Resins and phenolics dynamics of *Pinus taeda* in response to *L. terebrantis*

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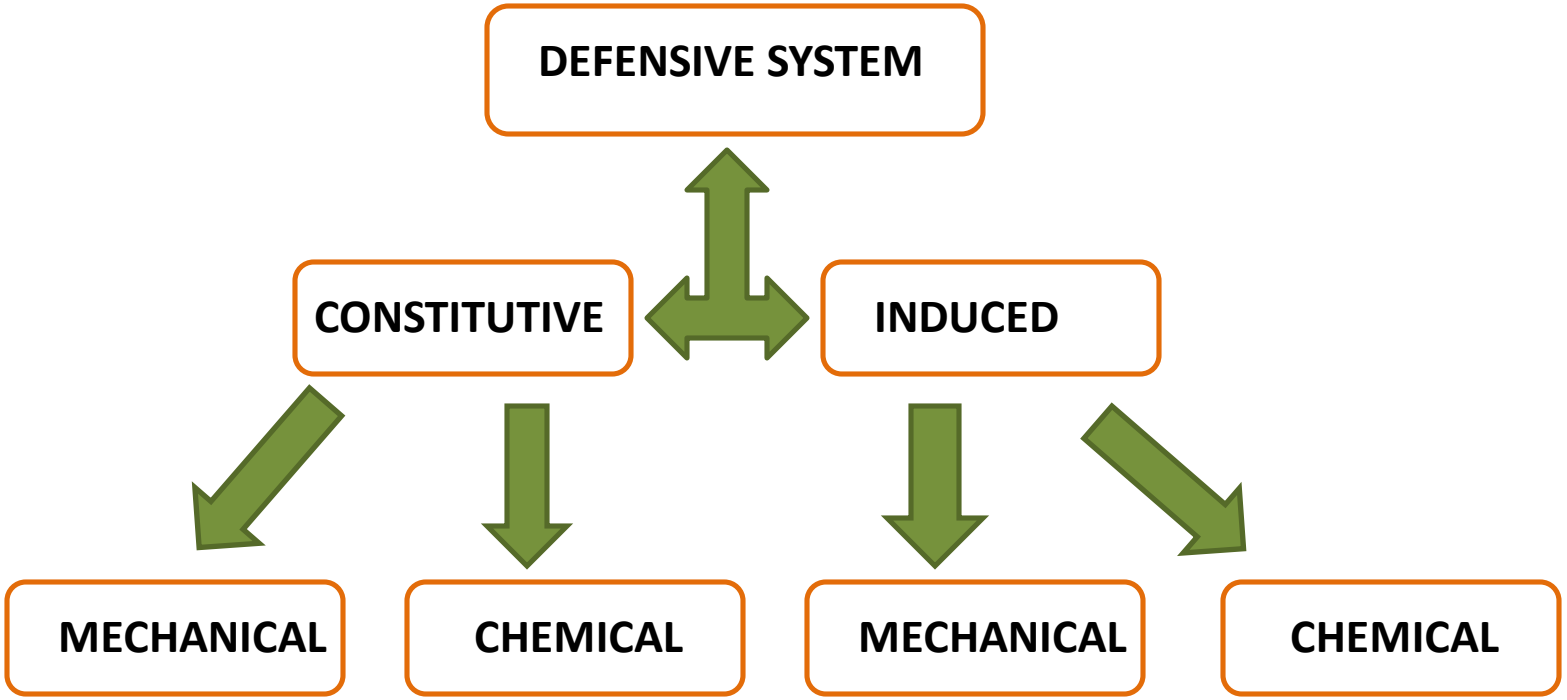
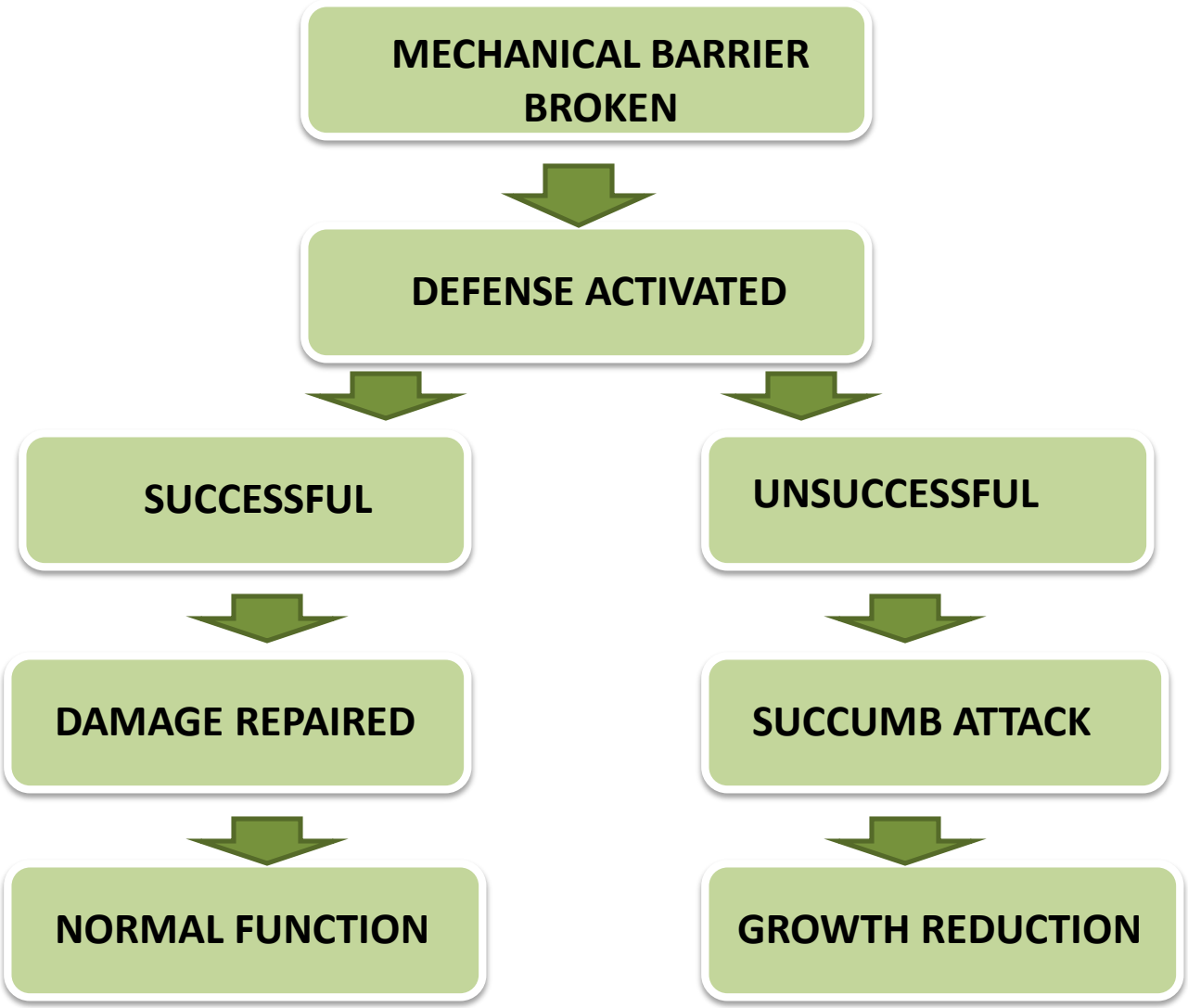
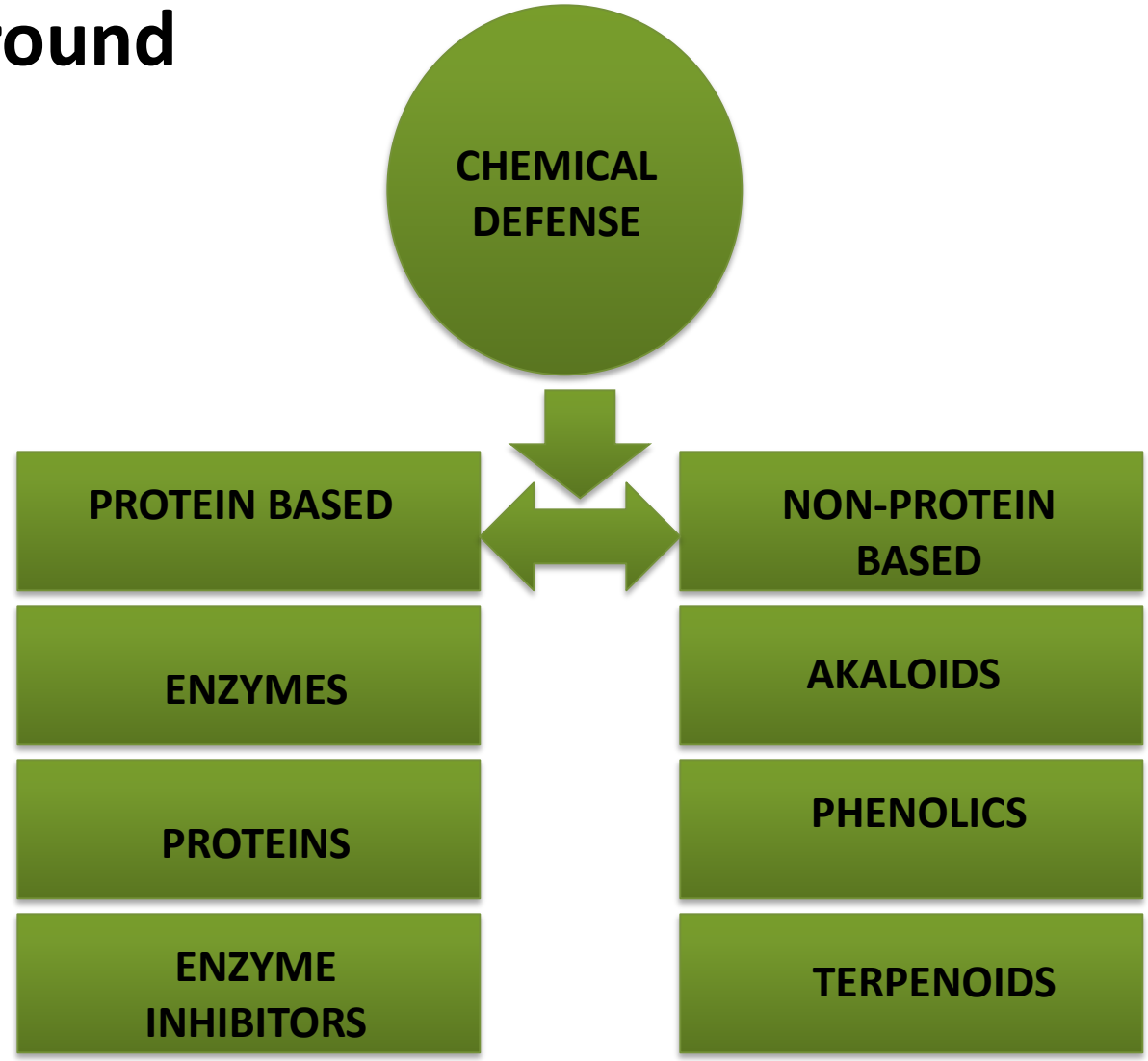
Background


