

Ending Project / Final Report

Stem form of Nitrogen-fertilized Douglas-fir trees

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Doug Mainwaring, Oregon State University
Kim Littke, University of Washington
Eric Turnblom, University of Washington
Aaron Weiskittel, University of Maine
Sukhyun Joo, Oregon State University
Carlos Gonzalez, Oregon State University

Presenter: Doug Mainwaring

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Justification

- Assessment of volume response to fertilization is typically based on measurements of DBH and height
- Log volume and final yield based on the size of the scaling diameter
- Previous analyses of fertilization effects on stem form are mixed
- Assessments of N-fert on Douglas-fir stem form best based on experiments most closely simulating operational conditions (SMC type 6)
- Determination of a stem form response to fertilization would provide a more accurate financial assessment of fertilization

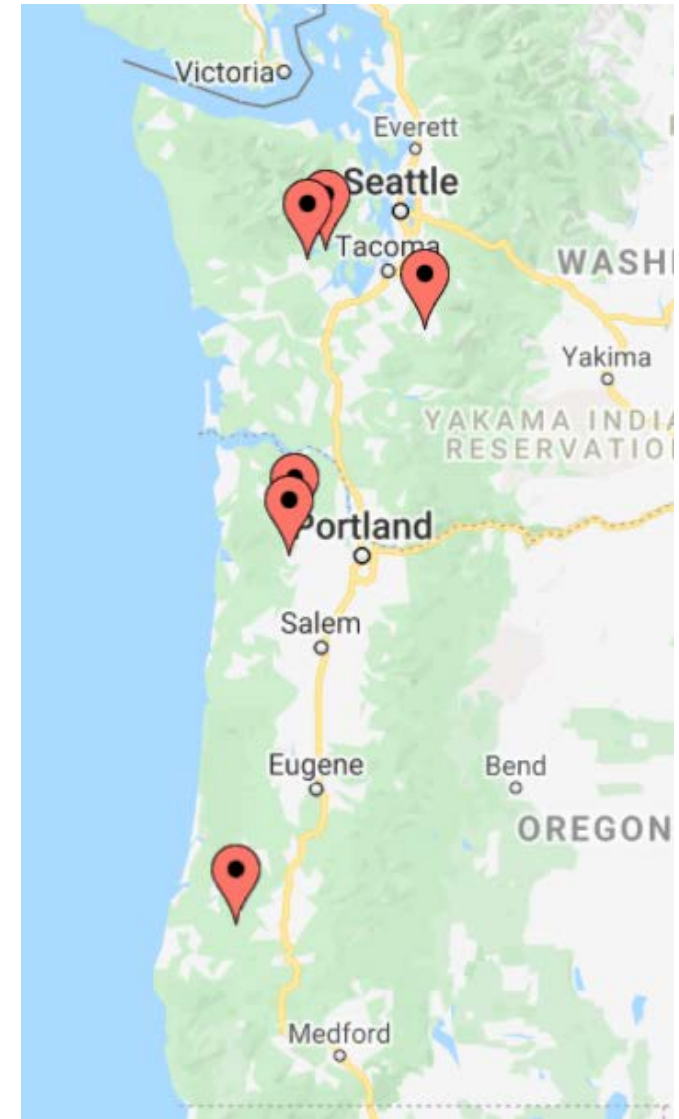


- Upper stem diameters (USD) of trees responding positively to operational nitrogen fertilization are under-estimated relative to DBH using standard taper equations.
- Objective will be to construct a taper modifier equation to adjust USD estimates of standard taper equations when applied in Douglas-fir stands fertilized with nitrogen.



