

WOODY UNDERSTORY BEFORE AND AFTER BURNING AT  
ROCKY BRANCH NATURE PRESERVE, CLARK COUNTY, ILLINOIS

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ABSTRACT

The woody understory vegetation of the white oak cover type of the Rocky Branch Nature Preserve was surveyed. Eight 50 m transects 1 m wide were located in the unburned section while four 25 m transects were located in the burned section. In the unburned section sugar maple seedlings averaged 0.51 individuals per sq m while sugar maple saplings averaged 0.25 individuals per sq m. In the burned section, sugar maple seedlings averaged 6.62 individuals per sq m and no saplings were present.

INTRODUCTION

Rocky Branch Nature Preserve is a 130 acre woodlot located six miles northwest of Marshall, Clark County, Illinois. This preserve is in the northern part of the Southern Uplands Section of the Wabash Border Natural Division (Schwegman, 1973). In this section the oak forests contain a mixture of beech, sugar maple, tulip tree, and other species typical of the forests to the east of Illinois.

Several vegetation studies have been undertaken in this preserve. The plant associations of the woodlot and a checklist

of the vascular plant species were reported by Stover (1930), while Arzeni (1947) prepared a checklist of the bryophytes of the area. Later, Ebinger and Parker (1969) studied the wood vegetation of the western section of the preserve, the eastern section was surveyed by Hughes and Ebinger (1973), while Hellinga and Ebinger (1970) prepared a checklist of the vascular plants. In 1985 the woody vegetation of the western section was again surveyed (Clapp and Ebinger, 1987). The results of these surveys indicate that the forests in the preserve are undergoing a change in species composition and importance values. The major changes involve the explosive increase in sugar maple (Acer saccharum Marsh), and a corresponding decrease in the importance of the oak species.

In the original study of the western section of this preserve (Ebinger and Parker, 1969) sugar maple ranked fifth in importance value (IV) while presently it ranks second in IV behind white oak (Clapp and Ebinger, 1987). Similar results have been observed in other forests in east-central Illinois (McClain and Ebinger, 1968; Newman and Ebinger, 1985). These findings indicate that sugar maple is replacing oaks and hickories as the dominant forest species in central Illinois (Ebinger, 1986). Runkle (1984) found that this aggressive species is a very significant part of tree-fall gaps, since it is able to rapidly fill these gaps. Also, this species grows rapidly, even in fairly small gaps due to its ability to grow and form good root systems at low light levels

(Logan, 1965).

The present study was undertaken to determine the woody understory composition of a section of this woodlot that had been subjected to a ground fire in 1980, and compare the result to an adjacent portion of the woodlot that had not been burned. The results give some indication as to the effect of fire on a sugar maple dominated understory.

#### DESCRIPTION OF THE WOODLOT

The area studied is in the western most portion of the Rocky Branch Nature Preserve, which consists of a 16 acre woodlot located in the NE1/4, SE1/4 of Section 30, T12N, R12W, Clark County, Illinois. The topography of the area varies from a level to gently sloping upland in the western part while the remainder of the area is divided by ravines with gradually sloping sides to steep banks. Sandstone outcroppings and a steep bank overlooking Rocky Branch Creek are found at the northern edge of the woodlot. Overall relief is about 60 feet with the high point being 645 feet above sea level. Ebinger and Parker (1969) divided this woodlot into three vegetation regions based on woody overstory composition. These are the white oak region which occurs on the relatively flat uplands, a sugar maple region on the steep north-facing hillside, and a mixed hardwood region on the slopes and lowland areas associated with the small streams and ravines in the woodlot.

## METHODS AND MATERIALS

Eight 50 m transects were randomly located in the unburned section of the white oak region while four 25 m transects were located in the burned section. Along each transect continuous 1 sq m quadrats were established and all woody plants were counted and identified. Also for all saplings (2.5 to 10 cm dbh) a basal cross section of the stem was removed so the number of annual rings could be determined. Also, the height (in cm) and diameter (in mm) of all saplings was recorded. In the burned section all woody seedlings (less than 2.5 in dbh) were recorded by height class (less than 40 cm tall; 40-100 cm tall, more than 100 cm tall). From this data the following calculations were made for each species:

Density (individuals per sq m) =

$$\frac{\text{Total individuals of a species}}{\text{Total plots examined}}$$

$$\text{Frequency} = \frac{\text{Total plots of occurrence of a species}}{\text{Total plots examined}} \times 100$$

Nomenclature follows Mohlenbrock (1975).

