

VASCULAR FLORA OF ROCK CAVE NATURAL AREA. EFFINGHAM COUNTY, ILLINOIS

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ABSTRACT

A total of 405 taxa of vascular plants, of which 46 are first reported for Effingham County, have been collected at Rock Cave Natural Area. Also, a woody vegetation survey of an upland and a lowland forest was completed in the study area. The upland forest is dominated by *Quercus alba* L. (IV of 162), while *Q. velutina* Lam. (IV of 86) and *Carya tomentosa* (Poir.) Nutt. (IV of 30) are also important components. The common taxa of the lowland forest include *Acer saccharum* Marsh. (IV of 71), *Q. alba* (IV of 64), *C. cordiformis* (Wang.) K. Koch. (IV of 34) and *Tilia americana* L. (IV of 29).

INTRODUCTION

The 80 acre Rock Cave Natural Area, owned by The Nature Conservancy, is located about 6 miles south of Becher City, Effingham County, Illinois (SW $\frac{1}{4}$ Sec 30 T8N R4E). It is situated on the Illinois glacial till plain about 15 miles south of the Shelbyville Moraine, the terminal moraine of Wisconsin glaciation. Due to the long period of time since glaciation, much of the area has been extensively dissected by the down-cutting of streams, forming steep-sided ravines and valleys. As a result, along Cedar Creek and some of its tributaries in the natural area, are occasional sandstone outcrops and steep hillsides that are more than 30 feet high.

During the present study a woody vegetation survey was undertaken in an upland and a lowland forest in the natural area. Also, a list of the vascular plant species was obtained by making numerous trips to the area during the past six years.

MATERIALS AND METHODS

Both the upland and the lowland forests were sampled using a 3 BAF metric wedge prism. The study plots were randomly located about 40 m apart along a compass line through the area. The total number of individuals of each species in each plot was recorded (Dilworth and Bell, 1976). From these data the basal area (m^2/ha), relative dominance, and relative frequency for each species was determined using the following formulas.

$$\text{Basal Area (m}^2\text{/ha)} = \text{Total stems of a species} \times 0.15$$

$$\text{Relative Dominance} = \frac{\text{Total individuals of a species}}{\text{Total individuals of all species}} \times 100$$

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

At every other sample point for the metric wedge prism a 0.025 ha circular plot was located. In these plots the trees were tallied by species into 10 cm d.b.h. diameter classes. From these data the density, relative density, and density by diameter class was determined for each species using the following formulas.

$$\text{Density (ha)} = \text{Total stems of a species} \times 4$$

$$\text{Density (ha) by diameter class} = \frac{\text{Total individuals of a species}}{\text{in a diameter class}} \times 4$$

$$\text{Relative density} = \frac{\text{Total individuals of a species}}{\text{Total individuals of all species}} \times 100$$

The Importance Value (IV) of each species was then calculated to provide a better basis for comparison of the various species in the forest areas studied. As used here the determination of the IV follows the procedure outlined by McIntosh (1957) and later Boggess (1964) in which the IV is the sum of the relative frequency, relative density, and relative dominance. The nomenclature used follows Mohlenbrock (1975).

RESULTS AND DISCUSSION

Rock Cave Natural Area contains remnants of the typical forests associated with the Effingham Plain Section of the Southern Till Plain Natural Division (Schwegman, 1973). Listed below are the community types found in the natural area along with a short description, and the plants associated with each community type.

UPLAND FOREST COMMUNITY: Most of the natural area is dominated by an upland forest that varies in composition depending on topography and past disturbances. *Quercus alba* L. is the most important species with an IV of 162, averaging 14.7 m² of basal area, and 428 stems per hectare (Table 1). Most of the stems are in the 1-2 and 2-3 dm diameter classes, though a few larger stems are scattered throughout the forest. On drier sites *Q. velutina* Lam. becomes more common, while on hillsides and other mesic sites *Q. rubra* L. increases in importance. On the northern part of the natural area the upland forests show evidence of more recent disturbance, with most of the trees in the 1-2 dm diameter class, and the few larger individuals have an open-grown appearance. Common understory trees and shrubs include *Ceanothus americanus* L., *Cornus florida* L., *Rubus allegheniensis* Porter., and *Toxicodendron radicans* (L.) Kuntze.

