

Unit B: Establishing a Fruit Garden

Lesson 3: Growing and Maintaining Small Fruits

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. Understand site and fruit selection when planning a small fruit garden.
2. Explain how to prepare and plant small fruits.
3. Discuss the maintenance of small fruit plantings.

Recommended Teaching Time: 2 hours

Recommended Resources: The following resources may be useful in teaching this lesson:

- A PowerPoint has also been developed for use with this lesson plan
- University of Illinois “Small Fruit Crops for the Backyard”
<http://urbanext.illinois.edu/fruit/small.cfm?section=small>

List of Equipment, Tools, Supplies, and Facilities

Writing surface
PowerPoint Projector
PowerPoint Slides
Transparency Masters
Seed catalogs with small fruit plants and seeds
Live samples of bramble canes and grape plants

Terms: The following terms are presented in this lesson (shown in bold italics and on PowerPoint Slide #2):

Heeling-in
Arbor
P1 soil test
K soil test
Primocane
Florican

Banded fertilizer
Broadcast fertilizer
Frost protection
Trellis
Cane
Perennial
Biennial

Interest Approach: Use an interest approach that will prepare the students for the lesson. Teachers often develop approaches for their unique class and student situations. A possible approach is included here.

Have samples of blackberries, raspberries, and grapes on hand. Ask students what these items have in common (they are all small fruits.). Find out which students have had experience in growing, harvesting, and consuming these products. Ask students what we need to know to raise these crops. Identify a site where the garden can be planted.

**** Use this activity to lead into Objective 1.**

Summary of Content and Teaching Strategies

Objective 1: Understand site and fruit selection when planning a small fruit garden.

(PowerPoint Slide #3)

- I. **Small fruits** are the edible fruit that is produced on a small perennial plant.
 - A. Four factors affect small fruit choice: the size of your family, personal taste preferences, the space available, and planned usage of the fruit are factors in determining what to plant.
 - B. The ideal small fruit site would be near the house with fertile well-drained soil.
 1. Full sunlight is preferred.
 - C. Varieties for home small fruit planting should be selected for high quality; either for eating fresh, preserving, or both.
 1. Selection of early, mid-season, and late-season varieties will provide a harvest of fresh fruit during a longer period.
 2. The use of several varieties helps ensure a successful harvest.

Ask the students for a definition of “small fruits”. Find out which fruits class members like and which ones they have raised. Use TM: B3-1 to show a guide to plant spacing, approximate yields, and a suggested number of plants for a family of five. Use LS: B3–1 to draw out this fruit garden for a family of 5. Advise the students to place the taller-growing fruits such as trellised grapes, north of the low-growing fruits. Characteristics of the varieties need to be studied so that the home gardener can make the correct variety choices to fit their needs.

Objective 2: Explain how to prepare and plant small fruits.

(PowerPoint Slide #4)

- II. Most small fruit plants occupy the same location for several years, therefore, it is desirable to build up the soil fertility of the proposed location. Planning one or two years ahead can also help to reduce weed problems.
 - A. Plant small fruits where row crops have been cultivated for one or two years.

1. Application of 4 bushels of well-rotted manure per 100 square feet in the summer or fall before planting will add organic matter and nutrients to the planting bed.
 2. Compost and decomposed leaves will also work well.
- B. All of the small fruits grow well in a pH of 5.5 to 7.5.
1. Test the soil prior to planting to determine the pH and add any amendments needed to improve the pH.

(PowerPoint Slide #5)

- C. When new plants are received they should be **heeled-in**.
1. **Heeling-in** is placing plants in a trench deep enough to permit covering the roots and long enough to spread the plants side-by-side one layer deep to hold them until planting.
 2. Plants should be stored at 0 to 5 degrees Celsius.
 3. Once the plants are heeled-in they should be watered and shaded until the planting area is ready for planting.
 4. Avoid letting the roots dry out.

(PowerPoint Slide #6)

- D. Planting and spacing requirements vary with the type of small fruit you plant.
1. Raspberries ripen in early summer and come in colors such as red, yellow, purple, and black
 - a. Because of virus disease, black and purple raspberries should be planted about 600 feet from red varieties.
 2. Virus-free one-year-old No. 1 grade plants are suggested for early spring planting.
 - a. Set red raspberries two or three inches deeper than they were in the nursery and set black and purple raspberries about one inch deeper.
 - b. Apply one or two quarts of water around each plant.
 - c. Cut red raspberry plants back to 8 to 12 inches after planting.
 - d. The stems of canes of black and purple raspberries should be cut off at ground level, removed from the planting, and burned.

