much of the crown exposed as possible. If planted too deep, the crown will rot. If planted too shallow, the roots will dry out. The original bare-root plant is called the mother plant. At the time of planting, it will have a single crown and about 6 inches of roots. As the plant matures, more crowns will form. Once the mother plant is established, it sends out runners that can root at every other node. Rooted runners are called daughter plants. During the first year, healthy mother plants should produce a “mat” of daughter plants that fill in the rows. Remove flowers during the establishment year to encourage runner production.

Fertilization

Only minimal fertilizer is needed during the first year until runner production begins. Add 1 cup ammonium sulfate per 100 feet of row as runners begin to root down. In the second and subsequent years, apply 1 cup ammonium sulfate per 100 feet after fruiting is finished and again 1 month later. Add a complete fertilizer in early spring if soil tests

or symptoms indicate a need. Like raspberries, strawberries are also susceptible to iron chlorosis and may need additions of iron chelate.

Irrigation

Strawberries are sensitive to overwatering, but they have shallow root systems. This results in a need to balance between too much and not enough irrigation. During fruiting and through the hottest summer months, plants need up to 2 inches of water per week. This is usually best applied in two irrigation events. The strawberry plant itself is somewhat drought tolerant, but production drops with insufficient water. Strawberries do best with drip irrigation, but can also be irrigated with sprinklers. Sprinkler irrigation should be done in the morning, which allows the leaves, flowers and fruit to dry out in the afternoon, minimizing fungal diseases (see descriptions below).

Mulches

Strawberries are not very competitive with weeds, and yields drop with weed competition. The best between-row weed control method is cultivation or using straw mulch. Plastic, spun bonded or woven mulch weed barriers can be used to suppress weeds in the row, but prevent daughter plants from rooting down. These are only appropriate in an “annual” production system, where the entire patch is torn out and replanted after a single crop. This approach is used widely in the commercial industry, but not practical for most home garden situations.

Renovation

In a matted row production system, the best fruit comes from the daughter plants that were produced the previous summer. To encourage continued formation of new daughter plants throughout the life of the planting, patches should be “renovated” immediately after fruit harvest is finished for the season. During renovation, weeds are removed, nitrogen fertilizer is applied to stimulate new growth (see above) and the sides of the rows are tilled out to narrow the row and make room for new daughter plants. The oldest mother

plants may also be pulled or broken out to reduce crowding. The optimum width of the matted row is about 18 inches. Maintaining discrete rows is preferred to a solid mat of strawberries—and also makes harvest and weed control easier.

Plant Rotation

Remove and replace strawberry plantings every 4 to 6 years. Over time, strawberry plants accumulate viruses and soil-borne pathogens that reduce vigor and productivity. As productivity drops off, start again with clean, disease-free plants from a reputable nursery, and establish the patch in a new location in the garden.

GRAPES

General Botany

Grapes are one of the most important and widely grown fruit crops in the world. They have many uses including fresh eating, jelly, juice, wine and as landscape plants. Grapes prefer low humidity, minimal summer rainfall, and a long growing season, making them well adapted to many areas of Utah. The three best types of grapes for Utah are American bunch grape (*Vitis labrusca*), European grape (*Vitis vinifera*) and hybrids (crosses between *V. vinifera* and several American species). European grapes have firm fruits

with a skin that remains attached to the flesh, but are less cold hardy, less disease resistant and require a longer growing season compared to the American and hybrid cultivars. The most common European table grape is ‘Thompson Seedless.’ European grapes can grow in the warmest areas of the state but often winter kill or fail to produce a crop in Northern Utah. American grapes are softer and their skin separates from the flesh when eaten (“slip-skin”). They have a stronger flavor than the European types and are generally not considered suitable for wine making. The most prominent American grape cultivar is ‘Concord.’ Hybrids have been selected with the cold hardiness of the American types, but with the seedlessness or the mild flavor characteristics that originated in the European types. Varieties include ‘Suffolk Red,’ ‘Canadice,’ ‘Interlaken’ and ‘Himrod.’

