Releasing Your Crop Trees from Competition – and other intermediate stand treatments

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Outline: Intermediate Stand Treatments

- Crop Tree Release: Basics
- Improvement Harvest
- Thinning
- Vine Cutting
- Exotic Invasive Species Control
SILVICULTURE ACTIVITIES

Period of regeneration or establishment

Period of intermediate cuttings

Period of regeneration or establishment

Period of intermediate cuttings

The tree crop

The tree crop

0 3 10 20 30 40 50 54 60 years
Even-aged Vs. Un-even aged Forest

**Uneven-aged**: a stand with trees of three or more distinct age classes, either intimately mixed or in small groups.

**Even-aged**: a stand composed of a single age class of trees in which the range of tree ages is usually plus or minus 20% of the rotation age.
What is a crop tree?

4’’-12” in diameter at breast height and codominant or dominant
Where do you find crop trees?

Typically in young even aged stands—trees are all roughly the same size and age

- Tree plantings – 8’x10’ spacing, 550 trees per acre
- Forests that have been heavily cut to regenerate a young forest
- Old fields that have been abandoned and growing back to trees
Crop Tree Release (CTR)

...is the selective and deliberate removal of adjacent, competing canopy trees (neighbors) whose crowns overtop, touch, or infringe upon the growth and development of your selected crop tree’s crown.
all trees are not created equal...
in most stands, there are only a limited
number of trees that have the potential
to produce high-value products.

Arlyn W. Perkey, PhD, USDA Forest Service (Retired)
“Why” Crop Tree Release?

• 93% of the value of a stand is in its relatively few crop trees – Gary Miller USDA Forest Service

• Allows crop trees to maintain a co-dominant or dominant position in the canopy

• Released crop trees expand their crowns, thereby increasing diameter growth.

• Young stands benefit the most – you get to pick the winners instead of mother nature
Develop Goals for Stands

• Are you managing for enhanced wildlife habitat, high quality timber, both?

• Goals will differ depending on individual site’s edaphic conditions (soil conditions”)
  -For example, walnuts growing on a poor site will never make high quality veneer logs
Potential crop tree species

Oak – White, Bur, swamp white, red, pin oak, etc.
Black walnut
Shagbark hickory
Black cherry
Hard maple
Soft Maple
Black cherry
Hackberry
Basswood
Cottonwood
Pine
Crop Tree Selection

Photos: Jay C. Hayek, U of I
Unacceptable growing stock

- Honey locust
- Black locust
- Ironwood
- Boxelder
- Chinese Elm
- American elm
- Mulberry
- Ash
- Poor formed…
- Hackberry
- Bitternut Hickory
- Basswood
- Black cherry
Winners vs. Losers

Start now…release

Crop Trees early in stand development

Are these trees you wanted? Do they meet your goals?

CTM allows YOU, not Mother Nature, to pick the winners!
How Do I Apply CTM?

1. **Field-Select Your Crop Trees**
   - Identify the best 20-50 crop trees acre – pick the best tree/species every 30’-45’
   - Evaluate trees form and release potential
   - **Flag** your crop trees or **paint** the trees that are competing with your crop trees
   - Expect to kill adjacent trees on 3-4 sides in order to fully release the crop to full sunlight!
   - CTR is all about giving your best trees full sun! It’s like growing a garden!
     - Vigourous crop trees, maximum growth rate, and shortest rotation age (length of time needed to grow economically mature timber!)
CROP TREE RELEASE

Before Treatment

After Treatment

VIEW FROM ABOVE
VIEW FROM SIDE
FOR OPTIMUM GROWTH
A 4-SIDED RELEASE IS REQUIRED

FTG Rating = 4

1 2
4 3

FTG Rating = 3

CT
1 2
4 3

the only exception is . . .

a 3-sided release when the competing tree retained is another crop tree.
How Many Crop Trees?

- depends on owner objectives
- visual impact of release

If this cutting is too heavy...

then reduce the intensity of cut by...

**Correct**
- reducing the number of crop trees selected for release

**Incorrect**
- not reducing the amount of release given each crop tree crown.
3. **Selectively fell or girdle competing crowns (trees)**
   - Girdling - cut till you see a ring of light around your crop tree
   - Girdle or Fell Competing Trees?
     - Personal preference...I prefer to girdle and leave standing during pre-commercial treatments.

*You can flush cut poor formed oak and walnut and let them resprout as reserves in case of wildfire or windtrow events*
Cut Stump Application
Herbicide Use

**Girdle Method:**
- Amine-based herbicides:
  - Garlon 3A, Pathway, Arsenal, Stalker, etc.

**Frill Method:**
- Amine-based herbicides
  - Garlon 3A, Pathway, Arsenal, Stalker, etc.
CTR Tips and Tricks

1. **Do not** scout your woods looking for trees to remove!

2. **Rather**, become a crop tree “hunter”... train your eyes to locate and evaluate your best trees!

3. **Remember**, you’re only cutting trees that are in direct competition with your crop tree’s crown!

4. **It is acceptable** to completely release fewer crop trees per acre compared to partially releasing more crop trees per acre!

Photo: Jay C. Hayek, U of I
CTR Tips and Tricks

5. **15 feet** of growing space between crowns provides adequate release for 7-8 years.

6. **Occasionally***, two adjacent crop trees may be left next to each other, assuming these crop trees are provided a full 3-sided release!

7. **Remember**, if you have a high quality stand of timber, expect to remove some high quality trees...you can only have so many crop trees per acre before you start sacrificing growth!

