

Chapter 23

SMALL FRUITS



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Chapter 23

Small Fruits

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I. Strawberries

Strawberries are grown all over the United States and perform well throughout the Pacific Northwest.

- A. Botanically, the strawberry is a member of the rose family (Rosaceae). The fruit is the swollen receptacle of the flower that bears seeds (achenes) on its surface. A high percentage of these seeds must be fertile for the berry to form properly. Plants produce for 3 to 5 years before production declines, and then they should be replaced.
1. Strawberry varieties, except for everbearing, are affected by daylength. Varieties are regionally adapted by latitude. Buy plants locally if possible, and base your purchases on regional recommendations.
 2. The two main types of strawberries are June bearing and everbearing. June bearing varieties set flower buds in the fall and ripen fruit in June. Everbearing varieties have a spring and fall crop.
 - a. The older cultivars of everbearers are daylength sensitive and have a break in production between the spring and fall crops.
 - b. The newer day neutral varieties set the flower buds throughout the season for a very long harvest period with no production break.
 - c. Total season berry production from the everbearing cultivars tends to be lower than the June bearing and day neutral types. The June bearing types produce the highest quality berries.
- B. Cultivars in Idaho (in order of ripening)
1. Cultivars are June bearing in northern Idaho. Be sure to select cultivars that are adapted to northern growing conditions. For southern Idaho, select cultivars that are also adapted to high summer temperatures.
 - a. Earliglow: Earliglow bears early in the season and is resistant to many diseases.
 - b. Crimson King: The plants of this variety are very hardy and produce large fruit.
 - c. Honeoye: Another very hardy variety with large, firm fruit.
 - d. Sumas: Sumas have a high yield, but they are susceptible to fruit rot. They grow large fruit.
 - e. Totem: These fruits are good fresh and frozen. Totems are disease resistant.
 - f. Benton: This variety grows a medium-sized fruit with a light inside color.
 - g. Shuksan: Shuksans are susceptible to virus. The fruit is excellent fresh and frozen.
 - h. Sparkle: This variety produces a soft fruit with an excellent flavor.
 2. Everbearing—Day neutral
 - a. Fort Laramie: An everbearing plant, the Fort Laramie is very hardy and productive.
 - b. Quinault: Another everbearing plant, the Quinault produces small berries, which are soft and have a good flavor.

- c. Tristar: The Tristar is day neutral and productive; it bears relatively large fruit with a good flavor.
- d. Tribute: A variety that is superior to Quinault, day neutral, and later in the season than Tristar, the Tribute has a firm fruit.

C. Culture

1. Planting

- a. Well-drained soil is required. Heavier soils should be molded to raised beds for improved drainage. Strawberry pyramids and containers work well and give good yields in small spaces. Incorporation of organic matter benefits both light (sandy) and heavy clay soils. Adjust pH to 5.5 to 6.5.
- b. Established weeds: Gardeners must eradicate all perennial weeds before planting. Use repeated fallow cultivation or heavy mulches.
- c. Matted row culture: Most popular in home gardens. Set plants 1 1/2 to 2 feet apart in rows 3 to 4 feet apart. Runners from initial planting are allowed to fill in to form a solid planting, until it reaches approximately one plant every 5 to 8 inches. Remove excess plants or runners. Plants at a higher density will produce fewer and lower quality berries.
- d. Hill culture: Plants remain as individual plants in the garden; remove all runners. Space individual plants 15 to 18 inches apart, and place them in rows 2 1/2 to 3 feet apart.

2. Setting plants

- a. Plant in early spring or early fall. In areas where frost heaving is a problem, plant only in spring, or mulch fall plantings to reduce heaving. If you plant at any time other than early spring, irrigation is important. Plants are mostly available in stores in the spring.
- b. Use certified virus, disease, and insect-free stock when establishing a new planting to ensure that pests are not introduced into the garden with planting stock.

3. Fertilization

a. Timing

- i. It is important to fertilize and water June bearers in late summer to promote maximum fall growth and flower bud formation.
- ii. Spring fertilization results in excessive formation of leaves and runners and in less fruit growth.
- iii. Fertilize everbearers and day neutrals with small amounts several times during the growing season.

b. Amount

- i. Apply a total of 30 to 60 pounds of actual nitrogen per acre for all types of strawberries.
- ii. June bearing types should be fertilized in early August, if irrigation is available; otherwise, fertilize in mid-September without irrigation.
- iii. A balanced fertilizer such as 10-10-10 will supply ample phosphorus and potassium. Any deficiencies should be diagnosed with a soil or plant tissue test.

4. Irrigation—Consistent watering is essential when plants are first set and during dry periods in spring and summer. Irrigate in the morning to reduce rot.

- a. Critical irrigation periods: These occur during harvest or in late August and fall, when plant growth resumes and the flower buds form for the following year's crop.
- b. Efficient irrigation methods: Black plastic or straw mulch and plastic-tube drip irrigation systems (soakers) are highly adaptable to strawberry culture and water conservation. Strawberries absorb 90 percent of their water from the top foot of soil.

5. Renewal (June bearers only)—After the harvest early in July, June bearers will benefit from removal of the foliage, which will allow you to rid the plants of disease-infested foliage and will act as a stimulant to the plant for new, vigorous foliage.

- a. Cut the foliage with a lawnmower set high or use hand tools. Be careful not to damage the crowns.
 - b. Rake leaves from the plot.
6. Cold protection
- a. Winter protection: In colder areas, strawberries will benefit from a mulch. Coarse hay or straw may be placed over the entire planting when the ground begins to freeze. The mulch should be removed from the plants in the spring. Weed-free mulch materials should be used.
 - b. Spring frosts: These often kill the early flowers. Sprinkle plants with water during the coldest frosts (when temperature at ground level reaches 34°F). Leave the water running until the temperature is above 32°F, or cover plants with a light mulch or a floating row protective fabric.
- D. Common Plant Problems—Diagnosis and Control
1. Diseases
- a. Verticillium wilt
 - i. Symptoms: A soilborne fungi, verticillium wilt causes wilting and death of older leaves in individual plants or groups of plants. Black lesions develop on petioles. New roots may be short with blackened tips. Plants may outgrow these symptoms.
 - ii. Control: Avoid planting strawberries in ground where potatoes, tomatoes, strawberries, or other susceptible crops have been planted. Eliminate infected plants and do not replant in spots. Rotate crops.
 - b. Red Stele: Soilborne fungi
 - i. Symptoms: Often there are no symptoms the year of planting. During the first year of fruiting, there may be dwarfing, reddening of leaves, and wilting of older leaves. Root tips may decay, causing “rat-tailed” appearance. The central core or vascular system of root (stele), may be clogged by fungi and show a red discoloration of the stele. Symptoms are most readily apparent early in the season. They may be difficult to see later in the season. Not all the roots of an infected plant will show symptoms.
 - ii. Control: Use certified plants. Plant in disease-free soil. The soil needs to have good drainage. Earliglow, Sparkle, Tribute, Tristar, and Totem are resistant to this disease.
- c. Viral diseases
- i. Symptoms: Viral diseases can cause stunting, an unevenness in field or planting, as well as some foliar symptoms, such as streaking, cupping, and yellowing.
 - ii. Control: Use certified planting stock. Control the aphid infestation, as aphids are the primary vector of disease.
- d. Fruit rot/botrytis
- i. Symptoms: Botrytis is evident in a gray, fuzzy mold on fruit during moist weather. Infections start at bloom. Fruit from the infected blossom rots as it ripens.
 - ii. Control: Ensure good air circulation, remove infected fruit, and clean straw mulch so that fruit rests on clean, dry surface. Use fungicide during wet springs. Apply fungicide at 10 percent bloom. Repeat according to label directions.
- e. Common leaf spot
- i. Symptoms: Leaf spot causes foliage with dark red or purple spots, that gradually becomes gray-white with age. Fully developed spots are 1/8 inch in diameter and have a whitish center with red margin. Infection occurs during moist weather and is most severe during spring and fall. Crimson King is resistant.
 - ii. Control: Fruit rot fungicide sprays will keep this disease under control. Removing foliage from June

bearers after harvest reduces inoculum.

