Incidence of *Phellinus punctatus* on Living Woody Plants in North Dakota

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ABSTRACT

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Sporocarps of *Phellinus punctatus* were found on living and dead plants of *Caragana arborescens*, *Fraxinus pennsylvanica*, *Prunus americana*, *Rhamnus cathartica*, *Salix alba* var. *vitellina*, *S. bebbiana*, *S. eriocephala*, and *Syringa vulgaris* and on dead *Prunus virginiana* and *Salix alba* in North Dakota. Canker rot symptoms are associated with this fungus on living hosts. In surveys, sporocarps of *P. punctatus* were found at 36% of the sites that had hosts older than 20 yr. They were more common in eastern than in western North Dakota.

Additional key word: shelterbelts

Woody plants are grown in shelterbelt rows in the Great Plains to modify the environment (18). Some of the species planted in the oldest shelterbelts have reached or soon will reach maturity. A decline in vigor or survival in some plantings has been observed (18). Investigations were started to determine what diseases were damaging woody plants so other plantings could be managed to avoid or treat those diseases. Among the fungi collected was a brown resupinate polypore identified as *Phellinus punctatus* (Fr.) Pilat. This paper reports the incidence of this fungus on several living and/or dead hosts in North Dakota.

P. punctatus has been known by many names (7,11,15,16). Some reports have listed it as a resupinate condition of *P. robustus* (Karst.) Bourd. & Galz. (*Fomes robustus* Karst.) (8–12). Brenckle (5) reported it in North Dakota as *Poria punctata* Fr. on *Tilia americana* L. and as *Poria laminata* Murr. on *Prunus americana* Marsh. Barnett (1) reported it in the Fargo, ND, region as *P. laminata* on dead trunks of deciduous trees, especially willow. Specimens of *P. punctatus* in the Solheim Mycological Herbarium, Rocky Mountain Herbarium, University of Wyoming, Laramie 82071 (reported as *Poria laminata*), were collected in North Dakota in 1916–1920 on *Prunus americana*, *P. virginiana* L., *Salix amygdaloides* Anders., and *Amelanchier alnifolia* Nutt. Specimens with identical collection data are deposited in the North Dakota State University (NDSU) Plant Pathology Department herbarium. *P. punctatus* has been reported on many species and genera of woody plants (2–4,6,7,13,16), but there are no published reports of occurrence on *Prunus virginiana* or *Amelanchier alnifolia*.

Some published reports of *P. punctatus* do not say if the host was living or dead (2–4,11,16). Overholts (13,14) and others (1,7,9) reported that it is found on dead wood of deciduous trees. David et al (6), however, reported it from France on living stems of *Euonymous europaeus* L., and Stack and Walla (17) cited several living hosts.

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MATERIALS AND METHODS

Woody plants at 503 sites in nine counties were examined in 1979–1981. Sites included various types and ages of shelterbelts, farmstead windbreaks, wildlife and recreation plantings, and natural stands. The counties surveyed were selected as representative of the entire state and included all major soil types in the state. Notation was made of all diseases found at each site and samples were collected for laboratory diagnosis. Observations of *P. punctatus* were also made in 1978 and 1982 during surveys of stem decay of *Fraxinus pennsylvanica* Marsh. in North Dakota Prairie States Forestry Project (PSFP) shelterbelts (19,20). Ages of plantings were determined by examining records (farmstead demonstration plantings, PSFP shelterbelts), by querying owners, or by estimates.

Sporocarps from various locations and from all host species on which they were found were identified on the basis of macroscopic and microscopic characteristics (7,11,16). Diagnostic characters of *P. punctatus* are brown, resupinate sporocarps; globose, dextrinoid basidiospores; and absence of setae. In addition, reference cultures from sporocarps and from associated decayed wood were obtained from various locations and hosts. Cultures were grown on 2% malt agar.

RESULTS

Woody plants on which sporocarps of *P. punctatus* were found in North Dakota were *Caragana arborescens* Lam., *Fraxinus pennsylvanica*, *Prunus americana*, *P. virginiana*, *Rhamnus cathartica* L., *Salix alba* L., *S. alba* var. *vitellina* (L.) Stokes, *S. bebbiana* Sarg., *S. eriocephala* Michx., and *Syringa vulgaris* L. (Table 1). The fungus was observed on living and dead plants of each species except *P. virginiana* and *S. alba*, on which it was observed only on dead plants. Living *F. pennsylvanica* and *C. arborescens* were infected at 100 and 92%, respectively, of the sites where the fungus was found on those hosts.

P. punctatus is usually associated with a canker rot of living hosts; that is, it apparently causes an expanding dead area on the stem of a living plant and at the same time causes a white rot of the wood. Sporocarps of *P. punctatus* were occasionally found on live hosts where cankers were not apparent. All closely examined cankers with *P. punctatus* sporocarps surrounded and appeared to have originated at branch stubs.

Incidence of *P. punctatus* as found in disease surveys is shown in Table 1. Specimens of *P. punctatus* found other than during surveys were on *R. cathartica* in Cass County, *C. arborescens* in Cass and Ward counties, *F. pennsylvanica* in Richland County, *S. alba* var. *vitellina* in Ramsey County, and *S. bebbiana* in Bottineau County. Ages of plants on which *P. punctatus* was found ranged from 21-yr-old *P. americana* to about 90-yr-old *F. pennsylvanica*. Of 526 sites examined during the general shelterbelt disease survey and the survey of stem decay in *F. pennsylvanica*, 227 had host species older than 20 yr. Sporocarps of *P. punctatus* were found at 36% of the 227 sites that had hosts older than 20 yr. The fungus was found in four native stands in Ramsey County and one native stand in Bottineau County. All other observations of *P. punctatus* were in planted stands.

