WOODY VEGETATION OF HART MEMORIAL WOODS, CHAMPAIGN COUNTY, ILLINOIS

T. W. ROOT, J. W. GEIS, and W. R. BOGGESS
Department of Biology, Blackhawk College, Moline, Illinois;
Department of Forest Botany and Pathology, New York State College of Forestry, Syracuse University, Syracruse, New York;
and Department of Forestry, University of Illinois, Urbana

ABSTRACT. — The Hart Memorial Woods is one of the more xerophytic examples of upland streamside forests in the Prairie Peninsula of east-central Illinois. Upland soils are well developed and support a mixed stand of white oak (*Quercus alba* L.), black oak (*Q. velutina* Lam.), and red oak (*Q. rubra* L.). Composition and ecological trends of three physiographic units (bottomland, upland, and mixed) are discussed. Hickories appear to be becoming more important stand components, based on numbers of seedlings and saplings present. As is characteristic of other woodlands studied, the oaks are not reproducing well. Elm mortality has been extremely heavy in the bottomland and mixed physiographic units.

The Hart Memorial Woods, located along the east bank of the Sangamon River near Mahomet, Illinois, is one of the more xerophytic examples of upland streamside forests in the Prairie Peninsula of east-central Illinois. The woodland is a remnant of a much larger timbered area that was about three miles wide and extended northward for six miles along the Sangamon from Mahomet (Spaeth, 1963). Hart Woods was acquired by the University of Illinois in 1965 for its system of natural areas. These areas now complete a sequence from the wettest to the driest upland forest sites in the area (Boggess, 1964; Boggess and Bailey, 1964; Boggess and Geis, 1966 and 1967). Among the natural areas, Hart Woods is unique in that it provides a transect from moist bottomlands, formerly dominated by elm, to an upland series occupied largely by red oak, white oak, and black oak as the sites become progressively drier. The woody vegetation of this woodland and its general ecological status are discussed in this paper.

DESCRIPTION OF AREA

Hart Memorial Woods occupies the N½ and E 16 acres of the S½, NE¼, SW¼, S36, T21N, R7E, 3rd P.M. (40° 14′ N. Lat.; 88° 21′ W. Long.), Champaign County, Illinois. The area lies between elevations of approximately 672 and 703 feet above sea level and includes a level bottomland and slopes up to 30 percent. Two small streams pass through the area and empty into the Sangamon River. One is intermittent, while the other has some flow except during prolonged dry weather.

SOILS

Some of the most highly developed soils in the prairie-forest border of central Illinois occur on the uplands of Hart Woods. They are recognized as Gray-Brown Podzolic soils in the classification of Thorp and Smith (1949) and as Hapludalfs in the current system detailed in the 7th Approximation (Soil Survey Staff, 1960). The Birkbeck and Camden series are the most prevalent upland soils in the woodland, and both developed in loess under the influence of forest vegetation. Birkbeck is moderately well-drained and developed in 36 to 60 inches of loess over glacial till. Camden, a shallower soil, developed in 15 to 36 inches of loess over glacial outwash and is well-drained. Horizons in both series are distinct and easily differentiated. The dark gray to brown surface layers are silt loams and grade into yellowish brown silty clay loam subsoils. Profiles are acid throughout.

One representative profile each of Birkbeck and Camden was excavated, described, and sampled. Data on selected physical and chemical characteristics are shown in Table 1. These data clearly indicate that the better upland sites are associated with the Birkbeck soils and that they support a more mesic vegetation than does Camden. Cation exchange capacity and percent base saturation is greater throughout the Birkbeck profile indicating its superior nutrient status as compared with Camden. Moisture relations are more favorable in Birkbeck due to generally higher amounts of fine-textured materials at all depths, greater amounts of organic carbon in the A horizon, and character of materials underlying the solum. Within the woodland, Camden soils are associated with stands that run heavily to black oak.

Table 1.—Selected physical and chemical characteristics of Camden silt loam and Birkbeck silt loam.

