Biomass Stock, Net Primary Productivity and Radiation Use Efficiency of 11 conifer species growing on a gradient of water availability in the Pacific North West of the U.S.A.

Erkan BABAT*, M.S. Graduate Student, Department of Forest Engineering, Resources & Management

Carlos Gonzalez-Benecke , Assistant Professor, Sustainable Forest management , Oregon State University

*Email: babate@oregonstate.edu

Background

- The increase in frequency and intensity of disturbances associated with climate change (such as diseases like Swiss needle cast on the Oregon coast). Because of this disease, severe defoliation and growth losses of 20 to 50 percent.
- 11 species of trees were planted by Starker Forests Inc. in three locations that span a range of water availability in Western Oregon in 1996. There are eleven plots, and each plot was created as a single species. Plots were never measured previously.
- Carbon sequestration explain long-term storage of CO2 or other forms of carbon to either mitigate or defer global warming and avoid dangerous climate change.

Research Objectives

1. Compare aboveground biomass across species and sites
2. Compare aboveground net primary productivity (NPP) across species and sites
3. Compare leaf area index and growth efficiency across species and sites
4. Correlate environmental factors with stand productivity

Research Questions

1. Which species is more productive?
2. Is there a species x environment interaction on stand productivity and growth efficiency?

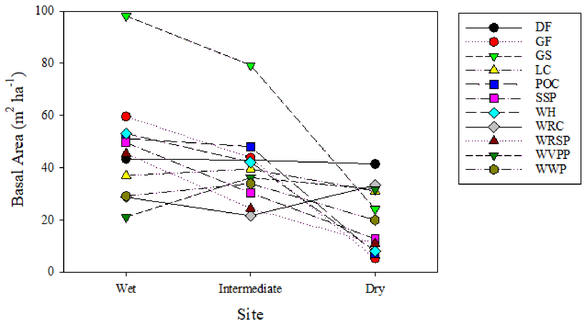
Hypotheses

1. Stand productivity and growth efficiency are different across species and environmental factors affect each species differently.

Methodology

- 3 STUDY SITES PLANTED IN 1996-1997. 0.5 ACRE PLOT SIZE
- SITES COVER A RANGE IN RAINFALL – WATER/DEFICIT
- 11 SPECIESTESTED IN EACH SITES (List all species).
- IN WINTER 2021 AND 2022: MEASURE DBH AND HT
- COLLECT LITTERFALL (BI-MONTHLY): 5 TRAPS PER PLOT
- TOTAL ABOVE-GROUND BIOMASS WILL BE CALCULATED USING PUBLISHED BIOMASS FUNCTIONS AND INVENTORY DATA.
- LAI WILL BE ESTIMATED BI-MONTHLY USING A CEPTOMETER
- WEATHER STATION (GLOBAL RAD, TEMP, RH, RAINFALL) INSTALLED IN MARCH 2021

DF	Douglas-fir
POC	Port-Orford-Cedar
JL	Japanese Larch
WVPP	Willamette Valley Ponderosa Pine
GS	Giant Sequoia
WWP	Western White Pine (Blister Rust Resistant
SSP	Sitka Spruce
WRC	Western Red-Cedar
WH	Western Hemlock
LC	Leland Cypress
GF	Grand Fir
WRSP	Sitka Spruce (Weevil Resistant)



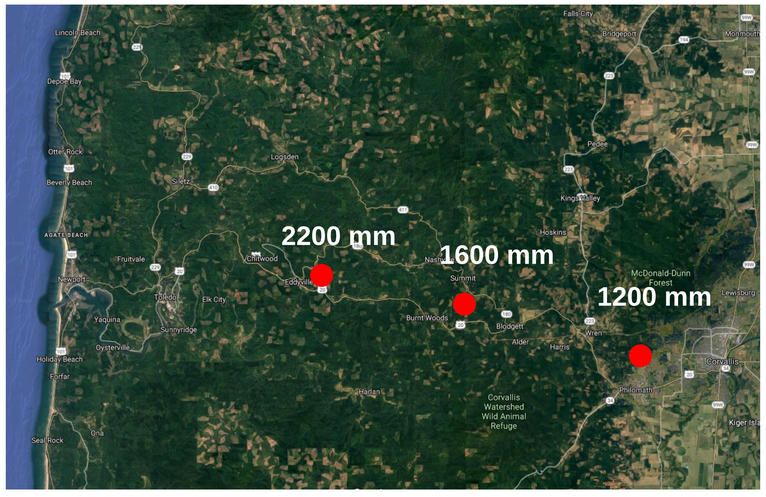


Figure 1. Study sites location (including rainfall)

Figure 2: Example of littertrap installed

Figure 3: Weather station

Scope of inference

Inferences are limited to the eleven conifer species and study area, but results will provide information about the differences between the three sites in Western Oregon.

Significance

By quantifying LAI, biomass stock and NPP in three different sites will give a significant opportunity to understand adaptability and growth potential of alternative species in the western Oregon.

References

Stone, Jeffrey K., Coop, Leonard B., and Manter Daniel K. A Spatial Model for Predicting Effects of Climate Change on Swiss Needle Cast Disease Severity in Pacific Northwest Forests https://www.fs.fed.us/pnw/pubs/gtr802/Vol1/pnw_gtr802vol1_stone.pdf. 04/08/2021.

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