- f. Powdery mildew
 - i. Symptoms: Disease causes upward curling of leaflet edges. Leaf undersides become reddened and coated with a grayish white fungus. Leaves later turn purplish red. To-tem and Benton strains are very tolerant. Shuksan has moderate susceptibility. Fort Laramie is very susceptible.
 - ii. Control: Destroy old infected leaves.

2. Insects

- a. Root weevils
 - i. Damage: Larvae feed on root systems. Adults notch edges of leaves.
 - ii. Control: Don't use chemical control in the home garden. Collect adults at night on leaves and destroy.
- b. Aphids
 - i. Damage: Can spread viruses.
 - ii. Control: Hose off and use insecticidal soap sprays.
- c. Spider mites
 - i. Damage: There is a stippled appearance to top part of leaves, which leads to bleaching. Webbing and mites will be found on the undersides of leaves.
 - ii. Control: See aphid control.
- d. Spittle bugs are small, yellow-green insects similar to the leaf hopper in appearance.
 - i. Damage: Nymphs develop "spittle" on plants.
 - ii. Control: Since this pest is not a major one, there is no need to control.
- e. Slugs (mostly nocturnal): Many sizes feed on foliage and fruit.
 - i. Damage: Slugs cause leaf damage, often in the leaf center.
 - ii. Control: Manually remove or use slug bait around the perimeter of the garden. Bury containers of beer

with the lip of the container at soil level to attract and drown slugs. Check containers often.

II. Red Raspberries

Red raspberries are grown as a commercial crop in the Pacific Northwest. More than 10,000 acres are planted in Washington, Oregon, and British Columbia. Raspberries can be expected to do well in most Idaho locations, although severe freeze injury to canes will occur in many winters in southeastern Idaho.

- A. Botanically, raspberries are members of the Rose family (Rosaceae) and belong to the genus *Rubus*, as do blackberries and other caneberries. The plants are perennial, with roots that live 40 years or more. Red raspberries have stiff erect canes, which are usually covered with thorns. Canes are produced freely from adventitious buds on the roots, and they generally live two seasons.
 1. Fruit is borne on lateral fruit spurs produced on 1-year-old canes. Fruiting canes die after harvest; meanwhile, new canes (primocanes) have been growing from the root system to be next year's fruiting wood.
 2. The raspberry is an aggregate composed of 75 to 125 drupelets that separate from the receptacle when ripe, producing a hollow "berry."
 3. Optimum production for red raspberries is in areas with relatively cool summers, a rain-free harvest season, and a mild winter with sufficient cold to satisfy chilling requirements. However, care in cultivar selection will sustain fruit in areas lacking in one or more of these conditions. Raspberries are one of the hardiest of cane fruits. Some cultivars will tolerate temperatures to -20°F without damage.
 4. Red raspberries come in two types: Summer bearing and fall bearing.
 - a. Summer bearing raspberry canes are biennial, growing one year and producing the next.
 - b. The fall bearing raspberry produces canes that bear on the upper part of the

primocanes in the same growing season. These canes, if left the second year, will bear fruit on the lower portions.

- i. Alternatively, the canes can be totally removed by mowing to the ground after the fall crop is harvested. When managed in this way, fall bearing raspberries will bear only the single crop in the fall.
- ii. In Idaho locations with short growing seasons, fall bearing raspberries may not ripen their crop. Trial plantings of these cultivars are recommended to ascertain their ripening characteristics.

B. Cultivars in Idaho

1. Summer bearing

- a. Boyne: Hardy in cold conditions, Boynes are good fresh and frozen. This variety is productive.
- b. Canby: Canbys produce a thornless plant. They are virus resistant and aphid immune, but sensitive to root rot. This variety is very productive, and it is cold hardy through Zone 4.
- c. Haida: Though this variety is hardy and has large, sweet, firm berries, it has short canes and is low in vigor.
- d. Latham: A popular variety, Lathams are hardy and have a nice flavor.
- e. Newburgh: Newburghs are cold hardy, as well as resistant to root rot and mosaic virus.
- f. Nootka: This variety is a firm, flavorful, vigorous plant.
- g. Nordic: Nordics are cold hardy, productive, and resistant to fungal diseases and aphid feeding.
- h. Skeena: A large, bright fruit, the Skeena is hardy and root rot susceptible.
- i. Taylor: A long conic fruit, the Taylor has an excellent flavor and is productive.
- j. Titan: The Titan produces a hardy, large fruit with a mild flavor. It is very productive and root rot susceptible.

2. Fall bearing

- a. Amity: This variety harvests about a week earlier than Heritage. It has a good size, flavor, and firmness.
- b. Autumn Bliss: A early crop variety, Autumn Bliss creates berries that have a large size and good flavor.
- c. Heritage: The Heritage ripens late in fall and produces heavy yields.
- d. Redwing: A soft fruit, resistant to high temperatures, this strain ripens earlier than Heritage.
- e. Ruby: Ruby bears a productive, large fruit, which can produce when planted with Amity.
- f. Summit: While this plant has a better flavor than Heritage and is root rot resistant, it produces a small fruit.

C. Culture

1. Planting—Plant in raised mounds or beds in heavier soil to improve drainage away from the crown of the plant.
 - a. Use certified stock, plants, or root cuttings.
 - b. Spacing is generally 1 1/2 to 3 feet apart in rows 6 to 8 feet apart. You must ensure a recommended 4 foot minimum depth to winter water table to create optimum conditions for high fertility and freedom from erosion.
 - c. Soil: Good drainage, high water-holding capacity, and adequate depth are essential. Plants are highly susceptible to root rot. Heavy, poorly drained soil severely limits life expectancy of plants. Irrigation is required on sandy or gravelly soils.
2. Established weeds—Gardeners must eradicate all perennial weeds before planting. Use fallow cultivation or heavy mulch.
3. Training—Place top wires at 4 1/2 to 5 1/2 feet to support canes. You may also have another wire at 2 to 3 feet. Use one-, two-, or four-wire systems. Plants will be shorter in some climates (Fig. 1).
4. Hill culture—Maintain plants as individual hills (weeding is easier), or allow to fill in as a solid row. Light distribution

is better when each individual cane is spaced along the wire separately. Canes are bundled commercially for labor savings. Tie canes to top wire in fall or winter as in Fig. 1. Tie in clumps or individually along the wire.

5. Pruning—Top dormant canes 6 to 10 inches above the wire in early spring to stimulate lateral branching. Canes are subject to dieback in a cold winter if they are pruned in the fall.

a. Remove all fruiting canes after harvest, as that reduces insect and disease problems, helps in hardening off process, and simplifies weed control. Remove weak new canes or those with small diameter.

b. Cut off canes close to soil line. Leave all canes over 6 feet and the diameter of your index finger (about 12 healthy canes per hill, or in solid rows spaced 4 to 5 inches between canes). Keep rows no more than about 12 inches wide.