Horizon	Depth, Inches	Texture, %				pH	Organic Carbon, %	Cation Exch. Cap., me/100 gm.	Base Saturation, %
		> 2 mm.	Sand	Silt	Clay				
Camden silt loam									
A1	0– 3	0.13	8.8	71.4	19.8	4.86	2.31	9.71	36.2
A21	3– 6	0.05	9.2	69.0	21.8	4.71	0.91	8.80	39.8
A22	6–12	0.10	9.0	66.2	24.8	4.90	0.46	9.30	58.1
B1	12–18	0.11	7.0	62.0	31.0	4.97	0.25	13.47	72.5
B21	18 24	0.03	6.6	56.6	36.8	4.99	0.25	18.53	75.2
B22	24–31	0.00	11.2	53.0	35.8	4.88	0.14	18.56	75.2
II B23	31–42	0.00	21.1	50.1	28.8	4.68	0.12	17.38	71.2
II B31	42–63	0.20	22.0	53.0	25.0	4.70	0.10	13.01	66.4
II C1	63–75+	0.28	68.2	18.3	13.5	4.64	0.03	8.86	68.4
Birkbeck silt loam									
A1	0– 4	0.45	5.8	67.8	26.4	4.98	3.18	26.55	91.7
A21	4– 8	0.61	6.0	66.0	28.0	4.90	1.24	15.54	85.8
A22	8 12	0.60	4.1	65.4	30.5	4.89	0.49	14.68	85.0
B1	12–18	0.16	3.6	64.0	32.4	5.07	0.27	21.70	84.8
B21	18–26	0.04	2.5	59.5	38.0	5.10	0.14	30.10	86.0
B22	26-36	0.06	1.9	57.0	41.1	4.90	0.14	22.89	81.6
B31	36–52	0.07	8.0	60.4	31.6	4.87	0.08	21.74	84.8
II C1	52–59	2.29	13.9	60.7	25.5	4.80	0.10	20.96	92.8
II C2	59-68	9.86	24.5	48.1	27.4	4.78	0.07	13.47	97.0
II C3	68–95+	12.00	31.2	46.2	22.6	4.59	0.06	28.29	100.0

Bottomland soils include both medium-textured (loam and silt loam) and moderately fine-textured (silty clay loam) alluvial soils. Medium-textured soils are represented by Otter silt loam, and the fine-textured by Sawmill silty clay loam. Both of these soils are imperfectly drained. New soil material is added to the bottomland almost every year, as spring flods deposit soil from the intensively cultivated uplands in the surrounding area. Because of this continuing deposition, soil horizons are poorly defined. Nutrient and moisture conditions are quite favorable for tree growth.

Methods

Prior to inventory in 1965, the woodland was permanently divided into 50-meter square blocks. Inventory data were kept separately by quarter-blocks, designated by dividing each block along the diagonals. Diameters at 4½ feet above the ground (DBH) of all woody vegetation 2.6 inches and above, were measured and tallied by species. Dead-standing and dead-down trees were also measured and identified where possible. Four sets of nested circular plots (1/100 and 1/1,000 acre) were randomly located in each sample block. Small saplings (1 and 2 inches DBH) were measured on the larger plots, and seedlings on the smaller plots. Seedlings were tallied by species and height class, those less than one foot tall, and those greater than one foot in height but less than 0.6 inch DBH.

Stand data were developed by summarizing information for quarter-blocks that fell completely in the bottomland, upland, or partly in both. The latter is designated as a "mixed" topographic unit and includes areas that are transitional between the two main topographic units. Although the "mixed" category is highly artificial, it allows a more concise interpretation of the bottomland and upland data.

Results

A total of 34 woody species were tallied. These are shown, along with their density and frequency by size class, in Table 2. The number of trees and basal area per acre, relative density, relative dominance, and Importance Value for the 10 leading species in each topographic unit are shown in Table 3. As used here, Importance Value (IV) is that defined by McIntosh (1957) and is the sum of the relative dominance and relative density (Boggess and Geis, 1967). The leading dominant (species with the highest IV) is shown for each quarter-block in Fig. 1, and a breakdown for these same species into broad diameter classes is shown in Table 4.

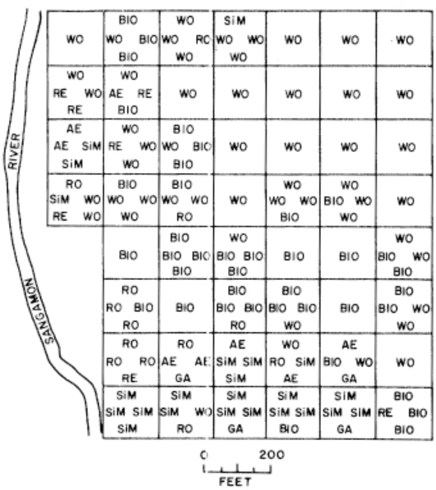

FIGURE 1. Diagram of woodland showing species with highest Importance Value by quarter-blocks.

