

The Effects of Sugar Maple Removal on Macrofungi in Baber's Woods Nature Preserve

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Introduction

Baber's Woods Nature Preserve is located in the southwest corner of Edgar County, Illinois (NW 1/4 Sec 18, T12N, R13W), just north of the Shelbyville Moraine at the southern edge of the Grand Prairie Section of the Grand Prairie Division (Schwegman 1973). The topography is gently rolling and relatively well drained by three small streams. Except for a few small depressions in the northwestern section of the woods no standing water is present, even during wet periods. When first surveyed by McClain and Ebinger (1965), three vegetation zones were reported in Baber's Woods; a sugar maple dominant zone along the western and northwestern edge of the preserve, a disturbed zone in the southwestern corner where two cabins once stood, and an oak-hickory zone that encompassed the majority of the woods. Vegetation surveys completed twenty years later (Ebinger, 1986) demonstrated that major changes have occurred in the composition of Baber's Woods and that the woods were now dominated by mesic, shade-tolerant taxa including a dense understory of shade-producing trees such as sugar maple (*Acer saccharum*) and red elm (*Ulmus rubra*). The explosive increase of sugar maple and red elm is due to changes in land use patterns that began more than 150 years ago when European settlers arrived in the Midwest and suppressed periodic prairie fires. A concerted effort to cut and/or girdle sugar maples and red elms and to reintroduce periodic fires at Baber's Woods presented a unique opportunity to initiate a long-term study of macrofungi that occur in Baber's Woods.

The purpose of this study is to examine changes in macrofungi that occur in Baber's Woods relative to changes in forest composition and to compare these changes with macrofungi at a control site in Jobst's Woods. Specific objectives include:

- Inventory of macrofungi in Baber's Woods prior to selective cutting and periodic burning.
- Inventory of macrofungi in Jobst's Woods.
- Inventory of macrofungi in Baber's Woods after selective cutting and the re-introduction of periodic burning.
- Creation of a macrofungi database to monitor changes in macrofungi that occur in Baber's Woods following forest alteration.
- Comparison of pre- and post-cutting/burning inventory of macrofungi in Baber's Woods with changes in forest structure.
- Comparison of macrofungi inventory in Baber's Woods with control site at Jobst's Woods.
- Assess the ecological role of macrofungi in Baber's Woods and Jobst's Woods.

Methods

Collecting trips were made to Baber's Woods and Jobst's Woods on July 17, July 31, August 14, August 28, September 11, September 25, October 9, October 16, November 6, and November 20, 2002. Collecting trips resumed in March 2003 and were made on March 26, April 9, April 23, May 7, May 21, June 4, and June 18, 2003. Macrofungi encountered in ten 25 m² circular plots along each of four 100 m long, randomly arranged transects in Baber's Woods and Jobst's Woods (a total of 40 plots representing a total sample area of 1000 m² in each forest) were recorded on transect data sheets (see Sample Transect Data Sheet; each number represents a circular plot along a single transect, in this case, Transect A). Unknown and previously unrecorded taxa were collected with minimal disruption of soil and vegetation for inclusion in the database.

Kodachrome slides of individual taxa were taken in the field or on return to the mycology laboratory at Eastern Illinois University. Macroscopic characteristics of unknown or previously unreported taxa were recorded and unknown taxa were identified using pertinent mycological literature. Voucher specimens were dried, boxed, and stored along with notes and photographs in the cryptogamic herbarium at Eastern Illinois University.

Results

A pre-cutting and pre-burning survey of macrofungi in Baber's Woods and Jobst's Woods has been completed (see Species List). A total of 81 taxa have been recorded from Baber's and Jobst's Woods. Of these, 16 are cup fungi (Division Ascomycota), 61 are mushrooms and polypores (Division Basidiomycota, Class Holobasidiomycetes), and 4 are jelly fungi or rusts (Division Basidiomycota, Class Phragmobasidiomycetes). No significant differences were recorded in the number or diversity of macrofungi in Baber's Woods and Jobst's Woods. The number and diversity of taxa collected is comparable to the number and diversity of taxa recorded in similar forests in Clark, Douglas, and Coles Counties (Methven, unpublished data).

Discussion and Summary

Research completed to date is part of a long-term monitoring project initiated four years ago. The project will be continued on an annual basis for several more years before trends in presence/relative abundance of individual taxa and their ecological role can be accurately assessed. The eastern half of the woods was burned in Fall 2000 and selective cutting that began in the northwest section of the woods in 2000 is complete. One of the four, randomly selected transects in Baber's Woods lies within the burn area in the eastern section of the preserve and one lies within the northwest section where selective cutting has been introduced. The remaining two transects lie in the southwestern section of Baber's Woods that has not been burned or selectively cut but was previously disturbed by the presence of an old homestead.

