Lesson B5–2

Selecting Trees for Urban Growing Conditions

Unit B. Plant Wildlife Management

Problem Area 5. Urban Forestry

Lesson 2. Selecting Trees for Urban Growing Conditions

New Mexico Content Standard:

Pathway Strand: Natural Resources and Environmental Systems

Standard: **III:** Apply scientific principles to natural resource management activities.

Benchmark: **III-B:** Examine biological and physical characteristics to identify and classify natural resources.

Performance Standard: **1.** Identify tree species and other woody vegetation.

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.

List of Resources. The following resources may be useful in teaching this lesson:

Recommended Resources. One of the following resources should be selected to accompany the lesson:

Biondo, Ronald J. and Charles B. Schroeder. *Introduction to Landscaping:- Design, Construction, and Maintenance*, 3 rd Edition. Upper Saddle River, New Jersey: Prentice Hall Interstate, 2003 (Textbook, Chapter 7).

Burton, L. DeVere. *Introduction to Forestry Science,* Albany, New York: Delmar Publishers, 2000 (Textbook, Chapter 16).

Other Resources. The following resources will be useful to students and teachers:

International Society of Arboriculture, Post Office Box 3129, Champaign, IL 61826-3129, (217) 355-9411, FAX (217) 355-9516, www.isa-arbor.com

List of Equipment, Tools, Supplies, and Facilities

Writing surface
Overhead projector
Transparencies from attached masters
Copies of student lab sheets

Terms. The following terms are presented in this lesson (shown in bold italics):

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

Anticipated Problem: What are the types of trees available?

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 12' 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 12' in height, but are still considered trees. Some trees have limbs to the ground, such as beech, fir, and pine.

B. 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. 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.
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.
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. 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'

C. Function is often an important consideration in tree selection. Some trees are ***deciduous***, meaning they drop their leaves in the fall. Some trees are referred to as ***evergreen***. They maintain green leaves throughout the year. The situation may call for deciduous of evergreen species. ***Shade trees*** are large trees with spreading canopies. ***Ornamental trees*** have aesthetic value in terms of flowers, fruit, fall color, growth habit, bark, etc. Ornamental trees are smaller in size.

Use an interest approach to capture the attention of the students. Following the interest approach prepare the students by clearly stating the objectives of this lesson and terms to be defined. Assign appropriate selections from the recommended text materials for the students to read. They should note key points presented in the text. Obtain a PowerPoint presentation or build a PowerPoint presentation to be used as a guide for lecture-discussion. Utilize the text and transparency master TM: B5–2A in 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.

Anticipated Problem: How does climate influence tree selection?

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. The ***USDA Plant Hardiness Zone Map*** is useful in deciding what trees survive in a particular region in the United States. A zone 5 tree species is known to withstand temperatures as cold as –20 to –10 F. The same tree species would either suffer or die in the next coldest zone.

B. Heat Tolerance has received increased attention in recent years. The American Horticultural Society has developed a ***Plant Heat-Zone Map*** showing 12 zones in the United States. The number of days in which the temperature exceeds 86 F is given for each zone. 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.

Prepare the students by having them read related sections of text materials identified in the resources list. Require students to take notes on the major points presented in the chapter. Follow the reading session with a discussion on climate and tree selection. Use transparency masters TM: B5–2B and TM: B5–2C to illustrate points. Have the students expand their notes based on the discussion. The discussion can also serve as a way to monitor students' mastery of the material

Objective 3: Identify factors in selecting trees for the urban environment.

Anticipated Problem: What are some factors to consider in selecting trees for the urban environment?

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.
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.
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.
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.

Have the students read related sections of text materials identified in the resources list. Require students to take notes on the major points presented in the chapter. Follow the reading session with a discussion on growing tree characteristics to consider in the tree selection process. Assign Lab Sheet LS: B5–2A, Selecting Trees to strengthen student understanding of the material. 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 at the end of the chapters in the textbooks may also be used in the review/summary.

