Unit C: Maintaining the Fruit and Nut Tree

Lesson 4: Pruning Small Fruits

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

1. Discuss the importance of pruning small fruits
2. Describe methods of pruning and training grapes
3. Describe methods of pruning and training brambles

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
- http://mtngrv.missouristate.edu/publications/SmallFruitPruning.pdf

List of Equipment, Tools, Supplies, and Facilities

Writing surface
PowerPoint Projector
PowerPoint Slides
Materials to build grape trellises or bramble supports (optional)
Grape vines and brambles for examples

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

Biennial
Cordons
Floricanes
Four Arm Kniffin System
Overhead arbor
Primocanes
Vertical trellis

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 raspberries, blackberries, 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. Talk about the lesson about pruning large fruit trees and ask the students if they think small fruits are pruned the same. Lead into the lesson.

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

Summary of Content and Teaching Strategies

Objective 1: Discuss the importance of pruning small fruits.

(PowerPoint Slide #3)

I. There are many good reasons to prune small fruit crops regularly.
   A. Brambles are plants with a **biennial** growth habit which means that canes are produced in one year (called **primocanes**), overwinter, and then flower and fruit in the second year (then called **floricanes**).
   B. Increasing the plant's efficient use of sunlight and improving the air circulation around the plant parts are other important reasons.

(PowerPoint Slide #4)

   C. Removal of broken, dead, and diseased canes aids in preventing disease problems from occurring or spreading.
   D. A properly pruned and maintained small fruit planting will not only bear a better quality, more consistent crop, but will do so for a longer period of time.

Discuss with the students the differences and similarities between tree fruit and small fruit pruning. Have them create a list as a class and discuss the list.

Objective 2: Describe methods of pruning and training grapes.

(PowerPoint Slide #5)

II. For grapes to be most productive, they must be trained to a definite system and pruned rather severely.

(PowerPoint Slide #6)

   A. Training during the first season mainly involves selecting a single new shoot to grow upward to the trellis wire.
      1. Support the shoot with twine or bamboo.
      2. Allow it to grow several inches beyond the trellis wire, and then cut 10 – 15 centimeters below it.
      3. Select one shoot growing each direction along the wire, and remove all others.
      4. In only one or two seasons, **cordons** (arms) will be fully developed on the trellis wire.

(PowerPoint Slide #7)

   B. The two most common training methods are the **vertical trellis** and the **overhead arbor**.

(PowerPoint Slide #8)

   C. Both of these are satisfactory in the home planting if kept well-pruned.

1. Of the many variations of the vertical trellis, the single-trunk, **Four Arm Kniffin System** is the most popular.
    a. Posts are set 4.5 to 6 meters apart and extend 1.5 meters above the ground.
    b. Two wires are stretched between the posts, the lower being about 76 cm above the ground and the upper, at the top of the posts.
    c. The vine is set between the posts and trained to a single trunk with four semi-permanent arms, each cut back to 15 to 25 centimeters in length.
    d. One arm is trained in each direction on the lower wire.
    e. The two-wire trellis increases yields by 30 to 35 percent, but it also increases disease problems.

(PowerPoint Slide #9) **This slide illustrates the Four Arm Kniffin System of grape pruning. Ask the students, "What are the benefits of this system?"**

(PowerPoint Slide #10)

D. During annual winter pruning, one cane is saved from those that grew from near the base of each arm the previous summer.
    1. This cane is cut back to about ten buds.
    2. The fruit in the coming season is borne on shoots developing from those buds.
    3. Select another cane from each arm, preferably one that grew near the trunk, and cut it back to a short stub having two buds.

(PowerPoint Slide #11)

E. This is a renewal spur.
    1. It should grow vigorously in the spring and be the new fruiting cane selected the following winter.
    2. All other growth on the vine should be removed.
    3. This leaves four fruiting canes, one on each arm, with eight to ten buds each, and four renewal spurs, one on each arm, cut back to two buds each.

(PowerPoint Slide #12)

F. The same training and pruning techniques may be effectively used in training grapes to the arbor system.
    1. The only difference is that the wires supporting the arms are placed overhead and parallel with each other instead of in a horizontal position.
    2. Overhead wires are usually placed 1.8 to 2.1 meters above the ground.

(PowerPoint Slide #13)

G. If an arm dies, or for any reason needs to be replaced, choose the largest cane that has grown from the trunk near the base of the dead arm and train it to the trellis wire.
    1. To renew the trunk, train a strong shoot from the base of the old trunk to the trellis as though it were the cane of a new vine.
    2. Establish the arms in the same manner as for a new vine, and cut off the old trunk.

