

Responses of Douglas-fir and Ponderosa Pine Seedlings to Silvicultural Treatments

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Introduction

- Douglas-fir and ponderosa pine seedling establishment experiment at 12 sites across ID, OR, and WA
 - 1998. Initial fertilization – Sub-surface controlled release – 6 treatments
 - 1999. Second fertilization – Spot broadcast – 6 treatments.
 - 2001. Third treatment (fertilizer + pronone) – Surface broadcast – 2 treatments.

Introduction

- This presentation will report seedling growth response from 2002 to 2003 for 2 sites in northeast WA
 - Site 1: Trail Divide – Bad rock – Clay schist
 - Site 2: Scoop Mountain – Good rock – Granite
 - Two treatments (2001)
 - Control
 - N + K + S + B + Cu + Zn + Fe + Pronone.

Methods

- Treatment overview (1998)
 - Control
 - N only
 - N + K + S
 - N + S
 - K + S
 - N + K + S + P + Mg + Cu + Fe + Mn + Mo
- Treatment same in 1999, only different in fertilizer amounts.

Methods

- Experiment
 - 2 species x 2 replications x 6 plots x 121 trees
- Analyses (Annual growth increment for caliper, height, volume)
 - ANOVA
 - Comparison of means
 - Growth responses

Results

- Caliper growth (ANOVA)

SOV	DF	F	Pr > F
Species	1	11.96	0.0006
Trt	1	37.88	0.0001
Block	3	4.16	0.0167
Plot(Blk)	20	0.40	0.94
Sp*PI(Blk)	5	1.70	0.13
Trt*PI(Blk)	5	10.08	0.0001
Cal_init	1	24.67	0.0001

Results

- Height growth (ANOVA)

SOV	DF	F	Pr > F
Species	1	62.70	0.0001
Trt	1	184.01	0.0001
Block	3	0.90	0.46
Plot(Blk)	20	0.60	0.82
Sp*PI(Blk)	5	4.59	0.0004
Trt*PI(Blk)	5	2.26	0.0467
Ht_init	1	498.20	0.0001

Results

- Volume growth (ANOVA)

SOV	DF	F	Pr > F
Species	1	6.46	0.0112
Trt	1	52.91	0.0001
Block	3	2.13	0.12
Plot(Blk)	20	0.48	0.90
Sp*PI(Blk)	5	1.75	0.12
Trt*PI(Blk)	5	7.66	0.0001
Vol_init	1	1736.7	0.0001

