



Coppicing evaluation in the Southeast U.S. to determine harvesting methods for bioenergy production

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Short Rotation Woody Crops

- ▶ Commonly used for biomass production
- ▶ Interests:
 - ▶ Great yields
 - ▶ Rapid production
 - ▶ Coppice regeneration

Coppice ability:



Challenge: Harvesting multi-stem trees:

- ▶ Current absence of specialized machinery.
- ▶ Generally time consuming.
- ▶ Lack of information.

Grabbing arm



Objectives:

- ▶ The objective of this study was to monitor coppicing development of SRWC in the southeastern United States.
- ▶ Specific goals:
 - ▶ To determine whether growth form and stem crowding of SRWC are affected by season of harvesting.
 - ▶ To examine how clump dimension could potentially affect subsequent harvesting operations in coppice stands.

Experimental sites:



Site description:

Eucalyptus urograndis (Florida): *Populus deltoides* (Arkansas):

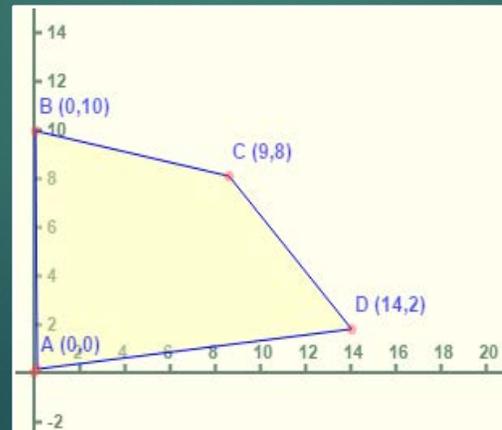
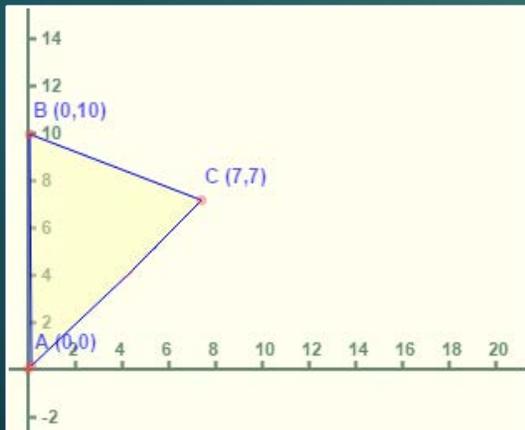
- ▶ Density: 728/acre
 - ▶ Tract size: ~1 Acre
 - ▶ Age of trees when harvested: 2 years
 - ▶ Harvesting dates:
(Winter plot): December, 2013;
(Summer plot): May, 2014
- ▶ Density: 820/acre
 - ▶ Tract size: ~1 Acre
 - ▶ Age of trees when harvested: 3 years
 - ▶ Harvesting dates:
(Winter plot): March, 2014;
(Summer plot): June, 2014

Coppice Development & Yield:

- ▶ Growth parameters: Height and DBH
- ▶ Stump survival
- ▶ Stem crowding and mortality of stems