TABLE 2.—Checklist of woody taxa identified and number per acre and frequency (percent) of seedlings and sapling by species and physiographic unit.

Scientific Name	Common Name	Symbol	Upland				Bottomland				Mixed			
			<0.6″ DBH		1″ and 2″ DBH		<0.6″ DBH		1″ and 2″ DBH		<0.6″ DBH		1″ and 2″ DBH	
			No.	Freq.	No.	Freq.	No.	Freq.	No.	Freq.	No.	Freq.	No.	Freq.
CANOPY TREES														
Ulmus rubra Muhl.	Red elm	RE	3,667	77.6	197	64.5	129	3.2	29	9.7	1,795	41.0	144	41.0
Prunus serotina Ehrh.	Black cherry	BC	2,956	66.6	67	31.2	97	6.4	.....	.....	385	20.5	8	5.1
Sassafras albidum (Nutt.) Nees	Sassafras	Ss	862	30.4	171	37.7	.....	.....	.....	.....	51	2.6	3	2.6
Quercus velutina Lam.	Black oak	B10	507	21.0	.....	.....	.....	.....	.....	.....	26	2.6	.....	.....
Carya cordiformis (Wana.) K. Koch	Bitternut hickory	BH	312	20.3	2	2.2	.....	.....	3	3.2	513	17.9	5	5.1
Carya tomentosa (Pair.) Nutt.	Mockernut hickory	MH	377	26.8	61	33.3	.....	.....	.....	.....	.....	.....	3	2.6
Quercus alba L.	White oak	WO	290	14.5	5	2.9	.....	.....	.....	.....	.....	.....	.....	.....
Carya ovata (Mill.) K. Koch	Shagbark hickory	SH	261	19.6	16	12.3	.....	.....	.....	.....	51	5.1	.....	.....
Quercus rubra L.	Red oak	RO	58	3.6	.....	.....	32	3.2	.....	.....	333	15.4	.....	.....
Acer saccharinum L.	Silver maple	SiM	29	2.9	.....	.....	161	3.2	16	6.4	102	5.1	13	5.1
Ulmus americana L.	American elm	AE	36	1.4	17	10.9	.....	.....	6	6.4	179	10.2	62	12.8
Juglans nigra L.	Black walnut	BW	22	2.2	1	0.7	97	9.7	.....	.....	.....	.....	.....	.....
Quercus imbricaria Michx.	Shingle oak	SO	43	4.3	1	0.7	.....	.....	.....	.....	.....	.....	.....	.....
Fraxinus pennsylvanica Marsh.	Green ash	GA	.....	.....	2	2.2	.....	.....	3	3.2	26	2.6	15	7.7
Tilia americana L.	Basswood	L	7	0.7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Celtis occidentalis L.	Hackberry	H	.....	.....	2	2.2	.....	.....	16	16.1	.....	.....	8	7.7
Acer negundo L.	Boxelder	BE	14	1.4	1	0.7	.....	.....	.....	.....	.....	.....	3	2.6
Gleditsia triancanthos L.	Honey locust	HL	.....	.....	1	0.7	.....	.....	.....	.....	.....	.....	.....	.....
Platanus occidentalis L.	Sycamore	S	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Quercus macrocarpa Michx.	Bur oak	BO	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

TABLE 2.—Checklist of woody taxa identified and number per acre and frequency (percent) of seedlings and sapling by species and physiographic unit. (Cont.)

Scientific Name	Common Name	Symbol	Upland				Bottomland				Mixed			
			<0.6" DBH		1" and 2" DBH		<0.6" DBH		1" and 2" DBH		<0.6" DBH		1" and 2" DBH	
			No.	Freq.	No.	Freq.	No.	Freq.	No.	Freq.	No.	Freq.	No.	Freq.
UNDERSTORY TREES														
Cercis canadensis L.	Red bud	RB	116	3.6	9	4.3			6	3.2	51	5.1	13	7.7
Crataegus	Hawthorn	HT	51	3.6	3	1.4			10	6.4				
Morus rubra	Mulberry	M	14	1.4	4	3.6			3	3.2				
Ostrya virginiana (Mill.) Koch	Ironwood	IW											15	5.8
SHRUBS														
Cornus racemosa Lam.	Gray dogwood	GD	862	15.9	1	0.7					77	5.1	3	2.6
Corylus americana Walt.	Hazelnut	HN	674	14.5			32	3.2			513	2.6		
Rubus allegheniensis Porter	Bramble	B	717	33.3							102	5.1		
Zanthoxylum americanum Miii.	Prickly ash	PA	232	8.7							102	7.7		
Smilax hispida Muhl.	Smilax	Sx	36	2.9			32	3.2			590	17.9		
Sambucus canadensis L.	Common elder	CE	22	1.4			258	6.4	6	6.4	231	12.8	3	5.1
Euonymus atropurpureus Jacq.	Wahoo	Wh	58	2.2										
Ribes missouriense Nutt.	Common gooseberry	GB	22	0.7										
Rhus glabra L.	Smooth sumac	Su	7	0.7	1	1.4								
Totals			12,252		562		838		98		5,127		283	

