02-028W

# 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 in 1965 by Ebinger and McClain, 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 in 1986 (Ebinger) demonstrate that major changes have occurred in the composition of Baber's Woods and that the woods are 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 6, July 20, August 3, August 17, August 31, September 14, September 28, October 12, October 26, November 9, November 23, and December 7, 2001. Collecting trips resumed in March 2002 and were made on March 29, April 12, April 26, May 10, and May 24, 2002. Macrofungi encountered in ten 25 $m^2$ 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 $m^2$ in each forest) were recorded on transect data sheets (Appendix A, 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 (Appendix B). 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 three years ago. The project must 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.

Preliminary data indicates that each 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 mushrooms and polypores 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 - $414.20**

An undergraduate student, Joanne Crawford, was hired to assist in collecting, identifying and processing specimens during Fall Semester, 2001 and Spring Semester, 2002. Joanne also enrolled in undergraduate research and earned credit toward her undergraduate degree. Joanne worked 41.5 hours during the project.

($5.15/hour) (41.5 hours) = $ 213.93

A graduate student, Anne Sierakowski, was hired to assist in collecting, identifying, and processing specimens during Spring Semester, 2002. Anne also enrolled in graduate research and earned credit toward her graduate degree. Anne worked 39 hours during the project.

($5.15/hour) (39 hours) = $ 200.27

**Travel - $351.90**

17 round trips between Charleston, Baber's Woods, and Jobst's Woods – 60 miles/trip

(60miles/trip) ($.345/mile) (17 trips) = $351.90

**Commodities - $214.90**

20 rolls, 36 exposure Kodachrome 64 slide film with processing @ $10.28/roll = $205.60
(Photographs of fungi collected at Baber's Woods)
Shipping = $ 9.30

**Total - $ 981.00**

## 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 resinosum
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 radicatus
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

**Transect A Data Sheet**

| Transect | A-1 | A-2 | A-3 | A-4 | A-5 | A-6 | A-7 | A-8 | A-9 | A-10 | A-11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Taxon** | | | | | | | | | | | |
| Agaricus placomyces | | | | | | | | | | | |
| Armillaria gallica | | | | | | | | | | | |
| Arachnopeziza aurelia | | | | | | | | | | | |
| Ascocoryne cylichnium | | | | | | | | | | | |
| Auricularia auricula | | | | | | | | | | | |
| Bisporella citrina | | | | | | | | | | | |
| Bjerkandera adusta | | | | | | | | | | | |
| Calvatia bovista | | | | | | | | | | | |
| Clitopilus prunulus | | | | | | | | | | | |
| Collybia acervata | | | | | | | | | | | |
| Collybia cookei | | | | | | | | | | | |
| Collybia subnuda | | | | | | | | | | | |
| Coprinus lagopus | | | | | | | | | | | |
| Coprinus micaceus | | | | | | | | | | | |
| Coriolopsis gallica | | | | | | | | | | | |
| Daedaleopsis confragosa | | | | | | | | | | | |
| Daldinia concentrica | | | | | | | | | | | |
| Ductifera puluhuana | | | | | | | | | | | |
| Entoloma abortivum | | | | | | | | | | | |
| Exidia glandulosa | | | | | | | | | | | |
| Exidia recisa | | | | | | | | | | | |
| Flammulina velutipes | | | | | | | | | | | |
| Fuscocerrena portoricensis | | | | | | | | | | | |
| Galerina autumnalis | | | | | | | | | | | |
| Ganoderma applanatum | | | | | | | | | | | |
| Grifola frondosa | | | | | | | | | | | |
| Gyromitra fastigiata | | | | | | | | | | | |
| Hericium coralloides | | | | | | | | | | | |
| Hohenbuehelia atrocaerulea var. grisea | | | | | | | | | | | |
| Hydnochaete olivaceum | | | | | | | | | | | |
| Hygrophorus subsalmoneus | | | | | | | | | | | |
| Hymenochaete ferruginea | | | | | | | | | | | |
| Hymenoscyphus fructigenus | | | | | | | | | | | |
| Hypoxylon "atropunctulatum" | | | | | | | | | | | |
| Inocybe sororia | | | | | | | | | | | |
| Irpex lacteus | | | | | | | | | | | |
| Ischnoderma resinosum | | | | | | | | | | | |
| Lentinellus omphalodes | | | | | | | | | | | |
| Lentinellus ursinus | | | | | | | | | | | |
| Lenzites betulina | | | | | | | | | | | |
| Lepiota cristata | | | | | | | | | | | |
| Lycoperdon pyriforme | | | | | | | | | | | |
| Marasmius capillaris | | | | | | | | | | | |
| Marasmius pyrrocephalus | | | | | | | | | | | |

