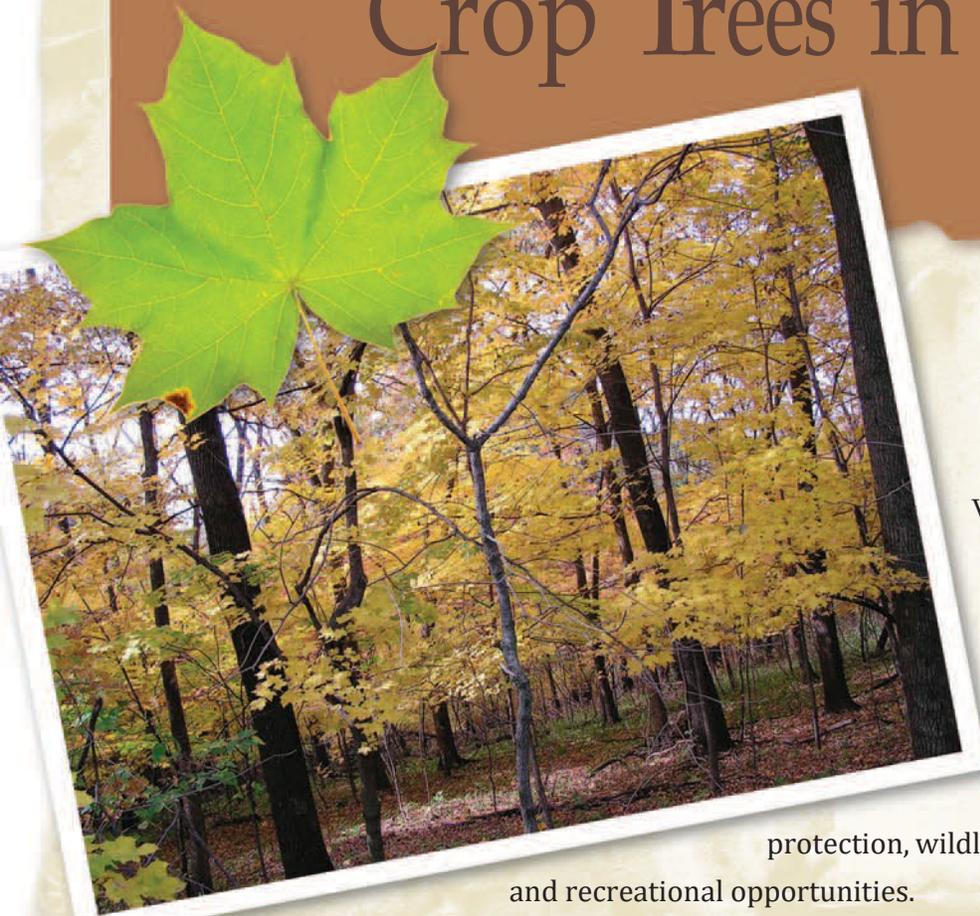


# Woodland Improvement and Crop Trees in Iowa



VIGOROUS AND HEALTHY woodlands in Iowa have the unique distinction of being able to provide a wealth of benefits for the landowner and residents of the state. Benefits from a healthy forest include timber and wood resources, watershed protection, fragile site protection, wildlife and bird habitat, aesthetics and beauty, and recreational opportunities.

*Healthy woodlands provide multiple benefits through good stewardship by woodland.*

Most woodland owners in Iowa are interested in the stewardship and improvement of their woodlands. When good stewardship is practiced landowners utilize their land in such a manner as to not diminish or destroy the potential of the land for future use. Woodland improvement operates under the umbrella of land stewardship and is a series of practices on the land with the intent of improving the amount and the quality of the benefits derived from forest land. One of the major tenants of good stewardship is protection; woodlands must be protected from livestock grazing and fire in Iowa. Grazing reduces the soil quality because livestock compact the forest floor and destroy desirable vegetation. Compaction causes the decline of woodland plants through reduction of air in the soil. Grazing may also result in soil loss and erosion. Fire may be a potential woodland management tool; however, uncontrolled fire can destroy regeneration, damages woodland stems, and modify herbaceous and woody understory plant composition. Fire should only be utilized when recommended and planned by a forester or other natural resource manager to achieve a specific management objective in your woodland.



