

A STUDY OF ROOT DISTRIBUTION  
IN TWO HARDWOOD STANDS IN THE DUKE FOREST

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## ABSTRACT

This investigation was conducted in a clay soil of Piedmont North Carolina to obtain data on surface root extension of hardwood species. Two uneven-aged upland hardwood stands on the Korstian Division of the Duke Forest were studied.

A tracer technique for studying root distribution developed at the School of Forestry, Duke University, was used. Radioiodine in a carrier solution was applied to a 0.5 square foot area of soil surface. The approximate volume of soil treated at each application point based upon autoradiographs was found to be 632 cubic inches. After application of I-131, the spot was shielded with lead and surrounding trees were monitored with a portable scintillation probe and scaler for three to five weeks to detect presence of I-131 in stems of trees growing in the immediate vicinity.

A total of 703 stems including 18 species were monitored on 12 plots. A large part of the sample consisted of oaks (Quercus spp.) and hickories (Carya spp.), although dogwood

(Cornus florida L.), sourwood Oxydendrum arboreum (L.) DC., and red cedar (Juniperus virginiana L.) were also abundant.

In almost all cases I-131 was detected in stems within three days following isotope application. Monitoring beyond one week served only to substantiate the presence of isotope in stems.

The relationship between trees exhibiting evidence of I-131 uptake and their respective distances from the point of application was evaluated using probit analyses. A high percentage of white oaks and hickories showed uptake in the zone nearest the application spot, implying an intensive network of roots close to their trunks. Other species had more extensive patterns of development. Maximum distance of recorded uptake ranged from 31.8 feet for dogwood to 54.6 feet for hickory.

A regression analysis using distance of trees absorbing I-131 from points of application as the dependent variable showed that the (1) number of trees occurring between the tree in question and the application point, (2) tree height, and (3) tree diameter were related to the distance of extension. For both height and diameter there was a positive relationship with distance.

Discriminate analyses were used to determine the value of various tree characteristics for discriminating between trees which absorbed I-131 and those which did not. Also, regression

analyses using count rate above background as the dependent variable were made. Tree diameter and distance from tree to point of application or their ratio were the only variables consistently correlated either with the discriminate Y or with the count rate.