Progress Report

Intraspecific Hydraulic Responses of Commercial Tree Seedlings to Nursery Drought Conditioning

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Project Overview

Our general **objective** is to examine seedling physiology and root system architecture in response to nursery-induced drought conditioning of coastal Douglas-fir, western larch, and black walnut seed sources across a range of maternal tree environments.

Douglas-fir

Black walnut

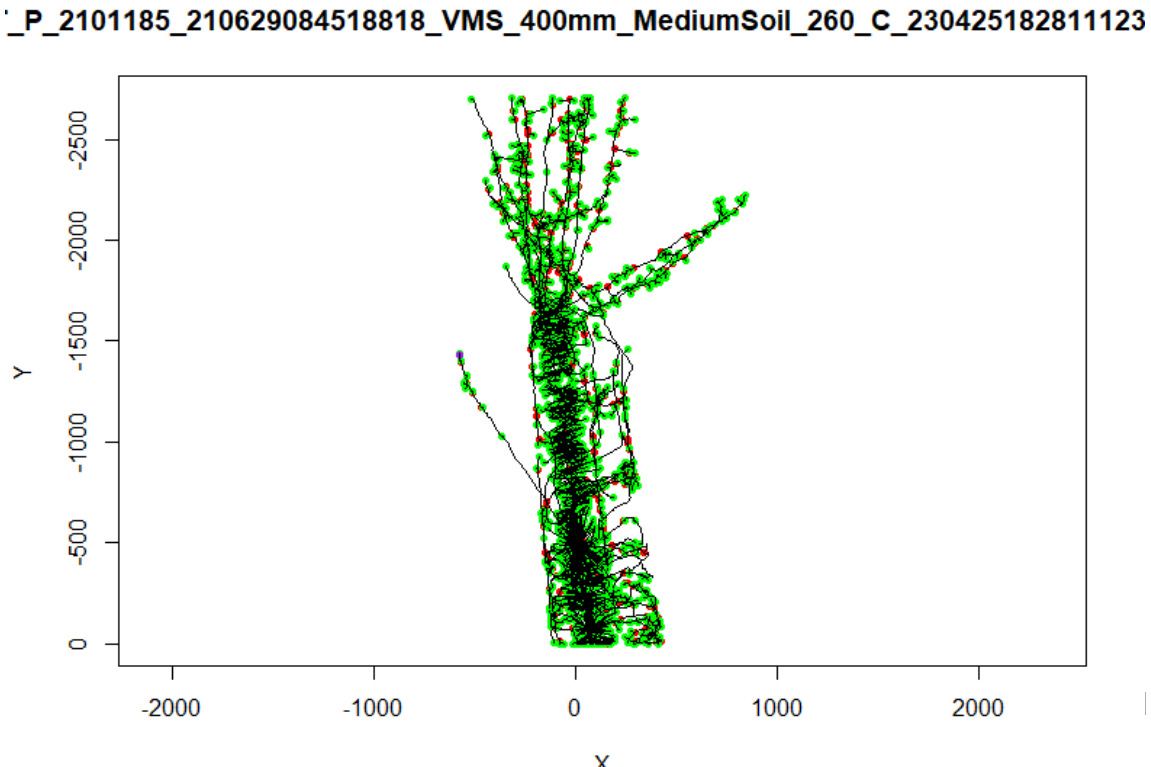
Western larch

Species	Provenance	Drought conditioning
Douglas-fir	Coast Range Inland Cascade Foothills	Control 75% Moderate 60% Extreme 50%
Western larch	8 seed sources (British Columbia- Inland North West)	Control 75% + Moderate 60%-75% Extreme 45-60%
Black walnut	Indiana Maryland	Control 85-95% Moderate 75-85% Extreme 55-65%