TABLE 3.—Number of trees, basal area per acre, Importance Value Index, and average diameter for leading dominants.

Species	Diameter Class, Inches												Av. Diam., In.	Impor. Value
	3-6		7-12		13-24		25-36		37+		Total			
	No.	BA	No.	BA	No.	BA	No.	BA	No.	BA	No.	BA		
WO	7.97	1.20	23.18	11.46	15.91	25.20	.55	2.28	......	......	47.61	40.15	12.5	78.2
B10	.27	.03	2.73	1.81	14.97	26.45	.90	3.52	......	......	18.87	31.80	17.5	46.5
RO	.09	.01	.49	.31	3.38	6.85	.77	3.13	.03	.24	4.76	10.58	17.9	14.3
RE	14.94	.93	.28	.10	.06	.15	......	......	......	......	15.28	1.21	3.8	13.7
AE	7.61	.74	1.64	.28	.03	.08	......	......	......	......	9.28	1.11	4.7	8.0
SiM	.87	.08	.77	.36	1.45	2.48	.27	1.15	.03	.24	3.39	4.32	15.2	7.0
BC	4.10	.33	1.12	.60	.24	.37	......	......	......	......	5.46	1.28	6.5	5.6
GA	.63	.08	.61	.26	.82	1.54	.03	.14	.03	.41	2.12	2.44	14.5	4.1
Others	8.76	.83	3.73	1.76	3.42	5.46	.24	1.04	.03	.26	16.18	9.28	10.2	23.3
Total	45.24	4.23	34.55	16.94	40.28	68.58	2.76	11.26	.12	1.15	122.95	102.17		

Table 4.—Stand data per acre and Importance Value (IV) for the 10 leading dominants (2.6 inches d.b.h. and above) in each of three topographic units.

Species	Upland (21.31 acres)						Bottomland (4.79 acres)						Mixed (6.02 acres)					
	No. Trees	Basal Area	Rel. Density	Rel. Dom.	IV	IV Rank	No. Trees	Basal Area	Rel. Density	Rel. Dom.	IV	IV Rank	No. Trees	Basal Area	Rel. Density	Rel. Dom.	IV	IV Rank
WO	63.62	55.05	49.62	48.45	98.07	1	.....	.....	.....	.....	.....		29.57	19.20	20.27	19.84	40.11	1
B10	25.12	42.98	19.59	37.83	57.42	2	.....	.....	.....	.....	.....		12.13	17.49	8.31	18.07	26.38	3
RE	14.13	1.03	11.02	0.91	11.93	3	5.64	1.16	7.94	1.99	9.93	6	27.41	1.88	18.79	1.94	20.73	4
RO	4.41	8.69	3.44	7.65	11.09	4	.....	.....	.....	.....	.....		9.63	24.41	6.60	25.22	31.82	2
BC	6.57	1.56	5.12	1.37	6.49	5	.....	.....	.....	.....	.....		.....	.....	.....	.....	.....	
Ss	3.76	0.42	2.93	0.37	3.30	6	.....	.....	.....	.....	.....		.....	.....	.....	.....	.....	
MH	2.25	1.26	1.75	1.11	2.86	7	.....	.....	.....	.....	.....		.....	.....	.....	.....	.....	
AE	2.49	0.36	1.94	0.32	2.26	8	15.87	2.53	22.35	4.34	26.69	3	23.92	2.63	16.40	2.72	19.12	5
SH	1.88	0.72	1.47	0.63	2.10	9	.....	.....	.....	.....	.....		.....	.....	.....	.....	.....	
BH	1.22	0.31	0.95	0.27	1.22	10	.....	.....	.....	.....	.....		3.49	2.15	2.39	2.22	4.61	9
SiM	.....	.....	.....	.....	.....		16.49	23.64	23.74	40.59	63.83	1	5.15	4.26	3.53	4.40	7.93	7
GA	.....	.....	.....	.....	.....		8.77	10.32	12.35	17.72	30.07	2	.....	.....	.....	.....	.....	
HB	.....	.....	.....	.....	.....		6.26	3.07	8.82	5.27	14.09	4	.....	.....	.....	.....	.....	
BW	.....	.....	.....	.....	.....		3.13	4.25	4.41	7.30	11.71	5	3.17	3.44	2.16	3.55	5.71	8
HL	.....	.....	.....	.....	.....		2.30	2.19	3.24	3.76	7.00	7	.....	.....	.....	.....	.....	
BO	.....	.....	.....	.....	.....		0.63	3.43	0.88	5.89	6.77	8	2.49	2.58	1.71	2.66	4.37	10
SO	.....	.....	.....	.....	.....		1.04	2.38	1.47	4.09	5.56	9	3.17	6.73	2.16	6.95	9.11	6
HT	.....	.....	.....	.....	.....		3.34	0.45	4.70	0.77	5.47	10	.....	.....	.....	.....	.....	