Methods

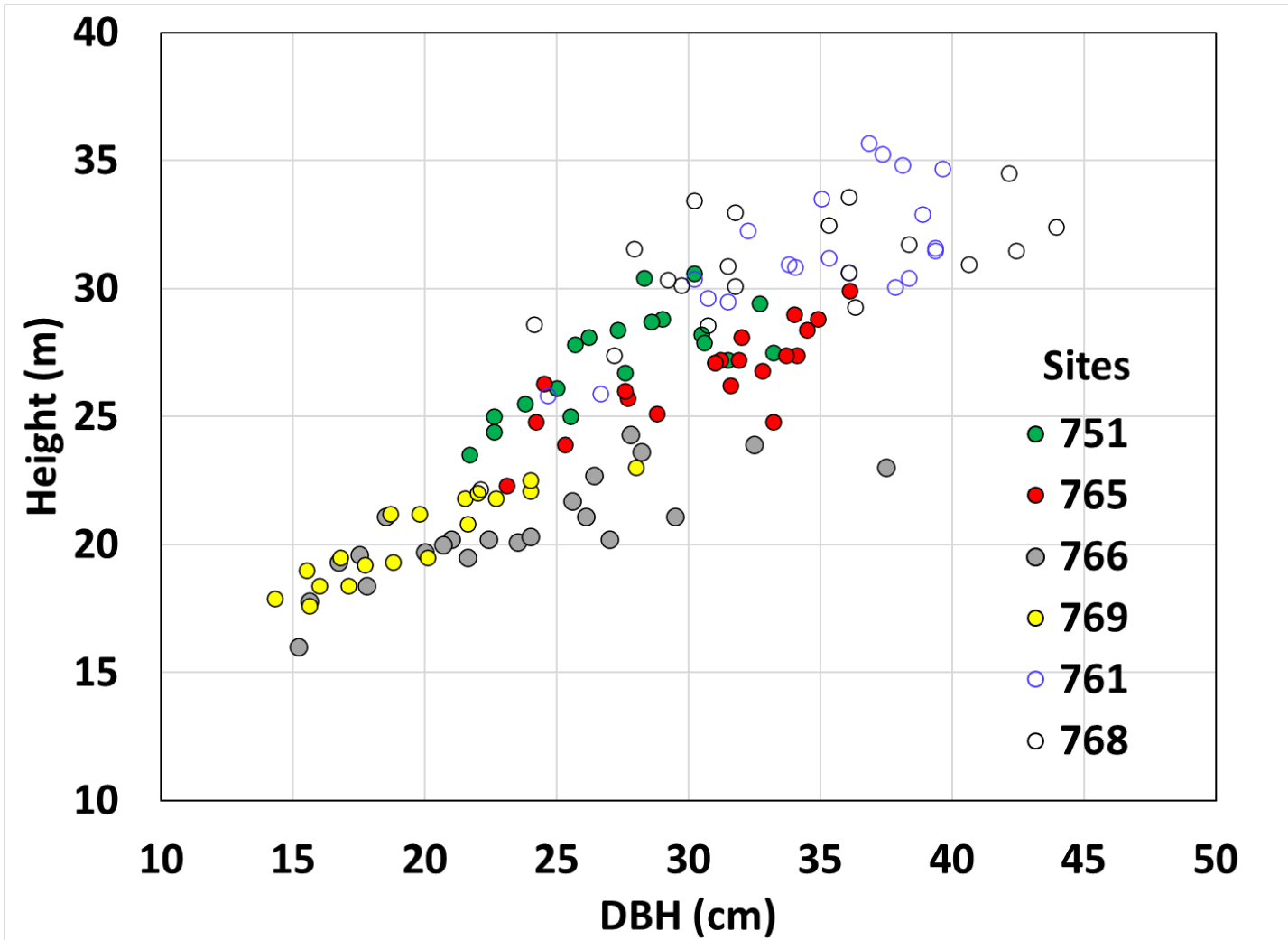
- SMC late-rotation Fertilizer trials (type 6)
- Located based on potential N response (Littke et al. 2017)
- Fertilized 8-10 yrs prior to final harvest
- 4-5 yrs post-fertilization
- Sampled sites chosen based on positive response, dominant height
- Sampled site ages: 30-40 yrs



