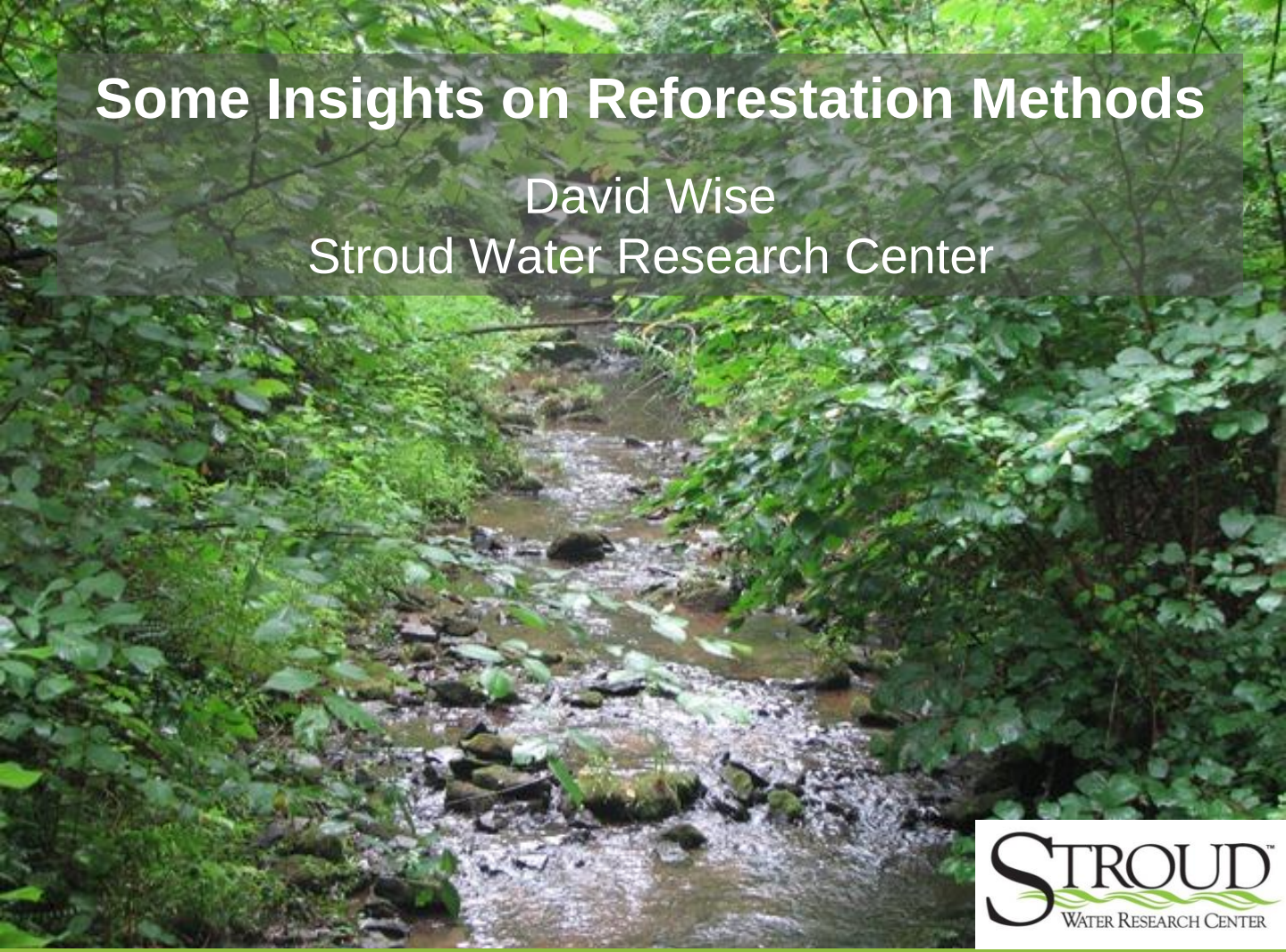
Some Insights on Reforestation Methods

David Wise
Stroud Water Research Center



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Special thanks to Stroud Center staff:
Dr. Bern Sweeney
Dr. Charles Dow
Christa Evans
Calen Wylie
Matt Gisondi

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Outline:

- bird nets
- stone mulch
- pre-emergence herbicide INSIDE tubes
- tests of shelter types
- how to protect multi-stem shrubs
- case studies:
    - legacy sediments
    - multiflora rose
    - reed canary grass

Center-Hole Net Method

- Nets protect birds
- If neglected, nets tangle trees

Center-hole Method

Tassel Method

Photos: Matt Gisondi

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Center Hole Net Method (Cont.)

- Initial Study:

~75% less tree tangling

  - intentionally neglected nets
  - limited sample size

- 2016-17: ~10,000 tubes checked for dead birds

appears safe for use

Center-hole

Undamaged despite net still on

Tassel

damage from tangling in net

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2013-17 Tests of Vole Protection Methods:

Vole guard
(used *inside* shelter)

Coarse stone mulch
(has voids)

2A modified stone
(packs tight)