SITE SELECTION

Location

Grapes need full sun for maximum production. They produce best when rows are oriented north to south to allow light exposure to both sides of the plant. In areas where winter kill is a concern, try to plant in a protected microclimate or cover the pruned vine with a winter mulch such as straw or wood chips.

COMMON GRAPE CULTIVARS

JUICE GRAPES

Concord	Mid-season	Red	Excellent for juice and jelly. High sugar content.
Buffalo	Mid-season	Blue-black	Earlier than Concord; same uses; just must age.
Fredonia	Mid-season	Blue-black	Later than Buffalo; ahead of Concord; same uses.
Canada Muscat	Early	White	Mild, early ripening.
Niagara	Late	White	Excellent for wine; good flavor

TABLE GRAPES (SEEDLESS)

Suffolk	Mid-season	Red	Large table grape with excellent flavor.
Canadice	Early	Red	Productive, high quality.
Himrod	Mid-season	White	Early with less clusters; makes good raisins.
Lakemont	Late	White	Makes good raisins.
Venus	Late	Black	Large, early, excellent quality.
Reliance	Mid-season	Red	Excellent quality; productive, very hardy.

Soil Preparation

Grapes prefer well-drained, high organic matter soils but are more tolerant of poor quality soils than other small fruits. They can be grown in heavier soils if they are not over-watered, but most are very sensitive to iron chlorosis, and the problem is aggravated by overwatering in alkaline soils.

Plant Selection

Purchase bare root grape plants in the spring, or potted plants throughout growing season. Bare root plants are less expensive but require extra care. Select cultivars carefully and make certain they will mature in your climate. Many grapes grow in Utah, but the length of the growing season and their winter hardiness may limit production.

Spacing

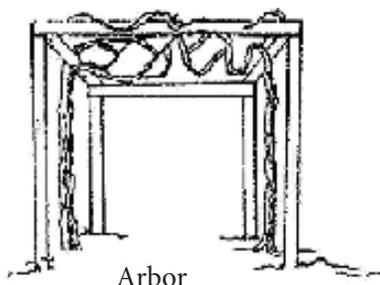
Grapes require adequate growing room. They need a minimum of 6 feet between plants with 8 to 10 feet between plants preferred for best growth. Leave enough space between rows for good light penetration and work equipment, typically 10 to 12 feet.

Trellising

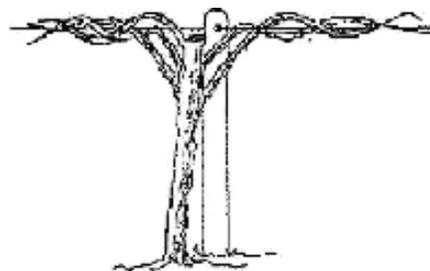
Grapes need to grow on some kind of support. There are many trellising systems, and if none are provided, grapes grow up trees, telephone poles or other structures. The most popular and easiest garden trellis is a two- or three-strand wire trellis. Arbors are good for growing grapes and they also provide shade. Avoid chainlink fences because the vines entwine in the fence making them difficult to prune and maintain. Trellises must support the fruit and plant weight and withstand strong winds and snow. Build them out of sturdy weather-resistant materials. Wood products should be pressure treated. See below for trellising ideas for home landscapes.

Pruning

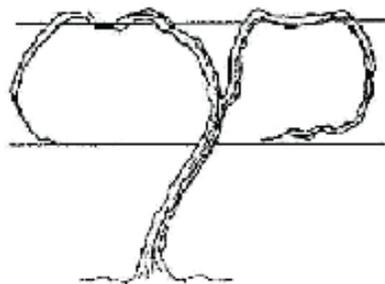
Grapes are pruned more severely than any other fruit and more than 90 percent of the previous season's growth may be cut away each year. Vines that are left unpruned have small fruit clusters that are scattered among dense growth and are difficult to find. The vines get longer and more crowded each season and soon become unproductive and very difficult to manage.



