Results of Nursery Survey *Bareroot*

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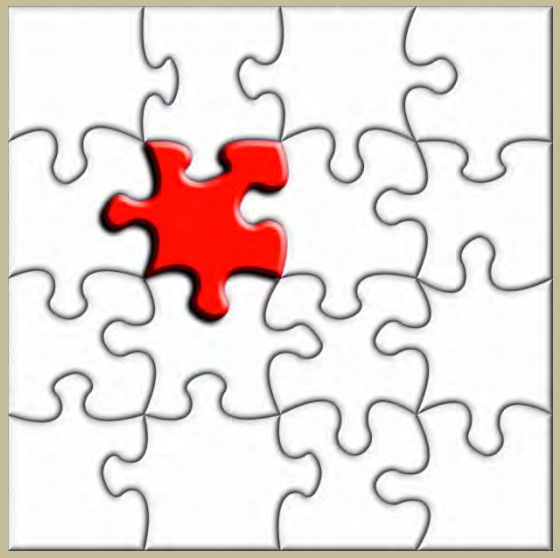
Background to Nursery Survey

Previous Surveys:

- **1954** Abbott – Forest Tree Nursery Practices. 1956. *The American. Nurseryman.* Survey of all bareroot nurseries in US.
- **1964** Abbott & Eliason – Forest tree Nursery Practices in the United States. 1968. *JOF*. Survey of all bareroot nurseries in US.
- **1974** Abbott & Fitch – Forest Nursery Practices in the United States. 1977. *JOF.* Survey of all bareroot nurseries in US.
- **1980** Boyer & South – Forest Nursery Practices in the South. 1984. *SJAF*. Survey of bareroot nurseries 13 southern states.

What has happened in the last 30 years?????



- We have a good estimate on production.
- Missing changes in nursery practices, such as:
  - Methods of sowing
  - Cultural practices
  - Pesticides
  - Pests
  - Impact of government regulations

Nursery Response

- Survey mailed:
  - Bareroot – 40
  - Container – 17
- Geographic Region - 13 states of the USDA Forest Service's Southern Region
- Surveys Returned: 79%
  - Bareroot – 35
  - Container – 10
- Percent Coop/NonCoop 73%/27%

Oldest Bareroot Nursery Reporting

1980

- Miller State Nursery - AL (1934)
- Ashe Federal Nursery – MS (1936)

2012

- Forestry Regeneration Center, Oklahoma Forestry Service, Goldsby, OK(1947)
- Superior Trees, Lee FL (1953)
- Claridge Nursery, Goldsboro, NC (1954)

Hardwood Producers

1980

- 50% of state nurseries produce hardwoods
- 11% of other nurseries produce hardwoods

2012

- 67% of state nurseries produce hardwoods
- 50% of other nurseries produce hardwoods