6. Fertilization—Test the soil to determine plant needs. Broadcast apply in spring over rows or split application with one-half applied at first growth in spring and the remaining one-half at the beginning

of or at fruit set. Apply a total of about 30 pounds actual nitrogen per acre.

7. Weed control—Hand hoe weeds between hills. Cultivate very shallowly.

a. Remove suckers between rows as they emerge.

b. Cover crops between rows are effective.

c. Herbicides can be used to control weeds. Make sure they are registered for use in raspberries.

8. Irrigation—Watering frequency will vary with conditions. As a general rule, irrigate every 2 to 3 weeks before and after harvest; then supplement with a weekly irrigation during harvest.

9. Cold protection

a. Winter protection: Good snow cover or mulch will protect crowns. In severe areas, or with less hardy cultivars, pin canes to the ground and mulch over them.

b. Spring frosts: See strawberries.

D. Common Plant Problems—Diagnosis and Control

1. Diseases

a. Phytophthora root rots: A fungus disease caused by *Phytophthora erythroseptica*.

i. Symptoms: The disease kills the fine feeder roots, while the interior of any larger roots becomes brown. Suckering is reduced. New primocanes wilt and leaves die. Floricane leaves turn bright yellow and brown and then die out. Favored by wet, heavy soils.

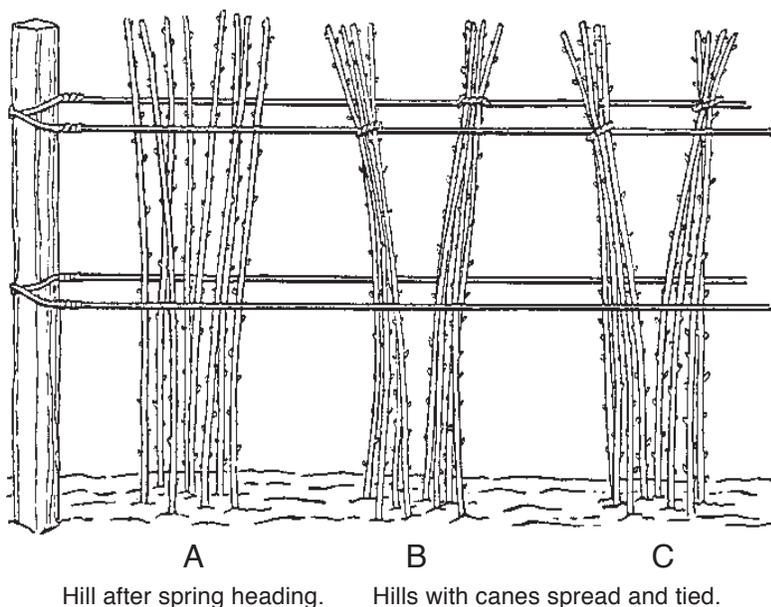
ii. Control: Use certified plants free of disease. Plant on well-drained soils. Increase drainage by using raised beds.

b. Virus diseases

i. Symptoms: Viruses create stunting, or delayed growth in the spring; crumbly berries; ring spotting; and a bright yellow mosaic on the leaves.

ii. Control: Plant certified stock; remove infected plants.

Fig. 1. Mature raspberry canes after spring pruning and tying to four-wire trellis.



- c. Crown gall: Bacterial disease.
 - i. Symptoms: Dark “knobs or tumors” of growth appear at or below soil line. Crown gall spreads primarily by pruning, when it enters new wounds on pruning shears. It also can come in on infected planting stock.
 - ii. Control: Remove plants.
 - d. Fruit rot/botrytis (see strawberries)
 - e. Spur blight: A common fungal disease (*Didymella applanata*) in damper areas, spur blight causes little damage in this area. Buds on infected canes are more susceptible to winter injury.
 - i. Symptoms: Spur blight creates wedge-shaped necrotic lesions on leaves, especially near base of cane. Infected leaves drop, leaving petiole attached to cane. Brown or reddish-brown lesions appear around buds at base of petiole; these lesions are usually limited to one or two buds. Minute black fruiting bodies appear on lesion by fall.
 - ii. Control: Avoid overhead watering if possible. Remove and destroy infected canes. Thin canes appropriately to allow for air movement. Avoid excessive nitrogen fertilizer.
 - f. Verticillium wilt (see strawberries)
 - g. Anthracnose (see blackberries)
 - h. Yellow rust: Caused by a fungus, particularly following late spring rains.
 - i. Symptoms: Plants develop leaves with yellow spotting, and later become dusty from the yellow spores. Lower leaves yellow and drop, and the crop is reduced. The fruit dies before maturing. In the winter, infected leaves produce black spores at sites of infection.
 - ii. Control: Good sanitation. Remove sources of infection; cut old fruiting canes immediately after harvest and destroy.
2. Insects
- a. Crown borer
 - i. Damage: These insects bore tunnels in lower portions of canes, which cause the death of the cane.
 - ii. Control: Dig out infected plants by hand. Replant any new plantings in different area.
 - b. Spider mites
 - i. Damage: Their feeding reduces plant vigor and causes leaves to brown and drop prematurely. When pesticide use kills natural predators, the mites are often a problem.
 - c. Cane borer
 - i. Damage: These insects bore tunnels in the upper portions of the cane (Shepherd’s Crook).
 - ii. Control: Prune out any affected cane and destroy. Use no chemical control.
 - d. Yellow jackets
 - i. Damage: Yellow jackets hide in ripe fruit and feed on sugars. They are a hazard to those working in the plants.
 - ii. Control: Keep overripe fruit harvested. Yellow jacket traps can be effective.
3. Other
- a. Crumbly berry
 - i. Damage: Crumbly berries may reveal a plant with a Boron deficiency. Soil testing is recommended. A virus disease may interfere with flower functions, causing crumbly fruit. Poor pollination occurring from lack of bees or from poor weather during flowering also causes crumbly fruits.
 - ii. Control: Add boron, if necessary; add bees to the field; and replace plants with virus free stock.
 - b. Sunburn/high temperatures
 - i. Damage: The fruit forms, but it doesn’t ripen, or it ripens slowly. This problem is caused by excess ultraviolet rays or elevated temperatures.
 - ii. Control: Shade the plants, especially during high noon hours. Use shadecloth or plant in the shade of other foliage or structures.

III. Black and Purple Raspberries

A. Purple raspberries are hybrids of red and black. The fruits resemble the red more than the black. Both have canes that will root at the tips and are propagated by tip layers.

1. Black raspberries are less cold hardy than red or purple types. Freeze injury will begin at temperatures around -5°F.
2. They are susceptible to virus diseases and anthracnose.
3. Except for Royalty, the following cultivars sucker poorly, so hill culture rather than hedgerow is recommended.

B. Cultivars in Idaho

1. Black raspberries

- a. Allen: An early fruit with a concentrated ripening, this strain is hardy.
- b. Black Hawk: A late variety, Black Hawk produces large, flavorful berries. A productive variety, it is very hardy, to Zone 5 (-20° to -10°F).
- c. Lowden: The Lowden is a cross between a purple and a black raspberry with an excellent flavor. The plant has good disease resistance and is hardy.
- d. Munger: The fruit of the Munger has an excellent flavor. Mungers ripen in midseason and are also hardy.

2. Purple raspberries

- a. Brandywine: A variety that produces large fruit with a tart flavor, the Brandywine is very winter hardy, to Zone 4 (-30° to -20°F).
- b. Royalty: Royalty produces large fruit, which is sweet when fully ripe. It is a very productive variety and hardy to Zone 4 (-30° to -20°F). This variety ripens late.