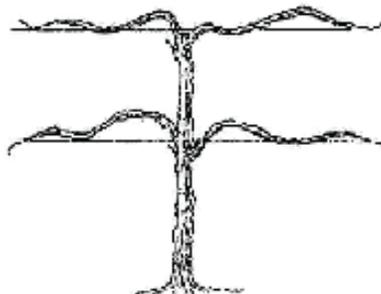
Arbor



One-Wire



Umbrella Kniffin



Four-cane Kniffin

Grape vines produce fruit on first-year canes. Each cane contains multiple leaves and several fruit clusters and originates from a single bud on 1-year-old wood. Each cane produces fruit only in the first year, but each of the buds along that cane have the potential of producing a cane the following year. Typically, a healthy grape vine can support about 40 canes at a time. There are two different approaches for pruning back to the target 40 buds, which are referred to as “cane pruning” and “spur pruning.” Both approaches have been used successfully in Utah.

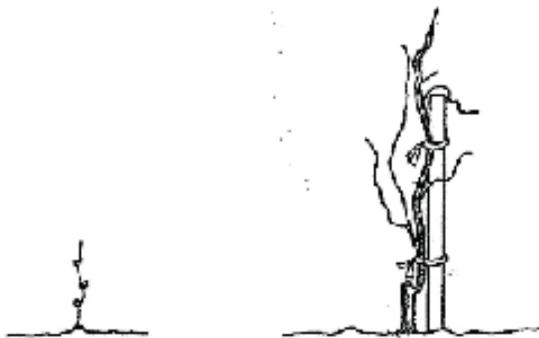
Spur pruning involves selecting 10 of last year’s canes and cutting each of these back to where only four to six buds remain. This shortened cane is known as a spur. After the 10 spurs have been selected, the remaining canes are removed during dormant pruning. After budbreak in the spring, keep the 40 strongest shoots, and rub off the remaining buds.

Cane pruning involves leaving four strong canes and heading these back to 10 to 15 buds each. Four additional canes are cut back to form “renewal spurs” that have three to four buds. After the four canes and the renewal spurs are selected, all the other canes are removed from the plant. The desired 40 fruiting canes will come from the buds on the four selected canes, while the renewal spurs will produce four more replacement canes to be kept for the following year.

Establishment of the plant over the first few years is the same for each approach.

Pruning First Year

After planting the grapevine in the spring, cut it back to two healthy buds at the base of the plant. This



will focus the plant’s energy into developing two strong canes during the first season. Pinch off any fruit clusters that may appear.

Pruning Second Year

Select the strongest of the two canes to be the main trunk, and attach this to the trellis. Remove the other cane. If the selected cane has lateral branches in the right location, these can also be kept. The lateral buds on this cane will break in the spring and produce canes that spread along the trellis. Any buds that open and begin to grow lower on the cane or near the soil line should be rubbed off in the spring when they first emerge.

Pruning Third Year – Cane Pruning Technique

The third spring, prune the vine leaving four canes along the trellis. Head each cane back to 10-15 buds. Create four renewal spurs by pruning four longer canes located near the trellis wires back to two buds each. Remove remaining canes.

Annual Pruning – Cane Pruning Technique

Prune the mature vine each year, leaving 40 to 60 good buds on four canes (10 to 15 buds per cane). The remaining wood should be a little thicker than a pencil, bright brown colored and pliable. Leave renewal spurs, each containing two buds. Next year’s canes will arise from the renewal spurs left this year. The canes should be loosely secured to the trellis using plastic ties or tape.

Annual Pruning – Spur Pruning Technique

Prune the mature vine each year, leaving 40 to 60 good buds on 10 to 15 spurs (three to four buds per spur). Remove all remaining new growth each year. After bud break, select the 40 strongest new canes and attach these to the trellis using plastic ties or tape. Rub or pinch off the remaining shoots.

