

STAND DESCRIPTION

Concepts and Definitions ^{1/}

Through the course of every profession a particular language, terminology, or jargon is developed. We are all familiar with habeas corpus of the legal profession and terms employed by chemists, physicists, etc. The concepts and definitions listed below are part of those which make up the jargon of forestry. Learn them and use them.

I. FORESTS AND STANDS

An important concept often misunderstood in forestry is the difference and utility of the terms forest and stand. Remember that the stand is the unit which is of interest in silviculture. The forester practices silviculture on stands not on forests. The following terms and definitions will serve to clarify the concept of stands as used by silviculturists.

1. Forest – A plant association predominantly of trees or other woody vegetation, a collection of stands.
2. Stand – An aggregation of trees or other growth occupying a specific area and sufficiently uniform in species composition, size, age, arrangement, and condition as to be distinguished from the forest or other growth on adjoining areas.
3. Stand Composition – The composition of stands is conceived of as being either pure or mixed. These are defined as:
 - (a) Pure Stand – A stand in which at least 80% of the trees in the main canopy are of single species.
 - (b) Mixed Stand – A stand in which less than 80% of the trees in the canopy are of a single species.
4. Stand Density – The density of stocking expressed in number of trees, basal area, volume, or other criteria, on a per-acre basis. In addition stocking is further modified and defined as:
 - (a) Fully stocked stands – Stands in which all the growing space is effectively occupied but which still have ample room for development of the crop trees.
 - (b) Overstocked stands – Stands in which the growing space is so completely utilized that growth has slowed down and many trees, including dominants, are being suppressed.
 - (c) Understocked stands – Stands in which the growing space is not effectively occupied by crop trees.

^{1/} All definitions employed were taken from or are modifications of those given in Forest Terminology. Society of American Foresters Revised Edition.

5. Stand Form – Stands are usefully described and considered from the standpoint of the age classes of which they are composed. Generally, two stand forms are recognized. These are:
 - (a) Even-aged stands – Stands in which there exists relatively small age differences between individual trees.
 - (b) Uneven-aged stands – Stands in which there exists relatively large age differences between individual trees. At least 3 age classes are present. A similar meaning is all-aged stand.
 - (c) Two-aged stands – Stands in which there are two distinct age classes.
6. Stand Origin – Stands may be classified by origin; whether from seed or sprouts and suckers, or a combination of the two. Also descriptive of origin are natural or planted, and virgin or second growth.
7. Stand Location – Of interest silviculturally is the topographic location of the stand. Generally, two broad topographic positions are recognized, upland or bottomland.

II. OTHER CONCEPTS AND TERMS EMPLOYED

The previous concepts and terms apply in a general sense to stands and are useful in the description thereof. However, to adequately describe stands, it is necessary to employ terms which are descriptive of some characteristic of the individual trees within the stand. Some of the more common ones are given in the following:

1. Tree Size Classification – The timber species are conveniently designated by certain size classes through their life development. Those commonly employed are:
 - (a) Seedling – from germination to the height of 3 feet.
 - (b) Small Sapling – from 3 - 10 feet tall.
 - (c) Large Sapling – from 10 feet tall to 4 inches d.b.h.
 - (d) Small Pole - from 4 to 8 inches d.b.h.
 - (e) Large Pole – from 8 to 12 inches d.b.h.
 - (f) Standard – from 12 to 24 inches d.b.h.
 - (g) Veteran – over 24 inches d.b.h.
2. Crown Classification - Trees in even-aged stands are classed on the basis of crown position in the canopy by a simple method which has long been standard procedure. These for classes are:

