Cutting Planting Costs – Draw the Lines, Do the Math:

Stocking and spatial arrangement considerations during regeneration.

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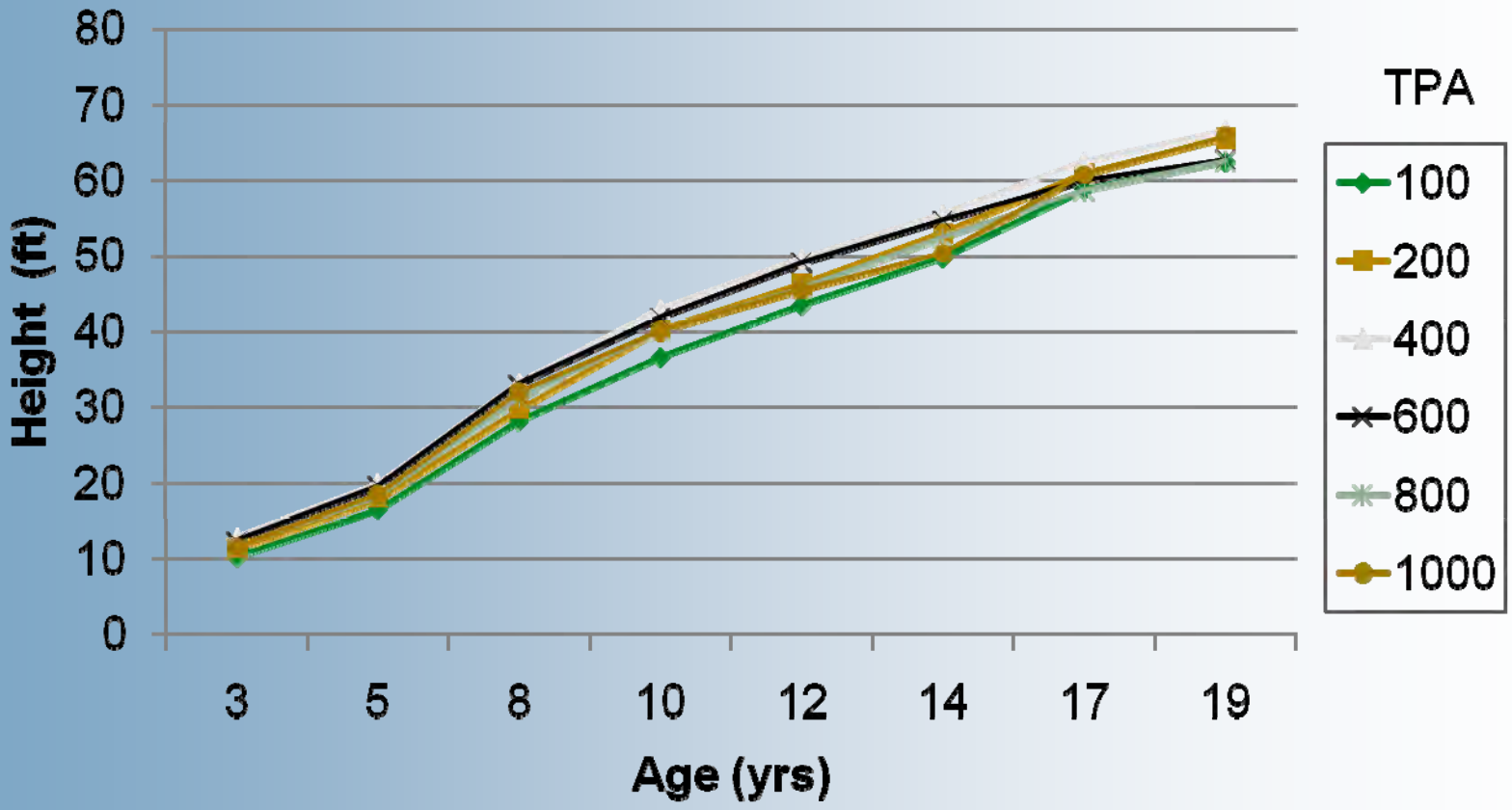
Planting Density

