1977

Crown Positions Within Unthinned Loblolly Pine Plantation Canopies

J. David Lenhart
Arthur Temple College of Forestry and Agriculture, Stephen F. Austin State University

Dwight R. Hicks
Stephen F. Austin State University

Chi-Yun Ho

CROWN POSITIONS WITHIN UNTHINNED LOBLOLLY PINE PLANTATION CANOPIES

by J. DAVID LENHART[1], CHI-YUN HO[2,3], *and* DWIGHT R. HICKS[2,4]

School of Forestry, Stephen F. Austin State University
Nacogdoches 75961

ABSTRACT

Crown class percentages are not affected by age or trees/acre. The percentage of dominant and suppressed trees is affected by land productivity.

INTRODUCTION

Thinning practices employed to grow trees for selected products are usually defined by designating proportions of trees to be removed from each of the 4 main recognized crown classes. There is little available published information, however, regarding the distribution of tree crowns within the canopy prior to thinning.

Information collected from 219 unthinned old-field loblolly pine (*Pinus taeda* L.) plantations in the Interior West Gulf Coastal Plain during a mensurational study provided an opportunity to describe the effects of age, site index, and trees/acre on crown classes (Lenhart, 1972).

Plantation Measurements

Plantations selected for sampling were unthinned, at least 9 yrs old, and undamaged by fire, insects, or disease. Within each plantation mensurational information, including age, site index (base age = 25), and trees/acre, were collected from a sample plot. In addition, the trees (10 to 16) on a sub-sample within the plot were each classified into one of 4 crown positions within the canopy—dominant, co-dominant, intermediate, or suppressed. These crown positions were converted to percentages.

Crown Class Percentages

For all sample plots, the average % of trees in each crown class was as follows:

---

[1] Associate Professor and Assistant to the Dean.
[2] Former Graduate Research Assistants.
[3] Presently employed by Ministry of Communications in Taiwan.
[4] Presently employed by Drummond Coal Company.

Accepted for publication: October 14, 1975.

The Texas Journal of Science, Vol. XXVIII, Nos. 1-4, March, 1977.

Crown Class	Percentage
Dominant	31
Co-dominant	28
Intermediate	31
Suppressed	10

The paucity of suppressed trees could suggest that many trees of this class have already died and disappeared. More probably, however, the spacing of these plantations–mostly nominally 6 X 8 feet–has been sufficient to support stands in which few trees have not yet been crowded into the suppressed condition.

Crown Class Percentages by Age Classes

Since the sampled plantations ranged in age from 9 to 30 yrs, we were able to describe crown positions in relation to 5-yr age classes (Figure 1).

