The cellulase encoded by the native plasmid of Clavibacter michiganensis ssp. sepedonicus plays a role in virulence and contains an expansin-like domain

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Abstract

We are examining the molecular basis of pathogenicity for Clavibacter michiganensis*ssp.*sepedonicus , a gram positive coryneform bacterium that causes the economically important potato ring rot disease. We present here a complete restriction map of the native plasmid pCS1, on which we localize the cellulase gene that it contains. A mutant produced by chemical mutagenesis that does not produce cellulase as well as a naturally occurring strain that does not contain the pCS1 plasmid were both shown to be markedly reduced in virulence on eggplant. Both strains became significantly more virulent after the cellulase gene was introduced into the cells by transformation. The complete nucleotide sequence of the cellulase gene was determined and shown to encode a protein of 727 amino acids which would have a predicted molecular weight of 71.5 kDa. The sequence shows a leader sequence for secretion and two typical cellulase domains (a catalytic domain and a cellulose binding domain). Additionally, we identify an unexpected third domain that shows similarity to a plant protein called expansin, which is believed to interact with cellulose microfibrils during plant cell expansion.

Keywords

cellulase;

Clavibacter michiganensis ssp. sepedonicus;

expansin;

Corynebacterium sepedonicum;

potato ring rot