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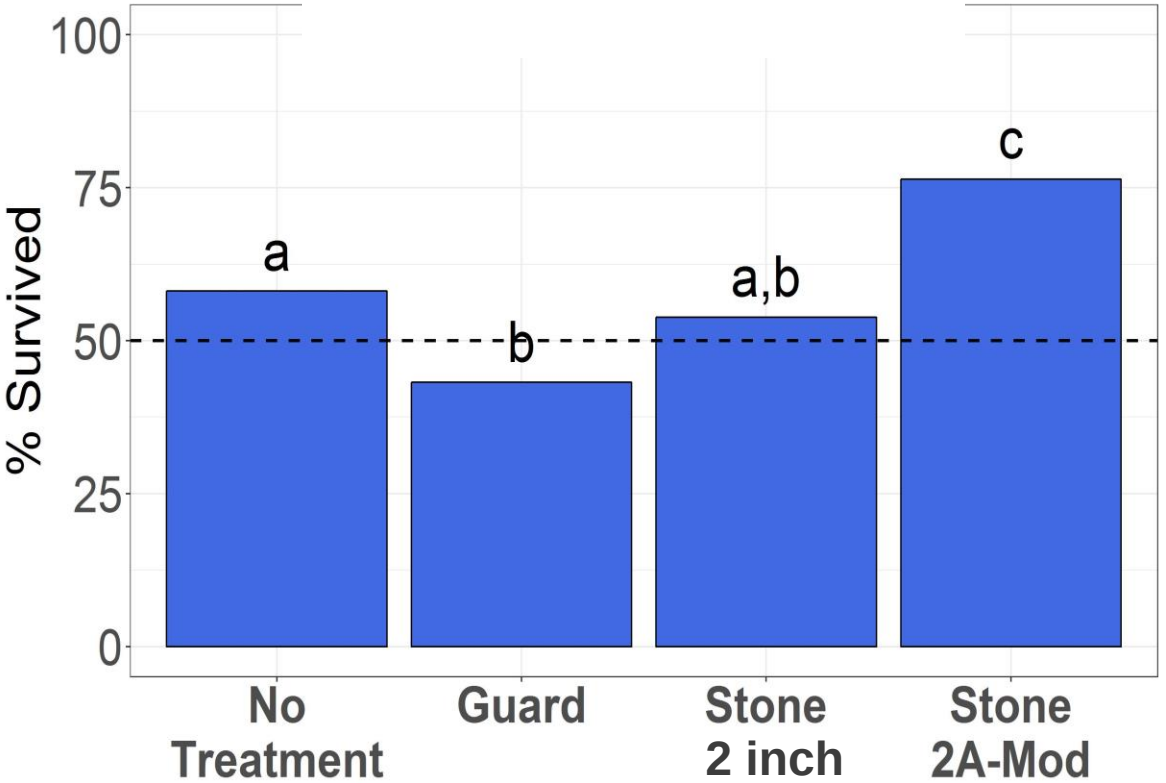
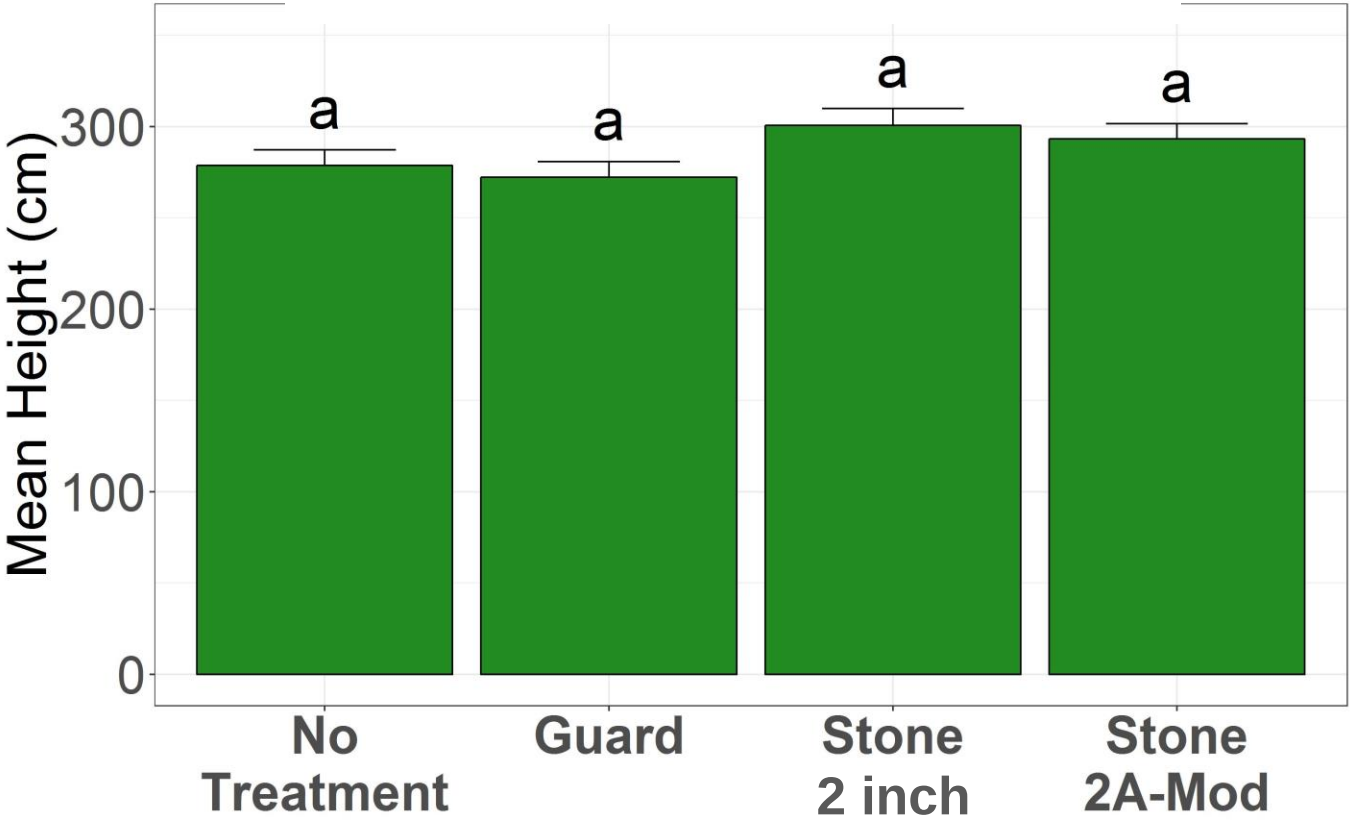
4-Year Survival Rates



