

Lesson B3–6

Examining Reforestation Practices

Unit B. Plant Wildlife Management

Problem Area 3. Forest Management

Lesson 6. Examining Reforestation Practices

New Mexico Content Standard:

Pathway Strand: Natural Resources and Environmental Systems

Standard: IV: Employ knowledge of natural resource industries to describe production practices and processing procedures.

Benchmark: IV-A: Prepare presentations to describe how natural resource products are produced, harvested, processed and used.

Performance Standard: 1. Describe forest harvest techniques and procedures.

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

1. Identify methods of reforestation.
2. Identify sources of tree seedlings.
3. Explain tree planting guidelines.
4. Explain how to care for and plant a seedling.

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:

Rolfe, Gary L., Edgington, John M., Holland, I, Irving, and Fortenberry, Gayle C. *Forests and Forestry*. Upper Saddle River, New Jersey: Prentice Hall Interstate, 2003. (Textbook Chapter 6)

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

Camp, William G. and Thomas B. Daugherty. *Managing Our Natural Resources*. 4th Edition. Albany, New York: Delmar, 2002. (Chapter 19)

List of Equipment, Tools, Supplies, and Facilities

Writing surface
Overhead projector
Transparencies from attached masters
Seedlings
Planting bars

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

Cuttings
Direct seeding
Heel-in
Planting bar (dibble)
Wild seedlings

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.

Hold up a tree planting bar to the class. Ask students to identify the tool. Once the correct answer is given, ask students to identify what they think are the important factors to consider when planting forest trees.

Summary of Content and Teaching Strategies

Objective 1: Identify methods of reforestation.

Anticipated Problem: How is reforestation accomplished?

- I. The majority of forest owners rely on natural regeneration to restore most stands after logging. However, in some instances human intervention is necessary. In these cases, foresters artificially reforest an area. Some methods by which this accomplished are:
 - A. Wild seedlings—**Wild seedlings** are those growing in the woods in a natural state. For all practical purposes, digging up and transplanting of such seedlings for reforestation purposes should be avoided. Such practice is uneconomical and inefficient.
 - B. Direct seeding—Sowing repellent-coated seeds on an area where trees are desired is known as **direct seeding**. This method can be effectively and successfully employed under proper conditions. Large areas can be directly seeded by hand, airplane, cyclone seeder, or grain drill. Also, the cost of establishing a stand by this method is usually less than the cost of planting tree seedlings. Some factors that affect the success of direct seeding are:
 1. Vegetative cover—Heavy vegetative cover can prevent seed from reaching the soil and interferes with germination. A prescribed burn can be used prior to seeding to remove such cover in the desired area.
 2. Soil moisture—Soil moisture affects germination of seed and growth of seedlings. An insufficient amount of moisture following direct seeding will result in a low germination rate and/or a high mortality rate of seedlings.
 3. Birds and rodents—Birds and rodents consume seed for food. Therefore, seed should be treated with a bird and rodent repellent before being broadcasted.
 - C. Cuttings—Some species of trees can be reproduced from cuttings. **Cuttings** are pieces of branches, usually 8 to 12 inches in length, cut from a tree. Examples of species that can reproduce via this method are willow, cottonwood, and several conifers.
 - D. Nursery seedlings—The planting of nursery-grown seedlings will increase the probability of establishing a good stand. Nursery seedlings are usually planted barerooted because of the ease of transporting and handling seedlings with this method.
 - E. Containerized seedlings—Using containerized seedlings for reforestation is becoming increasingly accepted. In this method, seeds are germinated in small pots of soil or other growing medium. After 8 to 32 weeks, the seedlings are planted without disturbing their roots.
 1. Advantages of this method are:
 - a. Improved rates of survival and growth of seedlings
 - b. Difficult species are more readily produced
 - c. The planting season can be extended.
 2. Disadvantages of this method are:

1. Cost. Containerized seedlings often cost at least twice as much as bareroot stock.
2. Seedlings are bulky, making them more difficult to handle and transport.
3. Requires more site preparation than direct seeding

There are many techniques that can be used to assist students in mastering this material. Students need text material to aid in understanding the methods of reforestation. Chapter 6 in Forests and Forestry is recommended.

Objective 2: Identify sources of tree seedlings.

Anticipated Problem: Where can I get tree seedlings?