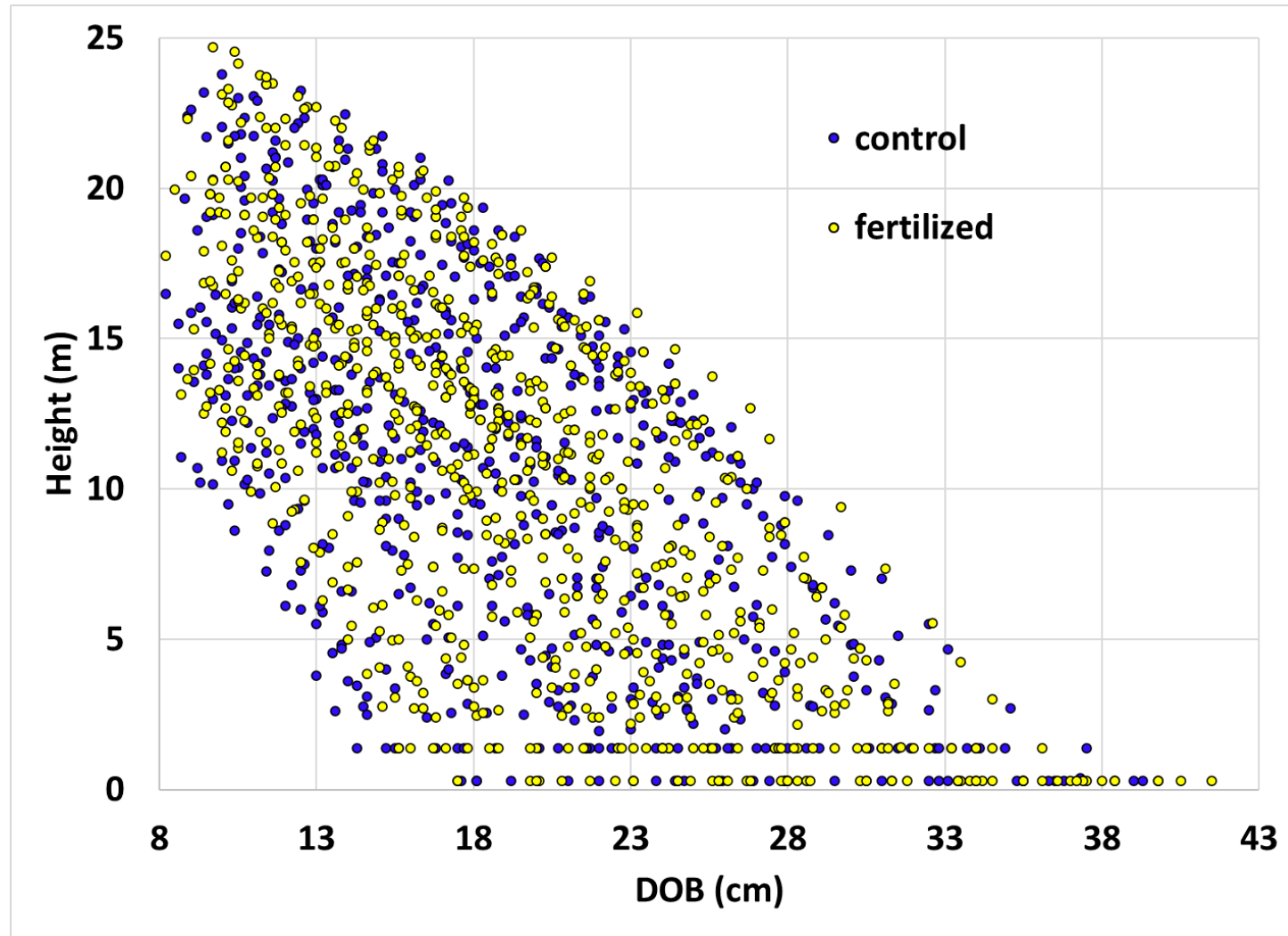
- On six responding installations:
- Climb 10 trees per treatment, chosen based on dbh distribution:
 - 20th percentile (2 trees)
 - 40th percentile (2 trees)
 - 60th percentile (3 trees)
 - 80th percentile (3 trees)
- Measure DOB at:
 - 0.3 m
 - 1.37 m
 - every other mid-whorl up to ht=10 m; every mid-whorl above 10 m up to 25.2 m or 10 cm DOB



