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First Report of *Xanthomonas vasicola* Causing Bacterial Leaf Streak on Corn in the United States

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First Report of *Xanthomonas vasicola* Causing Bacterial Leaf Streak on Corn in the United States

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In 2014 and 2015, *Zea mays* samples (field, seed, and popcorn) were submitted to the Plant and Pest Diagnostic Clinic at the University of Nebraska–Lincoln displaying long, dark, yellow to brown, water-soaked, linear lesions confined to the interveinal spaces of the leaves. Initial symptoms appeared as small water-soaked flecks that expanded between veins to form irregular lesions. In some cases, the disease progressed to cover 40 to 50% of the leaf area. The disease was confirmed by symptom expression and bacterial streaming in 41 counties in Nebraska as well as Yuma Co., Colorado, and Phillips Co., Kansas, both contiguous to Nebraska. Tape mounts taken from the abaxial and adaxial sides of the leaf revealed no fungal sporulation. However, excised leaf sections exhibited significant bacterial streaming. Yellow, mucoid bacteria were isolated on nutrient broth yeast extract agar (NBY) from symptomatic leaf tissue. Pathogenicity of the isolates was confirmed by spray-inoculation of *Z. mays* hybrid DKC 61-88 with a bacterial suspension of 10^8 to 10^9 CFU/ml followed by covering the plants with a clear plastic bag for 24 h. Two isolates (201500744 and 201500181) produced identical symptoms to those observed in the field. Corn plants

inoculated with all other isolates and control corn (sprayed with water only) were asymptomatic. Isolates 201500744 and 201500181 are pathogenic on greenhouse-inoculated sorghum (*Sorghum bicolor* cv. Richardson 11043) and sugarcane (*Saccharum officinarum* cv. L99-266). The causal bacterium is rod-shaped, gram-negative, motile, nonfluorescing, and nonfermentative. Based on multilocus sequence analysis (MLSA) of partial 16S rDNA, *rpoD*, *dnaK*, and *gyrB* gene sequences using MEGA6 (Tamura et al. 2013; Young et al. 2008), 201500744 and 201500181 are most similar to *X. campestris* pv. *vasculorum*, also called *X. vasicola* (Vauterin et al. 1995; Wasukira et al. 2014; Young et al. 2008). In fact, the genes analyzed in MLSA were identical among isolates 201500744 and 201500181 and *X. vasicola* isolated from corn and sugarcane. However, the two strains are distinct from *X. campestris* pv. *musacearum* (*Xanthomonas* wilt of banana), *X. v.* pv. *holcicola* (bacterial streak of sorghum), and *X. axonopodis* pv. *vasculorum* type A (sugarcane) (Vauterin et al. 1995). *X. vasicola* has been reported as a pathogen of palms and broom bamboo in addition to corn (Qhobela et al. 1990). *X. vasicola* from corn and sugarcane has also been called *X. v.* pv. *vasculorum* and *X. campestris* pv. *zeae* (Qhobela et al. 1990; Wasukira et al. 2014), though both of these names are invalid. This organism has been reported to occur only on corn in South Africa, causing bacterial leaf streak (Qhobela et al. 1990). Based on these results, we conclude that *X. vasicola* is the causal agent of bacterial leaf streak on corn in the United States. To our knowledge, this is the first report of *X. vasicola* occurring on corn in the United States.

References

- Qhobela, M., et al. 1990. Evidence that *Xanthomonas campestris* pv. *zeae* can be distinguished from other pathovars capable of infecting maize by restriction fragment length polymorphism of genomic DNA. *Can. J. Plant Pathol.* 12:183. <https://doi.org/10.1080/07060669009501024>
- Tamura, K., et al. 2013. MEGA6: Molecular Evolutionary Genetics Analysis, Version 6.0. *Mol. Biol. Evol.* 30:2725. <https://doi.org/10.1093/molbev/mst197>
- Vauterin, L., et al. 1995. Reclassification of *Xanthomonas*. *Int. J. Syst. Evol. Microbiol.* 45:472. <https://doi.org/10.1099/00207713-45-3-472>
- Wasukira, A., et al. 2014. Genome sequencing of *Xanthomonas vasicola* Pathovar *vasculorum* reveals variation in plasmids and genes encoding lipopolysaccharide synthesis, Type-IV pilus and Type III secretion effectors. *Pathogens* 3:211. <https://doi.org/10.3390/pathogens3010211>
- Young, J. M., et al. 2008. A multilocus sequence analysis of the genus *Xanthomonas*. *Syst. Appl. Microbiol.* 31:366. <https://doi.org/10.1016/j.syapm.2008.06.004>



Bacterial leaf streak (*Xanthomonas vasicola*) lesions on a popcorn leaf.



Bacterial leaf streak (*Xanthomonas vasicola*) lesions on the leaves of several neighboring plants.