Total Production

1980

- 1.3 billion Bareroot
- 3.5 million Container
- 15.4 million Hardwood

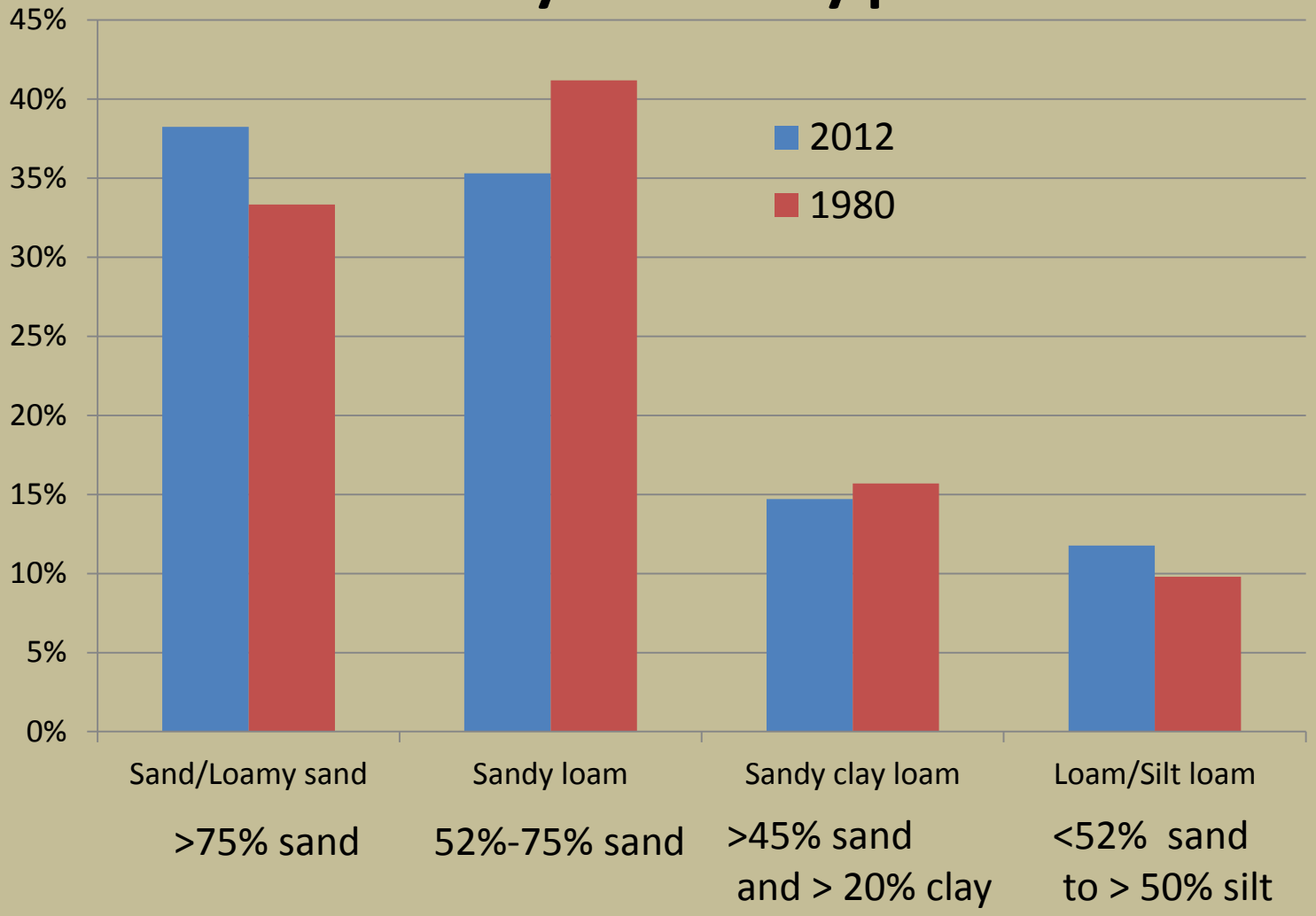
- 77% Loblolly
- 13% Slash
- 0.8% Longleaf
- 1% Shortleaf

2012

- 718 million Bareroot (-45%)
- 179 million Container (+5014%)
- 35 million Hardwood (+127%)

- 75% Loblolly
- 9% Slash
- 13% Longleaf
- 0.2% Shortleaf

Nursery Soil Types



Bed Protection

1980

- Mulch on beds - 98%

2012

- Mulch of bed - 52%
- Soil Stabilizer - 70%
- 4 nurseries use both

Organic Matter Amendment

1980

- 66% add amendment
- Sawdust 54%
- Bark 24%
- Frequency:
  - Annually - 12%
  - Every 2 - 34%
  - Every 3 – 8%
  - Every 4 – 12%

2012

- 85% add amendment
- Sawdust 48%
- Bark 52%
- Frequency:
  - Annually - 22%
  - Every 2 - 22%
  - Every 3 – 26%
  - Every 4 – 29%
- Average organic matter - 1.68%

Fumigation

1980

- MBr – 88%
- Average cost - $781/a
- Frequency - 60% each year
- Fall/Spring = ~equal
- No fumigation – 6%
- Type - 98:2

2012

- MBr – 97%
- Average cost - $2032/a
- Frequency – 18% each year
  56% every 2 years
- Fall – 68%
- No fumigation – 0%
- Type – 80:20 (82%)

Fumigation

- 88% have made no decision as to an alternative they would use without MBr

Sowing Pine

- 62% stratify seed on site
- 80% use latex in stratification
- Sowing Densities
  - Loblolly & Slash – 24/sq ft
  - Longleaf – 13/sq ft

Sowing - Pine

- 56% begin sowing mid-April
- Gravity Drop – 25/34
- Vacuum – 13/34
- Average sown/day (in terms of seedlings)
  - (Nursery > 20MM) - 5.4MM/day (average of 8 days)
  - (Nursery < 20MM) – 1.8MM/day (average of 4 days)
- Nursery > 20MM – using gravity drop sows an average of 700,000 more per day than vacuum

Sowing pine

- Loblolly 1st gen 8%
  2nd gen 56%
  3rd gen 16%
  Adv. 19%
- Slash 1st gen 9%
  2nd gen 74%
  3rd gen 5%
  Adv. 11%
- Longleaf Wild 91%
  Improved 9%

Monitor Soil Moisture for Irrigation

1980

- 31% do monitor
  - Touch & Feel - 57%
  - Tensiometer – 21%
  - Electric Probe – 14%

2012

- 100% monitor
  - Touch & Feel - 88%
  - Tensiometer – 9%
  - Electric Probe – 9%

Irrigation – inches/wk

	Median	Range
Germination	1.0”	0.5” to 2.5”
Growing	1.0”	0.25” to 4”
Lifting	0.5”	0” to 2”

Irrigation

- 15% irrigate at night (44% have considered it)
- 39% apply irrigation based upon a specific air temperature to “cool” seedlings.
- 61% do not have a specific temperature.

