

# CAN ROOT BIOMASS OF WHITE OAK ADVANCE REGENERATION BE RELIABLY PREDICTED FROM DIAMETER AND HEIGHT?

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## Poster Summary

The successful regeneration of oak-dominated stands is an issue of concern for foresters today. The size of the root system is directly related to the rate of growth following release and therefore to the chances of establishment of regrowth. The size of the root system is difficult to measure without destructive sampling, but it may be assessed through modeling. The objectives of this study were to test if root biomass of white oak (*Quercus alba* L.) could be predicted from aboveground measurements of diameter and/or height and to determine if disturbance history affected this prediction.

### METHODS

A mature hardwood stand in northwestern South Carolina was chosen for the study. One hundred thirty two seedlings were randomly selected (70 from a burned area and 62 from a control area) for measurement. Diameter measurements were taken at the level of the litter layer (DL), the level of the humus layer (Dh), and at the root collar (RCD). Height (H) was also measured for each seedling and incorporated with diameter measurements in additional variables (DL<sup>2</sup>H, Dh<sup>2</sup>H, RCD<sup>2</sup>H). Linear regression was performed to determine relationships between the log of aboveground measurements and the log of root biomass. F-tests with full and reduced models were used to determine if separate models were needed for the burned vs. unburned sites.

### RESULTS AND DISCUSSION

The results of the F-tests indicate that separate models are needed for all variables except DL, which was additionally modeled separately for comparison purposes. On the burned sites, all the aboveground variables provided adequate prediction of root biomass, with R<sup>2</sup> values ranging from 0.754 to 0.884. On the control site, RCD was the only good diameter measure for root biomass prediction, with an R<sup>2</sup> value of 0.848. The other diameter measures, DL and Dh, were poor predictors of root biomass (R<sup>2</sup> values of 0.553 and 0.531, respectively). On the unburned area, seedling shoots are likely to die back, although they do not resprout synchronously. Additionally, the seedlings are not able to sprout to their full potential until released from competition, therefore not utilizing the entire carbohydrate reserves in the roots. Although the root collar diameter measurement requires digging down into the mineral soil, in our study this was < 1 cm deep, making this a feasible field measurement.

### CONCLUSION

Root biomass can be reliably predicted from aboveground measures, although this differs based on disturbance history. On burned sites, the diameter at the top of the litter is adequate, while on unburned or unknown sites the diameter at the root collar should be used to predict root biomass.

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