MAINTENANCE

Fertilization

Grapes require little, if any supplemental fertilizer. If the vines are not growing well, add a small amount of nitrogen and potassium in late winter. Excess nitrogen stimulates vegetative growth at the expense of good fruit production.

Irrigation

Grapes require between 1 to 2 inches of water weekly. They are more drought tolerant than most other berries and have deeper root systems. Water them as deeply and infrequently as possible. Over-watering aggravates iron chlorosis and other problems. For juice and wine production, mild drought stress in the late summer will result in smaller but more intensely flavored fruit.

Mulches

Organic mulch reduces weeds and conserves moisture. Spread it around the trunk so it covers at least a 2-foot radius.

OTHER SMALL FRUITS

CURRANTS

Currants grow well in Utah and are ornamental and productive. In the early 1900s, black currants were banned in the northern United States to prevent the spread of white pine blister rust. However for most states, including Utah, the ban was lifted in 1966. Most red currants and some newer black currant varieties are immune to the disease. Popular varieties include 'Red Lake,' 'Perfection' and 'Wild-er.' Most cultivars bear fruit in mid-June and July, and with some simple renewal pruning they remain productive and are long lived. Currant bushes grow to be 3 to 5 feet tall and wide and canes are straight and thornless.

Planting

Choose a site with morning sun and afternoon shade if possible. The soil should be well-drained and light. Typically, it is a good idea to incorporate organic matter into the soil before planting. Plant early in the spring before the currant plant begins to leaf out. Bare-root plants are commonly sold, but containerized plants are also available. Space the plants 3 to 5 feet apart in a row with 8 to 10 feet between rows, depending on the vigor of the cultivar selected.

Plant Care

Mature currants are heavy nitrogen feeders; however, young plants do not require much fertilization. Lightly broadcast about 1/4 to 1/3 pound of 10-10-10 or 12-12-12 fertilizer per plant each year to promote good growth. Currants have shallow, fibrous roots that are ideal for drip irrigation. Drip irrigation also helps keep the canopy of the plants dry, reducing disease occurrence. Established plants need 1 to 2 inches of water a week for best production. Currants are drought resistant, but production declines without enough water. Keep plants well watered until fruits are harvested. At this point they stop active growth, and watering frequency can be reduced. Weed competition reduces plant growth and production. Mulch can help reduce weeds and the need to cultivate.

Pruning

For best production, currants need renewal pruning. Pruning should be done in late winter or early spring during dormancy. Remove any damaged branches or branches that are lying on the ground. After the first year of growth, remove all but six to eight of the most vigorous shoots. At the end of the second growing season, leave four or five of the best one-year-old shoots. At the end of the third year, prune so that approximately three or four canes of each age of wood remain. By the fourth year, the oldest canes should be removed and the new canes allowed to grow. Fruiting is strongest on 2 and 3 year-old canes. A strong and healthy plant should always have about eight bearing canes, with younger canes growing to replace the older ones.

GOOSEBERRIES

Gooseberries grow much like currants but have arching canes and in most cases, thorns. There are two species of gooseberries: the European gooseberry and the American gooseberry. Gooseberry plants do well in a home garden and are an excellent option for fruit production in very cold climates, as they are hardy to zone 3. American gooseberry plants are smaller and are more resistant to mildew than the European gooseberry. However, the American cultivars usually have smaller berries and can be less flavorful.

American Cultivars: 'Poorman' is very productive, produces medium-sized red fruit and is well suited for the home garden. It has been bred to be particularly cold-hardy, even for a gooseberry. 'Oregon Champion' produces yellow-green berries that work well for processing.

European Cultivars: 'Invicta' is resistant to mildew and produces large fruit with a somewhat bland flavor. 'Careless' is green-fruited and is one of the most commonly grown European cultivars. Gooseberry planting, plant care and pruning are very similar to currants. For planting and pruning specifics, refer to the currant section.

