Planting and Seeding
Artificial Regeneration

Lecture #6
Sept. 9, 2005

Sources of Reproduction

• Natural
  1. Seed
  2. Sprouts
  3. Advance Reproduction

• Artificial
  1. Planting
  2. Direct Seeding

Components of a Planting Program

• Species vs. Site Selection
  Matching the Species to the Site

Factors
  Costs of establishment (site prep)
  Losses to Insects & Disease
  Rate of growth
  Usefulness & Value of the product
Components of a Planting Program

• Do we replant with same species?

• Exotic Species?

• Genetics
  Phenotype vs Genotype
  Elite Trees vs Plus Trees
  Dr. Schlarbaum

Seeds --- Material Covered in Another Course

• Seed Source
• Seed Collection
• Seed Extraction
• Seed Storage
• Seed Germination and Dormancy
• Seed Testing
• Nursery Operations
• Treatment and care after lifting and during planting

PLANTING

• Why Plant?

  Factors
  a. age and size
  b. spacing
Spacing Considerations

- Product Desired
- Site Productivity
- Cultural Operations
- Species Characteristics
- Other Factors —— Insects and Disease
  - Timing
  - Income vs Costs

Spacing Study
Loblolly Pine —— Switzer —— Age 19 —— SI = 90

<table>
<thead>
<tr>
<th>Spacing (ft)</th>
<th>Total Volume (ft³ / A)</th>
<th>Avg. Ht. (ft)</th>
<th>Avg. DBH (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 x 5</td>
<td>4750</td>
<td>59</td>
<td>6.4</td>
</tr>
<tr>
<td>6 x 6</td>
<td>4830</td>
<td>60</td>
<td>7.0</td>
</tr>
<tr>
<td>7 x 8</td>
<td>4830</td>
<td>62</td>
<td>7.8</td>
</tr>
<tr>
<td>9 x 10</td>
<td>4460</td>
<td>63</td>
<td>9.2</td>
</tr>
</tbody>
</table>

Spacing Study
Loblolly Pine —— Switzer —— Age 15 —— SI = 75

Merchantable Volume

<table>
<thead>
<tr>
<th>Spacing (ft)</th>
<th>Total Volume (ft³ / A)</th>
<th>Merch. Volume (ft³ / A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 x 6</td>
<td>2940</td>
<td>2484 (84%)</td>
</tr>
<tr>
<td>8 x 8</td>
<td>2971</td>
<td>2767 (93%)</td>
</tr>
<tr>
<td>10 x 10</td>
<td>2584</td>
<td>2392 (92%)</td>
</tr>
<tr>
<td>12 x 12</td>
<td>2325</td>
<td>2110 (91%)</td>
</tr>
</tbody>
</table>
Spacing Comments

• Product Objectives ---- closer vs wider spacing
• Utilization of the site
• Maximum volume vs economic returns
• Cost of planting
• Wider spacing and merchantability

• Economic Yield vs. Density vs. Total Yield vs. Return goes back to Landowner Objectives, Products and Rate of Return

Spacing Comments

• Role of Thinnings
  Crown Closure
  Carrying Capacity of Site

Thus choice of Spacing is difficult, especially considering we do not know markets 20+ years in advance

Considerations with Planting

• Season of Planting
• Site Prep
• Methods of Planting
• Survival and Early Growth
• Protection of New Plantations
  fire, rodents, deer, insects
  ----- questionable to interplant after initial planting
Considerations with Planting

- **Planting Priority** --- different sites/stands/conditions
- **Use of Container Stock**
  - Advantages
  - Disadvantages
- **Planting Hardwoods**
  - More Site Specific & Site Demanding
  - Not Plastic like Pine
  - Lack of Uniformity, wide genetic variation

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**Planting**

**Advantages**

- Control of Composition and Genetic Makeup
- Control over Stand Density and Arrangement
- Shorter Establishment Period
- Reduce Risk in losing Seed Trees & other larger material
- Avoids Danger and Risk in using Seed
- Fewer Restrictions on Harvesting Techniques
- Fewer Restrictions on Methods for Site Prep
- Better Access for fire equipment and other operations

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**Planting**

**Disadvantages**

- High Cost of Establishment
- Danger of Planting Wrong Species or Strain for the Site
- Poor Root Systems — Did not develop on site
- High Visual Impact
- Intensive Site Prep — Influence on Soil Properties & Site Productivity — Careful
Direct Seeding
Artificial Regeneration Technique

Cost of establishment is less than a planted seedling, however likelihood of success is also less

WHY?

Advantages

- Less Costly than Seedlings
- Less Labor & Equipment
- Large Areas can be Regenerated Faster
- Can be Done on more Adverse Sites
- Conducted over Longer Time Periods
- More Flexibility
- More Natural Root System

Disadvantages

- More Risk of Failure
- Less Control over Spacing and Density
  - Overstocking and Understocking
- Wasteful use of Improved Seed
- Usually Longer Rotations
Direct Seeding

- Site Suitability
- Species Used
- Seed Characteristics
  - Dormancy and Stratification
  - Seed Repellents
- Site Prep Required ------- Fire
- Sowing Rate
  - Seed viability
  - Germination Rate
  - Projected Survival

Direct Seeding

- Methods of Sowing
  - Ground --- Cyclone seeder
  - Tractor-Mounted Broadcast
  - Helicopter or fixed wing aircraft
  - Spot & Row Seeding from the ground
- Rate of Sowing
  - Loblolly Pine --- 0.5 to 1.0 lb of seed is about 15,000 seed/acre and under average conditions will result in 2000 to 5000 seedlings/acre

Direct Seeding

- Rate of Sowing
  - Seeding oak acorns using a planter --- 3000 acorns/acre ----- sown 3 x 10 with 2 acorns/spot, expecting 800 or so seedlings/acre

  Question about oak development in pure stands vs. mixed stands ----- Stratified development
Direct Seeding

**Summary**

1. Assess Risk
2. Lower cost, but unknown results
3. Use of Improved Seed? Geographic source of seed?
4. Usually to revegetate sites that cannot be planted