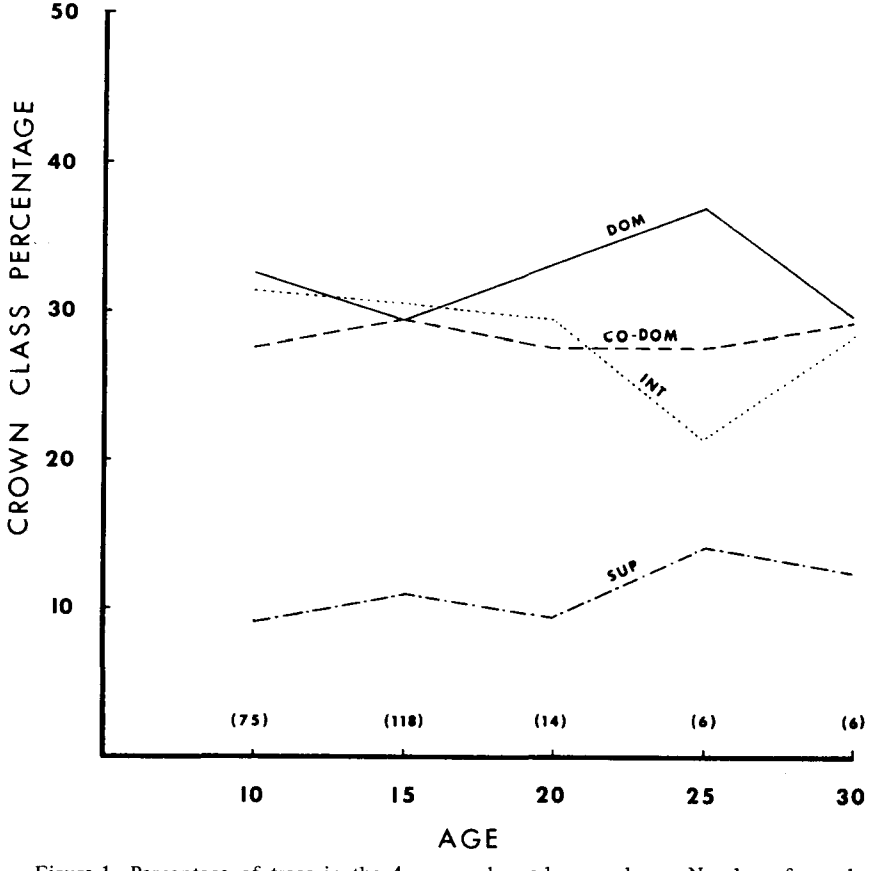

Figure 1. Percentage of trees in the 4 crown classes by age classes. Number of sample plots for each age class is shown in parentheses.

In age classes 10, 15, and 20, which included 95% of the sample plots, the % of crowns in each class is fairly constant. In these age classes, less than 6 %-points separate the upper 3 crown classes. Across all age classes about 10% of the trees had suppressed crowns. There was no indication of much shifting of trees between crown classes as they grow older.

Crown Class Percentages by Trees-Per-Acre Classes

The relationships between relative tree frequency in the 4 crown positions and trees/acre are shown in Figure 2. The sampled plantations ranged from 200 to 1700 trees/acre with 1 sample each in the 1400 and 1700 classes. About 92% of the sample plots were in the 400- to 1000-trees/acre classes.

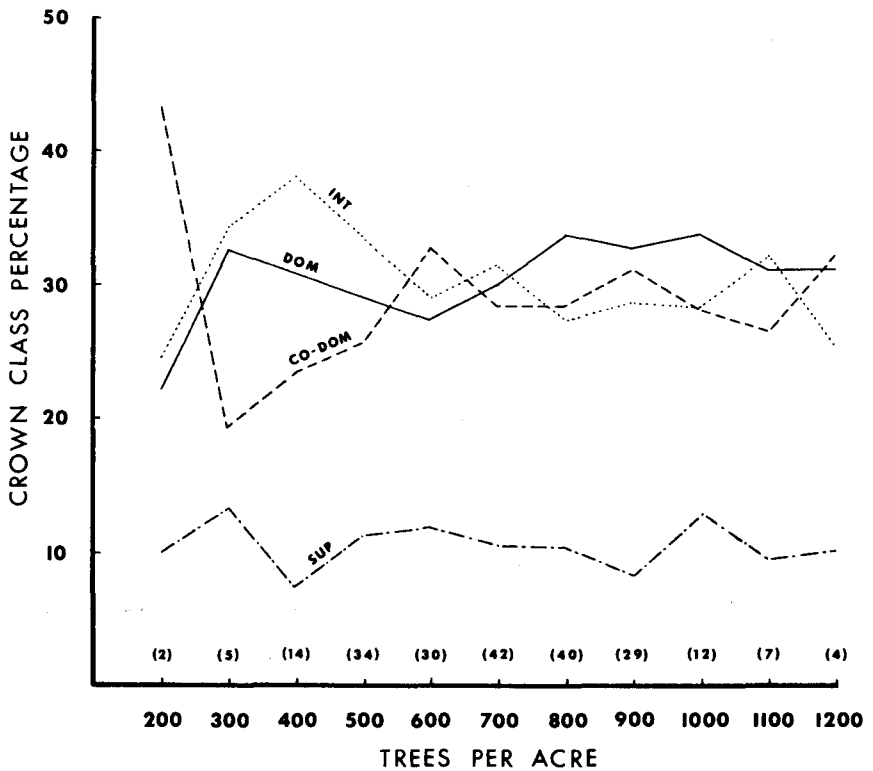

Figure 2. Percentage of trees in the 4 crown classes by trees/acre classes. Numbers in parentheses represent the sample size for each trees-per-acre class.

Trends in Figure 2 resemble those in Figure 1; each of the upper 3 crown classes includes about 30% of the trees, while the suppressed class represents about 10%. Between 600 and 1100 trees/acre about 4 to 7 %-points represents the spread between the dominant, co-dominant, and intermediate crown classes. No trends toward change in crown class with density are apparent.

Crown Class Percentages by Site Index Classes

Figure 3 depicts crown positions in relation to 5-ft site index classes. About 91% of the sampled plantations had site index values between 45 and 65 ft, inclusive.

