



# CENTRAL HARDWOOD NOTES

## Seeding And Planting Hardwoods

### Objectives of Hardwood Planting

Objectives of forest plantings can include one or more of the following:

1. Produce high quality timber and improve stand composition
2. Improve wildlife habitat
3. Reforest land not suited for agriculture
4. Arrest soil and wind erosion
5. Enhance esthetics

### Site Evaluation and Species Selection

Site quality is the most important factor in establishing hardwood plantings. Hardwoods grow best on deep, fertile, moist, but well-drained soils. These areas usually occur where top soil has accumulated along streams, on lower north and east slopes, and in coves. However, stream bottoms that contain excessive amounts of gravel or chert are poor sites because they are droughty.

Hardwood survival and growth are affected by how well soil properties and other site factors such as aspect and topography match the requirements for the desired tree species. Large planting sites usually embrace a range of site conditions and may require you to plant more than one species. In the past, most hardwood plantings failed because the soil was too thin, too tight, too coarse, or the competition too intense. Many sites will simply not support the species you want to plant. Do not waste time and money. Get help from local or regional experts on site evaluation and species choices.

### Seeds or Seedlings?

Nursery-grown seedlings are usually better for regenerating a stand than direct seeding. The advantages of seedlings over seed include (1) a more uniform spacing for future maintenance, (2) ability to use pre-emergent herbicides for weed control, and (3) less site preparation.

The advantages of direct seeding include (1) development of undamaged roots and tops, (2) ease of handling and transporting seeds, and (3) lower costs. The major disadvantage of direct seeding is uncertain success due to poor germination and seed pilferage by rodents. Plant seed just before or during germination in the spring when other food is available, maintain exposed areas around the planting, and trap seed eaters to minimize seed pilferage. Do not use pre-emergent herbicides when direct seeding.

### **Collecting and Storing Seed**

Collect seed from trees located near the planting site or no more than 200 miles south of the planting site. Collect only from the best formed and most vigorous trees growing in open stands; avoid isolated trees and trees with poor seed crops (see Note 2.02 Genetic *Principles*). In most cases, you should immediately air dry seeds in shallow layers to avoid damage from molds or overheating. Black walnuts and acorns should be immediately planted or placed in cold, moist storage.

Most hardwood seeds exhibit some form of dormancy which must be overcome by stratifying overwinter under moist, cold storage (34 to 40°F) or in outdoor pits. For further information on seed collection, handling and storage by species consult *Seeds of Woody Plants in the United States* (see References).

### **Preparing Sites, Controlling Weeds, Protecting, and Fertilizing**

Site preparation is the second most important factor in establishing a hardwood planting. For best results, remove all vegetation from the planting site by plowing or tilling in the summer or fall before spring planting. If the planting site is a forest opening or is too steep or stoney to cultivate, control competing vegetation with herbicides. Consult your local extension forester, service forester, or county agent for specific recommendations and instructions when using herbicides. Read herbicide labels before purchase to be sure they are registered for the intended use and follow all precautions on the label.

Control competition for at least 2 years or until planted trees are at least 1 foot taller than competing vegetation. To reduce rodent damage, keep weeds and mulches away from base of tree seedlings. Use fences to protect your trees from grazing and trampling by livestock. Cultivate firelanes as needed to keep them free of weeds and grasses. Periodically inspect seedlings for insect and disease damage and initiate corrective action if needed. Fertilization is generally not recommended during plantation establishment.

### **Spacing and Number of Seedlings Needed Per Acre**

Most hardwood plantings are spaced 8 to 12 feet between trees and 10 to 15 feet between rows. This allows farm equipment to mechanically control weeds and allows trees to reach about 5 inches d.b.h. before thinning. Keep trees at least 10 feet from fences and install 10-foot or wider firebreaks around and through your plantings.

To determine the number of seedlings to plant per acre, divide 43,560 by the product of the distance in feet between rows times the distance in feet between trees within rows.

