



The Case for Mulch

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Presentation outline

- Mulch basics
- The case against mulch
- Case studies from MSU mulch trials
- Tying it all together



Mulch basics (aka the usual story)

- Mulch:
 - Improves soil moisture
 - Reduces erosion & compaction
 - Improves soil temperature
 - Reduces weed competition
 - Improved plant establishment and growth

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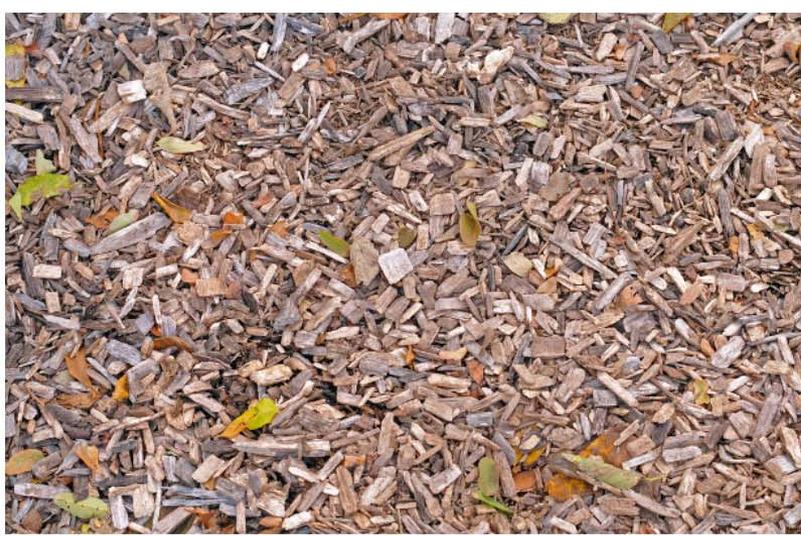


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Against Mulch

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Friday, January 21, 2011

The Case Against Mulch Rings

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It's a common sight in the American landscape: trees skirted with a ring of mulch around their base that float in a sea of lawn. Landscapers started the practice to

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Thomas Rainer is a horticultural futurist fascinated by the intersection of wild plants and human culture. A landscape

Mulch volcano



Hot mulch





Does mulch always help?

Response of green ash to mulch and planting depth

Fraxinus pennsylvanica

Years in the field	Planting depth	Mulch thickness (mm)	Trunk		
			Height (cm)	diameter (mm)	Survival (%)
3	7.6 cm below grade	0	146 ± 10	23 ± 2	100 ± 8
		7.6	183 ± 16	34 ± 3	40 ± 8
		15.2	168 ± 16	25 ± 3	44 ± 8
		22.9	147 ± 12	24 ± 2	73 ± 8
	At grade	0	192 ± 11	36 ± 2	90 ± 8
		7.6	172 ± 12	30 ± 2	80 ± 8
		15.2	150 ± 11	26 ± 2	90 ± 8
		22.9	152 ± 11	25 ± 2	90 ± 8
	7.6 cm above grade	0	189 ± 10	34 ± 2	100 ± 8
		7.6	175 ± 11	28 ± 2	90 ± 8
		15.2	166 ± 11	31 ± 2	90 ± 8
		22.9	155 ± 11	26 ± 2	89 ± 8



Arboriculture & Urban Forestry 2012. 38(1): 18–23



Impact of Mulch on Water Loss from a Container Substrate and Native Soil

Edward F. Gilman, Richard C. Beeson, and Dustin Meador

Abstract. This study was designed to measure evaporation from substrate-filled and soil-filled containers (360 L) to simulate a planted root ball. There was no difference in evaporation between mulched and non-mulched soil-filled lysimeters in any consecutive three-day period following irrigation. In contrast, more evaporation occurred the first dry day after irrigation from substrate-filled lysimeters covered with mulch than from





Does mulch reduce surface evaporation?

Table 1. Daily water loss and daily evaporation from mulched and non-mulched 360 L lysimeters filled with substrate or soil following application of 60 L irrigation at day zero.

Lysimeter contents/surface treatment	Daily water loss and (daily evaporation) in liters			Total
	Day 1	Day 2	Day 3	
Substrate-filled ^z				
Mulched surface	18.5 (2.0) ^y a ^x	2.0 (0.5) b	1.0 (0.5) b	21.5 (3)
Non-mulched surface	17.5 (1.0) b	2.5 (1.0) a	2.0 (1.0) a	22.0 (3)
Soil-filled ^z				
Mulched surface	21.0 (0.5) a	3.0 (1.0) a	2.0 (0.5) a	26.0 (2)
Non-mulched surface	21.5 (1.0) a	3.5 (1.5) a	2.0 (0.5) a	27.0 (3)

MSU Mulch Studies

- Landscape shrub study
- Conifer study
- Shade tree study



MSU Landscape Shrub Study



MSU Mulch trial

- 6 treatments
 - No mulch
 - No mulch + weed control
 - Pine bark
 - Hardwood fines
 - Cypress mulch
 - Recycled pallets
- 12' x 12' plots
- Each treatment replicated 4 times
- All mulch applied to 3" depth

MSU Mulch trial

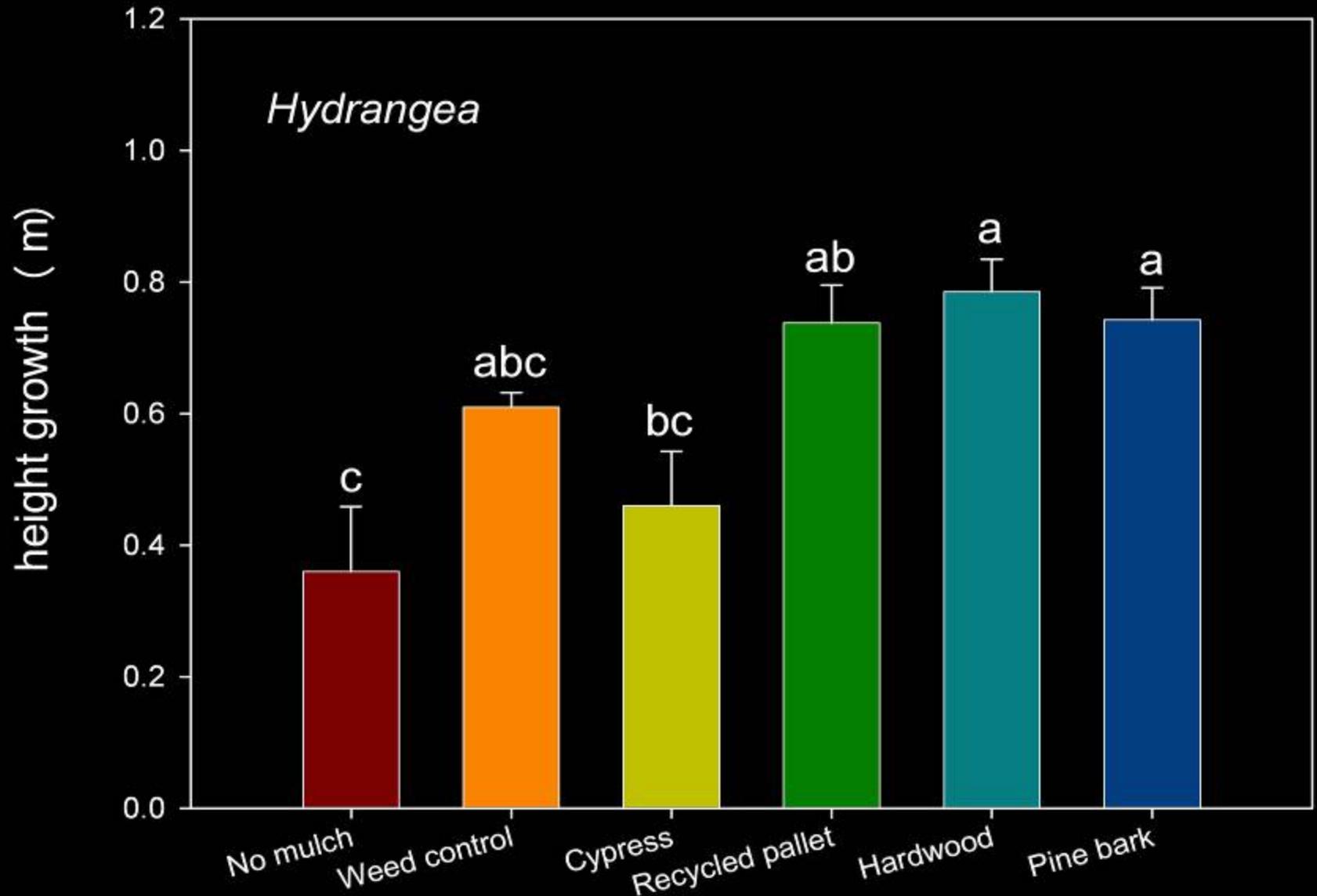
- Burning bush
- Goldflame spirea
- Java red weigelia
- Runyan yew (2)
- Golden globe arborvitae (2)
- Tardiva hydrangea
- Viburnum dentatum 'Chicago lustre'
- Viburnum trilobum 'Compactum'