Weeds – The big three

1980

- Spurge - #17 of 17 weeds
- Nutsedges - #2 of 17 weeds
- Morning glory - #5 of 17 weeds

- Crabgrass was #1

2012

- #1 – Spurge
- #2 – Nutsedges
- #3 – Morning glory

Weed Control

- 44% use a shielded herbicide sprayer
- 29% use a wick-wiper herbicide applicator
- 58% do not tank mix herbicides
  - Those that tank mix – Goal + grass herbicide most common

Herbicides in crop

1980

- Goal – 73%
- Modown 67%

2012

- Goal - 97%
- Goal Tender – 35%
- Cobra – 59%
- Reflex – 32%
- Sethoxydin – 38%
- Fusilade – 26%

Fungicides

1980

- Fermate – 75%
  (applications: 2-54/season)
- Bayleton – 25%
  (applications: 1-5/season)
- Captan - 33%
- Benlate – 18%

2012

- Bayleton – 71%
- Proline – 29%
- Cleary's 3336 – 29%
- Captan – 6%

Seedling Mortality

74% of the nurseries responding
indicated they lose <3% in an average year.

1980

1. Weeds & weeding
2. Early heavy rains
3. Post emerg. Damping-off
4. Heat or water stress

2012

1. Post emerg. Damping-off – 26%
2. Animals – 15%
3. Herbicides – 13%
4. Birds*; Pre emerg. Damping off; rain splash – 8% each

* In 1980 birds were not a problem
but was a leading cause of mortality in 1930

Fertilizer

- Source
  - 60% Some form of Urea
  - Potash
  - DAP
  - 34% - Individual nutrients
- Granular – 75% either alone or in combination with water soluble
- Who handles recommendation?
  - #1 - Davey et al 49%
  - #2 - in-house

Pine seedling culture

- 88% top prune
  - 72% start in July
  - 68% top prune 2 or 3 times
  - Top 3 reasons to top prune:
    1. Improve root: shoot ratio
    2. Increase crop uniformity
    3. Control height growth
  - 74% receive 1-3 customer questions about multiple leaders

Pine seedling culture

- 90% root prune
  - 87% undercut their crop
  - 29% root wrench their crop
  - 90% lateral prune their crop
- In preparation for lifting, 48% of nursery undercut or wrench seedlings 2 times
- In preparation for lifting , 74% of nursery lateral prune 1 time.

Lift/Pack/Ship

- 79% Shed pack
- 64% Machine lift, 36% Hand lift
- 47% use Love full-bed lifter

  27% use Fobro
- On Roots:
  - Hydrogels 79%
  - Clay – 24%

Lift/Pack/Ship

- Packing:
  - 100% bags – 45%
  - 100% bundles – 18%
  - 100% boxes – 6%
  - Combination - 30%

- Calculate chilling hours? 66% yes

Lift/Pack/Ship – Target RCD

	Average RCD
November	4.6 mm
December	5.0 mm
January	5.4 mm
February	5.5 mm

Cover Crop

- Only cover crop – 53%; Combination – 47%
- Primary reason for fallow ground – address weed problems
- #1 summer cover crop – Millet
- #1 winter cover crop – Rye
- #1 herbicide in cover crop - Glyphosate

Labor

- The primary labor source during sowing and in the summer are permanent employees.
- When non-permanent employees are used, during sowing and in the summer local labor sources are used over migrant.
- During lifting, permanent, local and migrant are used equally.

Labor

Percentage of temporary labor used by season

	Percentage Used
Sowing	9%
Summer	18%
Lifting	73%

Labor

- 91% of nurseries have not changed their source of labor in last 3 years.
- 3 primary concerns with the use of temporary labor are:
  1. Availability when I need them.
  2. Cost of labor
  3. Lack of attention to detail
  3. Consistent attendance

THANK YOU!!!

- For your participation in the survey
- Your response will remain confidential.
- Next step – prepare a paper comparing 2012 results with 1980 results. Also how regulations have impacted nursery culture.