PRUDENTERRA

Forest Management

FOR STEWARDSHIP, PROFIT AND ENJOYMENT

prudenterra.com (515) 382-1239 fb.com/prudenterra

Concepts derived from the following sources:

USDA Forest Service
Lamson, Neil I.; Smith, H. Clay; Perkey, Arlyn W.; Brock, Samuel M. 1990. Crown release increases growth of crop trees. RP-NE-635.
https://www.fs.fed.us/ne/newtown_square/publications/old_publications/old-research-papers.shtml

Iowa State University Department of Natural Resource Ecology and Management
https://www.nrem.iastate.edu/

Iowa State University Forestry Extension
https://www.extension.iastate.edu/forestry/

Iowa Department of Natural Resources, Forestry Landowner Assistance
http://www.iowadnr.gov/Conservation/Forestry/Forestry-Landowner-Assistance

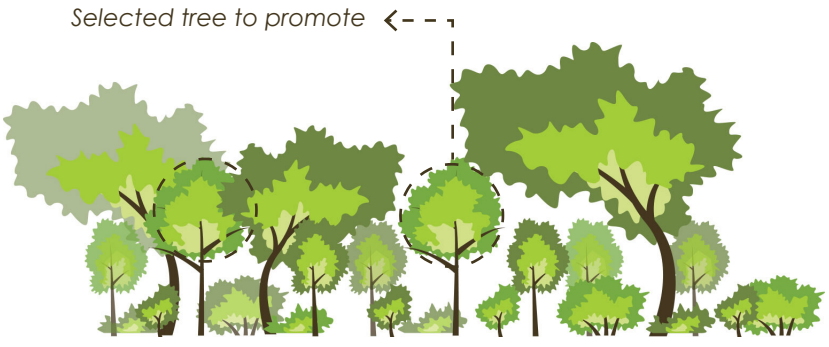
Graphics by Kim Corbin

Table of Contents

FOR STEWARDSHIP, PROFIT AND ENJOYMENT

Strategic Tree Selection

Before



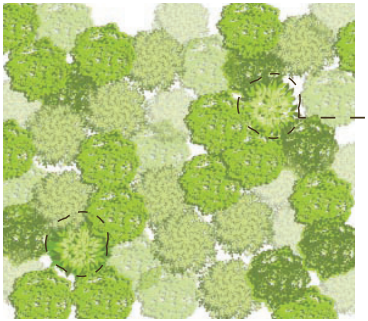
- Crowded canopies limit growth of the best trees and wildflowers in your woods.
- Promote trees that help accomplish your goals by removing trees that compete for sunlight and nutrients.
- 20-50 trees per acre are selected for promotion.
- Some landowners select for oak, walnut, and hickory, which are valuable timber species.

After

- Thinned woodlands make more sunlight available to selected trees, and increase their rate of growth.
- Oak trees require direct sunlight to regenerate.

Strategic Tree Selection

Before



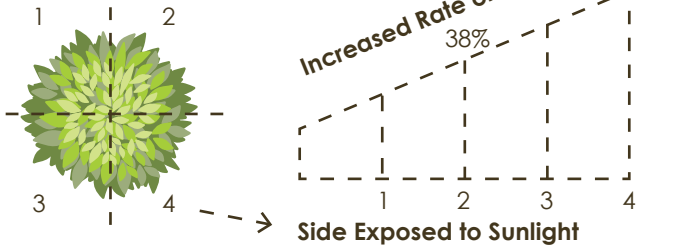
- Selected trees grow faster, and more wildflowers can thrive in the sunny understory of a thinned canopy.

Why Strategic Tree Selection?

- **Produce More Nuts**
  Walnut, oak, and hickory trees provide a critical source of food for wildlife. Thinning increases nut production 2-7x.
- **Double Rate of Growth**
  Thinning more than doubles the rate of growth of selected trees.
- **Higher Quality Timber**
  When all four sides of a tree are free to grow, they create more valuable, quality timber.