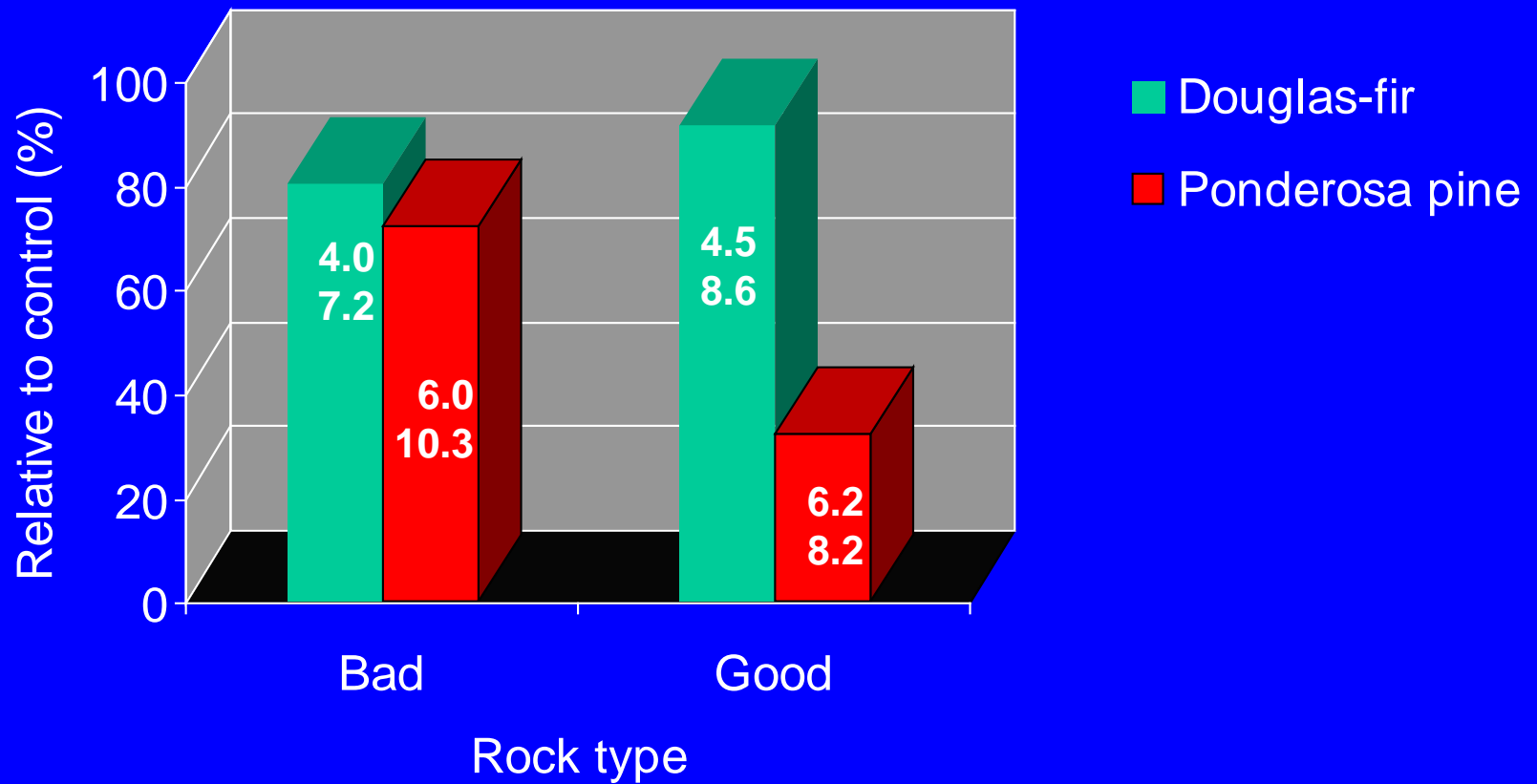
Results

- Rock type effects on growth (ANOVA)