LOWLAND FOREST COMMUNITY: Along the tributary of Cedar Creek that drains the southwestern part of the natural area is the best example of lowland forest. Fifteen tree species are found here (Table 1), with *Acer saccharum* Marsh., *Quercus alba* L., and *Carya cordiformis* (Wang.) K. Koch. accounting for over half of the basal area and stems per hectare. Other common species are *Tilia americana* L., *Juglans nigra* L., *Q. rubra* L., *Fraxinus pennsylvanica* Marsh. and *Platanus occidentalis* L.

This forest is fairly immature as half of the stems are in the 1-2 dm diameter class. Common understory shrubs include *Lindera benzoin* (L.) Blume., *Asimina triloba* (L.) Dunal., *Staphylea trifolia* L. and *Hydrangea arborescens* L. The only specimen of *Fagus grandifolia* Ehrh. in the natural area is found along this tributary.

The forest along Cedar Creek is more disturbed and more often flooded than the one surveyed, and has a floristic composition typical of a lowland terrace forest. Commonly encountered species are *Acer negundo* L., *A. saccharinum* L., *Platanus occidentalis* L., *Ulmus americana* L., *Populus deltoides* Marsh., *Juglans nigra* L., and *Celtis occidentalis* L. Most of the trees are in the 1-2 dm diameter class.

OPEN DISTURBED COMMUNITY: This community type occurs along the pipeline right-of-way that traverses the area, and along route 128 on the west edge of the natural area. Here *Festuca pratensis* Huds. is dominant while other common species are *Danthonia spicata* (L.) Beauv., *Phleum pratense* L., *Bromus commutatus* Schrad., *Erigeron annuus* (L.) Pers., *Lactuca canadensis* L., *Potentilla simplex* Michx., *Rumex acetosella* L., *Ceanothus americanus* L., *Rhus glabra* L., and *Rubus allegheniensis* Porter.

SUCCESSIONAL FIELD COMMUNITY: A successional field about 10 acres in size occurs in the northwestern part of the natural area. This area was probably cultivated about 15 years ago, and is now in the early tree stage of succession. Dominant shrubs are *Ceanothus americanus* L., *Cornus drummondii* C. A. Mey., *C. racemosa* Lam., *Rhus glabra* L., *Rubus allegheniensis* Porter, and *R. occidentalis* L., while the common trees are *Quercus velutina* Lam., *Q. inbricaria* Michx., *Diospyros virginiana* L., *Sassafras albidum* (Nutt.) Nees., and *Prunus serotina* Ehrh. Many of the herbaceous species in the open disturbed community occur here. The dominant herbaceous species of this community are *Schizachyrium scoparium* (Michx.) Nash., *Danthonia spicata* (L.) Beauv., and various species of *Panicum*.

SANDSTONE CLIFF COMMUNITY: A few sandstone cliffs occur along Cedar Creek and its tributaries in the natural area. Few vascular plants occur here, but on the thin soil of ledges and at the tops of the cliffs some taxa are found. The most commonly encountered are *Arabis laevigata* (Muhl.) Poir., *Aralia racemosa* L., *Cystopteris fragilis* (L.) Bernh., *Dodecatheon meadia* L., *Hydrangea arborescens* L., *Luzula multiflora* (Retz.) Lejeune., *Pedicularis lanceolata* Michx., *Polystichum acrostichoides* (Michx.) Schott., and *Ranunculus harveyi* (A. Gray) Britt.

HILLSIDE SEEP COMMUNITY: On the bank and hillside along a small tributary of Cedar Creek in the extreme northwest corner of the natural area is a small hillside seep. This seep, which was probably disturbed when route 128 was improved, is dominated by *Impatiens biflora* Walt. Other common species are *Glyceria striata* (Lam.) Hitchcock., *Flymus virginicus* L., *Bromus pubescens* Muhl., *Carex vulpinoidea* Michx., *Arisaema dracontium* (L.) Schott., *Erigeron annuus* (L.) Pers.