## RESULTS AND DISCUSSION

In the early spring of 1980 a ground fire of unknown origin burned through part of the 16 acre woodlots at the western edge of the Rocky Branch Nature Preserve. Most of the mixed hardwood region and about one-third of the white oak region was burned. This fire resulted in a total top kill of all woody seedlings, saplings, and a few of the smaller diameter trees, but did not

effect any tree with a diameter greater than eight inches dbh.

According to Ebinger and Parker (1969), the white oak region, which is located on the dry, relatively flat uplands of this woodlot, is dominated by white oak. This species accounted for over 50 percent of the total IV in this area with black oak and shagbark hickory being the most common associates. In this region sugar maple trees had an IV of less than 15, but the density of saplings and seedlings of this species was extremely high.

A total of twelve species of woody seedlings were recorded from the plots in the section of the white oak region that had not burned (Table 1). Of these species, only Acer saccharum and Ulmus rubra were commonly encountered. Both averaged more than 0.5 seedlings per sq m and both had a frequency of 29% or greater. Most of the A. saccharum seedlings were small, usually less than 40 cm tall, while the majority of the U. rubra seedlings averaged between 40 and 100 cm in height. Of the other species encountered, the seedlings were always less than 40 cm tall, and most appeared to be one or two year old plants.

Acer saccharum completely dominates the sapling category in the unburned part of the white oak region (Table 1). This species averaged 0.25 individuals per sq m. All other species were poorly represented in this category with only a few individuals being encountered. Two distinct size classes of A. saccharum saplings were present in this region (Table 2). A few individuals were found that averaged close to ten years in age, with an average

diameter of 10 cm and an average height of 126 cm. The second group exceed 20 years in age, have a diameter greater than 20 mm and a height greater than 240 cm. There is a general trend toward an increase in diameter and height with an increase in age within this second group (Table 2), but when all individuals are considered, there is no correlation between age and height or age and diameter of the A. saccharum saplings (Table 2).

In the section of the white oak region that had been burned in 1980, Acer saccharum seedlings dominated the understory, accounting for more than 75% of all the individuals recorded in the plots (Table 3). Overall, this species averaged 6.62 seedlings per sq m with most of the individuals in the less than 40 cm height class. The larger seedlings of this species (over 100 cm height class) were mostly stump sprouts from top killed saplings, were seven years old, averaged 11.4 mm in diameter at the base, and were less than 2 m tall. The seedlings of all other species were poorly represented in the plots and except for a few individuals of Ostrya virginiana, Ulmus rubra, and Cornus florida, none reached the more than 100 cm height class (Table 3). All of the oak and hickory seedlings encountered in the plots of this region were less than 40 cm tall. Also, no saplings were encountered in the plots in this section of the woodlot.

Though the western section of Rocky Branch Nature Preserve still contains many large oak and hickory trees, the present study indicates that they are not reproducing as relatively few

individuals of these species are found in the understory. The present data also suggests that sugar maple is an aggressive species that will replace these oaks and hickories as these veteran trees die. If this continues, the woods in this preserve will become a sugar maple dominated forest within forty to fifty years. The data also indicates that ground fires will remove most of the sugar maple saplings and open the canopy. Unfortunately, sugar maple will continue to dominate in these newly created gaps, and the oak and hickory species will probably not be successful in seedling establishment.

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Table 3. Density (individuals per sq m) by diameter class for woody seedlings in the burned section of the white oak region at Rocky Branch Nature Preserve, Clark County, Illinois.

Species	Less than 40 cm	40-100 cm	More than 100 cm
<u>Acer saccharum</u> Marsh.	4.68	1.56	0.38
<u>Quercus alba</u> L.	0.37	--	--
<u>Quercus velutina</u> Lam.	0.18	--	--
<u>Ostrya virginiana</u> (Mill) K. Koch.	0.15	0.16	0.02
<u>Prunus serotina</u> Ehrh.	0.10	0.05	--
<u>Morus rubra</u> L.	0.08	0.09	--
<u>Ulmus rubra</u> Muhl.	0.07	0.17	0.04
<u>Cornus florida</u> L.	0.06	0.13	0.09
<u>Sassafras albidum</u> (Nutt.) Nees.	0.05	--	--
<u>Carya cordiformis</u> (Wang.) K. Koch.	0.04	--	--
<u>Staphylea trifolia</u> L.	0.03	0.12	--
<u>Carya glabra</u> (Mill) Sweet.	0.03	--	--
<u>Fagus grandifolia</u> Ehrh.	0.03	0.03	--
<u>Quercus imbricaria</u> Michx.	<u>0.01</u>	<u>--</u>	<u>--</u>
TOTALS	5.88	2.32	0.53