- (a) Dominant – Trees with crowns extending above the general level of the crown cover and receiving full light from above and partly from the side; larger than the average trees in the stand, and with crowns well developed but possibly somewhat crowded on the sides.
 - (b) Codominant – Trees with crowns forming the general level of the crown cover and receiving full light from above but comparatively little from the sides; usually with medium sized crowns more or less crowded on the sides.
 - (c) Intermediate – Trees shorter than those in the two preceding classes, but with crowns either below or extending into the crown cover framed by the codominant and dominant trees, receiving a little direct light from above, but none from the sides, usually with small crowns considerably crowded on the sides.
 - (d) Overtopped – Trees with crowns entirely below the general level of the crown cover receiving no direct light either from above or from the sides.
3. Tolerance – This is an important concept in silviculture which is generally defined as the ability or capacity of a tree to develop and grow in the shade of and in competition with other trees. Species are generally ranked by the broad classification of being either tolerant or intolerant.
 4. Site Class or Site Quality – This is an additional concept of classification used freely by silviculturists when considering stands. It is defined as a designation of the relative production capacity or quality of a site (location or place) with reference to the species employed; the volume or the average height of dominant and codominant trees at a given age is usually used as standard for classification.
 5. Crown Percent – This is a descriptive tree term and is merely the percentage which crown length is of total height.

SOME PLOT SIZES AND AREAS

I. Square Plots

<u>Length of Side</u>	<u>Area in Acres</u>	<u>Blow Up Factor</u>
Feet		
6.6	0.0010	1000
33.0	0.0250	40
66.0	0.1000	10

II. Circular Plots

<u>Radius of Circle</u> Feet	<u>Area in Acres</u>	<u>Blow Up Factor</u>
11.75	0.0100	100
18.70	0.0250	40
37.25	0.1000	10

III. Rectangular Plots

<u>Length of Sides</u> Feet	<u>Area in Acres</u>	<u>Blow Up Factor</u>
16.5 x 33.0	0.0125	80
16.5 x 66.0	0.0250	40
33.0 x 132.0	0.1000	10

SUGGESTED METHODS OF DETERMINING THE DESIRED VALUES FOR EACH PLOT

1. Basal Area per Acre

- Square each d.b.h.
- Total these squares
- Multiply this total by 0.005454 (=b.a./plot)
- Then multiply this value by the appropriate expansion factor to obtain the basal are per acre.

2. D.B.H. of Tree of Mean Basal Area

- Total the number of tees per plot
- Total the squares of the d.b.h.'s
- Divide the total of squares (b) by the number of trees per plot (a).
Extract the square root of this value

3. Average Total Height

- Total height
- Divide by the number of trees

4. Average Dead Length

- Total dead lengths
- Divide by number of trees

5. Average Crown Percent

- a) Total heights
- b) Total dead lengths
- c) Divide (a) by (b) and convert to percent
- d) Subtract (c) from 100

6. Number of Trees per Acre

- a) Total the number of trees per plot
- b) Multiply (a) by the appropriate expansion factor

Site Index

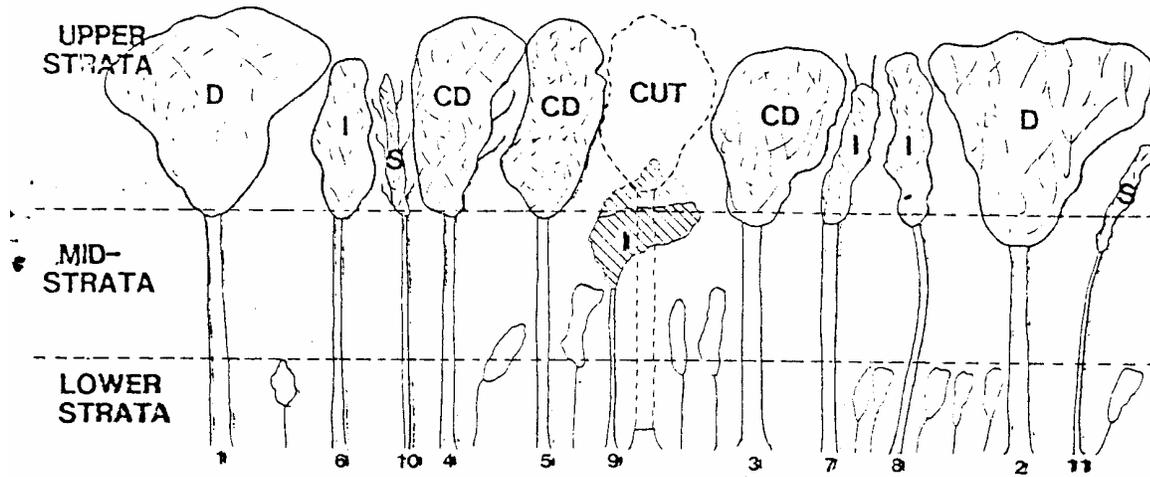
- a) Direct measure of site productivity
- b) Defined = average height of dominant and codominant trees that have been free-to-grow (not suppressed) in a stand at some base index age (usually 50 years for hardwoods and 25 years for southern pine) for a particular species
- c) Indirect measures of site productivity: soils, landform, indicator species
- d) Site index curves allow estimation of site index before and after the base age.

