Unit E: Urban Forestry

Lesson 2: Selecting Trees for Urban Growing Conditions

Student Learning Objectives: Instruction in this lesson should result in students

achieving the following objectives:

1. Understand the types of trees.
2. Explain how climate influences tree selection.
3. Identify factors in selecting trees for the urban environment.

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
- http://en.wikipedia.org/wiki/Urban_forestry
- http://www.bestcountryreports.com/Temperature_Map_Afghanistan.html

List of Equipment, Tools, Supplies, and Facilities

Writing surface
PowerPoint Projector
PowerPoint slides
Transparency Masters

Terms: The following terms are presented in this lesson (shown in bold italics and on

PowerPoint Slide #2):

- Cultivar
- Deciduous
- Evergreen
- Genus
- Hardiness
- Multi-stem trees
- Ornamental trees
- Plant Heat-Zone Map
- Plant Hardiness Zone Map
- Shade trees
- Species
- Tree
- Variety

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.

Ask the students what they like about trees. Compile a list of their answers for all to see. Have the students explain their responses. For instance, if they say they like trees because they are big, when explaining they might say they like the shade a big tree casts or they marvel at the thought of a living thing being so old and large. Continue the discussion by asking if there are some things they don't like about trees. Again, compile a list and request that their answers be accompanied with explanations.

Summary of Content and Teaching Strategies

Objective 1: Understand the types of trees.

(PowerPoint Slide #3)

I. It is important to define a tree and understand how trees are categorized.

   A. A broad definition of a ***tree*** is a single-stem, woody, perennial plant reaching the height of 3.6 meters or more. There are exceptions in that some trees, such as birch and alders, are grown with more than one trunk and are called ***multi-stem trees***. Other trees may not reach 3.6 meters in height, but are still considered trees. Some trees have limbs to the ground, such as beech, fir, and pine.

(PowerPoint Slide #4)

   B. Function is often an important consideration in tree selection. Some trees are ***deciduous***, meaning they drop their leaves in the fall.

(PowerPoint Slide #5)

   Some trees are referred to as ***evergreen***. They maintain green leaves throughout the year. The situation may call for deciduous of evergreen species.

(PowerPoint Slide #6)

   Shade trees are large trees with spreading canopies.

(PowerPoint Slide #7)

   Ornamental trees have aesthetic value in terms of flowers, fruit, fall color, growth habit, bark, etc. Ornamental trees are smaller in size.

(PowerPoint Slide #8)

   C. Plant nomenclature is used to help categorize trees.

      1. All cultivated trees have common and Latinized or botanical names. A tree may carry more than one common name. Confusion can take place when discussing a tree with multiple common names. However, a tree has only one botanical name.

(PowerPoint Slide #9)

   The botanical name is based on a binomial system, that is, the plant has two Latin names. The first of the two is genus, and second is species. A ***genus*** is a closely related group of plants comprised of one or more species. A ***species*** is composed of plants that show characteristics that distinguish them from other groups in the genus.

(PowerPoint Slide #10)

      2. Some trees have been selected for outstanding characteristics. In these cases the trees may be given a variety or cultivar name. A ***variety*** is a group of plants within a species that has a significant difference from other plants in the species. The trait passes on to the next generation through sexual reproduction. A ***cultivar*** is a tree with a distinguishing characteristic that does not transfer to the offspring through sexual reproduction.

(PowerPoint Slide #11)

3. The botanic name must be written properly. The genus is always capitalized. The species is lower case. A variety name is written in lower case and in italics or underlined. A cultivar name is capitalized and placed in single quotations.

(PowerPoint Slide #12)

For example, the variety of common honeylocust that is thornless is written as *Gledtisia triacanthos inermis* or *Gledtisia triacanthos* var. *inermis.* The cultivar, October Glory Red Maple, would be written as *Acer rubrum* 'October Glory'

Utilize the text and transparency master TM: E2-1in this lesson for the PowerPoint presentation. Have students take notes during lecture-discussion. Ask questions during instruction to gauge student understanding of the concepts.