C. Culture (see Red Raspberries)

D. Common Plant Problems—Diagnosis and Control (see Red Raspberries)

IV. Trailing Berries (Blackberries)

Trailing berries are in the same genus as raspberries (*Rubus*). Their fruit is similar to raspberries, but a white core or receptacle remains part of the fruit when picked.

A. Blackberries are the least hardy of the berries grown in Idaho. These plants can be injured by temperatures between +5° and -10°F. Boysenberries, Loganberries, Tayberries, Nectarberries, and Marionberries are all trailing berries.

B. Cultivars In Idaho

1. Cherokee—The plant has an upright, thorny, strong vigorous growth; it is hardy to Zone 5 (-20° to -10°F).
2. Chester—This variety has a semi-erect plant that is productive and hardy to Zone 5 (-20° to -10°F). In fact, the Chester is the most hardy of the thornless type. It produces large fruit late in the season.
3. Darrow—A tall, semi-erect, variety, the Darrow is the most cold hardy cultivated blackberry.
4. Hull—Another semi-erect variety, the Hull produces large fruit. The plant is thornless, and its growth is vigorous.
5. Roseborough—An upright plant, the Roseborough holds up under extreme heat and dryness. It produces heavy crops and is hardy to Zone 5 (-20° to -10°F).

C. Culture

1. The planting, fertilization, and soil requirements are similar to those for red raspberries.
2. Trellising systems—Long canes of trailing and semi-erect varieties are generally “woven” on a two-wire trellis system as in Fig. 2. Wires are 18 inches apart with the top wire 5 feet from ground level. Upright cultivars will not require trellising, or at most a single wire at 5 feet.
3. Pruning—Remove fruiting canes after harvest. Weave new canes around top wire in fall or spring.

D. Common Plant Problems—Diagnosis and Control

1. Diseases (see red raspberries)
 - a. Leaf and cane spot (Septoria leaf spot): Fungal disease.
 - i. Symptoms: Leaf spots vary from light to dark brown. They begin as an 1/8 inch purple spot later turning brown. Cane spots are larger and may contain fruiting bodies

- (spores). Spots girdle and kill cane. The disease is promoted by canes overwintering on or near ground.
- ii. Control: Remove fruiting canes after harvest. Provide good air circulation.
- b. Anthracnose: Overwinters on infected canes.
 - i. Symptoms: Purple spots appear on canes, then increase in size, and develop light gray centers with brown-purple edges. Spots converge to form large irregular lesions. Canes may dry and crack. On leaves purple spots enlarge to form gray to white areas that drop out. Berries ripen prematurely and are small and dry.
 - ii. Control: Remove canes after harvest. Leave no old stubs. Thin to allow air circulation.
- 2. Insects (see red raspberries)

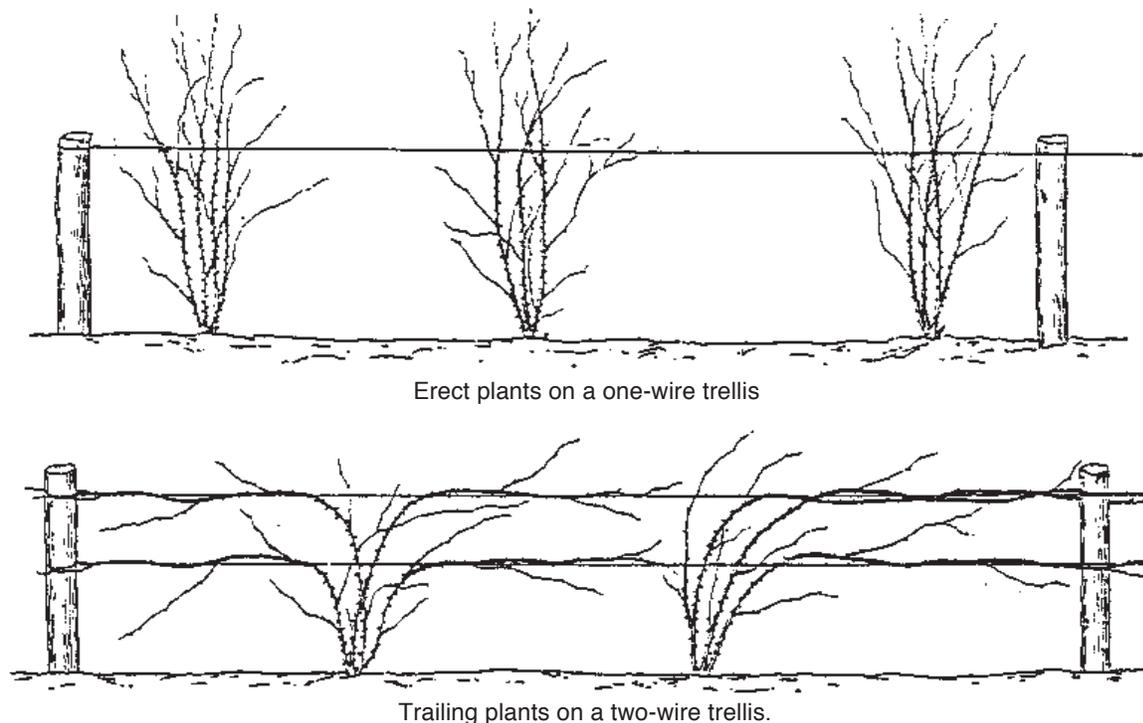
V. Blueberries

Blueberries, members of the Ericaceae or heath family, prefer a culture similar to rhododendrons or azaleas. Wild blueberries are

often called “huckleberries,” but are just different species of the cultivated blueberry.

- A. Blueberry production in Idaho will be limited to those sites with acidic soil (pH of 4.5 to 5.5).
 1. In areas with alkaline soil, grow blueberries in raised beds or large containers with peat. The addition of ground sulfur, 1 pound per 100 square feet in sandy soil and 2 pounds per 100 square feet in clay soil, will lower the pH approximately one point.
 2. Blueberry plants are attractive and can serve as ornamentals and fruit producers, as they tolerate partial shading better than other berry crops.
 3. Blueberries are self fertile but will have higher yields with cross-pollination. The plants are hardy.
- B. Cultivars in Idaho (listed in order of ripening dates).
 1. Earliblue—This short plant variety flowers very early.
 2. Patriot—The Patriot is a very hardy plant with large, firm fruit.
 3. Northland—A hardy, spreading plant, the Northland has a good flavor.

Fig. 2. Trellises for blackberries.