CROWN CLASS DESCRIPTION FOR HARDWOODS

In hardwoods, crown class not only reflects position in the canopy but also fullness and condition of the crown relative to the tree's size. For example, a tree which has part of its crown above the crowns of surrounding trees may be downgraded to a codominant class because of the condition of the crown, e.g., lack of fullness or size relative to expected size for a tree of that height and diameter. On the other hand, a tree which receives little sunlight from above, and usually classed as suppressed, might be classed as intermediate if the crown is in adequate condition. This situation usually reflects species tolerance.

The following definitions are given for crown classes of hardwoods. The definitions apply to trees of the main canopy.

	Crown Position	Crown Condition
Dominant	Trees with crown extending above the general level of the crown cover and receiving full light from above and almost full light from the sides	Crown should be wide, deep, well shaped and relatively full. If crown is too small for the tree size or if crown deterioration has occurred, the tree should be classed as dominant.
Codominant	Trees with crowns forming the general level of the crown cover and receiving practically full light from above but only partial light from the sides.	Crowns generally deep, well shaped and relatively full but may be somewhat lacking in density and spread. If crown is small for the tree size or if deterioration has occurred, the tree may be classed as intermediate.
Intermediate	Trees usually shorter than the dominants and codominants but crowns sometimes extending into the crown cover formed by dominants and codominants. May receive some direct light from above but usually little from the sides	Crowns usually small; may be dense and considerably crowded on the sides or relatively wide but lacking in density. Trees with crowns which show signs of past or present deterioration should be classed as suppressed.
Suppressed	Trees with crowns usually below the general level of the crown cover and almost all light received is diffused light.	Crowns usually small and sparse in foliage. Trees of tolerant species which have exceptionally well developed crowns may be classes as intermediates.



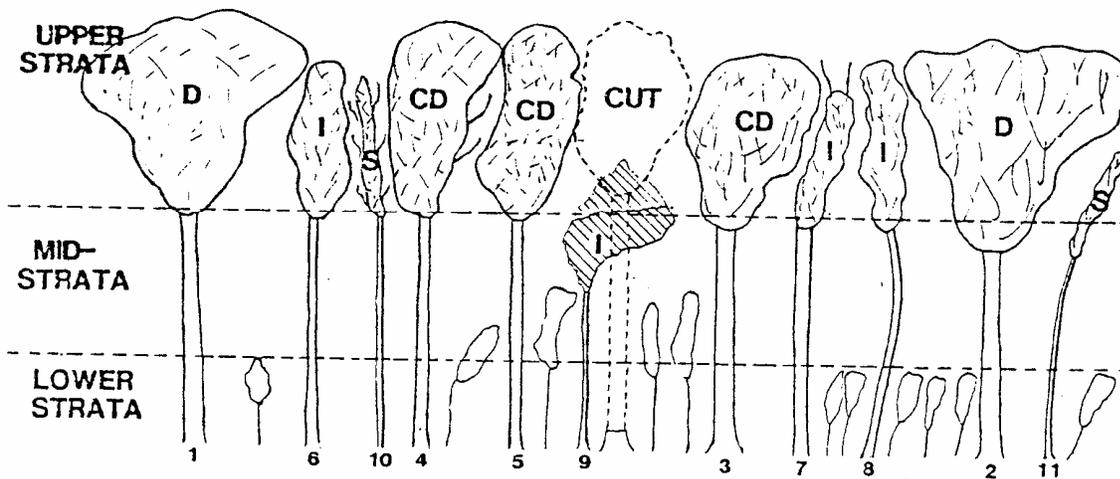
DOMINANT

- POSITION -

CROWNS EXTENDING ABOVE THE GENERAL LEVEL OF THE CROWN COVER AND RECEIVING FULL LIGHT FROM ABOVE AND ALMOST FULL FROM THE SIDES.