Objective 2: Explain how climate influences tree selection.
(PowerPoint Slide #13)

II. Extremes in regional temperatures can limit the species of trees that can be grown. Knowing the limits in advance can help in the selection process.

A. ***Hardiness*** is a term that refers to the ability of a plant to withstand cold temperatures. Hardiness is measured using a plant hardiness zone map. Each area of the world is assigned a zone numbered from one to thirteen. Hardiness zones are derived from the average coldest temperatures for the year.

(PowerPoint Slide #14)

1. The 13 hardiness zones are defined as followed:
Zone 1: below -46 C (below -50 F)
Zone 2: -46 to -40 C (-50 to -40 F)
Zone 3: -40 to -34 C (-40 to -30 F)
Zone 4: -34 to -29 C (-30 to -20 F)
Zone 5: -29 to -23 C (-20 to -10 F)
Zone 6: -23 to -18 C (-10 to 0 F)
Zone 7: -18 to -12 C (0 to 10 F)
Zone 8: -12 to -7 C (10 to 20 F)
Zone 9: -7 to -1 C (20 to 30 F)
Zone 10: -1 to 4 C (30 to 40 F)
Zone 11: 4 to10 C (40 to 50 F)
Zone 12: 10 to 15 C (50 to 60F)
Zone 13: above 15 C (above 60 F).

(PowerPoint Slide #15 shows a hardiness map of the world.)
(PowerPoint Slide #16)

B**.** Heat Tolerance has received increased attention in recent years. There is a ***Plant Heat-Zone Map*** showing the heat zones of Afghanistan. Some trees are more sensitive to heat than others, so the map aids in proper tree selection. The health of a tree species would suffer if in a zone warmer than the recommended zone.

(PowerPoint Slide #17 shows a picture of the heat zones in Afghanistan. It is not a clear picture, but you have internet access there is a good heat zone map of the following website: http://www.bestcountryreports.com/Temperature_Map_Afghanistan.html. It allows you to zoom in on specific areas in Afghanistan.)

** Use transparency masters TM: E2-2 and TM: E2-3 to illustrate points. Have the students expand their notes based on the discussion. Use the temperatures list for each zone to show the zone temperatures for your area on the hardiness zone map.

Objective 3: Identify factors in selecting trees for the urban environment.
(PowerPoint Slide #18)
III. A number of factors should be considered in selecting trees for urban situations.
    A. Tree species have characteristics that should be considered in the selection process.
        1. Urban areas have particular problems not often found in rural areas. One problem caused by manufacturing and automobile use is air pollution. Some trees, such as Ginkgo, red oak, and lindens are very tolerant to air pollution.
        2. The soils in urban areas are usually altered. Subsoil is brought to the surface, drainage patterns changed, and soil compacted. Tree species tolerant of these conditions are good selections.
(PowerPoint Slide #19)
        3. Salt is used on the highways and roads in northern regions to melt ice and snow. High salt concentrations are damaging to trees. In locations of heavy salt use, select trees that are tolerant to salt. Examples include honeylocust, goldenraintree, and green ash
        4. Some tree species are messy in terms of fruit, twig, or exfoliating bark that drop to the ground. The mess on the ground can be unsightly and labor may be required for clean up.
        5. Life expectancy might be important. Some trees live for hundreds of years, while others are much shorter lived. Generally speaking short-lived trees are faster growing and have weaker wood than the older lived species.
(PowerPoint Slide #20)
        6. Resistance to problems associated with pests and disease organisms is considered an attribute. Selection of trees resistant to such problems translates into healthy trees that require less care.
        7. Trees may suffer from physiological disorders. Often these problems are soil related. Drainage factors of the soil or pH of the soil can cause physiological disease. For example pin oaks develop iron chlorosis or a yellowing of leaves when grown in alkaline soils. The pH of the soil restricts the absorption of iron.
        8. Safety is a consideration in urban areas. Tree species with thorns might need to be avoided.
(PowerPoint Slide #21)
        9. A root system that grows near the soil surface is characteristic of some trees. The roots can interfere with turf grass.
        10. Trees that cast heavy shade inhibit grass growth. If grass growth is desired, select trees, such as, the honeylocust, that allow light to reach the ground.

