13-025W

The Effects of Sugar Maple and Red Elm 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 preserve 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: 1) a sugar maple dominant zone along the western and northwestern edge of the preserve; 2) a disturbed zone in the southwestern corner where two cabins once stood; and, 3) an oak-hickory zone that encompassed the majority of the preserve. Vegetation surveys completed in 1986 (Ebinger) demonstrated 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 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 fires in prairies and oak savannas. The concerted effort to cut and/or girdle sugar maples and red elms and the reintroduction of periodic fires in Baber's Woods that began in 1999 presents a unique opportunity to continue an ongoing assessment of macrofungi in Baber's Woods.

The purpose of this study is to examine changes in macrofungi community structure in Baber's Woods relative to changes in forest composition. Specific objectives include:

- Resume post-cutting and post-burning inventory of macrofungi in Baber's Woods Nature Preserve.
- Expansion of a macrofungi database to monitor changes in macrofungi that occur in Baber's Woods following forest alteration.
- Use Estimate S to generate species accumulation curves of macrofungi and NSMS statistics to assess differences in macrofungal community structure along each of four transects to compare pre- and post-cutting and post-burning inventory of Baber's Woods to data gathered in 2001-2002 and 2002-2003 studies supported by the Illinois Wildlife Preservation Fund.
- Assess the ecological role of macrofungi in Baber's Woods.

Methods

Collecting trips were made to Baber's Woods on April 19, May 17, June 2, June 9, June 23, July 12, July 26, August 9, August 23, September 6, September 20, October 4, October 18, November 1, November 15, and December 6, 2013. Macrofungi encountered in ten 25 m^2 circular plots along each of four 100 m long, randomly arranged transects in Baber's Woods (a total of 40 plots representing a total sample area of 1000 m^2) 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.

Digital images 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, and stored along with notes in the cryptogamic herbarium at Eastern Illinois University.

Results

A survey of macrofungi in Baber's Woods is presented in Appendix B. A total of 135 taxa have been recorded from Baber's Woods. Of these, 27 are cup fungi (Phylum Ascomycota), 96 are mushrooms and polypores (Phylum Basidiomycota, Class Holobasidiomycetes), 6 are jelly fungi or rusts (Division Basidiomycota, Class Phragmobasidiomycetes), and 6 are slime molds (Phylum Myxomycota). Thirty two (32) taxa not previously reported from Baber's Woods were recorded. As a result of the drought experienced in Summer and Fall 2014, not as many macrofungi were collected as originally anticipated. The paucity of data generated precluded Estimate S from generating meaningful species accumulation curves. However, 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). No significant differences were recorded in macrofungal community structure within and between transects using NDMS statistics. A no cost extension of the project, submitted after the November 30, 2013 deadline, was not approved.

Discussion and Summary

Research completed to date is part of a long-term monitoring project initiated several years ago. The project should 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 has been burned periodically since 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 were previously disturbed by the presence of an old homestead.

Preliminary data indicates that the taxa collected in Baber'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.

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 - $129.18

An undergraduate student, Marci Gallagher, was hired to assist in collecting, identifying and processing specimens during Summer 2013. Due to the limited rainfall, I was able to complete most of the survey work alone and Marci worked only 12 hours during the project.

($10.00/hour) (12 hours) = $ 120.00 (Plus $9.18 in Fringe Benefits)

Travel - $395.50

14 round trips between Charleston and Baber's Woods – 50 miles/trip

(50 miles/trip) ($.565/mile) (14 trips) = $395.50

Commodities - $7.98

Tert-butanol for preservation of fungal specimens

Total - $532.66

Appendix A.
Sample Transect Data Sheet

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
Agaricus placomyces											
Armillaria gallica											
Arachnopeziza aurelia											
Artomyces pyxidatus											
Ascocoryne cylichnium											
Auricularia auricula											
Bisporella citrina											
Bjerkandera adusta											
Calvatia bovista											
Ceratiomyxa fruticulosa											
Clitopilus prunulus											
Collybia acervata											
Collybia cookei											
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											
Gymnopilus											
Gymnopus subnudus											
Gymnopus subsulphureus											
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											