4. Bluecrop—A fruit with an excellent sweet flavor, this variety has a vigorous plant.
 5. Blueray—Large, firm fruit.
 6. Jersey—Fair flavor; late, vigorous plant.
- C. Culture
1. Established weeds—Eradicate all perennial weeds before planting. Use fallow cultivation or mulches.
 2. Planting
 - a. Setting: Blueberries are set out as dormant plants in late winter or potted plants in spring or fall.
 - b. Soil: The root system is shallow, fibrous, and prefers soil with high organic matter and good water holding capacity. Add organic matter to soil when planting; mix well with soil in and around planting hole. Mulch to protect the shallow root system from temperature extremes and drying.
 3. Pruning—Prune hard after planting to stimulate new growth. For mature plants, remove older canes to ground or to strong lateral, retaining 1- to 3-year-old wood.
 4. Fertilization—The amount of fertilizer used depends on the rate of previous growth. Apply light amounts three times in the growing season for optimal growth. Ammonium sulfate is a good nitrogen source to help acidify soil.
 5. Irrigation—Keep soil evenly moist. Plants need adequate drainage. Drip irrigation systems work well. Mulch up to 6 inches deep to conserve water.
- D. Common Plant Problems—Diagnosis and Control
1. Diseases
 - a. Mummy berry: Fungus disease (*Monilinia vaccinicorymbosi*).
 - i. Symptoms: Infected berries are reddish-buff or tan “mummies.” They fall to the ground, gray, shriveled, and hard to overwinter. In spring as blueberry buds break, fruiting cups grow from mummies on the soil and release infecting spores. Blossoms become infected and turn brown and wither. New vegetative shoot is blackened in the center and wilts and dies. The remaining fruit becomes infected.
 - ii. Control: Remove and destroy all infected parts including fruit. Mulch thickly to bury any dropped mummies. In early spring destroy developing fruiting cups by cultivation. Apply fungicide during bloom according to label instructions.
 - b. Botrytis
 - i. Symptoms: Twig dieback in wet weather, invading blossoms, and moving down shoots.
 - ii. Control: Apply fungicide early in spring when growth begins. Repeat, but do not make more than four applications before harvest. Follow label instructions. Prune out and destroy dead twigs.
2. Insects
 - a. Aphids
 - i. Damage: Deform leaves, devitalize plants, secrete honeydew.
 - ii. Control: Light infestations may be controlled by natural insect predators; use insecticidal soap.
 - b. Cherry fruitworm
 - i. Damage: Larvae approximately 3/8 inch in size will bore into the berries.
 - ii. Control: Insecticidal sprays before bloom or after, according to label directions, for cherry fruitworm on blueberries.
 - c. Leafrollers
 - i. Damage: Create webs and feed on foliage and fruit.
 - ii. Control: *Bacillus thuringensis* at any time.
 - d. Scale
 - i. Damage: Weaken plant.
 - ii. Control: Prune off infested areas as soon as observed.
3. Birds—Can be a persistent problem. Net plants as the fruit colors. Secure the perimeter of the net carefully. Use mylar strips or balloons to scare away birds.

VI. Hardy Kiwi

A. The botanical name of the hardy kiwi fruit, also known as Siberian Gooseberry, is *Actinidia arguta*. It is a member of the Actinidiaceae family (not related to the common garden gooseberries). Kiwi fruit is native to eastern Asia. Chinese gooseberry (*A. chinensis*) is not hardy anywhere in Idaho, as fruit buds are damaged by temperatures of 10° to 15°F.

1. The fruit is fuzzy and brown skinned, approximately the size of a large cherry. The flesh is green with edible black seeds and has a unique “fruity” flavor. Fruit is high in vitamin C and stores well.
2. Kiwi is dioecious (Latin for two houses), which means there are separate male and female plants. One male will pollinate six to eight female plants within 50 feet. Bloom periods between male and female must match. Some varieties are self-fertile.

B. Cultivars in Idaho

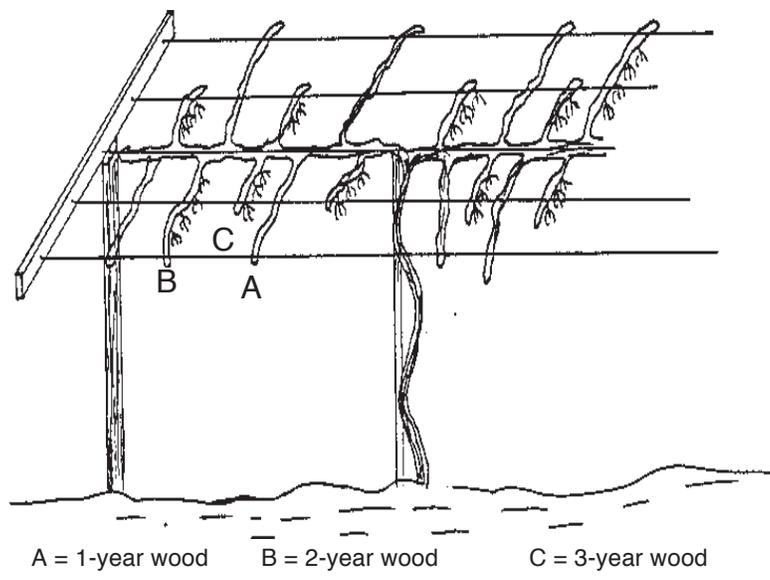
1. Seedlings—Many varieties are just listed as *A. arguta*, available in male or female plants.
2. Ananasnaja—A variety with a fuzzless skin, the Ananasnaja is very sweet and spicy. The Russian name means “pineapple-like.”
3. Issai—Self-fertile, the Issai has fruit with sweet flesh, often used as a fruit-producing pollinator. This variety is very productive.
4. Meader—A good pollinator for Ananasnaja, the Meader produces sweet fruit and ripens in late August.

C. Culture

1. Site

- a. Hardiness: Dormant vines are hardy to -25° to -30°F and sensitive to late spring frosts. Avoid frost pockets.
- b. Soil: Kiwi need well-drained soil, even soil moisture, and a sunny location **free from wind** to protect fruit and laterals from damage and drying.

Fig. 3. Kiwi on trellis.



2. Training and trellising—The vines are large and heavy so the kiwi needs a strong trellis system as in Fig. 3. The Kiwi is a perennial with a lifespan of 50 to 60 years. Pressure-treated posts should be 5 to 6 feet tall with another 3 feet below ground. Use high tensile 12 or 10 gauge wire. A T-bar trellis with three to five horizontal wires is recommended. Space the plants 10 to 15 feet apart in row and 10 to 15 feet between rows.
3. Pruning
 - a. Summer pruning: A must for kiwis. Avoid shading of fruiting wood. Prune new growth several times to 6 to 8 inches during the growing period.
 - b. Winter pruning: Prune during the dormant period. Start by developing well defined leaders or cordons which will be permanent. Set up an evenly spaced system of fruiting arms or laterals.
 - i. Remove fruiting wood that is losing vigor. Start with one-third removal each year.
 - ii. Remove fruiting lateral after third year.
 - iii. Shorten 1-year wood to two to four buds. Allow second-year wood to fruit freely.

4. Fertilization
 - a. Young plants: Add balanced fertilizer split into two applications.
 - b. Mature plants: Apply one-half to two-thirds of the balanced fertilizer at bud break; then apply the rest after the fruit is set.
5. Harvesting—Plants take 3 to 4 years to bear; they reach full production in 7 to 8 years. Pick the fruit in late August to November when it is **firm-ripe** (for best storage ability). Keep refrigerated.

D. Common Plant Problems—Diagnosis and Control

1. Diseases—None.
2. Insects—None.

VII. Black Currants

A. The black currant, or *Ribes nigrum*, is a native of central and eastern Europe.

1. The native plant grows in damp, woody places. A fully grown bush may reach 5 to 6 feet in height and spread, and have an average yield of 10 to 12 pounds per plant.
2. There are many cultivars, mostly of European origin. Most are extremely hardy. Black currants are partially self-fruitful, but set a larger drop with another cultivar nearby. Plant nonblister rust resistant cultivars at least 1,000 feet and preferably 3/4 mile from the nearest five-needle pine.