- CONDITION -

CROWN SHOULD BE WIDE, DEEP, WELL SHAPED AND RELATIVELY FULL. IF CROWN IS TOO SMALL FOR THE TREE SIZE OR IF CROWN DETERIORATION HAS OCCURRED, IT SHOULD BE CLASSED AS CODOMINANT.



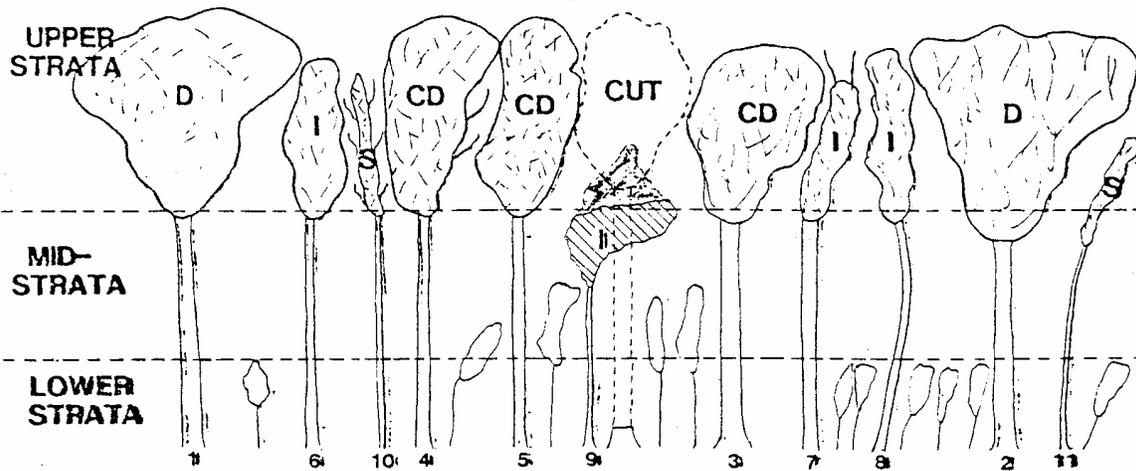
CODOMINANT

- POSITION -

CROWNS FORMING THE GENERAL LEVEL OF THE CROWN COVER AND RECEIVING PRACTICALLY FULL LIGHT FROM ABOVE BUT ONLY PARTIAL SIDE LIGHT.

- CONDITION -

CROWNS GENERALLY DEEP, WELL SHAPED AND RELATIVELY FULL BUT MAY BE SOMEWHAT LACKING IN DENSITY AND SPREAD (4). IF CROWN IS SMALL FOR THE TREE SIZE OR IF DETERIORATION HAS OCCURRED IT MAY BE CLASSED AS INTERMEDIATE (7).



