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plant disease

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Disease Notes

Bacterial Wilt of Mulberry (*Morus alba*) Caused by *Enterobacter cloacae* in China

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In August of 2006, a new bacterial disease was noted in Hangzhou mulberry orchards of Zhejiang Province, China where bacterial wilt of mulberry caused by *Ralstonia solanacearum* was previously reported (3). In the summer, the disease caused severe wilt, especially on 1- or 2-year-old mulberry plants, that resulted in premature plant death. Leaf wilt symptoms generally started on older leaves at the bottom of the plant and spread to the younger leaves. The leaves of infected plants became withered and dry, turned dark brown, and eventually the plants became defoliated. The root xylem of infected plants was moist and discolored with brown stripes. The phloem was asymptomatic, however, in severe infections, the phloem was decayed. The observation of wilting proceeding from the bottom of the plant to the top distinguishes this disease from bacterial wilt caused by *R. solanacearum*. Five bacterial strains isolated from infected mulberry plants showed characteristics similar to those of the standard reference strain of *Enterobacter cloacae* subsp. *cloacae* IBJ0611 from China, but differed from *R. solanacearum* IBJ35, *E. cancerogenus* LMG2693^T, and *E. cloacae* subsp. *dissolvens* LMG2683^T from the University of Gent, Belgium in phenotypic tests, including the Biolog Identification System version 4.2 (Biolog Inc., Hayward CA), pathogenicity tests, transmission electron microscopy (TEM, KYKY-1000B, Japan) observation, and gas chromatographic analysis of fatty acid methyl esters (FAMES) using the Microbial Identification System (MIDI Company, Newark, DE) with the aerobic bacterial library (TAB50). Isolates were gram negative, facultative anaerobic, rod shaped, 0.3 to 1.0 × 1.0 to 3.0 μm with peritrichous flagella. Colonies on nutrient agar were light yellow, smooth, circular, entire, and convex with no green fluorescent diffusible pigment on King's medium B (3). Weak hypersensitive reaction was observed on tobacco 3 days after inoculation. All five strains were identified as *E. cloacae* with Biolog similarity of 0.662 to 0.863 and FAMES similarity of 0.632 to 0.701. Inoculation of 10 6-month-old intact mulberry plants of cv Husang with cell suspensions containing 10⁹ CFU/ml by pinprick at the base of the stem reproduced symptoms observed in natural infections. No symptoms were noted on the two control plants inoculated by the same method but with sterilized distilled water. The bacterium was reisolated from the symptomatic mulberry plants. *E. cloacae* has been reported from the United States as the cause of internal yellowing of papaya fruits (1) and rhizome rot of edible ginger (2). To our knowledge, this is the first report of mulberry wilt caused by *E. cloacae* in China.

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Identification and characterization of the *Enterobacter* complex causing mulberry (*Morus alba*) wilt disease in China

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