Diseases Caused by Bacteria and Phytoplasmas

First Report of Bacterial Leaf Spot Disease of *Broussonetia papyrifera* Caused by *Pseudomonas syringae* pv. *actinidiae* in China

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Funding: This study was supported by the National Natural Science Foundation of China (31701974; 31901980) and the Science and technology program funded by Wuhan Science and Technology Bureau (2018020401011307). Plant Dis. 105:696, 2021; published online as <https://doi.org/10.1094/PDIS-07-20-1527-PDN>. Accepted for publication 2 October 2020.

Broussonetia papyrifera (paper mulberry) is a deciduous tree with a number of uses and is native to northeastern Asia. Because of its fast-growing nature and high tolerance to dust, smoke, and high temperatures, paper mulberry is regarded as an important and economically valuable component of a biologically diverse community and is used extensively in several areas including medicine, animal husbandry, paper making, weaving, afforestation, and light industry (Mei et al. 2016). From June to August of 2019, symptoms on paper mulberry trees were observed in Shiniushan village, Sanhua town, Xishui County, Hubei province of China. Typical symptoms on leaves included small, angular, brown spots surrounded by yellow haloes. These spots coalesced into necrotic areas. The incidence was around 30%, which threatened the survival and reduced the yield of paper mulberry. To identify the causal pathogenic organism, leaf samples from 10 different infected trees were collected every 2 weeks and isolations made over 3 months. Several circular, flat, granulated colonies with entire margins were isolated on King's B medium. The biochemical and physiological characteristics of 30 typical strains were tested and listed as following: gram negative, aerobic, rod shaped, and nonfluorescent on King's B

medium; positive for carbohydrate utilization (sucrose, glucose, fructose, and arabinose), levan production, hypersensitive on tobacco, potato, and tomato; and negative for oxidase, arginine dihydrolase, tyrosinase, and urease activity, gelatin liquefaction, and reduction of nitrate. *Pseudomonas syringae* pv. *actinidiae* (*Psa*) pathovar-specific primers PsaF1/PsaR2 (280-bp product) identified two representative strains as *Psa* (Rees-George et al. 2010). BLAST analysis further confirmed that the 16S rDNA region amplified by primers 27F/1492R (NCBI accession nos. MT472100 and MT472101) shared 99.84 and 99.77% identity with the *Psa* type strain ICMP 18884 (CP011972), respectively (Weisburg et al. 1991). For 10 typical strains, pathogenicity was confirmed by spraying a bacterial suspension (10^8 CFU/ml) onto fifty 1-year-old seedlings of *B. papyrifera*, with five seedling repetitions for each strain. Symptoms of infection similar to those observed initially in the field were detected within 7 days after incubation at 25°C with 80 to 85% humidity. No symptoms were observed on control plants. The pathogen was reisolated from symptomatic leaves and reidentified as *Psa* by morphological characteristics and sequencing. To our knowledge, this is the first report of *Psa* causing bacterial leaf spot disease on *B. papyrifera* in China. *Psa* has been reported as a pathogen causing bacterial canker of kiwifruit worldwide, resulting in severe economic losses to kiwifruit growers (McCann et al. 2017). As a host of *Psa*, *B. papyrifera* may be a source of inoculum for nearby kiwifruit orchards, and consequently effective control measures should be taken to manage this disease.

References:

- McCann, H. C., et al. 2017. Genome Biol. Evol. 9:932.
- Mei, C.-J., et al. 2016. Eur. J. Plant Pathol. 145:203.
- Rees-George, J., et al. 2010. Plant Pathol. 59:453.
- Weisburg, W. G., et al. 1991. J. Bacteriol. 173:697.

The author(s) declare no conflict of interest.

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Keywords: fruit, small fruits, prokaryotes, pathogen detection

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