BLUEBERRIES

Blueberries are acid-loving plants and typically do poorly in Utah. The soil and water here are both very alkaline, and blueberry plants deteriorate quickly as a result. Growing the plants in pots or highly amended soils is expensive and labor intensive, and typical Utah irrigation water would rapidly raise the pH of the container medium. Both the soil and the water must be constantly amended for the plants to grow and produce fruit. For more information consult the fact sheet "Blueberries in Utah" at: http://extension.usu.edu/files/publications/publication/Horticulture_Fruit_2009-01pr.pdf.

CHOKECHERRIES

Chokecherries are native in Utah and grow wild throughout the state. The small, dark-purple fruit are fairly astringent and are typically processed to make jelly, wine, juice or syrup. 'Boughen's Chokeless'

and 'Maskinonge' are two new cultivars that are not bitter like the species. Chokecherries grow as a large multi-stem shrub or as a small tree and can easily be incorporated into a landscape. 'Shubert' and 'Canada Red' are red-leafed cultivars selected for the landscape. Although the fruit from these are somewhat more astringent, they are also edible. Fruit is harvested in the late summer or fall. Chokecherry plants are tolerant of harsh conditions and can tolerate very cold temperatures, making them a great option for sites that are otherwise unsuitable for fruit production.

Planting

While adaptable to most soils, chokecherry performs best in moist, well-drained soils with lots of organic matter. Plant in the spring or fall to allow time for root establishment before summer heat. Chokecherry plants should be spaced 5 to 8 feet apart, with some variance depending on the cultivar. Applying mulch around the plant will help keep the soil moist between watering and reduce weed pressure. Plants will not begin fruiting heavily until the 3rd or 4th year after planting.

Plant Care

Although chokecherry plants can survive with little water, irrigation will improve yield and fruit quality. To keep the canopy dry and prevent disease occurrence, water at the base of the plant. Chokecherry plants can become weedy and invasive in some regions and habitats because of their tendency to sucker. Pruning and training helps reduce this issue. Pruning should be done either in the late winter or early spring, prior to bud break. The center of the plant should be thinned to keep it open for air circulation and low, spreading branches should be removed. Plants should be maintained at about 6 to 10 feet in height to facilitate easy harvest. Since fruit forms on young wood, remove older, weaker wood annually.

SERVICEBERRY (JUNEBERRY OR SASKATOON)

Native to North America, serviceberry is adapted to many areas of Utah. It grows as a multi-stemmed shrub. Serviceberry is self-pollinating, and flowering typically occurs between early and late May, depending on the location and weather. The berry-like pomes usually ripen in late June through July. When ripe, they are dark red, purple or almost black in color. They are primarily harvested for juice, jellies, jams and pies, but can also be eaten fresh. Serviceberries are cold hardy to zone 3, adapt to a range of soil types and can be used as part of the home landscape. Plant size is fairly variable by cultivar. 'Honeywood,' 'Regent' and 'Pembina' are good cultivars for home use, being heavy producers with minimal suckering.

Planting

Serviceberry is tolerant of a variety of soil types and pH levels, but prefers well-drained sandy loams and loams. If planting into heavy soils, till organic mulch into the soil before planting. Full sun is required for maximum harvest potential. Serviceberry plants are adaptable to partial shade, but will have reduced yields. Planting in the spring or fall is ideal for serviceberry.

Plant Care

Applying 4 ounces of a 16-16-16 fertilizer in the spring as the plant comes out of dormancy should supply sufficient nutrients for the growing season and will maximize growth. To maintain a healthy and manageable plant, renewal pruning is needed. For the first 3 years, only prune out weak or damaged branches. After 3 years, when the plant is in full production, pruning should become more vigorous to encourage new growth and to keep the plant size manageable. Flowers develop on stems that are 2 to 4 years old, and this should be kept in mind while pruning. Some cultivars are less adapted to Utah soils and may require iron chelate fertilizer when chlorosis appears (see raspberry fertilizer section above).