Upland Physiographic Unit

White oak and black oak rank first and second in importance. Red oak is in fourth position, slightly behind red elm. As a group, these three oak species comprise 70 percent of the total number of trees and 95 percent of stand basal area. Red oak and black oak have the largest diameters of all trees in the woodland, averaging 17.9 and 17.5 inches, respectively. Black oak is concentrated on the steeper slopes in the northeastern corner of the woods, where it exceeds white oak in importance. Seedling counts are 290 per acre for white oak and 507 per acre for black oak. Black oak was not represented in the 1- and 2-inch diameter classes, and there were only 5 white oaks per acre present in this size class.

Slippery elm and American elm ranked third and eighth in IV. Because of the high mortality of larger trees from phloem necrosis and Dutch elm disease, these two species have the smallest diameters of any leading dominant. Red elm comprises 30 percent of the seedlings, 35 percent of the small saplings, and almost one-third of the trees in the 3- to 6-inch diameter class. Its frequency of 77.6 percent for seedlings and 64.5 percent for small saplings exceeded that of any other species.

Black cherry, although confined largely to the smallest diameter classes, ranked fifth in IV and had the second highest number (2,956) of seedlings per acre. Unlike red elm, black cherry does not continue its high density into the 3- to 6-inch diameter class. Mortality of seedlings appears to be particularly heavy from 3 to 5 years after establishment.

In some parts of the upland, sixth-ranked sassafras forms a dense understory as evidence by the fact it accounts for almost one-third of the 1- and 2-inch trees. The 862 sassafras seedlings per acre, with a frequency of 30 percent, indicates that this species is reproducing quite well.

Three hickories—mockernut, shagbark, and bitternut—rank seventh, ninth, and tenth in IV, respectively. Collectively, there are 950 hickory seedlings per acre and 79 trees in the 1- and 2-inch diameter classes.

Other species in the upland forest, along with their IV's, are black walnut, 1.01; redbud, 0.54; shingle oak, 9.52; basswood, 0.32; red mulberry, 0.31; honey locust, 0.25; ironwood, 0.13; hawthorn, 0.06; green ash, 0.06; and hackberry, 0.04.

Mortality on the upland amounted to 6.9 square feet of basal area per acre. This included an average of about 7 elms and 8 white oaks per acre, with an occasional tree of other species.

Bottomland Physiographic Unit

Stocking in the bottomland is only one-half that of the upland, both from the standpoint of tree number and basal area. This is due to the near complete mortality of elm that once composed almost half of the bottomland stand. Dead-standing and dead-down elm comprise 65 trees and 48 square feet of basal area per acre. Total mortality (all species) in the bottomland was 70 trees and 56 square feet of basal area per acre.

Silver maple is the most important species and includes 23 percent of the trees and 40 percent of the basal area. Green ash is second in importance, followed by American elm in third place. The elms, including red elm, which is sixth in IV, are less than 6 inches in DBH. In contrast the largest tree in the entire woodland is a 49-inch green ash. Other species included in the 10 leading dominants with their IV's are hackberry, 14.1; black walnut, 11.7; honey locust, 7.0; bur oak, 6.8; shingle oak, 5.6; and hawthorn, 5.5. Collectively the IV of the "others" category is almost as great as that of silver maple, stressing the relatively high importance of minor species in the bottomland as compared with the upland.