A total of 405 taxa of vascular plants in 85 families were found in the Rock Cave Natural Area. Of the taxa collected, 16 are ferns, fern-allies, and gymnosperms, 100 are monocots, and 289 are dicots. Of these taxa, 46 have not been reported previously for Effingham County by Mohlenbrock and Ladd (1978) or Shildneck, Jones, and Mühlenbach (1981). These taxa are listed below with the collecting information.

- Agastache nepatoides* (L.) Ktze. Ebinger 20691. Hillside seep.
- Aralia racemosa* L. Ebinger 18358. Sandstone cliff.
- Aristolochia serpentaria* L. Ebinger 20625. Moist, hillside forest.

- Asclepias exaltata* L. Ebinger 17916. Lowland forest.
Aster lateriflorus (L.) Britt. Ebinger 20687. Lowland forest.
Aster parviceps (Burgess) Mack. & Bush. Ebinger 20720. Disturbed area.
Athyrium filix-femina (L.) Roth. var. *rubellum* Gilb. Ebinger 20643. Hillside seep.
Belamcanda chinensis (L.) DC. Ebinger 18249. Successional field.
Boehmeria cylindrica (L.) Sw. Ebinger 18277. Lowland forest.
Bromus commutatus Schrad. Ebinger 17863. Open, disturbed area.
Bromus pubescens Muhl. Ebinger 20646. Hillside seep.
Cacalia atriplicifolia L. Ebinger 20680. Lowland forest.
Carex albolutescens Schw. Ebinger 17859. Edge of road.
Carex gracilescens Steud. Ebinger 17650. Lowland forest.
Carex hystericina Muhl. Ebinger 20638. Edge of stream.
Carex lupulina Muhl. Ebinger 17777. Lowland forest.
Carex muhlenbergii Schk. Ebinger 17760. Open, disturbed area.
Carpinus caroliniana Walt. Ebinger 18287. Lowland forest.
Carya glabra (Mill.) Sweet. Ebinger 17927. Upland forest.
Cirsium altissimum (L.) Spreng. Ebinger 18344. Lowland forest.
Cornus florida L. Ebinger 17632. Upland forest.
Crotonopsis elliptica Willd. Ebinger 20702. Upland forest.
Datura stramonium L. Ebinger 18234. Edge of stream.
Desmodium dillenii Darl. Ebinger 20742. Open, disturbed area.
Desmodium glutinosum (Muhl.) Wood. Ebinger 18306. Upland forest.
Echinochloa crus-galli (L.) Beauv. Ebinger 18233. Edge of stream.
Gerardia tenuifolia Vahl. Ebinger 20711. Open, disturbed area.
Helianthus tuberosus L. var. *subcanescens* Gray. Ebinger 20728. Field.
Hieracium scabrum Michx. Ebinger 20698. Upland forest.
Krigia daudleion (L.) Nutt. Ebinger 17801. Upland forest.
Loportea canadensis (L.) Wedd. Ebinger 20633. Lowland forest.
Muhlenbergia schreberi J. F. Gmel. Ebinger 20700. Upland forest.
Ophioglossum vulgatum L. Ebinger 17623. Lowland forest.
Osmorhiza longistylis (Torr.) DC. Ebinger 17622. Lowland forest.
Osmunda claytoniana L. Ebinger 17900. Hillside forest.
Panicum depauperatum Muhl. Ebinger 20651. Open, disturbed area.
Panicum polyanthes Schult. Ebinger 20654. Successional field.
Phalaris arundinacea L. Ebinger 17924. Edge of stream.
Salix interior Rowlee. Ebinger 17807. Edge of stream.
Senecio glabellus Poir. Ebinger 17785. Open, disturbed area.
Silene nivea (Nutt.) Oth. Ebinger 17922. Edge of creek.
Smilax hispida Muhl. Ebinger 20628. Upland forest.
Spiranthes tuberosa Raf. Ebinger 20706. Upland forest.
Thelypteris hexagonoptera (Michx.) Weatherby. Ebinger 17912. Lowland forest.
Viola triloba Schwein. Ebinger 17643. Open, disturbed area.
Vulpia octoflora (Walt.) Rydb. Ebinger 17756. Open, disturbed area.

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