B. Cultivars in Idaho

1. Black September—This variety produces a large, firm fruit with a strong black currant flavor that is hardy to -30°F. The plant is mildew resistant.
2. Consort—The fruit of the Consort has a sweet, musky flavor, while the plant is self-fruitful, resistant to white-pine blister rust, and hardy to -30°F.
3. Crusader—The Crusader needs a pollinator; it is rust resistant.
4. Jostaberry—This variety is a cross between a black currant and a gooseberry. It produces large fruit that is good fresh. The vigorous plant is resistant to mildew and white-pine blister rust and is cold hardy.

C. Culture

1. Soil—The currant will grow on a wide variety of soils. The ideal pH is 6.5 with good water holding capacity. Currants will tolerate poorly drained soils. Add organic matter to light soils.
2. Site—Plants bloom early so avoid frost pockets. Though the currant prefers a sunny location, it will tolerate partial shade. Control all perennial weeds before planting.
3. Planting—Plant in late winter or early spring. Space the plants 5 feet apart in rows, with 6 feet between rows. Plants grow by stooling; plant 2 inches deeper than in nursery. Cut all shoots to 2-inch stubs at planting. Plants root easily; use prunings as cuttings.
4. Pruning—Prune annually, as black currants bear best on 1-year wood. Remove all 3-year-old wood annually, as well as any older growth. Cut to strong young shoot, or near base, or off completely. Keep five or six canes each of 1- and 2-year-old wood.
5. Irrigation and fertilization—The currant likes even soil moisture. It will require frequent irrigation in arid parts of the state. Currants are fairly heavy feeders, so apply balanced fertilizer in March and more nitrogen in April.
6. Weed control—These plants are shallow rooted, so avoid deep cultivation. Sawdust mulch 4 inches thick is effective in controlling weeds.

D. Common Plant Problems—Diagnosis and Control (see Gooseberries)

VIII. Red and White Currants

A. Red currants, or *Ribes rubrum* and *Ribes spicatum*, are native to Europe. A full-grown bush may be 5 to 6 feet in height and spread. The fruit is smooth skinned and glistening. Red currants are used for jelly, pies, juice, and wine.

1. The white currant is a sport of the red currant, and the culture is the same.
2. The plants are self-pollinating; the average yield of the mature plant is 8 to 10 pounds of fruit per plant.

B. Cultivars in Idaho

1. Red currants

- a. Cherry: This variety has a high fruit quality, is hardy in Zone 3 (-40° to -30°F), and is productive.
- b. Minnesota 71: A vigorous plant, the Minnesota 71 produces large fruit of good quality.
- c. Red Lake: The Red Lake is productive with a long growing season. It produces early fruit. The dark red berries are widely grown.

2. White currants

- a. White Imperial: An old, but vigorous variety, the White Imperial produces very sweet medium to large fruit.
- b. White Pearl: The White Pearl has a pale yellow skin and large fruit.

C. Culture

1. Soil—Both white and red currants are less tolerant of poorly-drained soils than black currants. Ideal pH is 6.5. The plants need good water holding capacity; add organic matter to light soils.
2. Site—These plants bloom early, so avoid frost pockets. The flowers are hardier than black currants; you'll find them useful for north-facing walls. If you want full flavor in the fruit, then these plants require a sunny location. Control all perennial weeds before planting.
3. Planting—Plant in late winter or early spring. Space plants 5 feet apart in rows, with 5 feet between rows. Plant at the same depth as in nursery.
4. Pruning—Your objective is to create a goblet-shaped bush with 8 to 10 main branches. Prune leaders to outward facing-buds. Prune drooping branches to upward-facing buds. Fruit buds produced in clusters at base of 1-year wood or on short spurs on old wood. Maintain about three canes each of 1-, 2-, and 3-year-old wood.
5. Irrigation and fertilization—These currants like even soil moisture. Use mulch on light soils. The plants are fairly heavy feeders, so apply balanced fertilizer in March at bud break.

6. Weed control—As the plants are shallow rooted, avoid deep cultivation.

7. Harvesting—Pick as soon as the berries are clear in color. Pick whole clusters to avoid injury to delicate fruit.

D. Common Plant Problems—Diagnosis and Control (see Gooseberries)

IX. Gooseberries

A. Botanically, gooseberries are known as *Ribes usa-crispa*.

1. They are self-pollinating and are a deciduous, thorny shrub.
2. The mature plant has a height and spread of 5 feet, and produces 5 to 6 pounds of fruit. It bears fruit like red currant at the base of 1-year wood and on spurs of older wood.
3. Gooseberries are more tolerant of hot weather than currants.

B. Cultivars in Idaho

1. Captivator—This variety is winter hardy and disease resistant. It produces a large 1-inch fruit that is pink to red when it is ripe and has an average flavor.
2. Pixwell—A hardy, thornless plant, the Pixwell produces fruit with sweet, pink flesh.
3. Poorman—A vigorous productive variety, the Poorman has a highly flavored, wine-red fruit. The plants are hardy.
4. Welcome—Welcomes are extremely productive plants with medium to large, light-green fruits that have a sweet-tart flavor.

C. Culture

1. Soil—The top 18 inches of soil needs to be well drained. An ideal pH is 6.5. Gooseberries need good water holding capacity; add organic matter to light soils.
2. Site—Avoid frost pockets, as the plants bloom early and blossoms can be damaged by spring frost. Gooseberries are tolerant of partial shade, though they do best in sunny site. Control all perennial weeds before planting; the thorny plant is hard to weed around.

3. Planting—Plant in late winter or early spring. Gooseberries are one of the first berry plants to leaf out. Space plants 5 feet apart in rows, with 5 feet between rows. Plant at same depth as nursery.
 4. Pruning—See red currants.
 5. Irrigation and fertilization—The gooseberry likes even soil moisture. Uneven or heavy watering may cause fruit to split as it ripens. Use mulch on light soils. The plants are fairly heavy feeders so apply balanced fertilizer in March at bud break.
 6. Weed control—As the plants are shallow rooted, avoid deep cultivation.
 7. Harvesting—Protect the plants from birds with netting. Pick as soon as the berries are good size, but while they are still green (June or July). For dessert fruit thin every other one. Use thinnings for cooking.
- D. Common Plant Problems—Diagnosis and Control
1. Diseases
 - a. Anthracnose or leaf fungal disease: Overwinters on dead leaves.
 - i. Symptoms: The disease creates small leaf and fruit spots. By mid-season there is a yellowing and dropping of leaves.
 - ii. Control: Remove and destroy affected leaves. Prune to open center to allow air circulation.
 - b. Powdery mildew: A fungal disease that overwinters on twigs.
 - i. Symptoms: The mildew can be seen as a white, powdery growth on the surface of leaves, green shoots, and fruits. Infected plants are stunted.
 - ii. Control: Prune to maintain an open plant with good air circulation.
 - c. White pine blister rust (fungal disease): It is no longer illegal to cultivate *Ribes* in Idaho. (Too many wild *Ribes* combined with rust resistant pine cultivars). Alternate the host to five-needle pines. Black currant is most susceptible.
 - i. Symptoms: Small cuplike spots appear on the underside of leaves and produce orange yellow spores.
 - ii. Control: Remove and destroy infected plants. Do not plant *Ribes* near five-needle pines.
 2. Insects
 - a. Currant fruit fly (gooseberry maggot).
 - i. Damage: The larvae enter the soil in late June. They overwinter as pupae in brown cases the size of wheat grains. Flies emerge in April and lay eggs on the developing berries of either currants or gooseberries.
 - ii. Control: Use shallow cultivation under bushes during July and August, as this method helps expose and kill pupae.
 - b. Currant aphid
 - i. Damage: A small, yellow aphid appears on new growth in the spring. The aphid overwinters as eggs on bark. It causes cupping and red color on new leaves. Honeydew accumulates.
 - ii. Control: Use water washes or insecticidal soap.
 - c. Currant borer
 - i. Damage: The adults are clear winged with blue-black coloring and yellow markings. The larvae tunnel in the canes. Canes wilt in summer and autumn.
 - ii. Control: Prune out and destroy infected canes.
 - d. Imported currantworm
 - i. Damage: The larvae are 1/2 inch long, greenish in color, while the immature have dark spots. They feed along leaf margin and may defoliate the plant when they become numerous. Sawfly adults are black with yellow markings.
 - ii. Control: Use insecticide according to label recommendations for currantworm on gooseberries.