Regeneration of woody species in the bottomland is sparse as indicated by the tally of 83 seedlings and 98 small saplings per acre. The elms were reproducing better than any other tree species.

Mixed Physiographic Unit

Since this unit is transitional, it contains species characteristic of both the bottomland and upland areas. It also contains the highest quality sites in the woodland. While there are more trees per acre present in the upland, 146 vs. 128, the basal area of 97 square feet per acre is about 17 sq. ft. less than that of the upland. Again, elm mortality has been an important factor, amounting to 39 trees and 35 sq. ft. of basal area per acre.

White oak, with an IV of 40.1, is the leading dominant, followed closely by red oak (IV, 31.8). However, the 30 white oaks per acre have an average diameter of 10.9 inches compared with 21.5 inches for the 10 red oaks present. Black oak is third in importance and is intermediate in size (average DBH, 16.4 in.) between the white and red oak. Collectively, these three oak species comprise 35 and 63 percent, respectively, of number of trees and basal area. Two additional oak species, shingle and bur, rank sixth and tenth, respectively, in importance but constitute a minor part of the stand. Regeneration of the oaks presents about the same picture as in the upland.

Other than oaks, the elms are the second most important species, with red elm ranking fourth and American elm fifth in importance. Their IV is based on tree number rather than size, with most of the individuals falling in the 3- to 6-inch diameter class. The former position of American elm in the stand is illustrated by the fact that dead individuals have an average diameter of 12.8, compared with 4.1 for those still living. However, larger individuals of red elm persist in the stand, especially in this transitional physiographic position. Also, red elm regeneration is greater than that of any other species, comprising 35 percent of the 5,178 seedlings and 50 percent of the 283 small saplings (1- and 2-inch DBH) per acre in the stand. Amrican elm is poorly represented in both of these size classes, reflecting the lack of seed source.

Discussion

The positioning of Hart Woods upland at the xeric end of a moisture sequence for upland forests in east-central Illinois is justified by two factors: (1) the complete absence of sugar maple (*Acer saccharum* Marsh) in the stand; and (2) the greater importance of white oak and black oak, particularly the latter, compared with other woodlands studied. On more mesic sites in these woodlands, sugar maple is an extremely aggressive species and appears to be continually increasing in importance. Although sugar maple ranked only ninth in IV in the streamside forest at Allerton Park, it is an important stand component with a relatively large number of individuals in the 3- to 6-inch diameter class (Boggess and Geis, 1967).

White oak will probably increase

in importance as the larger black oaks die. There are, as replacements, 31 white oaks compared with only 3 black oaks per acre less than 13 inches DBH. Mortality data suggests this trend, as the basal area of dead black oaks in the largest diameter class (13 to 24 inches) is four times that of white oak. Although mortality of small white oaks (3- to 6-inch DBH) is relatively high, there remain more live than dead trees. The reverse is true for black oak. Then, too, back oak does not generally reproduce well in the absence of some disturbance factor (U. S. Forest Service, 1965). Any prediction of future composition must be tempered by knowledge of the recent devastation of the elm population, plus the fact that oak wilt is a threat in sections of Illinois.

Although hickories as a group ranked relatively low among the leading dominants, they were third in the number of seedlings and small saplings. On this basis, hickories are likely to increase in importance.

The future of red elm is an intriguing question, as seedlings and saplings are quite dense in parts of the upland. However, many individuals were produced from interconnecting rhizomes rather than seed. There is a sharp drop in the density of red elm above 6 inches in diameter which suggests that the relatively large number of indiivduals less than this diameter may be of relatively recent origin. Competition from red elm in these smaller diameters has undoubtedly affected oak regeneration, particularly the growth of seedlings into saplings and so on. Any suggestion that red elm will form an important component of the future overstory must consider the susceptibility of this species to Dutch elm disease and phloem necrosis, even though it is less than that of American elm.