SOV	DF	F	Pr > F
Cal	1	0.81	0.37
Ht	1	8.06	0.0046
Vol	1	5.01	0.0254

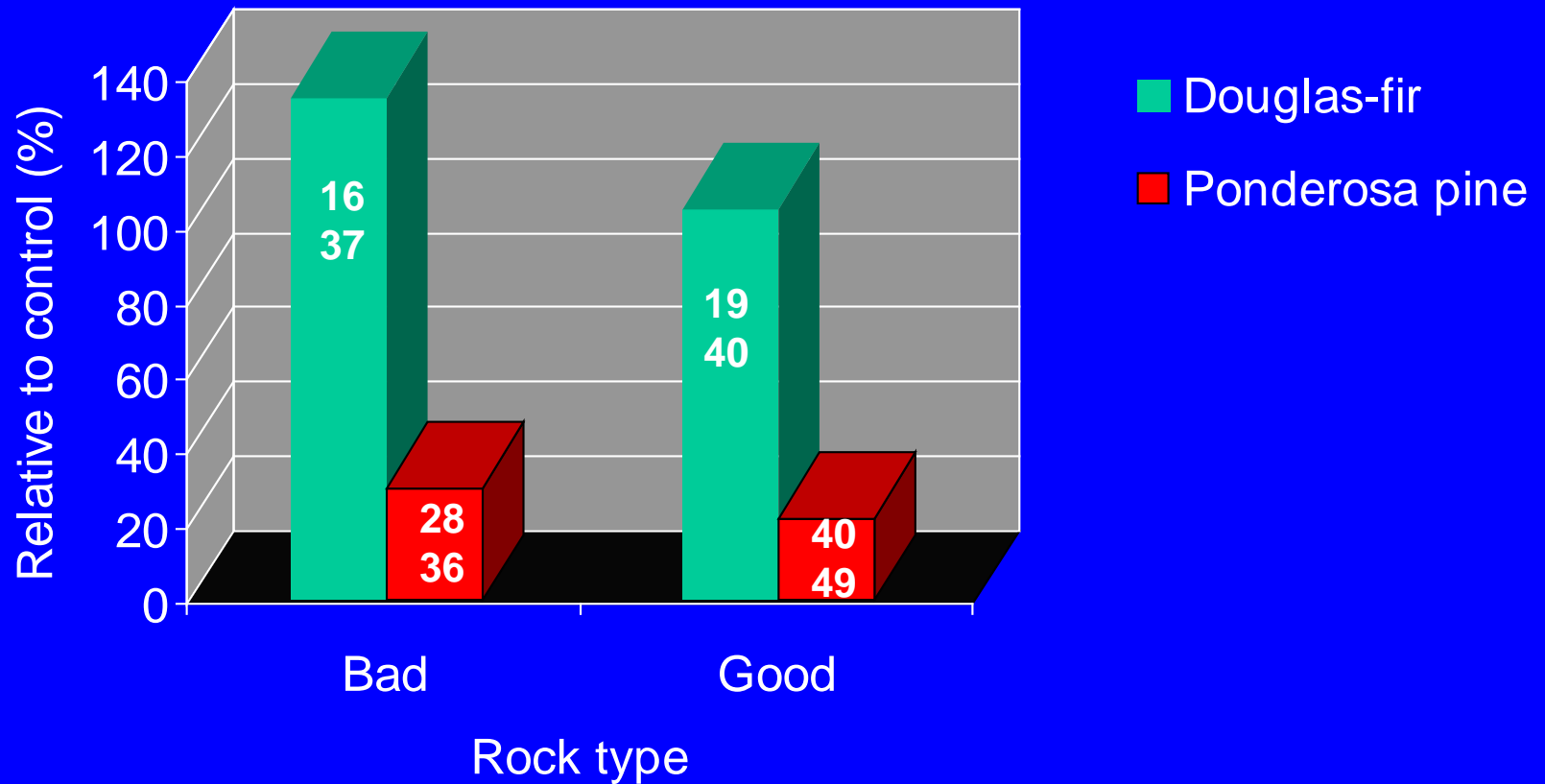
Results

- Caliper growth (cm tree⁻¹ yr⁻¹)