4-Year Tree Heights

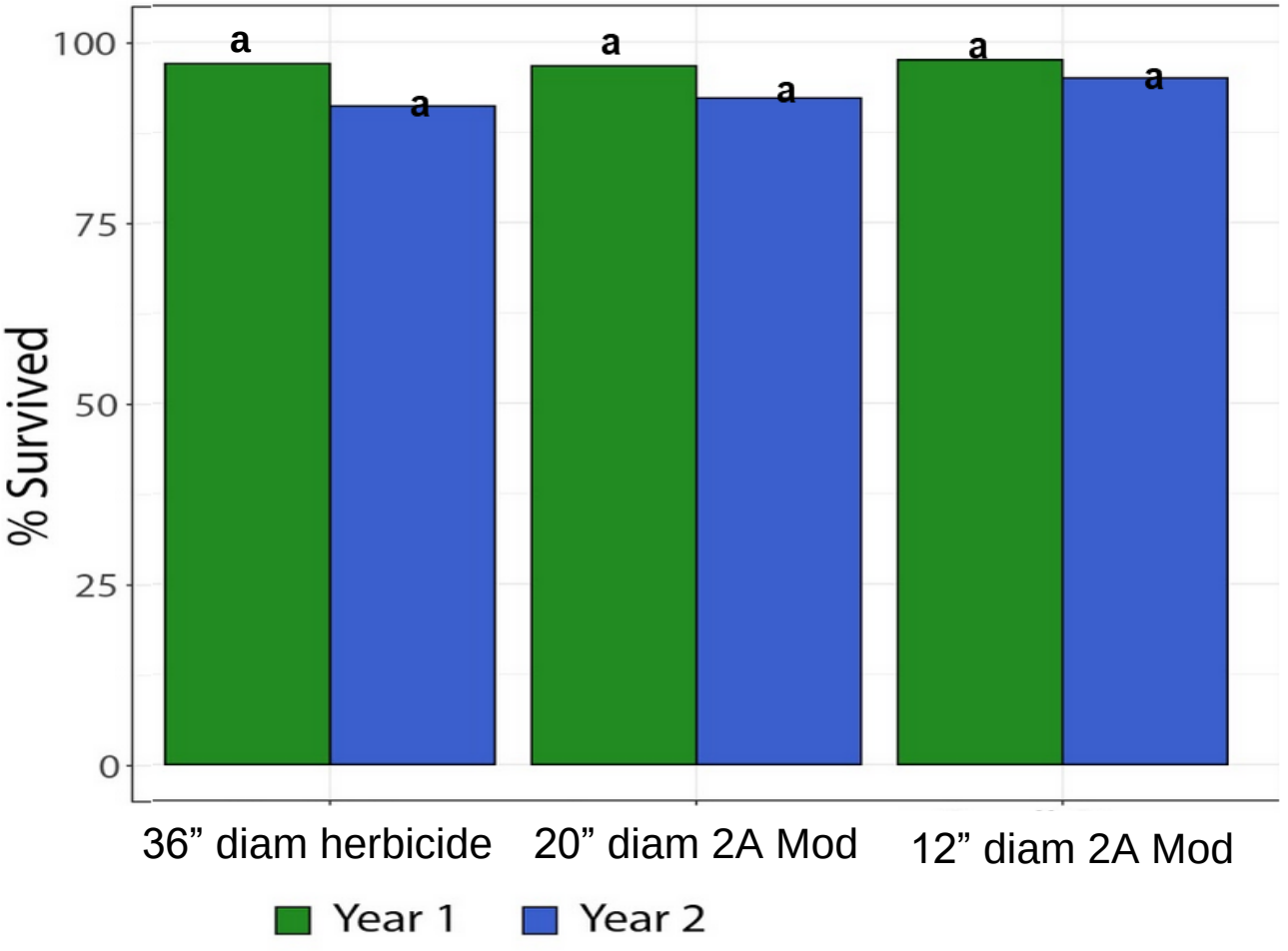


2018: began second generation trials

36” herbicide spot

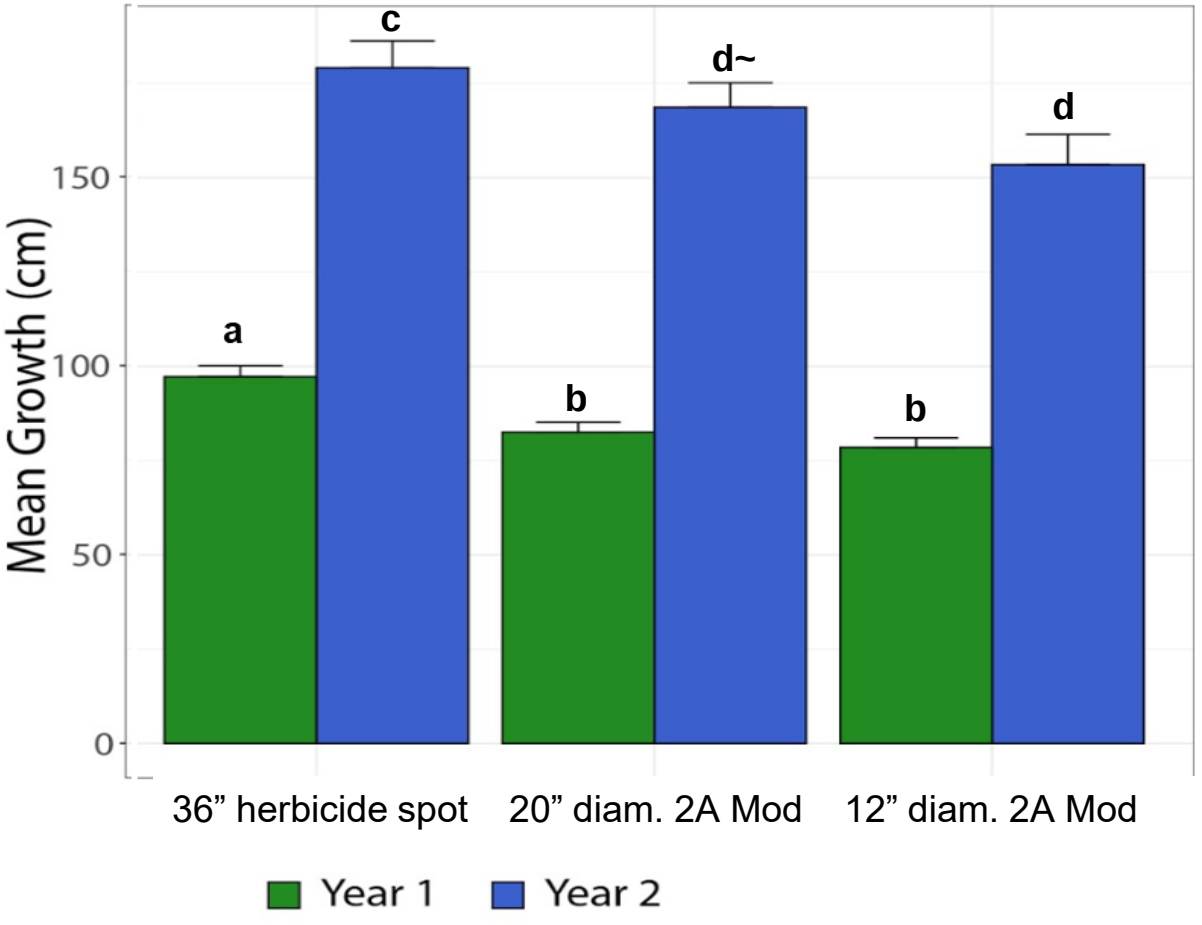
20x2” 2A-modified

12x2” 2A-modified



2018 Sites: Monaghan (n=40), Stroud Preserve (n=50)

2019 Site: polo club (n=120)



2018 Sites: Monaghan (n=40), Stroud Preserve (n=50)

2019 Site: polo club (n=120)

Research sites with 2A modified stone mulch									
Site	# trees	% surv	yrs old	stone diam.	pre-herb	mow /yr	prior veg	soil H_20	stone type
Weymouth	100	77	4	20	no	none	rcg	wettish	limestone
Lundale	150	89	2	20	no	3X	rcg	mixed	limestone
Stroud Pres. 12“	40	95	2	12	yes	2X	forbs	wettish	shale
Stroud Pres. 20“	40	93	2	20	yes	2X	forbs	wettish	shale
Monaghan	50	92	2	20	yes	>3X	grass	wettish	limestone
polo 12"	120	94	1	12	no	3X	grass	well dr	limestone
polo 20”	120	93	1	20	no	3X	grass	well dr	limestone

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2020: Stroud installed 60 acres w/ 2A modified

- we’re cautiously optimistic
- challenge: sites have reed canary grass
- we pre-treated RCG with herbicide spots
- we can use post-planting herbicide if needed

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Costs of Stone Mulch vs. Herbicide Spots

36” Herbicide Spot

~$7.70/tree
for 2x/yr x 4 yrs

8 mobilizations

Neglected?

Survival/growth in years 5-8??

15” Stone Mulch:

~$2.80/tree

done 1x only

No follow-up needed

Present in years 5-8

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Installation Details:

Site prep: mow grass short or herbicide (ex. RCG)

Planting: normal methods with shelter

Apply stone: (all inexact)

12” diam x 2” flat (226 in^3) = ~20 lb

15” diam x 2-3” coned (406 in^3) = ~27 lb

20” diameter x 2” flat (628 in^3) = ~40 lb

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Considerations for project management:

Consideration	Herbicide	Stone
Chemical usage	a concern	avoids
Logistics/mobilizations	numerous	once and done
Funding in grant window	challenging	easy
Longevity	short	longer
Flood impacts	avoids	a concern
Sites with challenging access	easy	a concern
Cost	$7.68/plant/4 yrs	$2.80/plant/8+ yrs?

Using Pre-Emergence Herbicide INSIDE Tubes

Issue: invasives in tubes

- Birds carry seeds
- Invasives compete with trees

Oriental bittersweet in tube

Using Pre-Emergence Herbicide INSIDE Tubes

Tests of Snapshot ™ INSIDE tree tubes

- intent is to prevent germination of seeds
- Apply before seed germ – for us, Feb/March
- easy task via custom shaker below
- First trial:
  - differing dosages – no effect
  - problem: bittersweet germination in May

Photo: Calen Wylie

Specimen Label

Dow AgroSciences

Snapshot® 2.5 TG

Specialty Herbicide

®Trademark of Dow AgroSciences LLC

A selective preemergence herbicide for control of certain broadleaf weeds and annual grasses in:

- Landscape Ornamentals
- Christmas Tree Plantations
- Container Grown Ornamentals
- Field Grown Ornamentals
- Groundcovers/Perennials
- Non-Bearing Fruit and Nut Trees
- Non-Bearing Vineyards
- Non-Cropland

Active Ingredients:

trifluralin: α,α,α-trifluoro-2,6-dinitro-*N*, *N*-dipropyl-*p*-toluidine	2.0%
isoxaben: *N*-[3-(1-ethyl-1-methylpropyl)-5-isoxazolyl]-2,6-dimethoxybenzamide and isomers	0.5%
Other Ingredients	97.5%
Total	100.0%

Contains 1.25 lb active ingredient per 50 lb bag.

EPA Reg. No. 62719-175

Rout ™ : additional active ingredients

For Sale To, Use and Storage By
Commercial Nursery, Cut Flower,
Foliage and Landscape Personnel Only

Scotts

Specimen label for information purposes only. The Scotts Company makes no representations as to the accuracy of this label. It is the responsibility of the user to read and follow the label attached to the pesticide product container.

