

Unit E: Fruit and Nut Production

Lesson 4: Growing Pears

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

1. Describe the taxonomy of pears.
2. Demonstrate planting and growing pears.
3. Describe the common pear trees of Afghanistan.

Recommended Teaching Time: 3 hours

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

- A PowerPoint has been developed for use with this lesson plan
- <http://www.hort.purdue.edu/NEWCROP/pearinhistory.pdf>
- <http://attra.ncat.org/attra-pub/pear.html>

List of Equipment, Tools, Supplies, and Facilities

Writing surface
PowerPoint Projector
PowerPoint Slides
Copies of Transparency Masters
Pear samples (optional)
Pear tree to plant (optional)

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

Double working

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 the students read the article at <http://www.hort.purdue.edu/NEWCROP/pearinhistory.pdf>. It gives a history of the pear all throughout history across the world. This article can be read individually or split into groups for students to teach to the rest of the class. After the article has been read, discuss the importance of pears to humans and talk about production in Afghanistan.

Use this approach to move into Objective 1.

Summary of Content and Teaching Strategies

Objective 1: Describe the taxonomy of pears.

(PowerPoint Slide #3)

- I. Pears are widely grown throughout the world.
 - A. They belong to the family *Rosaceae* and in the same subfamily as apple and quince.
 - B. There are 22 species of the genus *Pyrus* and originated in Asia, Africa and Europe.
 - C. China is the top producer, followed by Italy, the United States, and Spain.
 - D. Common varieties of pear in Afghanistan are *Pyrus communis*, *P. serotina*, and *P. pyrifolia*.
 1. Bartlett pear is the most common throughout the world accounting for about 75% of all pear production.

Show TM: E4-1 “Asian Versus European Pears”. Discuss the differences between the two varieties of pears with the class.

Objective 2: Demonstrate planting and growing pears.

(PowerPoint Slide #4)

- II. Pears are very similar to apples in their growth with only a few differences.
 - A. Pears tolerate heavy, poorly drained soils better than most tree fruits.
 1. Deep, well-drained loams with a pH of 6-7 provide the best production.
 - a. Pear trees are planted in the same manner as other fruit trees.
 2. Pears have very similar climatic requirements to apples, but are much more prone to fire blight and therefore cannot tolerate humid, wet springs.

(PowerPoint Slide #5)

3. Pears require about 900 to 1000 hours of cold weather to break dormancy.
4. Pears have similar or slightly lower cold hardiness than apples, tolerating -23° C to -28° C
5. Pears bloom 1-3 weeks before apple, and are therefore prone to frost damage in most regions.

6. Pears mature in as little as 90 days, or as long as 200 days.
 - a. Pears that ripen in the summer are called “summer pears” and those that are harvested in autumn are called “winter pears.”

(PowerPoint Slide #6)

- B. Pear orchards are designed very similarly to apple orchards.
 1. Standard size trees are planted at about 170 trees per hectare.
 2. Pear trees must be cross-pollinated and therefore every other row should be an alternate variety.
- C. The most common form for training and pruning pears is the central leader form, like that of apple.
 1. Major pruning should be done in the winter.
 2. Only necessary pruning should be done in summer.

(PowerPoint Slide #7) This slide shows a pear tree growing in a yard in Afghanistan. Have the students observe this tree for a few minutes. Ask them “Has this tree been pruned properly?” Have them point out what they would have done differently in the growth of this tree.

(PowerPoint Slide #8)

- D. Pear trees often overproduce on the tree and therefore need to be thinned.
 1. If the fruits are not thinned, a lot of very small fruits will be produced and limb damage could occur.
 2. Failure to remove the excess fruit impacts the production of flowers for the following year.
 3. The fruit should be removed by hand.
 - a. Leave one pear per cluster and try to space the clusters about every 15 cm.

Refer back to PowerPoint Slide #7 and have the students observe the fruit on this pear tree. Ask them, “Has this pear tree been sufficiently thinned?” Ask them to explain why they believe it has or has not been sufficiently thinned.

(PowerPoint Slide #9)

- E. Fire blight is the main disease that affects pears.
 1. The best method of preventing fire blight is to plan.
 2. If fire blight does occur remove the affected plant parts at least 15 cm below the affected area.
 - a. Immediately remove the infected plant parts from the orchard.

(PowerPoint Slide #10)

- F. Pear trees are usually grafted for better production and disease resistance.
 1. The main rootstock used is quince which will produce small to medium sized trees.
 2. Some varieties are not compatible with quince and must be **double worked**.
 - a. Double working involves using an intermediate pear that is compatible with both the quince rootstock and the pear scion.

