



# Pindar® GT Potential Use in Forestry

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Dow AgroSciences and Thunder Road Resources

CA Forest Vegetation Management Conference

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# Agenda

- Introduction to Pindar<sup>®</sup> GT
- Review trial data
  - Site preparation: fall and spring
  - Over the top of newly planted seedlings:  
spring
- Conclusions to date



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# Forestry Site-prep Trials

## Non-treated area



# Forestry Site-prep Trials

GoalTender + Accord XRT II + Oust Extra



# Injury from Herbicides

**Milestone<sup>®</sup> (7 oz/A) on Douglas-fir**

**Site prep: 11 days before planting  
(this is too close and it is NOT the  
label recommendation!)**



**Velpar DF (4 lb/A) on white fir**

**Site prep: 15 days before planting**

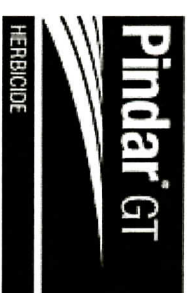


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# Products in New Research Trials

- Pindar® GT



- Oxyfluorfen + *penoxsulam*, 3.93 + 0.083 lb ai/gallon, SC
- Preemergent and early post emergent weed control
- Registered for use on noncropland and on nuts

- GoalTender®



- *Oxyfluorfen*, 4 lb ai/gallon SC
- Preemergent and early post emergent weed control
- Registered for use on conifer seedbeds, transplants, container stock and Christmas trees
- Also on cottonwood, eucalyptus, tree fruits, nuts and vines and other crops

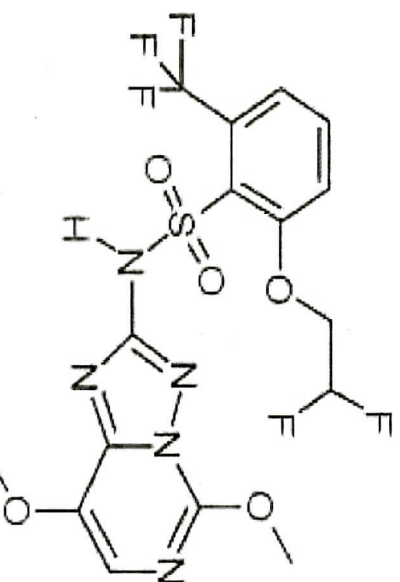


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# What is Pindar® GT?

- **A premix of:**
  - **Penoxsulam:** *A new ALS herbicide with broad spectrum weed control for use in tree nut crops*
  - **Oxyfluorfen:** *a PPO inhibitor that has been a long time agricultural standard for broad spectrum residual and contact weed control*
- **SC Formulation containing:**
  - **Penoxsulam:** 0.083 lb/gallon
  - **Oxyfluorfen:** 3.96 lb/gallon

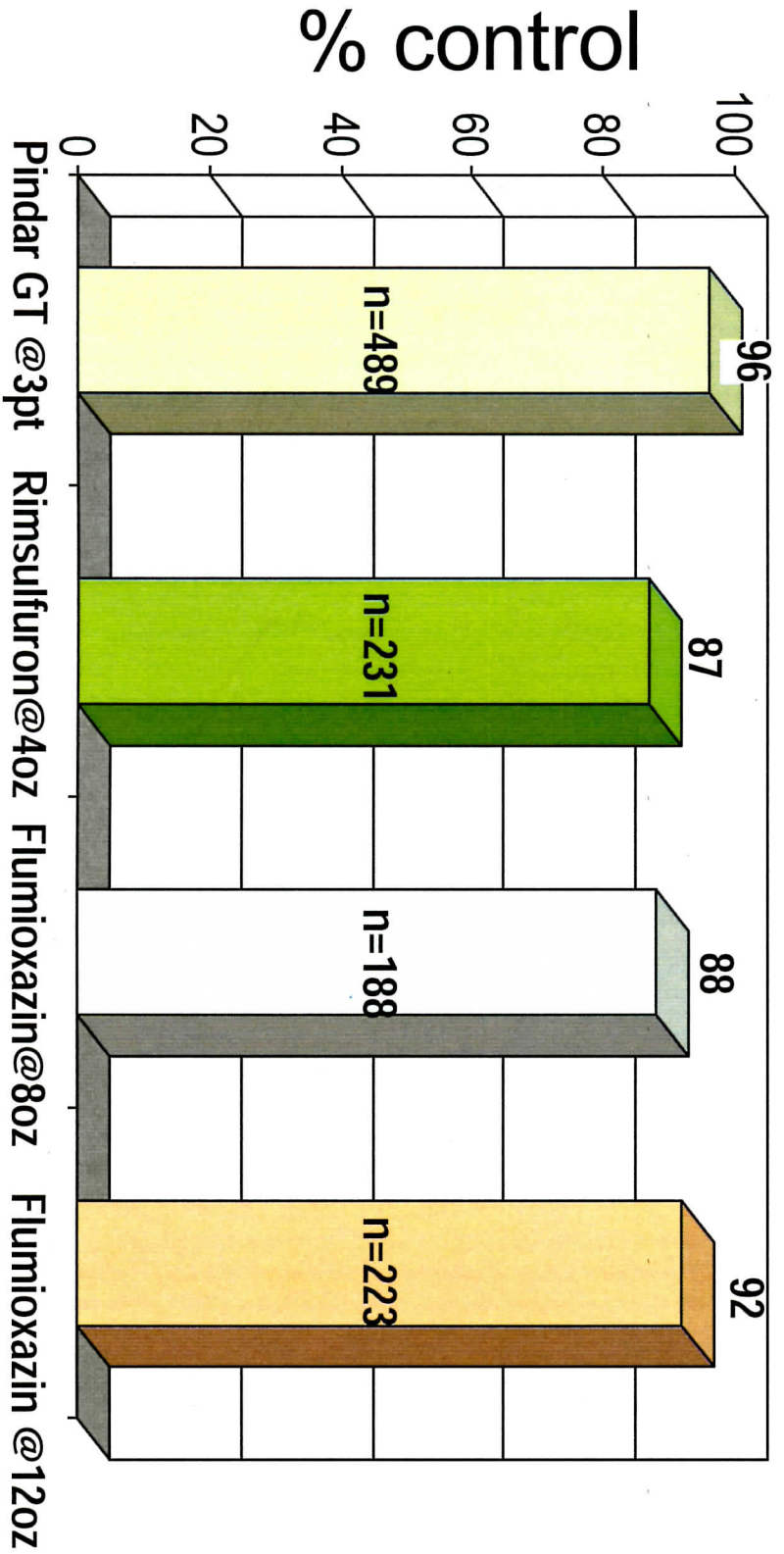


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# Pindar® GT – Control across all broadleaf weeds from fall applications in CA after 6 months