GROUP 3 14 HERBICIDES

Rout®

Ornamental Herbicide

Net Weight:
50 lb (22.68 kg)
Stock # 95721

For pre-emergence control of weeds in container, field grown and landscape ornamentals, cut flowers and foliage crops.

ACTIVE INGREDIENTS:

Oxyfluorfen†	2.00%
Oryzalin††	1.00%
OTHER INGREDIENTS	97.00%
Total	100.00%

†CAS # 42874-03-3
††CAS # 19044-88-3

EPA Reg. No. 58185-27 **EPA Est. 8378-IN-1**

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

KEEP OUT OF THE REACH OF CHILDREN

CAUTION

ROUT® is a registered trademark of Scotts-Sierra Crop Protection Company for its brand of ornamental herbicide.

FIRST AID

IF ON SKIN OR CLOTHING: Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call poison control center or doctor for treatment advice.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Some materials that are chemical-resistant to this product are listed below. If you want more options, follow the instructions for category F on an EPA chemical resistance category selection chart.

Mixers, loaders, applicators and other handlers must wear:

- Coveralls over long-sleeved shirt and long pants
- Chemical-resistant gloves such as barrier laminate, butyl rubber 14 mils, nitrile rubber 14 mils, or Viton 14 mils
- Chemical-resistant footwear plus socks
- Protective eyewear
- Chemical-resistant headgear for overhead exposures
- Chemical-resistant apron (mixers and loaders)
- Under prolonged use, a dust filter and disposable protective garment are additionally recommended.

Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables use detergent and hot water. Keep and wash PPE separately from other laundry. Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them.

When handlers use closed systems or enclosed cabs in a manner that meets the requirements listed in the Worker

What a typical application looks like

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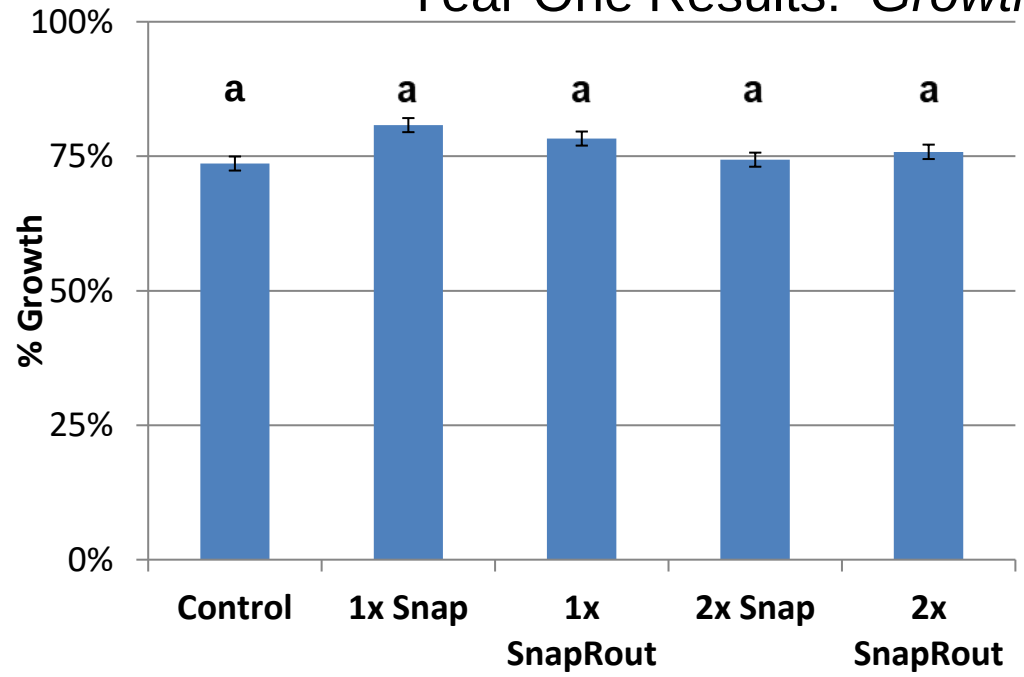
2nd Generation Pre-emergence Herbicide Tests: Year One Results: *Growth*



1x = Feb/Mar applic
2x= Feb/Mar + late May

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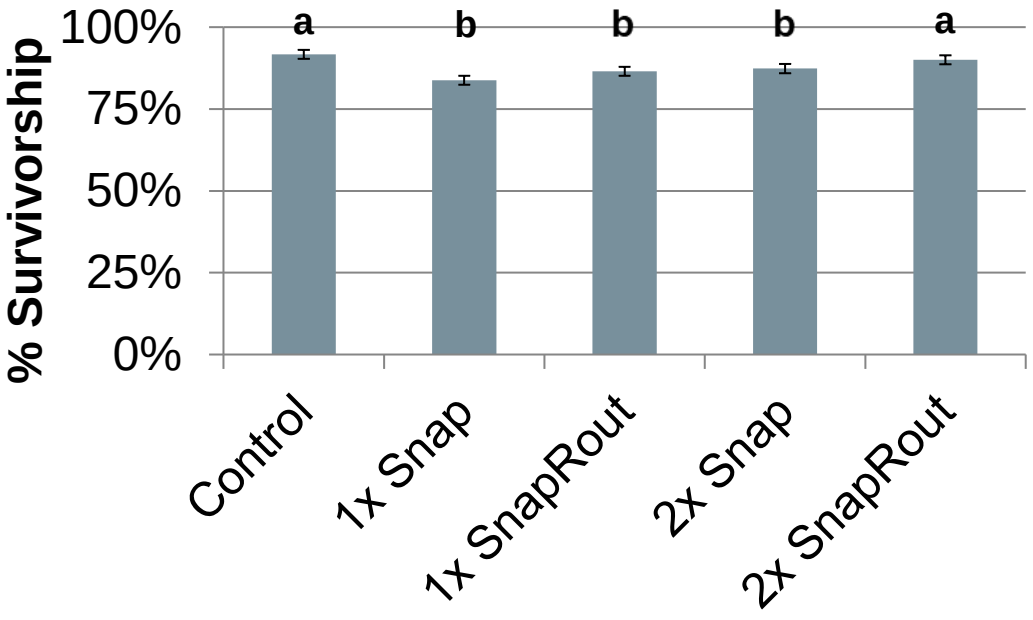
2nd Generation Pre-emergence Herbicide Tests: Year One Results: *Survivorship*



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Conclusions:

Oriental bittersweet in tube

Two applications per year -> no weeds thru August

Snapshot alone was sufficient

Appears safe for trees

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Testing Three Shelter Types:

Tubex Combitube (vented)

Plantra (vented)

Standard Tubex (not vented)

