First Report of Bacterial Stalk Rot of Maize Caused by Dickeya zeae in Mexico

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Disease Notes

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A bacterial disease of maize, bacterial stalk and top rot, was found in the state of Morelos in February 2011, and in the state of Puebla in July 2013, Mexico. In both cases, the incidence of diseased plants was lower than 0.5%. The typical symptoms were a soft rot and darkening of the tissues affecting the stalk and the top of the plant, causing breaking of the stalk. The lesions progressed from the top to below nodes, leaf sheaths and blades, and rotten tissues emitted an unpleasant odor. Eleven diseased plants were collected, and bacterial colonies were isolated from fragments detached from the edges of symptomatic tissues after sterilization with a 0.5% solution of NaClO for 30 s, rinsing three times in sterile water. The sterilized fragments were macerated in drops of distilled sterile water for 10 min and the extract was streaked on King's medium B (agar 15 g, distilled water 1,000 ml, proteose peptone 20 g, K_2HPO_4 1.5 g, $MgSO_4 \cdot 7H_2O$ 1.5 g, glycerol 10 ml). Eight representative strains from Morelos and five from Puebla were selected for identification. All strains were gram-negative, grew at 37°C, showed pectynolitic activity on potato tubers, were positive for indole production, utilized arabinose, galactose, glucose, glycerol, lactose, mannose, melibiose, rafinose, ribose, and sucrose but did not produce acid from arabitol, adonitol, and keto-methyl-glucoside (3,4). Pathogenicity tests were conducted with each strain by inoculating with a syringe four 25-day-old maize seedlings with 10^7 CFU ml^{-1} bacterial cells in the leaf collar. Plants were incubated in the greenhouse at 30°C during the day and 24°C during the night with a 12-h photoperiod, and relative humidity of 93%. The reference strains *Erwinia chrysanthemi* pv *zeae* ATTC29942 and *Dickeya zeae* CFBP 2052 were used as positive controls in laboratory and greenhouses tests. Sterile water was used as negative control. Two days after inoculation, soft stalk rot symptoms developed that were identical to those observed in the field. No symptoms were observed on the negative controls. Diagnostic amplification of DNA by conventional PCR was carried out and yielded the expected amplicon size of 420 bp of the *Dickeya*-specific *pel* gene with the ADE primers set (2). PCR was used to amplify the 16S rRNA gene with the universal primers 27f and 1495r (5) for molecular identification of the 13 strains (GenBank Accession Nos. KJ438941, KJ438942, KJ438943, KJ438944, KJ438945, KJ438946, KJ438947, KJ438948, KJ438949, KJ438950, KJ438951, KJ438952, and KJ438953). The strains *D. zeae* CFBP 2052 and *E. chrysanthemi* pv. *zeae* ATCC 29942 were sequenced as positive controls. A BLAST search with the 13 16S rRNA gene sequences of 1.4 kb were 99% identical to the sequence of *D. zeae* CFBP 2052 (NR_041923). *D. zeae* can be a major disease of maize in tropical and subtropical countries. It is particularly severe under conditions of high temperature and high humidity, but it occurs sporadically. Control of the vector, *Chilo partellus*, can aid disease management (1). To our knowledge, this is the first report of *D. zeae* causing maize stalk rot in Mexico.

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