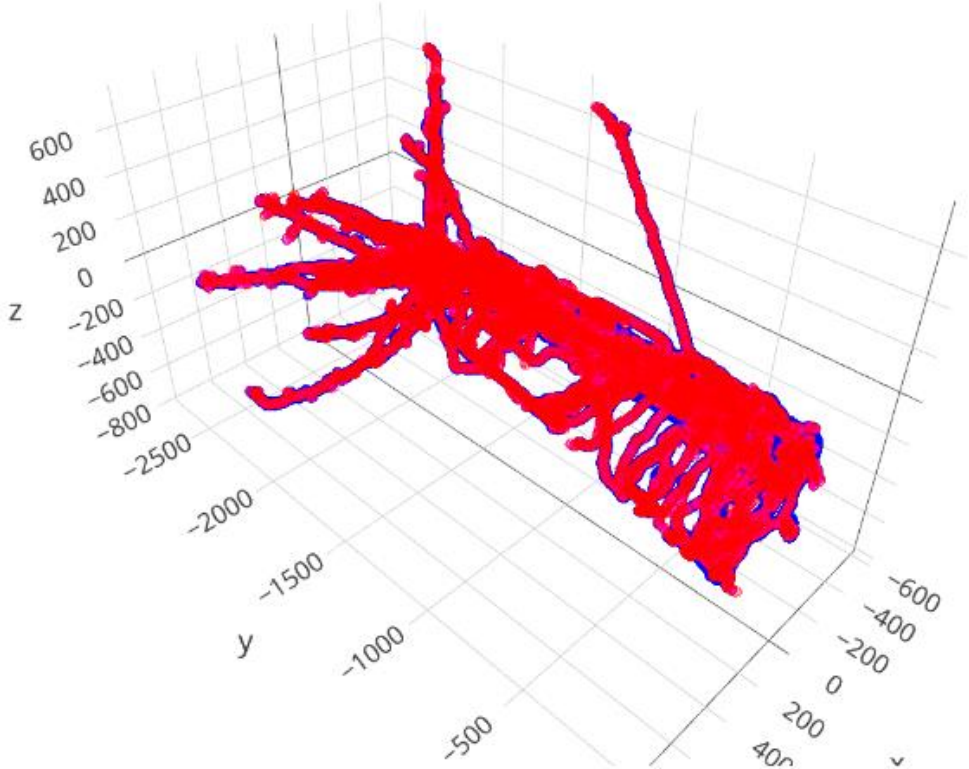
Current Progress

Estimating Black Walnut (week 3) root diameters by sampling 3D point cloud at various points along root skeleton