Appendix A.
Sample Transect 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
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											
Phaeomarasmius											
Phanerochaete chrysorhiza											
Phellinus gilvus											
Phlebia incarnata											
Phlebia radiata											
Phlebia tremellosa											
Pholiota											
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											
Puccinia on Jack-in-the-Pulpit											
Puccinia on *Rubus*											
Sarcoscypha occidentalis											
Schizophyllum commune											
Schizopora paradoxa											
Scutellinia scutellata											
Steccherinum ochraceum											

Appendix A.
Sample Transect 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
Stereum complicatum											
Stereum ostrea											
Trametes conchifer											
Trametes elegans											
Trametes versicolor											
Trichaptum biforme											
Urnula craterium											
Xerula megalospora											
Xylaria polymorpha *Xylobolus frustulatus*											

Appendix B.
Baber's Woods Species List 2013

Agaricus placomyces
** Arachnopeziza aurata*
Arachnopeziza aurelia
** Arcyria cinerea*
Armillaria gallica
Ascocoryne cylichnium
Auricularia auricula
Bisporella citrina
Bjerkandera adusta
Calvatia bovista
Ceratiomyxa fruticulosa
** Ciboria peckiana*
Clitopilus prunulus
Collybia acervata
Collybia cookei
Coprinus lagopus
Coprinus micaceus
Coprinus radians
Coriolopsis gallica
** Crepidotus appalachiensis*
** Crepidotus vukgaris*
** Crucibulum laeve*
Daedaleopsis confragosa
Daldinia concentrica
** Dasyscyphus virgineus*
Ductifera puluhuana
Entoloma abortivum
Exidia glandulosa
Exidia recisa
Flammulina velutipes
Fuscocerrena portoricensis
Galerina marginata
** Galiella rufa*
Ganoderma applanatum
Grifola frondosa
Gymnopilus liquiritae
** Gymnopus dichrous*
** Gymnopus semihirtipes*
Gymnopus subnudus
Gymnopus subsulphureus
Gyromitra fastigiata
** Hapalopilus nidulans*
** Helvella macropus*
** Helvella stevensii*
** Hemitrichia calyculata*
Hericium coralloides
Hohenbuehelia atrocaerulea var. *grisea*
Hydnochaete olivaceum
** Hygrocybe psittacina*
Hygrophorus subsalmoneus
Hymenochaete ferruginea
Hymenoscyphus fructigenus
** Hypocrea gelatinosa*
** Hypocrea rufa*
Hypoxylon "atropunctulatum"
** Inocybe calospora*
Inocybe sororia
Irpex lacteus
Ischnoderma resinosum
** Laccaria ohiensis*
Lentinellus omphalodes
Lentinellus ursinus
Lenzites betulina
Lepiota cristata
** Lycogala epidendrum*
Lycoperdon pyriforme
** Marasmiellus nigripes*
** Marasmiellus opacus*
Marasmius capillaris
Marasmius pyrrocephalus
** Marasmius rotula*
** Marasmius sullivantii*
Meripilus giganteus
** Metatrichia vesparium*
Microstoma floccosa
Mollisia cinerea
Morchella angusticeps
Morchella semilibera
** Mycena acicula*
Mycena corticola
Mycena flavoalba
Mycena galericulata
Mycena haematopus
Mycena idiolens
Mycena inclinata
Mycena leaiana
Mycena luteopallens
Mycena pullata
Mycena roseipallens
Naematoloma sublateritium
Omphalotus illudens

Appendix B.
Baber's Woods Species List 2013

** Orbilia luteorubella*
Panellus stypticus
** Panus conchatus*
Perenniporia ohiensis
Peziza repanda
Peziza varia
Phaeomarasmius erinaceus
Phanerochaete chrysorhiza
Phellinus gilvus
Phlebia incarnata
Phlebia radiata
Phlebia tremellosa
** Pholiota polychroa*
Pluteus admirabilis
Pluteus cervinus
** Pluteus longistriatus*
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
** Stemonitis axifera*
Stereum complicatum
Stereum ostrea
Trametes conchifer
Trametes elegans
Trametes versicolor
Trichaptum biforme
Urnula craterium
Xerula megalospora
** Xylaria longiana*
Xylaria polymorpha
Xylobolus frustulatus