DEFENSIVE SYSTEM
CONSTITUTIVE
INDUCED
MECHANICAL
CHEMICAL
MECHANICAL
CHEMICAL

Background


MECHANICAL BARRIER BROKEN
DEFENSE ACTIVATED
SUCCESSFUL
UNSUCCESSFUL
DAMAGE REPAIRED
SUCCUMB ATTACK
NORMAL FUNCTION
GROWTH REDUCTION

Background


CHEMICAL DEFENSE
PROTEIN BASED
NON-PROTEIN BASED
ENZYMES
AKALOIDS
PROTEINS
PHENOLICS
ENZYME INHIBITORS
TERPENOIDS

Background

- Bind hydrolytic enzymes
- Bind amino acids and proteins
- Inhibit spore germination
- Prevent mycelial growth

Objectives

- Assess the quantitative amount of resins and phenolics production of loblolly pine in response to *L. terebrantis* invasion
- Determine the relationship between the defensive chemical compounds produced

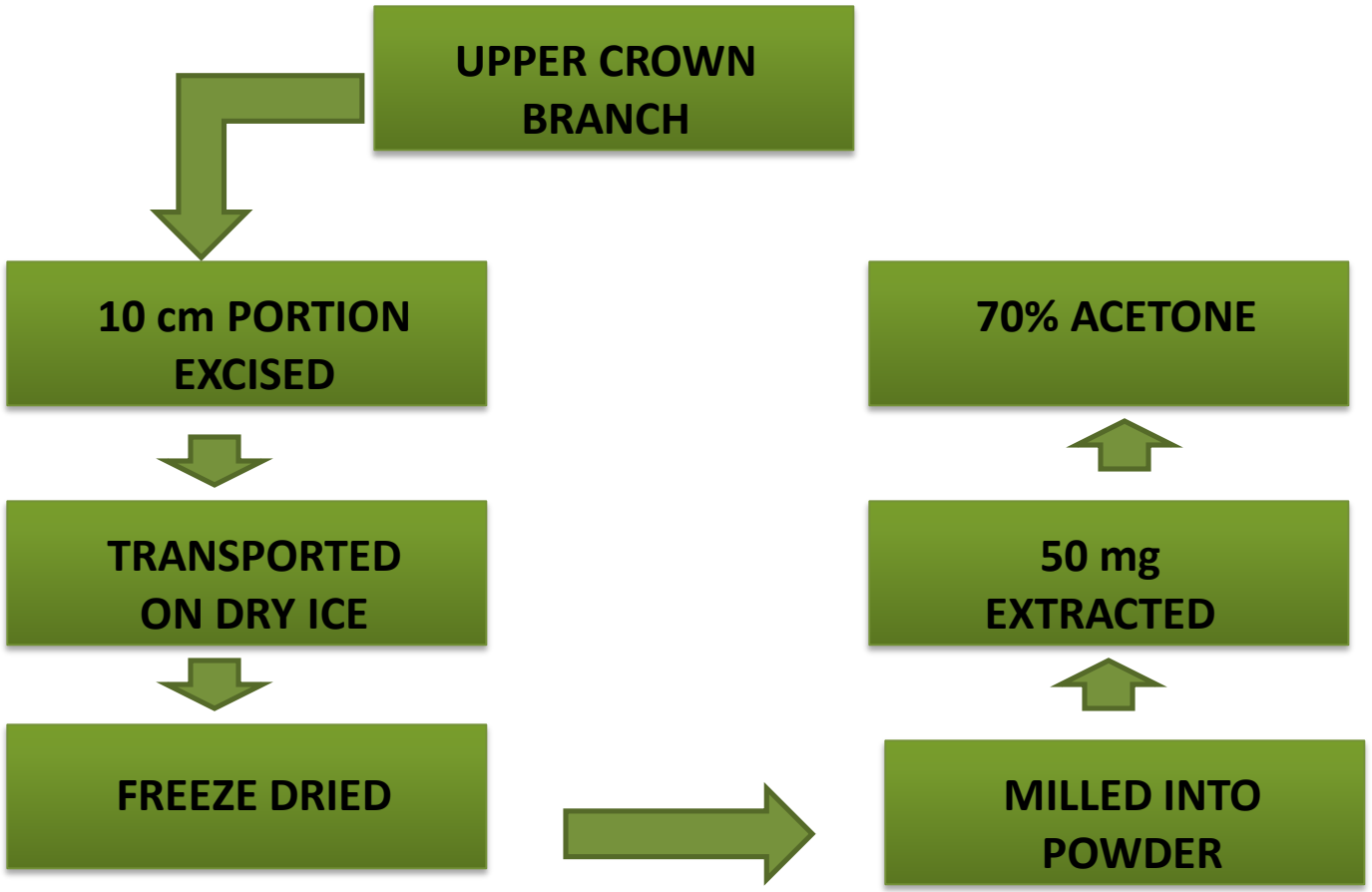
Hypotheses

- A significant increase in resins and phenolics production in loblolly pine trees following fungal invasion
- A significant positive correlation between the defensive chemical compounds produced

Approach - Resins

- North-south sides of each tree were sampled by punching a hole with 1.9 cm diameter arch punch at DBH
- A plastic connector was screwed into the tree to direct resin into a pre-weighed plastic tube attached to the connector
- Tubes were removed after 24 hrs and transported
- Average resin weights were determined

Background


UPPER CROWN BRANCH
10 cm PORTION EXCISED
TRANSPORTED ON DRY ICE
FREEZE DRIED
MILLED INTO POWDER
50 mg EXTRACTED
70% ACETONE

Approach - Phenolics

- Folin-Ciocalteu reagent
- Development - Na_2CO_3
- Absorbance - Spectrophotometry