Table 1. Density (individuals per sq m) and frequency of seedlings and saplings in the unburned section of the white oak region at Rocky Branch Nature Preserve, Clark County, Illinois.

SPECIES	SEEDLINGS (less than 2.5 cm dbh)		SAPLINGS (2.5-10.0 cm dbh)	
	Density	Frequency %	Density	Frequency %
<u>Acer saccharum</u> Marsh.	0.51	29	0.250	24
<u>Ulmus rubra</u> Muhl.	0.59	33	0.010	1
<u>Quercus alba</u> L.	0.15	12	--	-
<u>Fraxinus americana</u> L.	0.14	14	0.005	1
<u>Carya cordiformis</u> (Wang.) K. Koch.	0.07	7	--	-
<u>Carya glabra</u> (Mill) Sweet.	0.02	2	--	-
<u>Ostrya virginiana</u> (Mill) K. Koch.	0.02	1	0.010	1
<u>Carya ovata</u> (Mill) K. Koch.	0.02	2	0.005	1
<u>Prunus serotina</u> Ehrh.	0.02	2	--	-
<u>Quercus velutina</u> Lam.	0.01	1	--	-
<u>Morus rubra</u> L.	0.01	1	--	-
<u>Cornus florida</u> L.	<u>0.01</u>	<u>1</u>	<u>0.010</u>	<u>1</u>
TOTALS	1.57	-	0.290	-

Table 2. Average diameter (mm) and average height (cm) by age group for sugar maples in the unburned section of the white oak region at Rocky Branch Nature Preserve, Clark County, Illinois.

Number of annual rings	Average Diameter (mm)	Average Height (cm)
5 - 10	10.0 (9.0 to 14.0)	126.0 (100 to 210)
11 - 15	--	--
16 - 20	--	--
21 - 25	31.9 (20.0 to 55.0)	348.8 (240 to 600)
26 - 30	40.8 (33.0 to 47.0)	556.3 (400 to 750)
31 - 35	42.7 (32.0 to 72.0)	596.7 (350 to 1000)
36 - 40	53.3 (36.0 to 71.0)	760.9 (600 to 1100)
41 - 45	66.2 (51.0 to 81.0)	880.0 (600 to 1050)

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UNDERSTORY SURVEY OF ROCKY BRANCH NATURE PRESERVE,

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ABSTRACT

The herbaceous and woody seedling understory of the Rocky Branch Nature Preserve was studied using 1/10 sq m circular plots established along 100 m transects. In the mixed hardwood region 31.55 individuals per sq m were recorded during the Spring survey with Dicentra cucullaria and Acer saccharum being the dominant species. During the Summer survey only 12.30 individual per sq m were recorded, and in the Fall survey only 7.7 individuals were recorded. In the white oak region 18.60 individuals per sq m were recorded during the Spring survey with Arisaema triphyllum and Podophyllum peltatum being the dominant species. During the Summer survey the number of individuals per sq m dropped to 8.75, and only 4.3 individuals per sq m were recorded in the Fall. In the sugar maple region, located on a steep north-facing hillside, 21.3 individuals per sq m were recorded during the Spring survey with Hepatica nobilis and Arisaema triphyllum being the dominant species. The individuals per sq m dropped to 8.3 and 7.7 for the Summer and Fall surveys.

## INTRODUCTION

Rocky Branch Nature Preserve is located about six miles northwest of Marshall in Clark County, Illinois. This woodlot represents a remnant of the typical forest associated with deep valleys of the Illinois till of east-central Illinois. It is located in the Southern Uplands Section of the Wabash Border Natural Division (Schwegman, 1973). In this section the oak forests contain a mixture of beech, sugar maple, tulip tree, and other tree species typical of the forest to the east of Illinois.