Table 1. Incidence of *Phellinus punctatus* in North Dakota by host and portion of the state

Host	Incidence[w]		
	Western counties[x]	Eastern counties[x,y]	All counties[x,y]
Caragana arborescens (a,c,d,e)[z]	1/68	12/63	13/131
Fraxinus pennsylvanica (b,d)	7/74	65/115	72/189
Prunus americana (e)	1/22	8/46	9/68
P. virginiana (a,e)	0/29	5/54	5/69
Rhamnus cathartica (a,c,e)	0/11	3/7	3/18
Salix alba (b,e)	0/6	2/14	2/20
S. alba var. *vitellina* (a,e)	...	...	...
S. bebbiana (a,e)	...	...	...
S. eriocephala (a,e)	0/3	3/4	3/7
Syringa vulgaris (a,c,e)	1/19	1/10	2/29
All hosts	8/92	74/135	82/227

[w] Number of sites where *P. punctatus* was found on a host species/total sites with hosts older than 20 yr.

[x] Data from general shelterbelt disease survey, 1979–1981 (western counties: Bowman, Burke, McKenzie, Oliver; eastern counties: McIntosh, Ramsey, Ransom, Stutsman, Traill).

[y] Data from survey of stem decay of *Fraxinus pennsylvanica* in Prairie States Forestry Project shelterbelts in eastern counties, 1978 and 1982 (Cass, Grand Forks, Ramsey, Ransom, Stutsman).

[z] Lowercase letters in parentheses: a = new host species record; b = new host species record from these surveys but reported earlier (17); c = new host genus record; d = M. J. Larsen, Center for Forest Mycology Research (CFMR), U.S. Forest Service, Forest Products Laboratory, Madison, WI 53705, confirmed my identification of specimens of *P. punctatus* from these hosts (deposited in CFMR herbarium); e = R. L. Gilbertson, University of Arizona, Tucson 85721, confirmed my identification of specimens of *P. punctatus* on these hosts (deposited in NDSU Plant Pathology Department Herbarium).

Incidence within counties ranged from 0% (in McKenzie and Bowman counties) to 88% (in Ramsey County) of all sites that had hosts older than 20 yr. It was observed at many more sites (74 compared with eight) and on a higher percentage of sites (55 compared with nine) that had hosts older than 20 yr in eastern counties than in western counties. *P. punctatus* was found more often on individual host species in eastern counties than in western counties. It was found most often on *F. pennsylvanica*.

DISCUSSION

The occurrence of *P. punctatus* sporocarps on living hosts is important. Where host condition was given, only dead hosts have been reported elsewhere in North America. Of special interest is its occurrence on living *F. pennsylvanica* and *C. arborescens*; both are very important in shelterbelt planting programs throughout the Northern Plains. Heretofore, no important stem decay fungi were known on *C. arborescens* and only one stem decay fungus, *Perenniporia fraxinophila* (Pk.) Ryv. (formerly *Fomes fraxinophilus* (Pk.) Cooke), was reported as a potential problem on *F. pennsylvanica* in shelterbelts (20). Data on incidence of *P. punctatus* among counties and hosts in North Dakota show that it is widespread, has a relatively wide host range, and occurs in many sites (36% detected) that have hosts older than 20 yr. Occurrence on 38% of the sites that have *F. pennsylvanica* older than 20 yr is of immediate concern because *F. pennsylvanica* has been planted often in the last 20 yr and many of these shelterbelts will soon be older than 20 yr.

Differences between eastern and western North Dakota sites surveyed included types of shelterbelts examined. The PSFP shelterbelts were planted from 1935 to 1942 in all eastern counties but not in any western counties surveyed. They made up 61% of the sites surveyed that had hosts older than 20 yr in eastern counties. *P. punctatus* was found in 73% of the PSFP shelterbelts. The most common type of planting older than 20 yr examined in western counties was farmstead demonstration plantings (experimental plantings around farmsteads, established in 1916–1948 in western counties only, as a cooperative program between landowners and the USDA Northern Great Plains Research Laboratory in Mandan, ND). They made up 59% of the sites surveyed in western counties that had hosts older than 20 yr. *P. punctatus* was found in 9% of the farmstead demonstration plantings. Reasons for differing infection levels in PSFP shelterbelts and farmstead demonstration plantings are not known.

The incidence values (Table 1) among sites may be underestimates because of three factors: 1) not noticing or recognizing the fungus on trees observed, 2) not observing all trees at each site, and 3) failure to detect infected trees that lacked sporocarps.

The incidence of *P. punctatus* sporocarps on *F. pennsylvanica* in PSFP shelterbelts (19, J. A. Walla, *unpublished*) indicates that this pathogen is an important decay fungus. In 1978, sporocarps of *P. fraxinophila* and *P. punctatus* were found in 47 and 43% of the shelterbelts and on 0.3 and 0.1% of the living *F. pennsylvanica* examined, respectively (20, J. A. Walla, *unpublished*). In 1982, incidence had increased to 79 and 100% of the shelterbelts and 1.0 and 3.6% of the living *F. pennsylvanica* examined, respectively (19, J. A. Walla, *unpublished*). Based on sporocarp incidence, *P. punctatus* is the most important stem decay fungus on *F. pennsylvanica* in North Dakota PSFP shelterbelts. Based on incidence reported here, *P. punctatus* appears to be one of the most important stem decay fungi on several woody plants in North Dakota. Volume of decay or stem breakage caused by *P. punctatus* relative to other decay fungi remains to be quantified.

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