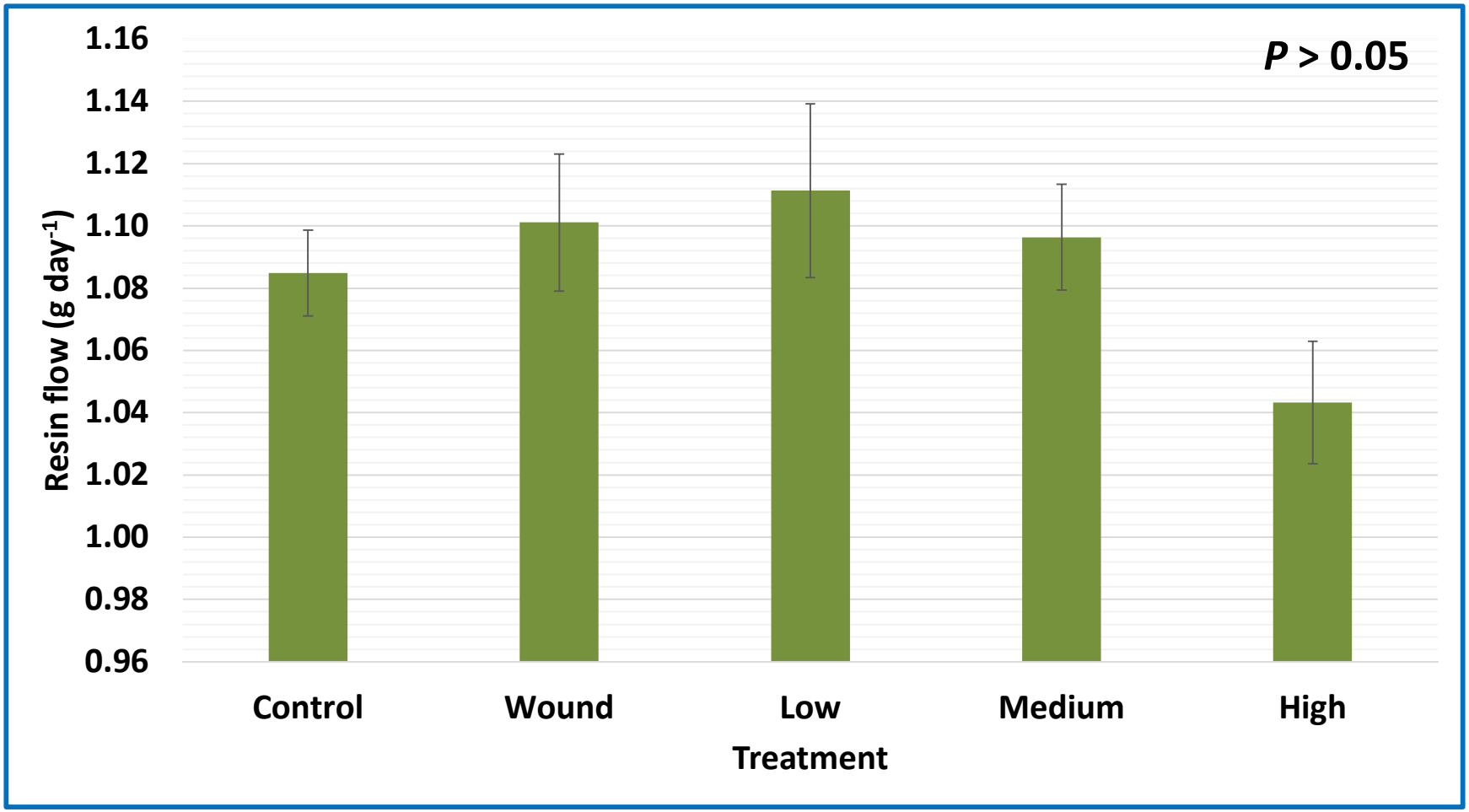
Post Inoculation Reaction

Wound

High

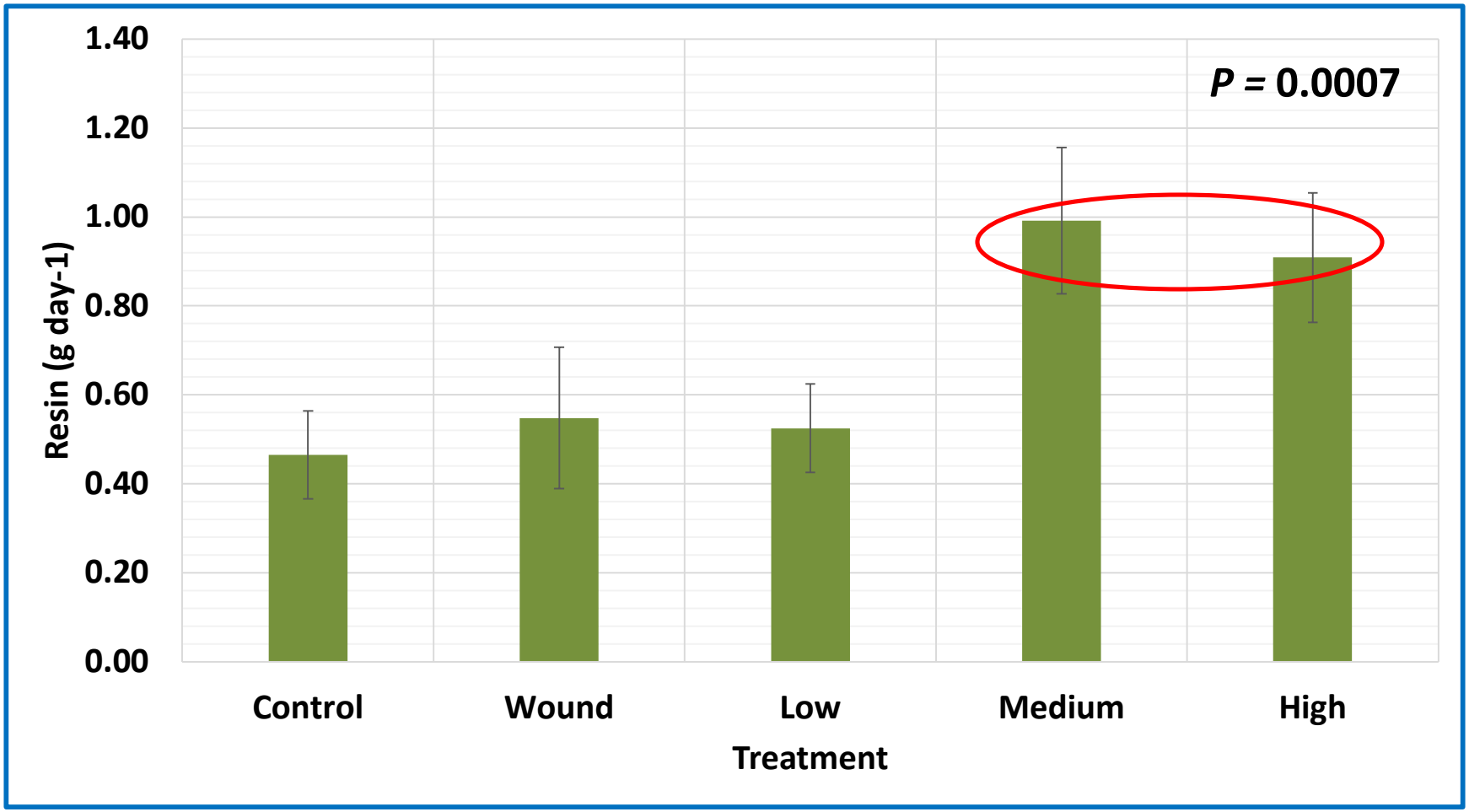
High

Results - Resins



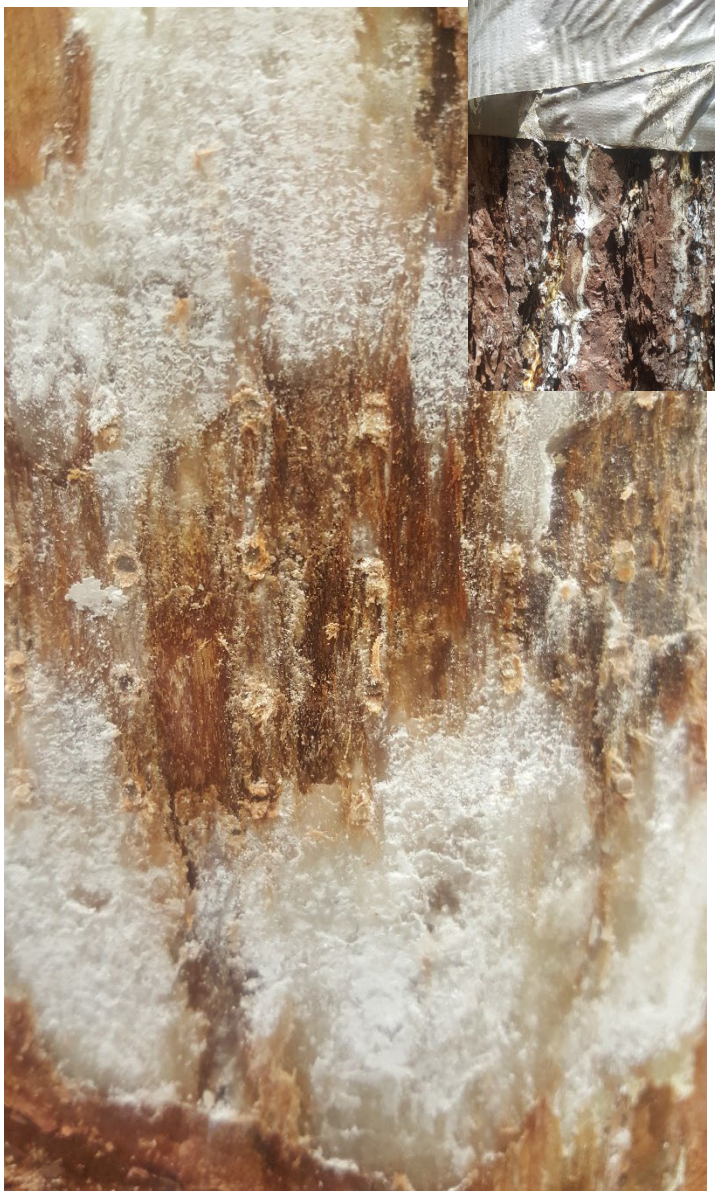
Pre-treatment

Results - Resins