Summary of over 100 trials from 2004-2009



n=number of obsvs.  
All treatments included Glyphosate @ 3pts

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# Weed Control with Pindar® GT at 6 months after fall application

**Nontreated**



**Pindar GT at 3 pt/A**



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# Pindar<sup>®</sup> GT - Benefits

- **Broad Spectrum Weed Control**, over 65+ species in pre and post emergent, including glyphosate resistant species
- **Burndown and Residual Control**, up to 6 months after the application
- **Tank mix compatibility**, can be tankmixed with other tree nut herbicides with no compatibility issues
- **Crop Safety**, excellent safety to bearing and non-bearing tree nuts
- **Outstanding environmental and toxicological profile**, low toxicity to bees, parasitic wasps, lacewings, predatory mites, etc.



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# Some Weeds Controlled by Pindar® GT over 65 weeds labeled

- Marestalk
- Willowherb
- Wild radish
- Wild oats and other annual grasses
- Prickly lettuce
- Redstem filaree
- Sowthistle, annual and perennial
- Lambsquarters
- Pigweeds



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# Research Questions on Pindar GT

- What is the tolerance of Ponderosa pine and Douglas-fir to either fall or spring site preparation applications?
- What is the tolerance of Velpar DF intolerant species with site prep applications?
  - Sugar pine, white fir and Douglas-fir
- Is there a potential use of Pindar GT in the spring over the top of newly planted conifers?
- What is the efficacy of Pindar GT on weeds of concern in CA forestry?



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# Pindar GT Assumptions

- Conifer tolerance on Ponderosa pine and Douglas-fir are good with site preparation use either in the fall or spring
- Conifer tolerance on Velpar DF intolerant species is good with Pindar GT
  - Sugar pine, white fir and Douglas-fir with site prep applications
- There is some potential for use of Pindar GT over the top of newly planted conifers in the spring
- Pindar GT gives season long control of problem herbaceous species and
- Pindar GT picks up preemergent control of some key brush species
  - squaw carpet (*Ceanothus prostratus*)
  - other weedy *Ceanothus* species such as deerbrush (*C. integririmus*) or snowbrush ceanothus (*C. velutinus*)



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# Site Preparation Trials

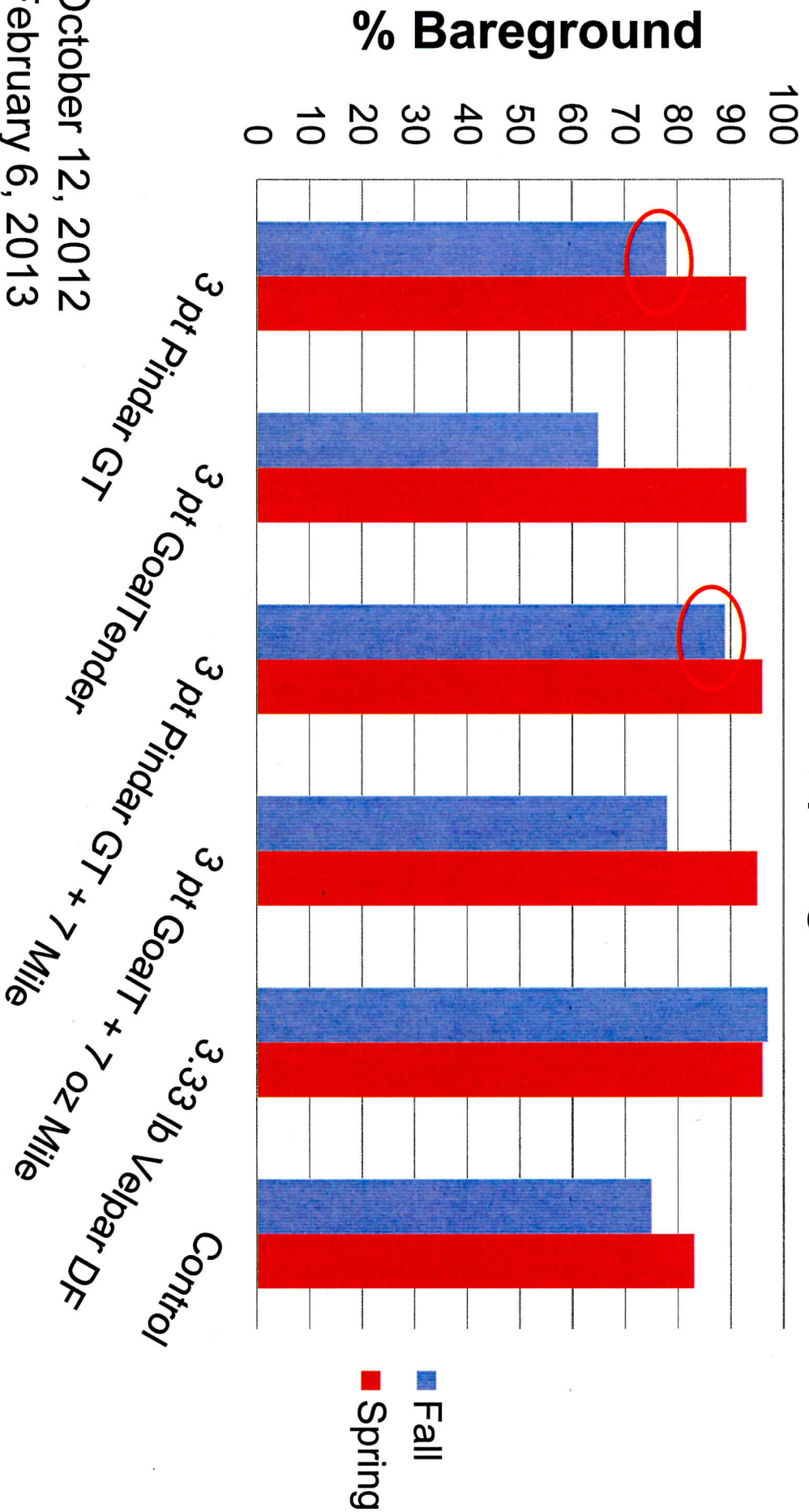
## Fall or Spring Applications

- Objective:
  - Determine the effect of Pindar GT and GoalTender used for fall or spring site preparation on conifer tolerance and weed efficacy
- Applications:
  - October 12, 2012
  - February 6, 2013
  - 10 GPA
- Planting: February 21, 2013
  - Douglas-fir, Sugar Pine, and White fir
- Round Mountain