Growth response



Height growth of landscape shrubs in response to mulch and weed control

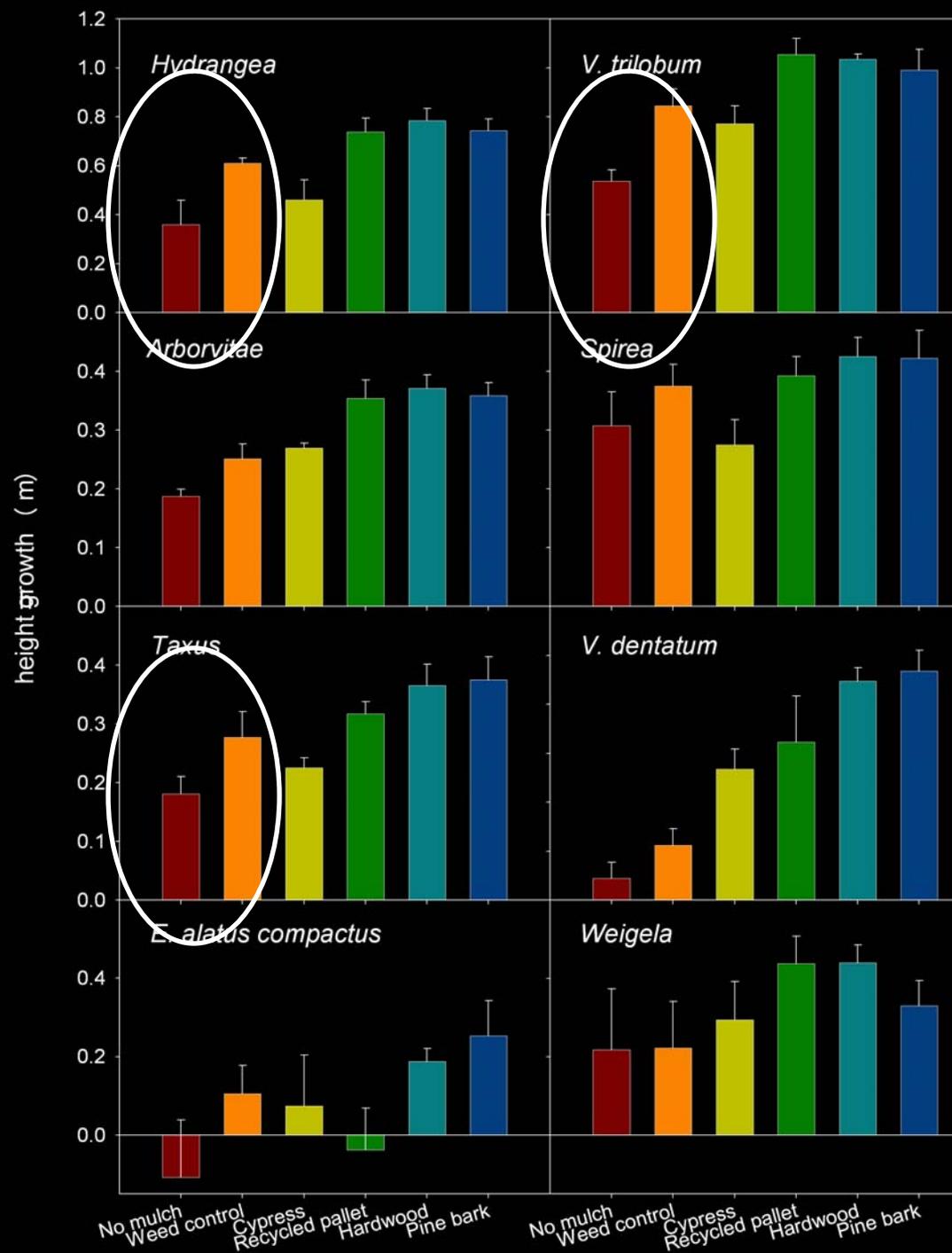
MSU Mulch Study 2005-2007



NOTE: Mean separation by Tukey's test at $\alpha = 0.05$

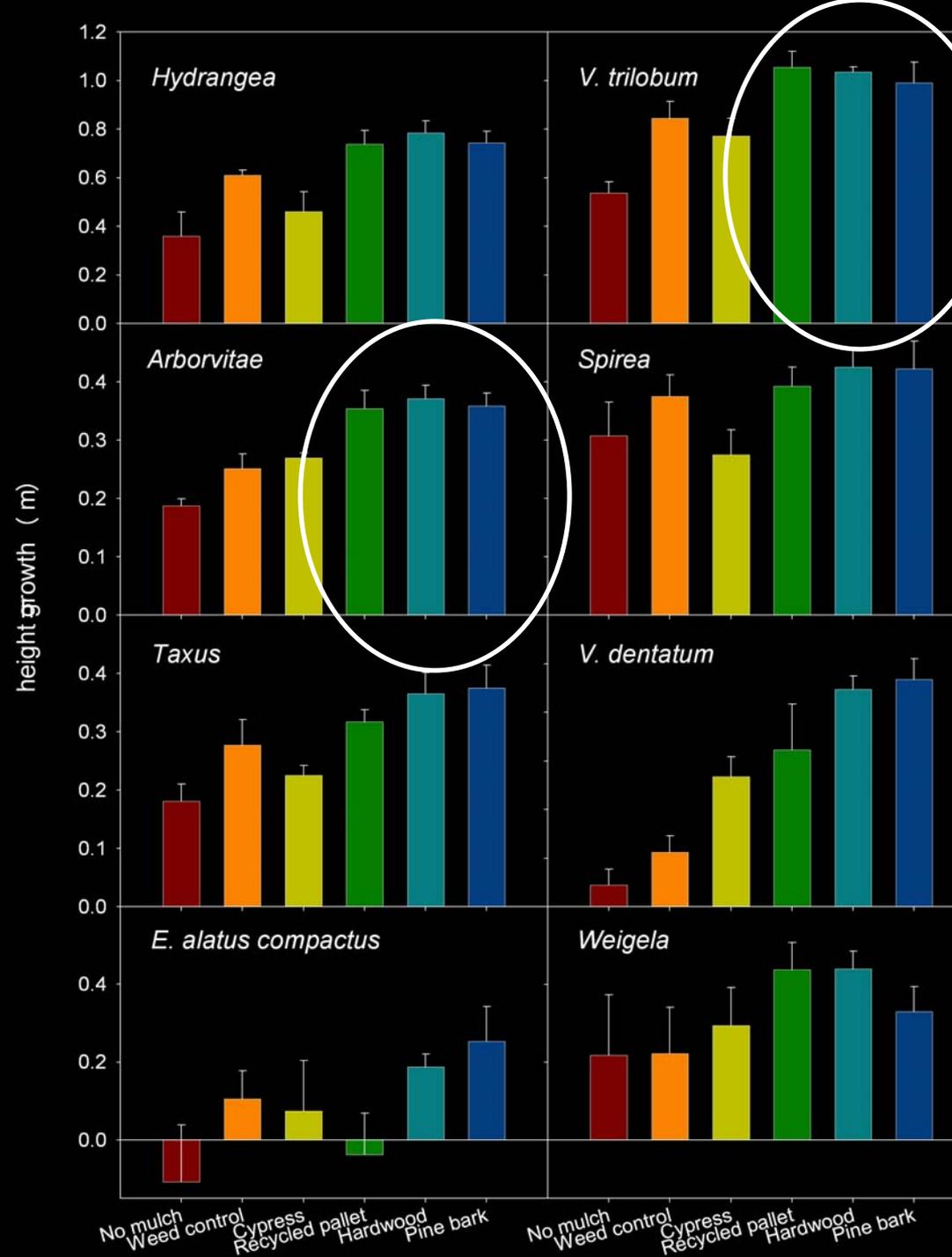
Height growth response

- Weed control increased growth relative to No mulch plots



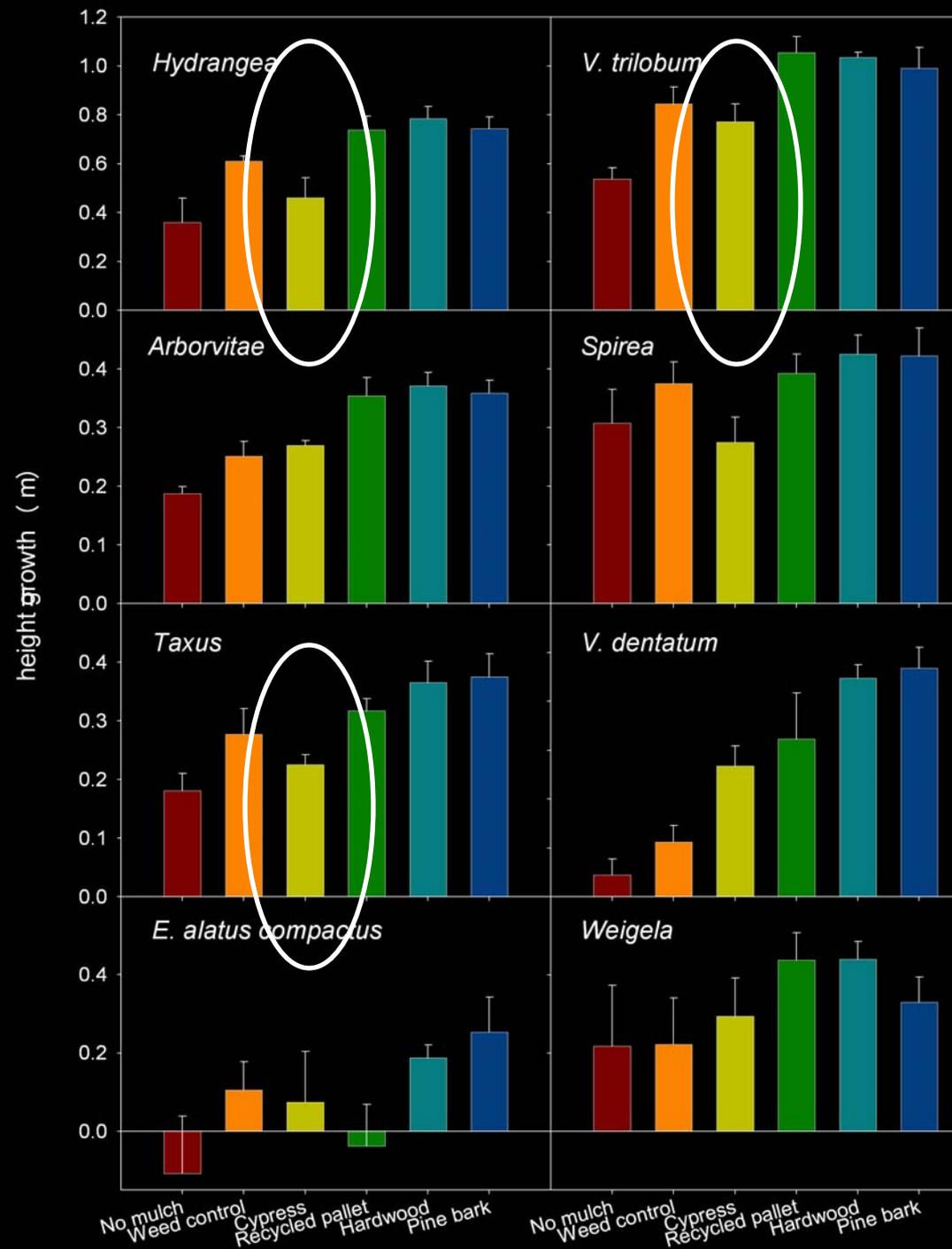
