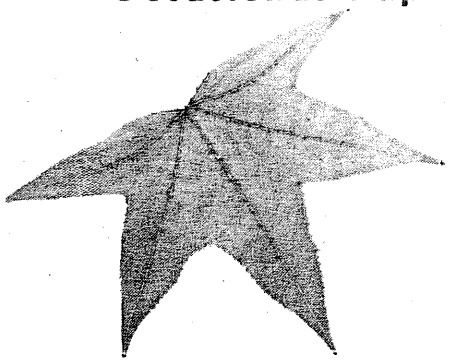
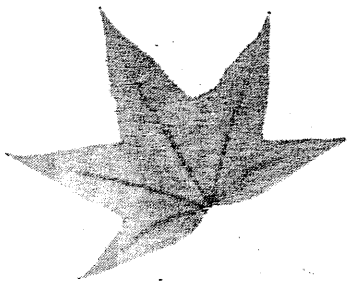
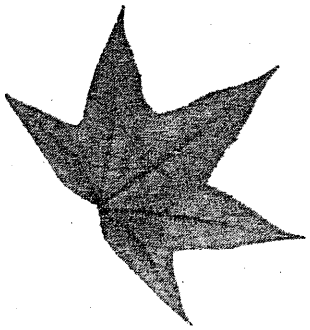
Occasional Paper 176 *1959*

