

Unit E: Fruit and Nut Production

Lesson 5: Nut Production

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

1. Discuss the growth and production of *Pinus gerardiana*.
2. Discuss the growth and production of *Juglans regia*.
3. Discuss the growth and production of *Pistacia vera*.
4. Discuss the growth and production of *Amygdalus communis*.

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.crfq.org/pubs/ff/pistachio.html>
- <http://www.icarda.org/Afghanistan/Rich.htm>
- <http://www.kabuliwala.com/>

List of Equipment, Tools, Supplies, and Facilities

Writing surface

PowerPoint Projector

PowerPoint Slides

Samples of almonds, pistachios, pine nuts, and walnuts

Nut trees for planting (optional)

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 each student make a list of as many nuts as they can think of. Once each student has their list, have them share their thoughts and write their responses on the chalkboard or use the computer and PowerPoint projector as they take turns stating their list. Ask the students to pick out the most important nuts to Afghanistan and state why they think those nuts are important.

Use this approach to move into Objective 1.

Summary of Content and Teaching Strategies

Objective 1: Discuss the growth and production of *Pinus gerardiana*.

(PowerPoint Slide #2)

- I. *Pinus gerardiana* is commonly known as pine nut or Chilgoza pine.
 - A. Pine nuts originated in Afghanistan, Pakistan, and India.
 1. They are produced all over the world and are primarily used for culinary purposes.

(PowerPoint Slide #3)

- B. Pine nuts are the seeds of pine trees.
 1. All pine trees produce seeds but some are so small that they are not suitable for human consumption.
 2. *Pinus gerardiana* can reach up to 25 meters tall.
 3. The needles are found in groups of three and are roughly 6 to 10 centimeters long.

(PowerPoint Slide #4)

4. Seeds are produced on the female cone which is about 12 to 20 cm long.
5. The seeds are a little over 2 cm long.
 - a. If trees are planted from seed or young trees, it could take as long as 10 to 20 years before a large crop is harvested.

(PowerPoint Slide #5) This slide shows the difference between the male and female pine cones. Male cones are generally located on the top of the tree so that the pollen can easily reach the female cones that are located towards the bottom of the tree.

(PowerPoint Slide #6) This is an example of harvested pine nuts from Afghanistan.

(PowerPoint Slide #7)

- C. Pine trees can be grown on poor soils that are quite rocky.
 1. The trees are planted in the same way as other fruit trees.
 2. Follow the same planting procedure for pine trees as all other tree species.
 3. Because of their mature size, more space between trees will be needed.

(PowerPoint Slide #8)

4. Pine trees are best planted when they are young, about 30 cm.
 - a. Large pine trees can be difficult to plant or move as their root system has already been well established and the move could cause excess stress resulting in death.
5. Keep young pine trees well watered.
 - a. Avoid overwatering because pine trees are sensitive to extremely wet conditions.

Try to provide samples of pine nuts to the students. Observe a growing pine tree and discuss its growth. Discuss the importance of pine nuts to Afghanistan.

Objective 2: Discuss the growth and production of *Juglans regia*.

(PowerPoint Slide #9)

- II. *Juglans regia* is known throughout the world as Common walnut, Persian Walnut, or English Walnut.
 - A. The walnut originated in areas around China and Persia.
 - 1. Walnuts were distributed throughout the world and are grown extensively throughout Europe and North America.
 - 2. Fully grown this tree can reach 25 to 35 meters with a trunk diameter of up to 2 meters.

(PowerPoint Slide #10)

- 3. The tree contains male and female flowers on the same tree.
 - a. Female flowers grow in clusters of 3 to 5 and produce nuts which will ripen in autumn.
 - 4. Walnuts produce a toxic chemical in their roots called juglone.
 - a. Juglone is produced in the tree's roots, nut hulls and leaves.
 - b. Plants grown under the canopy of the tree or near the canopy will exhibit some symptoms of juglone toxicity.
 - i. Symptoms of juglone toxicity include yellowing leaves, wilting and eventual death.

(PowerPoint Slide #11)

- B. Due to walnut trees' large size, they should be planted at least 9 meters apart.
 - 1. Plant walnut trees as any other fruit tree would be planted.
 - 2. New walnut trees should be staked as the wood is very soft and can easily break.
 - 3. Healthy walnut trees will grow 45 to 76 cm a year.
 - a. Fertilizing walnut trees should take place after one year of growth has passed.