Associated with this woodlot are many plant species not common to east-central Illinois (Stover, 1930; Arzeni, 1947). Due to this unique flora, the land bordering parts of Rocky Branch Creek was purchased by the Illinois Chapter of The Nature Conservancy and placed under the trusteeship of Eastern Illinois University. The area is now maintained as a natural area for instructional and research purposes.

Several vegetation studies have been undertaken in the woodlot. Stover (1930) prepared a checklist of the plants in the preserve and described the plant associations, while Arzeni (1947) prepared a checklist of the bryophytes of the area. The woody vegetation of the eastern section of the preserve was surveyed by Hughes and Ebinger (1973), while the western section was surveyed by Ebinger and Parker (1969). The woody vegetation of the western section was again surveyed in 1985 (Clapp and Ebinger, 1987). The results of these past survey indicate that the forests in the

preserve have undergone major changes in species composition and importance value during the past twenty years. Most of these changes involve the explosive increase in sugar maple and the corresponding decrease in the importance of the oak species.

This change in forest composition, due to the increase in sugar maple, is probably causing changes in the herbaceous species in the woodlot due to excessive shading and changes in the litter composition. The present study was undertaken to determine the existing floristic composition of the herbaceous understory in the preserve, since it is very possible that some management practice will soon be implemented to control this sugar maple increase. When this is done, the data from this study will be used to monitor any changes in the herbaceous understory.

#### DESCRIPTION OF THE WOODLOT

The area studied is the western most portion of the Rocky Branch Nature Preserve, consisting of a 16 acre woodlot located in the NE1/4, SE1/4 of Section 30, T12N, R12W, Clark County, Illinois. The topography of the area varies from a level to gently sloping upland in the western part while the remainder of the area is divided by ravines with gradually sloping sides to steep banks. Sandstone outcroppings and a steep bank overlooking Rocky Branch Creek are found at the northern edge of the woodlot. Overall relief is about 60 feet with the high point being 645 feet above sea level. Ebinger and Parker (1969) divided this woodlot into three vegetation regions based on woody overstory

composition. These are the white oak region which occurs on the relatively flat uplands, a sugar maple region on the steep north-facing hillside, and a mixed hardwood region on the slopes and lowland areas associated with the small streams and ravines in the woodlot.

#### METHODS AND MATERIALS

Ten north/south transects 100 m long were randomly located in the woodlot. Four of these transects were located in the white oak region, four in the mixed hardwood region, and two in the sugar maple region.

Along each transect 1/10 m circular plots were randomly located at 1 m intervals. A random number chart was used to determine the number of meters east or west of the transect the plots were placed. The plots were placed on the left side of the transect on odd meters and on the right side for even meters. Once the plot was in place all herbaceous plants and woody seedlings were identified and counted. From this data the following calculations were made for each species.

Density (individuals per sq m) =

$$\frac{\text{Number of individuals of a species}}{\text{Total plots examined}} \times 10$$

Relative frequency =

$$\frac{\text{Total plots of occurrence of a species}}{\text{Total plots of occurrence of all species}} \times 100$$



Relative density =

$$\frac{\text{Total number of individuals of a species}}{\text{Total number of individuals of all species}} \times 100$$

Importance Value = Relative frequency + Relative density

These calculations were made for each species in the three vegetation regions for each season. Nomenclature follows Mohlenbrock (1975).

#### RESULTS AND DISCUSSION

A total of 34 vascular plant species were found in the study plots of the mixed hardwood region (Table 1), 23 species in the white oak region (Table 2), and 21 species in the sugar maple region (Table 3). These species, along with the number of individuals per sq m, relative frequency, relative density, and importance value for each species during the Spring, Summer, and Fall surveys in each region are shown in Tables 1, 2, and 3.