After

Free to Grow Rating



Strategic Tree Selection

Forestry Pays Long-term Dividends

Black Walnut
No Management

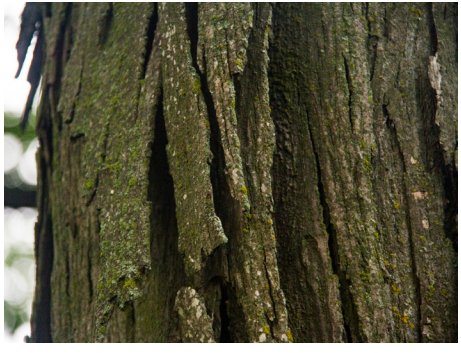
Age at Harvest:
125 yrs
Est. Tree Value:
$0-700

Black Walnut
With Management

Age at Harvest:
60 yr
Est. Tree Value:
$3,300-10,000

Common Iowa trees to select for:

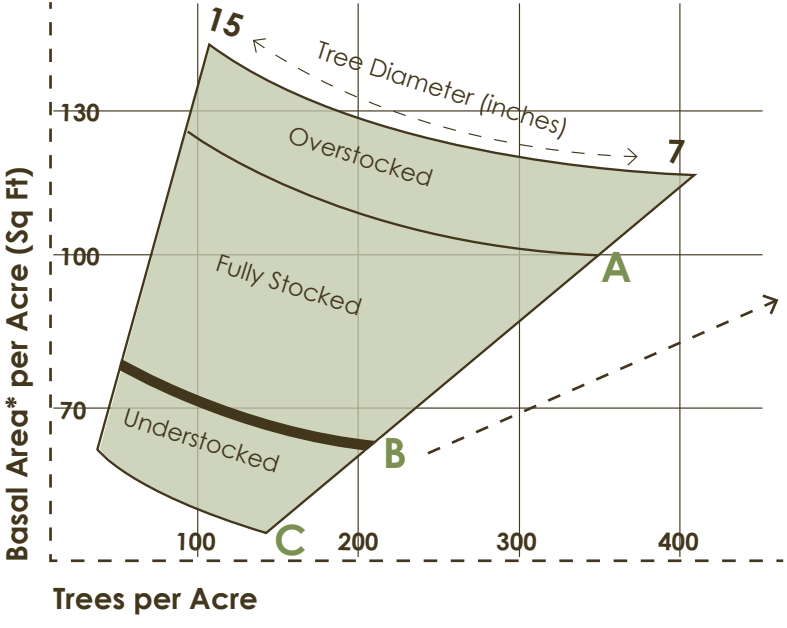
- **Black walnut:** Highest value tree for timber. Produces nuts that are an important food source for wildlife.
- **White oak:** Second most valuable tree for timber. Acorns are a preferred food source for wild turkeys and other wildlife.
- **Shagbark hickory:** Nuts are a premium source of food for wildlife. Bats make a home underneath the loosely hanging bark.



- **Basswood:** Soft, easily rotting wood makes this a great wildlife den tree. Its flowers provide forage for pollinators each spring.

Strategic Tree Selection

Growth Potential with Management



Trees grow most quickly when just fully stocked (the B line). The number of trees per acre and the diameter of the trees (measured in basal area*) determine whether a woodland is understocked, fully stocked, or overstocked.

- **A Line:** Slowest growth of trees, fewest seeds produced before being dangerous for tree health (overstocked).
- **B Line:** Fastest growth of timber, most abundant nuts produced, and most vigorous growth.
- **C Line:** Too few trees and of too small diameter to be a healthy forest.

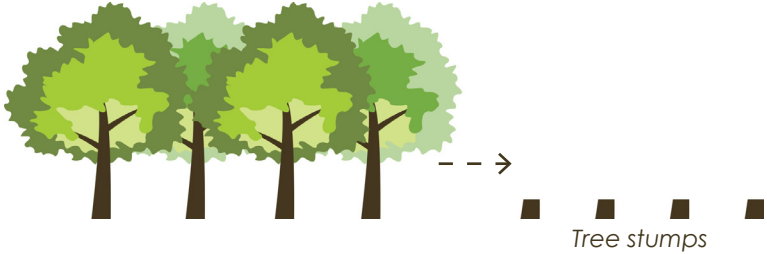
***Basal Area** - The area occupied by tree trunks. Measured by the cross-sectional area of each tree trunk at 4.5 feet above the ground.*

Graph adapted from Iowa Foresters' Handbook by the Iowa DNR.

Strategic Tree Selection

Clearcut

A group of evenly aged trees is harvested all at once.



- **Benefits:** After harvest, full sunlight enables oaks to germinate and thrive (when deer browse is managed).
- **Drawbacks:** The woodland disappears completely before it is regrown. Drastic and sudden change on the landscape.