# Woodland Improvement Practices

Forest stand improvement practices are used in stands<sup>1</sup> or woodlands prior to their maturity or their final harvest to improve the quality of the trees for their intended uses. These practices may be designed to improve species composition, quality of the woodland, survival, growth rates, forest health, and wildlife habitat. Woodland improvement practices are based on the tenet that a given parcel of land has limited productive potential and with management this potential can be distributed to the desired stems. Practices used in forest stand improvement include thinning, crop tree release, control of undesirable species including trees, shrubs and vines, pruning, and protection from damaging agents.

Forest thinning means cutting some of the trees in a stand or a forest. Commercial thinning is cutting of trees to improve the quality of the remaining trees in the stand. Commercial thinning results in cut trees, which are large enough to be marketed for sawtimber, firewood, or pulpwood. Noncommercial thinning refers to thinning in stands in which the thinned trees are too small to be sold for products.

## NONCOMMERCIAL THINNING

Weeding is the removal of all trees that compete with the desired species. This is rarely done except in the case of very special products such as plantations, sugar from maple syrup, or black walnuts for nut production. Cleaning is the removal of undesirable trees, which are competing with the desirable trees. The removal of trees that overtop seedlings or saplings is a liberation or release cutting. This may be required in a direct seeding to help the oaks become a component of the stand. Methods of tree removal include girdling, felling, and/or herbicide treatments.

<sup>1</sup> A stand is a group of trees with similar characteristics such as species, age, size, health, and quality.



*Slowed growth rate may indicate time for thinning or release.*

## COMMERCIAL THINNING

An improvement cutting is a thinning made in a stand to improve its composition by removing trees of less desirable species, form, and condition. Commercial thinnings are most often applied to even-aged stands (stands where all the trees are nearly the same age). Stands may contain more trees than the land is capable of supporting; tree tops in these stands often compete for sunlight and tree roots for water and nutrients. Trees in overcrowded stands often have slowed growth rates and smaller live crowns due to self pruning and shading. Some crowding in young stands will help develop good form—straightness and self-pruning of side branches. Once the trees have developed the desired form, they should be thinned to stimulate diameter growth. Thinnings may be required periodically to keep the desired trees growing fast—often stands require

Trees, which are removed in the thinning process may be cut and marketed, cut or removed by cutting and leaving in place, or girdled and left standing.



*Chain saw girdling.*



*Hack and frill.*



*Application of a herbicide to the outer sapwood will prevent sprouting of cut trees.*

thinning every 5–10 years, as the thinned stands grow back to occupy the site.

Trees, which are removed in the thinning process may be cut and marketed, cut or removed by cutting and leaving in place, or girdled and left standing. Girdling involved using a double chain saw cut around the tree making sure the cuts meet to avoid “bridging” or removing a strip of bark into the wood 2–4 inches wide completely around the tree. Trees that are cut or girdled may resprout below the girdle or from the

stump. To prevent sprouting, herbicides may be applied to the fresh cuts or the herbicide may be applied through an injection site or frill. The use of herbicides will prevent resprouting, and should be used with care to minimize damage to desired trees. Some risks exist that same species trees may be connected by root grafts and the herbicides may be translocated to a desirable tree. For more information on herbicides and their use see Forestry Extension Note F-341, *Chemical Control of Unwanted Woody Vegetation*.