** Assign Lab Sheet LS: E2-1, Selecting Trees to strengthen student understanding of the material. Use whatever resources available in order for students to complete this lab. Discuss the results of the lab sheet with the entire class.

Review/Summary: At the conclusion of the lesson review the learning objectives with the
students. Summarize the material that has been covered during the class discussions, supervised study, and other learning experiences. Review the terms and definitions of the terms. Have the students explain the concepts associated with each objective. Use their responses as the basis for

determining any areas that need additional review. Questions on PowerPoint Slide #22 can be used as a review.)

Application: Application can involve one or more of the following student activities using attached lab sheets: LS: E2-1—Selecting Trees

Evaluation: Evaluation should focus on student achievement of the objectives for the lesson. Various techniques can be used, such as student performance on the application activities. A sample written test is attached. Test questions found in the recommended resource materials might also be applicable.

Answers to Sample Test:
Part One: Matching
1. d
2. c
3. j
4. i
5. e
6. f
7. h
8. g
9. a
10.b

Part Two: Completion
1. Shade trees
2. lower case
3. Latinized or botanical
4. Hardiness Zone Map
5. pests and disease organisms
6. capitalized
7. pH
8. Subsoil is brought to the surface, drainage patterns changed, soil compacted
9. inhibit

Part Three: Short Answer
1. hardiness, heat tolerance, pollution tolerance, soil tolerance, salt tolerance, messiness, life expectancy, pest and disease resistance, lack of physiological problems, safety (such as thorns), surface roots, shade cast.

2. *Cornus florida* 'Cherokee Chief' is a cultivar name and *Cornus florida rubra* is a variety name.

Sample Test   Name_____

_____

Test
_____

Unit E Lesson 2: Selecting Trees for Urban Growing Conditions

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

a. Cultivar   e. Multi-stem trees   i. Tree
b. Deciduous   f. Ornamental trees   j. Variety
c. Genus   g. Evergreen
d. Hardiness   h. Species

_____ 1. A term that refers to the ability of a plant to withstand cold temperatures.
_____ 2. A closely related group of plants comprised of one or more species.
_____ 3. A group of plants within a species that has a significant difference from other plants in the
              species and the traits pass on to the next generation through sexual reproduction.
_____ 4. A single-stem, woody, perennial plant reaching the height of 3.6 meters or more.
_____ 5. Trees grown with more than one trunk.
_____ 6. Trees with aesthetic value in terms of flowers, fruit, fall color, growth habit, bark, etc.
_____ 7. Composed of plants that show characteristics that distinguish them from other groups in
              the genus.
_____ 8. Trees that maintain green leaves throughout the year.
_____ 9. A tree with a distinguishing characteristic that does not transfer to the offspring through
              sexual reproduction.
_____ 10. Trees that drop their leaves in the fall.

Part Two: Completion
Instructions. Provide the word or words to complete the following statements.

1. _____ are large trees with spreading canopies.

2. The species is written with _____letters.

3. All cultivated trees have common and _____names.

4. The _____is useful in deciding what trees survive cold
temperatures in a particular region in Afghanistan

5. Resistance to problems associated with _____is considered an
attribute.

6. The genus is always_____.

7. Drainage factors of the soil or _____ of the soil can cause physiological disease.

8. The soils in urban areas are usually altered in that _____,
_____, and _____.

9. Trees that cast heavy shade _____ grass growth.

Part Three: Short Answer
Instructions. Provide information to answer the following questions.