(PowerPoint Slide #14)

H. Pruning may be done anytime after the vines become dormant.
    1. In areas where there is danger of winter injury, pruning may be delayed until early spring.
    2. Grapes require severe annual pruning early each spring to remain productive.
    3. Grapes flower and produce fruit only on one-year-old canes.

4. The most productive wood is on the 6 to 8 buds closest to the base of the cane.
5. Canes with moderate vigor and about the diameter of a pencil are most productive.

Refer to TM: to show an illustration of the Four Arm Kniffin System. If possible, have the students prune a grape vine, or construct a grape arbor or trellis.

Objective 3: Describe the methods of pruning and training brambles.

(PowerPoint Slide #15)

III. Brambles include various forms and cultivars of raspberries and blackberries

A. There are basically three kinds of blackberries: erect, semi-erect, and trailing.
   1. Most erect blackberries have thorns, and most semi-erect and non-erect are thornless.

(PowerPoint Slide #16)

B. There are three kinds of raspberries; black, purple, and red.
   1. Yellow raspberries are handled the same as reds.
   2. The vast majority of raspberries possess thorns.

(PowerPoint Slide #17)

C. The brambles are perennial in that new canes are produced each year.
   1. The canes themselves, however, are biennial in nature in that canes grow vegetatively one year (**primocanes**) and bear fruit and die the following year (**floricanes**).
   2. The only exception to this rule applies to primocane bearing raspberries such as 'Heritage', whose canes grow and bear fruit the same year.

(PowerPoint Slide #18) **This slide illustrates a bramble plant. Point out the primocanes and floricanes. If possible, show a live bramble bush to the students and have them identify the primocanes and floricanes.**

(PowerPoint Slide #19)

D. Brambles require careful pruning if consistently high yields are to be obtained.
E. All brambles need to be confined to a narrow in row width of about 30 cm.
   1. Suckers that develop between rows should be cut off during the summer.
   2. If the rows get too wide the inner plants will not receive enough sunlight and harvesting will become difficult.

(PowerPoint Slide #20)

F. Pruning erect blackberries
   1. After planting in spring, the erect blackberries do not produce an erect hedgerow the first season, but rather relatively small, semi-erect plants.
   2. The next year, these small plants will fruit and the new primocanes will be erect.
   3. During the second year the canes should be pruned down to a height of about 1 meter to stiffen the canes and produce lateral shoots.
      a. Primocanes formed in later years should be pruned the same.
      b. During the following late winter or early spring, remove weak or diseased canes.
         i. Weak canes are typically less than 1.5 cm in diameter.

(PowerPoint Slide #21)

   4. The most recent summer's primocanes should be thinned to about 1 every 4 cm.
      a. Shorten the laterals to lengths of about 30 to 38 cm.
   5. Remove the floricanes anytime after fruiting but before the following spring.

6. Training thorned erect blackberries to a trellis is usually not necessary, but a trellis about 1.2 meters high may be helpful under circumstances of high vigor, high winds, and/or heavy fruit load.

(PowerPoint Slide #22)

G. Pruning semi-erect and trailing blackberries
   1. Because of their growing habit, these blackberries should be trellised.
   2. A one or two wire system similar to that of a grape trellis can be used.
      a. The wires should be about 1 to 2 meters off the ground depending on the cultivar.

(PowerPoint Slide #23)

   3. The most common training systems are the fan system and arm system.
      a. The fan system entails tying the canes to a trellis in a fan like pattern.
         i. During the summer the primocanes are clipped 15-25 centimeters above the top wire which causes lateral branch development.
         ii. In early spring select 8 to 10 strong canes and tie them to the trellis.
         iii. Remove lateral branches on the lower part of the cane as these will sag to the ground when full of fruit.
         iv. Trim the upper laterals to about 45 to 70 centimeters.
         v. After fruiting remove the floricanes.

(PowerPoint Slide #24)

      b. The arm system closely resembles that of the Four Arm Kniffin System for grapes.
         i. Canes are tied to either side of both the top and bottom wires and are tipped when they begin to grow into neighboring plants.