*Actually, this is quite common*
Improvement Harvest – intermediate stand treatment

Applied to uneven-aged forests

- Three or more age classes of trees
- Even aged forests transition to uneven aged forests through periodic selection harvests or natural mortality of individual trees within the stand
Improvement Harvest

• Targets removal of merchantable trees that are considered weed trees or poor formed, defective, over-mature trees

• Puts money in your pocket for continued forest management – low quality, low value sale

• May establish or restore skid trails that can be used for recreation

• May be followed up with a light crop tree release to kill unwanted trees or to coppice young oaks, walnuts, hickories, cherries etc. damaged during timber sale operations
Thinning: Basal Area Reduction

\[ BA = 0.005454 \times DBH^2 \]

Example:
\[ BA=0.005454 \times 12^2 \]
\[ BA=0.785376 \text{ sq/ft} \]
5.4 Upland Central Hardwood Stocking Guide

Basal Area per Acre (Square Feet) vs. Trees per acre (Number)

- **Fully Stocked**
- **Overstocked**
- **Understocked**

Average Tree Diameter:
- 15
- 14
- 13
- 12
- 11
- 10
- 9
- 8

Stocking Percent:
- 80
- 70
- 60
- 50
- 40
- 30
- 20
- 10
- 0

Legend:
- A
- B
- C
Stand description

Dominant and co-dominant trees: white and bur oak (12”-30” diam.)
Midstory trees: elm and cherry (4”-12” diam.)
Regeneration: elm, cherry, and hackberry (<2” diam.)
Shrub layer: exotic-invasive bush honeysuckle and buckthorn present in low densities (10% cover)
Site index: 65’ for red oak
## Stand Level Tree Data Table

<table>
<thead>
<tr>
<th>Species</th>
<th>Trees (#/ac)</th>
<th>Basal Area (Sq Ft/ Ac)</th>
<th>Ave. Diam. (in.)</th>
<th>Sawlog Volume (Bf/Ac)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black Cherry</td>
<td>14</td>
<td>5</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Bur Oak</td>
<td>2</td>
<td>5</td>
<td>24.7</td>
<td>481</td>
</tr>
<tr>
<td>Elm</td>
<td>141</td>
<td>25</td>
<td>5.7</td>
<td>0</td>
</tr>
<tr>
<td>White Oak</td>
<td>50</td>
<td>70</td>
<td>16</td>
<td>4430</td>
</tr>
<tr>
<td><strong>Totals:</strong></td>
<td><strong>207</strong></td>
<td><strong>105</strong></td>
<td><strong>9.6</strong></td>
<td><strong>4911</strong></td>
</tr>
</tbody>
</table>
Stand Prescription

1. Eradicate the honeysuckle and buckthorn from the stand

2. Thin undesirable intermediate and suppressed trees from the stand to include elm and hackberry, and poor formed black cherry and oak can be coppiced
Goal of stand Rx

- Remove undesirable species
- Lower stocking level so that residual trees are more vigorous and grow at max. rate
- Increase light to forest floor and stimulate oak regen and development
5.4 Upland Central Hardwood Stocking Guide*

The diagram represents the relationship between basal area per acre and the number of trees per acre for upland central hardwood forests. The graph illustrates different stocking levels such as fully stocked, overstocked, and understocked. The axes are labeled as follows:

- Y-axis: Basal Area per Acre (Square Feet)
- X-axis: Trees per acre (Number)

The zones are labeled as:
- A: Average Tree Diameter
- B: Overstocked
- C: Understocked

The points A, B, and C are marked on the graph to illustrate the stocking levels.
Vine cutting
Bush Honeysuckle Control
Questions?

Annual Rings
(Both 20 yrs.)

Free Grown

Suppressed
Commonly Used Herbicides

- Garlon 3A
- Garlon 4
- Tahoe 3A
- Tahoe 4E
- Triclopyr
- Pathway®
- Picloram
- Imazapyr
- Stalker®
- Arsenal®
- Chopper®
- Tordon®
Epicormic Branching

Dormant buds that have broken dormancy on the lower bole of a tree
Lead to grade defects
Keep understory trees to shade lower bole of released crop trees
Herbicide Flashback

**Defined:** the translocation of systemic herbicides through root grafts of similar species:

Be cautious with glyphosate, Picloram, and Imazapyr products due to flashback potential
Girdle/Frill Hack-n-Squirt Method

Jim Miller, USDA FS, forestryimage.org
Herbicide Use

Hack-n-Squirt

- Amine-based herbicides:
  - Garlon 3A
  - Tahoe 3A
  - Pathway
  - Arsenal

Stump Application

- Amine-based herbicides:
  - Garlon 3A, Tahoe 3A, Pathway, Stalker, Arsenal, etc.

- Ester-based herbicides:
  - Garlon 4, Tahoe 4E, Crossbow
Crop Tree Release is strictly crown management and manipulation

- Leave the non-competing understory trees

Hasten Stand Rotation Age

- CTR accelerates growth and high-value yield responses
- Financial maturity achieved more quickly
- End up with greater percentage of high-value canopy trees at the end of the rotation age!
“...all trees are not created equal... there are only a limited number of trees that have the potential to produce high-value products.” (Perkey 1993)

Therefore, if you do nothing else with your woodlands, at least implement CTR!
- The Proof is in the Numbers!
Where Do I Apply CTR?

Apply CTR to your best quality sites first!
--High productivity sites typically have more potential crop trees and greater growth rates (Perkey and Onken).

Apply to young stands, both plantation and natural!
--Young stands typically have a lot more crop trees than mature stands.
Apply a minimum 3 | 4 side release

Middle-aged stands, both plantation and natural!
--Older stands typically have fewer crop trees than younger stands
Apply a 2-sided release (Gary Miller, pers. comm, May 2006)

The attractiveness of the financial investment of CTM increases as the number of desirable crop tree candidates per acre increases!