(PowerPoint Slide #12)

- C. Pruning walnut trees is not common and is generally preventative in nature.
 - 1. Remove any branches that are rubbing or crossing.
 - 2. Try to keep one main trunk on the tree.
 - 3. Once walnut trees reach their mature height, pruning becomes difficult and sometimes impossible without climbing the tree.

Try to provide the students with samples of walnuts from Afghanistan. Observe a walnut tree and make notes about its growth. Discuss the importance of walnut production in Afghanistan.

Objective 3: Discuss the growth and production of *Pistacia vera*.

(PowerPoint Slide #13)

- III. *Pistacia vera* is commonly referred to as pistachio.
 - A. Pistachios originated around Turkey and Afghanistan.
 - 1. Studies have found pistachios were consumed as early as 7000 B.C.
 - 2. Natural forests of pistachios exist across Afghanistan.

(PowerPoint Slide #14)

- B. Pistachios thrive in areas which have winters cool enough to break bud dormancy and hot, long summers.
 - 1. They are drought resistant and very tolerant of high summer temperatures, but cannot tolerate excessive dampness and high humidity.

2. The tree has about the same cold resistance as almonds and olives but flowers later in spring than almonds.
 - a. Chill requirements are estimated at 600 to 1,500 hours.

(PowerPoint Slide #15)

- C. The pistachio is a broad, bushy, deciduous tree which grows slowly to a height and spread of 7.6 to 9 meters, with one or several trunks.
 1. The trees are inclined to spread and droop, and may initially need staking.
 2. Their open habit and attractive foliage make them valuable ornamentals.
 3. Under favorable conditions pistachio trees live and produce for centuries.

(PowerPoint Slide #16)

- D. The fruits are reddish, wrinkled, and borne in heavy clusters somewhat like grapes.
 1. Although known as a nut, the fruit of the pistachio is botanically a drupe, the edible portion of which is the seed.
 2. The oblong kernel is about 2.5 centimeters in length and 12.7 millimeters in diameter and protected by a thin, ivory-colored, bony shell.
 3. Normally the shells split longitudinally along their sutures when mature.

(PowerPoint Slide #17) This is an example of pistachios harvested in Afghanistan.

(PowerPoint Slide #18)

4. Under unfavorable conditions during nut growth, the shells may not split open.
5. The color of the kernel varies from yellowish through shades of green, which extends throughout the kernel.
 - a. Pistachio nuts are rich in oil, with an average content of about 55%.

(PowerPoint Slide #19)

6. The trees begin bearing in 5 to 8 years, but full bearing is not attained until the 15th or 20th year.
 - a. Pistachios tend toward biennial bearing, producing heavy crop one year followed by little or none the next.
 - b. Production of nuts is also influenced by drought, excessive rain, heat or cold and high winds.

(PowerPoint Slide #20)

- E. Pistachios should be planted in full sun.
 1. The size of the slow growing trees can be further controlled by pruning.
 2. When planting, avoid rough handling since the budded tops are easily broken away from the rootstock.

(PowerPoint Slide #21)

- F. The trees do best on soils that are deep and well drained but moisture retaining.
 1. It can, however, survive in poor, stony, calcareous, highly alkaline or slightly acid, or even saline soils.
 2. The root is deeply penetrating.

(PowerPoint Slide #22)

- G. Pistachios will tolerate considerable drought but do best with deep, infrequent watering.
- H. Since pistachios grow slowly, they do not require large quantities of nitrogen fertilizer.
 1. A spring feeding of a complete fertilizer such as 10-10-10 NPK should be adequate.

(PowerPoint Slide #23)

- I. Pruning can be important to commercial growers in order to shape the trees for mechanical harvesting, but less so for the home orchardist.

1. The trees should be trained to a modified central leader with 4 or 5 main scaffold limbs branching about 1.2 meters from the ground.
2. After initial training, little pruning is needed except to remove interfering branches.
3. Heavy pruning reduces yield.

(PowerPoint Slide #24)

- J. The pistachio is usually propagated by budding or grafting selected scions onto seedling stocks that are vigorous and resistant to nematodes and soil borne fungi.

Have the students view a pistachio tree. Bring in some pistachios to class for the students to sample. Discuss what consumers like about pistachios and why it is an important crop in Afghanistan.