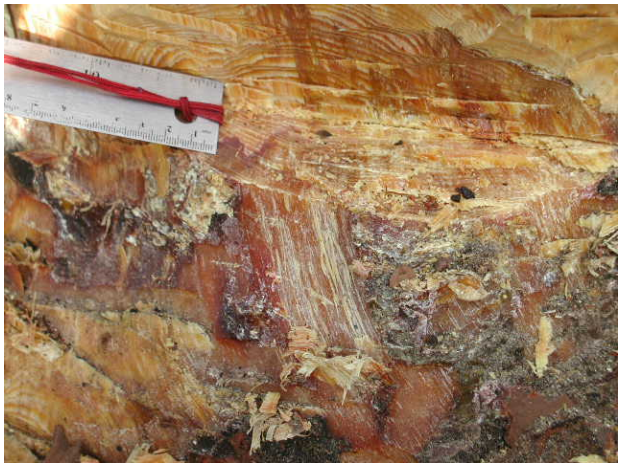


Post-treatment

Results – Resins



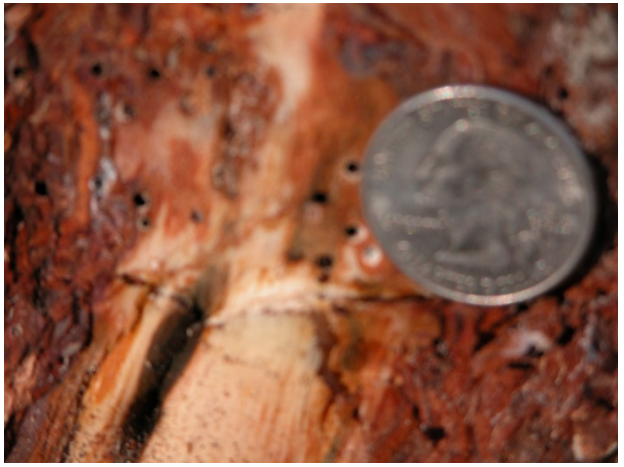
Staining & Resinosis in butt and roots caused by *Leptographium* spp. &insect feeding