## Obtain Quality Planting Stock

Order planting stock in the fall from state-operated or private nurseries for spring pick up or delivery. Obtain order forms from your local extension forester, state service forester, or county agent for seedlings from state-operated nurseries. Try to obtain seedlings from local seed sources or from proven seed sources. Pick seedlings up directly from nursery, if possible.

Hardwood seedlings are usually sold as 1-O stock (1 year from seed). Plant larger diameter seedlings with well-branched, fibrous root systems. The best stock will average one-fourth inch or more in diameter at the ground line. Premium stock for black walnut, yellow-poplar, and cottonwood will average one-third to one-half inch. Order extra seedlings and discard the smallest 10 to 20 percent plus any diseased or damaged seedlings.

## Care for Planting Stock

Plant seedlings as soon as possible after arrival. Protect stock from desiccation due to sun and wind during temporary storage and delivery to the planting site. Bundled seedlings that overheat or dry out cannot be revived by soaking in water. Seedlings can be held in their original wrappings up to a week if kept moist in an area protected from sun, wind, and freezing temperatures. Heel-in seedlings in a protected area, if they cannot be planted within a week. Dig a trench a little deeper than the root systems and spread roots against the back of the trench. Cover roots completely with soil, tamped to eliminate air spaces. Water as needed to keep roots moist but not wet.

## Planting Time

Plant seedlings in late winter or early spring after the frost is out of the ground and the soil is dry enough to work. Seedlings planted in late spring will survive but grow slowly. Seedlings may be fall planted south of 37° latitude north if soil moisture is adequate to initiate fall root growth. Hazards of fall planting include exposure to rodent damage and frost-heaving.

## Planting Methods

Use the hole method to plant containerized stock and seedlings having large spreading root systems (fig. 1). Use a shovel, mattock, or power-driven auger to dig a hole deep and wide enough to spread the root system in a natural manner. Roots should never be curled, bunched, or twisted. Plant seedlings about an inch deeper than they grew in the nursery. Firmly pack soil around the roots to eliminate air pockets. Do not plant when snow is on the ground. When using a power-driven auger, break up the compacted side walls before filling the hole.

Use the slit method to plant seedlings having a prominent taproot (fig. 2). Make a vertical slit in the soil with a planting bar, dibble, or tile spade, insert the taproot into the slit, and then close the slit taking care to remove air pockets. Properly planted seedlings should be very difficult to pull up. Use planting bars with a 1 0-inch-or-longer wedge-shaped steel blade. On taproot species, do not prune taproots shorter than 8 inches. Keep seedling roots moist during the planting operation. Survival and early growth may be enhanced by soaking the seedlings in water for 1 to 2 hours before planting and by planting on cool, cloudy days.