Objective 4: Discuss the growth and production of *Amygdalus communis*.

(PowerPoint Slide #25)

- IV. *Amygdalus communis* is commonly referred to as almond.
 - A. Almonds are closely related to peaches and are native to the Middle East.
 - B. The almond is a small deciduous tree, growing to between 4 and 10 meters in height, with a trunk of up to 30 centimeters in diameter.

(PowerPoint Slide #26)

1. The young twigs are green at first, becoming purplish where exposed to sunlight, then grey in their second year.
2. The leaves are 3–5 inches long with a serrated margin and a 2.5 cm (1 in) petiole.
3. The fruit is mature in the autumn, 7–8 months after flowering.

(PowerPoint Slide #27)

- C. In botanical terms, an almond is not a true nut. The fruit is a drupe 3.5–6 cm long.
 1. The outer covering or exocarp, fleshy in other members of *Prunus* such as the plum and cherry, is instead a thick leathery grey-green coat called the hull.
 - a. Inside the hull is a hard woody shell called the endocarp.
 - b. Inside the shell is the edible seed, commonly called a nut in culinary terms.
 2. Generally, one seed is present, but occasionally there are two.

(PowerPoint Slide #28)

- D. Almonds do best in deep, well-drained soil that is reasonably fertile and free of harmful salts.
- E. Early plantings have been more successful than late plantings.
 1. January–February plantings are better than March plantings.
 2. When trees are planted in January–February, ambient temperatures are low which prevents leaf buds from growing.
 3. This gives the roots time to callus and regenerate new roots before leaf buds begin to grow.

(PowerPoint Slide #29)

- F. The root system of trees from the nursery will contain some large roots and few small roots.

1. Their length in most cases will be such that they can be handled at planting time.
2. However, the normal tendency is to prune them back to such a length that it will fit into the planting hole.

(PowerPoint Slide #30)

3. This excessive root pruning practice will reduce the amount of food stored in the root system.
4. Therefore, a minimum amount of pruning is recommended at the time of planting.
5. The only roots that should be pruned are those that have been damaged.

(PowerPoint Slide #31)

- G. The planting hole should be just large enough to receive the roots without bending or crowding them.
 1. Compost or manure should never be placed at the bottom of the hole as it can create problems for the tree.
- H. Trees should be planted with the same procedure as all other fruit trees.

(PowerPoint Slide #32) This slide shows pictures of various varieties of harvested almonds from Afghanistan.

Provide the students with samples of almonds. Observe an almond tree and discuss its growth. Have the students discuss the importance of almonds to Afghanistan.

Review/Summary: Use the student learning objectives to summarize the lesson. Student responses to the questions on **PowerPoint Slide #33** can be used to determine which objectives need to be reviewed.

Application: Have the students determine the varieties of nuts discussed in this lesson that grow best in Afghanistan. Visit <http://www.kabuliwala.com/> to view the variety of nuts harvested and exported from Afghanistan. In addition to this, have the students research the common diseases that affect these nut trees. Split the class into groups and give each group a nut tree to research the diseases affecting it. Have the students share with the rest of the class their research findings.

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. D
3. A
4. B

Short Answer

1. Almonds do best in deep, well-drained soil that is reasonably fertile and free of harmful salts.
2. Modified central leader system.
3. Juglone
4. Plants grown under the canopy of the tree or near the canopy will exhibit some symptoms of juglone toxicity. Symptoms of juglone toxicity include yellowing leaves, wilting and eventual death.

Sample Test

Name _____

Test

Unit E Lesson 5: Nut Production

Part One: Matching

Instructions. Match the common name to the Latin name for each nut

- | | |
|---------------------------------------|------------------------------|
| 1. <input type="checkbox"/> Almond | A. <i>Juglans regia</i> |
| 2. <input type="checkbox"/> Pine nut | B. <i>Pistacia vera</i> |
| 3. <input type="checkbox"/> Walnut | C. <i>Amygdalus communis</i> |
| 4. <input type="checkbox"/> Pistachio | D. <i>Pinus gerardiana</i> |

Part Two: Short Answer

Instructions: Provide a short statement to answer the following questions.

- 3 / 7

 1. What type of soil do almonds prefer to grow in?
 2. What training/pruning system should be used for pistachio trees?
 3. What chemical is produced by walnut trees?
 4. What might happen to plants underneath or near a walnut tree? (describe the symptoms that could occur)