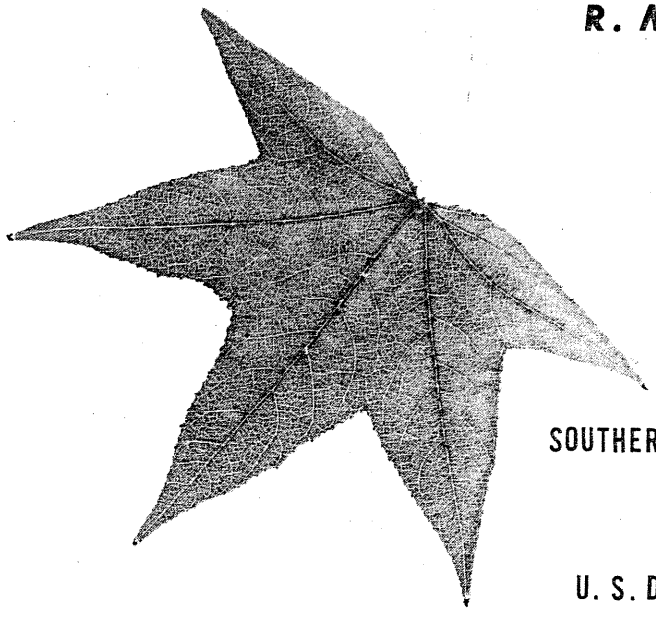


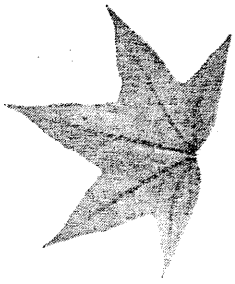


Guide for EVALUATING SWEETGUM SITES

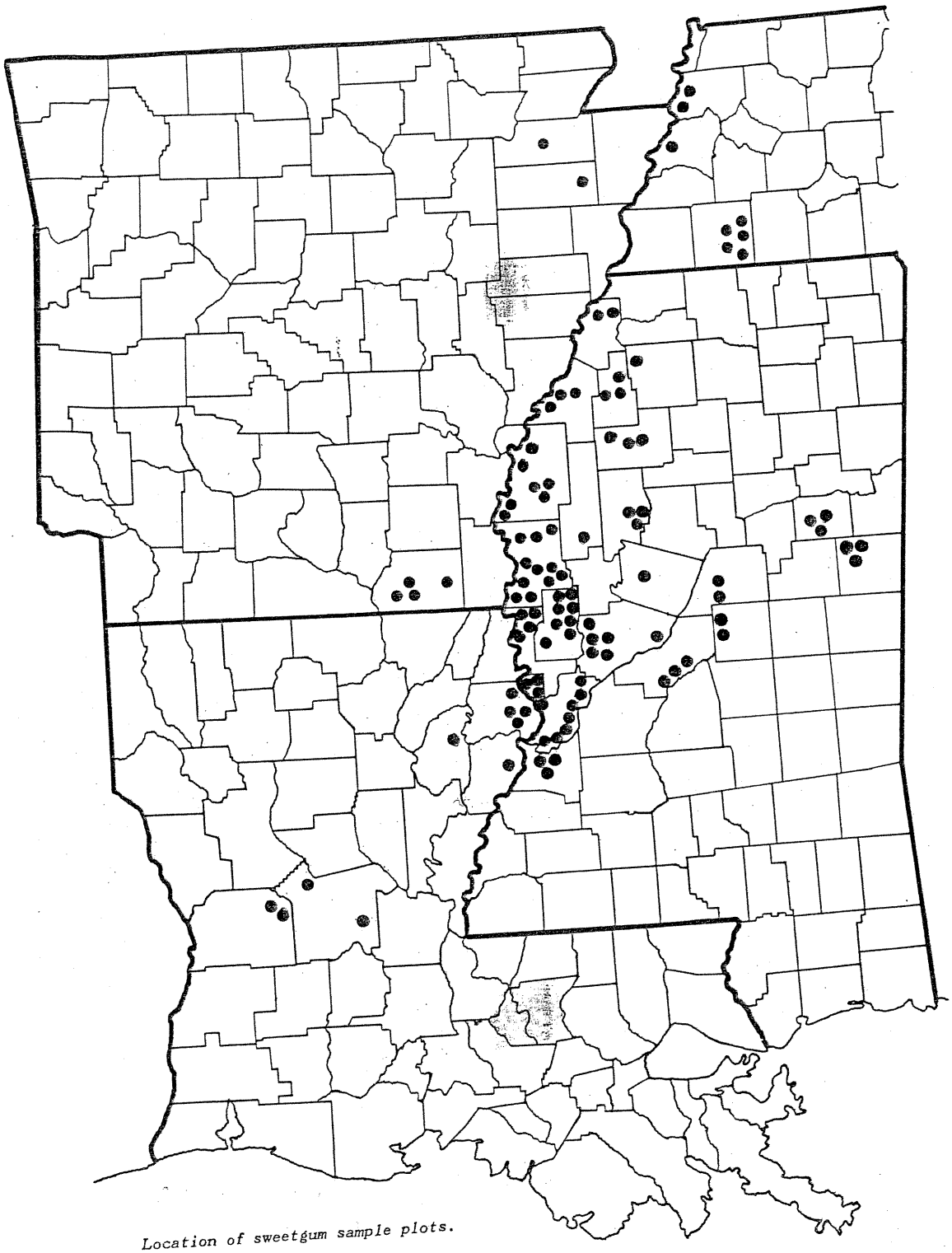


W. M. Broadfoot
R. M. Krinard





SOUTHERN FOREST EXPERIMENT STATION
Philip A. Briegleb, Director
FOREST SERVICE
U. S. DEPARTMENT OF AGRICULTURE



Location of sweetgum sample plots.

Guide for

EVALUATING SWEETGUM SITES

W. M. Broadfoot
R. M. Krinard

Studies at the Stoneville Research Center[1] have established 3 practical methods of estimating the ability of Midsouth soils to grow sweetgum (Liquidambar styraciflua). The methods were developed from data collected from 104 sweetgum plots in the area mapped on the opposite page.

The choice of method is a matter of individual preference. All three methods give site potential (site index) in terms of the height, in feet, that a free-growing forest tree will have reached at the age of 50 years.

In one study, the total height of trees at age 50 years was related to 37 chemical and physical properties of the soil. The two properties that proved most closely related, clay content and amount of exchangeable potassium, form the basis for evaluating sweetgum sites in the first method.

The second method provides rapid on-the-spot classification of sites by observation of surface drainage and determination of soil texture, internal drainage, and presence or absence of hardpan. This method is applicable only in the lower Mississippi Valley.