- This Black Walnut skeleton has 3000+ segments

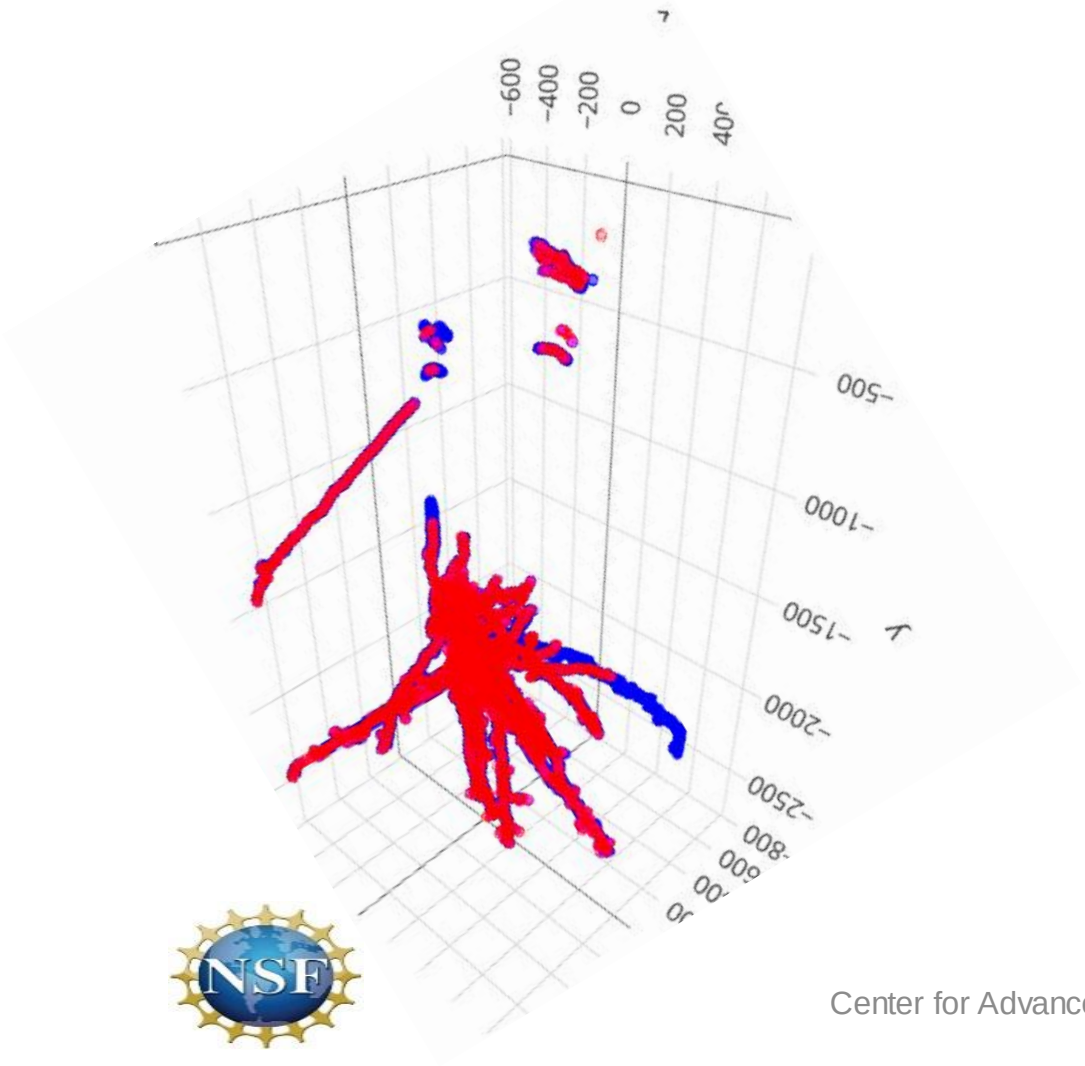


- Making sure the skeleton (red) and point cloud (blue) are aligned

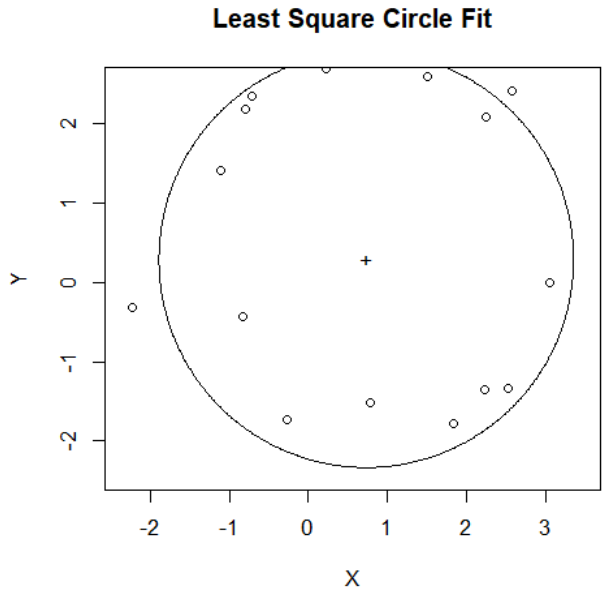


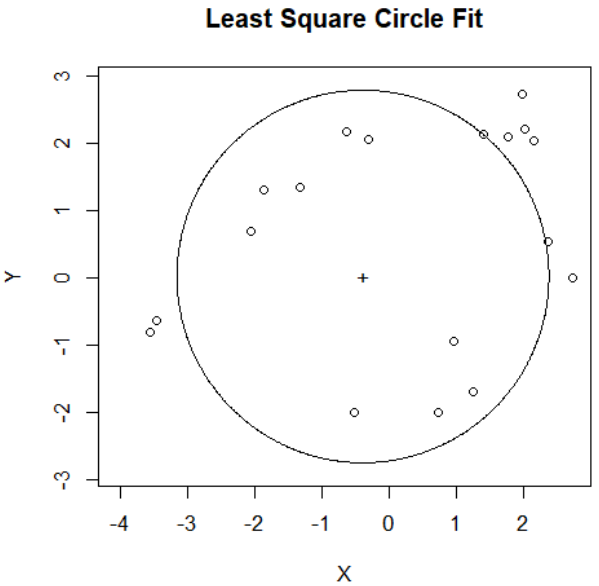
Current Progress

- Crop out most of the points in the root plug for architectural analysis



- Segments of the root skeleton are divided into slices
- Point cloud is sampled for each slice, and circle fitting is used to estimate radius/diameter

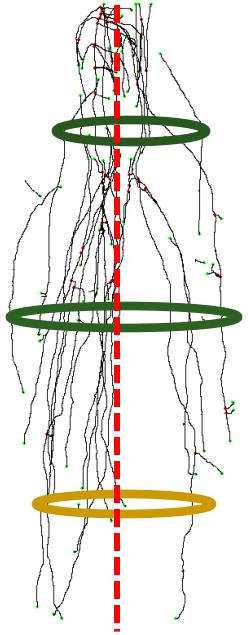




Future Plans

- Improve the method of measuring circle-fitting error for root diameter
- Estimate root volume
- Validate 3D models by comparing it to 2D scans of the same root systems
- Further develop the architectural analysis on egressing roots
- Preparing manuscripts on simulated drought physiological response and outplanting performance

Lateral root dispersion



Average distance of the root to the central axis