Height growth response

- Weed control increased growth relative to No mulch plots
- Mulches increased height growth compared to un-mulched plots



Height growth response

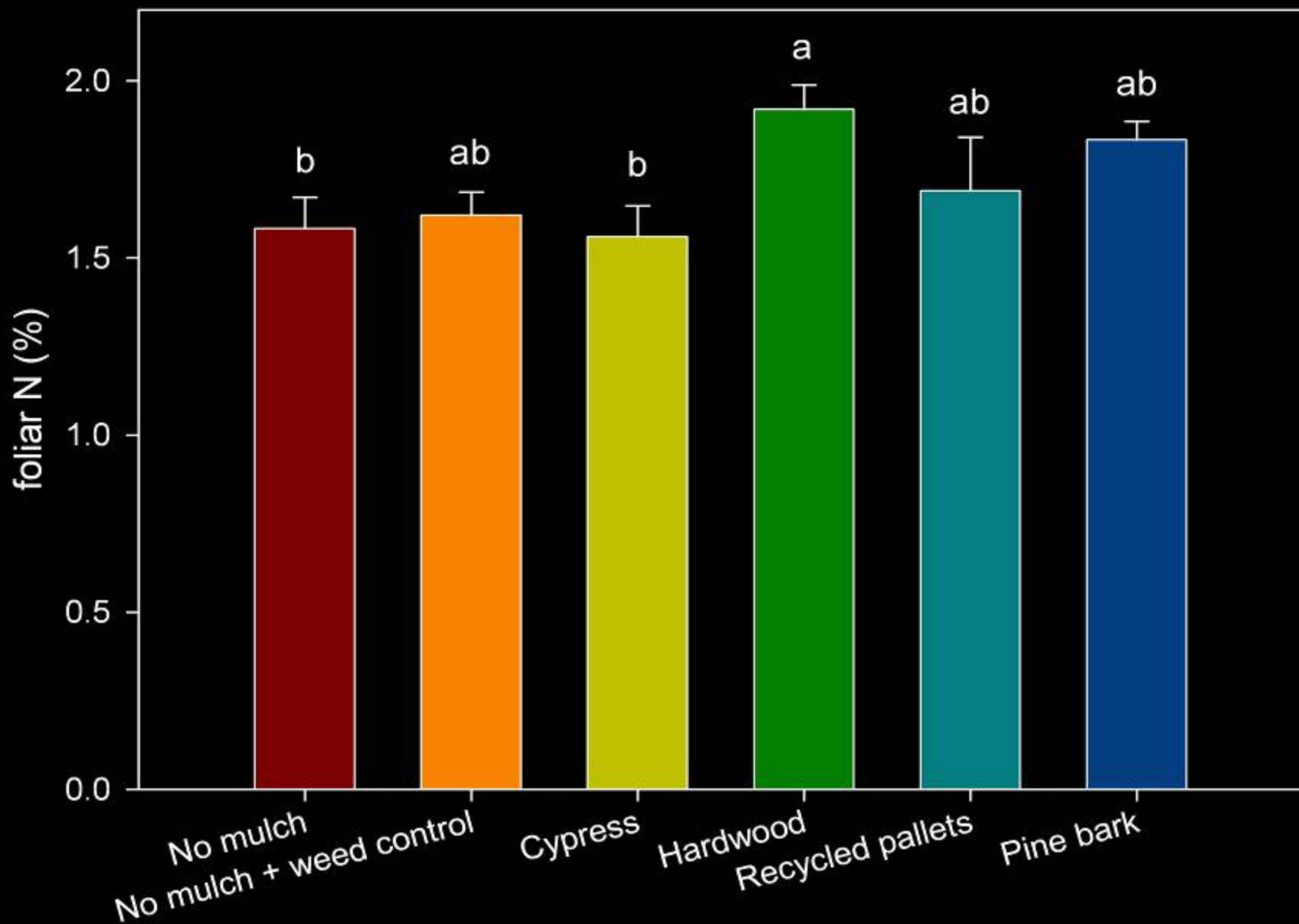
- Weed control increased growth relative to No mulch plots
- Mulches increased height growth compared to un-mulched plots
- Plants under cypress mulch grew less than with other mulches