- II. Forest land owners interested in securing seedlings for reforestation or windbreaks should request an application from the state department of natural resources. Seedlings for ornamental purpose are not usually sold by state agencies. In some instances, landowners may qualify for a small number of free seedlings from the state. Additional seedlings may be purchased if desired.

There are many techniques that can be used to assist students in mastering this material. Students need text material to aid in identifying sources of tree seedlings. Chapter 6 in Forests and Forestry is recommended.

Objective 3: Explain tree planting guidelines.

Anticipated Problem: What factors should be considered when planting trees for reforestation?

- III. A number of key factors should be considered when planning to reforest an area. They are:
 - A. Estimating needs—It is important to order the proper species and number of seedlings required for the area to be reforested. It is suggested that landowners consult the state forestry agency or extension forester for advice on selecting the best species for the site. If an open area is to be reforested, the following guide gives the number of seedlings per acre, depending on spacing used:
 1. 6 feet × 8 feet: 908 seedlings
 2. 6 feet × 10 feet: 726 seedlings
 3. 8 feet × 8 feet: 680 seedlings
 4. 8 feet × 10 feet: 544 seedlings
 5. 10 feet × 10 feet: 436 seedlings
 - B. Areas in need of planting—The area that will be planted during the reforestation process should be considered in selecting the species to be planted. Some possible locations are:
 1. Cleared or abandoned farmlands
 2. Non restocking forest land
 3. Openings in forest stands

4. Watershed protection areas
5. Windbreaks

There are many techniques that can be used to assist students in mastering this material. Students need text material to aid in understanding the tree planting guidelines. Chapter 6 in Forests and Forestry is recommended. Use TM: B3–6A to aid in the discussion on this topic.

Objective 4: Explain how to properly plant a seedling.

Anticipated Problem: How do I properly plant a tree seedling?

IV. There are several steps to follow to properly plant a tree seedling.

- A. Before planting, seedlings may be stacked in layers 8 to 10 deep for temporary storage without any adverse effects. It is important however to plant the seedlings as soon as possible after receiving them from the nursery. To **heel-in** seedlings means to store the young trees prior to planting by placing them in a trench and covering their roots with soil. In this process, seedlings are placed in a V-shaped heel-in trench and allowed to lean parallel to one side of the trench. The roots must be fully extended to the bottom of the trench. A seedling with curled roots will be difficult to plant correctly later. After placing the seedling in the trench, fill it three-fourths full with soil. The soil is then packed around the roots and then the rest of the trench is filled with soil. The soil is then covered with leaves to conserve soil moisture.
- B. The site in which the seedlings will be planted must be prepared by removing any excess vegetative cover. This may be accomplished through prescribed burning, bulldozers, brush cutters, or plows.
- C. Spacing of trees depends on the owner's objective. In pine trees, a spacing of 6 × 8 feet or 8 × 8 feet favors maximum cubic foot volume growth. A spacing of 12 feet between rows is sometimes used to allow the passage of vehicles and equipment. Wide spacing, such as 10 × 10 feet or 12 × 12 feet, often allows trees to grow to large diameters in a relatively short time.
- D. There are a variety of procedures that can be used to plant seedlings. As a rule, only about 75 to 80 percent of all properly planted seedlings will survive. Some of the procedures are:
 1. Hand planting—The **planting bar (dibble)** is a metal tool used to make a hole in the soil and is one of the best tools for planting seedlings by hand. The planting bar has four parts: handle, shaft, blade, and foot step. The wedge-shaped steel blade is usually 8 to 10 inches long and about 3 inches wide, tapering to a sharp edge at the base.
 2. Machine planting—As expected, machine planting is much faster than hand planting. A two-person crew can set out 7,000 to 10,000 seedlings a day on suitable sites.

There are many techniques that can be used to assist students in mastering this material. Students need text material to aid in understanding how to properly plant a seedling. Chapter 6 in Forests and Forestry is recommended. Use TM: B2–6B, TM: B2–6C, and TM: B2–6D to aid in the discussion on this topic.

Review/Summary. Use the student learning objectives to summarize the lesson. Have students explain the content associated with each objective. Student responses can be used in determining which objectives need to be reviewed or taught from a different angle. Questions at end of chapters in the textbook may also be used in the review/summary.

Application. Contact your local forester or Soil and Water Conservation office to obtain some seedlings to plant on your school grounds.

Evaluation. Use the following sample test to evaluate the students' comprehension of the material covered in this lesson.