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# 2013 Evaluations: % Bareground at 10 Months After Fall and 7 Months After Spring Treatment

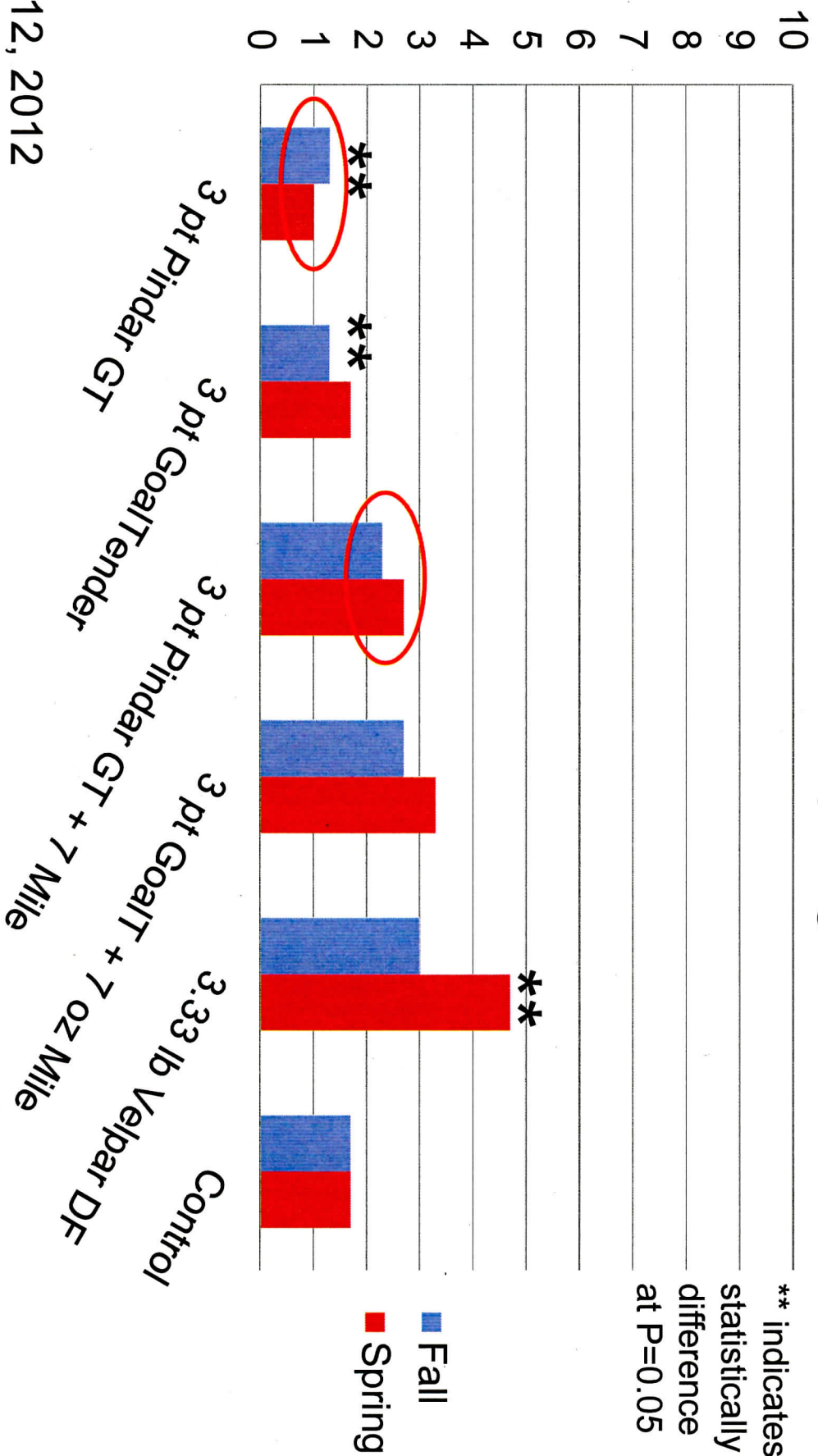


October 12, 2012  
February 6, 2013

All Treatments Contain 1.5 qts Accord XRT II

# 2013 Evaluations for White Fir: % Conifer Injury at 10 Months After Fall and 7 Months After Spring Treatment

% Injury (0-10 scale)