- e. Two-spotted spider mite
 - i. Damage: Adults are 1/5 inch long, tan or greenish in color with two spots on each side of the back. They overwinter as adults on weeds and debris near host plant. Feeding reduces plant vigor and causes stippling on leaves. Webbing, when severe, may cause leaf drop.
 - ii. Control: Insecticidal soap.

X. Elderberries

- A. Elderberries belong to the genus *Sambucus* and grow wild over much of the United States and Canada. The blue or black varieties are edible. The fruit, born in flat clusters, makes excellent jelly, jams, pies, and wine. Most elderberries require cross-pollination, and all are hardy to Zone 4 (-30° to -20°F).
- B. Cultivars in Idaho
 - 1. Adams—A strong plant with huge clusters, this variety produces sweet fruit.
 - 2. Johns—This variety bears later than the Adams and produces best when it has been cross-pollinated. It also has huge clusters of large, sweet fruit.
 - 3. Nova—Pollinate the Nova with the York. The plant produces large, sweet fruit.
 - 4. York—This hardy, late plant produces the juicy, sweet fruit that is the largest fruit of any elderberry. Pollinate the York with the Nova.
- C. Culture
 - 1. Soil—The elderberry grows on about any soil type, but prefers moist, well-drained, siltloam soils, neutral to slightly acidic.
 - 2. Irrigation and fertilization—The plants need to stay evenly moist. Fertilize lightly, as the root system is shallow.
 - 3. Weed control—Elderberries can be grown in sod. Mulch with 4 to 6 inches of sawdust to control weeds and conserve moisture.
 - 4. Propagation—Plants are spread by stolons. Propagate with hardwood, greenwood, or root-cuttings.
 - 5. Pruning—This vigorous plant requires pruning to control size and maintain productivity. Cut a few main shoots to the

ground each year. Prune out all wood more than 4 years old.

D. Common Plant Problems—Diagnosis and Control

- 1. Diseases—None.
- 2. Insects—None.

XI. Grapes

- A. Grapes account for one-fourth of all fruit production in the world. They are used for wine and juice, preserves, and are eaten as raisins or table fruit.
 - 1. Grape production in Idaho is limited by cold winter temperatures and, in many locations, short growing seasons.
 - 2. All grapes in the Genus *Vitis* have vines that are generally vigorous and deep rooted. Grape varieties are self-pollinated. Fruit is borne on current season's growth.
- B. Cultivars in Idaho
 - 1. Types of grapes
 - a. European (*Vitis vinifera*): European varieties produce a tight-skinned wine, raisin or table grape. Quality wine types are made from them. Most viniferas require a mild winter such as those in California or Arizona (hardy only to about 10°F). Thompson seedless falls in this group and will not be hardy in Idaho.
 - b. American (*Vitis labrusca*): American varieties have a slip skin and a musty or "foxy" flavor. The Concord is a typical example. Some are quite winter hardy.
 - c. French and American hybrids: These are crosses intended to combine the quality of European grapes with the hardiness and disease resistance of American grapes.
 - 2. Cultivars
 - a. Betas: This plant is a productive American blue-black variety with a tangy, wild grape flavor. It is good for jelly and juice and is hardy to -40°F.
 - b. Black Monukkas: While this grape is one of the hardiest of the European plants, it still requires winter protec-

tion in many parts of Idaho. The fruit is large, reddish-black, and mostly seedless. It is sweet and good fresh.

- c. Campbell's Early (Island Belle): A Concord type with early fruit, this variety is good for juice.
- d. Concord: An American, blue-black plant with a vigorous, hardy vine, this variety is cold-resistant to -15°F. The fruit has a distinctive flavor.
- e. Fredonia (Early Concord): Another American variety similar to the Concord, though it bears fruit earlier, this plant is hardy to -40°F.
- f. Himrod: An American variety with a golden yellow, seedless fruit, this grape makes a good table grape. The Himrod is hardy to -15°F.
- g. Interlakan Seedless: A sister of Himrod, the plant is similar, but more productive. It is hardy to -15°F, vigorous, and disease resistant.
- h. Reliance: The Reliance produces a fine quality, seedless grape that is pinkish-red in color and has an excellent sweet, fruity flavor. This variety is disease resistant and hardy to -34°F.
- i. Van Buren: An American Concord, this sweet table grape is hardy to -20°F.
- j. Worden: Another American Concord, except larger and darker, this variety is good for juice and jelly and good served fresh. Worden is disease resistant and hardy to -50°F.

C. Culture

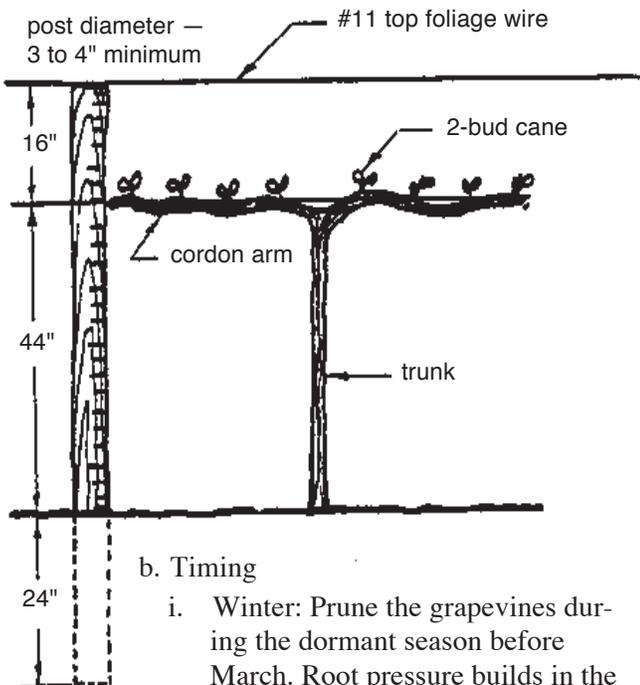
1. Planting

- a. Plants: Many plants are produced from dormant cuttings. Some cultivars are budded or grafted onto disease, insect, and nematode resistant rootstocks. Rootstocks can modify vigor (increase or decrease) and provide tolerance to a wide range of soil conditions.
- b. Soil: Grapes require a deep, well-drained soil for their extensive root system. Highest yields are on sandy loams. Grapes worldwide are planted on an extreme range of soil types.

Rootstock may be necessary to tolerate some soils.