A third method requires that soils be mapped or otherwise identified by standardized series and phase, after which sweetgum site index can be read from a table.

---

[1]Maintained at Stoneville, Mississippi, by the Southern Forest Experiment Station in cooperation with the Mississippi Agricultural Experiment Station and the Southern Hardwood Forest Research Group.

Method I

To apply the first method, two or more representative bulk soil samples should be collected from each site in the area for which sweetgum growth potential is to be determined. For example, a broad flat with heavy clay soil would require separate sampling from a ridge with sandy soil. Samples should be from a depth of 36 to 48 inches, and are preferably taken with a bucket-type soil auger. The samples from each site can be composited and mixed, and about 1 pint saved for laboratory analysis.

The samples may then be either turned over to a soils laboratory for determination of clay content and pounds of exchangeable potassium per acre, or prepared for these analyses if suitable laboratory facilities exist locally. For local analysis, the samples should be air-dried and sieved through a 2-mm screen and then put in a clean, pint-sized ice cream carton. Instructions for determining clay and exchangeable potassium by standard procedures usually can be obtained from State experiment stations.

When clay and potassium content have been determined from the sample, the site index can be read from table 1. The range of sites that may be encountered in this method are shown in figure 1.

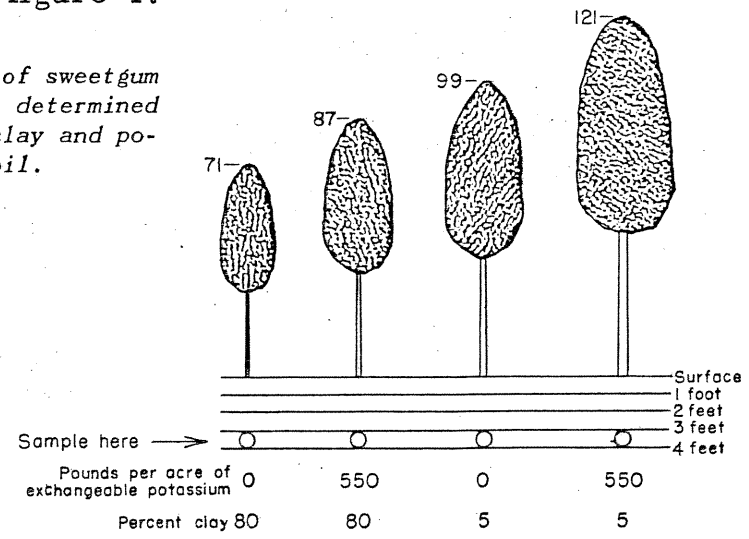


Figure 1.--*Range of sweetgum site indexes as determined from amount of clay and potassium in the soil.*

Table 1.--*Height of sweetgum at age 50 years, as determined from clay and potassium contents at 36- to 48-inch soil depth*[1]

Clay (percent)	Exchangeable potassium, in pounds per acre											
	0	50	100	150	200	250	300	350	400	450	500	550
	Feet											
5	99	101	103	105	107	109	110	112	114	117	119	121
10	97	99	100	102	104	106	108	110	112	114	116	118
15	95	97	98	100	102	104	106	108	110	111	114	116
20	93	95	96	98	100	102	104	105	107	109	111	113
25	91	93	94	96	98	99	101	103	105	107	109	111
30	89	91	92	94	95	97	99	101	103	104	106	108
35	87	89	90	92	94	95	97	99	100	102	104	106
40	85	87	88	90	91	93	95	96	98	100	102	104
45	83	85	86	88	90	91	93	94	96	98	100	101
50	82	83	85	86	87	89	91	92	94	96	97	99
55	80	81	83	84	86	87	89	90	92	94	95	97
60	78	79	81	82	84	85	87	88	90	92	93	95
65	76	78	79	81	82	83	85	86	88	90	91	93
70	75	76	77	79	80	82	83	85	86	88	89	91
75	73	74	76	77	79	80	81	83	84	86	87	89
80	71	73	74	75	77	78	79	81	82	84	85	87

[1]Standard error of estimate for Delta and combined soils, 8 percent; for non-Delta soils, 9 percent.