Application. Application can involve one or more of the following student activities using attached lab sheets:

LS: B5–2A—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. USDA Plant Hardiness Zone Map
5. pests and disease organisms
6. capitalized
7. Plant Heat-Zone Map
8. pH
9. Subsoil is brought to the surface, drainage patterns changed, soil compacted
10. 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

Lesson B5–2: 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
b. Deciduous
c. Genus
d. Hardiness
e. Multi-stem trees
f. Ornamental trees
g. Evergreen
h. Species
i. Tree
j. Variety

_____ 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 12' 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 the United States.
5. Resistance to problems associated with _____is considered an attribute.
6. The genus is always_____.
7. A _____showing 12 zones in the United States and indicates the number of days in which the temperature exceeds 86 F for each zone.
8. Drainage factors of the soil or _____ of the soil can cause physiological disease.
9. The soils in urban areas are usually altered in that _____, _____, and _____.
10. 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: B5–2A

LATIN NAMES

Acer rubrum var. columnar

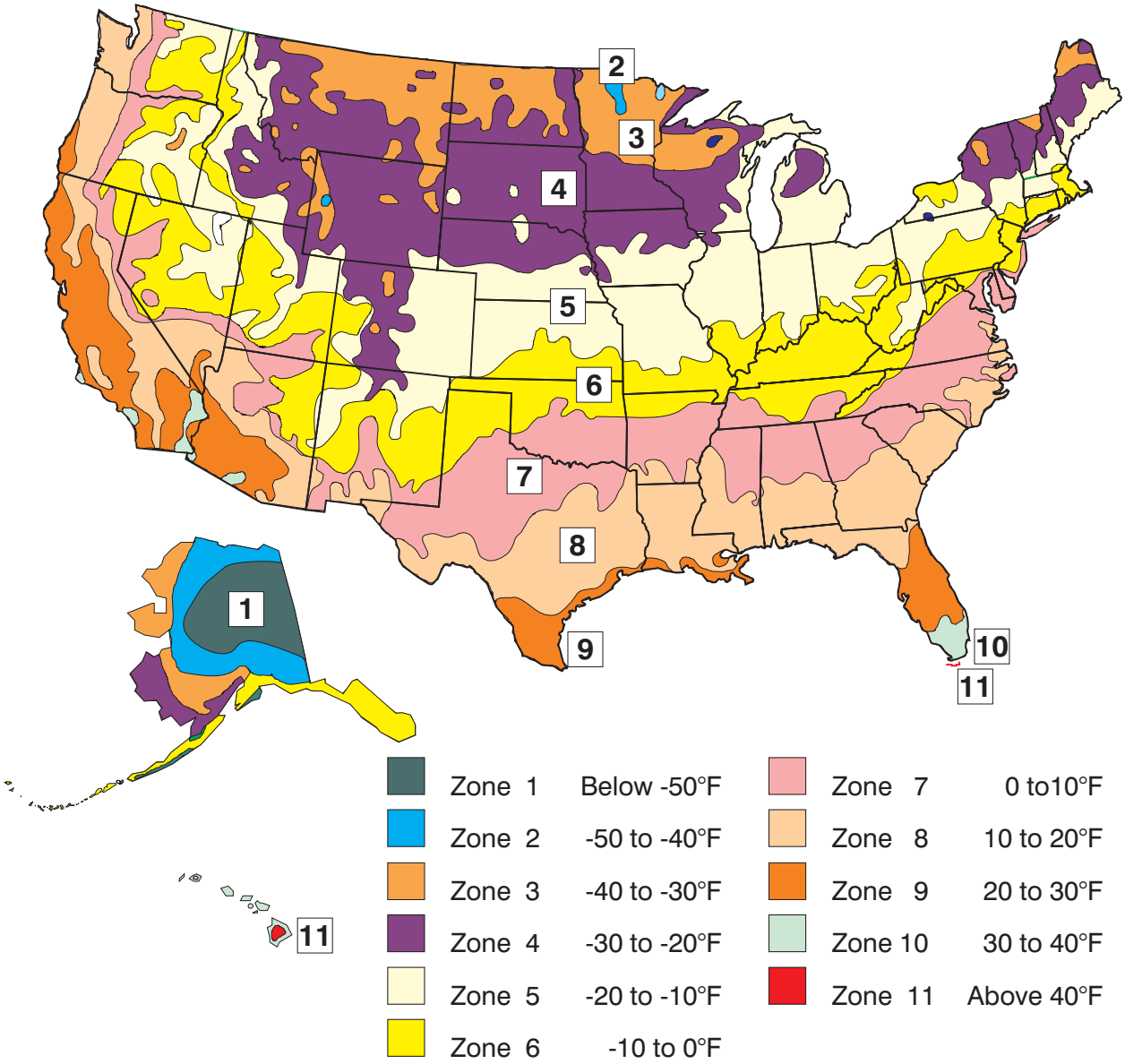
Genus species variety

Acer rubrum ‘Red Sunset’

