INONOTUS RICKII (ANAMORPH: *PTYCHOGASTER CUBENSIS*): A wood-decaying fungus of importance to Florida hardwoods[1]

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In 1896, Patouillard distinguished a gasteroporous polypore (Basidiomycotina) from among Cuban specimens identified as *Fistulina hepatica* (Huds.) Fr. in the Paris Museum of Natural History (3). He named this organism *Ptychogaster cubensis* n. sp. (Deuteromycotina) based on its conidial fructifications. In 1908, Patouillard noted that his *Ptychogaster* specimens were apparently the conidial stage of a polyporus basidiomycete collected by Rick in Brazil. He named this fungus *Xanthochrous Rickii* n. sp. (4), an organism later referred to as *Polyporus Rickii* (Pat.) Sacc. & Trott. (6). More recently, Reid (5) transferred this organism to the genus *Inonotus* where it is currently recognized as *Inonotus rickii* (Pat.) Reid having a *Ptychogaster cubensis* Pat. anamorph (2). If Davidson *et al.* (1) are correct with respect to the apparent conspecificity of several *Ptychogaster* specimens they examined, *I. rickii* (and/or its anamorph) is/are widely distributed in the tropics and subtropics (southern U.S., Brazil, Peru, Hawaii, India, Haiti, the Bahamas, and Cuba). Gilbertson and Ryvarden (2) state that in North America the fungus is known to occur only in Florida, Louisiana and Arizona.

HOSTS & PATHOLOGICAL IMPORTANCE: *Inonotus rickii* infects the branches and stems of a variety of living hardwoods, causing a white to yellow-brown decay of the heartwood. In some hosts, this decay progresses into the sapwood as well. The fungus occurs on waxmyrtle (*Myrica cerifera* L.) and several species of oak (*Quercus* spp.) in the southeastern United States. In Arizona, it occurs primarily on *Cercidium* and *Parkinsonia* spp., and has been collected once from a *Casuarina* sp. It is apparently quite common on ornamental palo verde (*Cercidium floridum* Benth. ex A. Gray) trees in the Tucson area, resulting in tree decline and mortality (2). In Florida, the author has observed the organism on waxmyrtle, and its associated decay in waxmyrtle, laurel oak (*Q. laurifolia* Michx.), and apparently on one occasion in silver maple (*Acer saccharinum* L.). It is very common, especially on waxmyrtle, in the southern portions of peninsular Florida. The author has observed it once in its ptychogastric stage on waxmyrtle in Gainesville. The organism appears to be very aggressive on this host, causing tree dieback and decline. According to Davidson *et al.* (1) "it is reasonable to expect it to occur in numerous other hosts". They examined specimens reportedly from a fruit tree, fig (?), citrus, *Acacia koa* A. Gray, and *Tamarindus indicus* L.

RECOGNITION: Infection by *I. rickii* is best recognized by the very distinctive fructifications of its *P. cubensis* anamorph (Fig. 1A). Gilbertson and Ryvarden (2) describe these structures as developing from cushion-like masses of soft, fleshy tissue which exude droplets of clear liquid from their surfaces, at first moist and velvety to the touch and resembling sessile *Inonotus* basidiocarps, but without a hymenial (tube) layer (Fig. 1B). Later, these structures assume a drier and firmer texture as they become "crumbly and dusty" due to the formation of chlamydospores. Davidson *et al.* (1), apparently describing mature fructifications, not their developmental stages, describe these structures as variably compact to loose and somewhat plumose aggregations of hyphae 2.5-5.0 cm in length radiating outward and downward from central points of attachment (typically, but not limited to branch stubs). These beard-like masses are often powdery and red-brown in color due to accompanying masses of dark brown, thick-walled spores ["chlamydospores", *sensu* Gilbertson and Ryvarden? (2)] apparently produced in chains on and among the radiating hyphae. Davidson *et al.* (1) describe their "spores" as variable in shape but usually globose, 8-13 µ in diameter, thick walled and dark brown. Gilbertson and Ryvarden (2) describe their "chlamydospores" as thick-walled, dark reddish brown..., irregular in shape, smooth, globose to ellipsoid or often with an elongated appendage, 10-30 µ in widest diameter. Patouillard (3) describes the spores produced in fructifications as "conidia" having very

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variable forms: some globose, some ovoid, some truncated at each end, others tapered at the ends and fusiform, and varying in color from pale rust to intense russet, reddish, auburn, or brown.