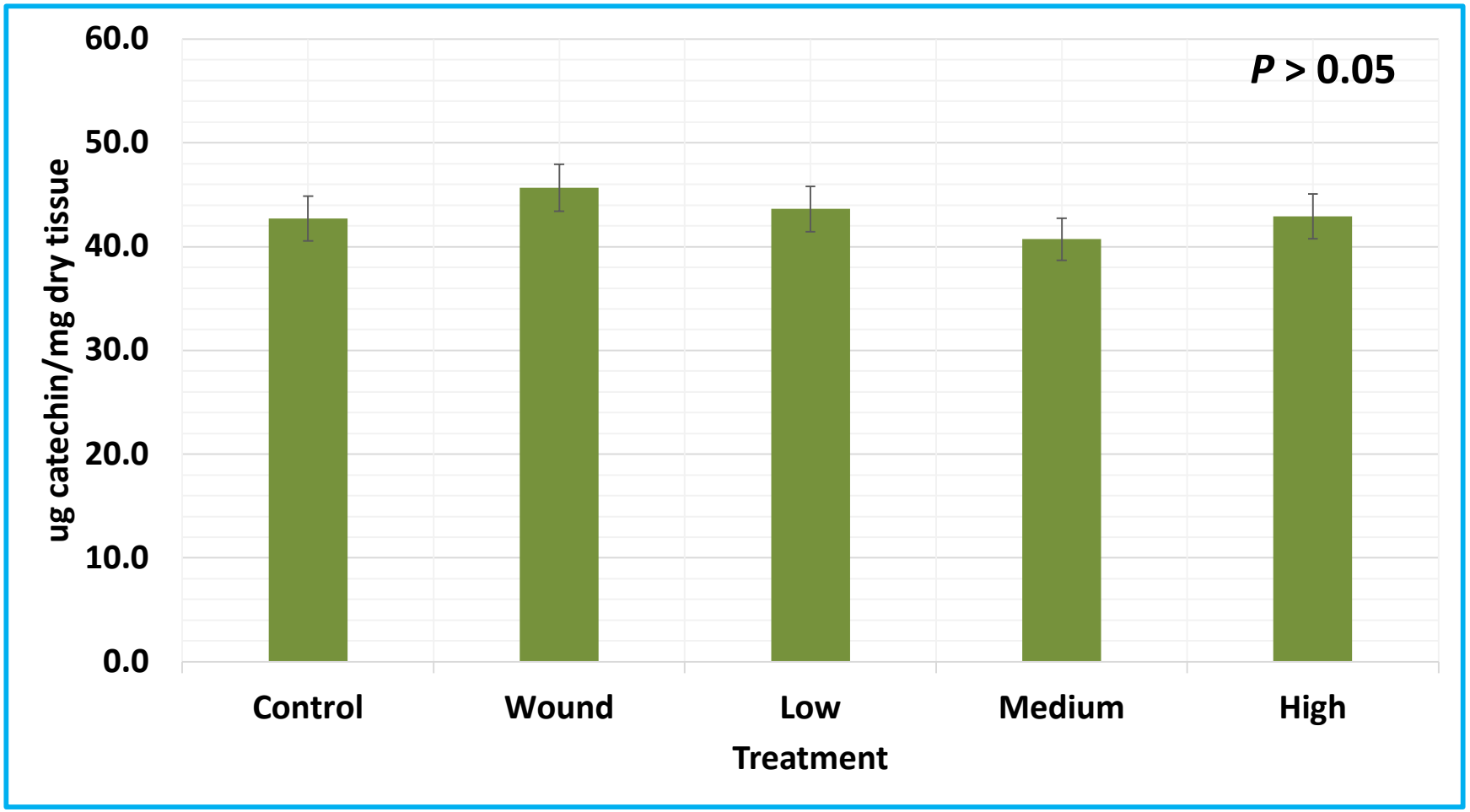
Butt of 20 yr old longleaf

Lateral root of 30 yr old loblolly attacked by *Hylastes* spp.

Root collar of 6 yr old longleaf attacked by *Hylastes* spp.