Genus species Cultivar

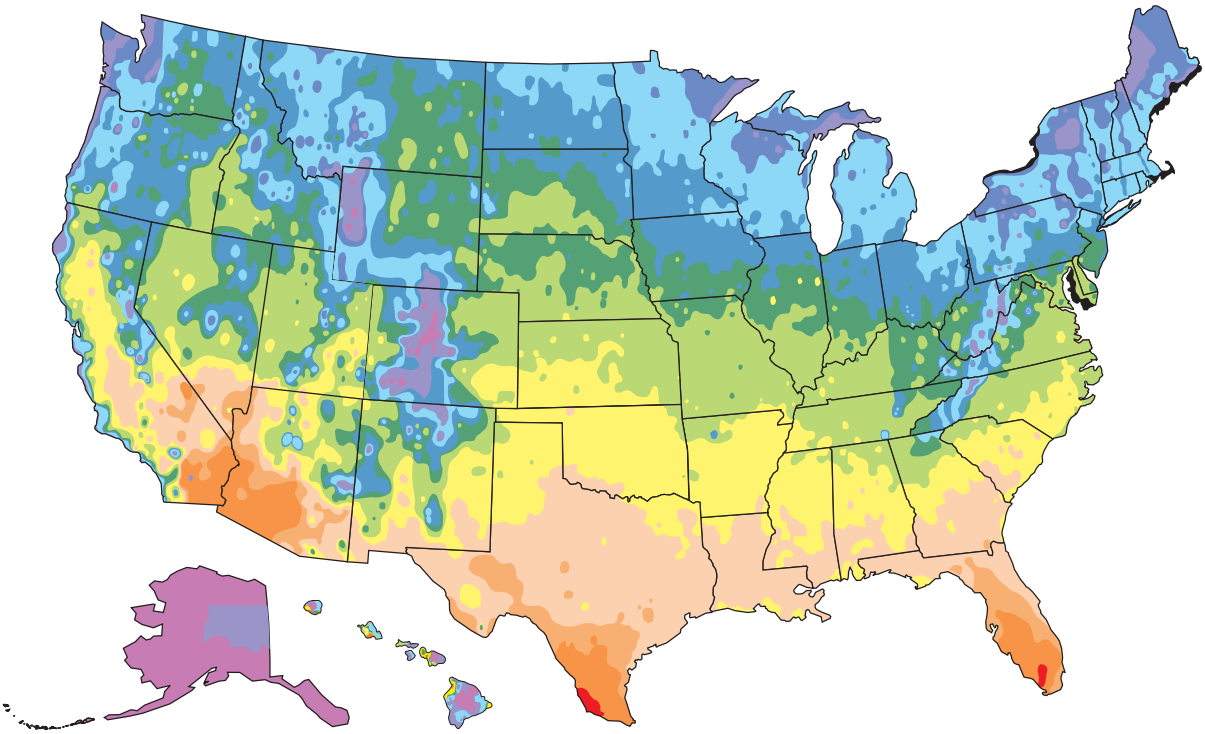
TM: B5–2B

PLANT HARDINESS ZONE MAP



TM: B5–2C

PLANT HEAT-ZONE MAP



Days Above 86°			Zone	Days Above 86°			Zone	Days Above 86°			Zone
Fewer than 1			1	30	to	45	5	120	to	150	9
1	to	7	2	45	to	60	6	150	to	180	10
7	to	14	3	60	to	90	7	180	to	210	11
14	to	30	4	90	to	120	8	More than		210	12

LS: B5–2A Name _____

Lab Sheet

SELECTING TREES

Objective:

Students will select trees for their region using various resources.

Materials:

Various resource materials—
university extension materials
arboretum publications
botanic garden publications
M. A. Dirr's Manual of Woody Landscape Plants
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.