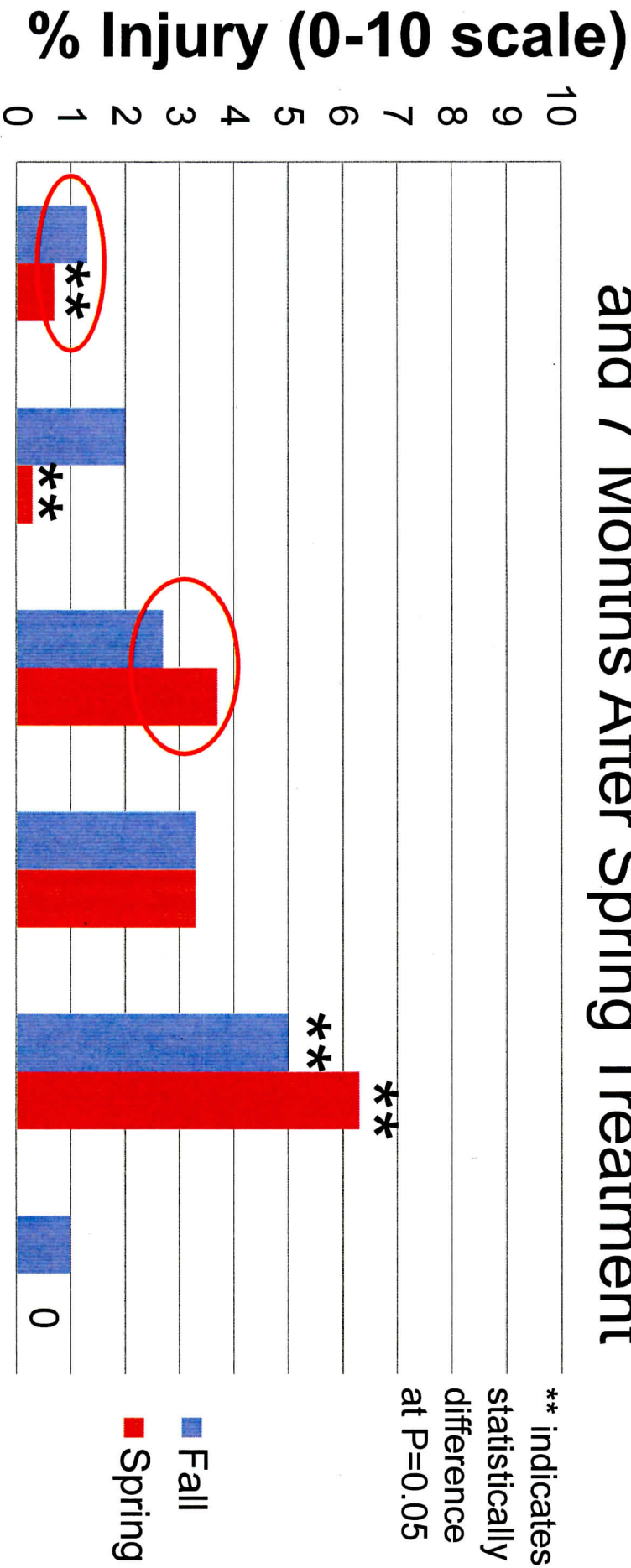


\*\* indicates statistically difference at P=0.05

Oct 12, 2012  
Feb 6, 2013 and planted Feb 21, 2013

All Treatments Contain 1.5 qts Accord XRT II

# 2013 Evaluations for [Sugar Pine](#): % Conifer Injury at 10 Months After Fall and 7 Months After Spring Treatment



Oct 12, 2012  
 Feb 6, 2013 and planted Feb 21, 2013

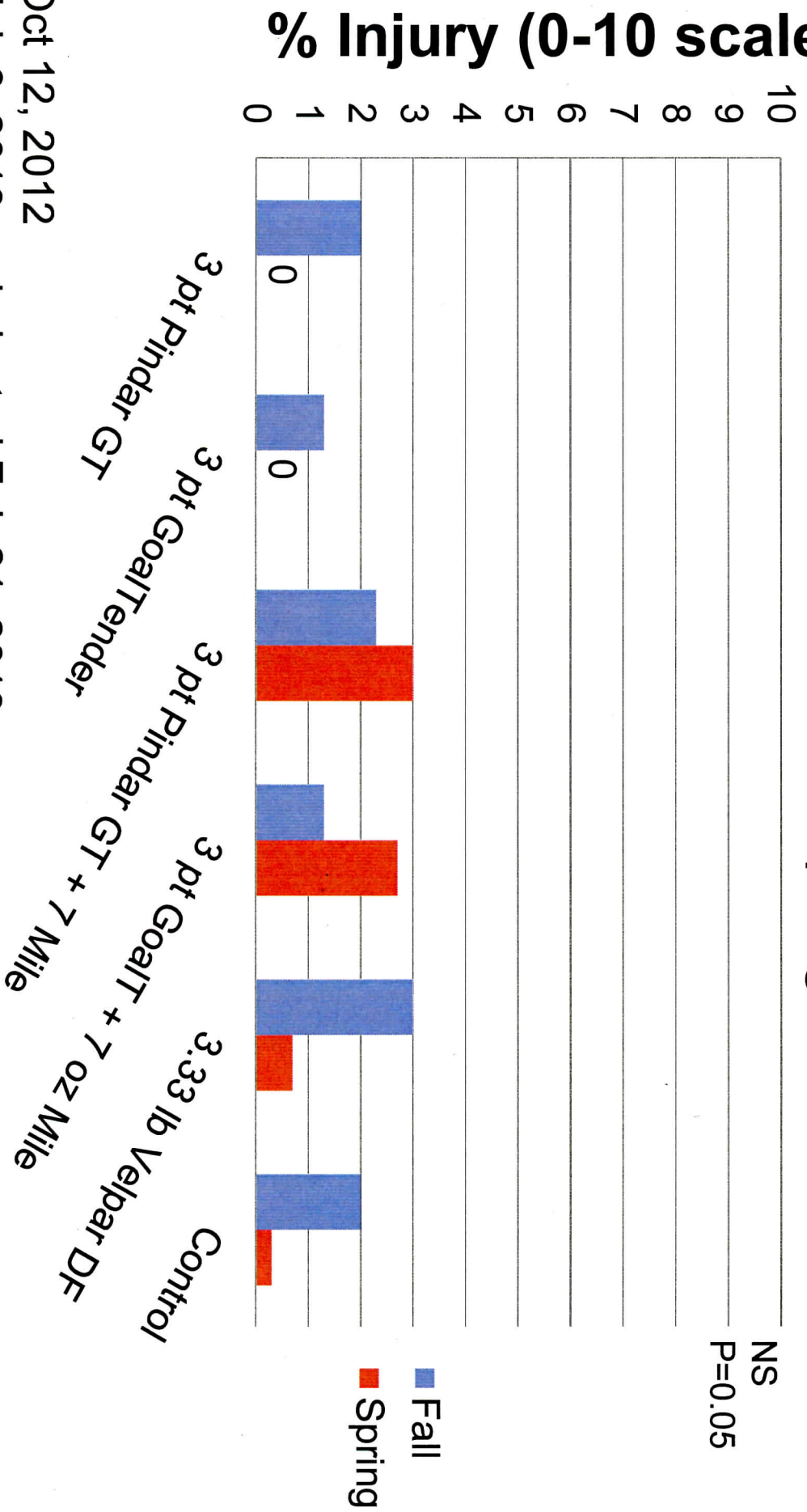
All Treatments Contain 1.5 qts Accord XRT II

# Sugar Pine Tolerance with Fall Application of Milestone + Pindar GT (7 oz + 3 pt/A)



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# 2013 Evaluations for Douglas-fir: % Conifer Injury at 10 Months After Fall and 7 Months After Spring Treatment