(PowerPoint Slide #7)

3. Blackberries are best planted in early spring.
 - a. Spacing will depend on the trellis and training system to be used.
 - b. Most erect blackberry varieties can be grown without supports, spaced four to five feet apart in rows 8 to 10 feet apart.
 - c. Set the plants at the same depth as they were planted in the nursery, and cut the tops back to six inches.

(PowerPoint Slide #8)

4. Grapes are popular for home gardens.
 - a. grape varieties ripen from early August until mid-October, thereby providing a long season of fresh fruit.
 - b. Set the plants slightly deeper than they grew in the nursery.
 - c. Space the plants eight feet apart and space rows eight feet apart.
 - d. As the plants develop they need supports such as trellises or arbors

(PowerPoint Slide #9)

- i. **Trellises** are two or three wire supports stretched between wood or metal posts.

(PowerPoint Slide #10)

- ii. **Arbors** are curved wooden supports that may also provide shade and interest to your garden.

Discuss seedbed preparation and planting procedures for each of the commonly grown small fruits. If possible have the students prepare a planting bed and plant plants. Note: Grape production will be covered in much more detail in a later unit.

Objective 3: Discuss the maintenance of small fruit plantings.

(PowerPoint Slide #11)

- III. Small fruit maintenance includes weed control, mulching, fertilizing, irrigation, frost control, pruning, and pest control.
 - A. Weed control in small fruits is important and hoeing is sometimes necessary
 1. When hoeing small fruits be careful to stay shallow and not disturb the roots- no deeper than 3 to 4 inches.
 2. As plants become established, mulch with black plastic and/or organic mulches such as straw, sawdust, or wood chips.

(PowerPoint Slide #12)

3. Mulching has many benefits
 - a. Suppresses weed growth, which reduces competition for soil moisture and nutrients.
 - b. Conserves soil moisture, increases rainfall penetration, and reduces erosion.
 - c. Requires less nitrogen each year for equivalent yields.
 - d. Often maintains or increases vine vigor and productivity without other added nutrient elements, because these are supplied by the decaying mulch.

(PowerPoint Slide #13)

- B. Soil tests taken before planting should guide fertilizer application during seedbed preparation.
 1. The **P1 soil test** is a soil test for available phosphorus.
 2. The **K soil test** measures potash (K₂O) levels in the soil.
 3. Soils showing a high P1 test (50 and up) and a high K test (300 and up) need only nitrogen fertilizer.

(PowerPoint Slide #14)

4. Apply fertilizer in the early spring in either a band or broadcast.
 - a. **Banded fertilizer** is placed only on the row while **broadcast fertilizer** is placed over the entire area.
 - b. The negative side of broadcast fertilizing is the stimulation of unwanted weed growth between the rows.

(PowerPoint Slide #15)

- C. Water is the key to successful small fruit production so irrigation/watering depends on the amount of natural rainfall.
1. Insufficient moisture results in undersized berries, delayed maturity, less flavor, and dull fruit color.
 2. One inch of water per week is ideal whether from natural rainfall or irrigation.
 3. Water can also be used to prevent frost and freezing in orchards.

(PowerPoint Slide #16)

- a. **Frost protection** is the practice of using water sprinklers in the patch when temperatures drop to 34° F at plant level in the field or garden to prevent frost damage.
- b. The sprinklers are run continuously until the ice that forms on the plants has melted because as water freezes, it releases heat (heat of fusion), which warms objects in contact with the water and ice.

(PowerPoint Slide #17)

- c. If some free water is maintained on a bud covered with ice, the temperature of the bud will remain approximately 32°F
 - i. At 32°, there will ordinarily be no injury since flower tissue damage generally begins at 28°F.

(PowerPoint Slide #18)

- D. Pruning is the removal of plant parts to regulate crop size and quality and to direct growth.
1. Brambles (raspberries and blackberries) send up new shoots or **canes** each year from the roots and crown.
 2. Fruit is only produced on the previous year's wood
 - i. **Primocanes** are the first year vegetative canes that grow vigorously during the summer, initiate flower buds in the fall, and over winter.
 - ii. **Floricanes** are the second year canes that form flowers and bear fruit.