- c. Spacing: Depends on the vigor of cultivar, soil, and training system used: 8 feet for American grapes and 6 feet on poor soils (sandy or gravelly) and 9 feet plus for vigorous European grapes.
 - d. Orientation: Maximize sunlight; plant on a south-facing slope; place rows north to south.
2. Irrigation—Required for most sites in Idaho.
 3. Fertilization
 - a. General: Nitrogen fertilizers are detrimental to a fruit set. Most vines have over-vigor problems. Only very old or stressed vines may require nitrogen boost.
 - b. Potassium and phosphorus: Needs are low. See Subsection D, "Common Plant Problems: Diagnosis and Control."
 - c. Micronutrient: Boron deficiencies are common. See Subsection D on common plant problems.
 4. Training and pruning
 - a. Types
 - i. Cordon or spur pruned (Fig. 4): Permanent canes or cordons are trained on a wire 40 to 45 inches from ground. Spurs are established along a cordon which bear fruiting canes each year. A second wire, placed at a height of 5 feet, is used to tie up fruiting canes in midseason.
 - ii. Cane-renewal system or Kniffen training (Fig. 5): Probably the best system for the homeowner in Idaho. A strong trunk is developed up to the second wire with spurs established at the trunk near the wires. Two canes with 10 to 12 buds are left as fruiting wood on wires; two to four spurs are left on the base of the cane to grow renewal wood.

Fig. 4. Bilateral cordon training on vertical trellis.



b. Timing

- i. Winter: Prune the grapevines during the dormant season before March. Root pressure builds in the spring and that leads to “bleeding” of water from plants. This has little harmful effect on plants, but it is best to avoid this period.
- ii. Summer: Vigorous vines require summer maintenance. Yearly removal of suckers from the base of the plant or on the trunk below the first wire is needed.
- iii. Pinching or heading back: The current season’s canes will top the wire and flop into the row. Head back to keep plant upright and to prevent shading of clusters.
- iv. Leaf removal: On late season grapes, remove leaves near clusters to provide air circulation and to lessen the chances for the development of bunch rot. Normally detrimental to overall vine vigor due to low sunlight.

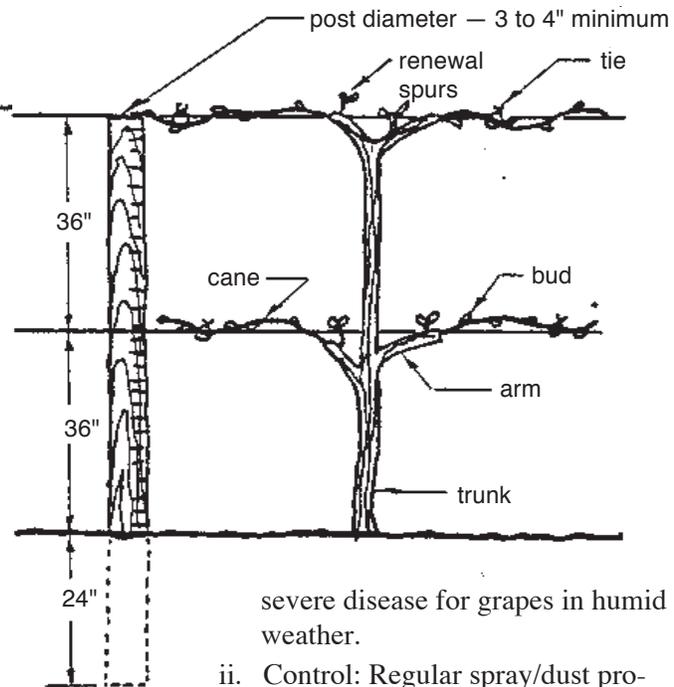
D. Common Plant Problems—Diagnosis and Control

1. Diseases

a. Powdery mildew

- i. Symptoms: This disease is the big limiting factor to home production of European grapes. It is the most

Fig. 5. Two-wire vertical trellis Kniffin trained.



severe disease for grapes in humid weather.

- ii. Control: Regular spray/dust programs of sulfur are essential. Use according to the label. Many recommended American grape varieties are resistant.
- b. Botrytis mold: “Noble rot” for producing a late harvest, sweet wine on many white wine varieties. Not desirable most of the time.
- i. Symptoms: Early infections cause spotting on leaves, or infection sites on cluster stems. Bunch rot also occurs during the late season on ripening grapes.
 - ii. Control: Fungicide sprays according to the label for botrytis on grapes.
2. Insects
- a. Caterpillars: Includes cutworms.
 - i. Symptoms: Feed on buds and shoots.
 - ii. Control: Pick off at night or use *Bacillus thuringiensis* (B.T.).
 - b. Scale
 - i. Symptoms: The scale may be round to oblong depending on species and may also have waxy excretions.

- ii. Control: Apply insecticide according to the label instructions for scale on grapes.
- c. Leafhoppers
 - i. Symptoms: These torpedo-shaped insects hold their wings in a rooflike position when at rest. They cause leaf injury and secrete honeydew.
 - ii. Control: Insecticidal soap sprays.
- 3. Other
 - a. 2,4-D injury: Grapes are very susceptible to damage by 2,4-D. It has been known to drift for miles and to affect plants.
 - i. Symptoms: Terminal growth can be misshapen; venation becomes parallel and fan-shaped; young leaves are thickened and distorted.
 - ii. Control: Avoid 2,4-D use around grapes. Wait for plants to grow out of problem.
 - b. Boron deficiency
 - i. Symptoms: There will be a light set of fruit, while the flower clusters will be affected with a “burning off.” Terminal shoots may die in early summer, or show leaf chlorosis. Some European grapes are particularly affected.
 - ii. Control: Soil or leaf analysis is recommended and foliar sprays of soluble boron should be applied to correct the deficiency.
 - c. Potassium deficiency
 - i. Symptoms: Chlorosis of outer margins of leaves will leave a dark green area (Christmas tree effect) in the center of leaf and brown spots on the margins.
 - ii. Control: Apply potassium.

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Booklets and Pamphlets

USDA

- Farmers Bulletin No. 2165: Growing Raspberries.
Farmers Bulletin No. 2236: Commercial Strawberry Growing in the Pacific Coast States.

University of Idaho Extension

Small Fruits

- CIS 932 Blueberry Production: Overview
BUL 815 Growing Blueberries in the Inland Northwest & Intermountain West
BUL 821 Growing Western Huckleberries
PNW 215 Highbush Blueberry Production
CIS 815 Northern Idaho Fertilizer Guide: Blueberries, Raspberries, Strawberries

Strawberries

- BUL 810 Growing Strawberries in the Inland Northwest & Intermountain West
CIS 931 Strawberry Production: Overview

Raspberries

- PNW 598 Commercial Red Raspberry Production in the Pacific Northwest
CIS 341 Crumbly Fruit in Raspberries
CIS 789 Diseases of Raspberries in Idaho
BUL 812 Growing Raspberries and Blackberries in the Inland Northwest & Intermountain West
CIS 960 Raspberry Production: Overview
CIS 847 Virus and Nematode Diseases of Raspberries

Further Reading

Books

Childers, Norman F. *Modern Fruit Science*. Horticultural Publications, Gainesville, FL.

Grapes

- CIS 790 Backyard Grapes
- RES 162 Contribution of the Grape and Wine Industry to Idaho's Economy
- BUL 828 Economic Feasibility of Growing Wine Grapes in Idaho
- CIS 1043 Selecting Grape Cultivars and Planting Sites in Idaho

Kiwifruit

- PNW 507 Growing Kiwifruit

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Small Fruits

- EB 1015 Small Fruits and Berries: Insect Disease Control for Home gardens
- EB 1082 Raspberry and Strawberry Root Rots in Home Gardens
- EB 1388 Small Fruit Pests: Biology, Diagnosis and Management

Grapes

- EB 0637 Training and Trellising Grapes for Production in Washington
- EB 1615 Critical Temperatures for Concord Grapes

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