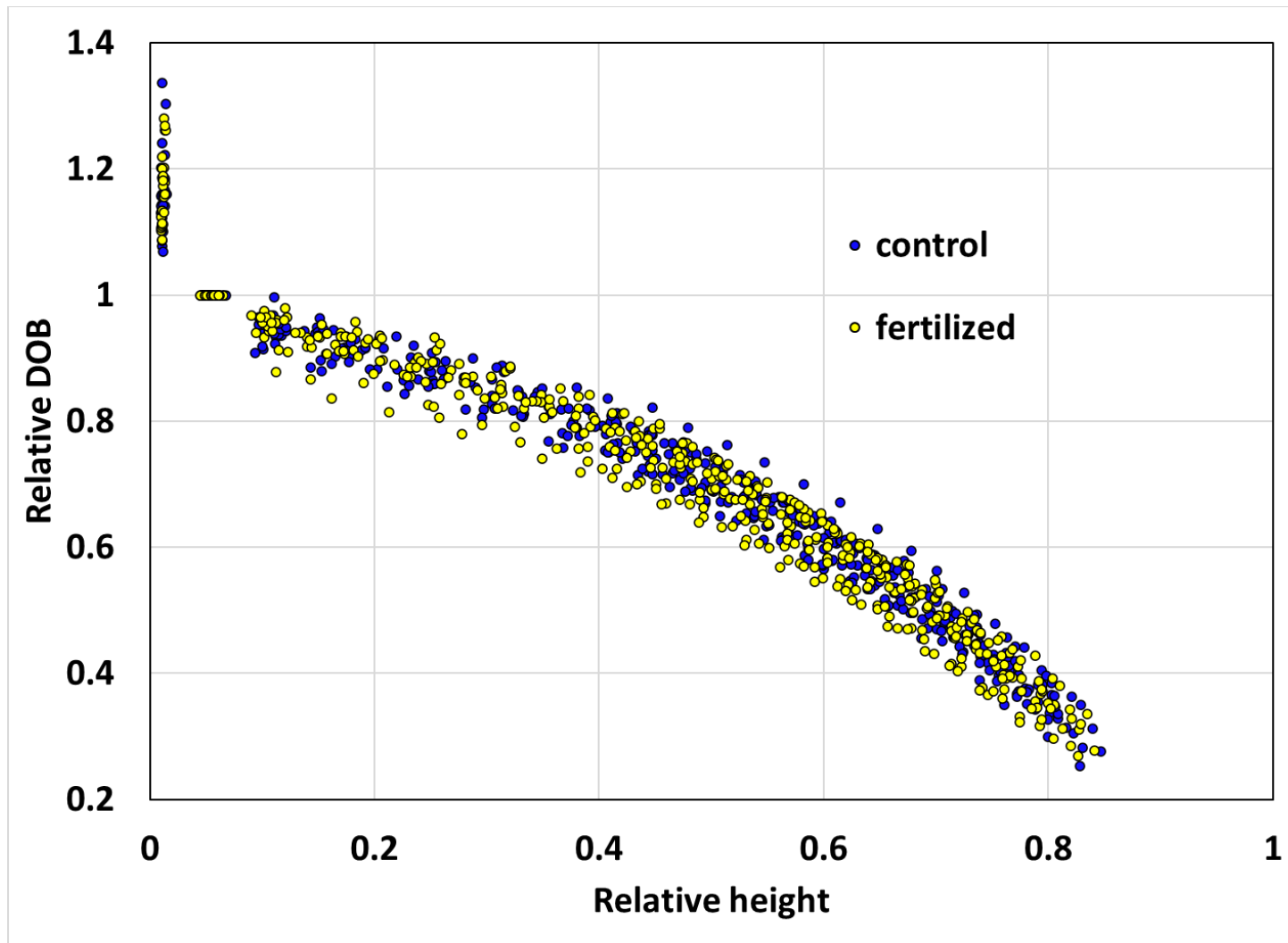
- Ht vs. DBH (4 sites completed)