Seed Tree

Mature, seed-producing trees are left standing where a harvest has taken place in order to produce seeds for regeneration.

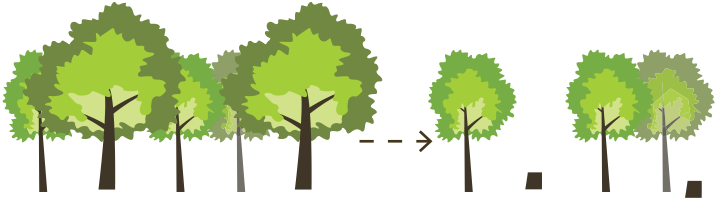
Commonly used with conifer trees.

- **Benefits:** Seeds are produced for successful regeneration of selected trees. Woodland animals continue to have some habitat and food after harvest takes place.
- **Drawbacks:** The forest mostly disappears for a time, which creates a sudden change on the landscape. Seed trees are susceptible to windthrow (being uprooted or damaged by the wind).

Strategic Tree Selection

Shelterwood

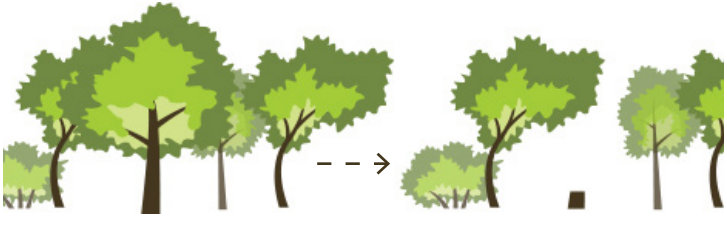
Where trees are more diversely aged, the mature ones are cut. Younger trees are left standing to continue to mature.



- **Benefits:** Forest is continually present on the landscape.
- **Drawbacks:** Favors trees that thrive in a shady understory. Management is needed to ensure regeneration of oaks, black walnut, and shagbark hickory.

Individual Tree Selection

Single trees of highest value are cut from a woodland, leaving less desirable species intact.



- **Benefits:** Less disturbance. Forest is continually present on the landscape. Wildlife continue to have shelter in the woodland.
- **Drawbacks:** Species of greatest timber and wildlife value are removed. Without additional action to promote regeneration of oaks, hickories, and black walnuts, shade-loving trees will take their place. The removal of all nut-producing trees can make food scarce for some species of wildlife.

Woodland Management

Side View: Without Management

~20% crown-to-height ratio

- Overstory is overcrowded with a low diversity of species. Limited timber and habitat value.
- **a:** Poorly formed trees are suppressed and will not improve in quality.
- **b:** Canopy branches are dying due to overcrowding and disease.

Side View: With Management

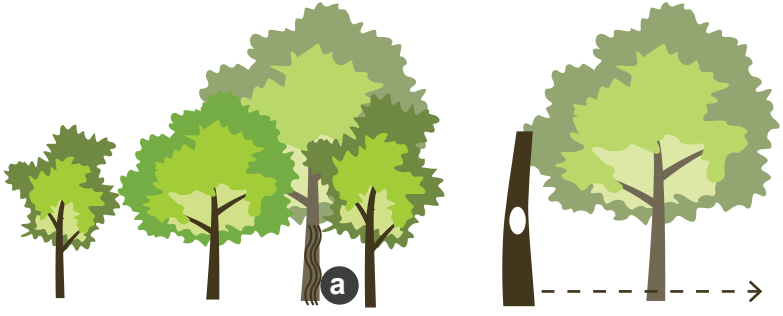
>30% crown-to-height ratio

- Healthy, productive overstory has high value potential.
- **Tree selection:** oaks, black walnut, shagbark hickory, black maple, black cherry.
- Trees produce nuts and berries for wild turkeys and other wildlife.

The crown-to-height ratio reveals how much sunlight is reaching the trees. When trees are growing too densely and do not receive enough sunlight, the height of the crown makes up less than 30% of each tree's overall height. When the crown comprises more than 50% of the height, the woodland is too thin for quality timber production.

Woodland Management

Side View: High Quality - The Forest of Tomorrow



How many standing dead trees are in your woods? Wildlife benefits the most with 8-10 per acre.