(PowerPoint Slide #19)

This slide shows a picture of a bramble. Point out the important terms to the students: primocane, floricanes, crown, root, and shoots. If possible, bring in a live bramble cane and have the students point out the structures.

(PowerPoint Slide #20)

3. Roots and crowns are **perennial** meaning that they live for an indefinite number of years going dormant for the winter.
4. The canes are **biennial** meaning they have a two year life.
 - a. Fruit is borne on leafy shoots from one-year-old wood during the second year, then gradually dry up and die shortly after harvest.
 - b. Prune out these canes at ground level.
5. Pruning brambles also involves training them to the support or trellis system you have selected.
 - a. Leaving brambles unpruned causes the plant to accumulate old unproductive wood and decreases yield.

(PowerPoint Slide #21)

- E. Pest control depends upon many factors.
1. selection of a suitable planting site
 2. the use of disease resistant varieties
 3. purchase of healthy plants
 4. the use of good cultural and sanitation practices.

The maintenance of small fruits is a very broad topic and can be covered in great detail. This objective presents the basic information to begin a small fruit garden. Pruning is especially important in small fruits and will be covered in its own lesson. To reinforce this objective have the students practice preparing the ground for a small fruit garden. Have the students research common small fruit pests and how to control them.

Review/Summary: Use the student learning objectives to summarize the lesson. Have the students explain the response to the anticipated problem of each objective. Student responses can be used to determine which objectives need to be reviewed. Questions on PowerPoint Slide #22 can be used as review.

Application: Have students as a class develop a comparison chart of weed control, fertilizing, irrigation, and frost control for blackberries, raspberries and grapes. Use seed catalogs or websites to review varieties and culture of small fruits.

Evaluation: Evaluation should focus on student achievement of this lesson's objectives. A sample written test is attached.

Answers to Sample Test:

Part One: Matching

1. H
2. F
3. A
4. D
5. B
6. E
7. G
8. C

Short Answer: Short Answer

1. Sprinkle the fruit with water a little bit at a time until it freezes. A thin layer of ice should form on the fruit. Once the ice begins to melt it will create heat and protect the fruit.
2. The size of your family, personal taste preferences, the space available, and planned usage of the fruit

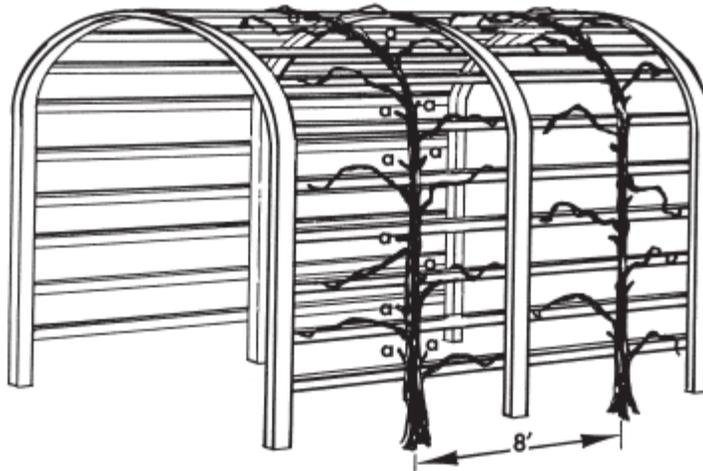
Recommended Fruit Garden For A Family of Five

Spacing, Bearing Age, And Production of Small Fruits							
Fruit	Planting Distance ^A		Interval from planting to fruiting	Life of plants	Height of mature plant	Estimated annual yield per plant ^B	Suggested number of planter for family of 5
	Between Rows	Between plants					
	<i>feet</i>	<i>feet</i>	<i>years</i>	<i>years</i>	<i>feet</i>		
Raspberries							
-Red	6-8	3-4	1	8-10	4-5	1.5 quarts	20-25
-Black	6-8	3-4	1	8-10	4-5	1 quart	20-25
-Purple	6-8	3-4	1	8-10	4-5	1 quart	20-25
Blackberries							
-Erect	6-8	4-5	1	10-12	3-5	1 quart	15-20
-Trailing or semi-trailing	6-8	6-10	1	8-10	6-8 (stalked or trellised)	4-10 quarts	8-10
Grapes	8-10	8-10	3	20+	6 trellised	¼-½ bushel	5-10
Everbearing Raspberries	8	3	½	8-10	4-5	1 quart-spring ½ quart-fall	15-20 15-20