Data collected to this point indicates that all of the taxa collected in Baber's Woods and Jobst's Woods is saprobic and non-mycorrhizal. Since oaks are obligately ectomycorrhizal trees, and should be accompanied by ectomycorrhizal fungi which sporulate sporadically, I hypothesize that the dominance of sugar maples and red elms in the forest has suppressed the development of ectomycorrhizal fungi in Baber's Woods and the subsequent production of sporocarps. Removal and girdling of sugar maple and red elm in the northwestern section of Baber's Woods may release this suppression and result in the re-appearance (and subsequent collection) of ectomycorrhizal fungi in this section of the preserve. The addition of woody debris to the forest floor in this section also provides additional substrata for litter decomposing fungi and may yield additional saprobic fungi that have not been recorded from the preserve. Reintroduction of fire to the eastern half of Baber's Woods may also result in the appearance of fungi that have not previously been recorded from the preserve. Periodic burning of woody debris and litter in the forest releases nutrients to the soil that may induce the growth and sporulation of fungi not previously encountered in the preserve. Likewise, since the spores of some macrofungi require a "heat treatment" to germinate, the reintroduction of periodic fires may cause spores that have remained dormant for long periods of time to germinate, grow, and produce sporocarps. As a result, I predict that over the next several years, the number and diversity of taxa in Baber's Woods will increase and diverge significantly from those previously recorded from Jobst's Woods.

Literature Cited

- Ebinger, J.E. 1986. Sugar maple, a management problem in Illinois forests? *Transactions of the Illinois State Academy of Science* 79: 25-20.
- McClain, W.E., and Ebinger, J.E. 1968. Woody vegetation of Baber Woods, Edgar County, Illinois. *American Midland Naturalist* 79:419-428.
- Schwegman, J. 1973. Comprehensive Plan for the Illinois Nature Preserves System. Part 2. The Natural Divisions of Illinois. Illinois Nature Preserves Commission, Rockford.

Final Budget Report

Student help - \$494.40

Two undergraduate students, Joanne Crawford and Stacy Dyer, were hired to assist in collecting, identifying and processing specimens during Fall Semester, 2002 and Spring Semester, 2003. Joanne and Stacy also enrolled in undergraduate research and earned credit toward their undergraduate degrees.

Joanne worked 39.5 hours during the project.

$$(\$5.15/\text{hour}) (39.5 \text{ hours}) = \$ 203.42$$

Stacy worked 56.5 hours during the project.

$$(\$5.15/\text{hour}) (56.5 \text{ hours}) = \$ 290.98$$

Travel - \$276

16 round trips between Charleston, Baber's Woods, and Jobst's Woods – 50 miles/trip

$$(50 \text{ miles/trip}) (\$.345/\text{mile}) (16 \text{ trips}) = \$276.00$$

Commodities - \$225

20 rolls, 36 exposure Kodachrome 64 slide film with processing @ \$10.56/roll = \$211.20

(Photographs of fungi collected at Baber's Woods)

Shipping = \$ 13.80

Total - \$ 995.40

Baber's Woods Species List

- Agaricus placomyces*
Armillaria mellea
Arachnopeziza aurelia
Ascocoryne cylichnium
Auricularia auricula
Bjerkandera adusta
Calvatia bovista
Collybia acervata
Collybia cookei
Collybia subnuda
Coprinus micaceus
Coriolopsis gallica
Daedaleopsis confragosa
Daldinia concentrica
Ductifera puluhuana
Entoloma abortivum
Exidia glandulosa
Exidia recisa
Flammulina velutipes
Fuscocerrena portoricensis
Galerina autumnalis
Grifola frondosa
Gyromitra fastigiata
Hericium coralloides
Hohenbuehelia atrocaerulea var. *grisea*
Hygrophorus subsalmoneus
Hymenoscyphus fructigenus
Inocybe sororia
Ischnoderma resinoseum
Lentinellus cochleatus
Lentinellus ursinus
Lenzites betulina
Lepiota cristata
Lycoperdon pyriforme
Marasmius pyrrocephalus
Meripilus giganteus
Merulius incarnatus
Merulius tremellosus
Microstoma floccosum
Mollisia cinerea
Morchella elata
Morchella semilibera
Mycena corticola
Mycena flavoalba
Mycena galericulata
Mycena haematopus
Mycena inclinata
Mycena leaiana
Mycena luteopallens
Mycena pullata
Mycena roseipallens
Naematoloma sublaterium
Omphalotus illudens
Panellus stypticus
Peziza repanda
Peziza varia
Phellinus gilvus
Pluteus admirabilis
Pluteus cervinus
Polyporus alveolaris
Polyporus arcularius
Polyporus badius
Polyporus melanopus
Polyporus radicans
Polyporus squamosus
Polyporus varius
Psathyrella echiniceps
Psathyrella psammophila
Puccinia claytoniata
Puccinia podophylli
Sarcoscypha occidentalis
Schizophyllum commune
Schizopora paradoxa
Stereum complicatum
Trametes conchifer
Urnula craterium
Xerula megalospora
Xylaria polymorpha

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July 31, 2003

Bob Szafoni, Natural Heritage Biologist
Illinois Department of Natural Resources
Office of Resource Conservation
1660 West Polk Avenue
Charleston, IL 61920

Dear Bob:

Enclosed are six copies of the final report for Wildlife Preservation Fund Grant #03-014W entitled *The effects of sugar maple removal on macrofungi in Baber's Woods Nature Preserve*. I have also enclosed a disk that contains the 2002-2003 report (*Word*), a sample transect data sheet (*Excel*), and the Baber's Woods species list (*Word*). Let me know if you have any questions or require additional information.

Sincerely,



Andrew S. Methven
Professor and Associate Chair

RECEIVED

AUG 08 2003

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