1. Scope
This work consists of pruning crop trees and the manipulation of species composition, stand structure, and stocking by cutting or killing selected trees, vines, and understory vegetation. This specification will be used to carry out this practice. Practice application will be documented in a Forest Stewardship Plan or by completing Form KS-ECS-666, Forest Stand Improvement (FSI) and Form KS-ECS-666A, Forest Inventory and Assessment (Resource Concern Documentation for FSI 666).

2. Improvement Methods
Give priority to thinning areas that have the highest potential for wood crop production. In dense, young native or planted stands, it is often necessary to thin the trees so that the stand may be opened, so the remaining trees can grow at a faster rate. Thinning will be prescribed where needed.

In many stands where trees of undesirable species are competing for soil nutrients, moisture, and growing space with desirable trees, thinning will be prescribed. The undesirable trees will be cut or killed to reduce the competition with the preferable trees.

The future value of any individual tree is directly related to the kind of product that can be manufactured from the tree. Limbs and knots have a major downgrading effect on timber quality and consequently on value. To improve the future value of the stand, individual trees may be designated for pruning, if such pruning will materially increase the market value of the mature tree.

Shade tolerant trees may be planted in established forests. When trees reach advanced regeneration size (5 to 6 feet tall), open the overhead canopy by thinning.

Trees may be cut down or killed standing. Use herbicides to prevent the sprouting of undesirable species. Sprouts can provide wildlife browse and cover. All treatments should be made at a height comfortable to the applicator.

Apply herbicide treatments anytime, except in the spring during heavy sap flow. Basal bark treatments may be applied anytime of the year. Care should be taken to avoid off-target herbicide damage through excess herbicide contact with the soil and through root grafts. Root grafting is more common in shallow or rocky soils where trees are closely spaced and between the same species.

See Figure 1 for methods to kill trees. These include, but are not limited to:

- **Double girdle**: Trees may be double girdled without herbicide when a total kill is not required. Make two (2) cuts, approximately one (1) to two (2) inches deep and about three (3) inches apart. Treating trees immediately after “leaf out” is the best time for this treatment.

- **Single girdle**: Make a single cut, approximately one (1) to two (2) inches deep and apply herbicide (follow the label directions).

- **Cut stump**: Apply herbicide within one (1) to two (2) hours of cutting. Stumps less than 10 inches in diameter should be sprayed until the point of runoff. Stumps larger than 10 inches in diameter need only the outer three (3) inches treated. Stumps that are not treated at the time of cutting can be re-cut and have herbicide applied.
- **Hack and squirt:** Cut slits with a hatchet around the tree and apply herbicide into the slits with a spray bottle. The number of slits required is dependent on diameter size and herbicide used. Frills can completely overlap on harder to kill species.

- **Hypo-hatchet and tubular tree injectors:** A special tool designed to automatically inject herbicide as slits are cut. (This is similar to hack and squirt above.)

- **Basal bark:** A treatment for only ester-based herbicides generally designed for thin bark trees less than six (6) inches in basal diameter. Diesel fuel, kerosene, or penetrating oils are generally added as carriers. This treatment generally involves applying herbicide to the bottom 18 inches of a tree to ground level.

When applying herbicides, it is important to follow label directions.

**Figure 1. Illustration by Randall B. Heiligmann**

| Double Girdle | Single Girdle | Cut Stump | Hack and Squirt | Basal Bark |

**Additional Criteria to Improve or Sustain Timber Production**

Thin stands at 10 to 15-year intervals to maintain a fully stocked condition based on Central Hardwood Notes, Stocking Chart For Upland Central Hardwoods and Central Hardwood Notes, Estimating Bottomland Hardwood Growth and Yield. Use Manager’s Handbook for Black Walnut, General Technical Report NC-38, for appropriate stocking levels in black walnut plantations.

Thin the stand so that five (5) to seven (7) feet exists between tree crowns on three (3) to four (4) sides of selected crop trees.

Prescribed fire may be used to:
- Remove undesirable hardwoods
- Reduce fuel buildup
- Expose mineral soil for natural regeneration
- Improve wildlife habitat

Refer to Kansas Conservation Practice Standard 338, Prescribed Burning, for additional guidance. A prescribed burn plan will be prepared.