(PowerPoint Slide #25)

H. Black and purple raspberries
   1. Pruning of raspberries is very similar to blackberries with some minor changes for some cultivars.
      a. In the summer, tip the new shoots to 76 to 100 centimeters if they are on a trellis, otherwise 60-76 centimeters if not grown on a trellis.
      b. The following spring, shorten the side branches to 17 centimeters for black raspberries and 30 centimeters for purple or red raspberries
      c. As with most brambles, remove the old canes after fruiting.
      d. During dormancy, thin the canes to about 6 to 8 per plant.

(PowerPoint Slide #26)

   2. Black and purple raspberries propagate themselves easily by tip layering which can be beneficial if new plants are desired.
      a. Lack of pruning can result in an overcrowded patch.

Have the students construct a bramble training system. Refer to TM: C4-2 for an illustration. If possible, have students prune some brambles.

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 #27 can be used as review.

Application: Have the students prune some grape vines and brambles. If there are no grape vines or brambles to prune have them observe some brambles. Have the students construct some grape trellises or bramble supports.

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

Answers to Sample Test:
Matching:

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

True/False

1. TRUE
2. FALSE
3. TRUE
4. FALSE

Short Answer

1. There are various answers but could include:
   A. Increasing the plant's efficient use of sunlight and improving the air circulation around the plant parts are other important reasons.
   B. Removal of broken, dead, and diseased canes aids in preventing disease problems from occurring or spreading.
   C. A properly pruned and maintained small fruit planting will not only bear a better quality, more consistent crop, but will do so for a longer period of time.

Sample Test Name_____

Test

Unit C Lesson 4: Pruning Small Fruits

Part One: Matching
Instructions. Match the term with the correct response. Write the letter of the term by the definition.

A. Biennial	C. Floricanes	E. Overhead arbor	G. Trellis
B. Cordons	D. Kniffin System	F. Primocanes	

_____ 1. Second year flowering and fruiting bramble canes.

_____ 2. First year vegetative bramble canes.

_____ 3. Training system of grapes with one stem and two lateral canes to the left and right.

_____ 4. Canes are produced in one year and flower and produce fruit in the next.

_____ 5. Support with two wires stretched between wooden or metal posts.

_____ 6. The part of the grape vine that supports it on the trellis.

_____ 7. Curved support used for grapes, generally used over walkways.

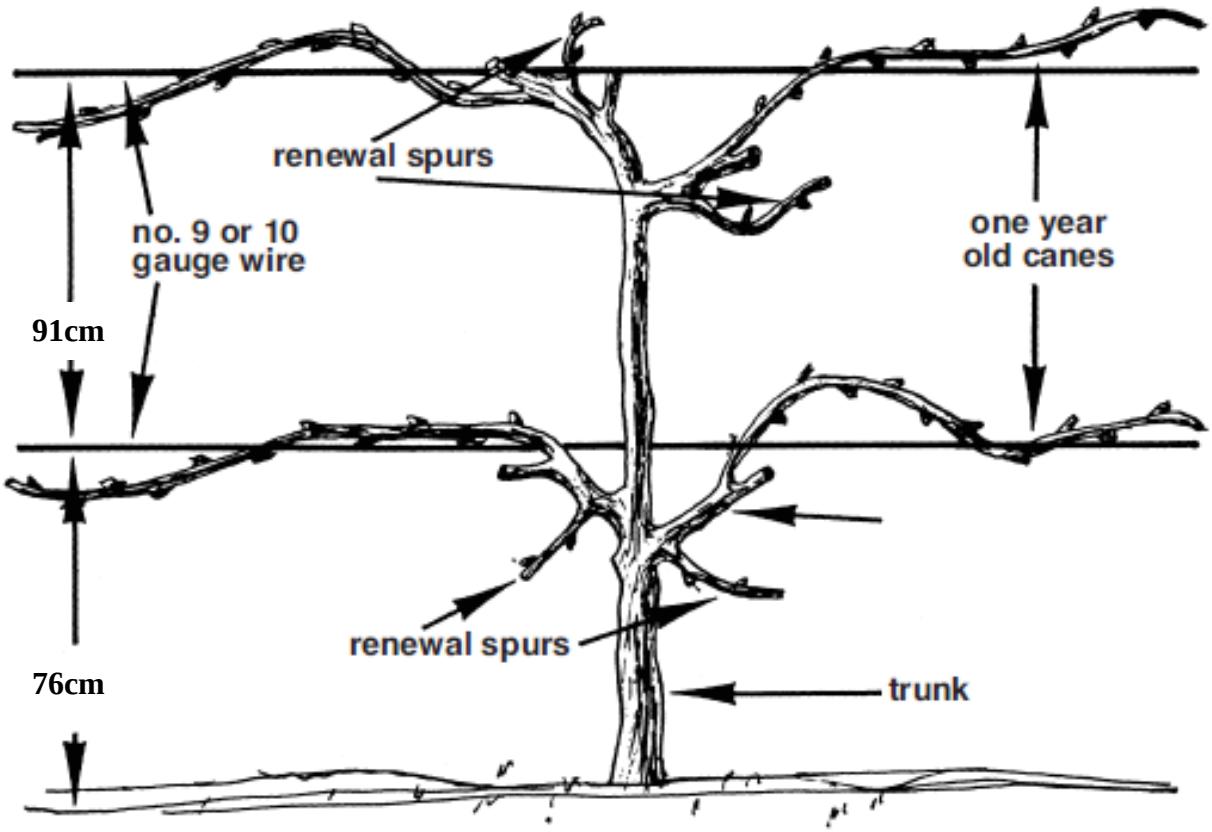
Part Two: True or False
Instructions. If the statement is true, write T; if the statement is false, write F.