Method II

This procedure, as yet applicable only in the Mississippi River flood plain, requires use of a soil auger or spade in the first 2 feet of soil to determine texture, internal drainage, and presence of hardpan. A fourth site factor, inherent moisture condition, can be established by observation. After the four components have been determined, site index can be read from figure 2 or keyed out in table 2.

Texture: Classify texture in the surface 2 feet as fine, medium, or coarse. Clays (buckshot and gumbo) are classed as fine, sandy soils as coarse, and all the rest as medium.

Internal drainage: If there is no distinct gray or reddish-brown mottling within the surface 2 feet, classify the site as moderately to well drained. If there is distinct mottling, classify internal drainage as moderate to poor.

Hardpan: If a firm or compact zone is present in the upper 2 feet, classify the site as having a pan.

Inherent moisture condition: If the site is on a slope or ridge, or is otherwise situated so that floodwater or heavy rains drain off, classify it as dry. If it is level, or situated so that it is subject to flooding, classify as moist. Generally no other classification of inherent moisture is necessary, but sometimes such factors as nearness of root zone to mean low water in rivers, streams, or lakes may have to be considered.

Table 2.--*Site index for sweetgum for soils derived from alluvium on the Mississippi River flood plain*[1]

Soil-site description	Site index
I. Fine texture	
A. Moderate to good internal drainage	100
B. Moderate to poor internal drainage	
1. Without pan	
a. Inherently moist	85
b. Inherently dry	95
2. With pan	70
II. Medium texture	
A. Moderate to good internal drainage	
1. Without pan	
a. Inherently moist	110
b. Inherently dry	105
2. With pan	90
B. Moderate to poor internal drainage	
1. Without pan	
a. Inherently moist	95
b. Inherently dry	105
2. With pan	75
III. Coarse texture	
A. Moderate to good internal drainage	
a. Inherently moist	100
b. Inherently dry (not a sweetgum site)	

[1] Key not applicable to soils outside the Mississippi River flood plain--as loess and Coastal Plain alluvium. Sites not indexed are either nonexistent or are not recommended for sweetgum.