# Crop Tree Identification and Release

Working with young woodlands to identify and thin around crop trees has the greatest potential of any practice to improve the woodland to meet landowner objectives. The concept of crop trees and release is simple, but in practice requires some commitment from the landowner starting with the identification of landowner objectives and continuing to the removal of some trees to favor others. In addition, for maximum benefit, it should be started early in the life of a stand or forest and continue throughout the life of the stand. For a more in-depth discussion of crop tree management, obtain a copy of *Crop Tree Management in Eastern Hardwoods*.<sup>2</sup>

## GOALS AND OBJECTIVES

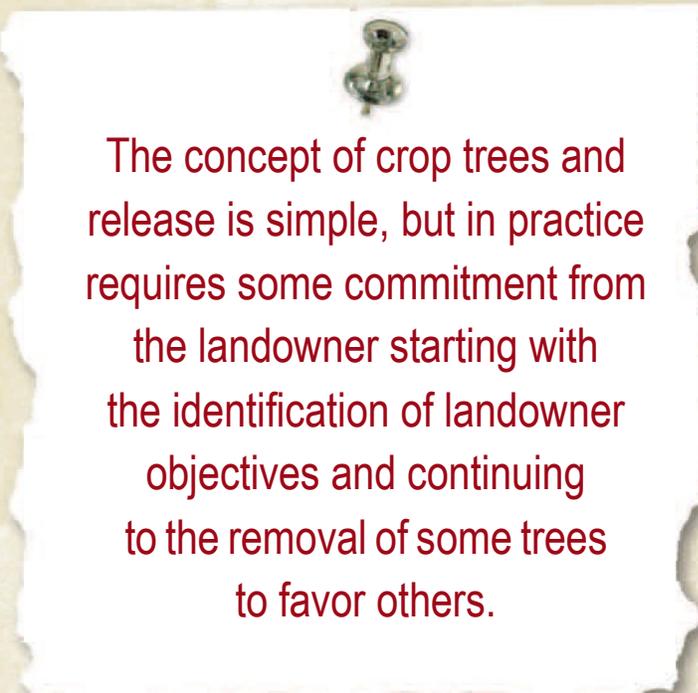
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Before going to the woods, a landowner should work through a planning process to identify goals for their property. Property goals may be fairly broad and for the whole woodland or property. Goals should answer the question: "What is the property used for? Do you like to hunt? Watch birds? Do you want income from your woodland? Are you enjoying wildflowers?" These broad goals become the basis for determining what management practices you will perform in your woodland.

After you have developed your broad goals, the next step is to begin to think about more specific objectives to attain the broader goals. Objectives are more task oriented and may relate to stands in the woodland. For example, if one of the goals was to "improve wildlife habitat," a related objective may be to "increase mast production from the oaks in the pole sized white oak stand." Or, if "future income generation" was a goal, the objective might be "to increase growth rate of valuable trees through crop tree identification and release".

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<sup>2</sup> Perkey, Arlyn W. and Brenda L. Wilkins. *Crop Tree Management in Eastern Hardwoods*. U.S.D.A. Forest Service Technical Publication NA-TP-19-93 Publication Available on the Web at: [www.fs.fed.us/na/morgantown/frm/perkey/ctm/ctm\\_index.html](http://www.fs.fed.us/na/morgantown/frm/perkey/ctm/ctm_index.html)



The concept of crop trees and release is simple, but in practice requires some commitment from the landowner starting with the identification of landowner objectives and continuing to the removal of some trees to favor others.

Woodlands are wonderful resources, partly because they can provide multiple benefits to owners. You might have a 30 year-old oak-hickory stand with the overall goal of improving timber production and wildlife habitat. In this stand this may be achieved with crop tree management to selectively release some of the trees that satisfy timber production and release others that provide more and better wildlife habitat.

## CROP TREES

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Crop trees are trees in your woodland that you want to keep in the woodland because they will help attain your goals and objectives; they would normally be selected for their characteristics and because they will live at least 20+ years. Crop trees may have different selection criteria depending on your goals and objectives.

