Shortleaf Pine
Pinus echinata

As a Reclamation Species on Former Mine Sites

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Mining in Appalachia

• 600,000 ha (1.5 million ac)
• SMCRA-1977
  • Erosion prevention
  • Wildlife habitat or grazing
• After bond release
  • Lands mostly unmanaged
  • Resulting vegetation
    • Moderate ecological value
    • Minimal/ no economic value
• ARRI created (2004)
  • Promotes Forestry Reclamation Approach (FRA)

Strip mine in West Virginia
Credit: National Geographic (2007)

Forestry Reclamation Approach on former mining site with Dr. James Burger
Powell River Project, VA Tech
Pines & Reclaimed Mine Sites

- Pine as a pioneer species-assist later successional species
  - Decrease bulk density (Asby, 1989)
  - Increase soil nutrients
    - Organic matter
    - Ectomycorrhizae (Callaway, 1995)
  - Provide shade (Bauman, et al., 2012)

- Pine as long term component of hardwood stands
  - Wildlife benefits
  - Economic benefits

Shortleaf pine and black locust on reclaimed mine site-Tennessee
Pre-SMCRA Research - mixed results for shortleaf pine

- Eastern Tennessee site-spoil bank (Kring, 1967) - 5 pines
  - Soils: low pH (4.1-5.3), P, and K
- S. Illinois reclamation site (Ashby & Baker, 1968)
  - Soils: High pH (6.0-8.1), low N
- Wilson Mtn strip mine reclamation, TN (1975)
  - Slope influences species dominance
    - North Aspect - Yellow poplar
    - South Aspect - Shortleaf pine
Post-SMCRA Research- *shortleaf pine still struggles*

- SW Virginia reclamation site (Torbert, et al., 1985)
  - High Ca soils
- E. Tennessee reclamation site (Walker, et al., 1985)
  - *P. tinctorius* inoculation on height and survival of shortleaf, loblolly, Virginia
  - After 6 yrs, shortleaf 5 ft tall!
Shortleaf Pine’s Tolerance is Tested

• Conditions not suitable for shortleaf pine:
  • Compacted & poorly drained soils
  • High Ca/ pH soils
  • Very low soil nutrients
  • Excessively well-drained
  • Heavy Competition/ shade in early stages of growth
Why Shortleaf Pine?

- High Quality Wood Products
- Wildlife Habitat & Diverse Ecosystems
- Resilient
- Diverse Stands
- High Quality Wood Products

Ron Masters
Shortleaf Pine—Wide Range (Lawson, 1990)

- 1 of 4 major commercial species in SE
- 22+ state range (440,000 square miles)
- Wide precipitation range (40-60 in/yr)*
- Wide temperature range (48-70° F)*
- Wide elevation range (10-3,000 ft)

*average annual

Surface mining range

Shortleaf Pine Range (Little)

Little (1971)
Shortleaf Pine—Suited to Diverse Sites
(Lawson, 1990)

- Adapted to variety of soils
  - Shallow to deep, well-drained
  - Sandy & gravelly clay-best
  - Tolerates dry and low-nutrient soils
  - Lower pH preferred
- Adapted to a variety of sites
  - S and W aspects
  - 600-2,500 ft elevation
- Occurs in 18 SAF forest cover types
- Growth Rate
Shortleaf Pine—Resilient (Lawson, 1990)

Forest Health

- Fire, drought, wind-throw, and ice tolerant
- Fusiform rust resistance
- Fire scar resistance
- Susceptible to Nantucket pine tip moth, annosum root rot (low/no SPB susceptibility in mine range)

Prescribed burn
Tennessee
Clarence Coffey

Shortleaf sprouts after top-kill

Ice damage on shortleaf
North Carolina
Rob Evans
Shortleaf Pine—High Wood Quality

- 80-100 ft tall, 2-3 ft. diameter
- 4-7 growth rings/ inch
- Straight and low taper
- Small & confined knots
- Thin bark/ higher volume
- Sawtimber (lumber, plywood, pulpwood) & poles

175 year old shortleaf core—B. Pickens, NCFS
Shortleaf Pine - Wildlife (Masters, 2007)

- Seeds - food source for birds and squirrels
  - Preferred by Bobwhite quail
- Heartrot trees utilized by RCW
- Canopy provides habitat
  - Important winter protection in deciduous forests
- Savannah and Woodland management
  - Improve wildlife food and shelter
  - Habitat attracts: deer, turkey, quail, songbirds, and more
Shortleaf Pine on Reclaimed Mining Sites: Management Recommendations

- Site and soil selection
- Site Preparation
- Quality seedling selection
  - Containerized seedlings
  - Nursery list (website)
- Competition control
  - Low height herbaceous ground cover
  - Prescribed fire (generally used)
    - Every 3 years (regular disturbance)
    - 8-15 years (survival & recruitment in overstory)

Clarence Coffey
Shortleaf Pine on Reclaimed Mining Sites: Management Recommendations

- Planting density
  - Generally, 681 trees/ac (even age stand)
  - Increased wildlife & vegetation diversity
    - Savanna (30-45 sq. ft./ac)
    - Woodland (45-70 sq. ft./ac)
  - Pasture & timber (silvopasture)
    - 100-400 trees/ac
- Mixed stands (shortleaf-oak)
  - Fire management (compatible species)
    - Chestnut, white, black, post, chinkapin, bur, and white oak
    - Locust and hickory
Shortleaf Pine - Financial Assistance

Cost share and grant

- NRCS-EQIP
- State programs
- International Paper & National Fish and Wildlife Foundation ($743,000)
  - Grant to restore Cumberland plateau forests (TN, KY)
  - Shortleaf forest
Addressing Shortleaf Decline

Forest History Society Images
Addressing Shortleaf Decline

- 53% reduction since 1980
- Greatest reduction east of the Mississippi river
- Why?
  - Land use change, species preference, forest health, fire suppression

Percent change of shortleaf (> 1” diameter) on FIA plots from 1980 to 2013. *FIA data-USFS*
Addressing Shortleaf Decline

2007-2015: Partnerships, research, workshops & symposia supporting shortleaf restoration
2013: Shortleaf Pine Initiative, Director Mike Black
2015: Shortleaf Restoration Plan & website
Future:
  Research
  Tree Improvement
  Diverse management demonstration sites
  Financial assistance
Shortleaf Pine - Conclusion

• Shortleaf not right for all sites
• Will need improved soil/site conditions
• Can be planted with other desired timber species
• Resilient tree, but needs some management (competition control)
• Great timber quality and wildlife benefits
• Financial assistance to support its restoration
References


Thank you. Questions?

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**Shortleaf Pine Initiative**

*Draft website: shortleaf.sref.info*

*Feedback is welcome!*