**Snag Trees**

Snag trees are dead trees that are left upright (standing) to decompose naturally. Snag trees provide essential food and cover for many species of pollinators and wildlife. Consider retaining existing snags or create new snags by girdling live trees of at least one (1) per acre.

**Pruning**

Pruning is removing limbs to produce the maximum clear lumber or veneer in the butt log. Prune only selected hardwood trees where high value species are grown on good sites.

When pruning lower limbs of young trees, don’t remove too much of the food producing leaf surface of the tree. The living crown should cover half the total tree height. Never remove more than 1/3 of the tree.
crown in a single year. In general, prune trees before they reach eight (8) inches in diameter. Limbs to be removed will be pruned before they reach two (2) inches in diameter to reduce the wound size, ensure proper closing, and lessen the impact of entry by insects or disease organisms.

Refer to Kansas Conservation Practice Standard 660, Tree/Shrub Pruning, for additional guidance.

**Crop Tree Management**
Crop tree management is a system of forest resources management that offers private, nonindustrial forestland owners a means of accomplishing single or multiple stewardship goals. It focuses on releasing individual trees that have been selected to produce benefits consistent with stand specific objectives. This system is based on application of the crown touching release technique. The seven (7) steps in the crop tree management approach include:

1. Identify the landowner’s property goals
2. Establish stand specific objectives
3. Develop crop tree selection criteria
4. Inventory the property
5. Explain proposed treatment to the landowner
6. Decide the number per acre of crop trees to release
7. Determine trees to cut to release crop trees

A crop tree inventory will provide an estimate of the number of crop trees, as well as trees needing to be cut or killed per acre for planning purposes. Guidelines for conducting an inventory and completing a Crop Tree Release Tally Sheet (found in *Crop Tree Management in Eastern Hardwoods*, Appendix A, page A-9). See the References section of this document.

In stands where there are no suitable crop trees, heavy site preparation and regeneration maybe necessary. Occasionally, two (2) crop trees may be left adjacent to each other. In those cases, treat their crowns as a single crown and apply a crown touching release.

**Grazing**
In forestland and woodland communities, protect the area from domestic livestock grazing. See Kansas Conservation Practice Standard 472, Access Control, for further guidance.

Grazing by livestock is only allowed as a component of a forest management plan, wildlife management plan, or livestock grazing plan for invasive and/or exotic species management or natural community management. Plans will include documentation of resource concerns and desired outcomes for an appropriate grazing plan to be developed. Refer to Kansas Conservation Practice Standard 528, Prescribed Grazing, for further guidance.

The intensity and frequency of grazing will be managed to prevent negative impacts on soil and water resources.

For silvopasture systems, follow Kansas Conservation Practice Standard 381, Silvopasture Establishment, when livestock grazing is involved.

**Forest Management Plan**
A Forest Management Plan will be documented in a written Forest Management Plan and/or Form KS-ECS-666, Forest Stand Improvement (FSI) and Form KS-ECS-666A, Forest Inventory and Assessment (Resource Concern Documentation for FSI 666). This plan documents objectives, resource concerns, inventory of species, and planned treatment.
References


Consultants & Contractors (List of Consulting Foresters and Forestry Contractors), Kansas Forest Service, Manhattan, Kansas.


Dale, Martin E. and Donald E. Hilt. *Central Hardwood Notes, Stocking Chart For Upland Central Hardwoods*. Northeastern Forest Experiment Station, USDA Forest Service, Delaware, Ohio.

Heiligmann, Randall B. *Controlling Undesirable Trees, Shrubs, and Vines in Your Woodland*. Publication F-45-97. Ohio State University Extension, School of Environment and Natural Resources. Columbus, Ohio.


USDA. NRCS. Field Office Technical Guide, Kansas, Section IV, Conservation Practices:
- 338 Prescribed Burning
- 660 Tree/Shrub Pruning
- 472 Access Control
- 528 Prescribed Grazing
- 381 Silvopasture Establishment

USDA. NRCS. CAP–Forest Management Plan (106).

USDA. NRCS. Forest Stand Improvement, Form KS-ECS-666.

USDA. NRCS. Forest Inventory and Assessment, Form KS-ECS-666A.