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

Dr. Andrew S. Methven
Department of Biological Sciences,
Eastern Illinois University
Charleston, IL 61920

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 (1968), 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) demonstrated that major changes had 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, in part, 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 fire in 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-introudction 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 August 23, September 6, September 20, October 4, October 18, November 1, November 15, and November 29, 2000. Collecting trips resumed in April 2001 and were made on April 4, April 18, May 2, May 16, May 30, and June 12, 2001. 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 nearly 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 - $496.10

An undergraduate student, Tiffany Armstrong, was hired to assist in collecting, identifying and processing specimens during Fall Semester, 2001 and Spring Semester, 2002. Tiffany also enrolled in undergraduate research and earned credit toward her undergraduate degree. Tiffany was worked 96.33 hours during the project.

($5.15/hour) (96.33 hours/trip) = $ 496.10

Travel - $273.00

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

(60miles/trip) ($.325/mile) (14 trips) = $273.00

Commodities - $225.00

10 rolls, 36 exposure Kodachrome 64 slide film with processing @ $12.50/roll	= $125.00
(Photographs of fungi collected at Baber's Woods)	
Wax paper bags and paper bags for collecting specimens	= $ 50.00
Plastic storage containers for smaller specimens	= $ 50.00

Total - $ 994.10

Division Ascomycota

Arachnopeziza aurelia
Ascocoryne cylichnium
Daldinia concentrica
Gyromitra fastigiata
Hymenoscyphus fructigenus
Microstoma floccosum
Mollisia cinerea
Morchella elata
Morchella esculenta
Morchella semilibera
Peziza repanda
Peziza varia
Sarcoscypha occidentalis
Urnula craterium
Xylaria longiana
Xylaria polymorpha

Division Basidiomycota

Class Holobasidiomycetes

Orders Agaricales, Hericiales, Lycoperdales

Agaricus placomyces
Armillaria gallica
Armillaria mellea
Calvatia bovista
Collybia acervata
Collybia cookei
Collybia dryophila
Collybia subnuda
Coprinus micaceus
Entoloma abortivum
Flammulina velutipes
Galerina autumnalis
Hericium coralloides
Hohenbuehelia atrocaerula var. *grisea*
Hygrophorus subsalmoneus
Inocybe sororia
Lentinellus cochleatus
Lentinellus ursinus
Lepiota cristata
Lycoperdon pyriforme
Marasmius pyrrocephalus
Mycena corticola
Mycena flavoalba
Mycena galericulata
Mycena haematopus
Mycena idiolens
Mycena inclinata
Mycena leaiana
Mycena luteopallens
Mycena pullata
Mycena roseipallens
Naematoloma sublateritium
Omphalotus illudens
Panellus stypticus
Pluteus admirabilis
Pluteus cervinus
Psathyrella echiniceps
Psathyrella psammophila
Schizophyllum commune
Xerula megalospora

Division Basidiomycota

Class Holobasidiomycetes

Order Polyporales

Bjerkandera adusta
Coriolopsis gallica
Daedaleopsis confragosa
Fuscocerrena portoricensis
Grifola frondosa
Ischnoderma resinosum
Lenzites betulina
Meripilus giganteus
Phlebia incarnata
Phlebia tremellosa
Phellinus gilvus
Polyporus alveolaris
Polyporus arcularius
Polyporus badius
Polyporus melanopus
Polyporus radicans
Polyporus squamosus
Polyporus varius
Schizopora paradoxa
Stereum complicatum
Stereum ostrea
Trametes conchifer
Trametes elegans

Classes Phragmobasidiomycetes and Teliomycetes

Auricularia auricula
Ductifera puluhuana
Exidia glandulosa
Exidia recisa
Puccinia claytonii
Puccinia podophyllii

Transect A Data Sheet											
Taxon	A-1	A-2	A-3	A-4	A-5	A-6	A-7	A-8	A-9	A-10	A-11
Agaricus placomyces											
Armillaria mellea											
Arachnopeziza aurelia											
Ascocoryne cylichnium											
Auricularia auricula											
Bjerkandera adusta											
Calvatia bovista											
Collybia acervata											
Collybia cookei											
Collybia subnuda											
Coprinus micaceua											
Coriolopsis gallica											
Daedaleopsis confrgosa											
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											
Phlebia incarnata											
Phlebia tremellosa											
Microstoma floccosum											
Mollisia cinerea											
Morcehlla angusticeps											
Morchella semilibera											
Mycena corticola											
Mycena flavoalba											
Mycena galericulata											
Mycena haematopus											
Mycena idiolens											
Mycena inclinata											
Mycena leaiana											

Taxon	A-1	A-2	A-3	A-4	A-5	A-6	A-7	A-8	A-9	A-10	A-11
Mycena luteopallens											
Mycena pullata											
Mycena roseipallens											
Naematoloma sublateritium											
Omphalotus illudens											
Panellus stypticus											
Peziza repanda											
Peziza varia											
Phellinus gilvus											
Pluteus admirabilis											
Polyporus alveolaris											
Polyporus arcularius											
Polyporus badius											
Polyporus melanopus											
Polyporus radicatus											
Polyporus squamosus											
Polyporus varius											
Psathyrella echiniceps											
Psathyrella psammophila											
Puccinia claytonii											
Puccinia podophylli											
Sarcoscypha occidentalis											
Schizophyllum commune											
Schizopora paradoxa											
Stereum complicatum											
Trametes conchifer											
Urnula craterium											
Xerula megalospora											
Xylaria polymorpha											