"Snags" or cavity trees provide homes for birds, bats, bobcats, raccoons, hawks, owls, squirrels, and other wildlife.

- The midstory includes valuable native shrubs and trees reaching maturity, such as American plum, serviceberry, chokecherry, dogwood, and downy hawthorn.

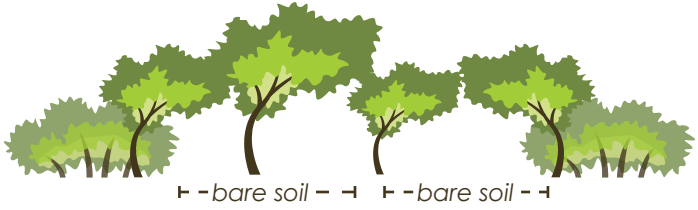
- **a:** Vines connect the ground to the treetops for woodlife to move around. They produce food and provide cover for small birds and mammals.
  Desirable vines: wild grape, wild cucumber, moonseed, poison ivy[1], and virginia creeper.
  Undesirable vine: oriental bittersweet (invasive).

- A well-managed midstory provides habitat for wildlife and pollinators, beauty, and the opportunity to forage for fruit and nuts.

1. Poison ivy fruits are highly desirable for birds. Poison ivy produces fruits along woodland edges.

Woodland Management

Side View: Before



- In the dense shade beneath invasive shrubs, the soil is bare and eroding. Wildflowers, native shrubs, and trees cannot regenerate. Little timber or wildlife habitat value will remain after the current overstory has died or is removed. Water quality is poor and valuable land washes away.
- **Invasive species:** honeysuckle, Japanese barberry, autumn olive, multiflora rose, garlic mustard, oriental bittersweet, buckthorn and more.

Side View: After

- Healthy, diverse, and productive understory is filled with native wildflowers, grasses, and sedges that buzz with pollinators when in bloom.
- **a:** Dense roots and downed woody debris protect the forest floor from erosion and provide natural water filtration.
- **b:** Successful regeneration of valuable tree species has resulted in 800-1,200 young seedlings per acre (1” d.b.h., 6’ tall).
- **c:** Enjoy more woodland edibles such as morels, oysters, chicken of the woods, hen of the woods, and wild woodland ramps.

Woodland Management

Ecological Value of Management:

- Threatened and endangered animals and plants can persist.
- Pollinators can thrive and benefit crops.
- Water and air quality improve.

Personal Enjoyment:

- Be able to walk through your woods.
- See diverse songbirds and wildflowers.
- Have the satisfaction of a healthy, regenerating resource and a legacy of innovative land stewardship.

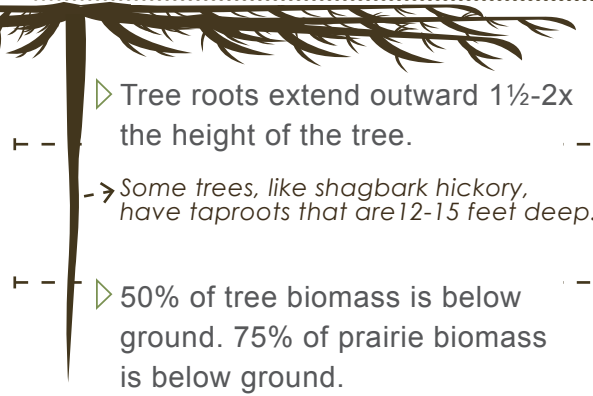
Revenue Potential with Management:

- Timber sales: $1,000-$135,000/acre every 60 years
- Hunting: $15-$50/acre annually
- Honey and maple syrup production
- Agritourism

State, federal, not-for-profit, and private sources of financial assistance are available to help you improve your land. Contact Prudenterra for more information.

Woodland Management

- Successful woodland management encourages plants with diverse root structures. This helps prevent soil erosion and promote carbon sequestration.



soil depth

5 ft

10 ft

15 ft

- Tree roots extend outward 1½-2x the height of the tree.