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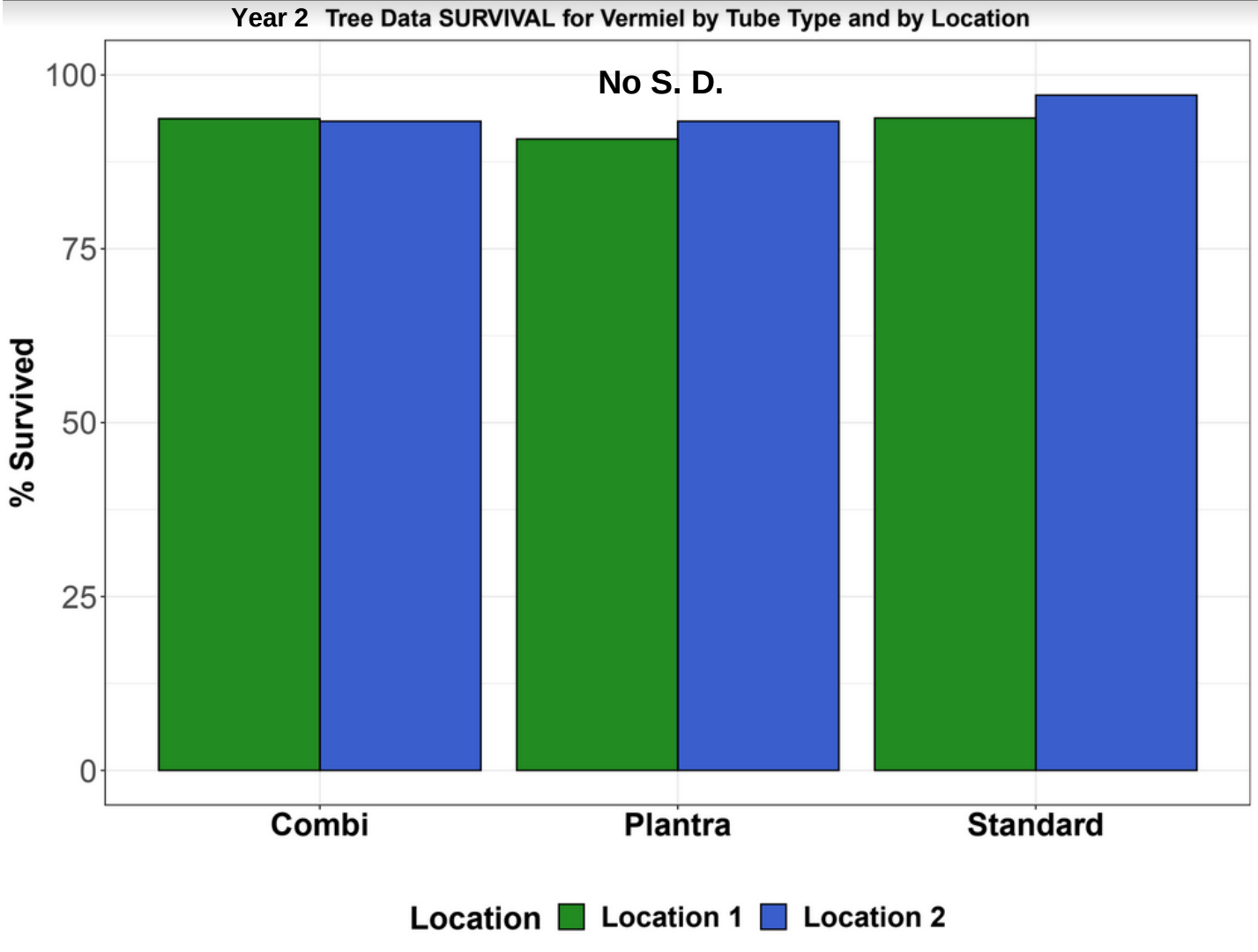
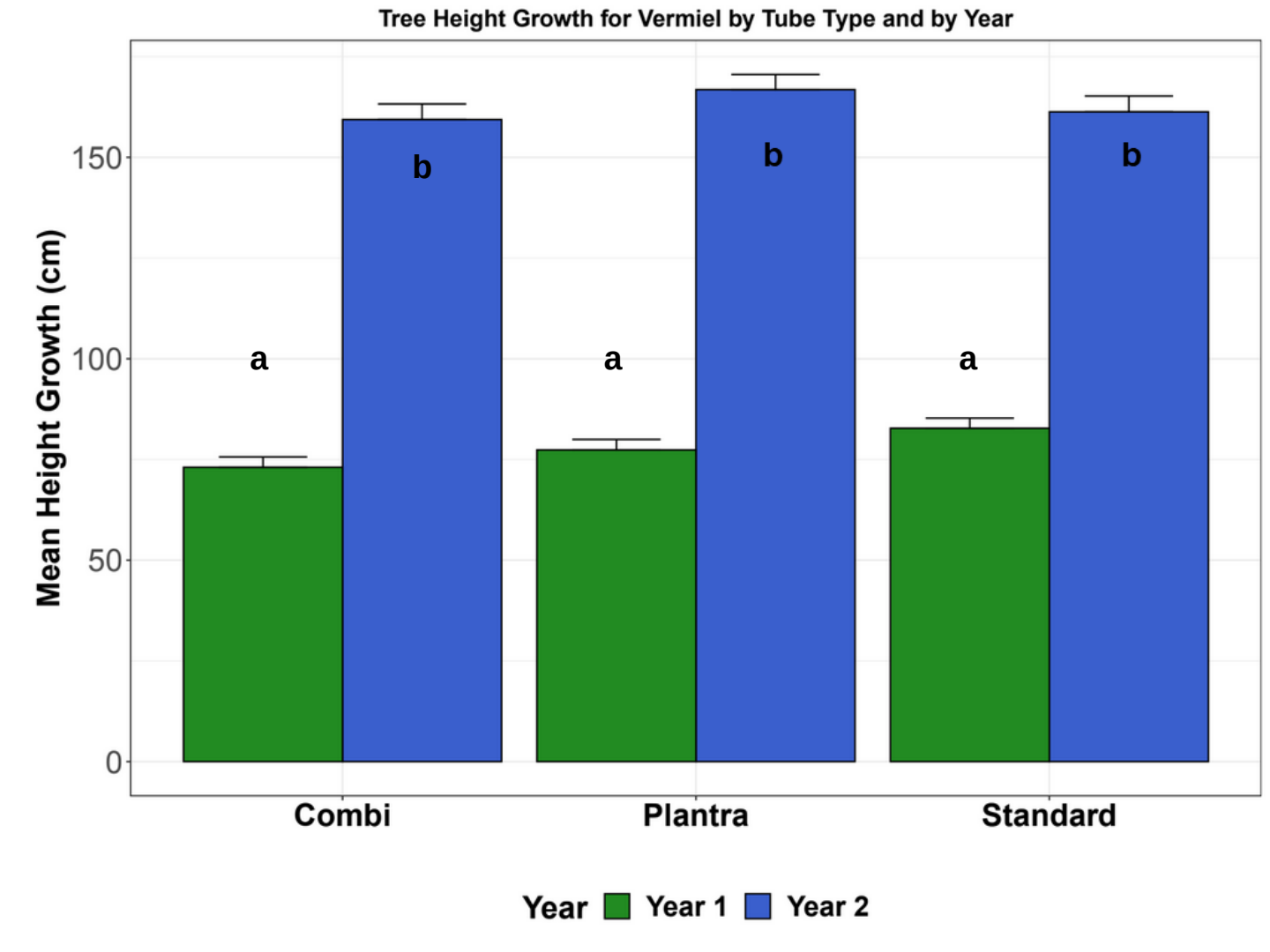
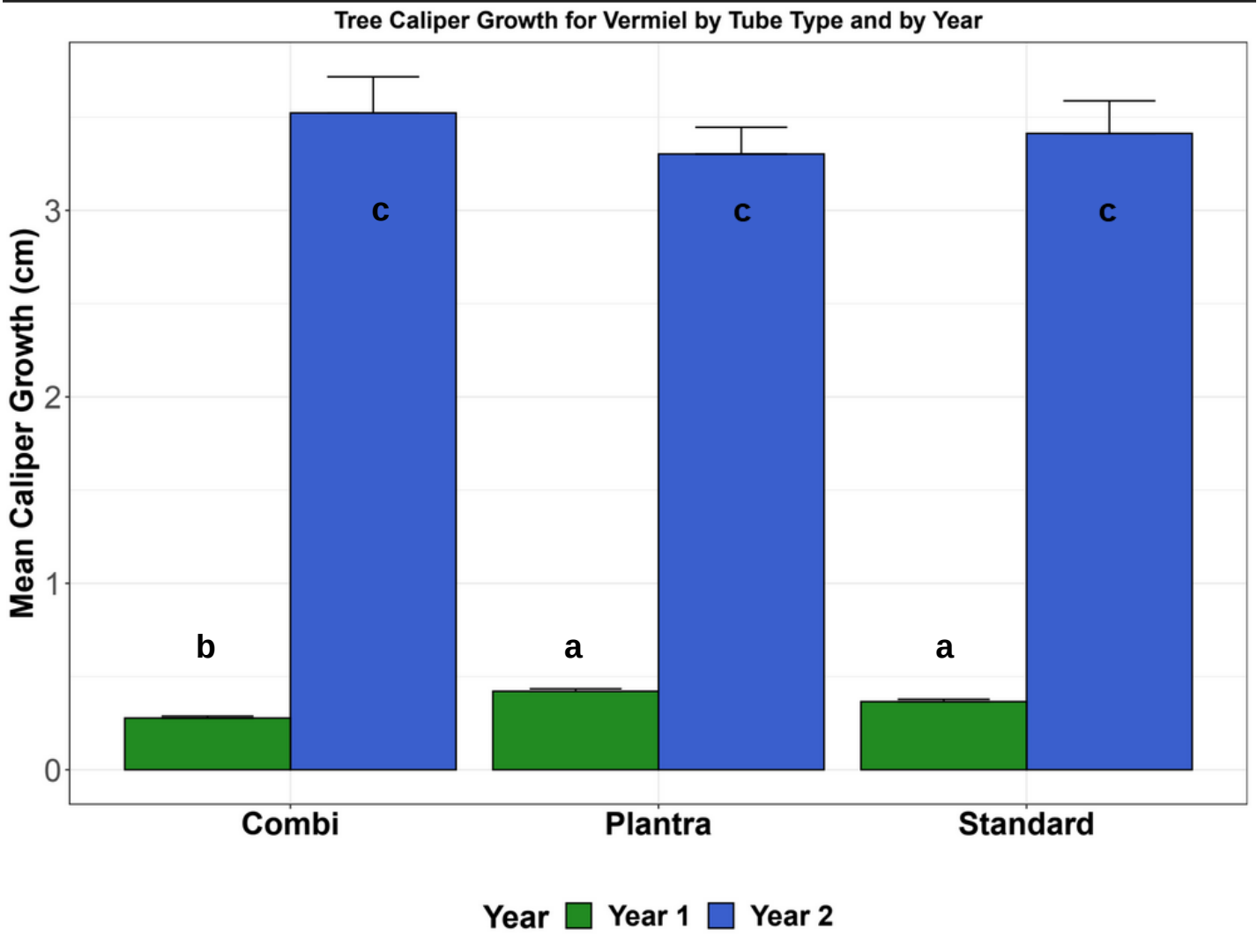
Too rapid top growth: only an issue regionally?


