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BRIEF ARTICLES

ARTHROGRAPHIS CUBOIDEA CAUSING PINK STAIN OF SODIUM PENTACHLOROPHENOXIDE-TREATED RED OAK[1]

E. L. SCHMIDT AND M. G. DIETZ

Department of Forest Products, University of Minnesota, St. Paul, Minnesota 55108

In the course of inspecting a 10-mo-old trial of anti-stain chemicals as dip treatments for red oak (*Quercus rubra* L.) lumber, we observed a soluble-type, jasper pink [R XIII, (**9**)] stain on all 15 boards of one stack. These boards had been dipped in a commercial formulation containing 1.5% (a.i.) sodium pentachlorophenoxide (SP). Although stains of wood generally described as red, crimson, or pink are occasionally produced by species in genera such as *Penicillium* or *Fusarium* (**7, 10**), *Confertobasidium* (**6**), or *Geotrichum* (**3, 11**), these fungi have not been reported to cause stain in SP-protected wood. Discoloration of SP-treated lumber by *Ascocybe* (=*Cephaloascus*) or, rarely, *Trichoderma* species has been reported (**4, 5, 16**), but such superficial fungus growth may easily be removed by planing as compared to the penetrating (8 mm below surface) stain we encountered.

This report documents the fungus responsible for the stain, and includes preliminary data on its SP tolerance *in vitro* as well as its capacity to decay wood.

Twenty small wood slivers from a representative board with stain were surface-flamed and plated onto malt extract agar (MEA: 1% Difco malt extract, 2% Difco agar). In addition to common wood-inhabiting molds (e.g., *Penicillium* and *Paecilomyces* species), all plates supported a rapidly growing fungus forming pale yellow to buff, flocculent colonies which produced a diffusable pink pigment. Monoxenic cultures were identified as *Geotrichum microsporum* Smith (**14**). This species was transferred to *Briosia* by von Arx (**2**), and more recently, has been designated as *Arthrographis cuboidea* (Sacc. et Ellis) Sigler (**12, 13**). This report is the first to document this species as associated with pink stain of red oak.

Red oak sapwood and heartwood blocks (19 mm cubes, 10 each) were wetted to 75% moisture content (oven-dry basis), autoclaved (30 min, 121 C), dipped in a conidial suspension of *A. cuboidea* (harvested from a single-spored isolate), and suspended in sealed jars over water. Other sterile blocks placed in deep glass dishes containing MEA were inoculated at the wood-agar junction with one cm^2 plugs from actively-growing cultures. A replicate set of sterile blocks was immersed for 3 min in a solution containing 1.2% (a.i.) SP, dried in a microvoid hood for 24 h, wetted to 75% moisture with sterile water, and then inoculated and incubated as were the untreated blocks.

Pink stain identical to that observed on the lumber developed to varying degrees on 80% of all test blocks within 4 wk. Sapwood supported more extensive staining than heartwood. Isolations from the stained blocks confirmed *A. cuboidea* as the only fungus present. The colony development was less flocculent on SP-treated wood, but treated blocks were overgrown.

The SP tolerance of this isolate of *A. cuboidea* was determined *in vitro* by streaking conidia onto 1% MEA containing 0, 0.25, 0.5, 1, 5, 10, and 20×10^3 ppm SP (w/w: added to cooling, sterile medium). Also, conidia and ascospores

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of *Cephaloascus fragrans* Hanawa (ATCC 24950) were tested for comparison. Colonies of *A. cuboidea* developed on all amended plates, although crystallization of SP was noted in agar containing more than 0.5% (5000 ppm by weight), whereas *C. fragrans* failed to grow at concentrations exceeding 250 ppm. The *A. cuboidea* colonies developing from conidia were compact and grew very slowly on plates containing more than 500 ppm SP, reaching a diam of only 4–5 mm after 3 wk on the plates containing more than 5000 ppm SP. Even such limited development would make this fungus unusually tolerant to SP as compared to published thresholds for other fungi considered "penta tolerant": e.g.: *C. fragrans*—280 ppm (**4**), *Trichoderma* sp.—120 ppm (**8**), and *Rhinocladiella atrovirens* Nannf.—12 ppm (**17**).

As other isolates of *A. cuboidea* have been described as strongly cellulolytic (**12, 13**), the potential of our isolate to decay wood was tested using red oak sapwood and heartwood blocks in a standard 3-month soil block test (**1**). Also, we conducted qualitative estimation of cellulase production using dye release from cellulose-azure (Calbiochem, San Diego, Calif.) in medium tubes (**15**).

Mass loss from the 36 blocks tested averaged less than 1% after 3 months, indicating no decay potential for *A. cuboidea.* The cellulose-azure tests were also negative (no dye release into basal medium) after 2 wk whereas a cellulolytic culture of *Asperigillus niger* van Tieghem (ATCC 9644) turned tubes dark blue within 1 wk. After 1 yr of storage and subculture, our *A. cuboidea* isolate was retested by the tube method and did produce a faint color after 10 da, suggesting very low cellulase production. We conclude that our isolate (on deposit at CMI as IMI 278529) would not affect the use of colonized lumber in structural applications.