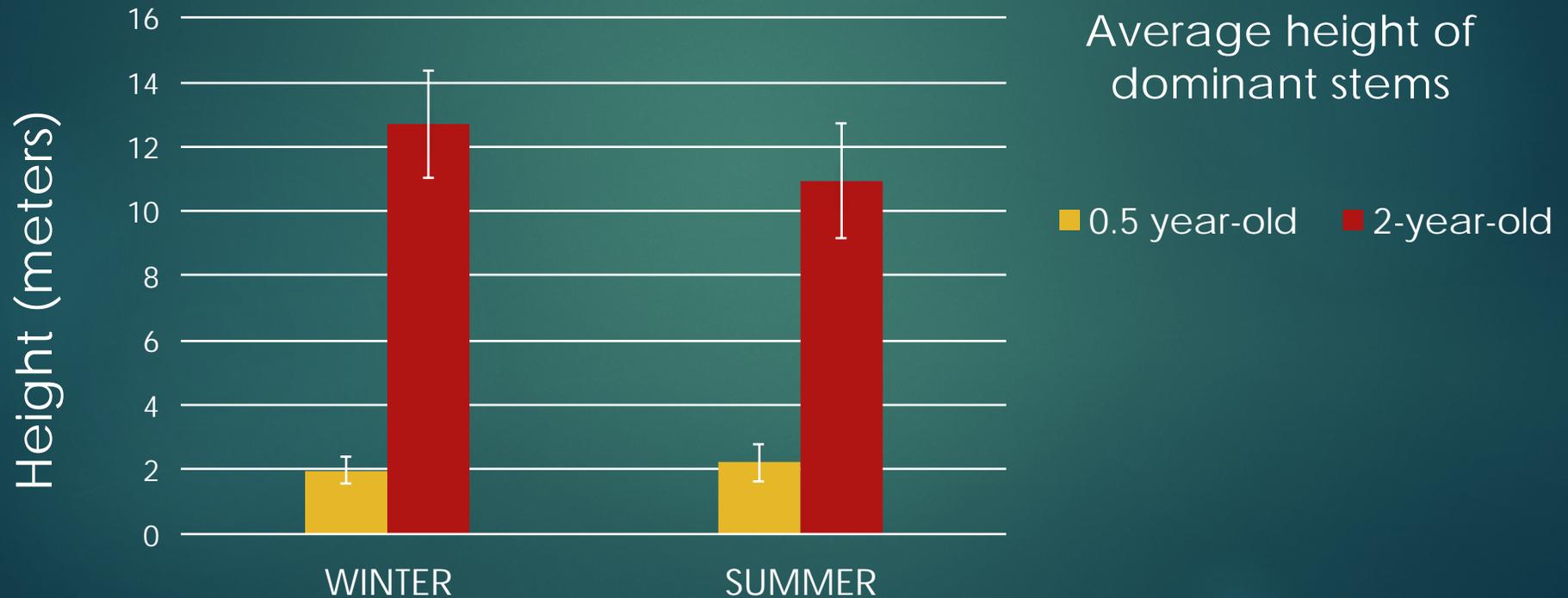
Clump Dimension Analysis

- Data collected during second evaluations: 2-year-old
- 2-dimensional ruler (i.e. X & Y) for data collection
- Each dot represent one stem growing from the same stump.



