

Unit B: Establishing a Fruit Garden

Lesson 4: Growing and Maintaining Tree Fruits

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

1. Describe how fruit trees should be planted.
2. Discuss practices used to maintain a fruit tree orchard.

Recommended Teaching Time: 2 hours

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

- A PowerPoint has also been developed with use of this lesson plan

List of Equipment, Tools, Supplies, and Facilities

Writing surface
PowerPoint Projector
PowerPoint slides
Transparency masters
Lab sheets
Fruit trees for planting

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

Bud scars	Heading back (tipping) pruning
Fruit thinning	Thinning-out pruning
Modified-leader pruning system	Suckers or Watersprouts
Open-center (vase) pruning system	Fruiting habit

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.

Show students fruits that come from trees and are popular in Afghanistan (apples, mulberries, citrus). Determine their knowledge of fruit production through questions and discussion. Talk about the nutritional value of fruits. Fruits are important sources of vitamins A, C, and B6 along with such

minerals as potassium, magnesium, copper, and iron. Fruits taste good but also provide dietary fiber, lessen cancer risk, and reduce cholesterol. Show the economic value of fruit trees.

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

Summary of Content and Teaching Strategies

Objective 1: Describe how fruit trees should be planted.

(PowerPoint Slide #3)

I. Fruit trees can be obtained either locally from a fellow grower or greenhouse or can be ordered through the mail.

A. Mail-order fruit trees are sold bare root packed in moist peat moss.

1. On arrival, unpack and place the roots in a tub of water, for no longer than two days.
 - a. If trees will be stored longer they should be heeled in.

(PowerPoint Slide #4)

B. When weather and soil conditions permit, dig a hole large enough to accommodate the roots extended in their natural position.

(PowerPoint Slide #5)

1. Before planting soak the roots in a bucket of water but not longer than one hour.

(PowerPoint Slide #6)

2. Dig a hole about 30 centimeters wider and the same depth as the root system.

(PowerPoint Slide #7)

3. Remove any broken, damaged, dead, or diseased branches and roots.

(PowerPoint Slide #8)

4. Set on a firm mound of soil and then backfill the hole.

(PowerPoint Slide #9)

5. Plant the tree at the same depth as grown in the nursery, never deeper.

(PowerPoint Slide #10)

6. Fill the hole $\frac{3}{4}$ full with backfill and water; tamp with hands.

(PowerPoint Slide #11)

7. Reform the basin, fill with mulch and fertilize.

(PowerPoint Slide #12)

C. Trees should be planted so that they are about 5 centimeters deeper in the soil than they were in the nursery.

1. Apple trees grafted high on dwarfing rootstocks should be planted 18 to 25 centimeters deeper than they were growing in the nursery.
 - a. Remember to keep the graft of any fruit trees above ground to prevent the standard from sprouting.

(PowerPoint Slide #13)

D. Leave a saucer shaped surface with a collar built around the edge of the saucer.

1. This serves as a catch basin for watering the tree.
2. Fill the basin with mulch (wood chips, sawdust, or ground corncobs).

E. Apply 0.15 kilograms of mixed fertilize such as 10-10-10 to each tree.

1. Spread the fertilizer in a circular band $\frac{1}{4}$ to $\frac{1}{2}$ meter from the trunk.

(PowerPoint Slide #14)

F. Nursery or garden center fruits trees typically will be larger.

1. They are either balled and burlapped or container grown.
2. Remove the twine from the balled and burlapped tree and the container from the container grown tree.
3. Use the same planting procedure as with the bare root tree.

Pass out LS: B4-1. If possible, have the students plant a fruit tree. If a fruit tree cannot be planted have the students observe some trees that have been recently planted. Discuss the proper procedure to plant a tree. Use TM: B4-1 to make sure students understand the difference between bare root and balled and burlapped trees.

Objective 2: Discuss practices used to maintain a fruit tree orchard

This objective will present the general practices of orchard maintenance but after Unit B an entire unit is spent on maintaining the fruit and nut tree and will cover each practice in depth.

(PowerPoint Slide #15)

II. Proper maintenance of a fruit tree and the entire orchard is very important and will improve the quality of fruit and length of life of an orchard. Many practices are used to properly maintain an orchard.

A. Orchard maintenance begins with the care of young trees. Young fruit trees have difficulty competing with weeds and grass for nutrients and water.