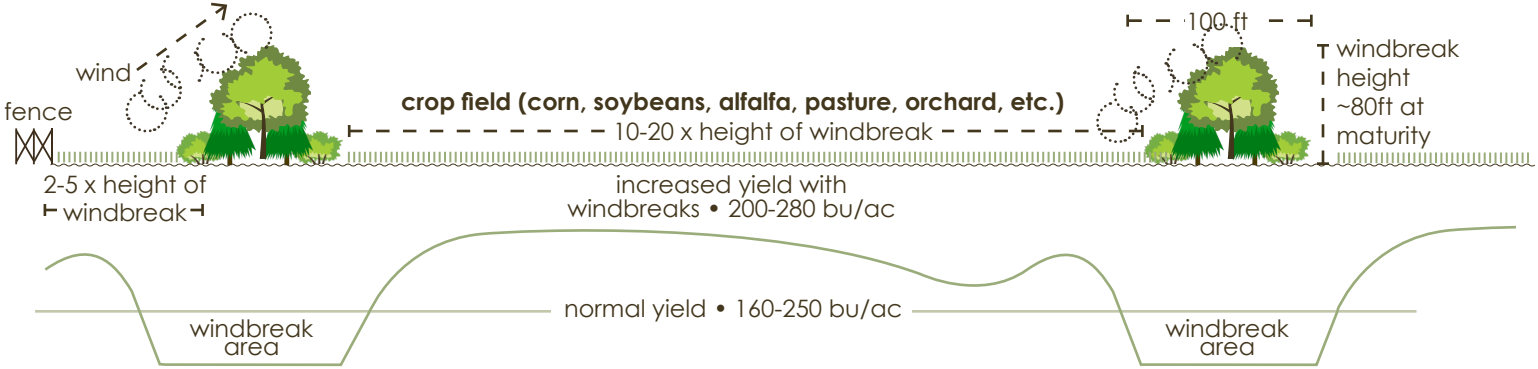
Some trees, like shagbark hickory, have taproots that are12-15 feet deep.

- 50% of tree biomass is below ground. 75% of prairie biomass is below ground.

Above ground elements (tree, prairie plants, corn) not proportionally to scale. Diagram should be used only to understand root depth and width.

Windbreaks

Increase Crop Yield with Properly Spaced & Managed Field Windbreaks*



Field Windbreaks Yield Many Benefits

- Slower wind speed on crops means less water lost to evapotranspiration and less energy devoted to holding plants upright.
- 10-15% increase in crop yields.
- Timber, fruit, and nut production potential.
- Mitigation of herbicide drift on crops.
- Increased biodiversity, habitat for beneficial insects, birds, and small mammals.

Challenges of Windbreak Establishment

- Requires up-front investment of trees, shrubs, and labor.
- Takes time for crop yield increase to cover cost of the land removed from crop production.
- Management is needed to mow and spray herbicides around trees and shrubs during establishment.
- Success is dependent on choosing appropriate species for each site's soil, climate, drainage, and pest pressure.

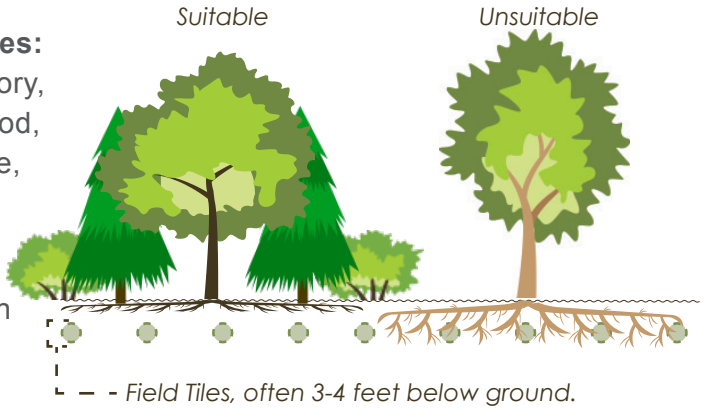
**Adapted from ISU Forestry Extension Publication PM-1716.*

Windbreaks

Windbreak Interactions with Field Tile

Trees Safe for Tiles:
Oak, Walnut, Hickory, Chestnut, Basswood, Pine, Cedar, Maple, Hackberry, Cherry

About half of a tree's roots grow in the top 6 inches of soil.



Trees that Can Disrupt Tiles:
Cottonwood, Willow

If cottonwood or willow are planted in a windbreak, nearby perforated drainage tiles will need to be cleared and replaced more often.

Avoiding Tile Trouble

Increase distance between trees and tiles with shrub rows or prairie.

If windbreaks will not be kept free of problem species such as cottonwood and willow, non-perforated tile should be installed within 125 feet of the windbreak.