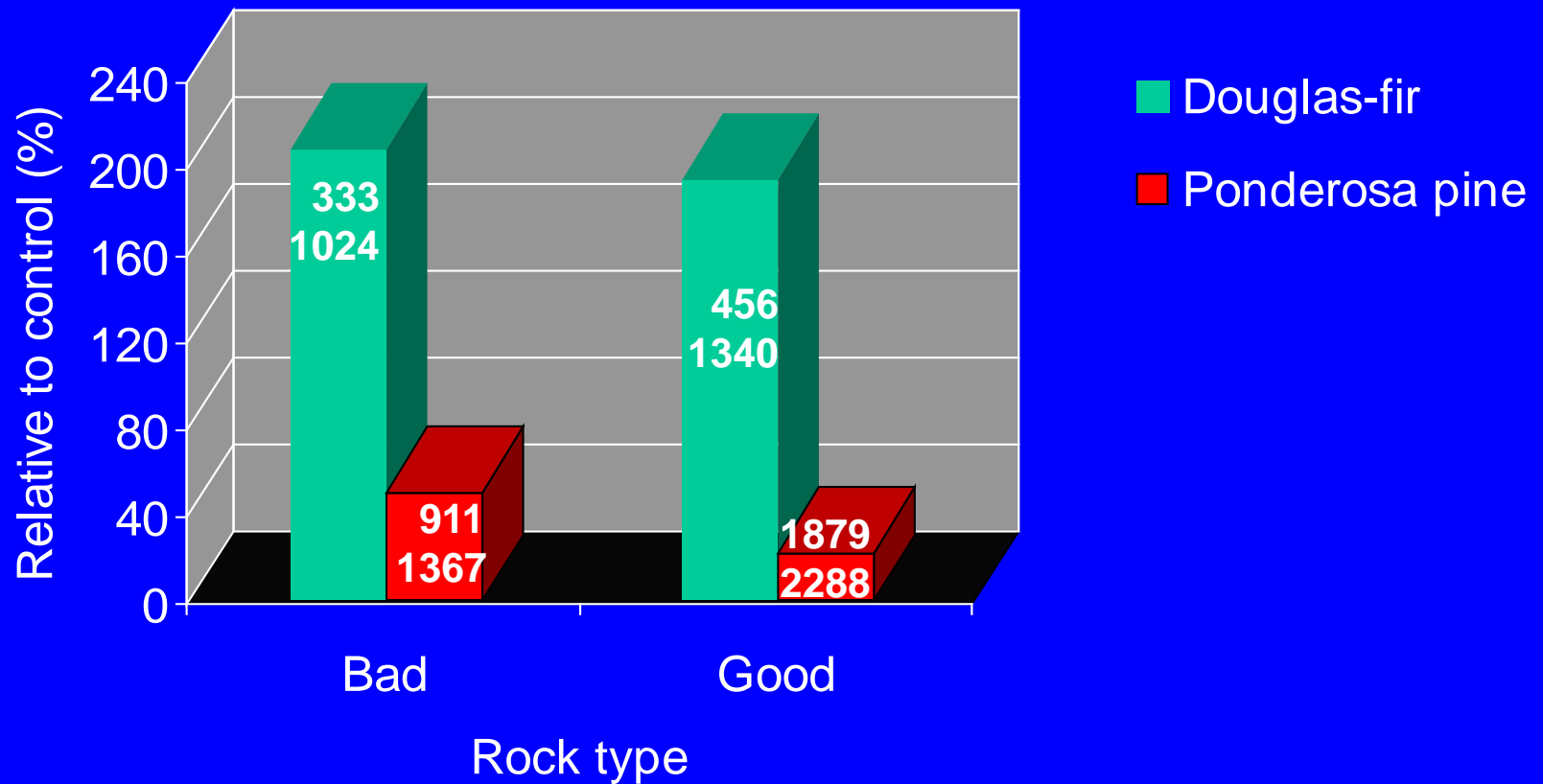
Results

- Height growth (cm tree⁻¹ yr⁻¹)