The mixed hardwood region, which occurs on the slopes and lowland areas associated with the small stream and ravines in the woodlot, has the highest herbaceous species diversity. In this region 31.55 individual per sq m were recorded during the Spring survey. Dicentra cucullaria, with an importance value (IV) of 26.5 and an average of 5.05 individual per sq m, was the dominant species encountered (Table 1). Other important herbaceous species included Galium concinnum, Podophyllum peltatum, Arisaema triphyllum, Carex artitecta, Smilacina racemosa, and Cytopteris fragilis. During the Summer survey in this region only 12.30

individuals per sq m were recorded. Of the herbaceous species Arisaema triphyllum dominated with an IV of 20.8, and all herbaceous species decreased in number from the Spring survey. Only five new species were found during the Summer, while three were added in the Fall survey. None were important, as very few individuals of each were found. Similar results were obtained in the Fall survey with only 7.70 individuals per sq m (Table 1). Of the species recorded in this region, nine were shrubs or seedlings of woody species. Acer saccharum was the dominant woody species encountered with an IV of 25.2 and an average of 3.55 individuals per sq m (Table 1). Seedlings of Ulmus rubra, Cornus florida, Prunus serotina, Ostrya virginiana, and Quercus alba were also occasionally encountered. The number of individuals per sq m for these woody species remained fairly constant during the growing season, generally show only a slight decline from the Spring to Fall survey.

The white oak region, which occurs on the gently sloping to flat uplands, has a relatively low species diversity. In this region 18.6 individuals per sq m were recorded during the Spring survey. Arisaema triphyllum, with an IV of 61.5 and an average of 6.85 individuals per sq m, was the dominant species encountered (Table 2). Other important herbaceous species included Podophyllum peltatum, Smilacina racemosa, and Circaea quadrisulcata. During the Summer survey the number of individuals per sq m in this region dropped to 8.75, while a further drop to

4.30 individuals per sq m was recorded during the Fall survey. Of the woody plant seedlings found in this region, only sugar maple and ash exceeded one individual per sq m during any of the surveys. During the Fall survey sugar maple averaged 1.3 individuals per sq m, while ash seedlings averaged 1.3 individuals per sq m during the Summer survey (Table 2).

In the sugar maple region, which is located on the steep north-facing hillside at the northern edge of the woodlot, are some herbaceous species that were not found in the remainder of the forest. In this region 21.3 individuals per sq m were recorded during the Spring survey. Hepatica nobilis, with an IV of 47.8 and an average of 5.2 individual per sq m, was the dominant species (Table 3). Arisaema triphyllum and Podophyllum peltatum were also commonly encountered. During the Summer and Fall surveys many of the same species were found, but in lower numbers. Important woody species of this region were seedlings of sugar maple and a relatively large number of Hydrangea arborescens.

At the present time the herbaceous understory in most parts of this woods lacks the diversity, and population size typically found in many forests of central Illinois. This low diversity and density is probably the result of excessive shading and nutrient depletion created by a dense sapling population of sugar maple (Acer saccharum). Sugar maple saplings and large seedlings virtually blanket the herbaceous understory in the parts of the

woodlot surveyed. As indicated by Clapp and Ebinger (1987) sugar maple dominates the lower diameter classes in the woods, while oaks are mostly found in the larger diameter classes. Also, A. saccharum has a high gap-phase-replacement-potential, so as these larger oaks die, A. saccharum will increase in importance. This will result in more shading of the herbaceous understory, further decreasing diversity and density of the herbaceous layer. It should also be noted that A. saccharum has a compensation point of 3.4 while Quercus spp. have a compensation point of approximately 13.6 (Burns, 1923). With such a low compensation point A. saccharum can easily become established as an understory seedling.

Table 1. Density (individuals per sq m), and relative values of the species found during the Spring, Summer, and Fall surveys in the mixed hardwood cover type at the Rocky Branch Nature Preserve, Clark County, Illinois.