Foliar Nitrogen



Mulches did not reduce foliar nitrogen of landscape shrubs



mean separation by Tukey-Kramer test at $P = 0.05$

Soil moisture



Mulch increased soil moisture

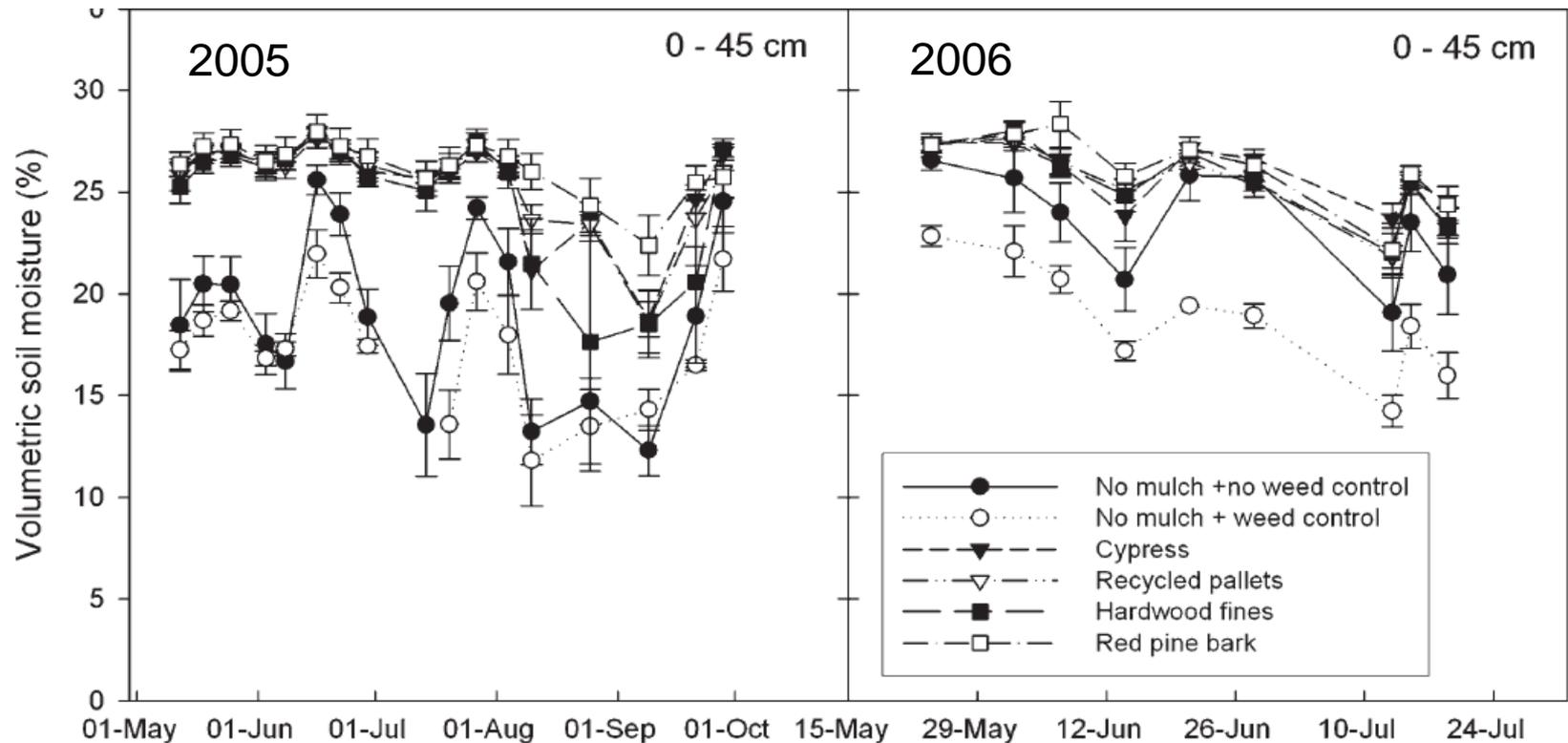


Fig. 2. Mean (\pm SE) volumetric soil moisture at 0 to 15 cm and 0 to 45 cm for landscape plots with 8 cm organic mulches or unmulched with and without weed control, Michigan State University Horticulture Teaching and Research, East Lansing, MI, 2005 to 2006. N = 4 for all means.