Once the crop tree criteria have been developed and stands and areas to crop tree release have been identified, test your system on a stand or two and evaluate the results before cutting or removing any trees. As stands change, so might the objectives and

# Examples of Crop Tree Selection Criteria

with Timber, Wildlife, Aesthetics, and Water Quality as Primary Objectives

## TIMBER CROP TREE

- Dominant/Codominant
  - large healthy crown
  - no dead upper crown branches
  - should be single stem or as a sprout have a very wide U-shaped connection
- High quality trees—straight, good butt log, minimal forking
- No sprouts
- Valuable species
- Be well adapted to the site

## WILDLIFE CROP TREE

- Dominant/Codominant
  - large healthy crown
- Mast producer
- Cavities and dead branches are a plus

## AESTHETICS CROP TREE

- Species with good fall color, flowers, bark, or other visual characteristics
- Large well developed crowns
- Allow some dead branches, stump sprouts, and maybe an understory tree

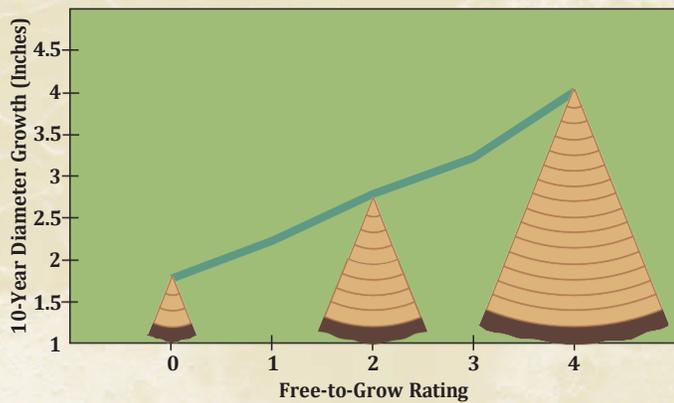
## WATER QUALITY CROP TREE

- Dominant/Codominant trees
- Species and individuals (young trees) with fast growth rates for nutrient accumulation
- Species tolerant to flooding and water

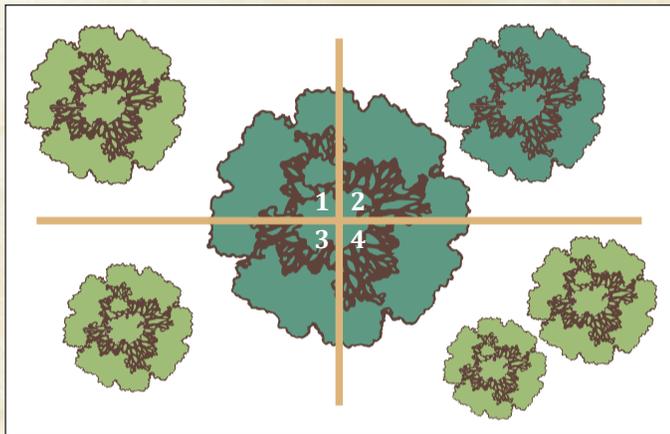


the criteria for crop trees. Be careful not to select too many crop trees; never consider more than 50–100 crop trees per acre; younger stands tend to have more crop trees than older stands. Some stands may have as few as 5–10 crop trees, and parts of a stand may not have any desirable crop trees. Stands with a large number of crop trees will have more material removed than stands with fewer crop trees. It is very important to

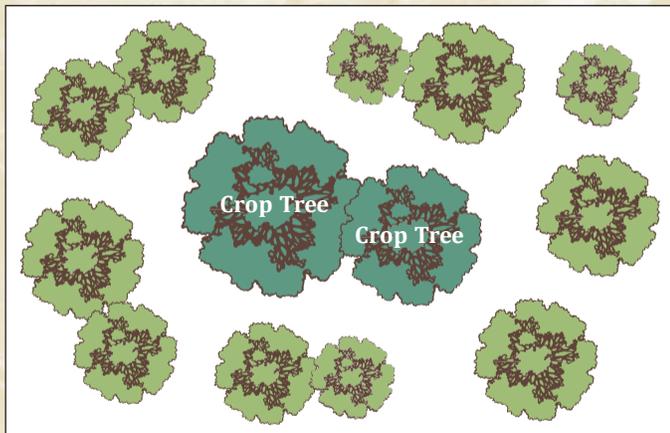
remember that if crop trees are to have the maximum response to release, they need to receive a complete crown touching release; release on all four sides of the selected crop tree. This concept is visualized by dividing the crown of the crop tree into four sections and then determining how many of the sections have room to grow. Trees with the most free-to-grow quadrants will grow and the fastest.