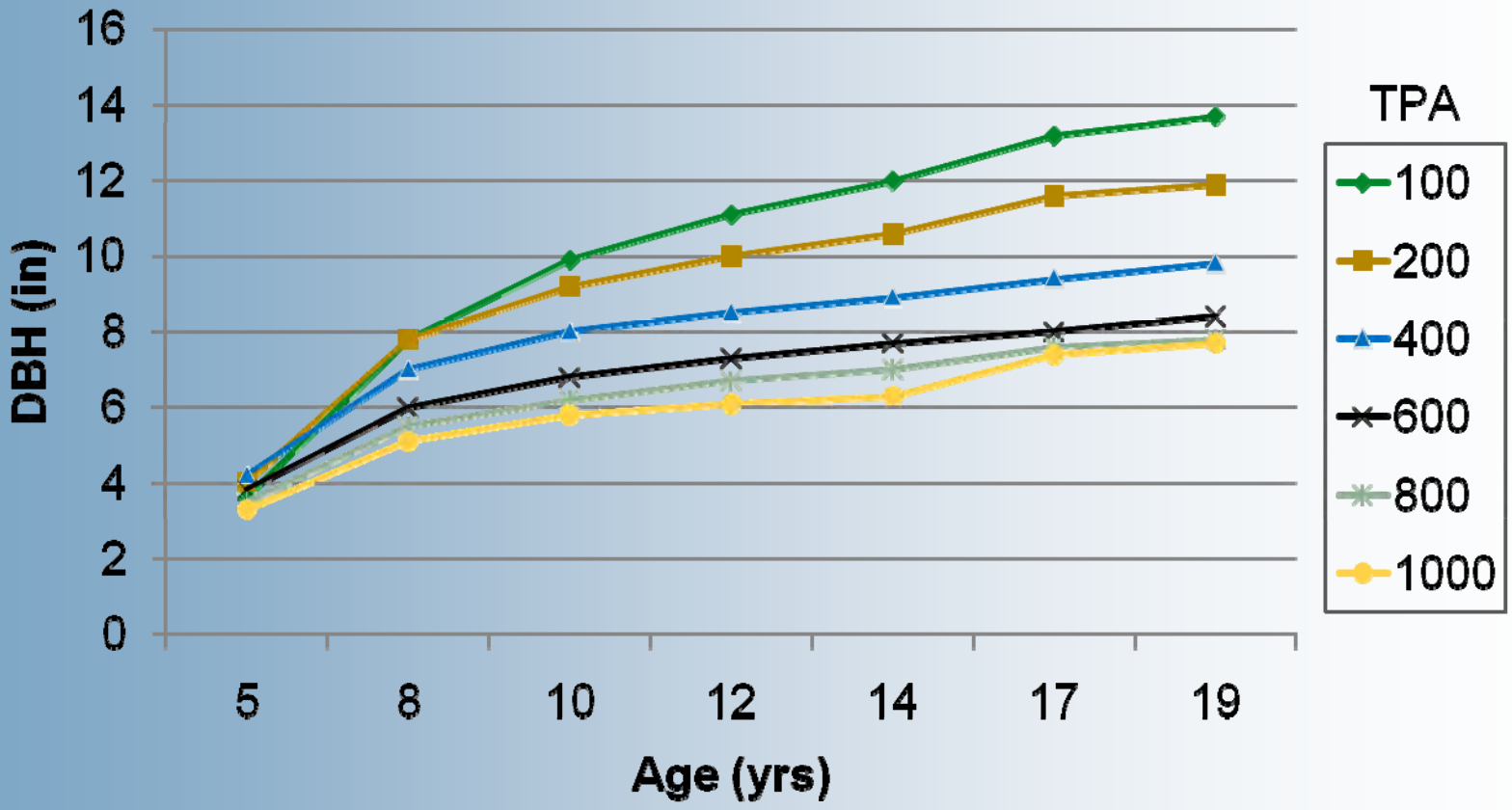
- Three Rules of Stand Dynamics
  - Stand height at a given age is a function of species & site productivity
  - With inter-tree competition, tree diameter is a function of the space per tree
  - Shortly after crown closure, volume (i.e. yield) is relatively equal across a wide range of tree densities

Average Height



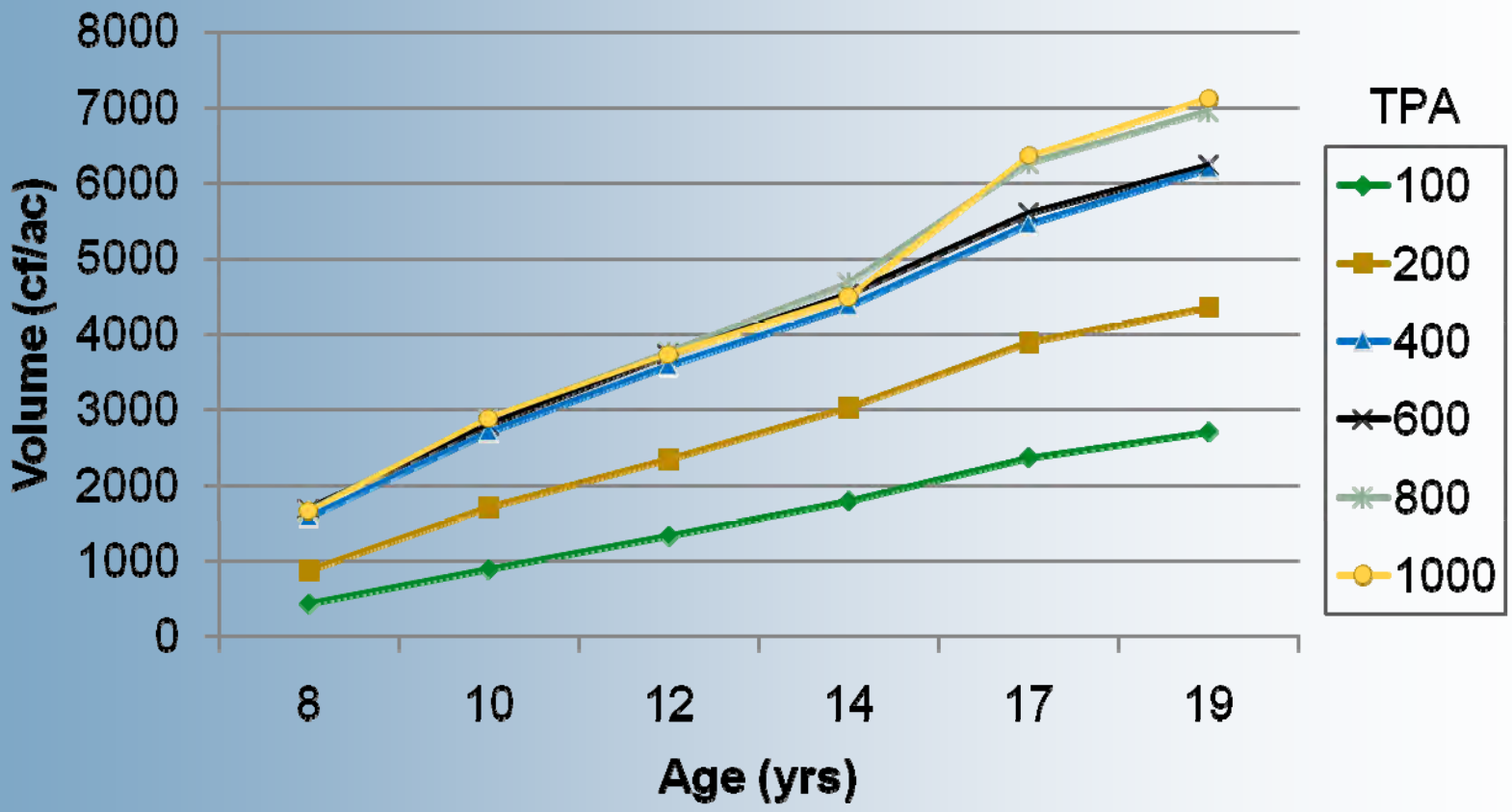
Source: Harrison, W. M. 2002. The B. F. Grant Spacing Study: Results through Age 19. PMRC Technical Report 2002-6. 25 pp.