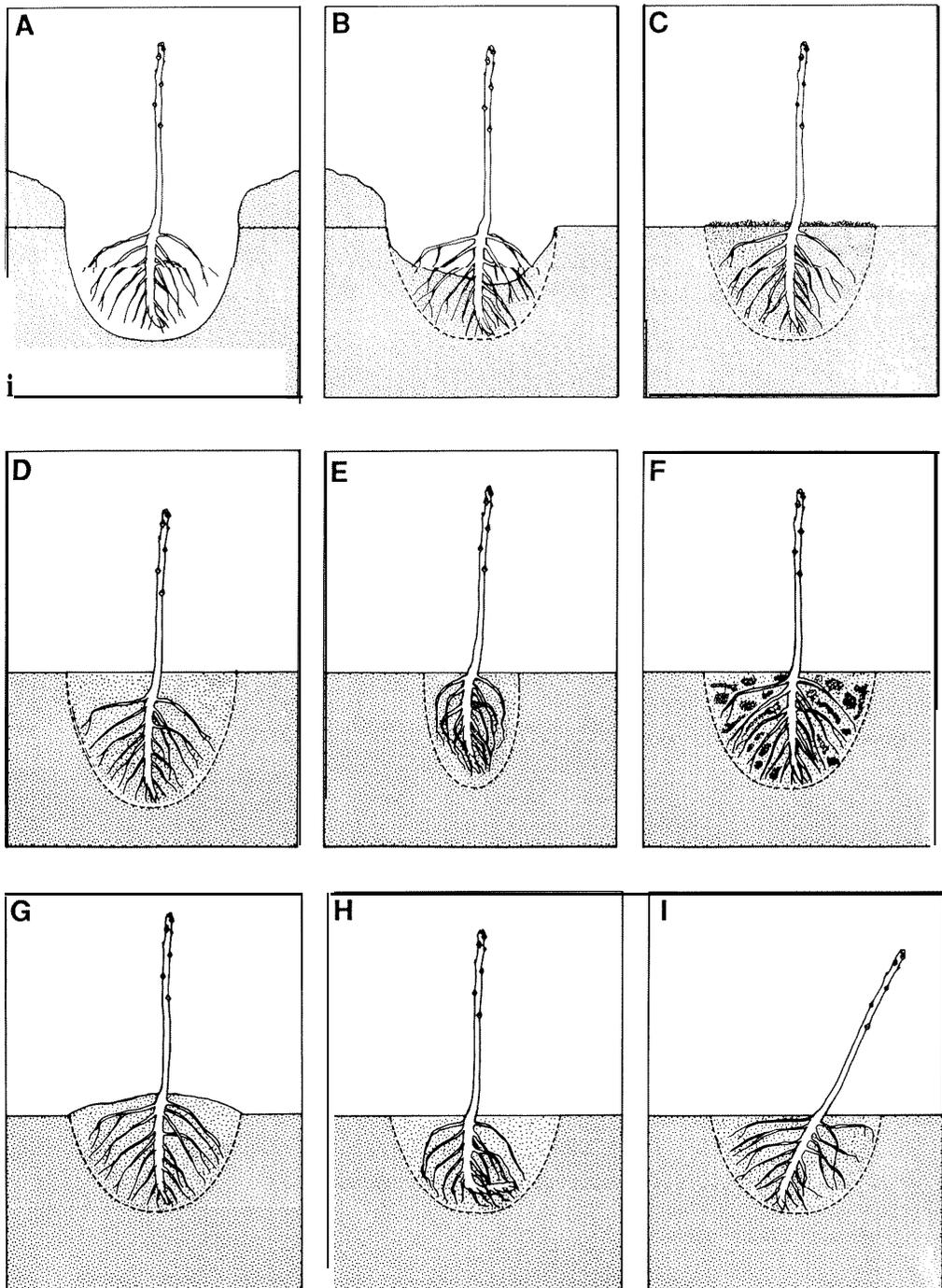


Figure 1 .-Hole planting

**PROPER PLANTING**

- A. Dig hole slightly larger than the roots spread out.
- B. Set seedling an inch deeper than in nursery. Partially fill hole and firm
- C. Fill hole, firm, and add loose soil as mulch.

**IMPROPER PLANTING**

- D. Hole too deep.
- E. Compacted roots, hole too narrow.
- F. Air pockets remain, organic debris in hole.
- G. Exposed roots, hole too shallow.
- H. "L"- or "J"-rooted, hole too shallow.
- I. Not vertical, hole too shallow.