Growth rate increase is dependent on how many sides of the crop tree are released.



The space around a crop tree is divided into four sides or quadrants for thinning.



Two crop trees growing close to each other are treated as a single when thinning around them.

Crop tree selection and release should only impact the crop trees and trees which are competing with the crop trees. Trees that are not in direct competition with the crop trees are not removed from the stand. This includes trees not touching the crop trees and trees in the understory which are not competing with the crown

of the crop trees. By default in the crop tree release, some other trees may receive benefit from the removal of competition around the crop trees.

## APPLICATION OF THE CROP TREE RELEASE

Before beginning to remove trees, use flagging to mark both the crop trees and trees to be removed. This will help visualize the affects on the stand when the trees are removed. With a large number of crop trees, the cutting will be heavy; with a smaller number of crop trees, fewer trees will be removed to obtain the desired release of the crop trees. If the cutting appears to be too heavy, reduce the number of crop trees; do not reduce the number of free-to-grow quadrants around the crop tree because of the resulting reduction in growth response.

Spacing in woodlands is seldom ideal for crop trees. In some cases, two trees adjacent to each other are ideal crop trees. In this case, treat the pair of crop trees like they were one, and provide room to grow space around their common space. For each tree this means it is released on three sides, rather than on all four sides.

Free-to-grow means more than a foot or two. When removing trees around a crop tree, if there is doubt about a potential competitor, remove it. Healthy trees in Iowa grow at least a foot per year. Therefore, 15 feet of spacing from a crop tree to a competitor will provide adequate release for seven to eight years. At that time, the process starts over again, with the identification and release of crop trees.

When selecting crop trees, try to avoid selecting trees that will form epicormic<sup>3</sup> branching. Species that are most likely to form epicormic branching are white oak, and basswood; others are red oak, black cherry, hickory, sugar maple, white ash, and black walnut. Crop trees that are dominant/codominant with large healthy crowns are less likely to form epicormic branches. Over thinning may also contribute to the formation of epicormic branches, as does the genetics of the tree. If the tree already has epicormic branching, thinning will only stimulate more branching.

For more information on crop tree release or for an on-site inspection of your woodland contact your District Forester. You can locate your forester on the Web at [www.iowadnr.com/forestry/district.html](http://www.iowadnr.com/forestry/district.html) or by calling (515) 242-6898.

<sup>3</sup> Epicormic branches originate from dormant buds beneath the bark that become active, forming new shoots.

## Additional Resources

The publications listed below are also available from ISU Extension. To learn how to order copies or which publications are available contact your local ISU Extension county office, visit the ISU Extension online store on the Web at: [www.extension.iastate.edu/store/](http://www.extension.iastate.edu/store/) or call (515) 294-5247.