Answers to Sample Test:

Part One: Matching

1 = a, 2 = c, 3 = e, 4 = d, 5 = b

Part Two: Completion

1. transporting; handling
2. objective
3. 75; 80

Part Three: Short Answer

1. See Objective 1 for scoring this question.
2. See Objective 4 for scoring this question.

Test

Lesson B3–6: Examining Reforestation Practices

Part One: Matching

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

- | | | |
|-------------|-------------------|--------------------------|
| a. Heel-in | c. Wild seedlings | e. Planting bar (dibble) |
| b. Cuttings | d. Direct seeding | |

- _____ 1. Storing the young trees prior to planting by placing them in a trench and covering their roots with soil.
- _____ 2. Seedlings that are growing in the woods in a natural state
- _____ 3. A metal tool used to make a hole in the soil and is one of the best tools for planting seedlings by hand.
- _____ 4. Sowing repellent-coated seeds on an area where trees are desired
- _____ 5. Pieces of branches, usually 8 to 12 inches in length, cut from a tree used in reproduction.

Part Two: Completion

Instructions. Provide the word or words to complete the following statements.

1. Nursery seedlings are usually planted barerooted because of the ease of _____ and _____ seedlings.
2. Spacing of trees depends on the owner's _____.
3. As a rule, only about ____ to _____ percent of all properly planted seedlings will survive.

Part Three: Short Answer

Instructions. Provide information to answer the following questions.

1. List the advantages of reforestation with containerized seedlings.

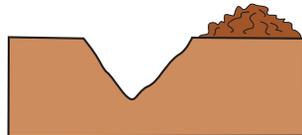
2. Describe the purpose and process of heeling-in seedlings.

SEEDLINGS PER ACRE BASED ON SPACING USED

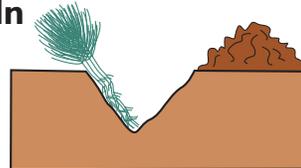
- ◆ **6 feet × 8 feet: 908 seedlings**
- ◆ **6 feet × 10 feet: 726 seedlings**
- ◆ **8 feet × 8 feet: 680 seedlings**
- ◆ **8 feet × 10 feet: 544 seedlings**
- ◆ **10 feet × 10 feet: 436 seedlings**

HEELING-IN AND PLANTING PINE SEEDLINGS

Heeling-In



1. Dig V-shaped trench in moist, shady place.



2. Break bundles and spread out evenly.



3. Fill the trench $\frac{3}{4}$ full of loose soil, and water well.



4. Complete filling in soil and firm with feet. Water again.

Handling Seedlings in Field



Correct

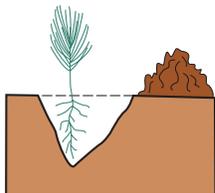
In bucket, with sufficient wet moss to cover roots.



Incorrect

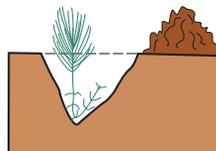
In hand. Roots dry out.

Correct and Incorrect Depths



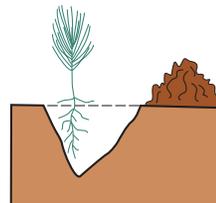
Correct

At same depth or $\frac{1}{2}$ " deeper than seedling grew in nursery.