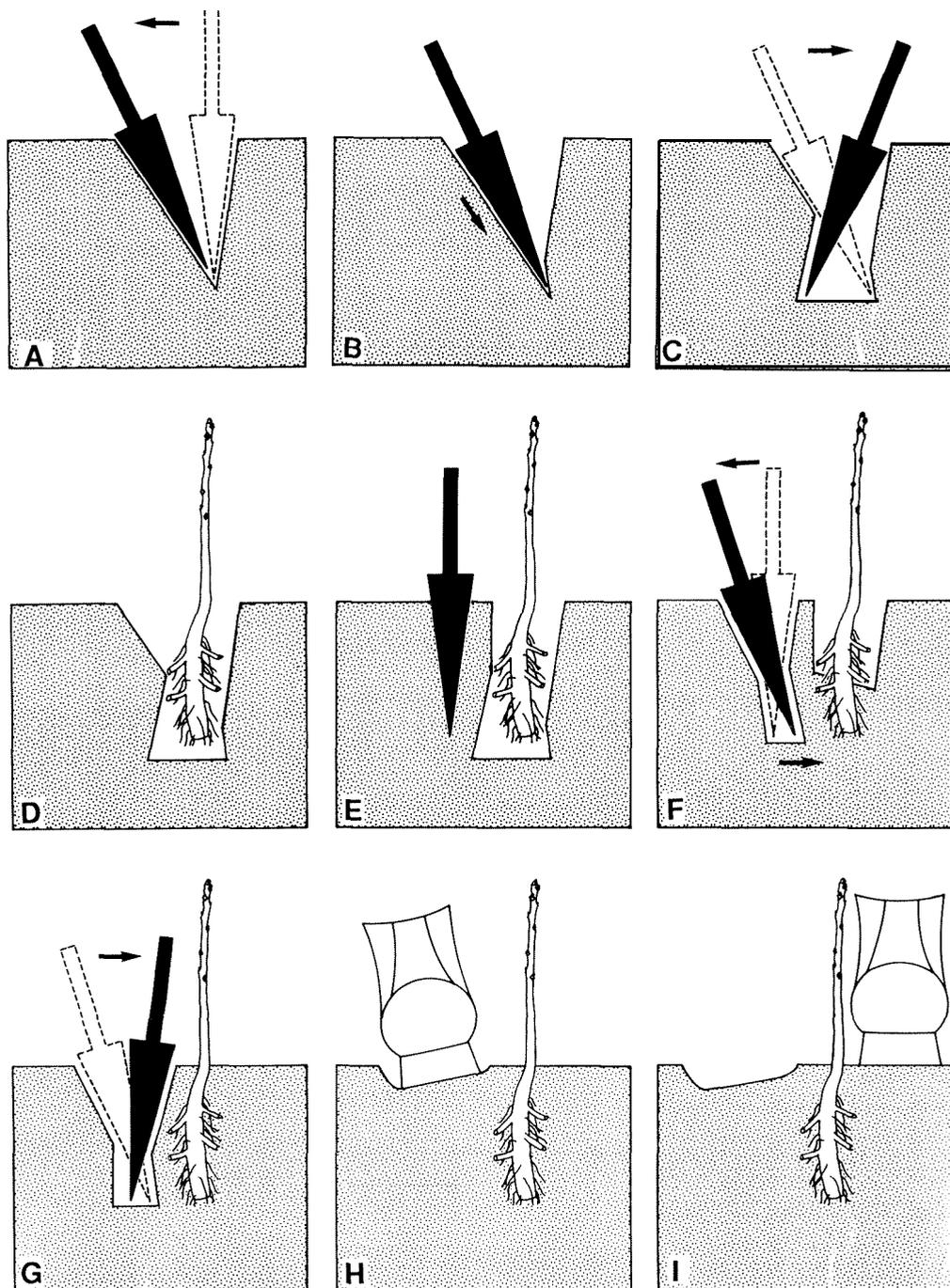


Figure 2.-Bar or tile spade planting.

- A. Insert bar straight down and pull backward.
- B. Push bar down at same angle to get a new bite.
- C. Push bar to vertical position.
- D. Remove bar and set seedling in hole at correct depth. (Root is schematically drawn. Prune taproots 8 to 10 inches long and lateral roots 3 inches long.)
- E. Insert bar about 2" behind first hole.
- F. Pull bar back to pack soil around lower roots.
- G. Push bar forward to pack soil around upper roots.
- H. Repeat steps E to G and close new hole with shoe heel.
- I. Firm soil around seedling with foot.

When planting 3,000 or more seedlings on relatively level areas (slopes less than 20 percent) that are free of stones, consider using a tractor-drawn tree planter. If you do, make sure you set the planting depth deep enough to prevent L-shaped roots along the bottom of the slit. Follow the planter to straighten seedlings and to be sure the soil is firm around each seedling.

Reference

Schopmeyer, C. S. 1974. Seeds of woody plants in the United States. Agric. Handb. 450. Washington, DC: U.S. Department of Agriculture, Forest Service. 883 p.

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