S P E C I E S	S P R I N G				S U M M E R				F A L L			
	Density	Relative Frequency	Relative Density	Importance Value	Density	Relative Frequency	Relative Density	Importance Value	Density	Relative Frequency	Relative Density	Importance Value
Dicentra cucullaria	5.05	10.5	16.0	26.5	0.00	0.0	00.0	0.0	0.00	00.0	00.0	00.0
Acer saccharum	3.55	13.9	11.3	25.2	2.05	11.8	16.8	28.6	2.10	31.5	27.3	58.8
Galium concinnum	4.05	8.0	12.7	20.7	.55	4.2	4.5	8.7	1.65	18.5	21.4	39.9
Podophyllum peltatum	2.80	11.1	8.9	20.0	.55	7.6	4.5	12.1	0.00	00.0	00.0	00.0
Arisaema triphyllum	2.80	6.5	8.9	15.4	1.45	9.0	11.8	20.8	0.00	00.0	00.0	00.0
Parthenocissus quinquefolia	1.95	6.2	6.2	12.4	1.30	11.8	10.6	22.4	.95	14.3	12.4	26.7
Hydrangea arborescens	.95	4.9	3.0	7.9	.75	9.7	6.1	15.8	.70	5.0	9.1	14.1
Carex artitecta	1.30	3.4	4.1	7.5	.45	3.5	3.7	7.2	0.00	00.0	00.0	00.0
Smilacina racemosa	.80	4.3	2.5	6.8	.25	2.1	2.0	4.1	.15	2.5	1.9	4.4
Cystopteris fragilis	1.45	2.2	4.6	6.8	1.15	4.9	9.3	14.2	0.00	00.0	00.0	00.0
Ulmus rubra	.70	3.7	2.2	5.9	.40	4.2	3.3	7.5	.50	5.0	6.5	11.5
Circaea quadrisulcata	.80	2.5	2.5	5.0	.10	1.4	.8	2.2	0.00	00.0	00.0	00.0
Impatiens biflora	.75	2.5	2.4	4.9	.05	.7	.4	1.1	0.00	00.0	00.0	00.0
Dentaria laciniata	.70	2.5	2.2	4.7	0.00	0.0	0.0	0.0	0.00	00.0	00.0	00.0
Galium aparine	.45	2.2	1.4	3.6	0.00	0.0	0.0	0.0	0.00	00.0	00.0	00.0
Phlox divaricata	.45	1.8	1.4	3.2	.20	2.8	1.6	4.4	0.00	00.0	00.0	00.0
Claytonia virginica	.45	1.5	1.4	2.9	0.00	0.0	0.0	0.0	0.00	00.0	00.0	00.0
Cornus florida	.35	1.8	1.1	2.9	.30	3.5	2.4	5.9	.40	5.0	5.2	10.2
Polystichum aerostichoides	.30	1.8	1.0	2.8	.65	7.6	5.3	12.9	.35	5.9	4.5	10.4
Viola sororia	.30	1.8	1.0	2.8	0.00	0.0	0.0	00.0	0.00	00.0	00.0	00.0
Blephilia hirsuta	.35	1.5	1.1	2.6	0.00	0.0	0.0	00.0	0.00	00.0	00.0	00.0
Prunus serotina	.30	1.5	1.0	2.5	0.00	0.0	0.0	00.0	0.00	00.0	00.0	00.0
Uvularia grandiflora	.40	.9	1.3	2.2	.20	2.1	1.6	3.7	.10	.8	1.4	2.2
Toxicodendron radicans	.20	.9	.6	1.5	.10	1.4	.8	2.2	.05	.8	.6	1.4
Ostrya virginiana	.15	.9	.5	1.4	.10	1.4	.8	2.2	.05	.8	.6	1.4
Quercus alba	.10	.6	.3	.9	.15	2.0	1.2	3.2	.15	1.7	1.9	3.6
Dioscorea villosa	.05	.3	.2	.5	.05	.7	.4	1.1	.10	1.7	1.4	3.1
Smilax lasioneuron	.05	.3	.2	.5	.05	.7	.4	1.1	.05	.8	.6	1.4
Pilea pumila	.00	.0	.0	.0	.95	1.4	7.7	9.1	.10	.8	1.4	2.2
Others	.00	.0	.0	.0	.50	5.5	4.0	9.5	.30	4.9	3.8	8.7
TOTALS	31.55	100.0	100.0	200.0	12.30	100.0	100.0	200.0	7.70	100.0	100.0	200.0

Table 2. Density (individuals per sq m), and relative values of the species found during the Spring, Summer, and Fall surveys in the white oak cover type at the Rocky Branch Nature Preserve, Clark County, Illinois.