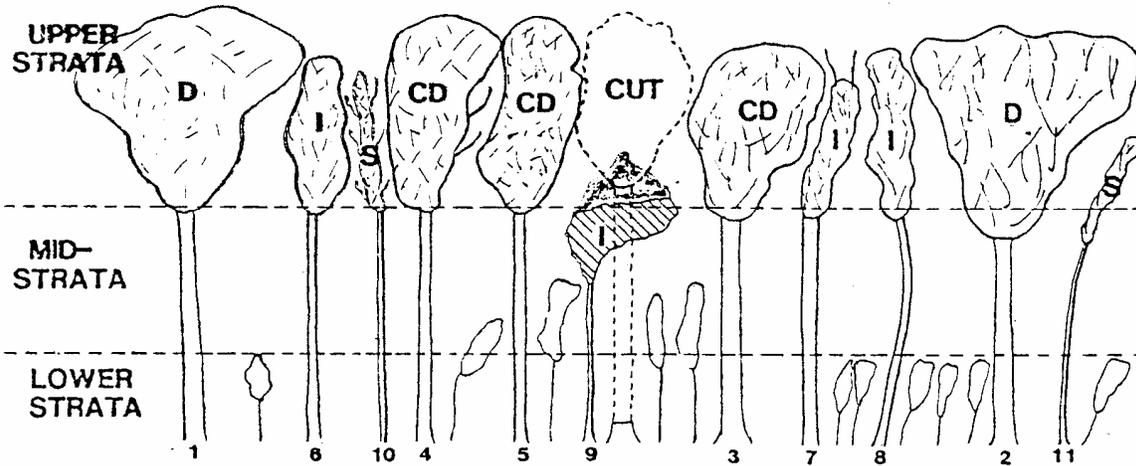
SUPPRESSED

- POSITION -

CROWNS USUALLY BELOW THE GENERAL LEVEL OF THE CROWN COVER. ALMOST ALL THE LIGHT RECEIVED IS DIFFUSED LIGHT (11).

- CONDITION -

CROWNS USUALLY SMALL AND SPARSE IN FOLIAGE (11). TREES OF TOLERANT SPECIES WHICH HAVE EXCEPTIONALLY DEVELOPED CROWNS MAY BE CLASSED AS IMMEDIATE (9).



INTERMEDIATE

- POSITION -

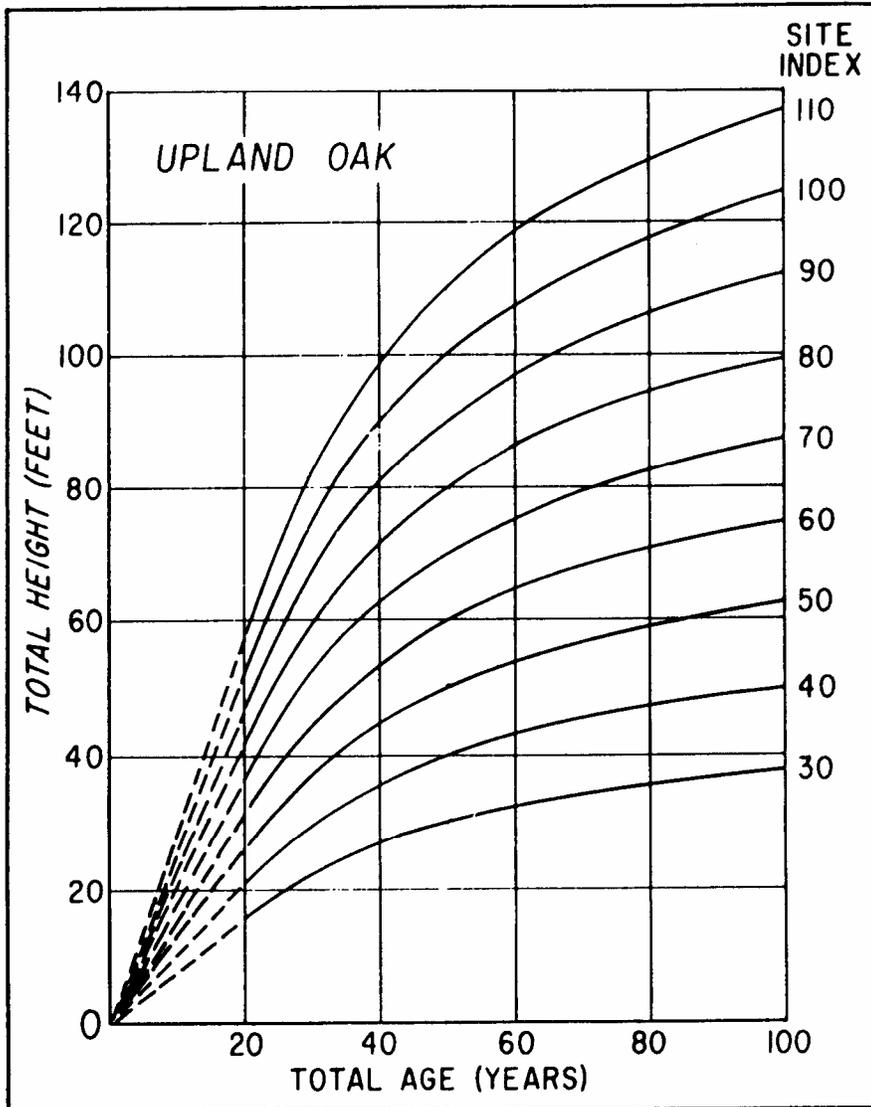
USUALLY SHORTER THAN THE DOMINANTS AND CODOMINANTS BUT CROWNS SOMETIMES EXTENDING INTO THE CROWN COVER FORMED BY DOMINANTS AND CODOMINANTS (8). MAY RECEIVE SOME DIRECT LIGHT FROM ABOVE BUT USUALLY LITTLE FROM THE SIDES (8).