Weed control

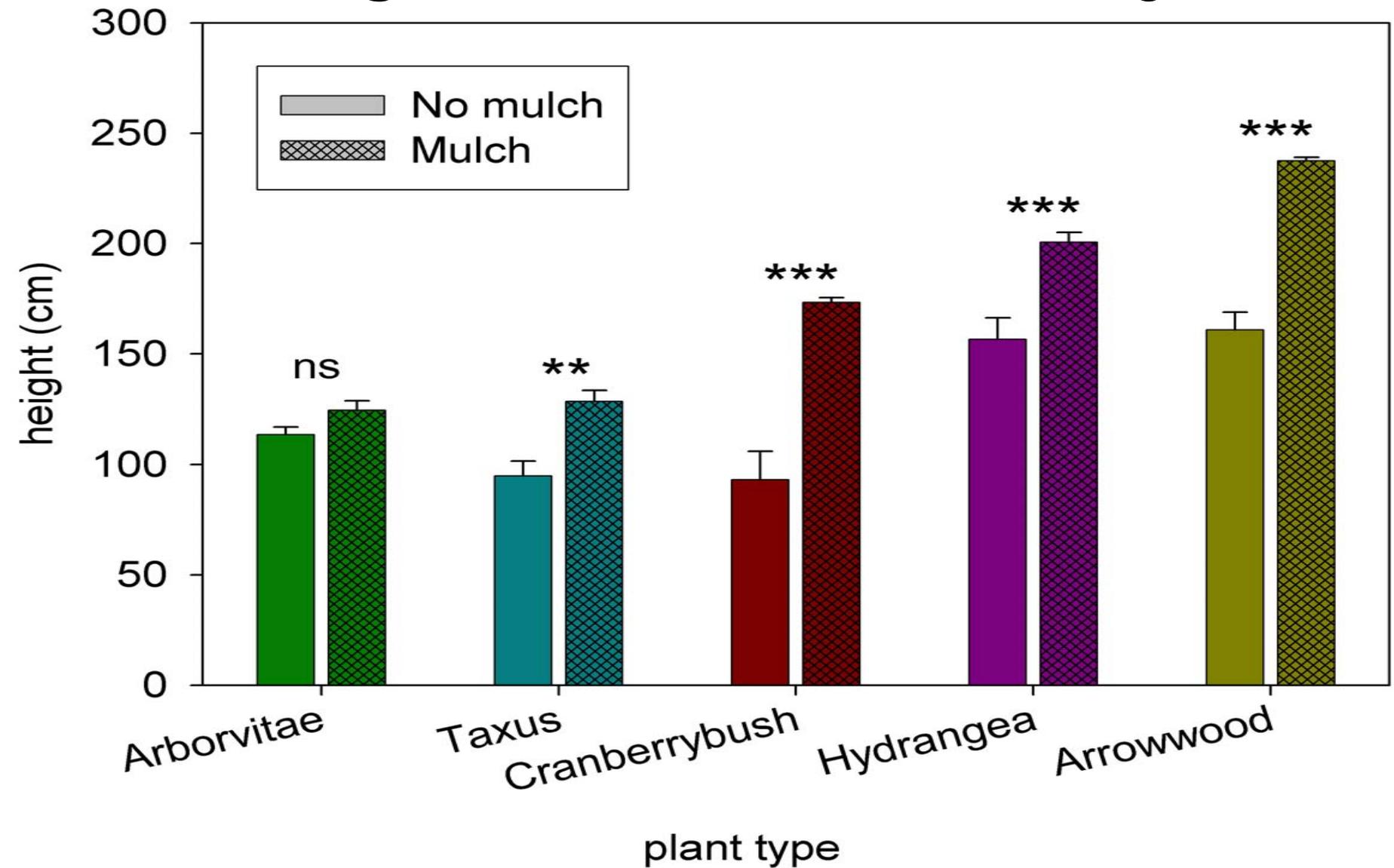


2013: Mulch plots revisited





Mulch growth effect after 8 years



Conifer mulch study



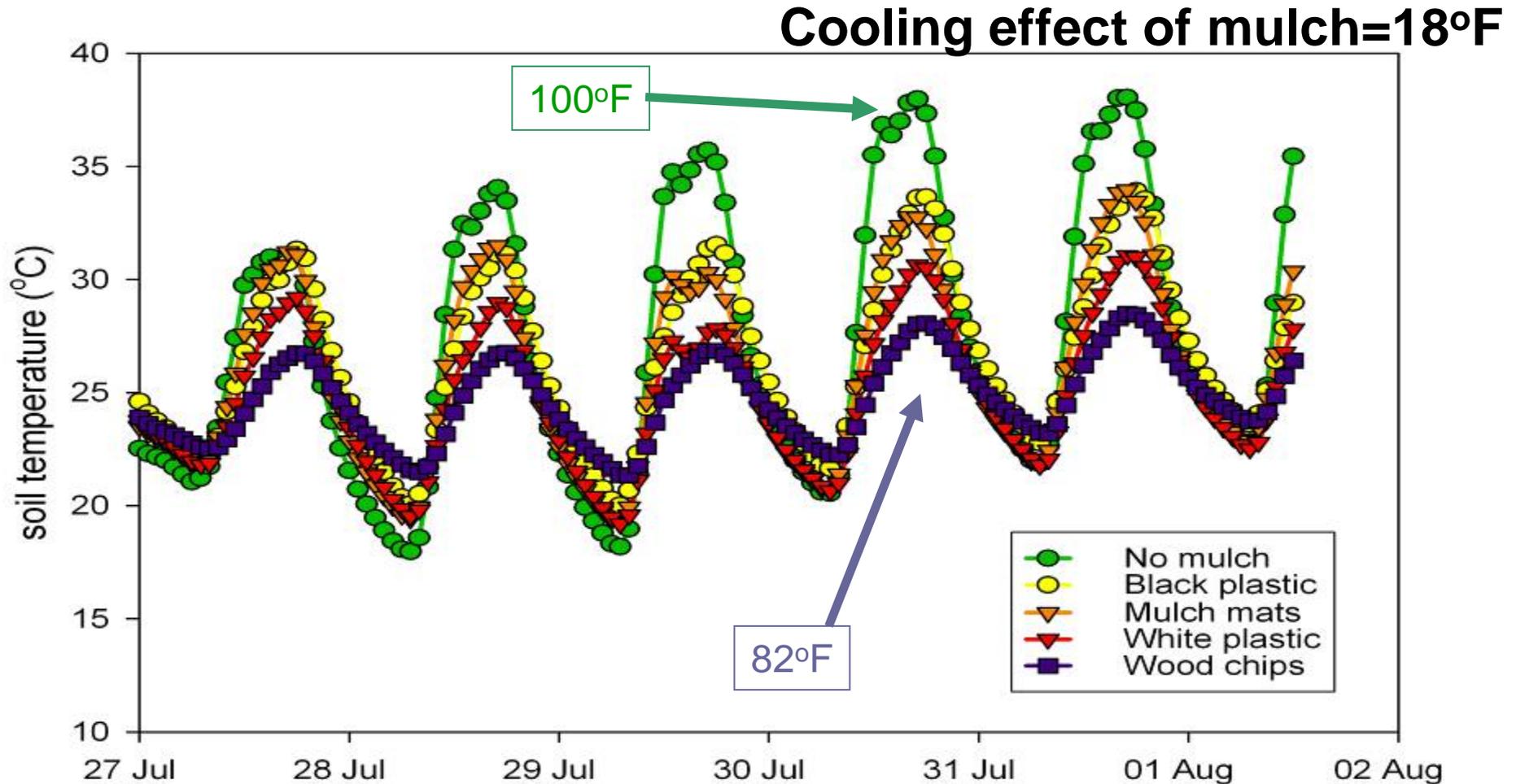


80m

Effect of mulch and irrigation on growth of Fraser fir

Production system			Fraser fir		
Weed control	Irrigation	Bedding	Diam growth (mm)	Ht growth (cm)	Survival (%)
1 Black plastic	Irrigated	Bedded	12.4 bc ^y	17.3 bc	95 a
2 White plastic	Irrigated	Bedded	17.9 a	21.1 ab	100 a
3 Chemical + hand weed ^z	Irrigated	Bedded	12.5 bc	22.6 ab	100 a
4 Chemical + hand weed	Irrigated	Flat	13.4 b	20.4 ab	100 a
5 Mulch mats	Irrigated	Flat	15.7 ab	22.9 ab	100 a
6 Wood chips	Not irrigated	Flat	13.6 b	26.2 a	100 a
7 Chemical + hand weed	Not irrigated	Flat	8.8 c	13.8 cd	95 a
8 None	Not irrigated	Flat	1.9 d	9.4 d	67 b

Mulch moderates fluctuation in soil temperatures



Does mulch always help?