The presence of large numbers of sassafras seedlings and small saplings in the upland forest is unusual for this area. This species did not occur in Trelease Woods, Brownfield Woods, or the Funk Forest Natural Area. Although sassafras did occur on well-developed forest soils, Allerton Park numbers were quite limited compared with the Hart woodland. Sassafras along with persimmon (*Diospyros virginiana* D.) are usually the first woody plants to appear in fields abandoned from cultivation in southern Illinois. While sassafras persists for many years, it appears to drop out of the successional picture in mature oak-hickory forests of the area (Bazzaz, 1968). In sharp contrast, Eisenhauer (1967) found that seedlings of sassafras ranked second in importance in forests growing on relatively level claypan soils and on slopes in south-central Illinois. In these same stands, it ranked eleventh in IV for trees 3 inches DBH and above. Sassafras is found in Sargents and Baber woods, located on the Shelbyville Moraine approximately 50 miles southeast of Hart Woods, occurring as seedlings, small saplings, and small trees exceeding 3 inches DBH. (Ebinger, 1968; McClain and Ebinger, 1967). It ranks eleventh in importance in Baber Woods but is not included among the 10 most important species in Sargents Woods.

Hart Woods is at the northern range of sassafras in east-central Illinois, although farther to the east it extends into central Michigan. Harmon (1968) reported abundant sassafras in the dune forests of southwestern Michigan, as did Olson (1958) from the Indiana dunes.

Thus the distribution of sassafras (U. S. Forest Service, 1965) shows a distinct adjustment to the geographic occurrence of the Prairie Peninsula. Kucera and McDermott (1954) list sassafras as one of the species common to Missouri forests that drops out in the northern portions of the Prairie Peninsula. The abundance of sassafras in Hart Woods may well be related to the advanced stage of soil development that has resulted in more pronounced base removal and lower pH than is found for soils of other woodlands in the area.

The future composition of the bottomland forest is uncertain. Spring flooding, siltation, heavy soils, and a dense herbaceous cover will all affect the establishment of tree seedlings. Silver maple is now the leading dominant, but whether it will fill the niche created by loss of the elms is open to question.

Literature Cited

Bazzaz, Fakhri A. 1968. Succession on abandoned fields in the Shawnee Hills, Southern Illinois. Ecology 49: 924-936.

Boggess, W. R. 1964. Trelease Woods, Champaign County, Illinois: woody vegetation and stand composition. Trans. Ill. State Acad. Sci. 57: 261-271.

————, and L. W. Bailey. 1964. Brownfield Woods, Illinois: woody vegetation and changes since 1925 . American Midland Naturalist 71: 392-401.

————, and J. W. Geis. 1967. Composition of an upland, streamside forest in Piatt County, Illinois. American Midland Naturalist 78: 89-97.

————, and ————. 1966. The Funk Forest Natural Area, McLean County, Illinois: woody vegetation and ecological trends. Trans. Ill. State Acad. Sci. 59: 123-133.

Ebinger, J. E. 1968. Woody vegetation survey of Sargeants Woods, Coles County, Illinois. Trans. Ill. State Acad. Sci. 61: 16-25.

Eisenhauer, Leon D. 1967. Relationships between oak-hickory forest types and soils in central Illinois. Ph.D. Thesis, University of Illinois at Urbana-Champaign. 77 pp.

Harmon, Jay R. 1968. Environment and forest gradients on the southeast shore of Lake Michigan: a study in plant geography. Ph.D. Thesis, University of Illinois at Urbana-Champaign. 88 pp.

Kucera, C. L., and R. E. McDermott. 1954. Sugar maple-basswood studies in the forest-prairie transition of central Missouri. American Midland Naturalist 54:495-503.

McIntosh, R. P. 1957. The York Woods: a case history of forest succession in southern Wisconsin. Ecology 38: 29-37.

McClain, W. E., and J. E. Ebinger. 1967. Woody vegetation of Baber's Woods, Edgar County, Illinois. American Midland Naturalist 79: 419-428.

Oison, Jerry S. 1958. Rates of succession and soil changes on southern Lake Michigan sand dunes. Bot. Gaz. 119: 125-170.

Soil Survey Staff (1960). Soil classification, a comprehensive system, 7th Approximation. Soil Conserv. Serv., USDA. 265 pp.

Spaeth, J. N. "Forests," Natural Resources of Champaign County. Ed., D. F. Hansen. Champaign County Conservation Education Council, Urbana, Ill. pp. 5-8.

Thorp, J., and Guy D. Smith. 1949. Higher categories of soil classification: order, suborder, and great soil groups. Soil Sci. 67: 117-126.

U. S. Forest Service. 1965. Silvics of forest trees of the United States. U.S. Department of Agriculture Handbook no. 271.

Manuscript received July 8, 1970