Oct 12, 2012  
 Feb 6, 2013 and planted Feb 21, 2013

All Treatments Contain 1.5 qts Accord XRT II



Milestone + Pindar GT @ 7 oz + 3 pt

Application: October 2012 site prep

Photo: August 2013

# Site Preparation Conclusions

- What is the effect of Pindar GT and GoalTender used for fall or spring site preparation on efficacy and conifer tolerance?
- CONIFERS (Douglas-fir, sugar pine, white fir)
  - Good survival and tolerance with Milestone and Pindar GT
  - Sugar pine (sensitive to hexazinone) is tolerant to Pindar GT
- WEED CONTROL
  - Excellent weed control with fall applications of Milestone + Pindar GT
  - All spring treatments gave excellent weed control

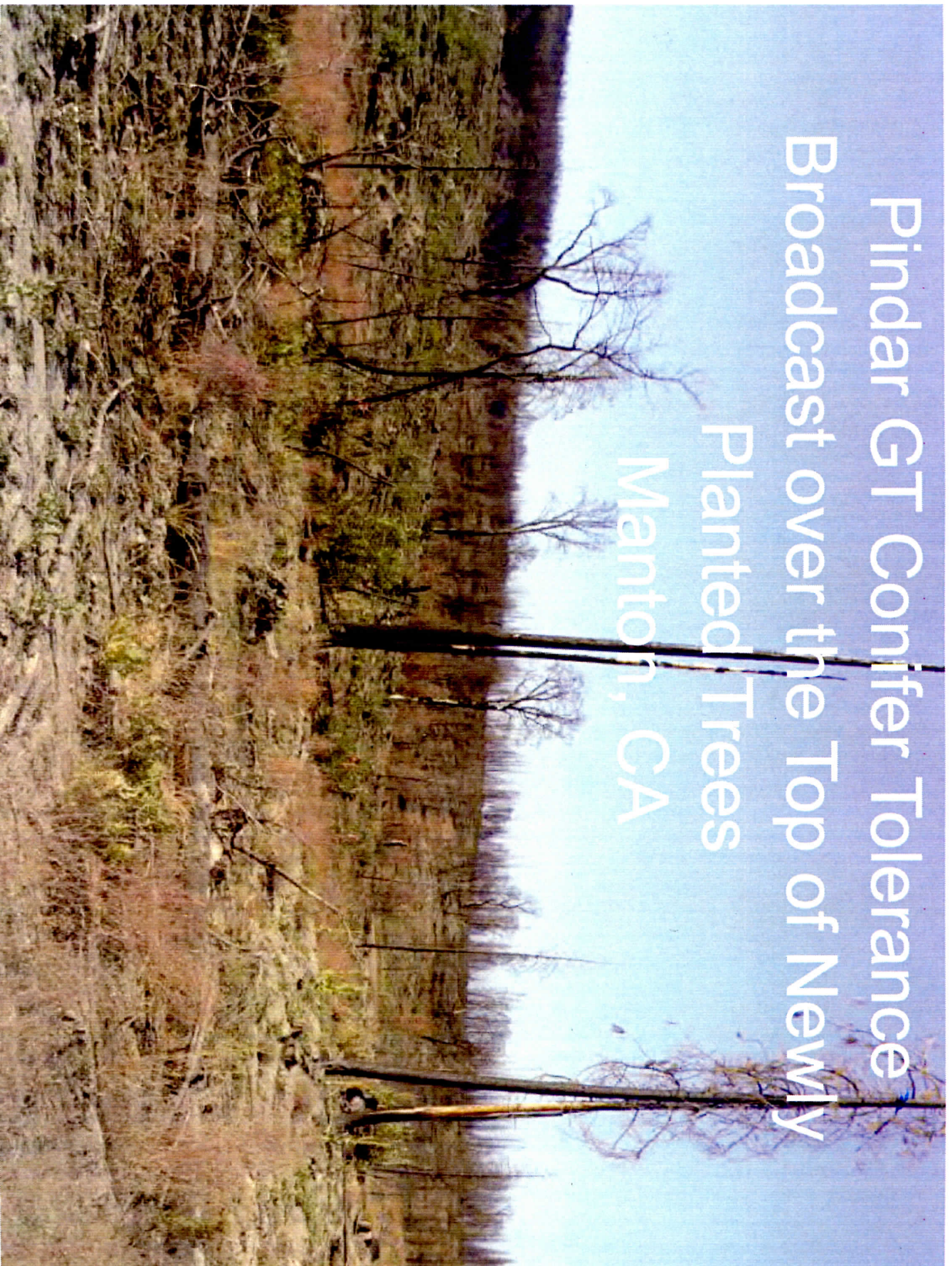


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Pindar GT Conifer Tolerance  
Broadcast over the Top of Newly  
Planted Trees  
Manton, CA



Effect of Pindar GT spring or fall broadcast over the top of newly  
planted (spring) conifers

Trt #	Code	Treatment	Rate
1	A	PINDAR GT	3 pt pr/a
2	A	PINDAR GT	6 pt pr/a
3	A	GOALTENDER	3 pt pr/a
4	A	GOALTENDER	6 pt pr/a
5	B	PINDAR GT	3 pt pr/a
6	B	PINDAR GT	6 pt pr/a
7	B	GOALTENDER	3 pt pr/a
8	B	GOALTENDER	6 pt pr/a
9	AB	UNTREATED	