- HT vs. DOB, 4 sites

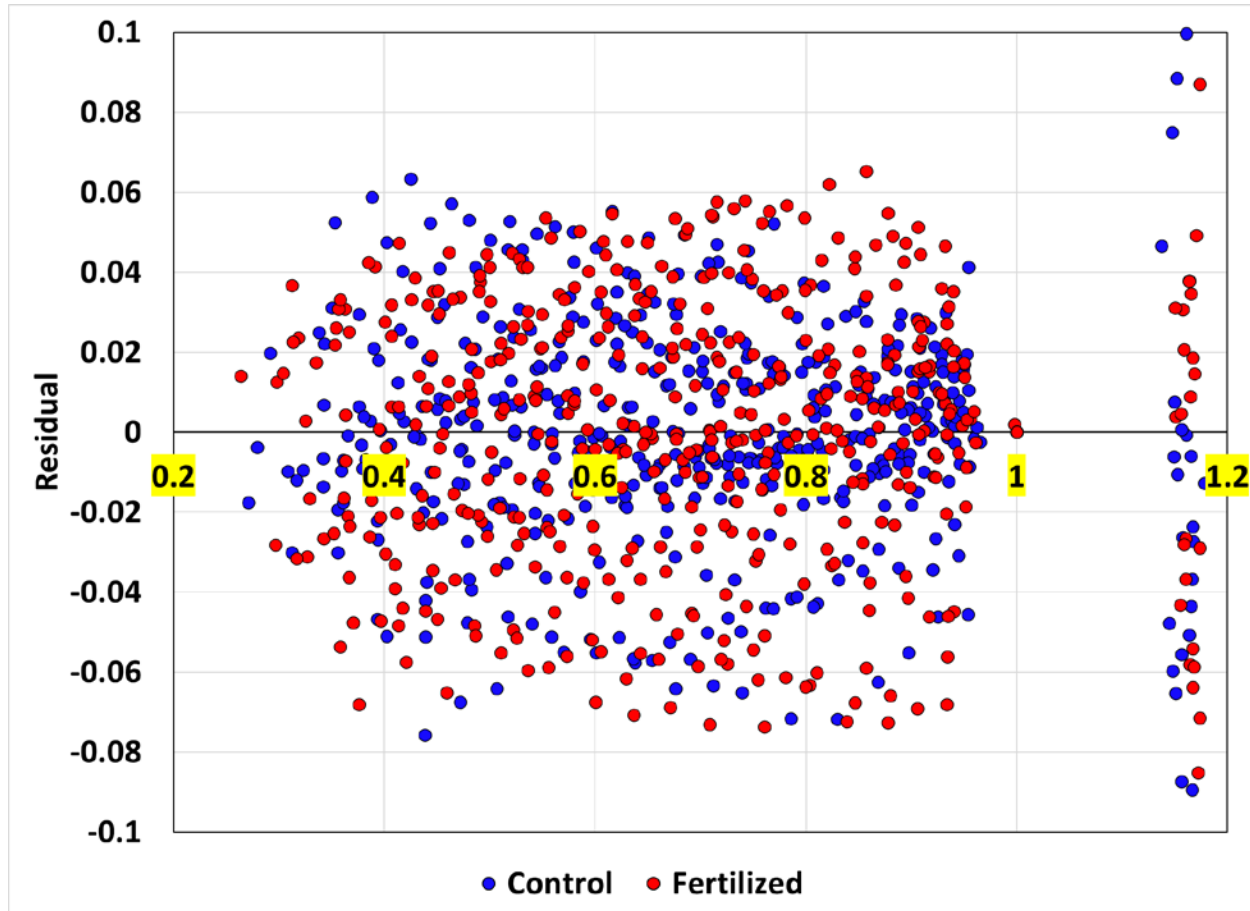


- Relative height vs relative DOB, 4 sites



- Premature Kozak (2002) derived fit:

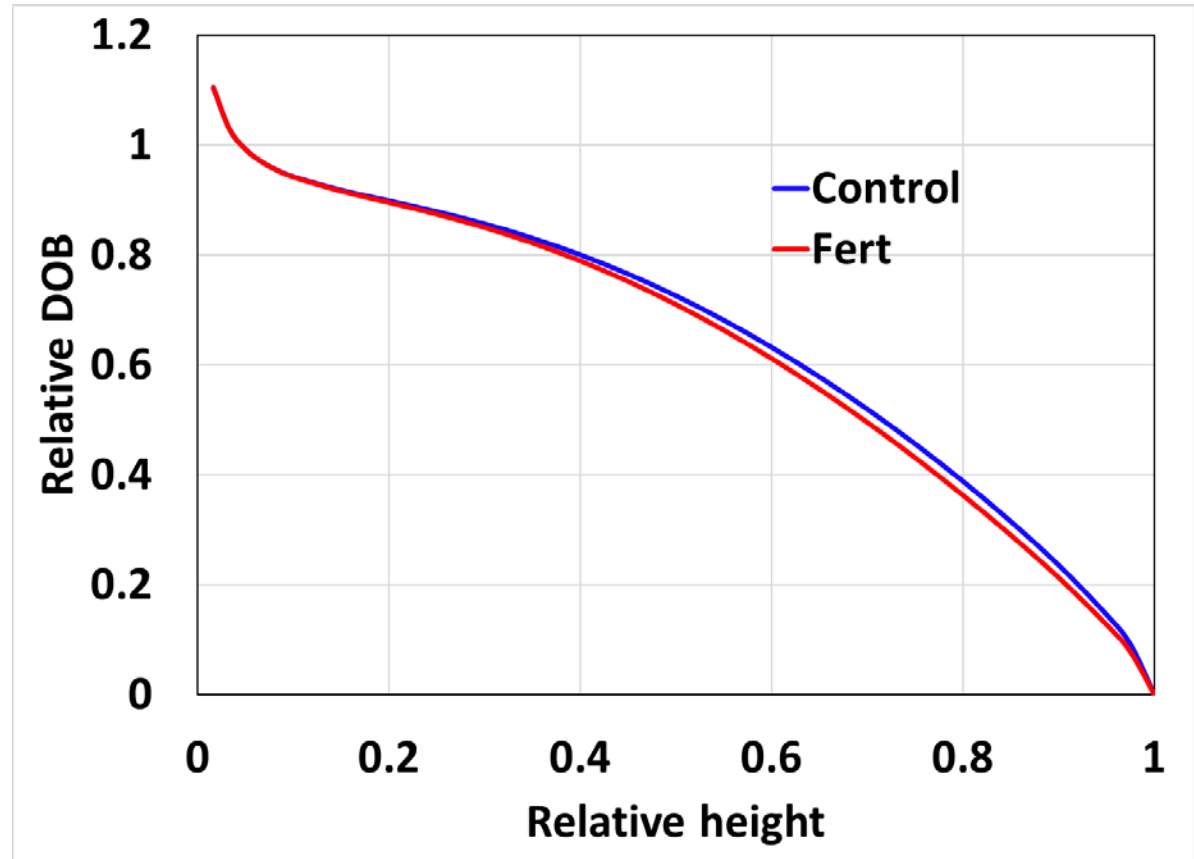
$$rDOB = X^{**}(b_1 * RH + b_2 * (1 / (\exp(DBH/HT)))) + b_3 * X^{0.1} + b_4 * HT^Q + b_5 * X + b_6 * FERT$$



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$$rDOB = X^{**}(b_1 * RH + b_2 * (1 / (\exp(DBH / HT)))) + b_3 * X^{0.1} + b_4 * HT^Q + b_5 * X + b_6 * FERT$$

Maximum difference
for 30 cm, 30 m tree:
~0.5 cm



Timeline

- Fall 2021: Field sampling
- Winter/spring 2021-2022: Statistical analysis
- Summer 2022: Final report



- Dataset of measurements
- Report with final models describing stem form, accounting for the effect of fertilization
- Public presentation of findings at CAFS Annual Meeting and regional Coop meetings
- Draft manuscript for peer-reviewed journal

