Diseases Caused by Bacteria and Phytoplasmas

First Report of *Cedecea neteri* Causing Yellow Rot Disease in *Pleurotus pulmonarius* in China

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Pleurotus pulmonarius is a popular edible fungus and widely cultivated in many areas of China. In June 2018, yellow rot (more than 10% incidence) was found on the first crop of *P. pulmonarius* fruiting bodies in a mushroom factory in Nanning, Guangxi Province, China. At first, yellow water-soaked lesions appeared in the infected fruiting bodies. Lesions then spread, and purulent tissues were formed. Severe rot induced production of deformed fruiting bodies and offensive odor. Internal sections of the diseased tissue (approximately 0.5 × 0.5 cm) were sterilized in 75% alcohol for 30 s, rinsed three times with sterile deionized water, crushed, and suspended in sterile deionized water. The suspension was spread on Luria-Bertani (LB) medium. After incubation at 30°C for 2 days, dominant bacterial colonies were oyster white, smooth, convex, and circular. Individual colonies were transferred two times to LB medium using the conventional streak plate techniques to obtain pure cultures. The cells were gram-negative, short rods, motile, and no capsules or endospores were observed. Using a BoJian gram-negative bacteria biochemical analysis kit (5 CARDS, Hopebio, Qingdao, China), data were obtained and analyzed, showing that the isolated strain belongs to the *Cedecea* genus (positive for β-galactosidase, citric acid, arginine, sucrose, mannitol, sorbitol, D-glucose,

gelatin hydrolysis, and Voges-Proskauer test but negative for H₂S, urease, oxidase, indole, rhamnose, melibiose, amygdalin, lysine, ornithine, lactose, inositol, and arabinose). Amplified 16S rDNA gene sequences (1,424 bp, GenBank accession no. MT925570) of the isolate using the universal primers 27f and 1492r (Lane 1991) exhibited 99.86% identity with *Cedecea neteri* M006 (CP009458.1). Based on its morphological characteristics, 16S rDNA sequences, and biochemical test results, the strain was identified as *C. neteri*. Pathogenicity tests for this strain were performed with bacterial suspensions (approximately 1 × 10⁸ CFU/ml) after growing for 24 h in LB medium at 30°C. Mycelia of *P. pulmonarius* were cultivated for 60 days in plastic bags. Then young fruiting bodies were formed after being induced with low temperature stimulation to serve as a host source. The prepared bacterial suspensions were directly sprayed onto the surface of three bags of fruiting bodies; another three bags were sprayed with sterile deionized water as a negative control. All inoculated fruiting bodies were then incubated at 20°C with 90 to 95% relative humidity. All experiments were repeated three times. After 2 days, all the fruiting bodies inoculated with the bacterial suspensions showed yellow water-soaked lesions, and the normal growth of the fruiting bodies was inhibited. An offensive odor then developed along with a severe soft rot that was similar to the disease symptoms observed under natural conditions. The fruiting bodies of the negative control grew healthily with no symptoms. Koch's postulates were fulfilled by isolating bacteria from lesions on artificially inoculated fruiting bodies that were identical to the original isolates based on morphological characteristics, 16S rDNA sequences, and biochemical test results. *C. neteri* was formally reported as a pathogen to humans that could cause bacteremia (Farmer et al. 1982). Recently, it has also been reported causing soft rot disease on mushrooms of *Pholiota nameko* (Yan et al. 2018) and yellow sticky disease on mushrooms of *Flammulina velutipes* (Yan et al. 2019). However, to the best of our knowledge, this is the first report of *C. neteri*-induced yellow rot disease of *P. pulmonarius* in China.

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