| Transect | A-1 | A-2 | A-3 | A-4 | A-5 | A-6 | A-7 | A-8 | A-9 | A-10 | A-11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Taxon** | | | | | | | | | | | |
| Meripilus giganteus | | | | | | | | | | | |
| Microstoma floccosum | | | | | | | | | | | |
| Mollisia cinerea | | | | | | | | | | | |
| Morchella angusticeps | | | | | | | | | | | |
| Morchella semilibera | | | | | | | | | | | |
| Mycena corticola | | | | | | | | | | | |
| Mycena flavoalba | | | | | | | | | | | |
| Mycena galericulata | | | | | | | | | | | |
| Mycena haematopus | | | | | | | | | | | |
| Mycena idiolens | | | | | | | | | | | |
| Mycena inclinata | | | | | | | | | | | |
| Mycena leaiana | | | | | | | | | | | |
| Mycena luteopallens | | | | | | | | | | | |
| Mycena pullata | | | | | | | | | | | |
| Mycena roseipallens | | | | | | | | | | | |
| Naematoloma sublateritium | | | | | | | | | | | |
| Omphalotus illudens | | | | | | | | | | | |
| Ozonium (Coprinus cinereus) | | | | | | | | | | | |
| Panellus stypticus | | | | | | | | | | | |
| Perenniporia ohiensis | | | | | | | | | | | |
| Peziza repanda | | | | | | | | | | | |
| Peziza varia | | | | | | | | | | | |
| Phanerochaete chrysorhiza | | | | | | | | | | | |
| Phellinus gilvus | | | | | | | | | | | |
| Phlebia incarnata | | | | | | | | | | | |
| Phlebia radiata | | | | | | | | | | | |
| Phlebia tremellosa | | | | | | | | | | | |
| Pluteus admirabilis | | | | | | | | | | | |
| Pluteus cervinus | | | | | | | | | | | |
| Polyporus alveolaris | | | | | | | | | | | |
| Polyporus arcularius | | | | | | | | | | | |
| Polyporus badius | | | | | | | | | | | |
| Polyporus elegans | | | | | | | | | | | |
| Polyporus melanopus | | | | | | | | | | | |
| Polyporus radicatus | | | | | | | | | | | |
| Polyporus squamosus | | | | | | | | | | | |
| Polyporus varius | | | | | | | | | | | |
| Psathyrella echiniceps | | | | | | | | | | | |
| Psathyrella psammophila | | | | | | | | | | | |
| Puccinia claytonii | | | | | | | | | | | |
| Puccinia podophylli | | | | | | | | | | | |
| Sarcoscypha occidentalis | | | | | | | | | | | |
| Schizophyllum commune | | | | | | | | | | | |
| Schizopora paradoxa | | | | | | | | | | | |
| Scutellinia scutellata | | | | | | | | | | | |
| Steccherinum ochraceum | | | | | | | | | | | |

| Transect | A-1 | A-2 | A-3 | A-4 | A-5 | A-6 | A-7 | A-8 | A-9 | A-10 | A-11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Taxon** | | | | | | | | | | | |
| Stereum complicatum | | | | | | | | | | | |
| Stereum ostrea | | | | | | | | | | | |
| Trametes conchifer | | | | | | | | | | | |
| Trametes versicolor | | | | | | | | | | | |
| Trichaptum biforme | | | | | | | | | | | |
| Urnula craterium | | | | | | | | | | | |
| Xerula megalospora | | | | | | | | | | | |
| Xylaria polymorpha | | | | | | | | | | | |
| Xylobolus frustulatus | | | | | | | | | | | |