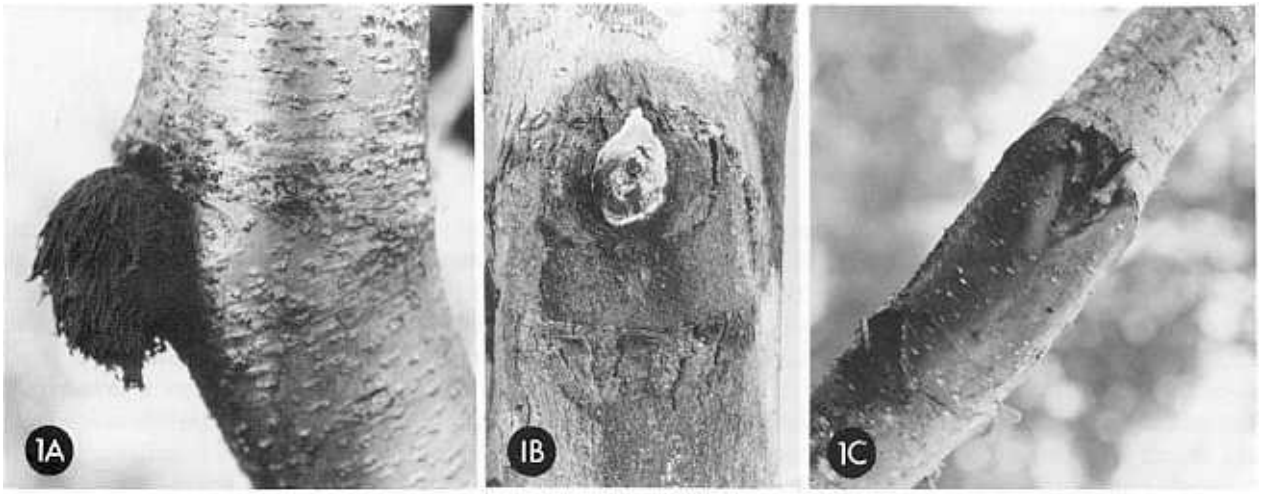

Fig. 1. External indicators of infection by *Inonotus rickii* (anamorph: *Ptychogaster cubensis*) on various hardwoods in Florida. A) Dusty red-brown, beard-like fructification of *P. cubensis* at branch stub of waxmyrtle. B) Cushion/pad-like structure (an apparent sporocarp initial) at branch stub of infected silver maple. C) Sap exudation ("bleeding") and associated bark staining at branch stub of infected waxmyrtle.

Despite Patouillard's (4) observation that the fungus is remarkable due to its simultaneous production of basidiospores in tubes and conidia in the tramal tissues of the same fructifications, the teleomorph (basidiospore stage) remains unknown in the U.S. (2). Nonetheless, large (up to 250 x 15 µ), brown setal hyphae are apparently characteristic of both the anamorph and teleomorph stages of the organism (1, 2). Setal hyphae and abundant chlamydospores (conidia) are typical of laboratory cultures as well. Detailed cultural characteristics are provided by Davidson *et al.* (1).

Branch stubs of trees (particularly waxmyrtle) infected with *I. rickii* (anamorph: *P. cubensis*) often "bleed" or exude copious quantities of sap. Subsequently, the surrounding bark may appear wet and stained a light to dark brownish color (Fig. 1B-C). Internally, decayed wood is typically white to yellow brown and often separated from sound wood by narrow zones of distinctly dark-stained (oxidized?) wood tissues (Fig. 2A-C). Hard, sterile masses of fungal tissues may form at and within branch stubs (Fig. 2C).

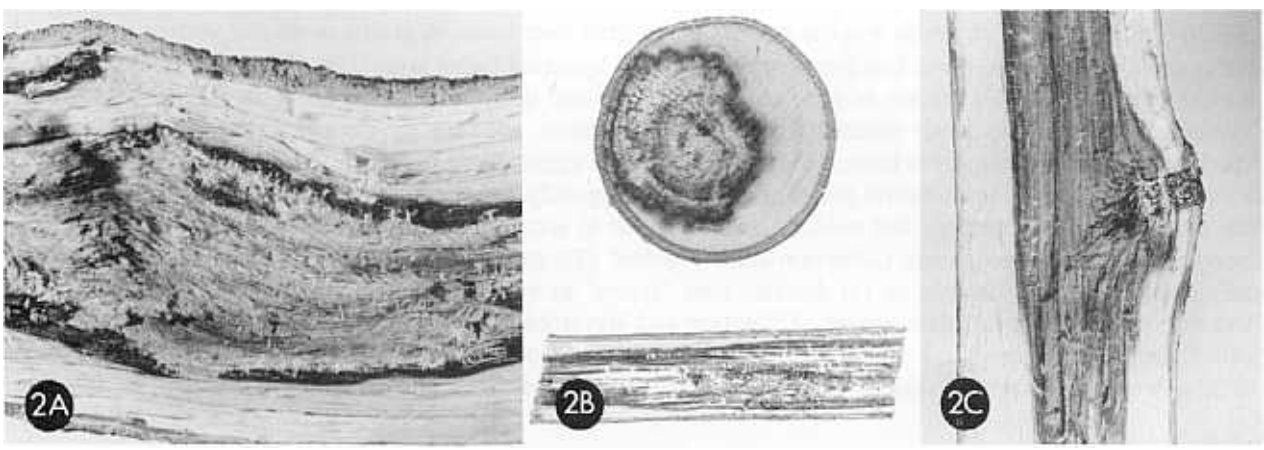

Fig. 2. Advanced wood decay typical of that caused by *Inonotus rickii* (anamorph: *Ptychogaster cubensis*) in A) laurel oak, B) waxmyrtle, and C) silver maple. Note 1) the distinct, narrow darkened zones of sound wood at the margins of the decayed wood and 2) the dark mass of sterile hyphae at the branch stub of the silver maple.

CONTROL: Prevention is the key to control. Avoid the purchase or planting of infected trees. Prune healthy trees properly and avoid injury to susceptible hosts. Infection apparently occurs through broken branch stubs, stem wounds, and pruning scars.

SURVEY AND DETECTION: Look for dusty or powdery, red-brown, beard-like fructifications at branch stubs, and bark fissures. Also, be alert for the occurrence of dark red-brown to coffee-brown exudation and bark staining at the same foci. Examination of interior wood decay provides additional evidence. Rely upon microscopic observation of characteristic fungal features and/or laboratory cultural analyses for confirmation.

LITERATURE CITED

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