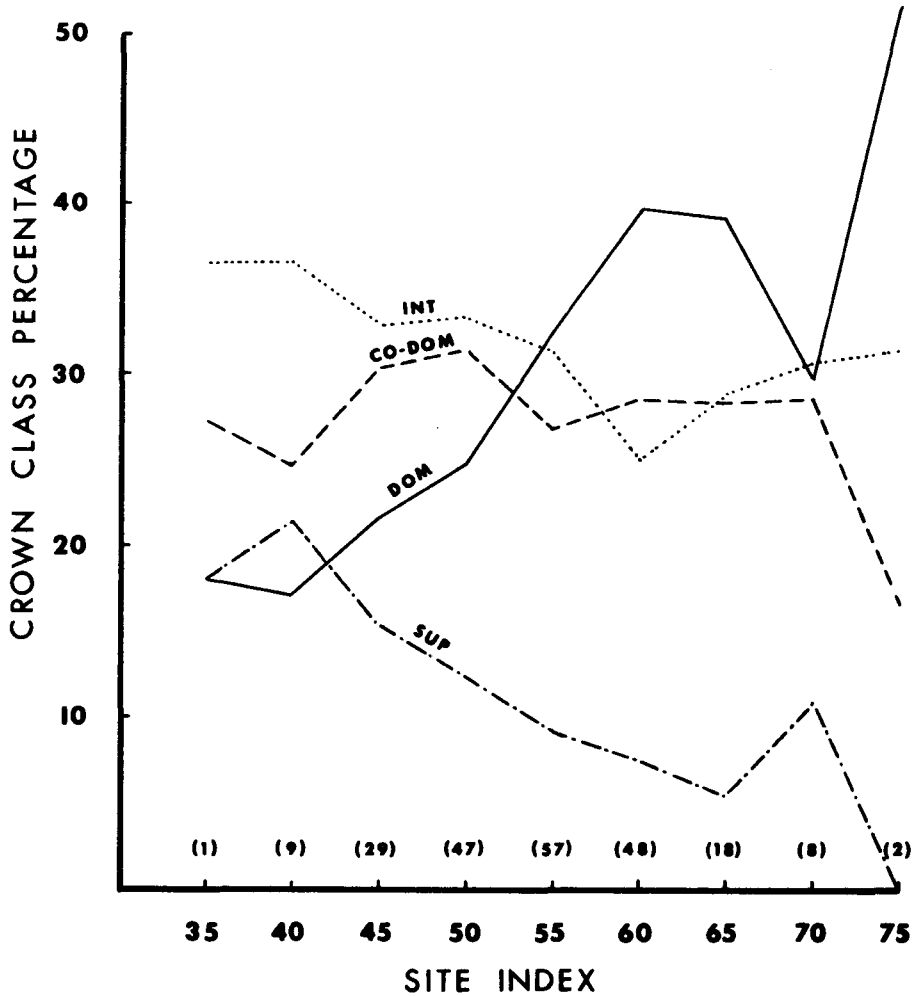

Figure 3. Percentage of trees in the 4 crown classes by site index classes. Numbers in parentheses represent the sample size for each site index class.

The proportions of trees in the top and bottom crown positions, definitely tend to vary with site index. As site index increases, the dominant % increases and the suppressed % decreases. Also, intermediate % appears to decrease slowly with increasing site index, while co-dominant % shows no definite trend.

On the poorer sites—35, 40, and 45 ft, about 40% of the trees are either dominant or suppressed. On the better sites—65, 70, and 75 ft, about 40% of the trees

are dominant, and 1 in 10 or less is suppressed. Across all site index classes, except 75 ft, the majority of the tree crowns are in either the co-dominant or intermediate classes.

The data suggest that in unthinned plantations within the ranges observed, the forester cannot expect any change in canopy composition as age or trees/acre increase or decrease. It may require some type of thinning regime to increase, for example, the % of dominant trees in a plantation. On the other hand, the % of dominant trees is larger and the % of suppressed trees is smaller on more productive than on less productive land. On the better sites about 40% of the trees are dominant.

ACKNOWLEDGEMENTS

Research for this project was supported in part by funds made available under the McIntire-Stennis Act.

This paper is based in part on a masters thesis by Mr. Ho.

LITERATURE CITED

Lenhart, J. D., 1972–Cubic-foot yields for unthinned old-field loblolly pine plantations in the Interior West Gulf Coastal Plain. Texas Forestry Paper No. 14, 46 pp.