

Biogeography and hosts of poroid wood decay fungi in North Carolina: species of *Fomes*, *Fomitopsis*, *Fomitella* and *Ganoderma*

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Abstract – Distribution and host species are given for two species of *Fomes*, one species of *Fomitella*, four species of *Fomitopsis* and four species of *Ganoderma*. A county distribution map is provided for each species. Numerous new fungus-host plant associations are reported. Species checklist and figures can also be accessed at:

http://www.cals.ncsu.edu:8050/plantpath/people/faculty/grand/mycotaxon_4.pdf

Keywords – fungus distribution, polypores.

Introduction

The importance of biodiversity and biogeography of fungi, especially in unique ecosystems and specific regions, was previously addressed by Grand and Vernia (2004a, b, 2005). Studies by Jung (1987), Vernia and Grand (2000) and Grand and Vernia (2002, 2003) reported on the occurrence of host plants of poroid wood decay fungi in North Carolina. The distribution and host plants in North Carolina of species of *Phellinus* and *Schizopora* (2004a), *Ceriporia*, *Ceriporiopsis* and *Perenniporia* (2004b) and *Coltricia*, *Coltriciella* and *Inonotus* (2005) were previously addressed. This report is the fourth in a continuing study of poroid wood-decay fungi in North Carolina and deals with species of *Fomes*, *Fomitella*, *Fomitopsis* and *Ganoderma*.

Materials and methods

Poroid wood-decay fungi were intensively collected in North Carolina over the past seven years (1997-2004). Collections, housed in the Mycological Herbarium, Department of Plant Pathology, North Carolina State University (NCU), and records of the Plant Disease and Insect Clinic, Department of Plant Pathology, NCSU, were utilized in the results. Previous studies (Grand, et al., 1975 and Jung, 1987) that contained data on county distribution were used in developing the distribution maps. Similarly, data from the BPI website (Farr, et al., n.d.) provided some county data.

Collections were made of all species of *Fomes*, *Fomitella*, *Fomitopsis* and *Ganoderma* species on unusual hosts. Specimens were placed in paper bags in the field with a sample of decayed wood with most collections and field notes for all collections. Specimens were examined in the laboratory and identified using existing taxonomic treatments (Gilbertson & Ryvarden, 1986, Jung, 1987, Overholts, 1953).

Nomenclature and authorities are from Gilbertson & Ryvardeen (1986) and Kirk & Ansell (1992) for the fungi and Kartesz & Kartesz (1980) for the host plant species.

The majority of collection sites were in state parks, gamelands and natural areas, Nantahala, Pisgah, Croatan and Uwharrie National Forests, the Blue Ridge Parkway and the Great Smoky Mountains National Park. A county distribution map is provided for each species (Figs. 1-12).

Results and discussion

Fomes fomentarius (Fig. 2) was found on six host species in 12 western counties, all in the Blue Ridge Mountains of the Southern Appalachian Mountain chain. *Fomes fasciatus* (Fig. 1), a species with a distribution in the southern United States (Gilbertson & Ryvardeen, 1986), was collected for the first time in three North Carolina counties in the Coastal Plain and southern Piedmont regions. It appears that *F. fomentarius* reaches its southern-most distribution in the southern mountains of North Carolina and Tennessee and *F. fasciatus* reaches its northern-most distribution in southern North Carolina.

Fomitopsis cajanderi (Fig. 4) was found in 15 counties in the Blue Ridge Mountains and Piedmont regions and was recorded on four host species. *Fomitopsis pinicola* (Fig. 6) was found in eight counties in the Blue Ridge Mountain region of western North Carolina.

Fomitella supina (Fig. 3), *Fomitopsis durescens* (Fig. 5) and *F. spraguei* (Fig. 7) were not collected frequently enough to determine any distributional patterns.

Five species of *Ganoderma* were recorded in this study. *Ganoderma applanatum* (Fig. 8) was found in 18 counties on 20 host species. *G. applanatum* is primarily distributed in the Blue Ridge Mountains of western North Carolina but collections were made in the eastern Piedmont and northern Coastal Plain regions as well. *Ganoderma tsugae* (Fig. 12) which is primarily found on *Tsuga canadensis* in North Carolina was also found on *Abies fraseri* and *Pinus pungens*. *Tsuga caroliniana* is most likely a host as well. Dead, needleless trees of this *T. caroliniana* are difficult to distinguish from *T. canadensis*. *Ganoderma tsugae* is distributed in nine counties in the Blue Ridge Mountains in western North Carolina with a single report from a disjunct population of *T. canadensis* in the Piedmont.