ELDERBERRY

Elderberry plants grow as large shrubs, usually 6 to 15 feet tall. Since elderberry flowers in late June, blossoms are rarely damaged by spring frosts. They produce large umbrella-shaped clusters of fruit that ripen in September. The individual berry is very small and bluish purple when ripe. The fruit has a very unique, pleasant flavor and is prized for syrup, jelly preserves and wine. Elderberry can be very successful as a fruiting landscape plant, and once established, is a tough plant. 'Adams' and 'York' are two cultivars that have large fruit cluster size and good flavor.

Planting

Plant elderberry plants into fertile, well-drained soil early in the spring, spacing plants 6 to 10 feet apart. They are only partially self-fruitful, so plant at least two different cultivars within 60 feet of each other to ensure proper pollination. Elderberries have very shallow root systems and should be watered regularly, particularly during establishment.

Plant Care

Fertilize each spring to maintain healthy growth. Pruning should be done in the spring, before bud break. Fruit forms on new growth, either on the tips of new canes or on new lateral growth on 1-year old canes. Start with pruning out any broken or damaged branches, and then remove any canes older than 3 years. Weed control can be challenging with newly established elderberry plantings. Their shallow root systems can easily be damaged by cultivation. It is best to control weeds by applying thick mulch at the base of the plants and hand pulling weeds while they are small. Harvest fruit by breaking off the entire cluster and then stripping off the berries from the cluster.

SMALL FRUIT WEED MANAGEMENT

Weeds compete with desirable plants for light, water, nutrients and space. Weedy plants harbor insect and disease pests, reduce crop yield and often affect harvest and processing operations. Some suggested considerations for weed management practices in small fruits include:

1. Plant high quality seeds or transplants. Do not introduce weed seeds or plant parts into the garden in soil or debris that comes with the new crop.
2. Practice weed prevention. Consider the source of the weeds in the garden and do everything possible to reduce the introduction of new weeds. Clean equipment, evaluate the irrigation water source for weed seed contamination, make certain that compost has been processed so weed seeds are dead before applying and practice cultural methods of weed control such as hand-pulling and spot treating to control small patches or individual weeds.
3. Eradicate perennial weeds before planting a new crop.
4. Rotate crops where possible to break the life cycle of winter annual and summer annual weeds. Perennial crops usually have more problems with perennial weeds and annual crops have more problems with annual weeds. Rotating crops from annual to perennial is an effective weed control practice.
5. Control weeds along the edge of the garden and landscape. Reduce the possibility of new invasion by keeping weeds on the perimeter of the field from going to seed and spreading into the field.
6. Use herbicides according to the label.
7. Herbicides that are translocated throughout the plant need careful consideration. Systemic herbicides, some foliar applied and some soil applied, can be taken up through the foliage or roots of caneberries and can kill the rest of the plant. A few examples of systemic herbicides include products that contain the active ingredient 2,4-D, dicamba, glyphosate or picloram. There are many others. Always read the label and use caution when making application.

HORTICULTURE CLASSIFICATION OF SMALL FRUITS

Common Name	Scientific Family	Family	Type of Fruit
Blackberry	<i>Rubus</i> sp.	Rosaceae	Aggregate
Black raspberry	<i>Rubus occidentalis</i>	Rosaceae	Aggregate
Blueberry	<i>Vaccinium</i> sp.	Ericaceae	Berry
Chokecherry	<i>Prunus virginiana</i>	Rosaceae	Drupe
Currant & Gooseberry	<i>Ribes</i> sp.	Grossulariaceae	Berry
Elderberry	<i>Sambucus canadensis</i>	Adoxaceae	Berry
Grape	<i>Vitis</i> sp.	Vitaceae	Berry
Red raspberry	<i>Rubus ideaus</i>	Rosaceae	Aggregate
Serviceberry	<i>Amelanchier</i> sp.	Rosaceae	Pome
Strawberry	<i>Fragaria × ananassa</i>	Saxifragaceae	Aggregate