S P E C I E S	S P R I N G				S U M M E R				F A L L			
	Density	Relative Frequency	Relative Density	Importance Value	Density	Relative Frequency	Relative Density	Importance Value	Density	Relative Frequency	Relative Density	Importance Value
<i>Arisaema triphyllum</i>	6.85	24.7	36.8	61.5	3.50	32.8	40.0	72.8	0.00	00.0	00.0	00.0
<i>Podophyllum peltatum</i>	5.05	19.5	27.2	46.7	.40	4.8	4.6	9.4	0.00	00.0	00.0	00.0
<i>Smilacina racemosa</i>	2.05	15.5	11.0	26.5	.75	8.0	8.6	16.6	.45	11.4	10.5	21.9
<i>Circaea quadrisulcata</i>	1.20	8.0	6.5	14.5	.00	0.0	0.0	00.0	0.00	00.0	00.0	00.0
<i>Parthenocissus quinquefolia</i>	.65	6.9	3.5	10.4	.80	11.2	9.1	20.3	.40	10.1	9.3	19.4
<i>Arisaema dracontium</i>	.65	3.4	3.5	6.9	.55	6.4	6.3	12.7	0.00	00.0	00.0	00.0
<i>Acer saccharum</i>	.35	4.0	1.9	5.9	.15	2.4	1.6	4.0	1.30	27.8	30.2	58.0
<i>Viola sororia</i>	.35	3.4	1.9	5.3	.00	0.0	0.0	00.0	0.00	00.0	00.0	00.0
<i>Galium concinnum</i>	.25	2.3	1.3	3.6	.25	4.0	2.9	6.9	.35	7.6	8.0	15.6
<i>Claytonia virginica</i>	.20	1.8	1.0	2.8	.00	0.0	0.0	0.0	0.00	00.0	00.0	00.0
<i>Carex</i> sp.	.15	1.8	.8	2.6	.00	0.0	0.0	0.0	0.00	00.0	00.0	00.0
<i>Quercus alba</i>	.15	1.8	.8	2.6	.15	2.4	1.6	4.0	.15	3.8	3.5	7.3
<i>Geranium maculatum</i>	.20	1.1	1.0	2.1	.00	0.0	0.0	0.0	0.00	00.0	00.0	00.0
<i>Carya cordiformis</i>	.10	1.1	.5	1.6	.05	.8	.6	1.4	0.00	00.0	00.0	00.0
<i>Smilax lasioneuron</i>	.10	1.1	.5	1.6	.35	4.0	4.0	8.0	.10	2.5	2.3	4.8
<i>Fraxinus</i> spp.	.00	0.0	0.0	0.0	1.30	16.8	14.9	31.7	.45	11.4	10.5	21.9
<i>Ulmus rubra</i>	.05	.6	.3	.9	.25	2.4	2.9	5.3	.50	10.1	11.6	21.7
<i>Toxicodendron radicans</i>	.05	.6	.3	.9	.20	3.2	2.3	5.5	.20	5.1	4.7	9.8
<i>Desmodium nudiflorum</i>	.00	0.0	0.0	0.0	.00	0.0	0.0	00.0	.15	3.8	3.5	7.3
<i>Uvularia grandiflora</i>	.00	0.0	0.0	0.0	.05	.8	.6	1.4	.10	2.5	2.3	4.8
Others	.20	2.4	1.2	3.6	.00	0.0	0.0	0.0	.15	3.9	3.6	7.5
TOTALS	18.60	100.0	100.0	200.0	8.75	100.0	100.0	200.0	4.30	100.0	100.0	200.0

Table 1. Environmental parameters indexed by date and parameter at Baber Woods, Edgar County, Illinois.

<u>DATE</u>	<u>TEMPERATURE</u>	<u>RELATIVE HUMIDITY</u>	<u>SOIL TEMPERATURE</u>	<u>SOLAR RADIATION</u>	<u>WIND SPEED</u>
5-2-86					
<u>Range</u>	46-66 F	48-100%	47-55 F	200-750 fc	.3m/sec-1m/sec
<u>Low</u>	46 F @ 5:00am	48% @ 11:00am	47 F @ 6:00am		
<u>High</u>	66 F @ 12:00pm	100% @ 9:00- 11:00pm & 5:00am	55 F @ 1:00pm & 3:00pm		
7-29-86					
<u>Range</u>	68-82 F	58-100%	51-59 F	30-200 fc	0m/sec-.8m/sec
<u>Low</u>	68 F @ 4:00am	58% @ 7:00am	51 F @ 6:00am		
<u>High</u>	82 F @ 2:00pm	100% @ 5:00am	59 F @ 5:00pm		
10-5-86					
<u>Range</u>	47-67 F	42-98%	51-59 F	20-70 fc	0m/sec-.4m/sec
<u>Low</u>	47 F @ 5:00am	42% @ 2:00pm	51 F @ 6:00am		
<u>High</u>	67 F @ 4:00pm	98% @ 8:00pm	59 F @ 1:30pm		