- CONDITION -

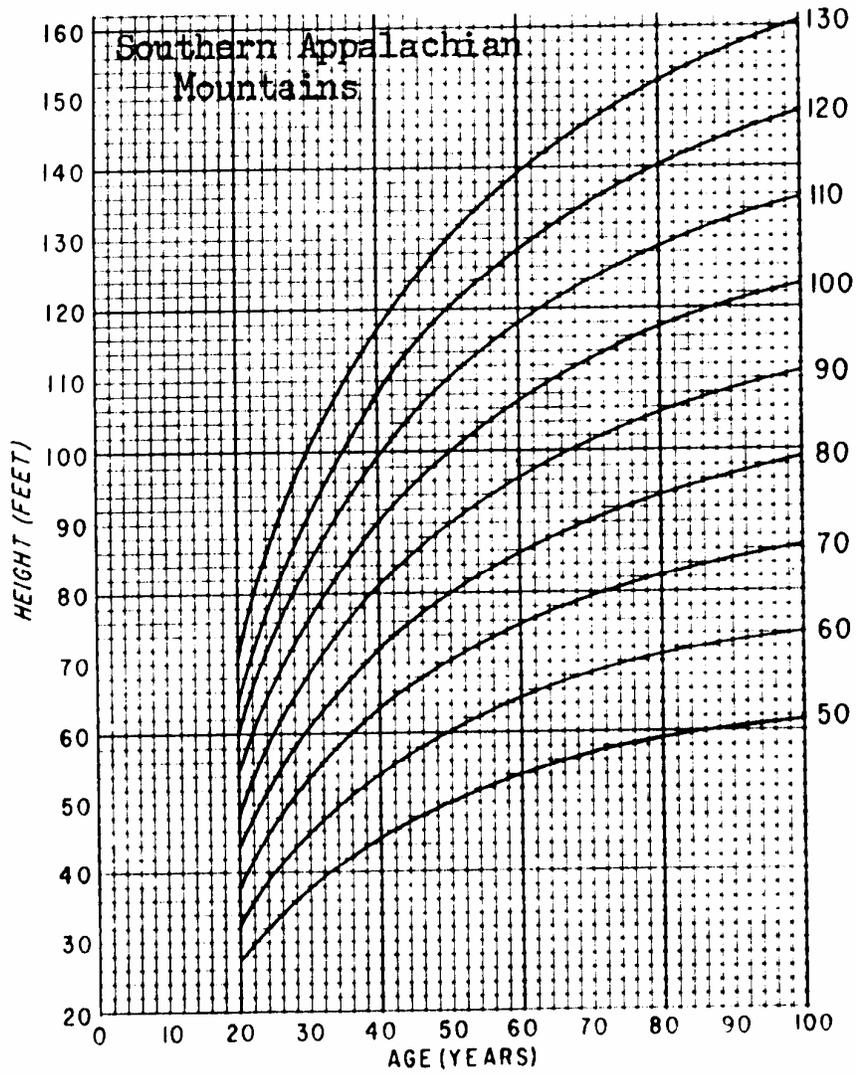
CROWNS USUALLY SMALL, MAY BE DENSE AND CONSIDERABLY CROWDED ON THE SIDES OR RELATIVELY WIDE BUT LACKING IN DENSITY. CROWNS WHICH SHOW SIGNS OF PAST OR PRESENT DETERIORATION SHOULD BE CLASSED AS SUPPRESSED (10).

SITE INDEX CURVES FOR UPLAND OAK IN THE SOUTHEAST

These site index curves are based on 697 observations of height on age for white, northern red, southern red, scarlet, black, and chestnut oak in the Virginia-Carolina Piedmont and the Southern Appalachian Mountains. The curves were constructed using equations of the form, $\text{Log Height} = a + b \left(\frac{1}{\text{Age}} \right)$.