SMALL FRUIT DISEASE PESTS

Pest	Host	Symptoms	Cultural Control	Chemical
Black Root Rot	Strawberry	Stunted plant growth, wilting and plant death.	Caused by one or more pathogens and environmental conditions. Plant resistant cultivars and rotate plantings.	Replant in new area.
<i>Botrytis</i> (gray mold)	Blackberry, Raspberry, Strawberry	Blossoms show browning and drying. Infected berries are covered with gray, dusty or powdery growth.	Develops on fruit during prolonged rainy, cloudy periods. Improve air circulation and soil drainage.	Registered fungicides.
Crumble Berry	Raspberry	Small, poorly developed, discolored and fragile fruit.	Problem caused by poor pollination, nutrient deficiencies, cultivar traits and viral diseases.	Find and correct causes.
Leaf Spots	Strawberry	Small purple to reddish spots on leaf. The center can get light while the margins stay dark.	Destroy leaves in fall. Frequent renewal of strawberry beds may help. Resistant cultivars.	Registered fungicides.
Powdery Mildew	Currant, Gooseberry, Blackberry, Raspberry, Strawberry	The leaves develop light green blotches on the upper surface and the lower surface becomes covered with a white powdery growth.	The disease increases in cool, wet periods during spring. Destroy infected leaves and leaves dropped in fall (spores overwinter in leaves). Plant resistant cultivars.	Improve air circulation. Registered fungicides.
Powdery Mildew	Grape	The leaves develop light green blotches on the upper surface and the lower surface becomes covered with a white powdery growth.	Destroy infected leaves after leaves drop in fall (spores overwinter in leaves).	Spray fungicide when growth is 6, 12 and 18" long.
Root Rot <i>Phytophthora</i>	All	Infected canes may be stunted and have weak lateral shoots. Leaves may yellow prematurely or scorch. Severely infected canes wilt and die.	Fertilize and irrigate properly to keep plants vigorous. Plant disease-free plants.	No practical controls for homeowners.
Verticillium Wilt	Grape	Leaves wilt in the early summer heat and eventually collapse, followed by death of some shoots, streaking of the wood and vascular discoloration.	Fungus favors wet soil. Damaged roots are susceptible, so keep plants healthy and avoid overwatering.	No practical control.
Verticillium Wilt	Strawberry, Raspberry	Plants wilt. Leaves may become stunted, dry and flat with small yellowish leaves.	Fungus favors wet soil. Damaged roots are susceptible so keep plants healthy and avoid overwatering. Resistant cultivars.	Don't plant after potato, tomato, pepper or eggplant.
Virus diseases	All	Yellow mottling, yellow lines or yellow mosaic patterns in the leaves. Small, hard or crumbly fruits.	Control vectors and buy virus-free plants. Remove infected plants.	No control.
Virus Leaf Curl/Mosaic Virus	Raspberry and others	Yellow-green leaf mottling, leaf tip browning, leaf blistering and/or stunted growth.	Vectored by aphids, nematodes and other pests. Plant virus-free plants and destroy infected plants.	No chemical controls.