Planting date: 25Mar13

Conifers: Douglas-fir, Ponderosa pine, white fir

15 seedlings planted per species so that 5 could be dug for root evaluations

Spring application: 26Mar13

Fall application: 03Oct13, no data yet

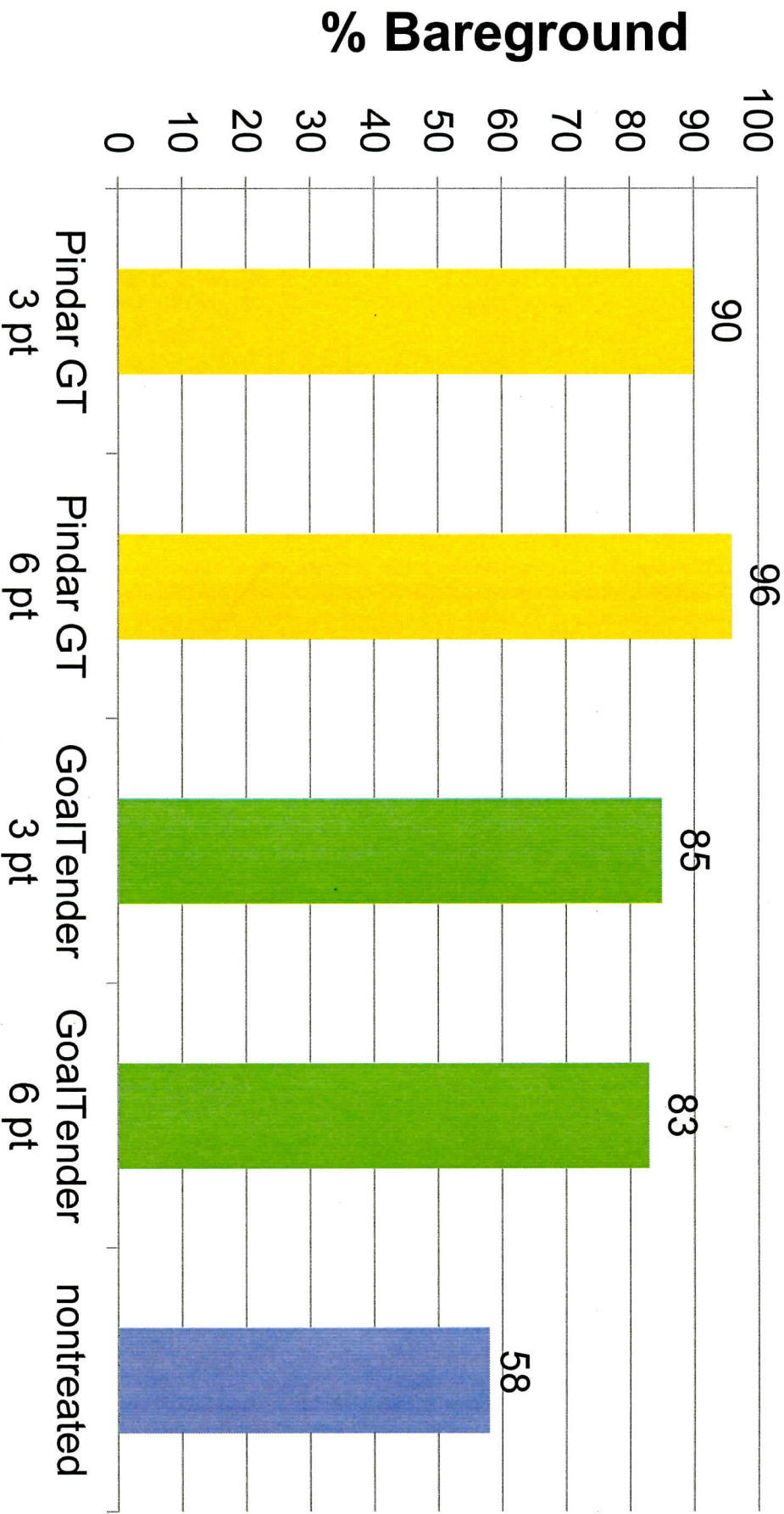
10 GPA

# Survival

- All conifers had excellent survival (95-100%)
  - White fir
  - Douglas-fir
  - Ponderosa pine

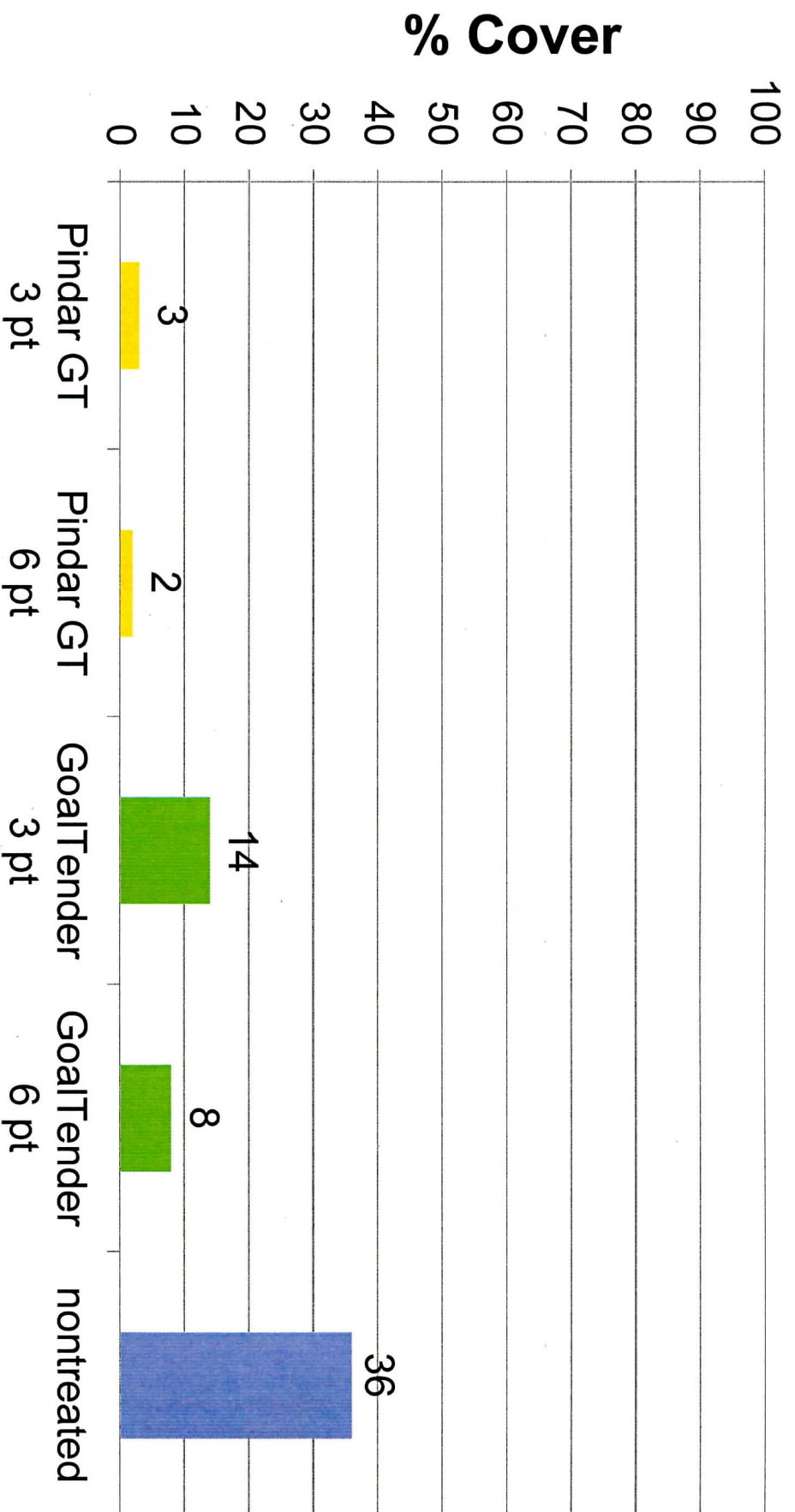


# % Bareground - March Application (140 days after application)



Spring application: 26Mar13  
10 GPA

# Control of Squaw carpet - March Application (140 days after application)



Spring application: 26Mar13  
10 GPA

# Squaw carpet control with Pindar GT

photos taken June 11, 2013 (2.5 MAT)