Modest effect on red maple

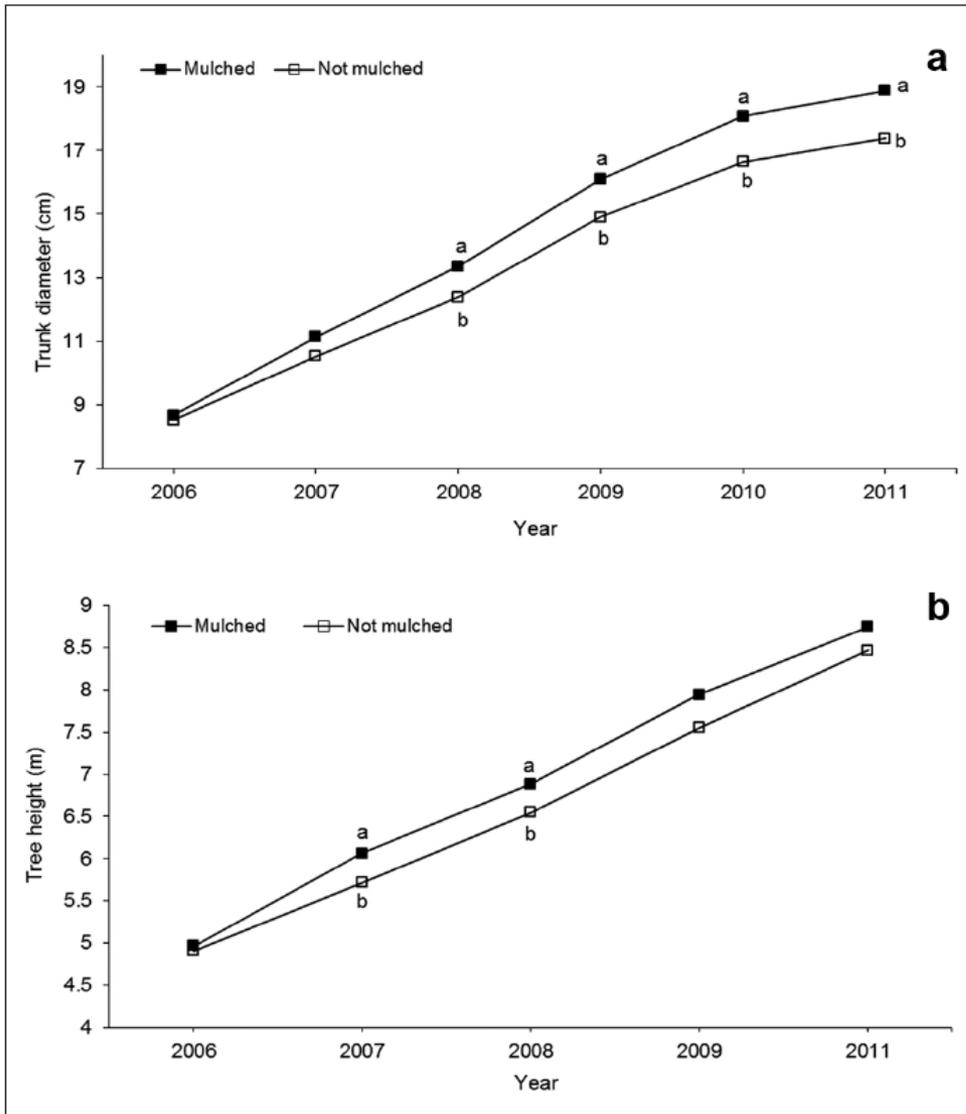
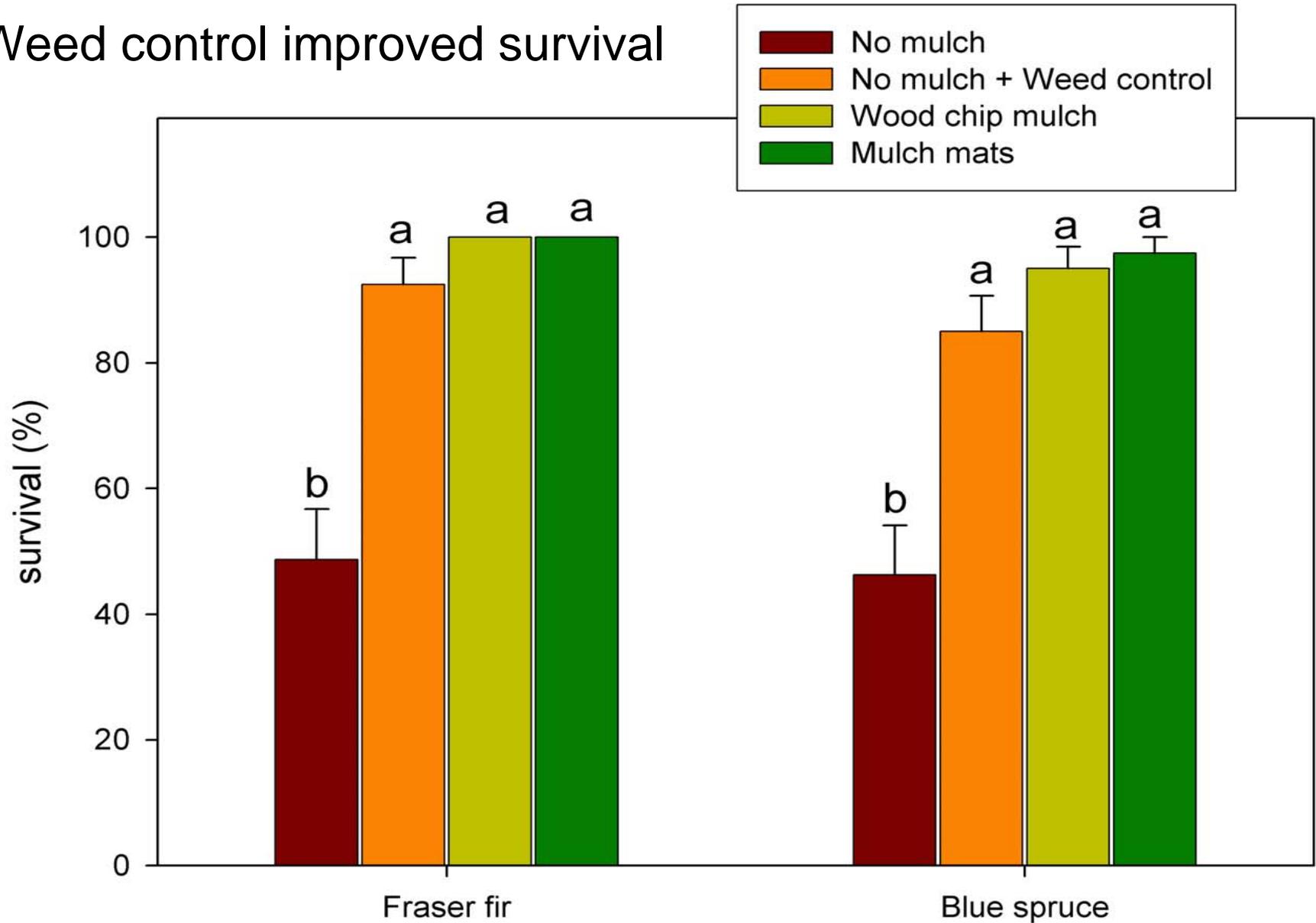


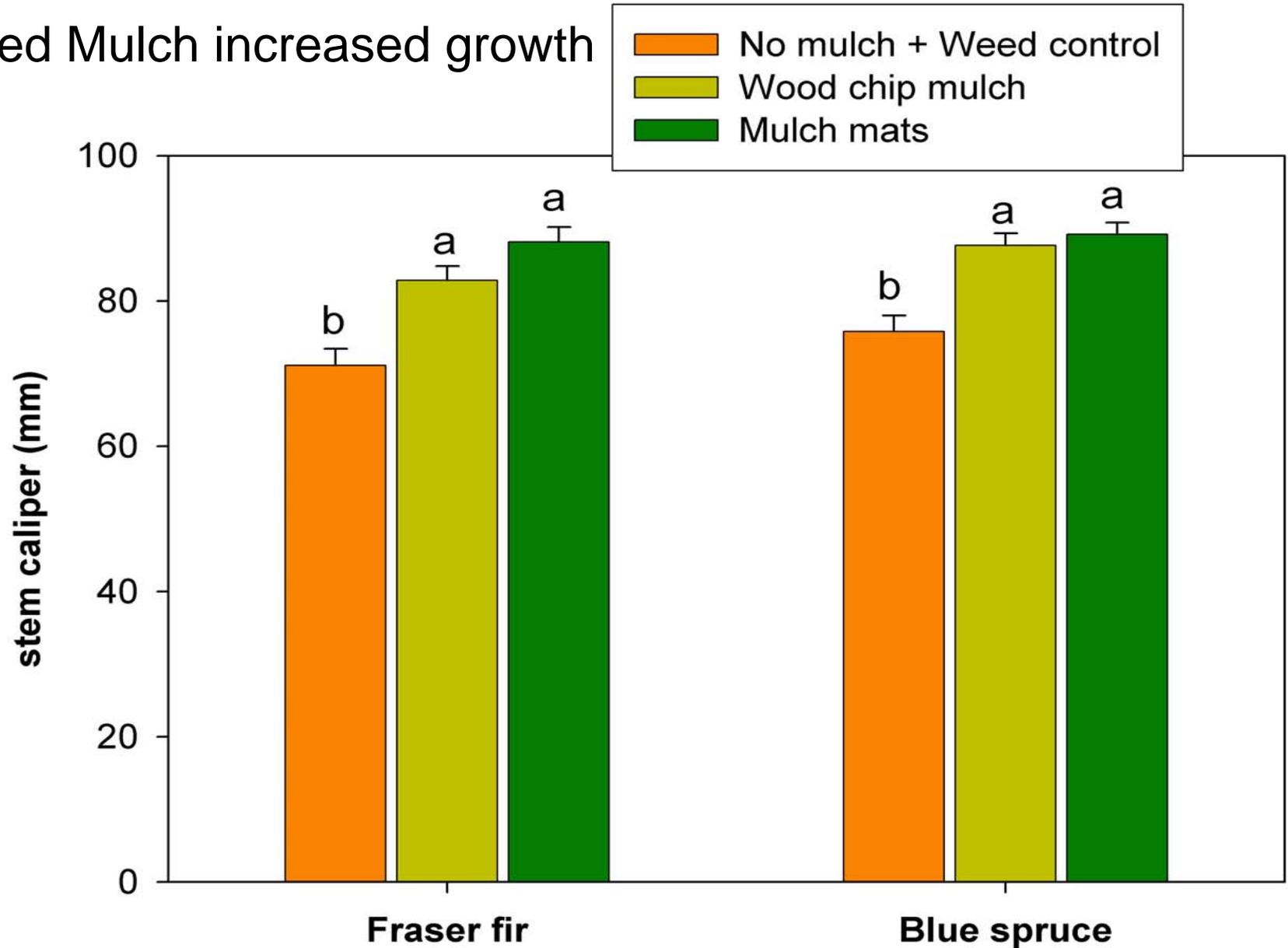
Figure 3. Trunk diameter (a) and tree height (b) measured each September (caliper only in 2010) on red maple planted in mulched and non-mulched plots. Different letters within a year indicate