1. List 12 considerations in selection trees for the urban forest.

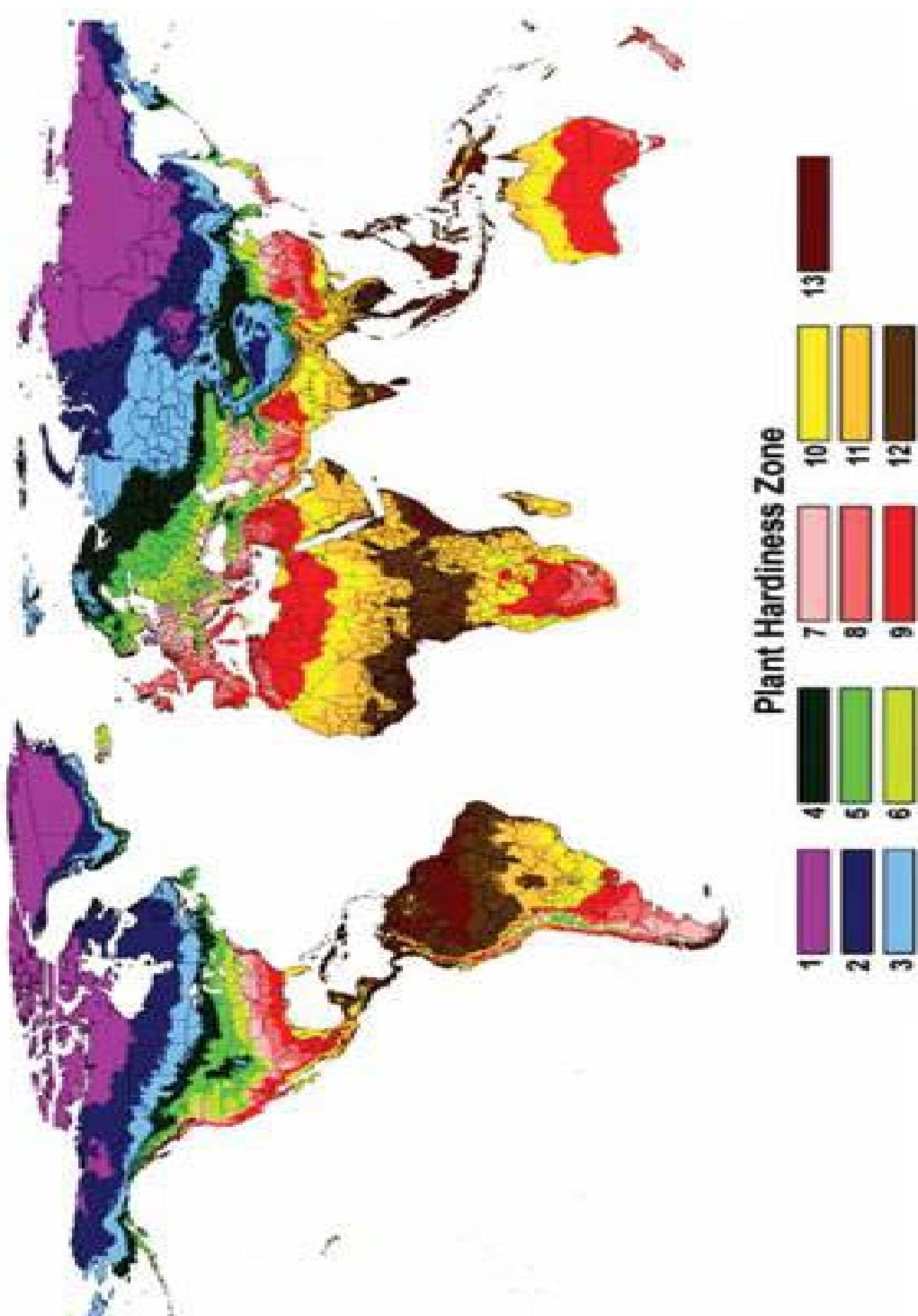2. How do the botanical names *Cornus florida* 'Cherokee Chief' and *Cornus florida rubra* differ.

