Site and substrate treatments influence American chestnut budset and survival

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Background

- Cross-Ridge mining
  - Overburden returned
- Mountaintop Removal
  - Overburden in valleys

Background

- Historic Surface Mining
  - Left “as is”
  - Valleys filled in
  - Erosion/Landslides
  - Mass Instability
  - Water Pollution
  - Trees Planted
Background

- Post Surface Mining Control and Reclamation Act of 1977

- The Forestry Reclamation Approach (FRA)
  1. Create a suitable rooting medium for good tree growth that is no less than 4 feet deep and comprised of topsoil, weathered sandstone and/or the best available material.
  2. Loosely grade the topsoil or topsoil substitute established in step one to create a noncompacted growth medium.
  3. Use ground covers that are compatible with growing trees.
  4. Plant two types of trees—early successional species for wildlife and soil stability, and commercially valuable crop trees.
  5. Use proper tree planting techniques. (Burger et al., 2005)

- FRA
Background

- American chestnut
  - Not available in the past
    - Chestnut blight (Cryphonectria parasitica)
- Center of Range
- Growth
  - Increased light levels
  - Moderately acidic soils
  - Well drained soils

Background

- Budset
  - Photoperiod
  - Temperature
  - Nutrient availability
- American chestnut
  - Neoform (sustained)

Objective

- Determine the influence of site and planting treatments on:
  - Survival of differing genetic stock of C. dentata
  - Budset of differing genetic stock of C. dentata
Hypotheses
- American chestnut will set bud sooner than hybrids.
- All chestnut on south facing slopes will delay budset.
- Fertilizer, Terra-Sorb, and native soil will delay budset.

Methods
- Study site
- 2 sites, 4 plots
  - Flat (A,B)
    - NE
  - Sloped (C,D)
    - SE
Methods

Lot 1 – Pure American chestnut

<table>
<thead>
<tr>
<th>Terra-Sorb Applied</th>
<th>Fertilizer Applied</th>
<th>Soil Sterilized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terra-Sorb Not Applied</td>
<td>Fertilizer Not Applied</td>
<td>Soil Un-Sterilized</td>
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</tbody>
</table>

Blue-X tree shelter

May, 2008

Lot 2 – Hybrid families

- GM: American
- NB8: B1F3
- SA: B2F3
- WT: American
- GB: American

Mesh tree shelter

May, 2008

Methods

1.5m x 1.5m spacing

Treatments randomly assigned to planting spots

Directly seeded

18” tall direct seed Blue-X shelter or yellow mesh

Pile Native Rock around tube
Methods

- Budset
  - Every two weeks
  - Growing, Set, Dead
  - 90%
- Survival
  - Every two weeks

Methods

- Statistical Analysis
  - Randomized Block Design
  - Repeated Measures
- SPSS 16.0
- Microsoft Excel 2007
- $\alpha = 0.05$

Results and Discussion

![Percent Survival by Treatment](image)
Results and Discussion

Percent Survival by Genetic Stock

Error Bars indicate 95% Confidence Interval

Results and Discussion

Percent Bud Set by Genetic Stock

Error Bars indicate 95% Confidence Interval

Results and Discussion

Percent Bud Set of Genetic Stock by Site

Error Bars indicate 95% Confidence Interval
Implications

- Money saving
  - No treatment is the better treatment
- Site matters
  - South facing slopes generally have warmer soil temperatures, which may delay budset
  - Similar survival and budset between genetic families used.

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Questions?