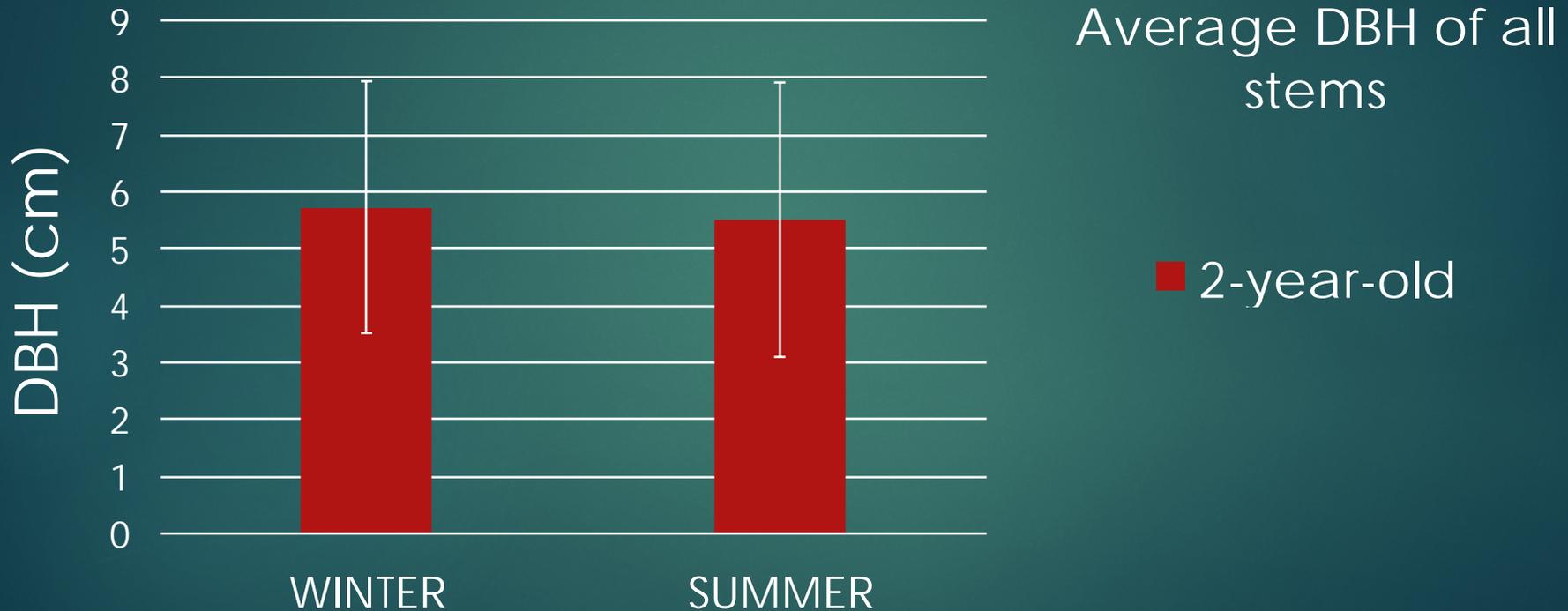
Results: Growth parameters

Eucalyptus urograndis:



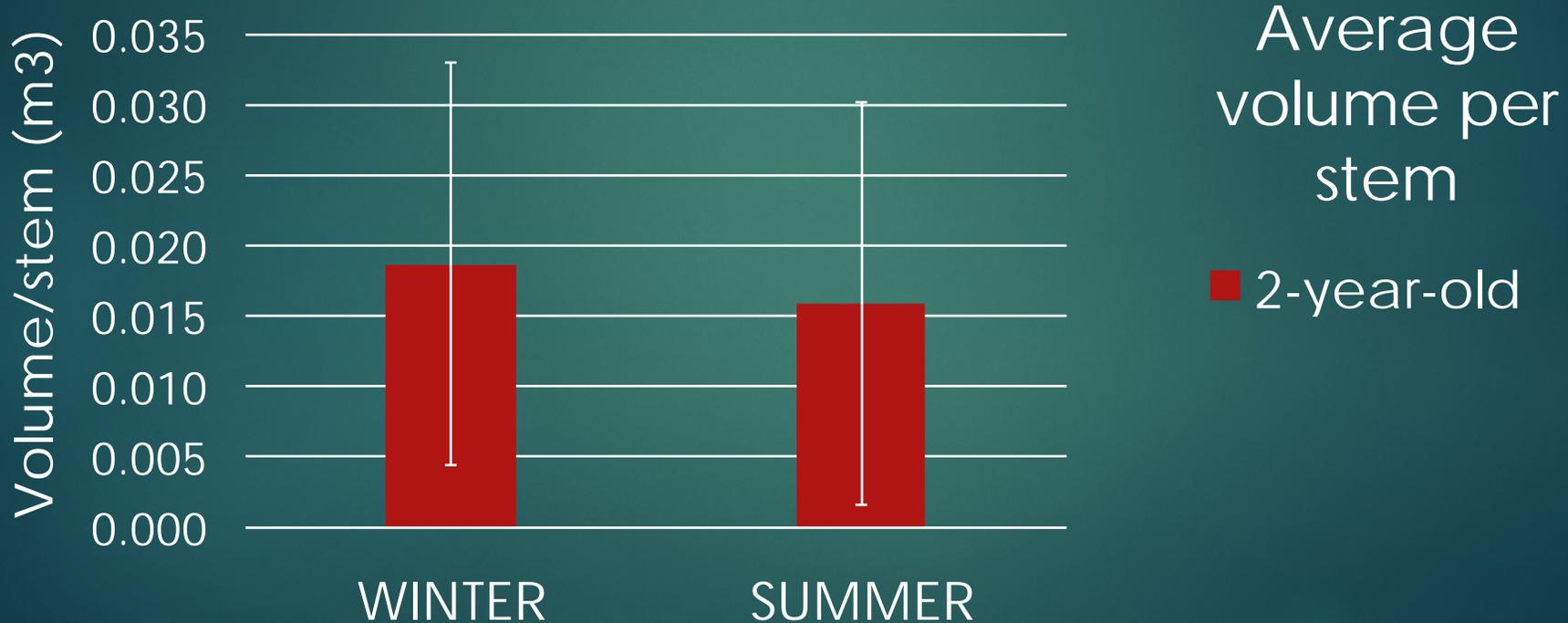
Results: Growth parameters

Eucalyptus urograndis:



Results: Growth parameters

Eucalyptus urograndis:



Results: Stump mortality

Eucalyptus urograndis:

Winter harvest ~0% mortality

Age	Live stumps	Live stems
Harvesting	431	431
6-month-old	395	1673
2-year-old	393	1042