Ganoderma lucidum (*sensu lato*) is a morphologically variable species (Gilbertson & Ryvardeen, 1986) and considered by most taxonomists to be a species complex. With the exception of *G. curtisii*, *G. lucidum* was considered in the broad species concept in this study. *Ganoderma lucidum* (Fig. 11) is widely distributed in North Carolina and was found in 29 counties on 28 host species. The species concept of *G. curtisii* in this study was limited to those basidiocarps with a well-developed stipe, eccentric pileus and typically forming from underground roots near stumps. *Ganoderma curtisii* (Fig. 9) is widely distributed in North Carolina and was found in 11 counties on 13 host species.

LIST OF SPECIES

Previously unreported fungus-host associations for the United States are indicated by a double asterisk. Counties are in parenthesis following host species.

***Fomes fasciatus* (Sw.:Fr.) Cooke (Fig. 1)**

Persea borbonia (L.) Spreng. (Brunswick); *Quercus falcata* Michx. ** (Anson); *Quercus* sp. (Robeson).

***Fomes fomentarius* (L.:Fr.) J. Kickx fil. (Fig. 2)**

Acer rubrum L. (Graham); *A. saccharum* Marsh (Swain); *Betula alleghaniensis* Brit. (Ashe, Avery, Buncombe, Cherokee, Clay, Macon, Transylvania, Watauga, Yancey); *B. lenta* L. (Ashe, Buncombe, Macon, Watauga); *Fagus grandifolia* Ehrh. (Haywood, Macon); *Prunus serotina* Ehrh. (Avery, Macon).

***Fomitella supina* (Sw.:Fr.) Murrill (Fig. 3)**

Quercus falcata ** (Johnston).

***Fomitopsis cajanderi* (P. Karst.) Kotl. & Pouz. (Fig. 4)**

Picea rubens Sarg. (Swain); *Pinus echinata* Mill. (Catawba); *P. pungens* Lamb. (Macon); *P. virginiana* Mill. (Durham, Franklin, Gaston, Jackson, Stanly, Stokes, Swain, Wilkes); *Pinus* sp. (Montgomery); *Tsuga canadensis* (L.) Carr (Polk, Watauga); unidentified substrate (Henderson, McDowell).

***Fomitopsis durescens* (Overh. ex J. Lowe) Gilb. & Ryvarden (Fig. 5)**

Quercus sp. (Durham).

***Fomitopsis pinicola* (Sw.:Fr.) P. Karst. (Fig. 6)**

Abies fraseri (Pursh) Poir (Transylvania, Yancey); *Picea rubens* (Haywood, Mitchell, Swain, Yancey); *Tsuga canadensis* (Macon, Swain); unidentified substrate (Buncombe, Henderson).

***Fomitopsis spraguei* (Berk. & M.A. Curtis) Gilb. & Ryvarden (Fig. 7)**

Unidentified substrate (Henderson).

***Ganoderma applanatum* (Pers. in Wallr.) Pat. (Fig. 8)**

Acer pensylvanicum L. (Swain); *A. rubrum* (Avery, Currituck, Haywood, Jackson, Transylvania, Watauga); *A. saccharinum* L. (Ashe); *A. saccharum* (Henderson); *Amelanchier arborea* (Michx.) Fernald (Jackson); *Betula alleghaniensis* (Ashe, Avery, Haywood, Swain, Yancey); *B. lenta* (Avery, Macon, Watauga); *Betula* sp. (Swain); *Carya tomentosa* (Poiret) Nutt. (Jackson); *Cercis canadensis* L. (Wake); *Fagus grandifolia* (Graham, Haywood, Jackson, Swain); *Juglans cinerera* L. (Macon); *Liriodendron tulipifera* L. (Ashe, Graham, Macon, Swain, Watauga); *Magnolia fraseri* Walt. ** (Burke); *Malus sylvestris* Mill. (Henderson); *Prunus pensylvanica* L. (Swain); *Quercus alba* L. (Transylvania, Wake, Watauga); *Q. prinus* L. (Rutherford, Transylvania, Watauga, Yancey); *Q. rubra* L. (Ashe, Avery, Graham,

Macon, Swain, Watauga, Wilkes); *Robinia pseudoacacia* L. (Graham); *Tilia heterophylla* Venten. (Franklin, Macon); *Tsuga canadensis* (Burke); *Ulmus rubra* Muhl. (Wake); unnamed substrate (Buncombe, Henderson, McDowell, Yancey).