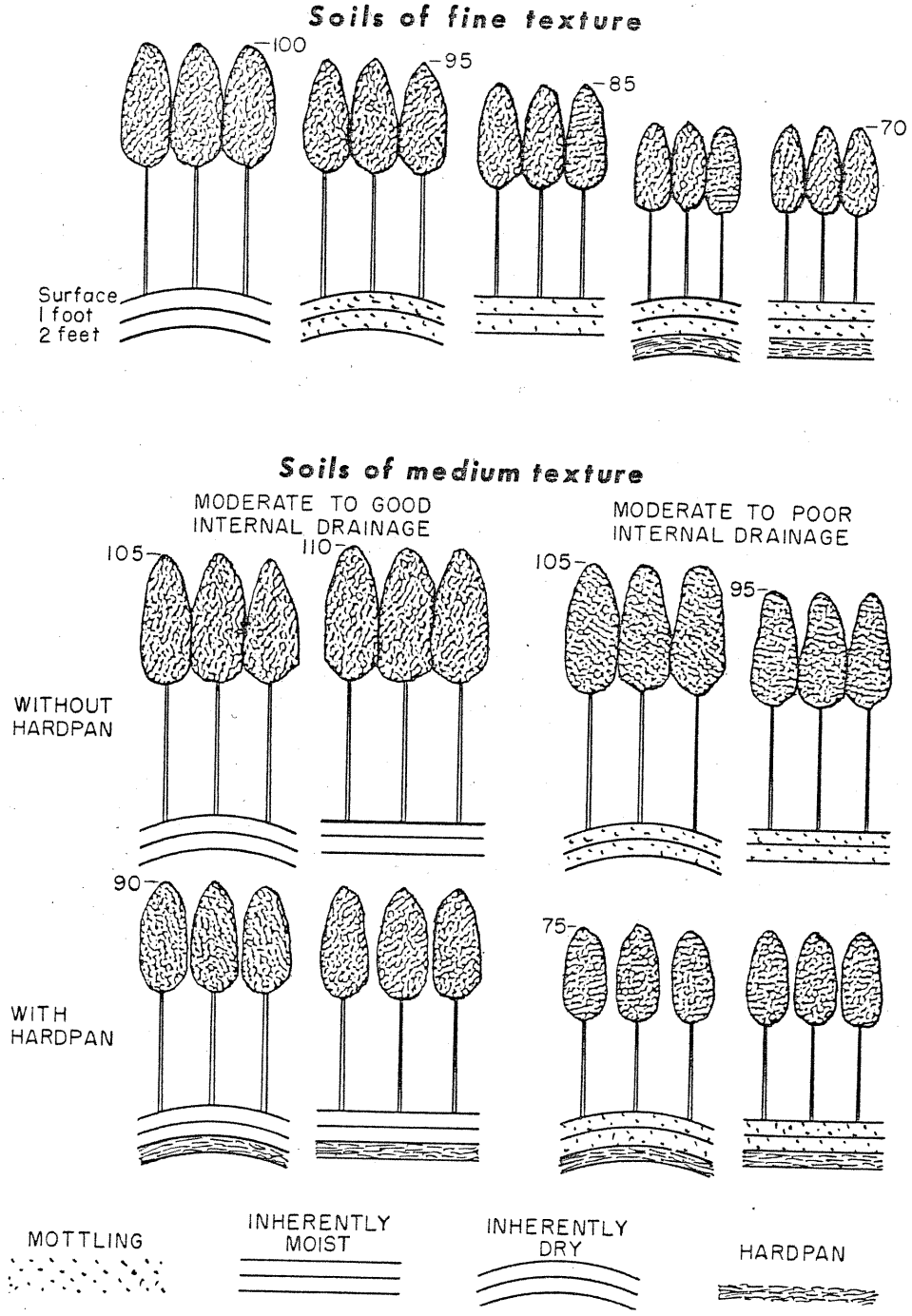


Figure 2.--*Height of sweetgum at 50 years on fine and medium soils derived from alluvium on the Mississippi River flood plain.*

Method III

The third method requires identification of the soil series and its local phase. Identification can be made in the field by any locally competent soil scientist. Standard soil surveys have been made in many counties, and the resulting maps will serve as the quickest means of identifying the soil.

With soil series and phase determined, sweetgum site index can be roughly classified from table 3. It should be remembered that sites may vary considerably within a series and phase.

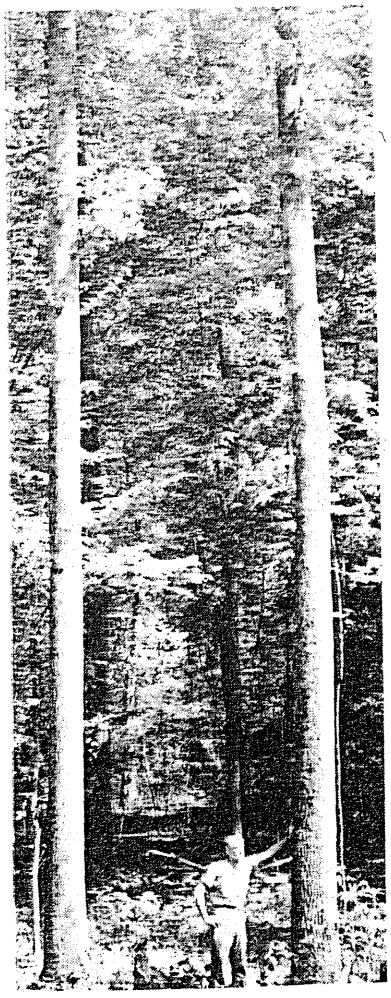


Figure 3.--*Site index for sweetgum averaged 104 feet on recent natural-levee soils (left), and 90 feet on slack-water soils (right).*