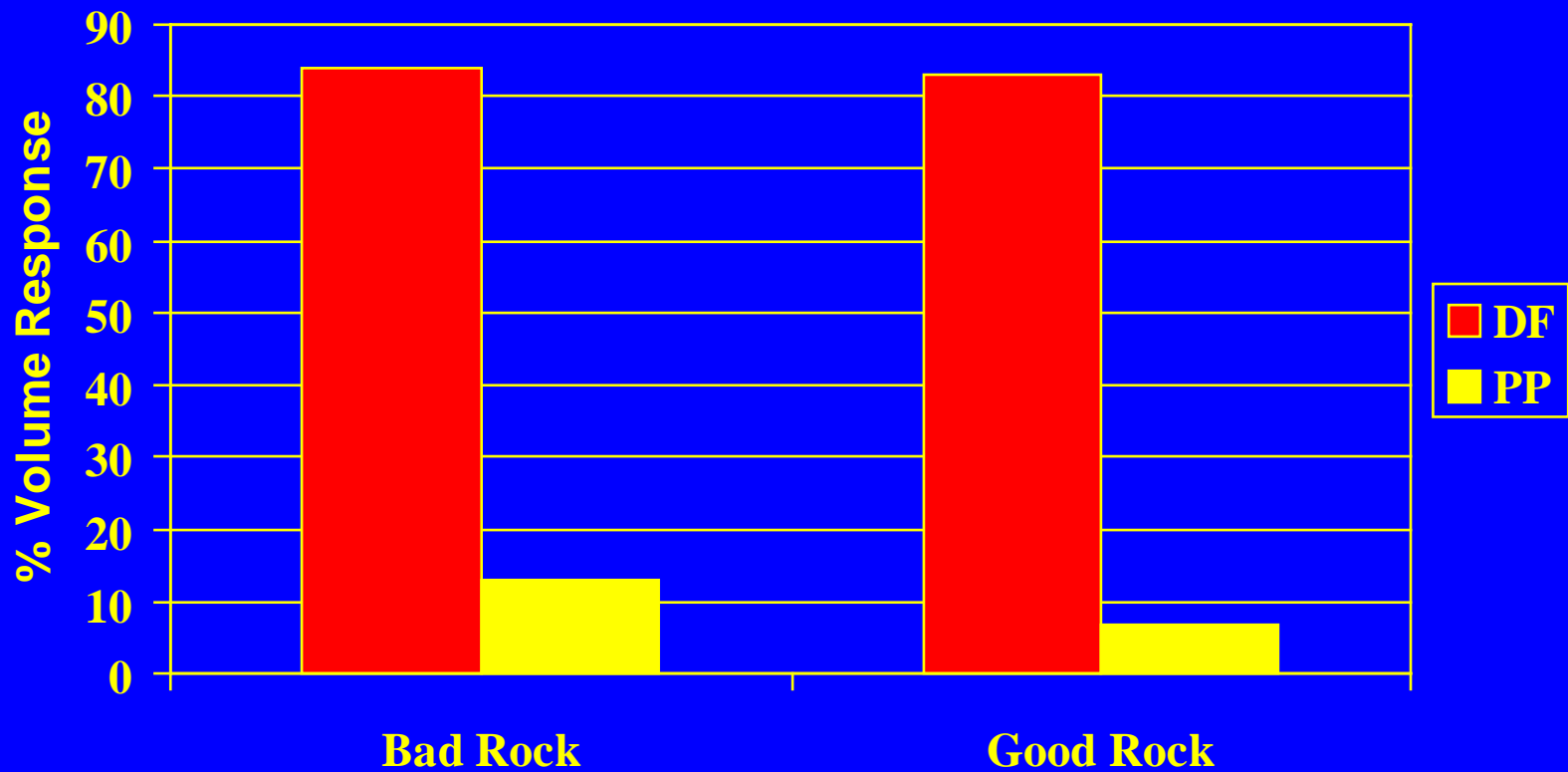


Results

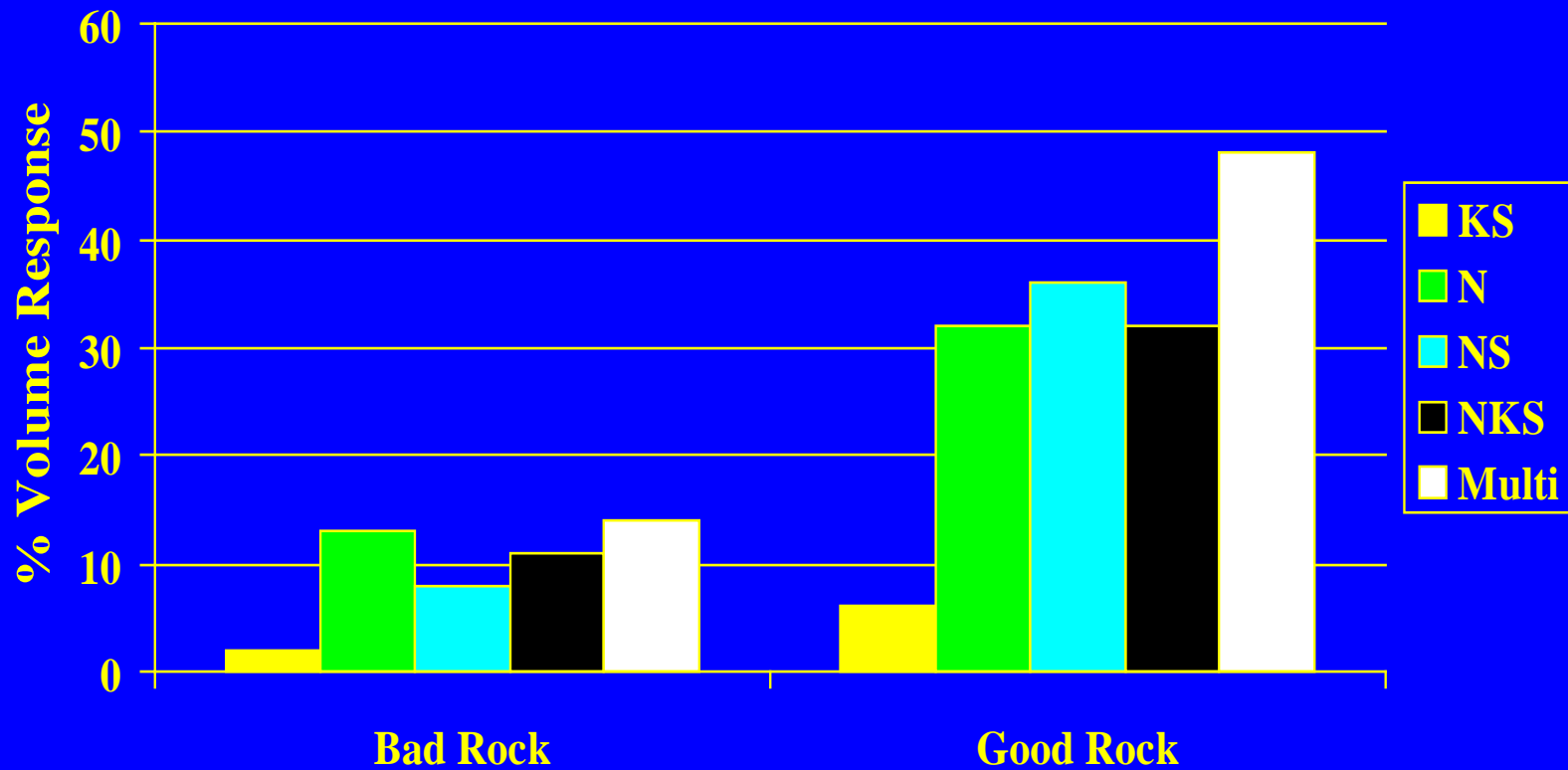
- Volume growth ($D^2H - \text{cm}^3 \text{ tree}^{-1} \text{ yr}^{-1}$)



% Volume Response 1 Year after Third Treatment for Douglas-fir & Ponderosa Pine



1-Year % Volume Response



Conclusions

- Species, treatment and initial seedling size contributed most significant differences to growth rates in caliper, height and volume.
- Caliper growth did not differ significantly on the two rock types (granite, clay schist).
- Height and volume growth were about 30% and 75%, respectively, higher for seedlings on granite than those on clay schist.

Conclusions

- Species*rock or treatment*rock did not differ greatly in affecting growth response.
- Douglas-fir was much more responsive to the treatment than ponderosa pine.