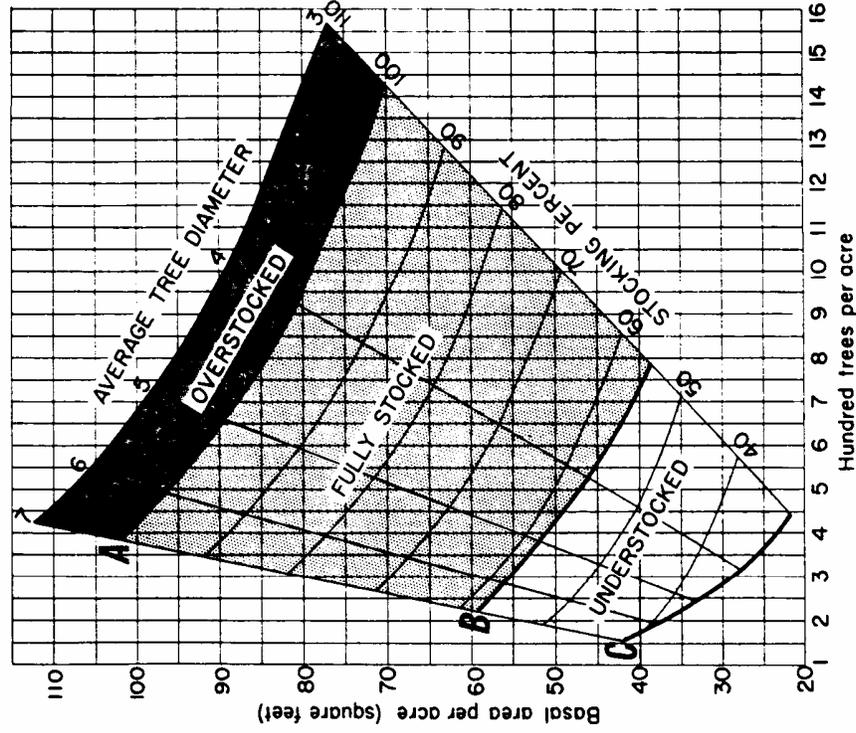


Source: USDA Forest Service Research Note No. SE-125.
April 1959.



Yellow poplar site index curves at an index age of 50-yrs.

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 trees can fully utilize the site. Curve C shows the lower limit of stocking necessary to reach the B level in 10 years on average sites. (Average tree diameter is the diameter of the tree of average basal area.)



Relation of basal area, number of trees, and average tree diameter to stocking percent for upland central hardwoods. Tree-diameter range 7-15 (left), 3-7 (right). The area between curves A and B indicates the range of stocking where (continued on next page)

