
Plum Creek's Experience Managing
Red Pine in the U.P.

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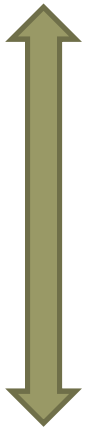
Growing Value from Exceptional Resources

Habitat Types for Red Pine

- Range of Habitat Types suitable for Red Pine:

AVO



QAE

Site Index Examples

AVO – S.I. 90

ATD – S.I. 84

AQV – S.I. 66

- Soil Drainage and Depth to Water Table related to productivity.

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Artificial Regen – Site Preparation

- Good site prep key to successful plantations.
- One year green-up following harvest
- Chemical site prep application in 2nd year after harest.
  - Glyphosate + Imazapyr + Sulfometuron methyl
    3# AI/ac 0.375# AI/ac 1 oz product
  - Treatment window: mid-June to mid-July (preferred)
- Most sites are not mechanically site prepped (cost savings)

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Artificial Regen – Planting

- Sites are planted following spring (need to let set over winter to ensure no herbicide residual).
- Exclusively use containerized stock (hand planted)
- Target stocking level:
  - High Site Index: 600 – 650 TPA
  - Low Site Index: 550 – 600 TPA
- Average first year survival: > 90%

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Artificial Regen – Release

- About 60-70% of our sites get a release application.

- Four options for releasing red pine:

  - Oust (broadcast) - pre-emergent to control grass
  - Velpar (broadcast) - effective on most species, but costly
  - Glyphosate (broadcast) - primarily for woody brush (cherry)
  - Garlon 4 (LVB) - effective on woody brush, but costly

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Benchmarks for Evaluating Success

- Conduct annual walk-thru to evaluate survival and competition.
- Minimum stocking is about 350-400 trees/acre at age 4, but dependent on variability across site.
  - Interplanting not a good option - creates problems later
- "Free to Grow"

  3-4 ft tall with no overtopping competition

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Red Pine Plantation Keys to Success

- Good site prep (good competition control).
- Good seedling quality
- Right site (not too wet)
- No browse

Red Pine Thinning Studies

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Red Pine Thinning Studies

- Four major thinning studies initiated in the U.P. in 2004.
- Two high quality sites and two medium quality sites.
- Three main treatments compared on these sites:
  1. Row Thin (remove every 3rd row)
  2. Row Thin plus 1 in 5 trees removed in remaining rows (crown release)
  3. Unthinned Control

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Basal Area and Volume Growth

Crane Lake (SI 94)	Annual BA Growth (ft^2)	Volume MAI, cords
Row thin	8.8	2.6
1 in 5	9.2	2.5
unthinned	9.6	2.8
Atlantic Mine (SI 81)		
5th row	9.2	2.2
1 in 5	8.9	2.2
from below	8.9	2.1
unthinned	9.0	2.5
Middle Branch West (SI 65)		
row thin	7.2	1.7
1 in 5	6.4	1.7
unthinned	6.0	1.8

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1st Thin Recommendations

- Think crown management
  - **Needles + Light = Wood**
- Initial entry around age 23-24 (sooner on better sites, later on poorer sites)
- Merchantable Basal Area at entry: 140 – 160 ft^2
- Enter before live crown ratio falls below 40%.
- Crown release – Remove every 3rd row plus 1 in 5 trees in remaining rows (BA Target: 90 ft^2)
- Think about releasing crowns, not thinning from below.

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2nd Thin Recommendations

- Timing of Re-entry:
    - High S.I. – Merchantable BA is 160-180 ft^2 (8 – 10 years)
    - Low S.I. – Merchantable BA is 140-150 ft^2 (8 – 10 years)
- Enter before live crown ratio falls below 40%.
- Thin to a residual BA of 90 ft^2

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Tree Selection in 2nd Thin

- Set up crop trees for fast response
- Removals should be from “below,” e.g. forked tops, damaged, double stems, poor form, weak intermediates, and for spacing
- Leave strong intermediates where their removal would create holes and affect site occupancy

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Rotation Age

- Current thinking is 40 – 50 years (2 thins and clearcut), but that varies by a number of factors:
    - Site quality (lower SI sites shorter?)
    - Stand quality / stocking levels
    - Markets
- Gary Wyckoff has an article coming out soon in Forest Science entitled "*Stand and Tree Response to Commercial Thinning of Red Pine in Michigan*."


Questions ?
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