TM: E2-1

LATIN NAMES

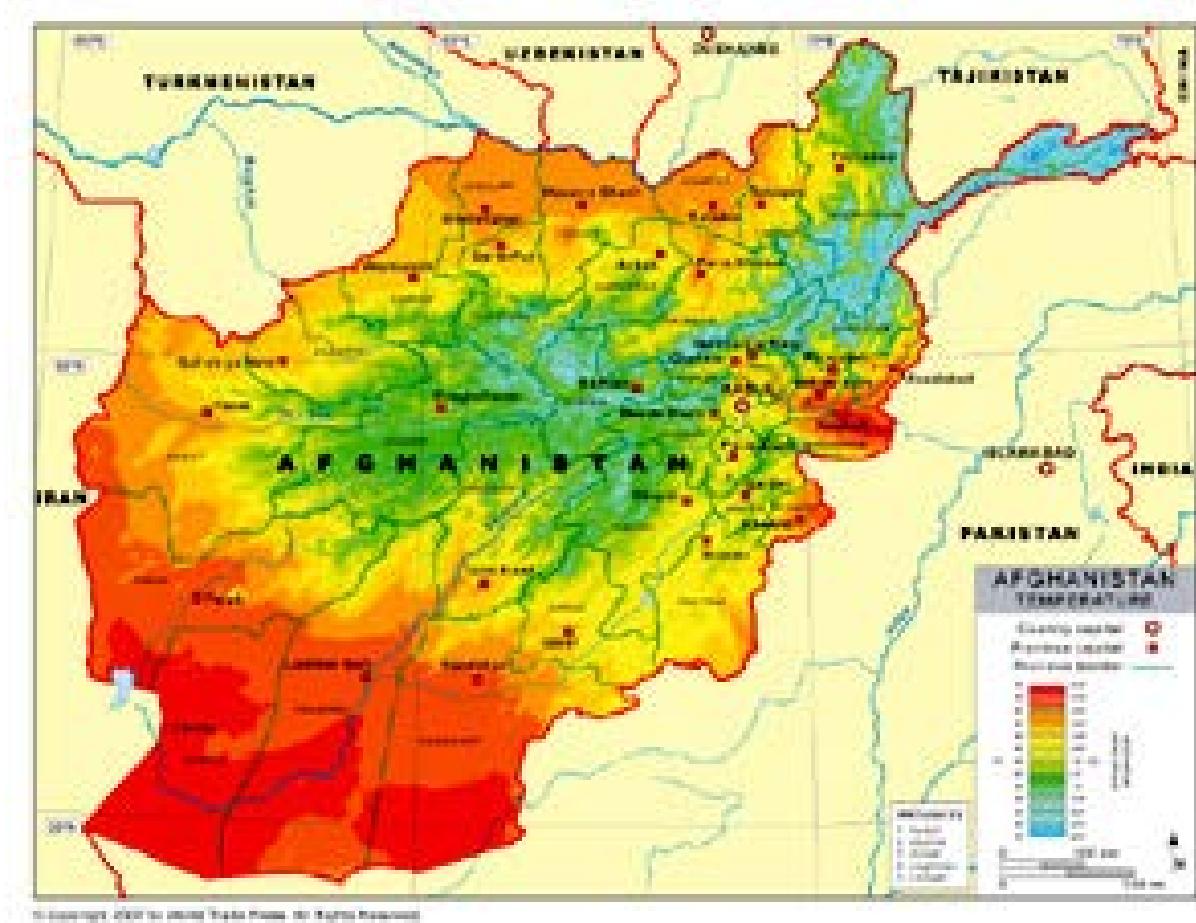## Acer rubrum var. columnar
Genus species variety

Acer rubrum 'Red Sunset'
Genus species Cultivar

Plant Hardiness Zone

Heat Zones in Afghanistan

Name_____

Lab Sheet

SELECTING TREES

Objective:
Students will select trees for their region using various resources.

Materials:
- Various resource materials if available—
- arboretum publications
- botanic garden publications
- Introduction to Landscaping: Design, Construction, and Maintenance
- Websites

Procedure:
Complete the following using resource materials available.

1. Identify five shade trees for the urban environment.

2. Identify five ornamental trees for the urban environment.

3. Identify three trees for the urban environment that are tolerant of air pollution.

4. Identify three trees for the urban environment that are tolerant of poor soils.

5. Identify three trees for the urban environment that are tolerant of salt.

6. Identify three trees for the urban environment that are free of pests and disease.

7. Identify three trees for the urban environment that are free of physiological disease.

8. Identify three trees that tend to be messy.

9. Identify three trees that tolerate wet soils.

10. Identify three trees that are drought tolerant.