Year 2 Tree Data SURVIVAL for Vermiel by Tube Type and by Location
No S. D.
% Survived
100
75
50
25
0
Combi
Plantra
Standard
Location
Location 1
Location 2


Tree Height Growth for Vermiel by Tube Type and by Year
Mean Height Growth (cm)
150
100
50
0
a
b
a
b
a
b
Combi
Plantra
Standard
Year
Year 1
Year 2


Tree Caliper Growth for Vermiel by Tube Type and by Year
Mean Caliper Growth (cm)
0
1
2
3
b
a
a
c
c
c
Combi
Plantra
Standard
Year
Year 1
Year 2

Conclusions:

- no important differences through 2 years in our locations
- choose tubes based on other aspects:
  - ease of installation, seating into soil
  - burst feature is important
  - flair at top of tube might matter
  - price! seems to change
- Also testing Suregreen vented tube (began 2020)

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Fencing shrub clusters

Issue: survival of multi-stem shrubs
- not suited to 5’ tubes??
- 2’ tubes don’t protect from deer

- Protect from voles via “clean culture” (2’ tubes allow use of herbicide)

- Protect from deer via 4’ fence

- Drawbacks: cost, floods

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Results in 18 months for silky dogwood:

control – no fence
mean height: 26 cm

welded wire fencing
mean height 91 cm

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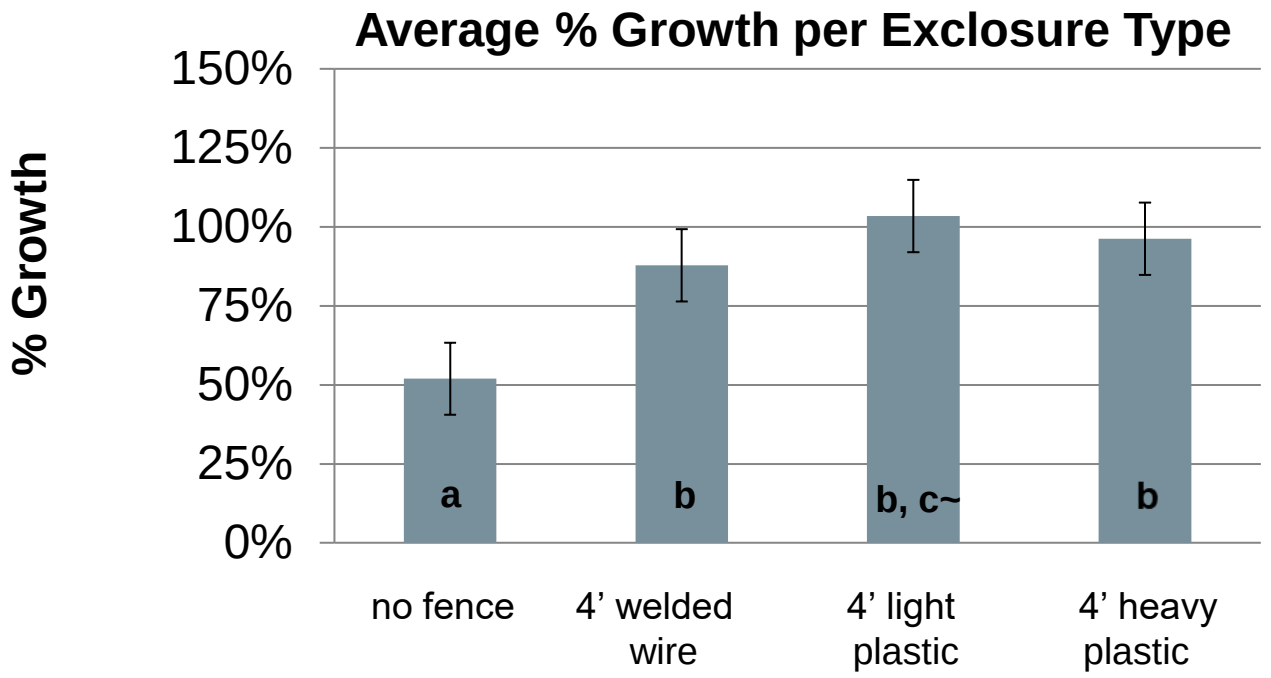
Alternatives to welded wire fencing



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5’ tube for multistem shrubs?

2’ tube + cage for multistem shrubs

Informal trials of stakes:

- ½” round fiberglass
- untreated white oak/chestnut oak
- pressure treated mixed oak (lots of red oak)
- ¾” PVC pipe

- no profound insights
- we’ve switched to pressure treated oak

Can buffers succeed on legacy sediments?

Upcoming paper: *Survivorship and growth of seedlings on riparian areas with thick deposits of legacy sediment. Goodwin Preserve, Chester County PA*
Sweeney, Dunbar, and Dow 2018 (submitted to *Restoration Ecology*)

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Can buffers succeed on legacy sediments?