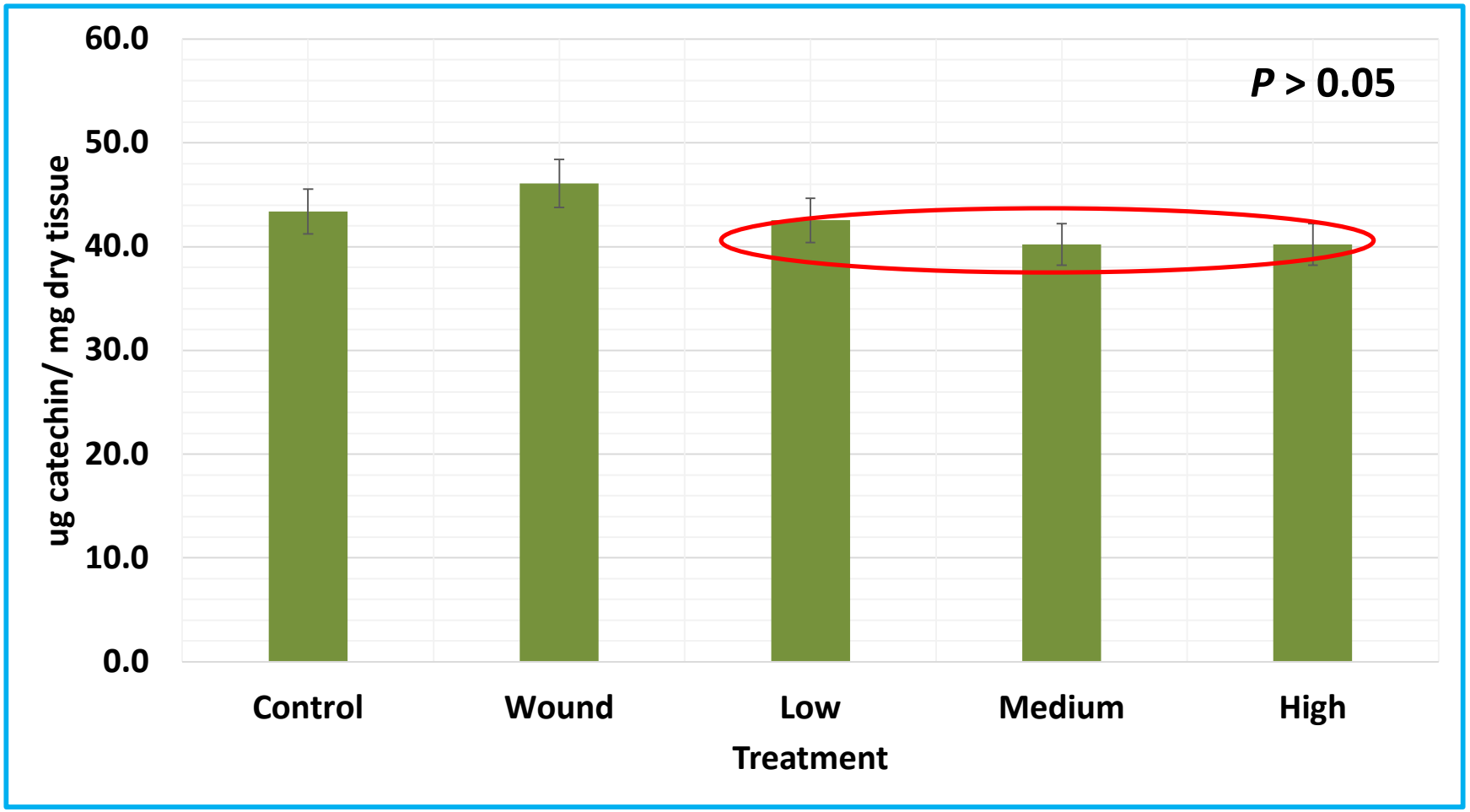


Results - Phenolics



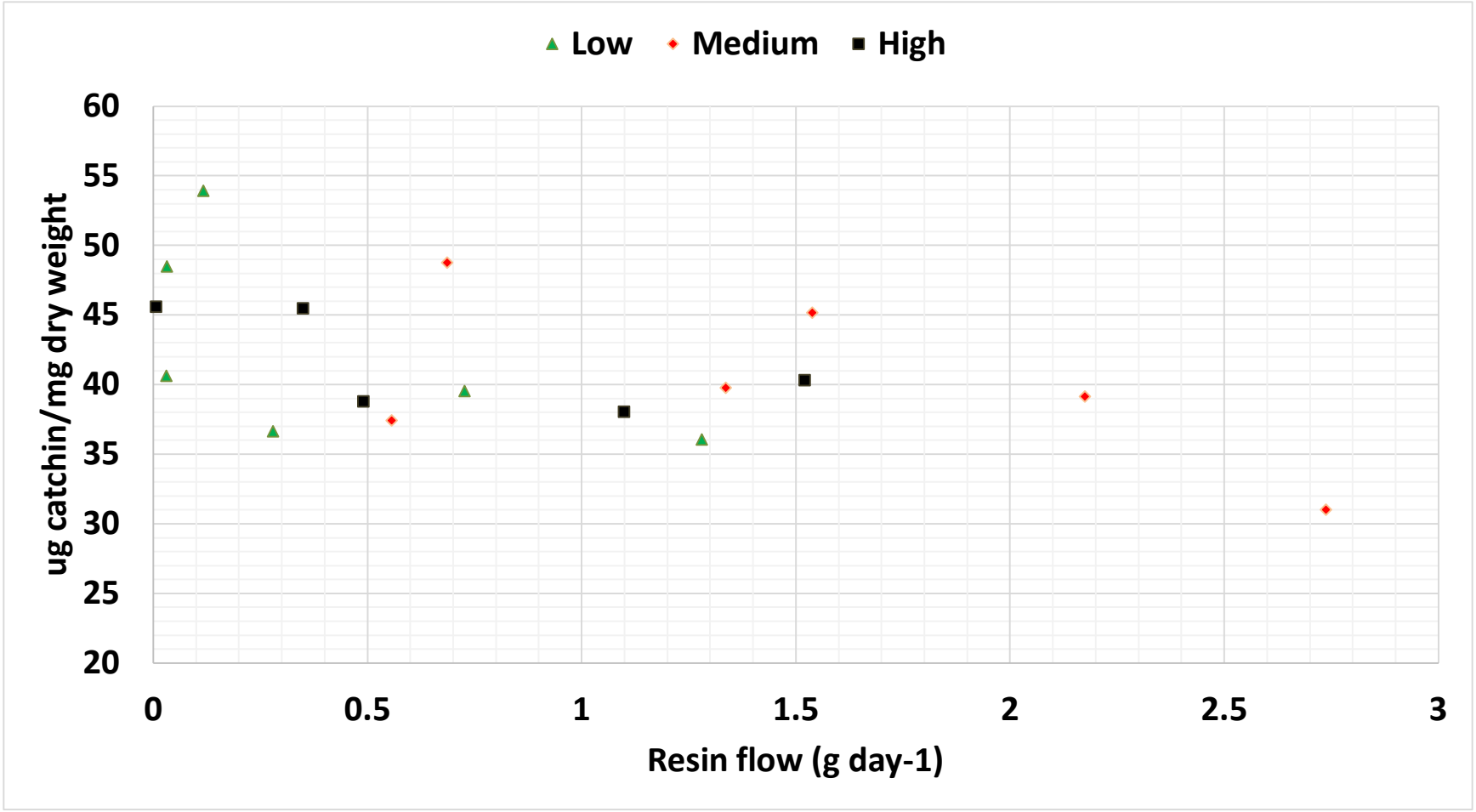
Pre-treatment

Results - Phenolics



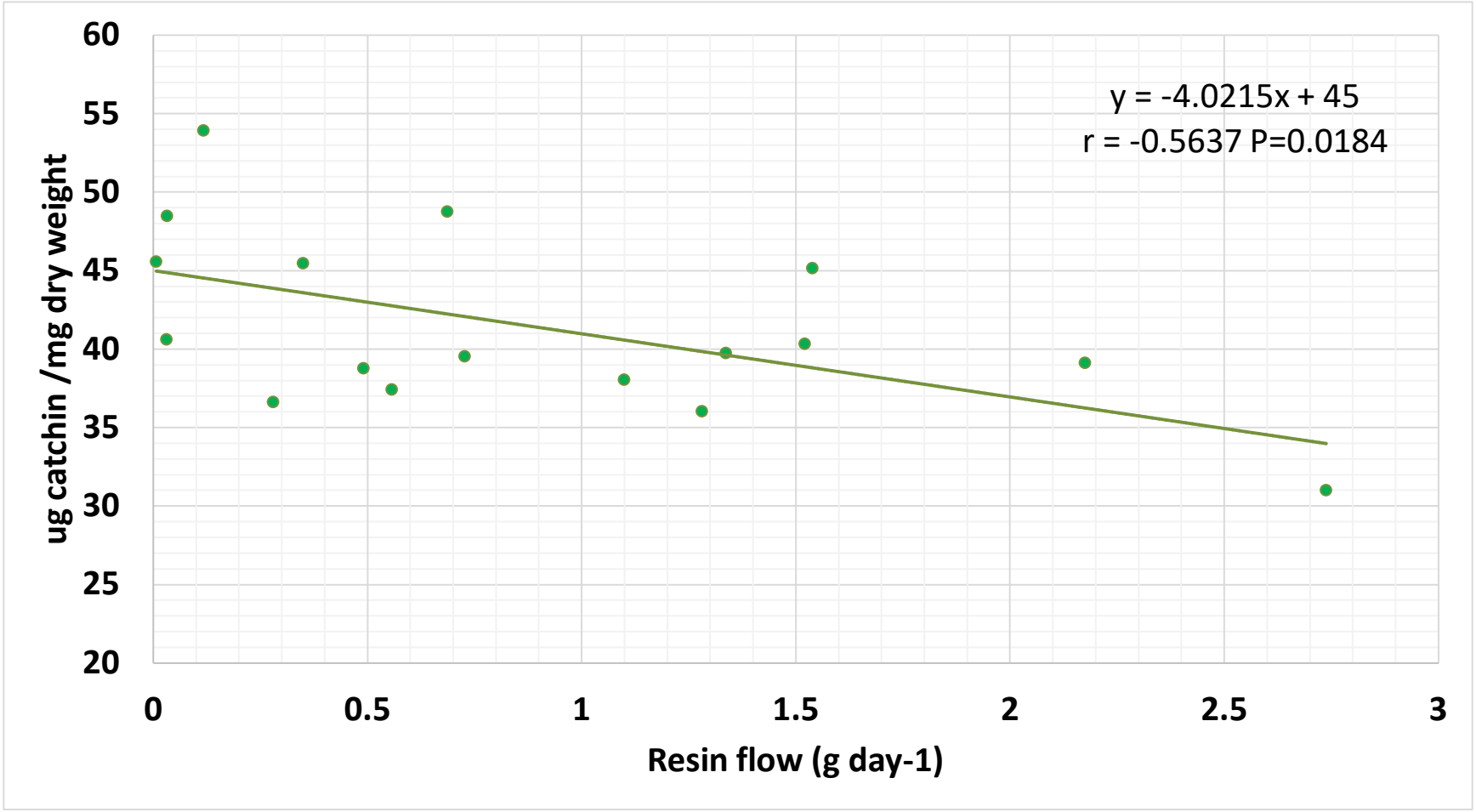
Post-treatment

Results - Phenolics



Post-treatment

Results - Phenolics



Post-treatment

Conclusions

- Pre-treatment resin flow rate did not differ significantly among the selected trees but post-treatment resin flow rate was significantly different

- Resin induction was most severe in the high and medium treatments trees

- Similarly, phenolic content did not differ significantly before and after treatment application

Conclusions

- Contrary to resin flow rate, phenolic content decreased with increased fungal inoculum density

- This suggests phenolic degradation or utilization by *L. terebrantis*

Future Work

- Qualitative and quantitative analysis of the monoterpenes in the phloem tissue

- Non-structural carbohydrates analysis

Acknowledgements

- Luis Mendez
- Dalton Smith
- Andrea Cole
- Shrijana Duwadi
- Jessica Ahl
- Charles Essien
- Pratima Devkota
- Kristi Wharton
- Dr. Susana Sung
- Undergraduates

Forest Health Cooperative