1. An area extending 1 meter in all directions from the trunk should be cultivated and mulched.
2. At least the first year watering is needed to supplement rainfall.
 - a. Water once a week if at least 3 centimeters of rainfall does not occur.

(PowerPoint Slide #16)

B. Mature tree maintenance includes fertilization, pest control, fruit thinning, and pruning.

C. Fertilize in early spring as the buds begin to swell.

1. Broadcast the fertilizer in a circular band starting about 30 centimeters from the trunk and extending out to the spread of the branches.

(PowerPoint Slide #17)

2. If the tree is heavily pruned, reduce or omit the fertilization for that year.

- a. Nitrogen is the nutrient required in greatest amount, but must be applied with care.
- b. Too much causes excessive vegetative growth, less fruit set, and less flavor. Too little nitrogen causes slower shoot growth and smaller, lower quality fruit.

(PowerPoint Slide #18)

c. Soil levels of phosphorus and potassium similar to a garden are recommended along with a pH of 5.6 to 7.0.

- i. Ammonium nitrate is a good nitrogen fertilizer choice if phosphorus and potassium levels are already sufficient.
- ii. To determine the need for nitrogen, measure the previous year's shoot growth. This measurement is done in early spring before the buds open.
- iii. Last year's growth will be a more intense color (bright red or yellow) starting with the ***bud scars*** (compressed scars that circle the twig) and extend to the tip.

(PowerPoint Slide #19)

- d. Apples, plums, apricots, and cherries need 0.1 to 0.25 kilograms of mixed fertilizer (such as 10-10-10) per year of tree age with a maximum of 4.5 kilograms per tree.
 - i. Peaches and nectarines need 0.25 to 0.5 kilograms per year of tree age with a 4.5 kilogram maximum.
- e. Pears do best without fertilizer because of the danger of fire-blight disease.
 - i. If you fertilize, limit it to 0.1 kilograms per year of tree age with a maximum of 1.8 kilograms.

(PowerPoint Slide #20)

- 3. Pest control is essential to the successful harvest of fruit trees.
 - a. Fruit trees differ in the severity of insect and disease attacks and the length of time from bloom to harvest.
 - b. Generally speaking, the flowers and fruits must be protected from insects and diseases by sprays applied from blossom time until harvest.
 - c. Some varieties also require a dormant oil spray to prevent borer damage.

(PowerPoint Slide #21)

- 4. **Fruit thinning** is hand picking during late May and in June of misshaped, damaged, diseased, and excess fruit which will result in larger, higher quality fruit.
 - a. Trees not thinned will have potential limb breakage and lower fruit bud set for next year.
 - b. In some cases the tree may go to alternate year bearing.

(PowerPoint Slide #22)

- 5. Pruning is a skill acquired through knowledge of the plant to be pruned, practice, and observation of the results of pruning.

(PowerPoint Slide #23)

- a. Pruning has many purposes which include
 - i. improving the size and quality of the fruit
 - ii. developing a strong tree framework capable of supporting the fruit load, shape the tree, and adjust or partially control size of the tree to facilitate spraying and harvesting.
 - iii. Unpruned trees tend to produce fruit only on the outer edges and the top where sunlight reaches.
 - iv. The interior of the tree becomes a tangled mass that is difficult to spray and harvest.

(PowerPoint Slide #24)

- b. There are various methods of pruning utilized in an orchard. The names of the methods are presented here and the practice will be discussed in a future lesson.
 - i. Light pruning may be done any time of the year, but heavy pruning should be limited to the latter part of the dormant season. Summer pruning has a dwarfing effect on the tree.

(PowerPoint Slide #25)

- ii. The **modified-leader pruning system** creates a main leader branch and three to four lateral branches which are all treated with equal importance..
 - (1) Apple, pear, cherry and nut trees use this system.

(PowerPoint Slide #26)

- iii. The ***open-center (vase) pruning system*** is used to allow good light penetration for fruiting of inner branches.

(PowerPoint Slide #27)

- iv. ***Heading back (tipping) pruning*** encourages the growth of lateral (side) branches.

(PowerPoint Slide #28)

- v. ***Thinning-out pruning*** is the removal of an entire branch, shortening of a branch, and reduction of the number of laterals growing from branches.
 - (1) The general effect of thinning-out is a more open, easier to manage tree.

(PowerPoint Slide #29)

- vi. Annual pruning is needed to keep the trees productive and prevent trees from becoming too large and too dense.