SMALL FRUIT INSECT PESTS

Pest	Host	Symptoms	Cultural Control	Chemical
Aphids	Blackberry, Raspberry, Gooseberry, Currant	Small, soft-bodied green or black insects concentrated around tender new shoots.	Leaves curl or crinkle. Upper leaf surfaces are raised and can turn red or brown. Stems may be covered with insects and sticky excretions.	Remove with water, insecticidal soap, registered insecticides. Apply a delayed dormant oil. Spray each spring at bud break.
Cane Borer/ Currant Borer	Currant, Gooseberry	Pale yellow larva; clear-winged wasp-like moth.	Canes wilt and die, starting at the tip.	Prefers red over black currant and gooseberries over currants. Cut out and destroy infested canes as early as possible.
Earwigs	Raspberry, Strawberry and most others	Dark reddish brown, elongated segmented insect. Pincers at end of abdomen.	Eat holes in petals, leaves, fruits.	Traps. Destroy breeding sites or use registered insecticides.
Fruitworms/ Imported Currant Worm	Currant, Gooseberry	Black sawflies about 0.33" long. Small, white larvae grow to 0.5" long and become greenish.	Larvae eat small holes in the center of the leaves, often near the center of the plant.	Remove with water. Apply insecticidal soap or other registered insecticides.
Grape Mealybug	All	White, cottony material present on branches and stems.	Honeydew produced by the mealybug can support sooty mold.	The mealybug can transmit grape viruses. Use appropriate registered insecticides.
Grasshopper	All	Large, chewing insects with large legs developed for jumping.	Chew holes in leaves and fruits.	Apply registered insecticides when grasshoppers are young. <i>Nosema locustae</i> is a biological control. Chickens.
Leafhoppers	Grape	Pale yellow with reddish and dark brown markings, about 0.12" long.	Adults and nymphs pierce leaf cells and suck out the contents leaving white spots and reducing photosynthesis.	Spray with water when insect appears; soaps, oils or registered insecticides.
Leafroller	Currant, Strawberry	Caterpillar is a moth larvae. Cylindrical, white body with brown head capsule and a short spine on the tail end.	Make shelters in leaves by attaching webbing to hold edges together. Can feed on fruit.	Spray with registered insecticides before bloom.
Mites	All	Tiny arachnids that suck plant juices. Most are difficult to see with the naked eye.	Cause small stippling, decreased ability of plant to pull up water. Small webbing, usually on the back side of leaves.	Avoid dusty conditions. Apply oil spray. Spray back of leaves with water or insecticidal soap. Registered miticide.
Raspberry Crown Borer	Blackberry and Raspberry	Clear-wing moth that looks like a yellowjacket. Has a 2-year life cycle.	Canes weaken and often break off. Cane ends look like a shepherd's crook. Canes die.	Destroy affected canes and roots. Spray with registered insecticide in April as larvae become active. Drench plant root zone.

SMALL FRUIT INSECT PESTS CONTINUED

Pest	Host	Symptoms	Cultural Control	Chemical
Raspberry Horntail (Cane Borer)	Raspberry	Adult is a black wasp about 1" long. White larvae grows to 1" and has a brown head.	Bores in the canes, causing cane dieback from tip down.	Spray with registered insecticide at bud break and 14 days later. Cut below affected part of cane and destroy it.
Root Weevils	Blackberry and Raspberry	Small black night-feeding beetle.	Reduced fruit yields and even cane death.	Apply baits, use traps or parasitic nematodes. Apply registered insecticides if damage is severe.
Rose Stem Girdler (Cane Girdler)	Raspberry	Beetles less than 0.25" long with dark copper to greenish copper color.	Larvae feed inside primocanes, girdling them and causing swollen stem galls.	Prune and destroy infested canes. Spray before bloom with registered insecticides.
San Jose Scale	Currant, Gooseberry	Small armored insects covered with a waxy coating.	Scale insects suck on plant juices. Canes, shoots and stems have bumps (scales) on them. Reduces plant vigor.	Dormant or delayed dormant oils.
Slug/Snail	All	Slimy, soft-bodied worm-like mollusks. Snails have hard shells.	Chew holes in leaves and fruits. Chew off tender young stems.	Do not overwater. Do not contaminate fruit with bait.
True Bugs	All	Stink bugs, lygus bugs, boxelder bugs.	Feed on fruits.	Control weeds around plants.
Western Grape Leaf	Grape	Metallic bluish or greenish day flying moth. 0.6" long with a 1" wing span.	Larvae feed on the lower leaf surface, leaving veins and eventually defoliate the vines.	Spray with registered insecticide when insect is detected (St. George area).

Review Questions: Section 12

1. What are the three types of raspberries?
2. What is the most obvious difference between black raspberries and blackberries?
3. What species of grapes are most commonly grown for juice production?
4. What age of vines or canes produce grapes?
5. Define fruiting cane and renewal spur in grape pruning.
6. Name the three types of strawberries that commonly grow in Utah.
7. What are three difficulties when growing strawberries in home gardens?
8. Name two other small fruits that grow well in Utah.