Incorrect

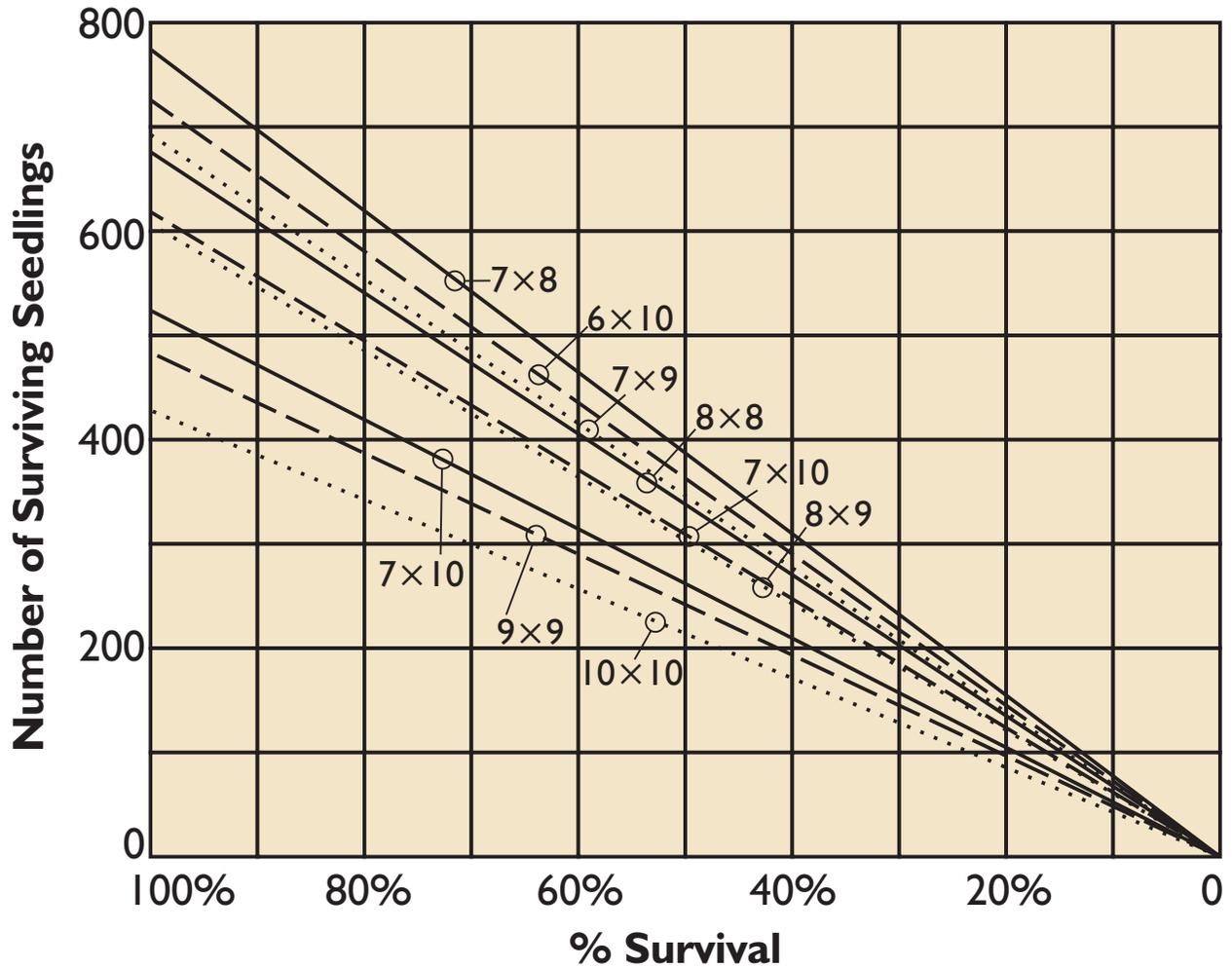
Too deep; roots bent.



Incorrect

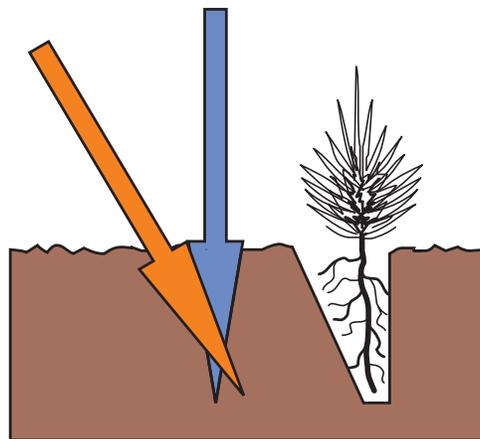
Too shallow; roots exposed.

PLANTING PROCEDURE

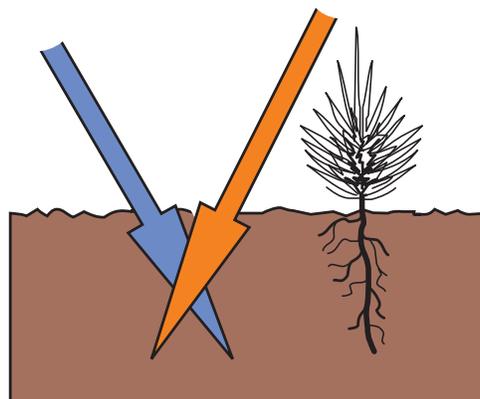


(Courtesy, USDA Forest Service)

PROPER USE OF A PLANTING BAR



Pull handle of planting bar toward planter to firm soil around root end.



Push handle of planting bar away from planter to firm soil around root top.