**Pindar GT at 3 pt/A**



**nontreated**



White PVC post marks the center of the plot (12 X 36 ft),  
3 rows of conifers planted in each plot

# Ponderosa pine, white fir and Douglas-fir tolerance to Pindar GT

**Pindar GT at 6 pt/A (2X rate):**

**trees and no squaw carpet**



**Nontreated:**

**trees and squaw carpet**



GoalTender also showed no  
conifer damage to date

# Nontreated Control



Pindar GT @ 3 pt applied in March  
photo at 5 months after treatment

Squaw carpet  
seedlings



# GoalTender @ 3 pt applied in March photo at 5 months after treatment



Pindar GT @ 6 pt (2X) over the top of newly  
planted Ponderosa pine, Douglas-fir and white  
pine at 5 Months after Planting



# Evaluations for Conifer Roots

## Root Length

- 0 = no new roots
- 1 = 0.1 to 1 cm
- 2 = 1.1 to 2 cm
- 3 = 2.1 to 3 cm
- 4 = 3.1 to 4 cm
- 5 = 4.1 to 5 cm
- 6 = 5.1 to 6 cm
- 7 = 6.1 to 7 cm
- 8 = 7.1 to 8 cm
- 9 = 8.1 to 9 cm
- 10 = 10+ cm

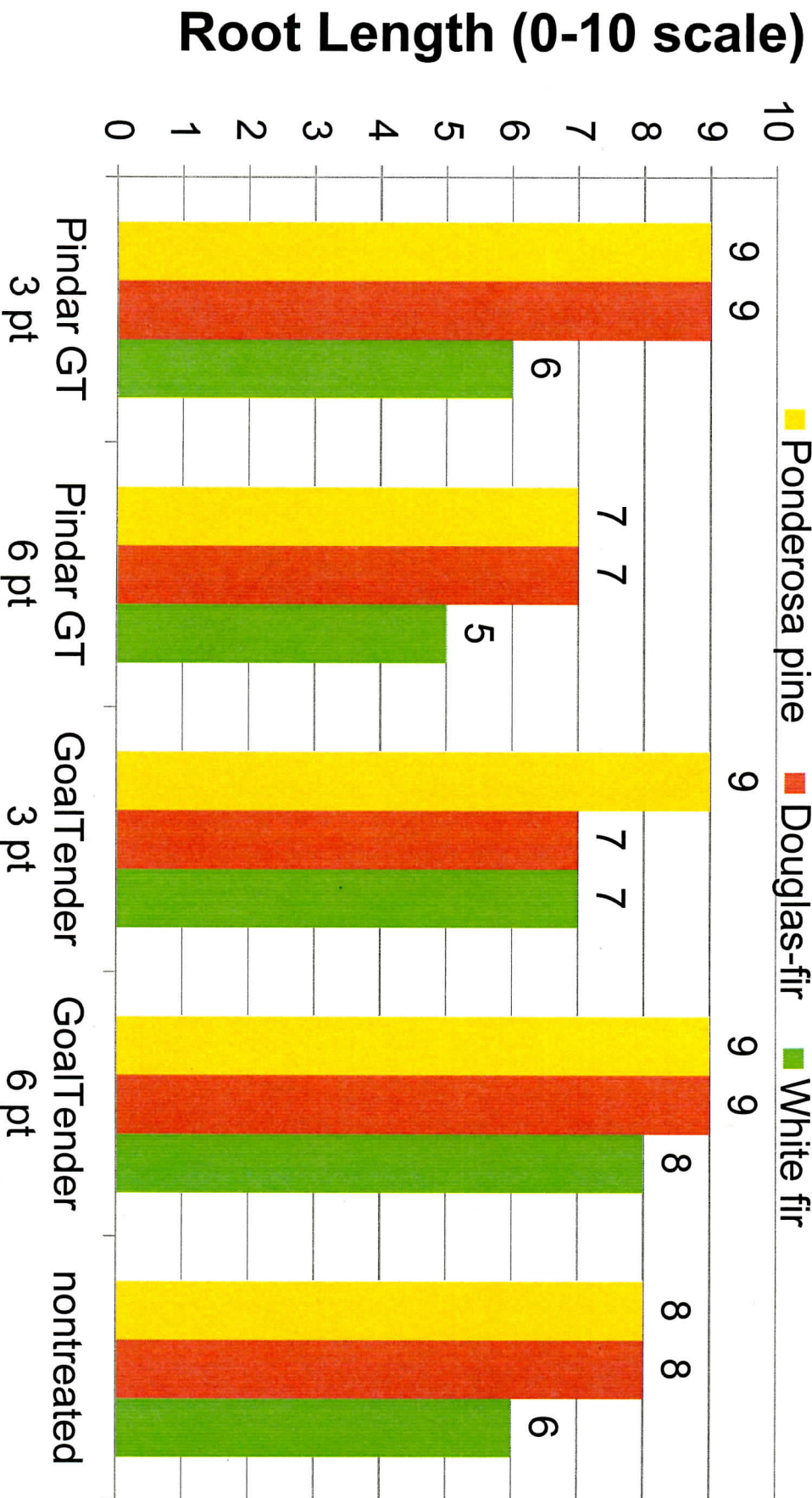
## Number of new roots

- 0 = no new roots
- 1 = 1 to 5 new roots
- 2 = 6 to 10 new roots
- 3 = 11 to 15 new roots
- 4 = 16 to 20 new roots
- 5 = 21 to 25 new roots
- 6 = 25+ new roots