Diameter per Tree



Source: Harrison, W. M. 2002. The B. F. Grant Spacing Study: Results through Age 19. PMRC Technical Report 2002-6. 25 pp.

Volume per Acre



Source: Harrison, W. M. 2002. The B. F. Grant Spacing Study: Results through Age 19. PMRC Technical Report 2002-6. 25 pp.

Regeneration Costs

- Components
  - Site preparation
    - Chemical – Air, ground, hand application
    - Land Clearing – chopping, shearing, raking, mowing
    - Tillage – subsoiling, bedding
  - Planting
    - Labor
    - Seedlings
  - Herbaceous Weed Control

Planting Density Example I

Per Acre Costs of Planting 435 TPA vs 681 TPA

Broadcast Herbicide Site Prep - $70

Hand planting labor - $0.08 per tree

Seedlings - $70/ 1,000

	435 10x10	681 8x8
Site prep	$70.00	$70.00
Planting	$34.80	$54.48
Seedlings	$30.45	$47.67
Total	$135.25	$172.15

Reduces costs by $15.00 per 100 seedlings.

Rectangularity Study

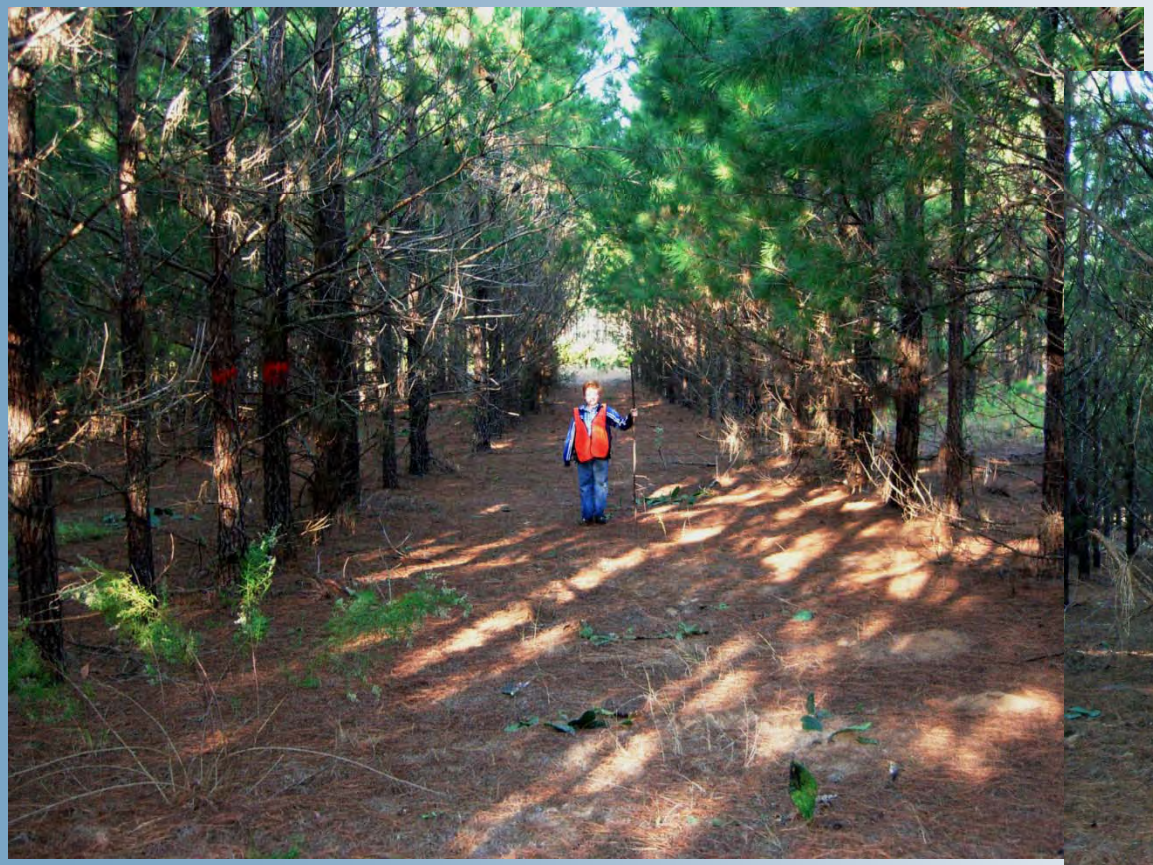
- Five degrees of rectangularity; ~600 TPA
  - 9-ft X8-ft spacing 1:1 ratio
  - 12-ft X 6-ft spacing 2:1 ratio
  - 15-ft X 4.8-ft spacing 3:1 ratio
  - 18-ft X 4–ft spacing 4.5:1 ratio
  - 24-ftX3-ft spacing 8:1 ratio
- Interested in:
  - Tree size over time
  - Volume
  - Branching characteristics

