Wildlife Preservation Fund Grant # 07-700W
Macrofungi Associated with Tree Windfall in Old Growth Prairie Groves

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Project Objectives

Questions to be addressed by this study include:

i) Does macrofungi species composition differ on two different decay classes of Northern red oak and sugar maple?
ii) Does macrofungi species composition and species richness change within and between years?
iii) Do tree windfalls influence macrofungi species composition and richness patterns?
iv) Does fungal species diversity decline as Northern red oaks are replace by sugar maples?
v) Do environmental and abiotic variables influence macrofungi species composition and species richness?

Completed Project Description:

This study investigated macrofungi (Ascomycota and Basidiomycota) associated with tree windfall in Brownfield (26.1 ha) and Trelease Woods (24.5 ha), Champaign Co., Illinois. These woods are remnants of a larger, pre-settlement prairie grove now encircled by houses, fragmented forests, prairie and agricultural land. Although initially a virgin, deciduous, upland forest dominated by oak, ash and maple with a high, closed canopy and fairly open (Brownfield Woods) to moderately dense (Trelease Woods) understory, sugar maple is rapidly becoming the dominant tree species. Beginning with a windstorm in November 1994 that damaged canopy trees in Trelease Woods, fallen trees in both woods have been tagged with an ID number, date of windfall, dbh and location relative to a network of marked grids by Steve Buck, Resources Technologist, Committee on Natural Areas Site Manager, University of Illinois.

This study represents a unique opportunity to study: i) differences in macrofungi species composition relative to woody substrates of different species, dbh, decay class and bark condition; ii) variation in macrofungi production between years; iii) changes in macrofungi species composition and species richness change within and between years; and iv) perturbation of macrofungi species composition and richness patterns by tree windfalls. A preliminary survey completed in Fall 2005 facilitated selection of tree windfalls to be sampled, established transects to survey terrestrial macrofungi, and yielded a baseline of nearly 100 taxa of macrofungi from Brownfield and Trelease Woods.

Summary of Project Accomplishments:

Introduction: This study investigated macrofungi (Ascomycota and Basidiomycota) associated with tree windfall in Brownfield (26.1 ha) and Trelease Woods (24.5 ha), Champaign Co., Illinois. These woods are remnants of a larger, pre-settlement prairie grove now encircled by houses, fragmented forests, prairie and agricultural land. Although initially a virgin, deciduous, upland forest dominated by oak, ash and maple with a high, closed canopy and fairly open (Brownfield Woods) to moderately dense (Trelease Woods) understory, sugar maple is rapidly becoming the dominant tree species. Beginning with a windstorm in November 1994 that damaged canopy trees in Trelease Woods, fallen trees in both woods have been tagged with an ID number, date of windfall, dbh and location relative to a network of marked grids by Steve Buck, Resources Technologist, Committee on Natural Areas Site Manager, University of Illinois.

A preliminary survey initiated in Fall 2005 to survey macrofungi on tree windfalls as well as terrestrial macrofungi was extended through a second field season (2006) and into a third (2007). To date, nearly 100 species of macrofungi have been recorded from Brownfield and Trelease Woods (See separate file for a list of species).

This study will help address a trend observed in mixed forests in the Midwest where Northern red oaks are rapidly being replaced by sugar maples. It will allow us to predict if macrofungal species diversity declines in mixed forest stands as Northern red oaks are replaced by sugar maple and will add significantly to knowledge of the ecological role of macrofungi in forest ecosystems.

Materials and Methods: Brownfield and Trelease Woods were visited July 7, July 21, August 4, August 18, September 1, September 15, September 29, October 13, October 27, November 3, November 17, and December 1, 2006 as well as March 9, March 23, April 6, April 20, May 4, May 18, June 2, June 16, and June 30, 2007. As part of her Master's thesis research, Kim Vernier collected wood decay macrofungi present on two decay classes of Northern red oak and sugar maple logs in Brownfield and Trelease Woods. As part of his Master's thesis research, Vince Hustad collected terrestrial macrofungi within permanent transects in Brownfield and Trelease Woods.

Digital images of representative macrofungi were recorded in the field. Representative macrofungi were collected with minimal disruption of soil and vegetation. Macroscopic characteristics were recorded for representative macrofungi collected upon return to Eastern Illinois University. Taxa were identified using pertinent mycological literature available in the mycology laboratory at Eastern Illinois University. Representative macrofungi were dried, stored in Ziplock bags along with field labels and macroscopic notes, and accessioned into the cryptogamic herbarium at Eastern Illinois University. A database of macrofungi was prepared to allow for correlation of macrofungi, trees, and environmental and abiotic variables. Resemblance matrices were created using Bray-Curtis Similarity and analyzed using MDS, ANOSIM and SIMPER.