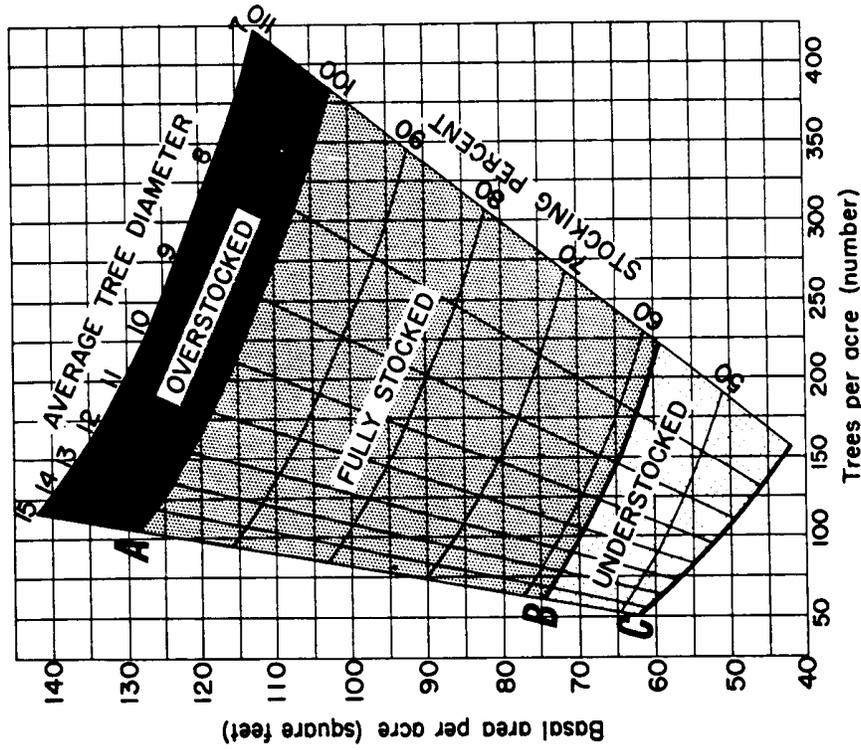


Table 1.--Sources of reproduction and shade tolerance of some species in hardwood forests.

Species	Relative importance of reproduction source in relation to species regeneration potential ^a					Shade tolerance
	Seed from current seed crop	Seed stored in forest floor	Advance reproduction ^b	Stump sprouts ^c	Root sprouts (suckers) from cut trees	
<u>Hardwoods</u>						
American basswood			1	1	2	tolerant
American beech			1	3	2	very tolerant
American elm			1	3	2	intermediate
American holly		1	2	2		very tolerant
American hornbeam			1	2		very tolerant
Bigtooth aspen	2		3	3	1	very intolerant
Black cherry		1	2	2		intolerant
Blackgum			1	2		tolerant
Black locust		2			1	very intolerant
Black walnut	1		1	2		intolerant
Black willow	1			2	2	very intolerant
Boxelder	2		1	1		tolerant
Buckeye	1	1	2	2		tolerant
Butternut			1	2		intolerant
Cucumbertree		1	2	2		intermediate
Eastern cottonwood	1			1	3	very intolerant
Eastern hophornbeam			1	2		very tolerant
Eastern redbud		2	1	1		tolerant
Flowering dogwood			1	2		very tolerant
Green ash		1	1	2		intermediate
Hackberry			1	3		intermediate
Hickories ^d			1	3		intermediate
Oaks ^e			1	2		intermediate
Persimmon		2	1	1	2	very tolerant
Quaking aspen	2		3	3	1	very intolerant
Red maple			1	2		tolerant
River birch	1		2	2		intolerant
Sassafras			1	2	1	intolerant
Silver maple			1	2		tolerant
Slippery elm			1	3	2	tolerant
Sourwood		2	1	1		tolerant
Sugar maple			1	2		very tolerant
Sweetgum	1			1	1	intolerant
Sycamore	1		2	2		intolerant
White ash		1	1	2		intermediate
Yellow birch	1		2			intermediate
Yellow-poplar		1	2	2		intolerant

Species	Relative importance of reproduction source in relation to species regeneration potential ^a					
	Seed from current seed crop	Seed stored in forest floor	Advance reproduction ^b	Stump sprouts ^c	Root sprouts (suckers) from cut trees	Shade tolerance
<u>Conifers</u>						
Baldcypress		1	1	2		intermediate
Eastern hemlock			1			very tolerant
Eastern redcedar	1		1			intolerant
Eastern white pine	1		1			intermediate
Loblolly pine	1		1			intolerant
Pitch pine	1		1	2		intolerant
Shortleaf pine	1		1	3		intolerant
Virginia pine	1		1			intolerant

^a 1 = primary source; 2 = potentially significant but not primary source; 3 = minor source. Relative importance of reproduction source is for sawtimber-size stands.

^b Includes seedlings, seedling-sprouts, and in a few species root sprouts (i.e., species occurring in root sprouts column).

^c Sprouts originating from stumps of trees \geq 2 inches d.b.h.

^d Hickories as a genus are mostly intermediate in shade tolerance. Mockernut and bitternut range more toward intolerant

^e Oaks as a genus are mostly intermediate in shade tolerance. Red oaks range more toward the intolerant scale.

Sources:

- Johnson, Paul. Central Hardwood Notes, North Central Forest Exp. Stn., Columbia, MO.
 Burns, R.M. & B.H. Honkala. 1990. Silvics of North America. Agric. Handb. 654. USDA Forest Service, Washington, DC. (2 volumes).
 Putnam, J. L. et al. 1960. Management and inventory of southern hardwoods. Agric. Handb. 181. USDA Forest Service, Washington, DC.