Study Layout

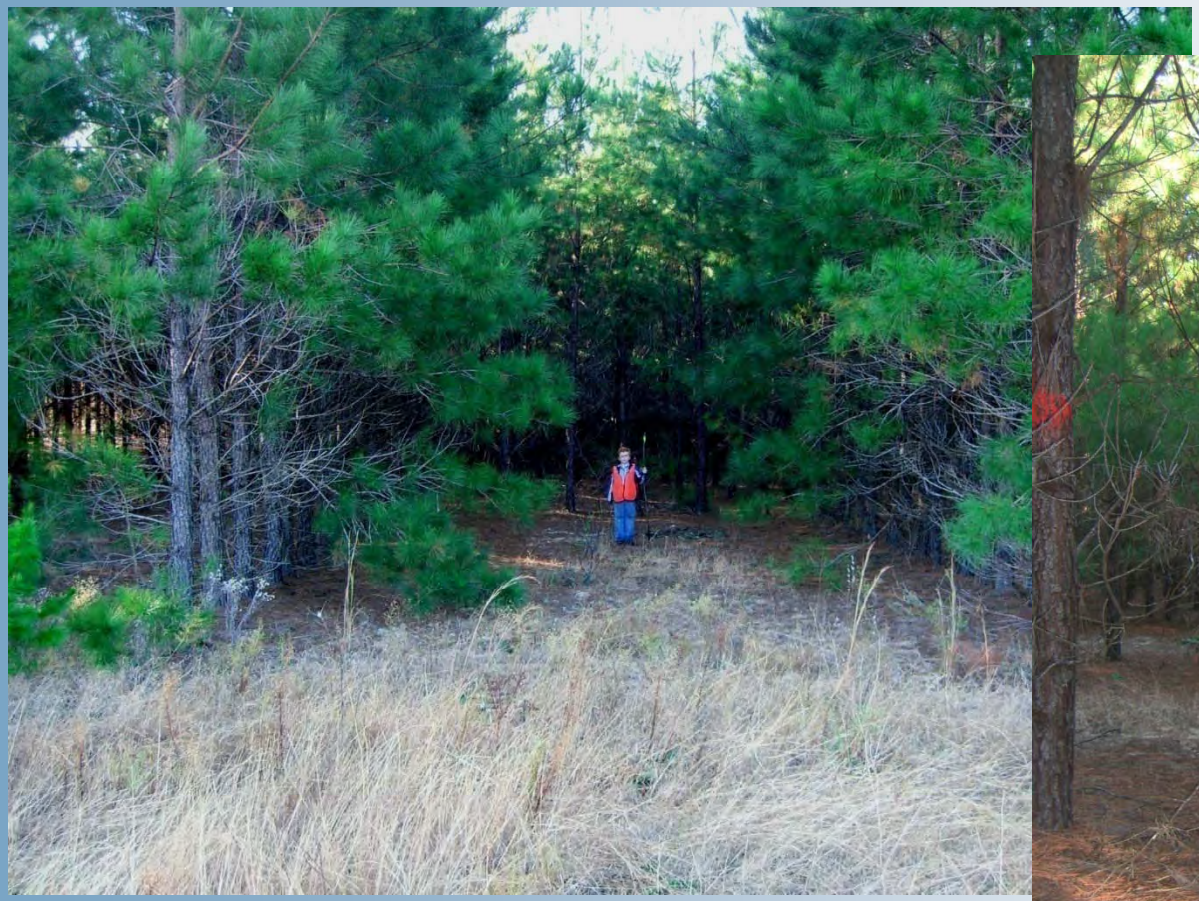
Treatments- 1:1 ratio, 9x8-ft

Treatments- 2:1 ratio, 12x6-ft

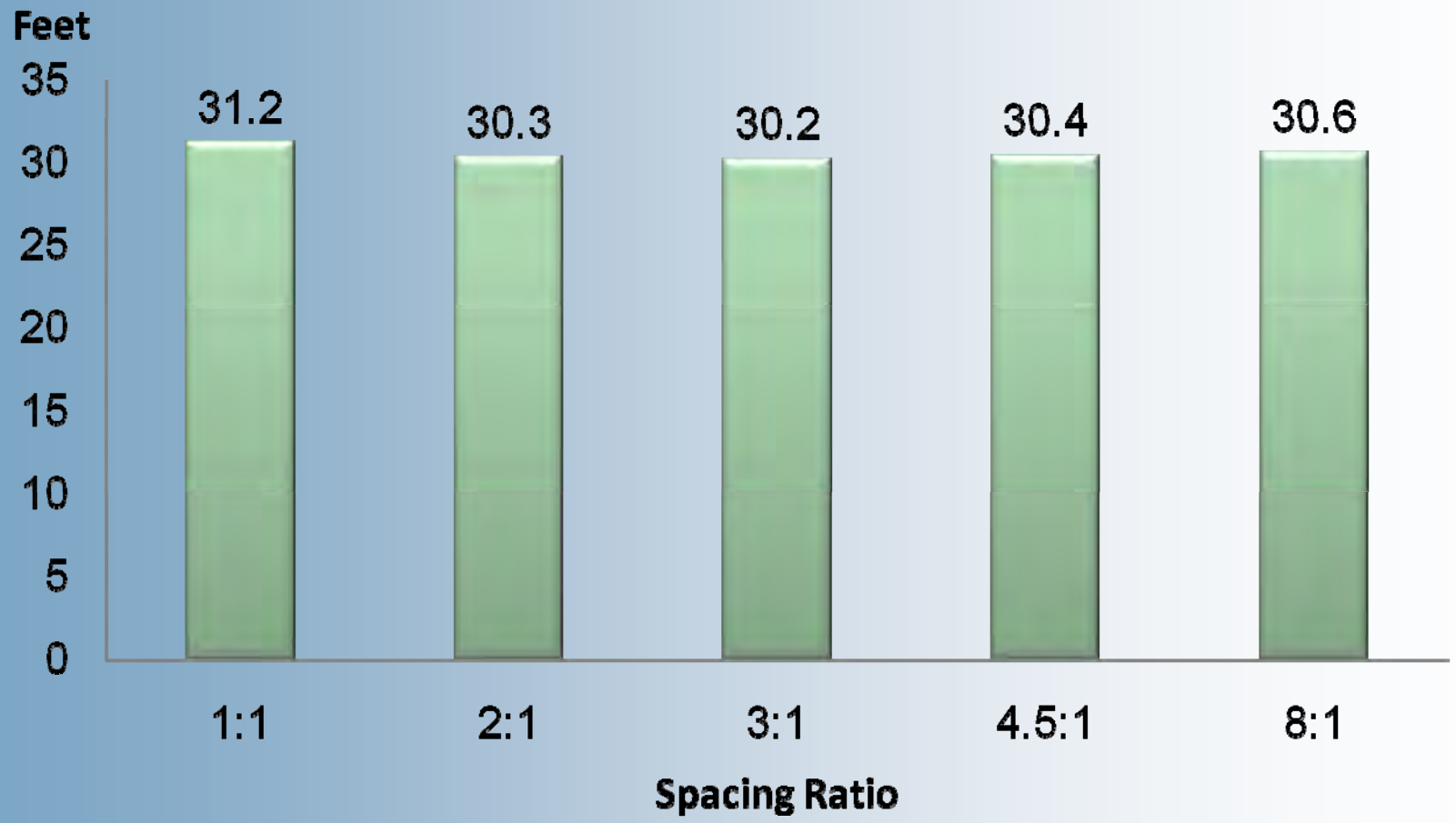
Treatments- 4.5:1 ratio, 18x4-ft



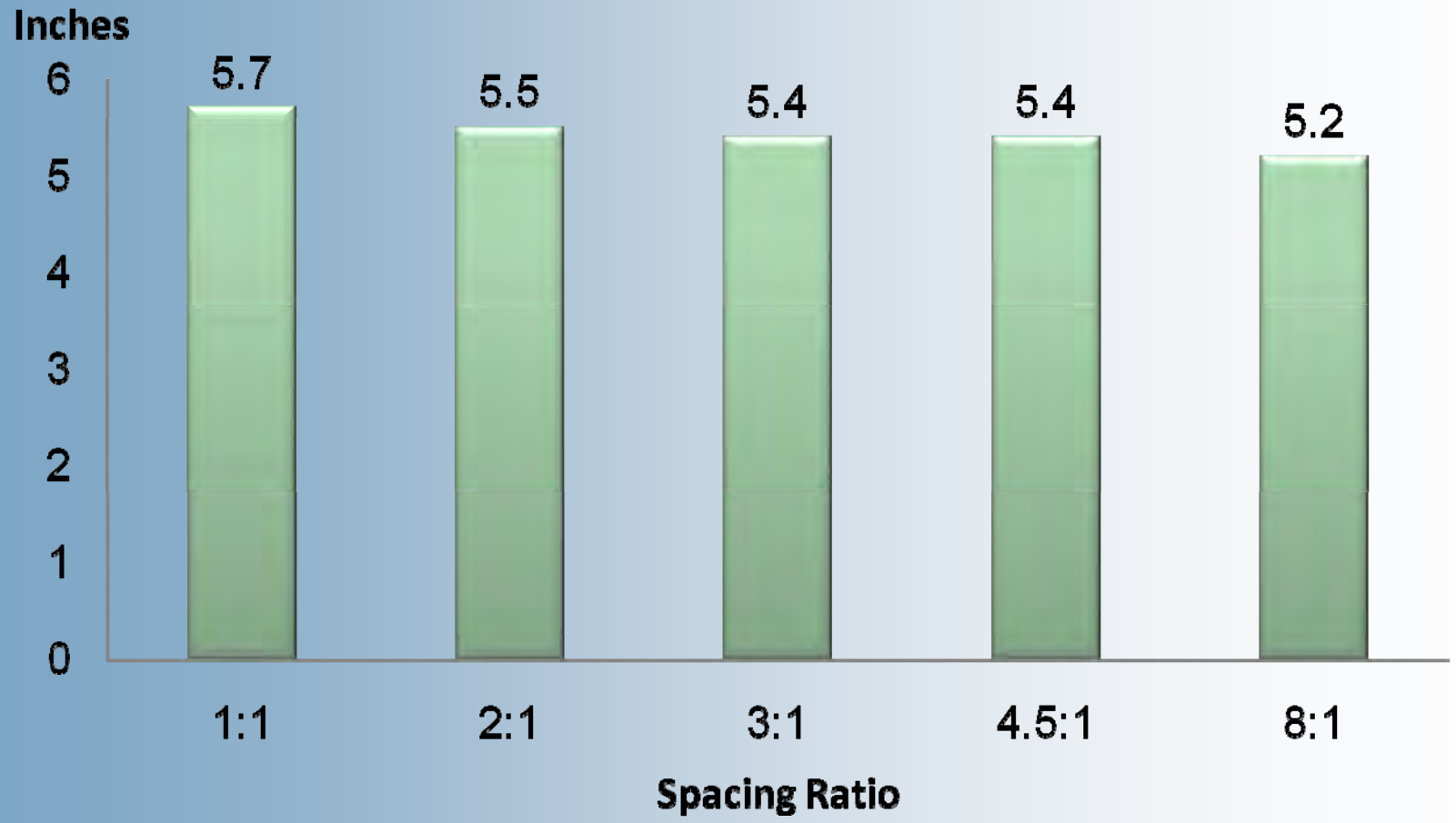
Treatments- 8:1 ratio, 24x3-ft



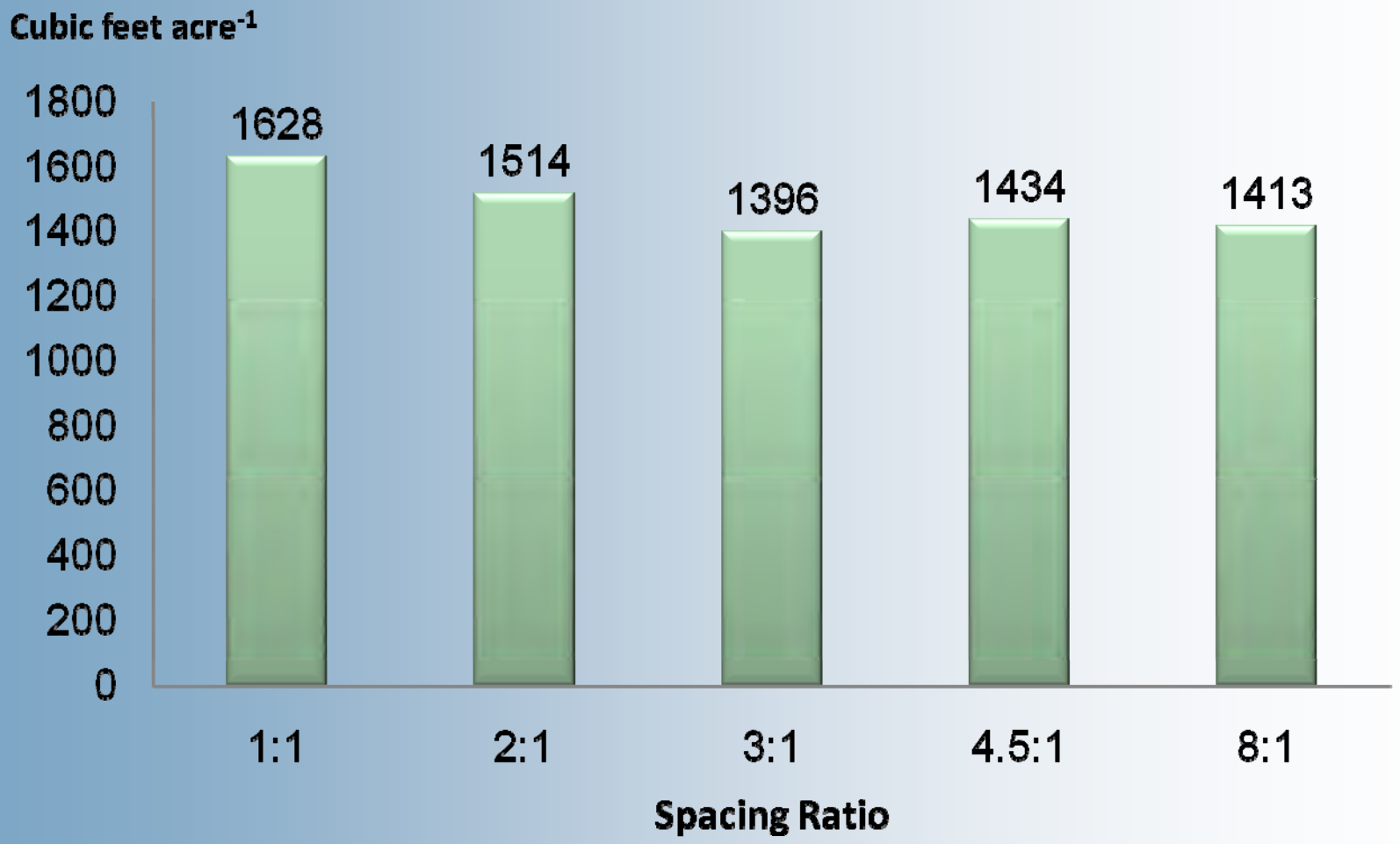
Total height



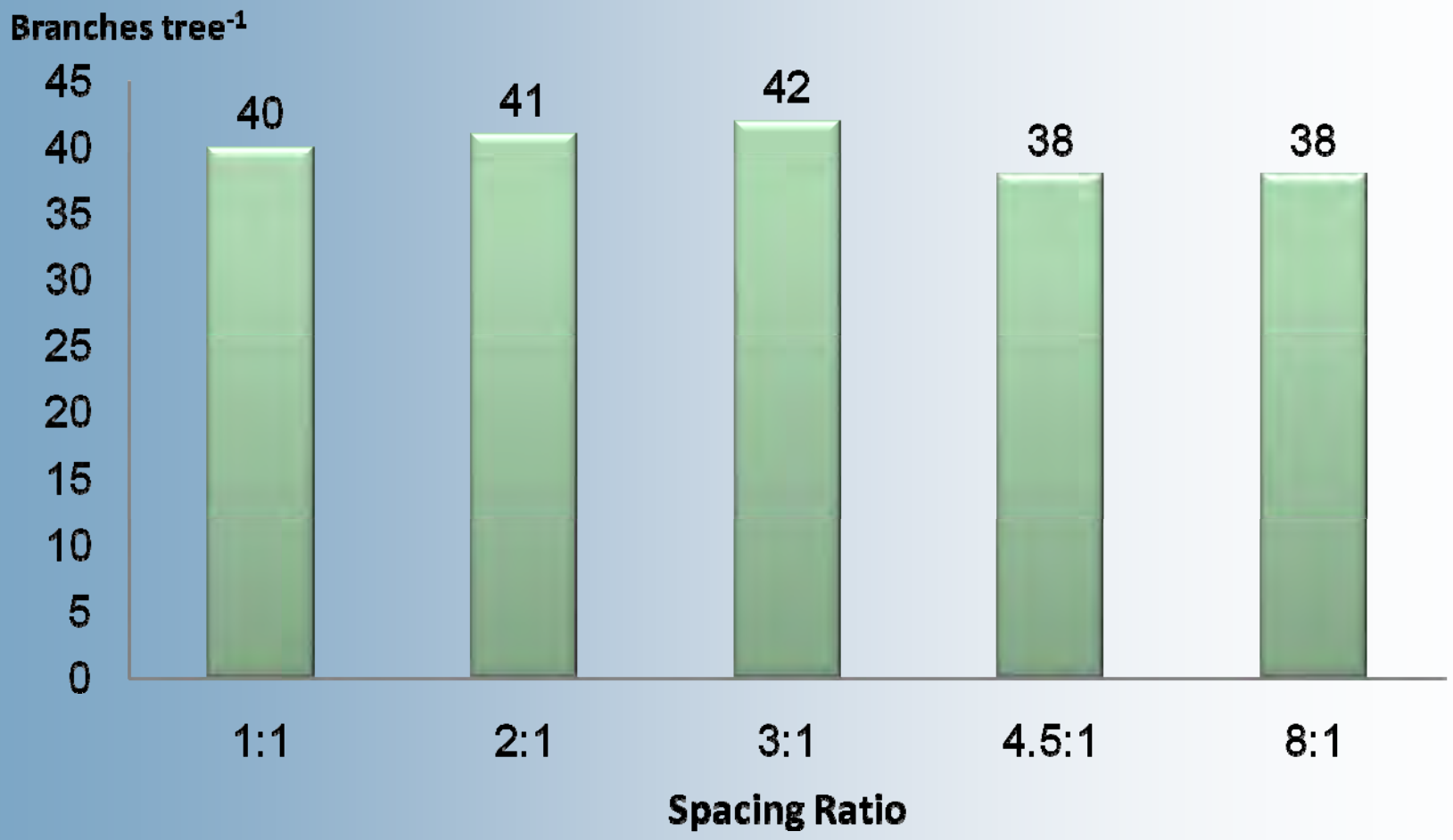
Diameter per tree



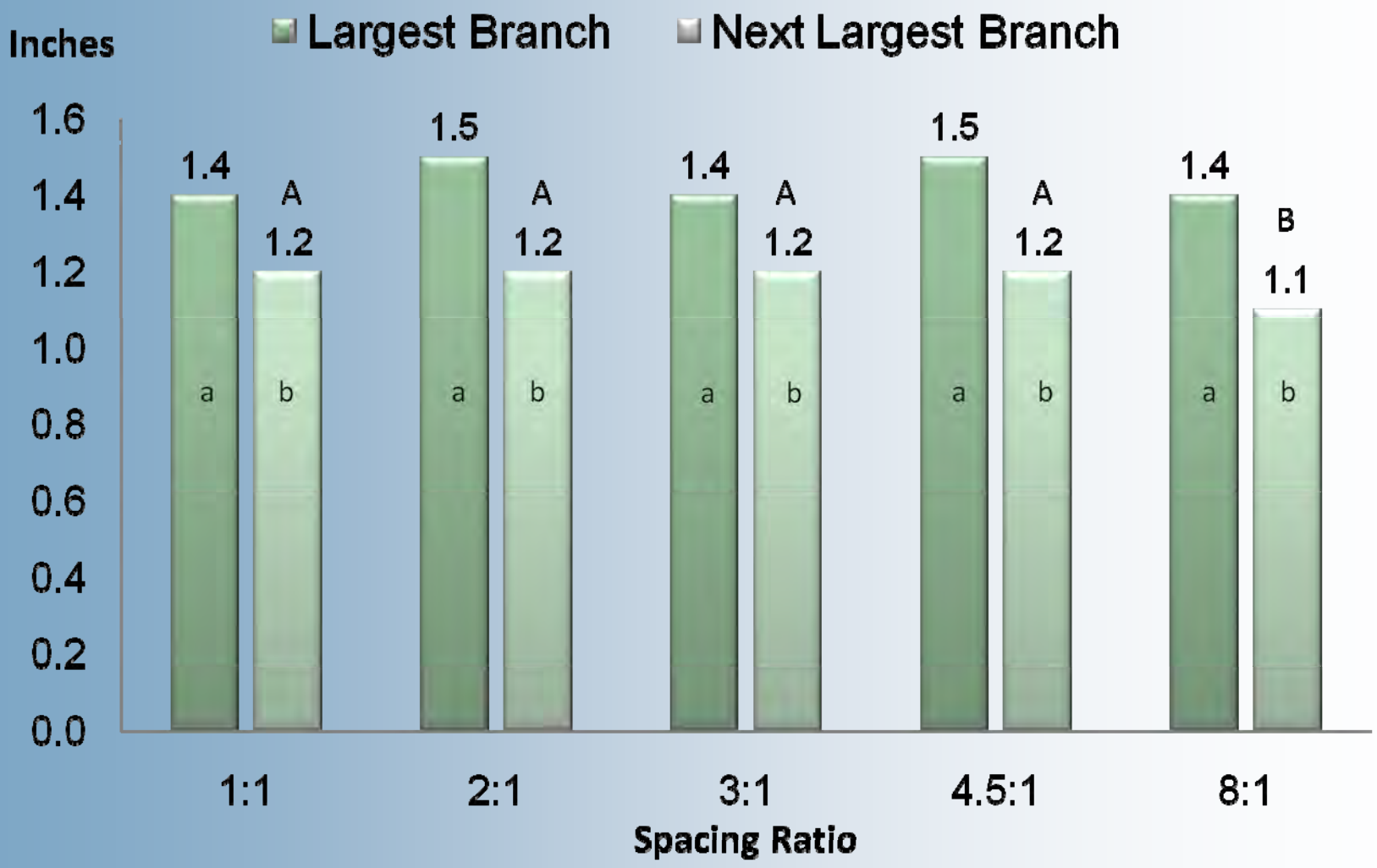
Volume per Acre



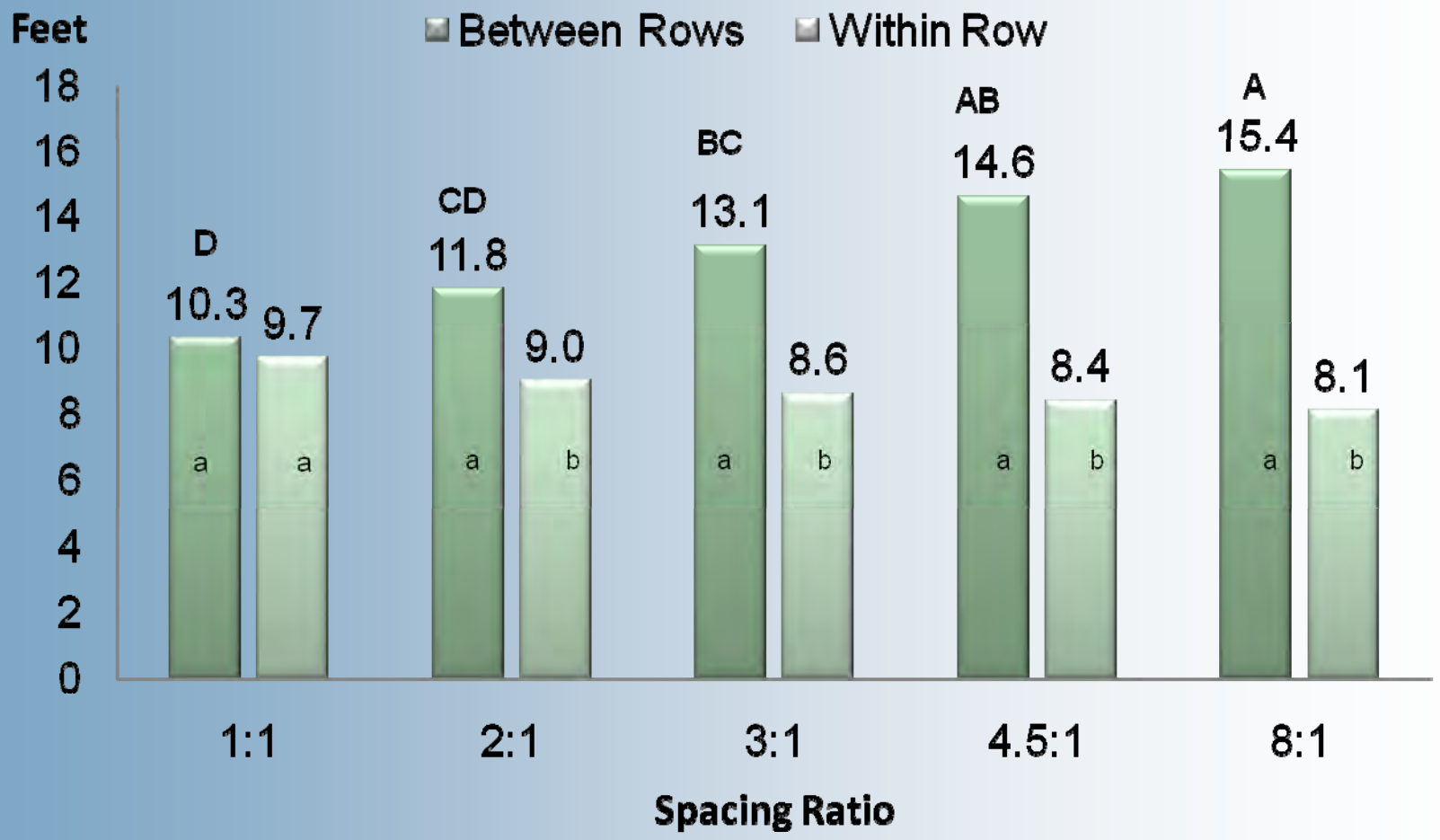