1. ____ Brambles require careful pruning if consistently high yields are to be obtained.
2. ____ Floricanes do not need to be removed after they are done fruiting.
3. ____ Growing brambles on a two wire system increases yield but also increase disease problems.
4. ____ Pruning may be done anytime the vice is actively growing.

Part Three: Short Answer
Instructions: Provide a few statements to answer the following question.
1. What are some benefits of pruning small fruits?

TM: C4-1

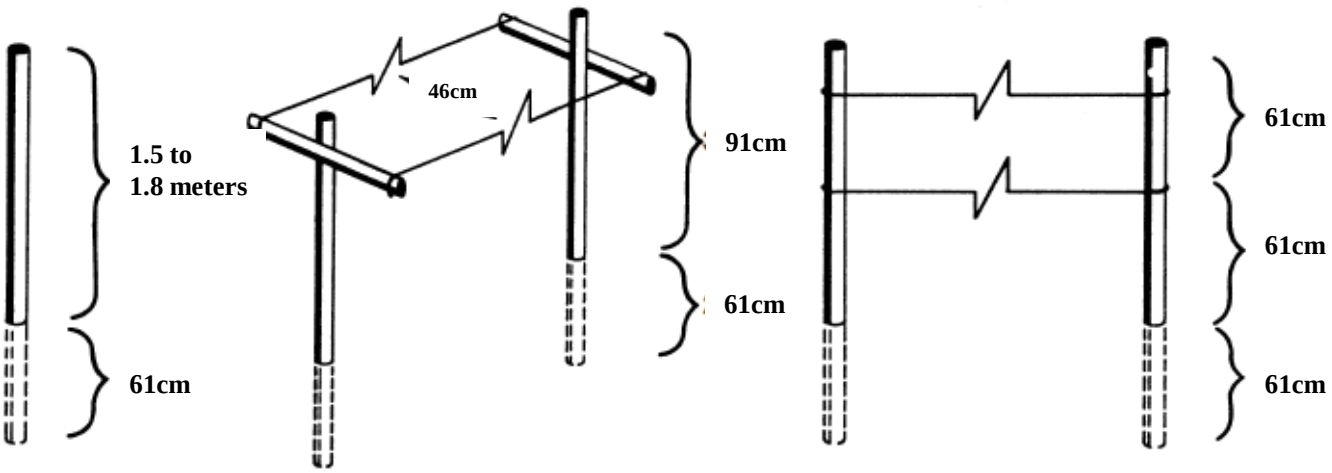
Four Arm Kniffin System For Grapes



This is a grapevine after three growing seasons. Notice there are about 12 to 15 buds per lateral shoot.

TM: C4-2

Bramble Support System



Staked Hill System
-5-10 cm diameter posts.
-treat underground portions of posts
-canes are tied to posts
-may be used for any bramble fruit

Horizontal Trellis
-5 x 10 cm cross bars
-No. 12 galvanized wire
-5-10 cm diameter posts, 7.6 to 9.14 meters apart.
-wire clips
-treat underground portions of posts
-no tying required
-most common system of training
-used with hedgerows

Vertical Trellis
-No. 12 galvanized wire
-5-10 cm diameter posts, 7.6 to 9.14 meters apart.
-treat underground portions of posts
-canes tied to wires
-used for linear system (narrow rows)
-most useful with semi-erect blackberries