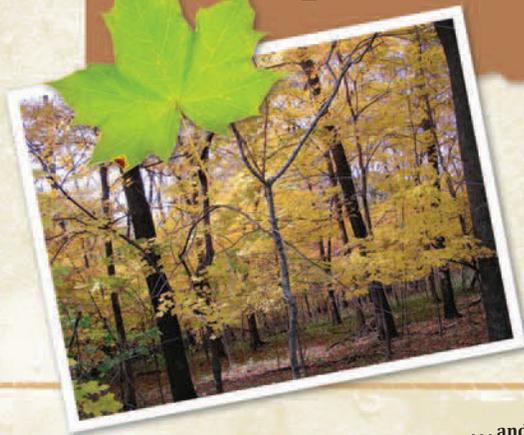
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|----------|---|----------|--|
| PM 605   | <i>Iowa's Forest Reserve Laws</i>   | PM 1717  | <i>Farmstead Windbreaks: Establishment, Care, and Maintenance</i>                    |
| PM 1374B | <i>Growing Black Walnut in Iowa – Woodland Management</i>                           | PM 1812  | <i>The Forest Where Ashley Lives</i>   |
| PM 1374C | <i>Improving Woodlands – Woodland Management</i>                                    | PM 1812A | <i>The Forest Where Ashley Lives CD</i>  |
| PM 1374D | <i>Harvesting and Regenerating Upland Woodlands – Woodland Management</i>           | PM 1814  | <i>Crabapples for Midwestern Landscapes</i>  |
| PM 1383  | <i>Identification of Conifer Trees in Iowa</i>                                      | PM 1850  | <i>Forestry Reference Handbook</i>   |
| PM 1384  | <i>Identification of Hardwood Trees in Iowa</i>                                     | PM 1943  | <i>Deciduous Shrubs</i>  |
| PM 1429A | <i>Establishing a Community Tree Program – Community Trees</i>                      | PM 1981  | <i>Woodland Invasive Species In Iowa</i>   |
| PM 1429B | <i>Tree Ordinances for Iowa Communities – Community Trees</i>                       | PM 2002B | <i>Planning for Wooded Acreages and Woodlands</i>                                    |
| PM 1429C | <i>Sample Tree Ordinances for Iowa Communities – Community Trees</i>                | RG 0701  | <i>Iowa's Oaks – Reiman Gardens</i>  |
| PM 1429D | <i>Low-Growing Trees for Urban and Rural Iowa – Community Trees</i>                 | SUL 0001 | <i>Understanding the Effects of Flooding on Trees – Sustainable Urban Landscapes</i> |
| PM 1429E | <i>Street Trees for Iowa – Community Trees</i>                                      | SUL 0002 | <i>Understanding Decline in Trees – Sustainable Urban Landscapes</i>                 |
| PM 1429F | <i>Power Lines and Trees – Community Trees</i>                                      | SUL 0003 | <i>Diagnosing Tree Problems – Sustainable Urban Landscapes</i>                       |
| PM 1429G | <i>Conifer Species for Iowa – Community Trees</i>                                   | SUL 0005 | <i>Pruning Trees and Shrubs – Sustainable Urban Landscapes</i>                       |
| PM 1499  | <i>Christmas Tree Production in Iowa – Economics and Marketing</i>                  | SUL 0006 | <i>Managing Storm-Damaged Trees – Sustainable Urban Landscapes</i>                   |
| PM 1500  | <i>Christmas Tree Production in Iowa – Establishment and Care</i>                   | SUL 0007 | <i>Topping: Tree Care or Tree Abuse? – Sustainable Urban Landscapes</i>              |
| PM 1528  | <i>Common Diseases of Conifers in Iowa</i>  | SUL 0011 | <i>Fungal Cankers of Trees – Sustainable Urban Landscapes</i>                        |
| PM 1626  | <i>Buffer Strip Design, Establishment and Maintenance – Stewards of Our Streams</i> | SUL 0010 | <i>Pine Wilt Poster – Sustainable Urban Landscapes</i>                               |
| PM 1676  | <i>Tree Planting: Planning</i>  | SUL 0015 | <i>Oak Wilt: Identification and Management – Sustainable Urban Landscapes</i>        |
| PM 1677  | <i>Tree Planting: Establishment and Care</i>  |          |  |
| PM 1716  | <i>Farmstead Windbreaks: Planning</i>   |          |  |

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Use one color flagging for crop trees and one color for trees to be removed.

## Woodland Improvement and Crop Trees in Iowa



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File: Forestry 5

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