***Ganoderma curtisii* (Berk.) Murrill (Fig. 9)**

Acer rubrum (Dare, Johnston); *Carya* sp. (Wake); *Lagerstroemia indica* L. ** (Wake); *Liquidambar styraciflua* L. (Wake); *Malus x domestica* (Richmond); *Pinus taeda* L. stump (Wake); *Quercus alba* (Wake); *Q. falcata* (Gaston); *Q. laevis* Walt. (Bladen, Columbus); *Q. laurifolia* Michx. (Robeson); *Q. prinus* (Wake); *Q. velutina* Lam. (Moore); *Quercus* sp. (Pender); *Robinia pseudoacacia* (Wake); *Zelkova serrata* (Thunb.) Makino ** (Wake); unnamed substrate (Henderson, Wake).

***Ganoderma lobatum* (Schwein.) G.F. Atk. (Fig. 10)**

Carya glabra (Transylvania); *Quercus alba* (Anson).

***Ganoderma lucidum* (Curtis: Fr.) P. Karst. (Fig. 11)**

Acer rubrum (Carteret, Guilford, Iredell, Wake, Wilkes); *A. saccharum* (Jackson); *Betula nigra* L. (Warren); *Carya* sp. (Wake); *Celtis laevigatus* L. (Bladen); *Cercis canadensis* (Wake); *Fagus grandifolia* (Wake); *Ilex opaca* Ait. (Wake); *Gleditsia triacanthos* L. (Wake); *Juglans nigra* L. (Jones); *Liquidambar styraciflua* (Gates, Wake); *Lirodendron tulipifera* (Ashe, Jones, Wilkes); *Malus x domestica* Borkh. (Montgomery); *Myrica cerifera* L. ** (Wake); *Oxydendrum arboreum* L. ** (Camden); *Platanus occidentalis* L. (Wake); *Quercus alba* (Surry); *Q. coccinea* Muench. (Watauga); *Q. falcata* (Alamance, Anson, Moore); *Q. laurifolia* (Robeson); *Q. lyrata* Walt. (Wayne); *Q. phellos* L. (Wake); *Q. prinus* (Harnett, Wake, Wilkes); *Q. rubra* (Clay, Franklin, Jones, Watauga, Wayne); *Q. velutina* (Wake); *Q. virginiana* Mill. (Carteret, Dare, New Hanover); *Quercus* sp. (Buncombe, McDowell); *Robinia pseudoacacia* (Wake); *Salix babylonica* L. (Wake); *S. nigra* Marsh (Gates); unnamed substrate (Johnston, Vance).

***Ganoderma tsugae* Murrill (Fig. 12)**

Abies fraseri (Watauga); *Pinus pungens* (Macon); *Tsuga canadensis* (Buncombe, Burke, Graham, Henderson, Macon, Mc Dowell, Swain, Transylvania, Wake, Watauga).

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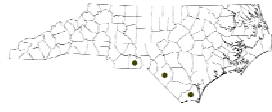


Fig. 1. Distribution of *Fomes fasciatus* in North Carolina



Fig. 2. Distribution of *F. fomentarius* in North Carolina



Fig. 3. Distribution of *Fomitella supina* in North Carolina



Fig. 4. Distribution of *Fomitopsis cajanderi* in North Carolina



Fig. 5. Distribution of *F. durescens* in North Carolina



Fig. 6. Distribution of *F. pinicola* in North Carolina



Fig. 7. Distribution of *F. spraguei* in North Carolina



Fig. 8. Distribution of *Ganoderma applanatum* in North Carolina

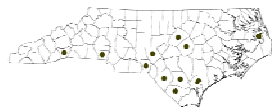


Fig. 9. Distribution of *G. curtisii* in North Carolina

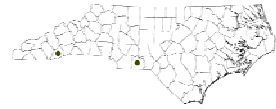


Fig. 10. Distribution of *G. lobatum* in North Carolina



Fig. 11. Distribution of *G. lucidum* in North Carolina



Fig. 12. Distribution of *G. tsugae* in North Carolina