- Formal study: “yes”
- Dozens of non-study sites: “yes”
- Deep, rich soils are aids, not barriers
- Sites with legacy sediments removed will be more challenging (wetness)

Photo: 5 year old tree on legacy sediment

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Success in multiflora rose

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Methods

initial clearing w/ forestry mower

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Methods

- typical planting
- broadcast Rodeo on invasives after regrowth
- seeded pasture mix (limed/fertilized)

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Methods

Normal maintenance:

- 2x/yr herbicide
- 2-3x/yr mowing

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2016 before work

2017 after work
(17 months later)

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Success in reed canary grass

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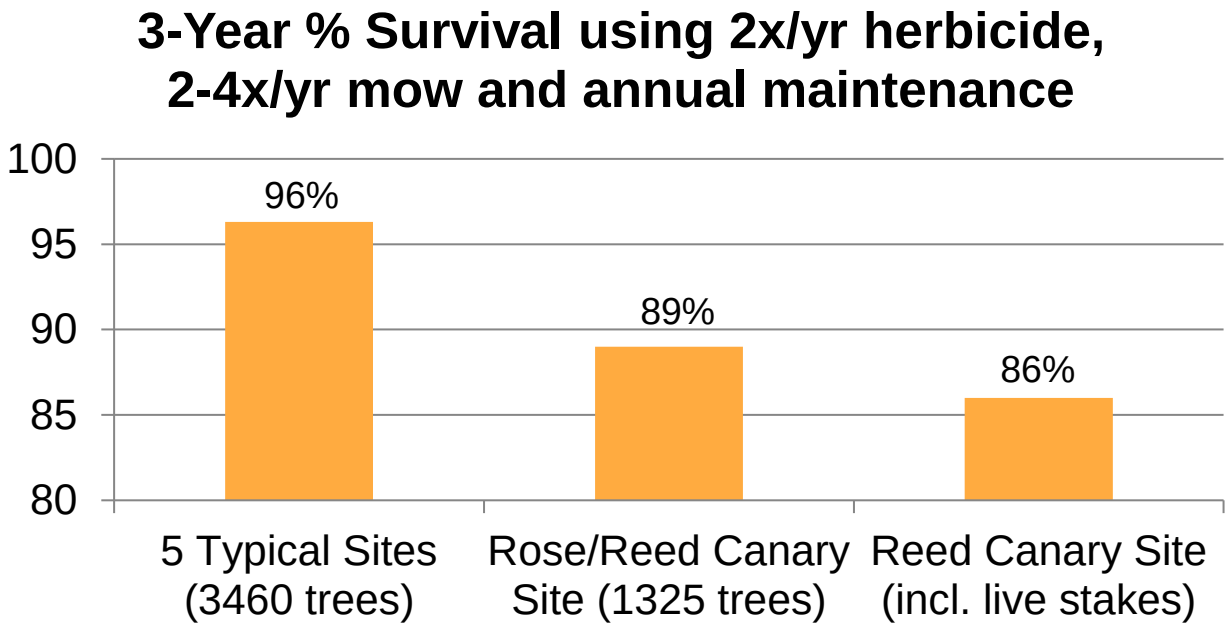
Success in reed canary grass

Standard approach works:

- 5’ tube
- 2x/yr herbicide
- 2-3x/yr mowing

- 2 yr old Chester Co site

Survival Rates for Current Methods:



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Contact info:

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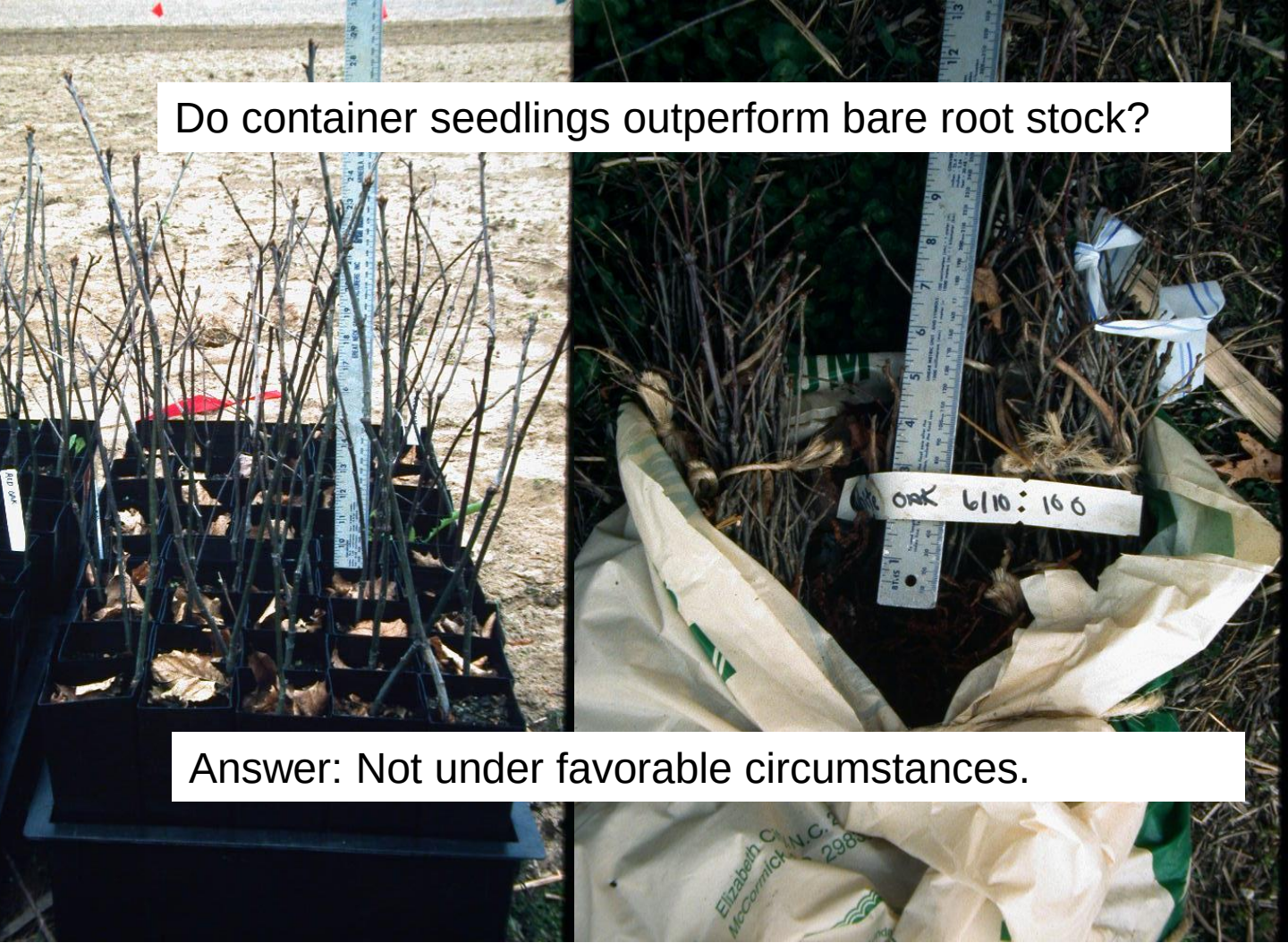
Do container seedlings outperform bare root stock?
ORK 6/10: 100
Answer: Not under favorable circumstances.

Does planting method matter?
Using dibble bar vs. auger to install 3x3x9” container seedlings

Table 2. Comparison of seedling survivorship (mean percent [confidence limits]) and growth (mean cm [± SE]).

	Survivorship		Growth	
	Year 1	Year 3	Year 1	Year 3
Planting method				
Dibble-bar	74.2 (69.4, 78.5)	46.6 (38.6, 54.8)	4.4 (±2.3)	14.8 (±4.3)
Auger	79.5 (71.7, 85.5)	53.3 (44.4, 62.0)	3.6 (±2.3)	14.1 (±4.1)

Sweeney, B. W., S. J. Czapka, and C. Petrow. 2007. How planting method, weed abatement, and herbivory affect afforestation success. Southern Journal of Applied Forestry 31(2):85-92.