Results: Nearly 100 species of macrofungi have been identified from Brownfield and Trelease Woods (See separate file for a list of species). Macrofungal assemblages were not found to significantly differ between forests (R=0.023, P=14.0) forest division within and between sites (R=0.007, P=23.9), and collection areas (R=.002, P=39.3). Macrofungal assemblages were shown by MDS and ANOSIM (Table 1) to be significantly affected by seasonality. Macrofungal assemblages were found to be significantly different for pairwise comparisons of several months. SIMPER analysis revealed six genera to be most informative in seasonal differentiation of fungal assemblages: *Mycena, Irpex, Xylaria, Marasmius, Gymnopus,* and *Schizophyllum*. Soil samples will be taken from each area to measure the influence of abiotic variables on terrestrial macrofungal assemblages. Fungal DNA will be extracted and isolated from soil cores using fungal specific primers and soil extraction kits. The ITS region of amplified cloned sequences will be compared to published sequences to further identify macrofungal assemblages within each area

Discussion and Summary: Additional environmental variables (precipitation, canopy cover) and soil characteristics (pH, texture, organic content) will be collected this year to determine which variables have the greatest influence on fungal assemblages. Additional environmental variables (precipitation, canopy cover) and soil characteristics (pH, texture, organic content) will be collected to determine which variables have the greatest influence on fungal assemblages. Fungal communities detected through ITS sequencing will be compared with macrofungal communities observed fruiting over two seasons.

Total Project Expenditures:

Travel – 16 trips to Brownfield and Trelease Woods – 110 miles/trip @ $0.445/mile = $734.25
(Only $713.00 reimbursed from the grant; $21.25 paid by principal investigator)

Material Supplies – Dneasy Plant Mini Kit (Qiagen Inc) – P.O. 64385 = $202.31
Ultraclean Soil DNA Kit (MoBio Laboratory) – P.O. 64503 = $147.69

Total = $1063

Project expenditures paid by funds other than Special Wildlife Grant Funds

Travel – 5 trips to Brownfield and Trelease Woods – 110 miles/trip @ $0.445/mile = $293.76
(Paid by principal investigator)

Brownfield and Trelease Woods Fungi

Annulohypoxylon annulatum
Annulohypoxylon truncatum
Armillaria gallica
Armillaria mellea
Armillaria mellea rhizomorphs
Armillaria tabescens
Ascocoryne cylichnium
Auricularia auricula
Bactridium flava
Biscogniauxia atropunctata
Bisporella citrina
Bjerkandera adusta
Camillea punctata
Camillea tinctor
Cerrena unicolor
Chlorosplenium aeruginascens
Coprinus disseminatus
Coprinus micaceus
Coprinus radians
Coprinus variegatus
Creopus gelatinosus
Crepidotus applanatus var. applanatus
Crepidotus applanatus var. globergi
Crepidotus crocophyllus
Dadaleopsis confragosa
Daldinia concentrica
Dasyscyphus niveus
Dasyscyphus niveus
Ductifera pululahuana
Eutypha spinosa
Flammulina velutipes
Fuligo septica
Galerina marginata
Ganoderma applanatum
Gymnopus subnudus
Hohenbuehelia angustatus
Hydnochaete olivaceum
Hypholoma sublateritium

Hysterographium #1
imperfect #1 (resembles Bactridium)
imperfect dark stem/ w/ green head
Inonotus #1 (resupinate on bark)
Irpex lacteus
Ischnoderma resinosum
Kretzschmaria deusta
Laetiporus sulphureus
Lenzites betulina
Lycogala epidendrum
Lycoperdon pyriforme
Marasmiellus nigripes
Marasmius rotula
Megacollybia platyphylla
Metatrichia vesparium
Mollisia sp.
Mycena #1 (gray gills)
Mycena #2 (furfuraceous base)
Mycena alcalina
Mycena corticola
Mycena galericulata
Mycena haematopus
Mycena haematopus parasite
Mycena leaiana
Mycena luteopallens
Mycena niveipes
Nemania illita
Orillia coccinella
Orillia sp.
Panellus stipticus
Panus conchatus
Paxillus corrugatus
Penicillium sp.
Peziza repanda
Phellinus gilvus
Phleogena fagicola
Phlebia incarnata
Phlebia radiata
Phlebia tremellosa
Pluteus granularis
Pleurotus pulmonarius
Pluteus #1 (choc. brown cap)
Pluteus cervinus
Pluteus longistriatus

Pluteus major
Pluteus petasatus
Pluteus seticeps
Pluteus tomentosulus
Polyporus alveolaris
Polyporus badius
Polyporus brumalis
Polyporus squamosus
Poria sp. (orangish)
Psathyrella hirtosquamosa
Psathyrella sp.
Resinomycena rhododendri
Rhodotus palmatus
Rosellinia subiculata?
Rosellinia subiculata?
Russula densifolia
Sacroscypha coccinea
Sacroscypha occidentalis
Schizophyllum commune
Scutellinia scutellata
Simocybe centunculus
Sphaerosporium (imperfect)
Spongipellis pachydon
Steccherinum ochraceum
Stereum complicatum
Stereum hirsutum
Stereum ostrea
Trametes elegans
Trametes hirsuta
Trametes versicolor
Trichaptum biforme
Volvariellla bombycina
Xeromphalina tenuipes
Xylobolus frustulatus