Weed control improved survival



Weed Mulch increased growth



Shade tree mulch study



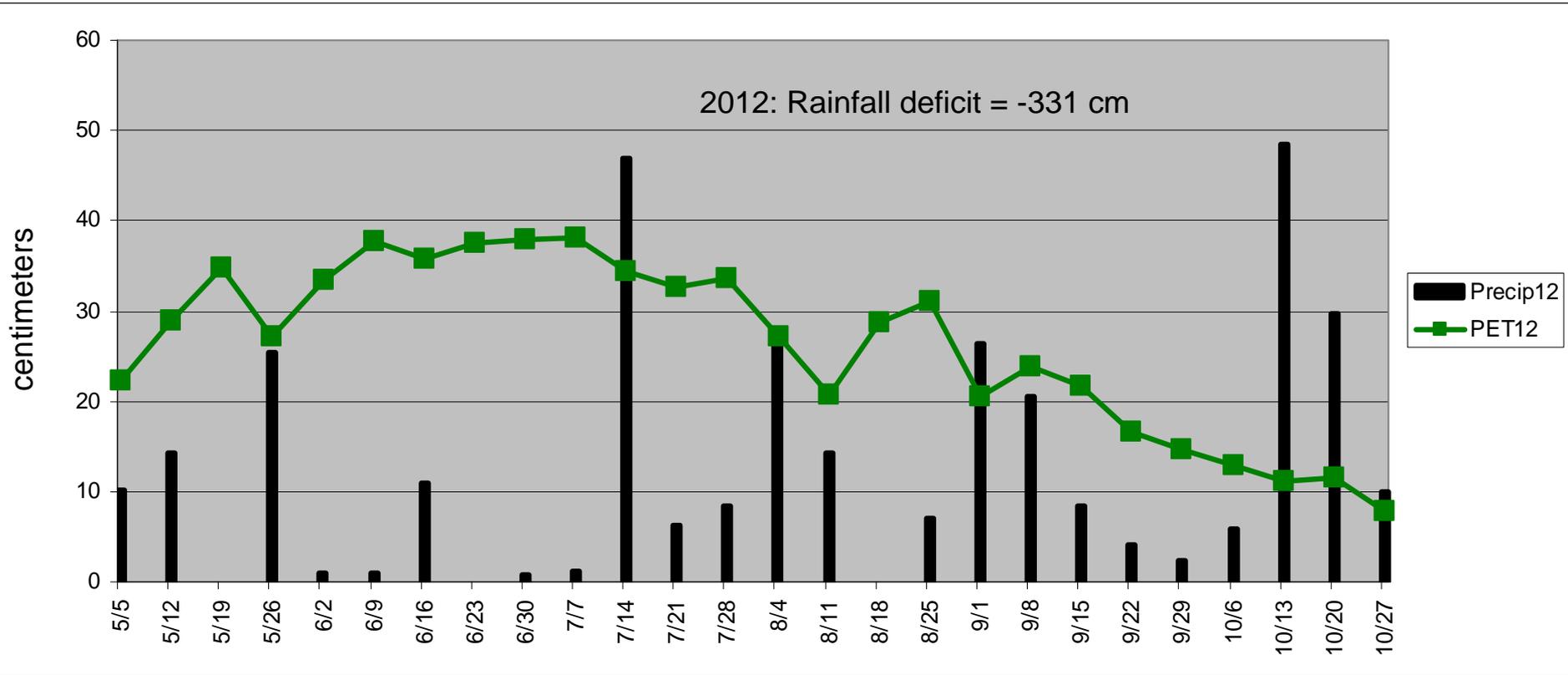


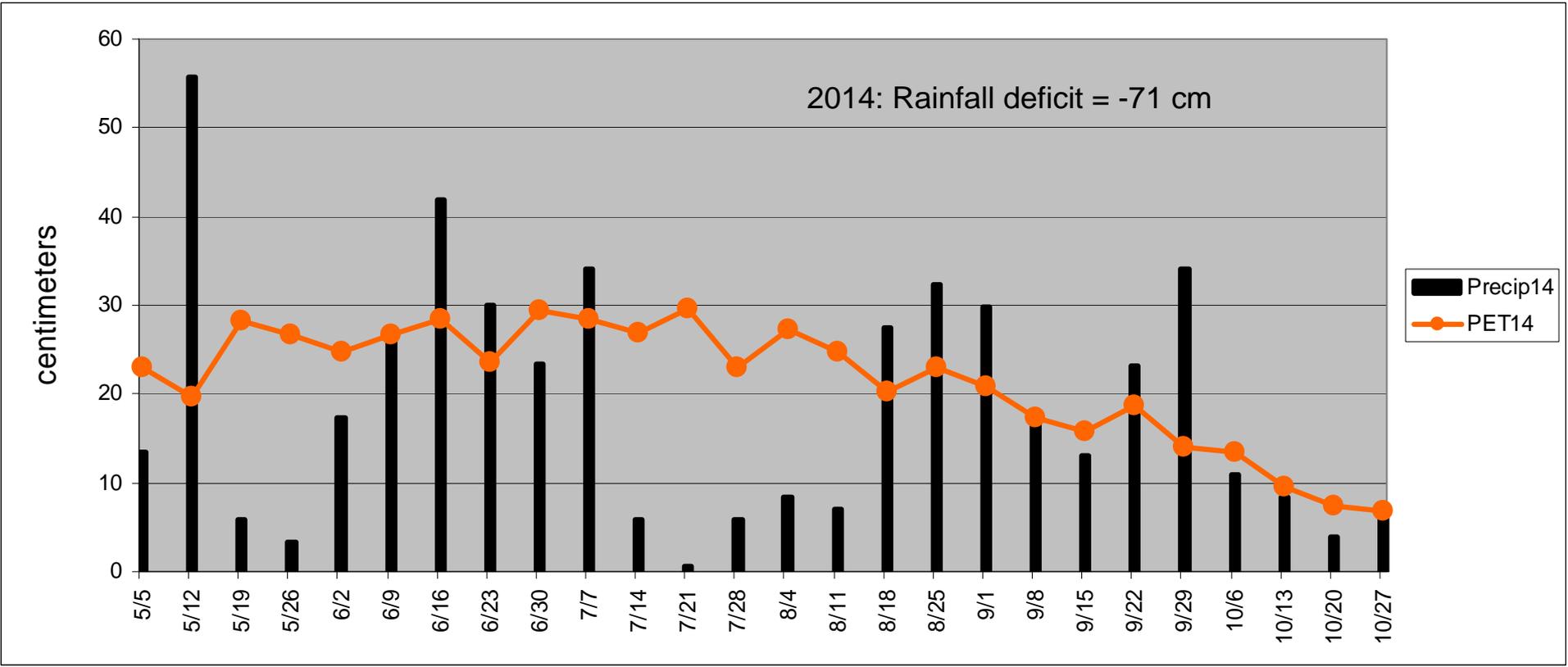




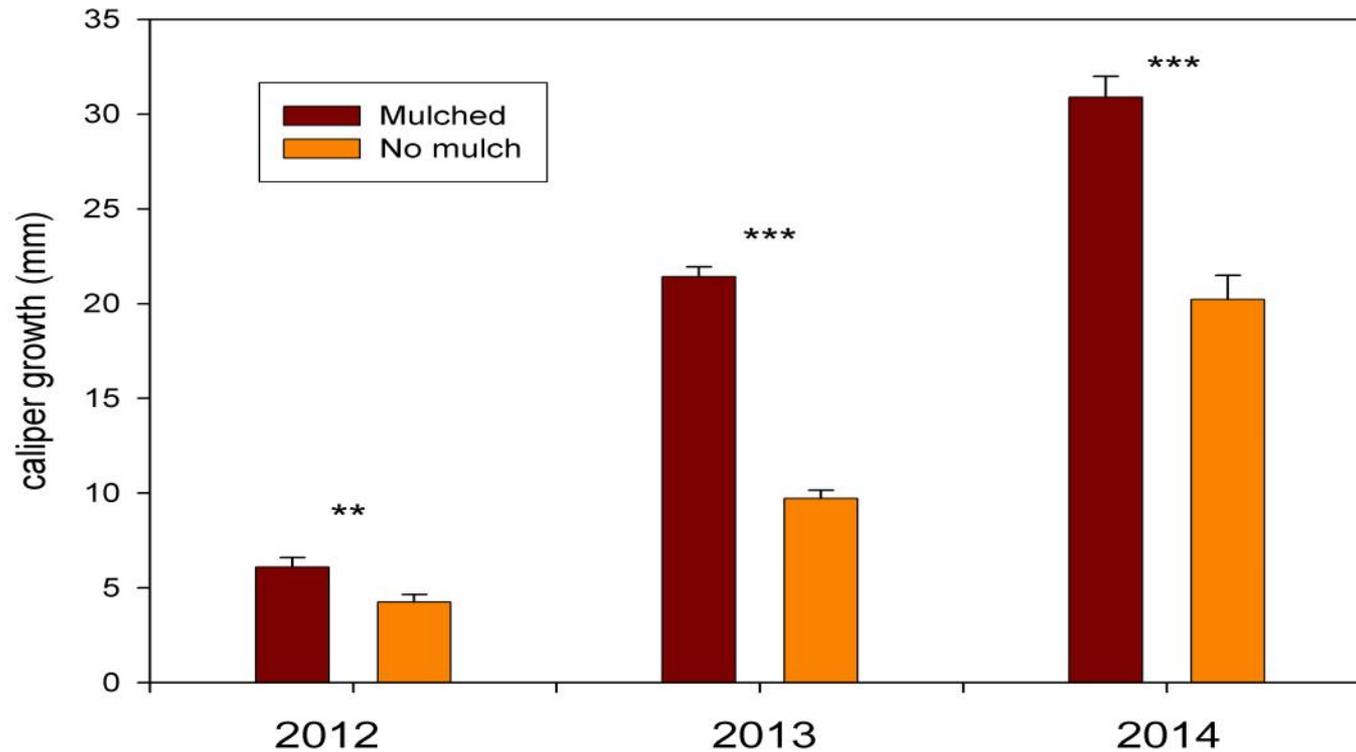


2012: A tough year for planting trees

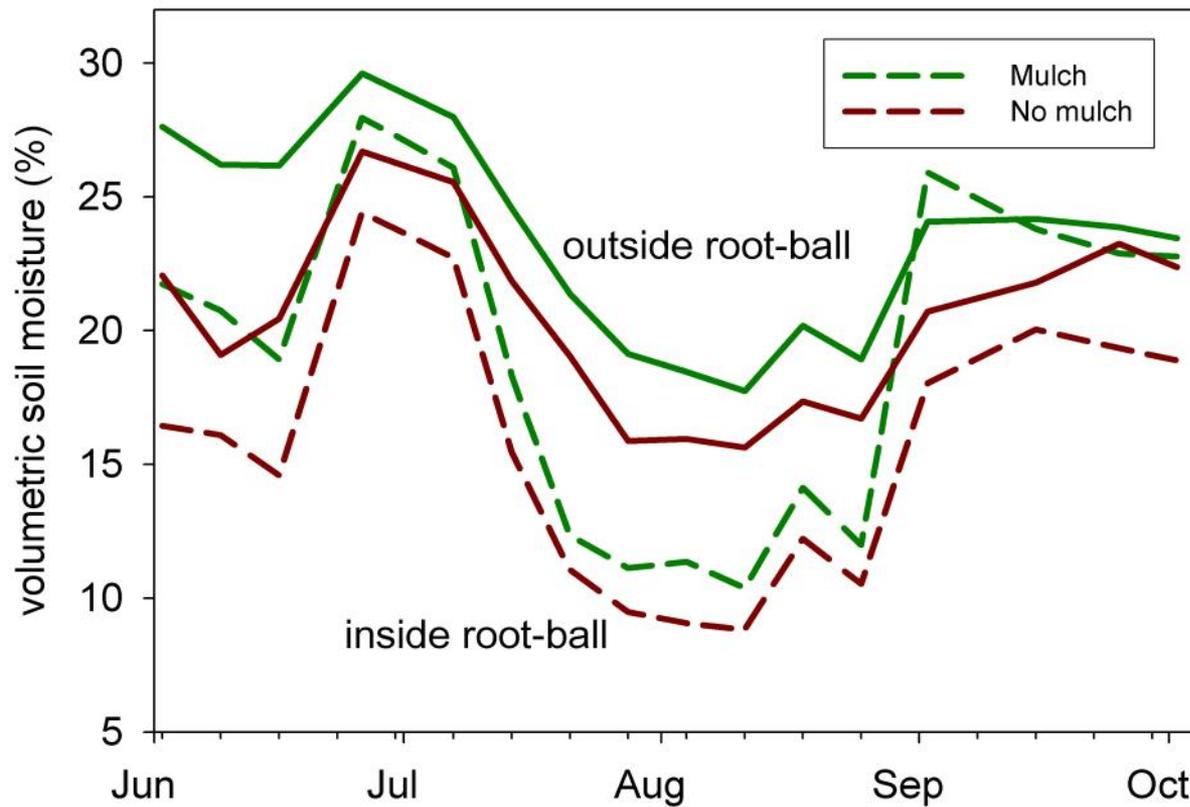




Mulch significantly increased tree growth

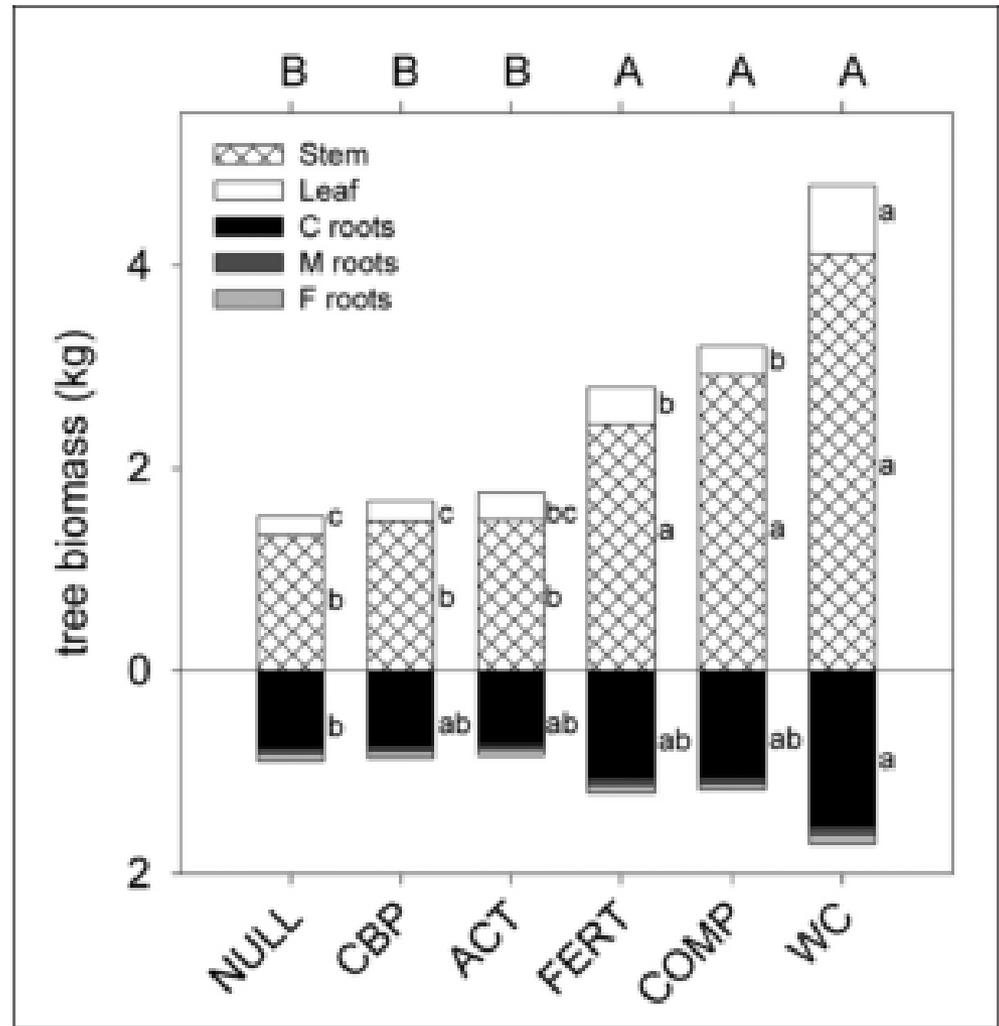


What about soil moisture?



Root and shoot growth of red maple and river birch five years after transplanting

NULL = untreated
 CBP = biostimulant
 ACT = compost tea
 FERT = NPK
 COMP = compost
 WC = wood chips



Tying it all together

- Preponderance of evidence shows mulch:
 - Increases soil moisture
 - Moderate soil temperatures
 - Reduces weed competition
 - **Improves tree growth and survival**



- Aesthetics





- Plant protection



String trimmer trauma





Questions?