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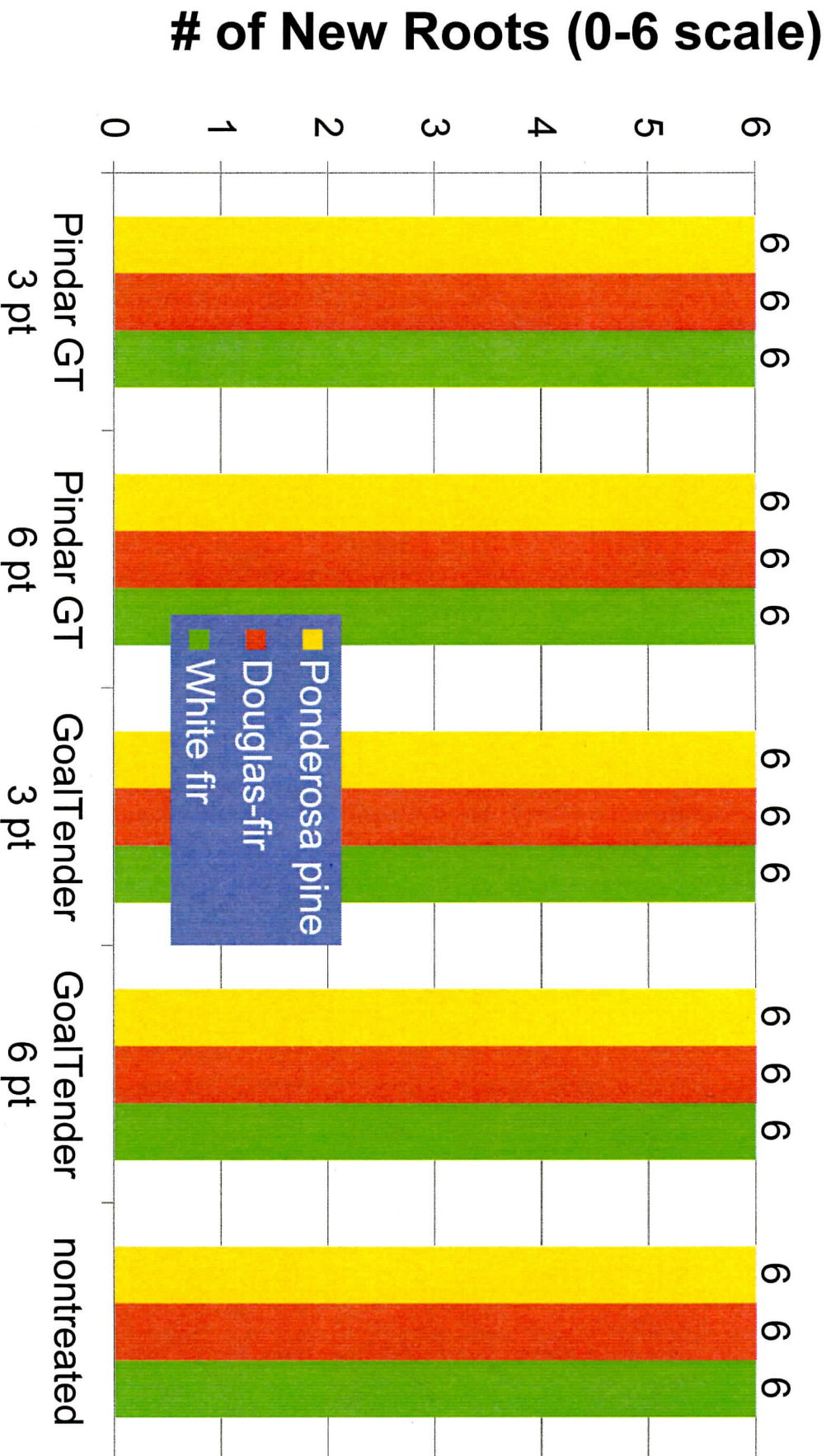
# Root Length - March Application (140 days after application)



Spring application: 26Mar13  
10 GPA

NS  
P = 0.05

# New Roots - March Application (140 days after application)



Spring application: 26Mar13  
10 GPA

NS  
P = 0.05

Pindar GT @ 3pt: Root growth on Ponderosa pine,  
Douglas-fir and white pine at 5 Months after Planting



# Conclusions to Date about Pindar GT

## Use in Forestry

- Conifer tolerance – site prep
  - Fall or spring applications = excellent for Douglas-fir, Ponderosa pine, sugar pine, white fir
- Conifer tolerance - over the top of newly planted seedlings
  - Spring applications = excellent survival and growth for Dougals-fir, Ponderosa pine and white fir
  - Conifer root data: There was no difference between treatments (including the 2X rates of Pindar GT and GoalTender) and the nontreated control
- Weed control
  - Very good weed control, Pindar GT gave better control of squawcarpet versus GoalTender



N Idaho

Oct 2012 application of Pindar GT + Milestone @ 3 pt + 7 fl oz  
Photo taken June 2013  
about a 45 to 50 inch rainfall zone, clay loam



# Future Research Needs

- Conifer tolerance:
    - Continue established studies
    - New trials with Oregon Vegetation Management Research Cooperative
  - Effect of high organic matter (up to 15-18%)
    - Fall application on high elevation site before snow
    - Spring application on low elevation site with high precipitation
  - Woody brush seed germination efficacy
    - Manzanita, Deerbrush, Snowbrush ceanothus
  - CA SLN label for Pindar GT use in forestry
- 



# Partnerships

- Dow AgroSciences is pleased and proud to partner with private timber companies, Thunder Road Resources, Sierra Cascade Forestry Cooperative, FSC Cooperative and others in forestry research
- Thank you for your continued dedication to growing trees for our future



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# Trials with Potential New Products for Site Prep



- Pindar® GT and GoalTender®
  - Fall and spring applications for site prep
  - Conifer tolerance and weed control
- Fall:
  - Sprayed October 20, 2011
    - Planted March 24, 2012 (about 150 DAT/5 MAT) Redding
  - New site sprayed fall 2012, planted spring 2013
    - Conifer tolerance with destruction sampling for root analysis
- Spring:
  - Sprayed April 4, 2012
    - Planted April 20, 2012 (16 DAT) Burney
  - New site planned for spring 2013
    - Conifer tolerance with destruction sampling for root analysis



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