(PowerPoint Slide #30)

- vii. ***Suckers or watersprouts*** are rapidly growing young shoots arising from the roots, trunk, or scaffold branches.
 - (1) They grow straight upward and should be removed whenever they occur.

(PowerPoint Slide #31)

- 6. The ***fruiting habit*** is the location where fruit is borne—laterally along the branch or terminally at the tip on one-year-old twigs or on fruit spurs produced on older wood.
 - a. When you prune keep in mind where the fruit is borne.
 - b. Apples and pears produce most of their fruits terminally on spurs from two year old or older wood.

Invite a grower to come to class and discuss their orchard and how they plant and prune the trees.

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 #32 can be used as review.

Application: Have students visit an orchard. If possible have them practice pruning and planting a tree. Have them observe the orchard and determine if any practices need to be implemented or changed.

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. A
3. D
4. B
5. E
6. F

1. What is the difference between balled and burlapped, containerized, and bare root trees?

Balled and burlapped have a root ball with soil intact wrapped in a burlap and can be planted in the burlap. Containerized trees are grown in a container and must be removed from the container before planting. Bare root trees are generally small in size (around 1 meter) and come packed in moist peat moss or wet newspaper.

2. Describe how to plant a bare root tree

Answers will vary but the student should list the major steps with important details.

To plant a bare root tree: dig a hole large enough to spread out the roots, place the tree in the hole, work loose soil around the roots filling the hole half full, tamp, water, fill the other half of the hole, tamp, water, leave a saucer spaced surface to fill with mulch.

Planting a Bare Root Tree

Materials:

bare root tree
spade or round point shovel
large bucket
1 meter square piece of plywood, tarp, or blanket
bark mulch or wood chips

Procedure:

1. Dig a hole at least $\frac{1}{2}$ meter wider than the spread of the root system.
2. Put the soil on the piece of plywood, tarp or blanket to keep it out of the grass. The hole should be wide enough and deep enough that the root system can be fully extended.
3. Prune any damaged roots before planting.
4. For sandy soils, mix $\frac{1}{2}$ to $\frac{2}{3}$ existing site soil with $\frac{1}{2}$ to $\frac{1}{3}$ peat moss. The added peat moss will help the sandy soil to retain moisture and nutrients. For clay soils, mix $\frac{1}{3}$ existing soil from the site, $\frac{1}{3}$ sphagnum peat moss, and $\frac{1}{3}$ coarse sand plus provide a drainage system in the bottom of the planting pit. If the soil on the site is good loam topsoil, it is not necessary to amend it with peat moss or sand.
5. Place a mound of soil in the bottom of the planting pit. This helps to support the root system.
6. Backfill the planting pit halfway. Tamp the backfill to remove large air spaces.
7. Fill the planting pit to the top with water. At this time, a soluble starter fertilizer high in P_2O_5 , and low in nitrogen, can be used to stimulate new root development. Allow the water to soak into the planting pit walls and continue backfilling.
8. Backfill the planting pit to its original grade. Tamp and water to eliminate air pockets.
9. Leave a saucer-like surface with a 15 centimeter collar built up around the edge.
10. Fill the saucer with wood chips or shredded bark mulch.

PLANTING BARE ROOT TREES



Bare root
Hole mounded on bottom

Balled and burlapped
Flat on bottom

Test

Unit B Lesson 4: Growing and Maintaining Tree Fruits

Part One: Matching

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

- | | |
|-----------------------------------|-----------------------------------|
| A. Watersprouts or suckers | D. Heading back (tipping) pruning |
| B. Modified-leader pruning system | E. Fruiting habit |
| C. Fruit thinning | F. Thinning out pruning |

- _____ 1. hand picking during late May and in June of misshaped, damaged, diseased, and excess fruit which will result in larger, higher quality fruit..
- _____ 2. rapidly growing young shoots arising from the roots, trunk, or scaffold branches..
- _____ 3. encourages the growth of lateral (side) branches.
- _____ 4. Creates a main leader branch and three to four lateral branches which are all treated with equal importance...
- _____ 5. The location where fruit is borne.
- _____ 6. The removal of an entire branch, shortening of a branch, and reduction of the number of laterals growing from branches..

Part II Short Answer

Instructions. Provide information to answer the following questions.

1. What is the difference between balled and burlapped, containerized, and bare root trees?

2. Describe how to plant a bare root tree