Answer: Study found no significant difference

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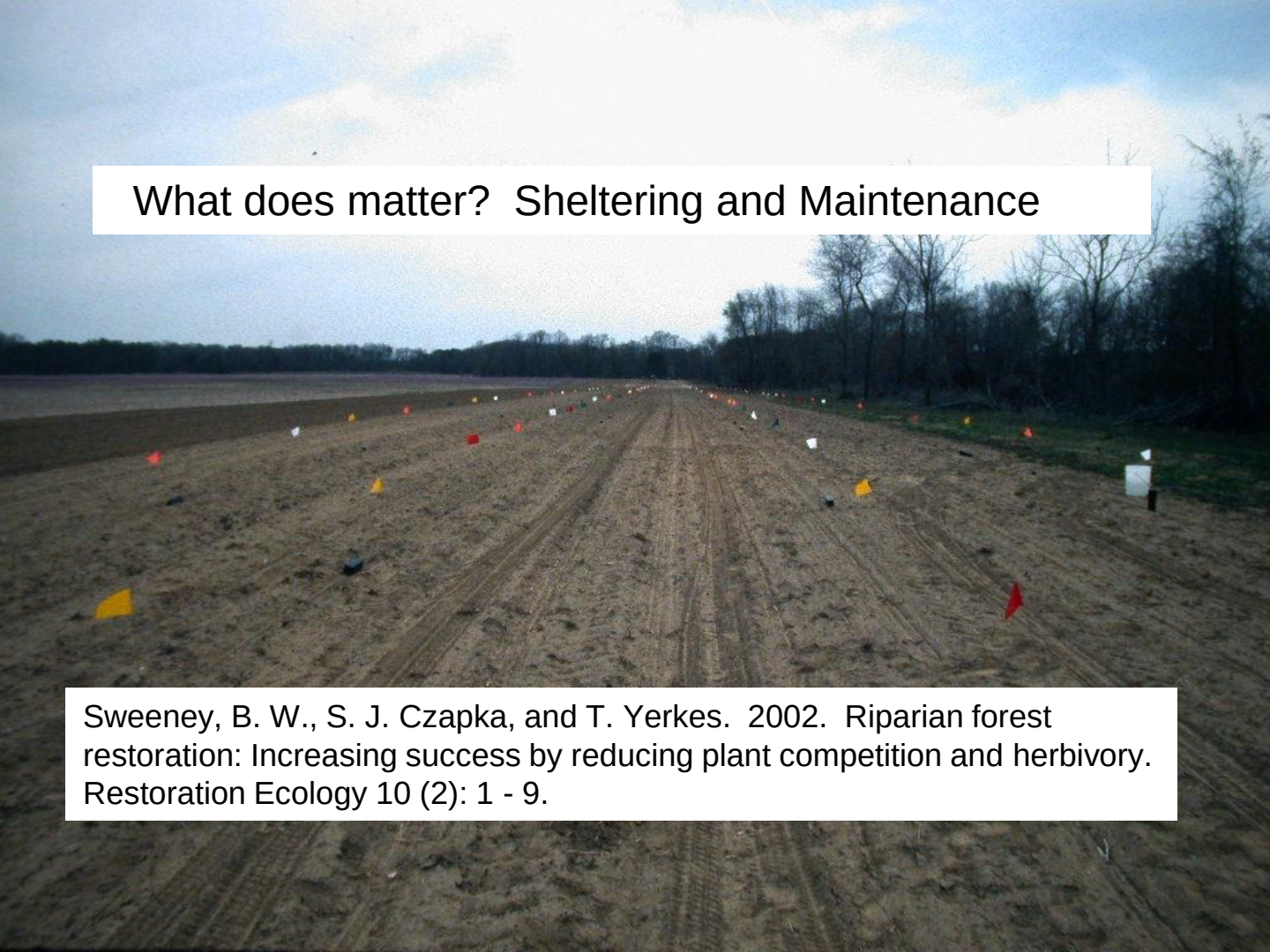
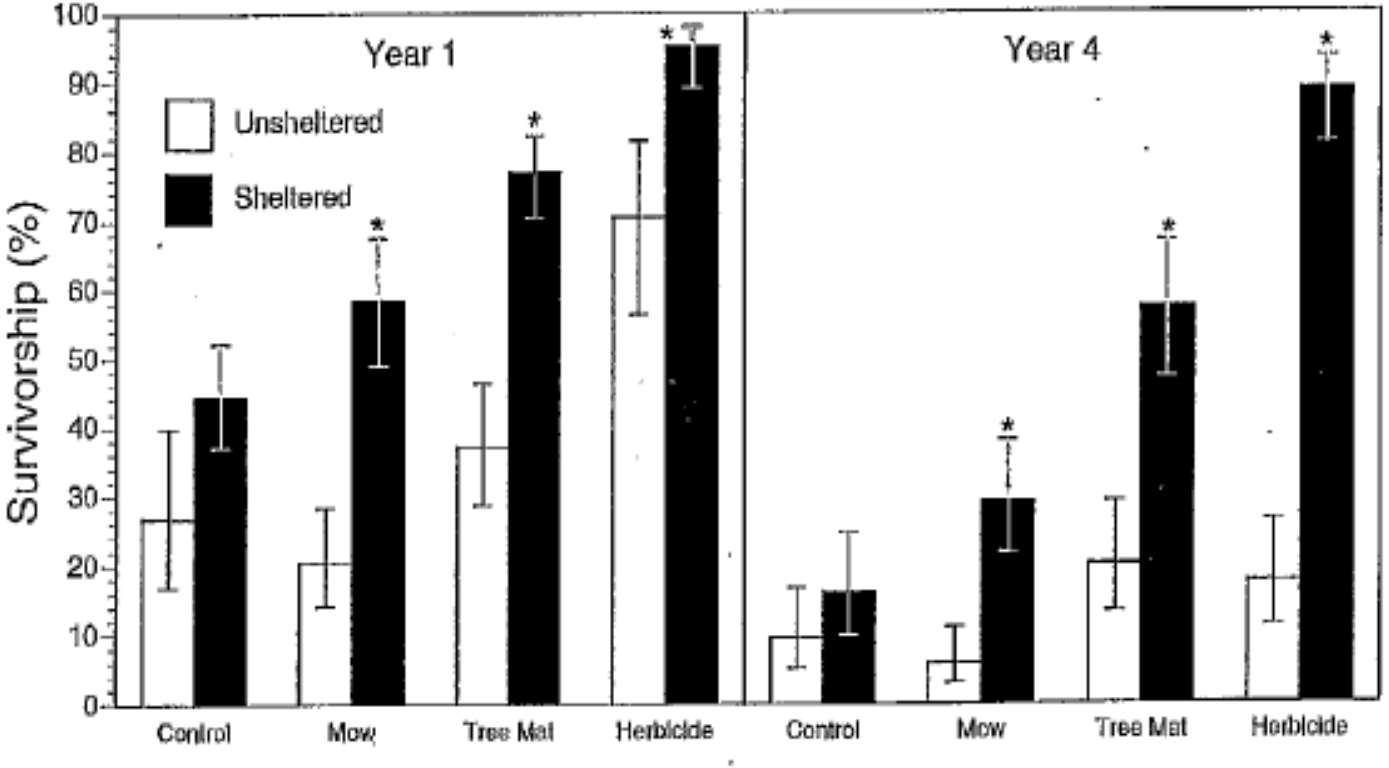


What does matter? Sheltering and Maintenance

Sweeney, B. W., S. J. Czapka, and T. Yerkes. 2002. Riparian forest restoration: Increasing success by reducing plant competition and herbivory. Restoration Ecology 10 (2): 1 - 9.



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