As the soluble pink stain caused by *A. cuboidea* (=*Geotrichum* sp.) is reported (**3**) only from wood incubating for prolonged periods at relatively high moisture content (in the fungicide trial of red oak, polyethylene was draped over the lumber piles to encourage fungal development), it is unlikely that its tolerance to SP will cause problems in commercial settings where wood is dried after anti-stain treatment. Investigations continue to assess potential of this fungus for penta degradation or detoxification.

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Key Words: *Arthrographis,* pink stain, oak, sodium pentachlorophenoxide.

LITERATURE CITED

1. **American Society for Testing and Materials.** 1971. Standard method for accelerated laboratory test of natural decay resistance of woods. ASTM Design. D, Philadelphia, Pennsylvania. 2017.
2. **Arx, J. A. von.** 1972. On *Endomyces, Encomycopsis* and related yeast-like fungi. *Antonie van Leeuwenhoek Ned. Tijdschr. Hyg.* **38**: 289–309.
3. **Chidester, M. S.** 1940. A pink stain of wood caused by a species of *Geotrichum. Phytopathology* **30**: 530–533.
4. **Cserjesi, A. J.** 1967. The adaptation of fungi to pentachlorophenol and its biodegradation. *Canad. J. Microbiol.* **13**: 1243–1249.
5. **Davidson, R. W., and F. Lombard.** 1954. A brick red stain of stika spruce and other wood substrata. *Phytopathology* **44**: 606–607.
6. **Eslyn, W. E.** 1981. Ability of isolates of *Confertobasidium olivaceo-album* to stain and decay wood. *Canad. J. Forest Res.* **11**: 497–501.
7. **Hedgcock, G. C.** 1906. Studies upon some chromogenic fungi which discolor wood. *Ann. Rep. Missouri Bot. Gard.* **17**: 59–114.
8. **Lew, J. D., and W. W. Wilcox.** 1981. The role of selected Deuteromycetes in the soft-rot of wood treated with pentachlorophenol. *Wood & Fiber* **13**: 252–264.

9. **Ridgway, R.** 1912. *Color standards and color in nomenclature.* Publ. by the author, Washington, D. C. 43 p. + 53 pl.
10. **Scheffer, T. C., and R. M. Lindgren.** 1932. Some minor stains of southern pine and hardwood lumber and logs. *J. Agric. Res.* **45**: 233–237.
11. ———, **and** ———. 1940. Stains of sapwood and sapwood products and their control. USDA Agric. Tech. Bull. No. 714. 124 p.
12. **Sigler, L., and J. W. Carmichael.** 1976. Taxonomy of *Malbranchea* and some other Hyphomycetes with arthroconidia. *Mycotaxon* **4**: 349–488.
13. ———, **and** ———. 1983. Redisposition of some fungi referred to *Oidium microspermum* and a review of *Arthrographis. Mycotaxon* **18**: 495–507.
14. **Smith, G.** 1962. Some new and interesting species of micro-fungi: III. *Trans. Brit. Mycol. Soc.* **45**: 387–394.
15. **Smith, R. E.** 1977. Rapid tube test for detecting fungal cellulase production. *Appl. Environ. Microbiol.* **33**: 980–981.
16. **Wells, D. E.** 1954. *Ascocybe,* a new genus of lower Ascomycetes. *Mycologia* **46**: 37–51.
17. **Zabel, R. A., C. J. K. Wang, and F. C. Terracina.** 1982. The fungal associates, detection and fumigant control of decay in treated southern pine poles. EPRI Research Rpt. EL-2768. SUNY, Syracuse, New York. 104 p.

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MORRISIELLA, A NEW GENUS OF SYNNEMATOUS HYPHOMYCETE

U. N. SAIKIA

Mycology Research Section, Assam Agricultural University, Jorhat-785013, Assam, India

AND

A. K. SARBHOY

Division of Mycology & Plant Pathology, Indian Agricultural Research Institute, New Delhi-110012

A synnematous hyphomycete of unique morphology was found on a split bamboo in Jorhat, Assam. Examination of the material revealed several significant differences and combination of characters with *Podosporium* and warranted erection of a new genus for its accomodation.

Morrisiella Saikia et Sarbhoy, gen. nov.

Synnemata fusca, erecta, subcylindrica, ad basim incrassata parte longa fertili praedita. Stipes synnematicus conidiophoris atro-fuscis usque fere atris septatis dense compactis efformatus. Cellulae conidiogenae monoblasticae, discretae, determinatae, ampulliformes, in conidiophoris a latere dipositae vel terminales. Conidia obclavata, recta vel curvata, aureobrunnea vel olivaceo-brunnea, solitaria, multipseudoseptata.

Species typica: *Morrisiella indica* Saikia et Sarbhoy.

Synnemata dark, erect, somewhat cylindrical with expanded base and a long fertile portion. Synnematal stalk composed of dark brown to almost black, septate, closely compacted conidiophores. Conidiogenous cells monoblastic, discrete, determinate, ampulliform, mostly lateral on the conidiophores or sometimes terminal. Conidia obclavate, straight or curved, golden brown to olivaceous brown, solitary, multipseudoseptate.