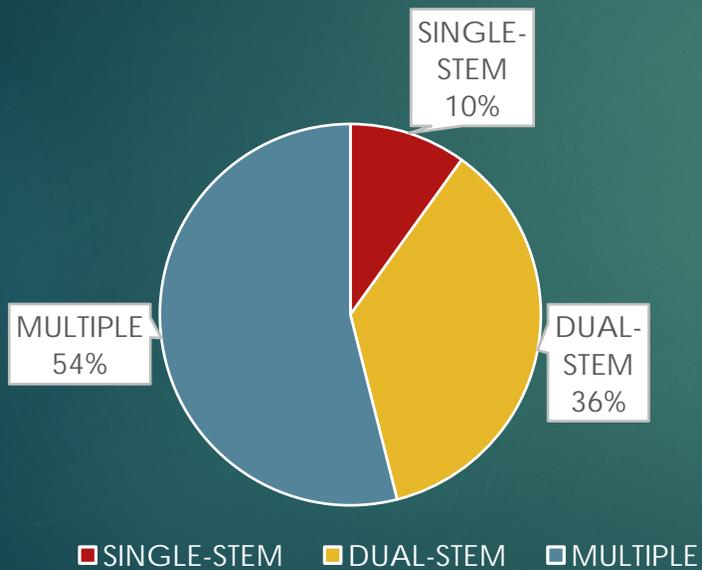
Summer harvest ~0% mortality

Age	Live stumps	Live stems
Harvesting	435	435
6-month-old	331	1515
2-year-old	329	835

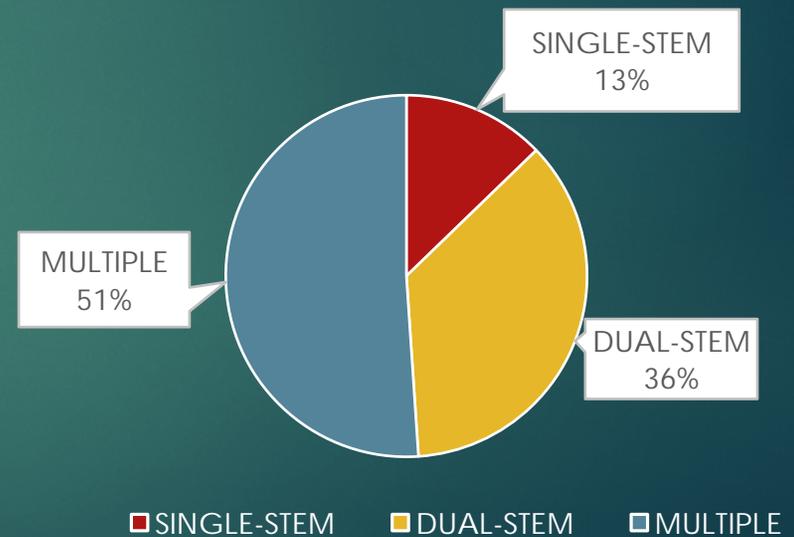
Results: Stem crowding

Eucalyptus urograndis at age 2:

Winter harvest plot



Summer harvest plot



Results: Stem dispersion

Eucalyptus urograndis at age of 2:

Winter harvest plot

Operation	Distance apart (cm)
Max	135
Median	33
Mean	35
Mode	25

Summer harvest plot

Operation	Distance apart (cm)
Max	118
Median	33
Mean	34
Mode	25

Challenging

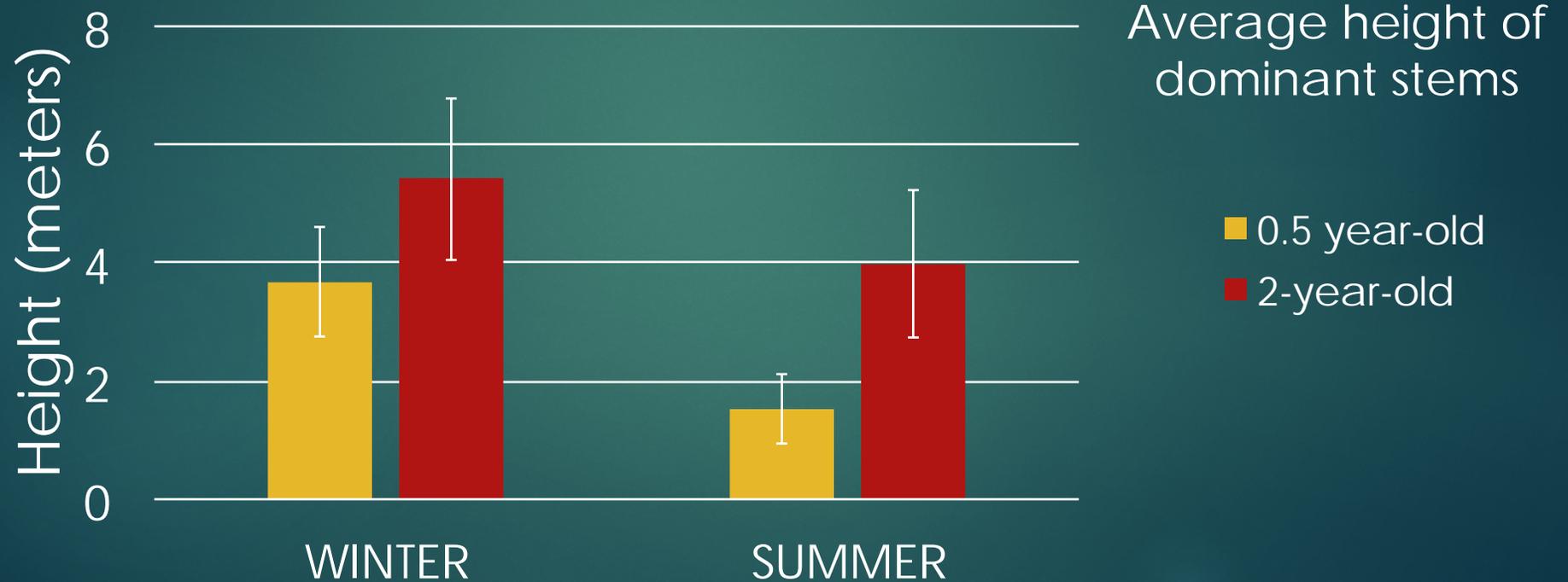
Criteria	Stump counting
> 76 cm	4
Percentage	1%

Challenging

Criteria	Stump counting
> 76 cm	4
Percentage	1%

Results: Growth parameters

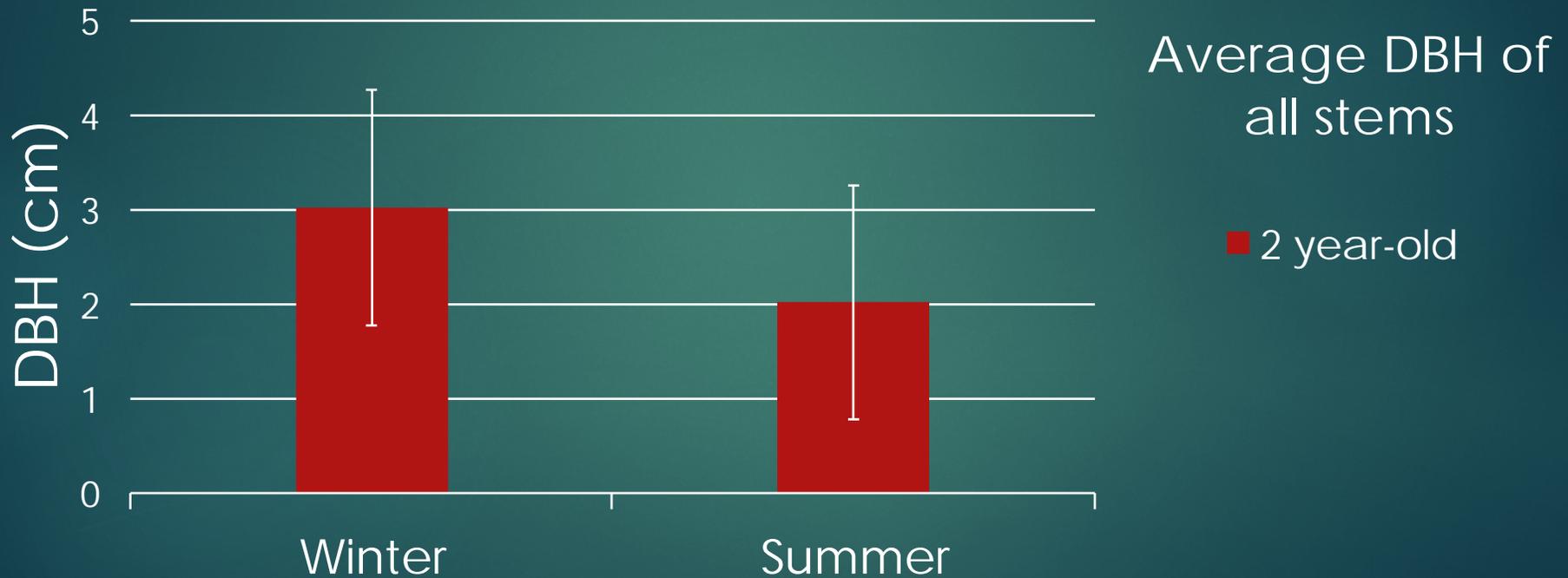
Populus deltoides:



Results:

Growth parameters

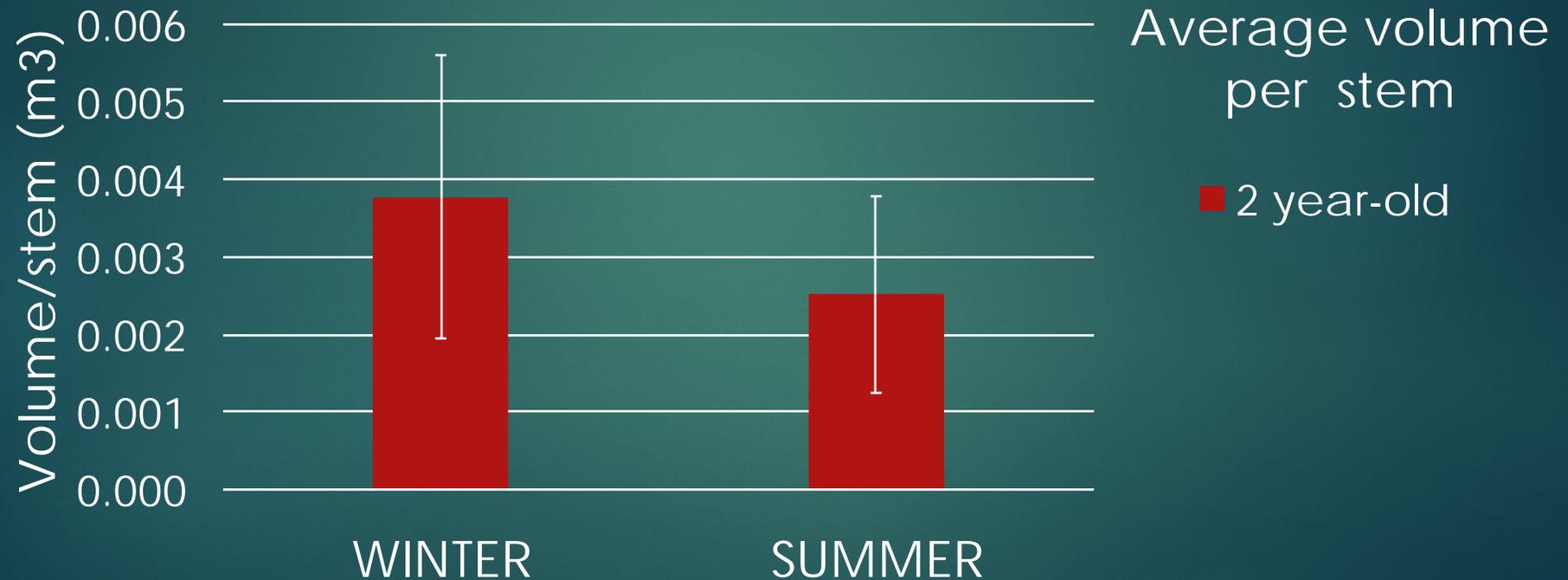
Populus deltoides:



Results:

Growth parameters

Populus deltoides:



Results: Stump mortality

Populus deltoides:

Winter harvest ~0% mortality

Age	Live stumps	Live stems
Harvesting	401	401
6-month-old	386	1047
2-year-old	383	497