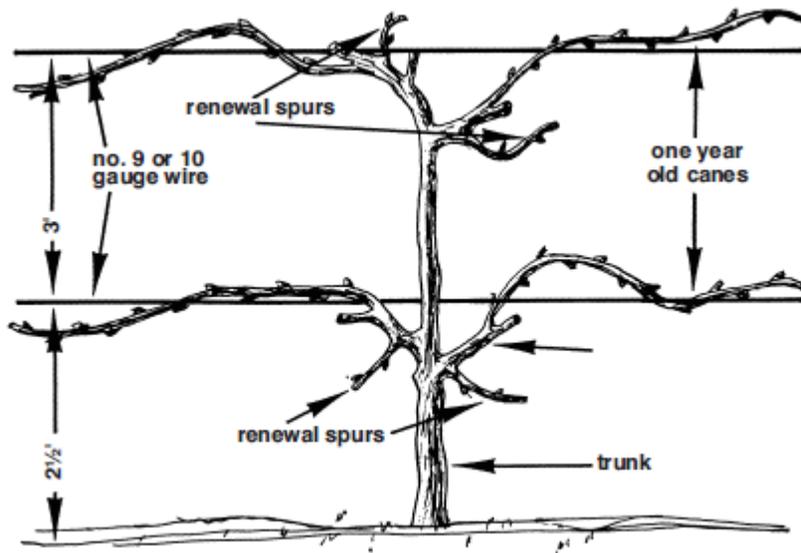
^A Minimum suggest spacing.

^B At full bearing age, with good care.

GRAPE ARBOR AND GRAPE TRELLIS



Mature grapevines trained and pruned on an arbor



A grapevine after three growing seasons.
A maximum of 12 to 15 buds may be left on each lateral cane.

DORMANT BRAMBLE PRUNING



Red raspberry plant before (left) and after (right) dormant pruning.



Black raspberry plant before (left) and after (right) pruning.
Purple raspberries and erect blackberries are pruned in a similar manner.

LS: B3-1

Lab Sheet

Using TM: B3-1 and a piece of graph paper to lay out a fruit garden for a family of five. Plant taller small fruit plants on the north and west. TM: B3-1 gives the spacing between rows, spacing between plants, and the number of plants needed. Select a minimum of four different types of small fruits. Try to choose fruits that your family will eat and are commonly grown in Afghanistan. If you would like to use a small fruit not listed, research the same information provided in TM: B3-1.

Assume each square is 1 foot by 1 foot. Use the following codes to label your fruit:

Red Raspberries= ----- RR
Black Raspberries= ----- BR
Purple Raspberries= ----- PR
Erect Blackberries= ----- EB
Trailing/Semi-Trailing Blackberries= ----- TB
Grapes=----- G
Everbearing Raspberries=----- ER

In the box on the graph paper you will write in your code. For example, if you planted Black Raspberries the code would be BR. For a long row of brambles draw an arrow to indicate a row of plantings.



Sample Test

Name _____

Test

Unit B Lesson 3: Growing and Maintaining Small Fruits

Part One: Matching

Instructions. Match the term with the correct response. Write the letter of the term by the definition.

- | | | | |
|-----------------------------|---------------------|--------------|---------------|
| A. P ₁ Soil Test | C. Frost Protection | E. Broadcast | G. Heeling-in |
| B. Banded | D. K Soil Test | F. Trellis | H. Arbor |

- _____ 1. Curved support used for grapes.
- _____ 2. Support with two wires stretched between wooden or metal posts.
- _____ 3. Available phosphorus is measured with this test.
- _____ 4. Available potassium (potash) is measured with this test.
- _____ 5. This type of fertilizer is applied over the row.
- _____ 6. This type of fertilizer is applied over the entire area.
- _____ 7. This practice stores the plants and acclimates them until planting
- _____ 8. The practice of using water sprinklers in the patch when temperatures drop to 34° F at plant level in the field or garden.

Part II Short Answer

Instructions. Provide information to answer the following questions.

1. Explain how sprinklers are used to prevent frost damage to small fruits:

2. What are the four factors you should consider when planting a small fruit garden?