Have the students double work a pear tree. If this isn't possible, observe a full grown pear tree or orchard. Observe the layout, the growth of the tree, and depending on the season, the fruit.

Objective 3: Describe the common pear trees of Afghanistan.

(PowerPoint Slide #11)

III. Afghanistan has three common pear varieties.

A. *Pyrus communis*

1. This pear tree is the most common pear tree.
2. It ranges in height from 6 to 9 meters.
 - a. Older mature trees can reach heights of 12 meters.
3. The bark is grayish brown and scaly.
4. The fruit is 7.6 to 10 cm in diameter
5. Blooming begins in early spring and fruiting generally ends by the end of summer.

(PowerPoint Slide #12) Shows a pear in the *communis* species. This is a picture taken in Afghanistan.

(PowerPoint Slide #13)

B. *Pyrus serotina*

1. This pear tree is 8 to 10 meters in height with rough dark brown to black bark.
2. Thorns can be found at the leaf axils and are about 5 cm long.
3. The fruit is rusty brown with white spots on the outer surface and are about 5 cm in diameter.
4. Flowering takes place in March and ripening begins in November and continues until the end of December.
 - a. Fruits become fairly large by the end of September and can be eaten at this point.

(PowerPoint Slide #14) Shows a pear in the *serotina* species.

(PowerPoint Slide #15)

C. *Pyrus pyrifolia*

1. This tree reaches 9 to 12 meters in height.
2. The fruit is brown to reddish brown or yellow in color and can be up to 15 cm in diameter for cultivated varieties or 2 to 3 cm in diameter for wild types.
3. The fruits ripen 4 to 5 months after blooming.
4. These trees generally need 250-1000 hours under 7°C to overcome the dormancy period.

(PowerPoint Slide #16) Shows a picture of a pear in the *pyrifolia* species.

Try to provide pictures or live samples of each of these fruits. If fresh fruits cannot be provided show pictures and ask the students if any of them have ever eaten any of these pears.

Review/Summary: Use the student learning objectives to summarize the lesson. Student responses to the questions on **PowerPoint Slide #17** can be used to determine which objectives need to be reviewed.

Application: As a class, plant some pear trees. Have the class determine the varieties suitable for the area. Once they pick some varieties, have the class create a chart discussing the positives and negatives of each variety they choose. Allow the class to plan where the trees would be planted.

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

Answers to Sample Test:

Short Answer

1. What pear variety is most widely produced throughout the world?
Bartlett
2. What is double working?
Using an intermediate pear that is compatible with both the quince rootstock and the pear scion
3. Why is double working needed?
Some pear varieties are not compatible with quince and therefore the graft will reject.
4. What fruit is commonly used as the rootstock for pear grafting?
Quince
5. What is the most common form to prune pear trees?
Central leader
6. About how many hours of cold are needed to break dormancy in pears?
900-1000
7. Why is fruit thinning necessary on pear trees?
Excess fruits will produce small unattractive fruits. Removing excess fruits will also remove weight from the branches reducing breakage.
8. When is the best time to prune pear trees?
Winter and during the summer if necessary.

Test

Unit E Lesson 4: Growing Pears

Part One: Short Answer

Instructions. Provide information to answer the following questions.

1. What pear variety is most widely produced throughout the world?
2. What is double working?
3. Why is double working needed?
4. What fruit is commonly used as the rootstock for pear grafting?
5. What is the most common form to prune pear trees?
6. About how many hours of cold are needed to break dormancy in pears?
7. Why is fruit thinning necessary on pear trees?
8. When is the best time to prune pear trees?

Asian Versus European Pears

	European	Asian
Scientific Names	<i>Pyrus communis</i>	<i>Pyrus ussuriensis</i> <i>P. serotina</i> <i>P. bretschneideri</i>
Common cultivars	Bartlett, Bosc, D'Anjou, Seckel, Magness, Maxine, Moonglow, Comice	20th Century, Shinseiki, Korean Giant, Shinko, Chojuro, Niitaka
Texture and flavor	Buttery smooth and sweet.	Crisp. Flavors vary widely, including bland, sweet, sweet-tart, pineapple-like, and more.
Color	Green to yellow, though russeted types are dull bronze, and there are a few red types.	Green, yellow to golden, russeted bronze, and many types with white lenticels (spots).
Shape	Pyriform (i.e., round & bulb-like on the calyx end, narrowing to a slender neck at stem end).	Most cultivars are round. Some are misshapenly round. A few are somewhat pyriform.
Harvest and postharvest	Harvest before fully ripe. Allow to ripen (cure) at room temp. Buyer usually does curing.	Allow to tree-ripen. Ready to consume or sell.

<http://attra.ncat.org/attra-pub/pear.html>