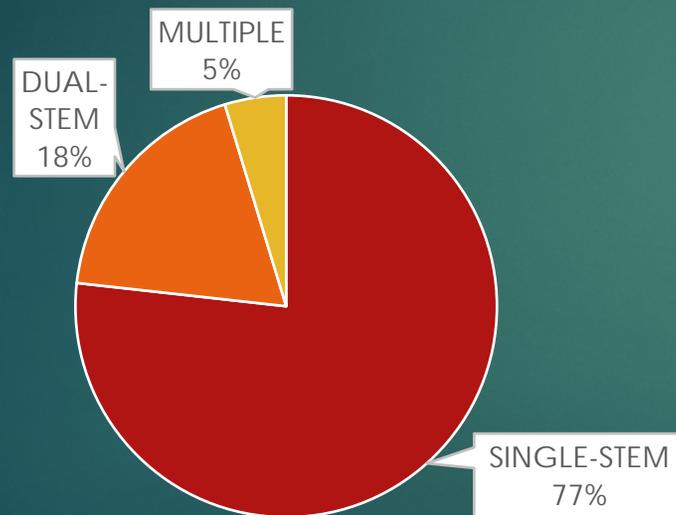
Summer harvest ~5% mortality

Age	Live stumps	Live stems
Harvesting	425	425
6-month-old	207	566
2-year-old	196	288

Results: Stem crowding

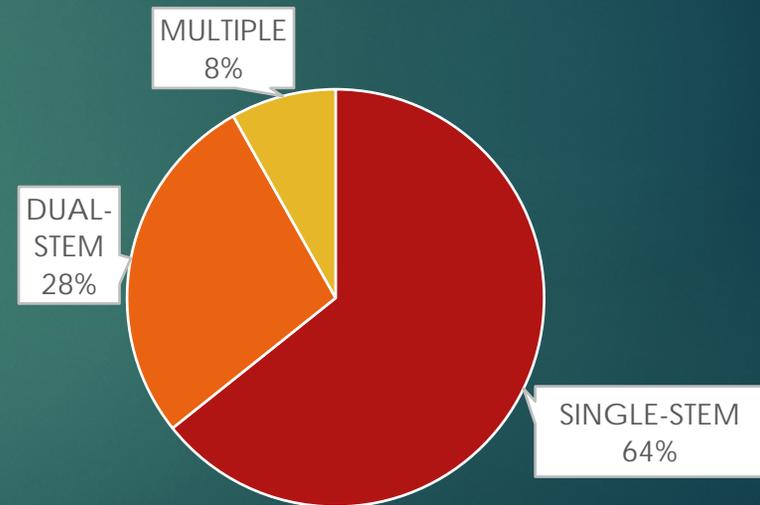
Populus deltoides at age 2:

Winter harvest plot



■ SINGLE-STEM ■ DUAL-STEM ■ MULTIPLE

Summer harvest plot



■ SINGLE-STEM ■ DUAL-STEM ■ MULTIPLE

Results: Stem dispersion

Populus deltoides at age 2:

Winter harvest plot

Operation	Distance apart (cm)
Max	69
Median	23
Mean	27
Mode	23

Summer harvest plot

Operation	Distance apart (cm)
Max	116
Median	30
Mean	32
Mode	30

Challenging

Criteria	Stump counting
> 76 cm	0
Percentage	0%

Challenging

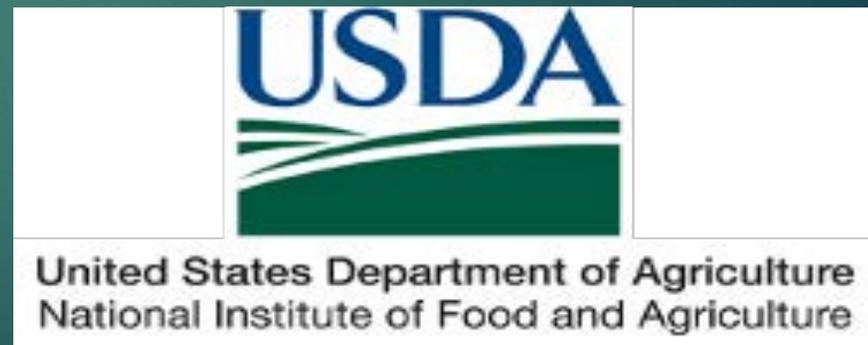
Criteria	Stump counting
> 76 cm	2
Percentage	1%

Conclusions:

- ▶ Once successfully coppiced, stump mortality is minimal.
- ▶ Higher above ground volume in winter plots.
- ▶ Both species and seasons of harvest showed that harvesting multi-stem coppiced trees with current technology is feasible.
- ▶ Season of harvest did not affect both stem crowding and stem dispersion
- ▶ Differences in growth parameters were observed between summer and winter plots for both species. However, these differences was greater with cottonwood.

Funding

- ▶ This project was supported by



Questions?