Number of Branches



Branch Diameter



Crown Width



Planting Density Example II

Per Acre Costs of Planting 435 TPA vs 681 TPA

- Broadcast Herbicide Site Prep - $70
- Bedding $100/acre @681 TPA
- Hand planting labor - $0.08 per tree
- Seedlings - $70/ 1,000

Site prep	435 10x10	681 8x8
Herbicide	$70.00	$70.00
Bed	$82.00	$100.00
Planting	$34.80	$54.48
Seedlings	$30.45	$47.67
Total	$217.25	$272.15

Reduces costs by $22.32 per 100 seedlings.

Wide Row Example

Per Acre Costs of Planting 16-ft row vs 10- ft row

Broadcast Herbicide Site Prep - $70

Bedding $100/acre @681 TPA

Hand planting labor - $0.08 per tree

Seedlings - $70/1,000

Site prep	454 16x6	435 10x10
Herbicide	$70.00	$70.00
Bed (row width)	$54.98	$82.00
Planting	$36.32	$34.80
Seedlings	$31.78	$30.45
Total	$193.08	$217.25

Reduces costs by $4.00 / 1-foot increase in row width.

Costs Reduction

In the last two examples regeneration costs have gone from $272 / ac to $193 / ac by making two simple decisions:

1. Reduce initial planting density: 681 TPA → 454 TPA
2. Utilizing wide rows: 8 feet → 16 feet

	454 16x6	681 8x8
Site prep		
Herbicide	$70.00	$70.00
Bed	$54.98	$100.00
Planting	$36.32	$54.48
Seedlings	$31.78	$47.67
Total	$193.08	$272.15

A difference of $79.00 29%.

In the end you will get same yield and better revenues because individual trees will be larger.

Make it work for you

Any treatment that is row oriented should cost less as row width increases.

- Machine planting
- Shearing, chopping, or mowing if only done in planting space
- Banded herbicide applications

Know how row widths will influence costs if contracting work.

Other Benefits of Wide Rows

- Facilitate thinning by allowing pure selection first thinning.
- Broader window for thinning on certain sites.
- Possible benefits of long period with open canopy.

Conclusions

- Regeneration Costs Lowered by planting fewer trees on wider row spacing.
- Yield is same, value is higher
- Other management and wildlife benefits are possible