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**Title:** Carbohydrate-related enzymes of important Phytophthora plant pathogens

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**Abstract:** Carbohydrate-Active enZymes (CAZymes) form particularly interesting targets to study in plant pathogens. Despite the fact that many CAZymes are pathogenicity factors, oomycete CAZymes have received significantly less attention than effectors in the literature. Here we present an analysis of the CAZymes present in the *Phytophthora infestans*, *Ph. ramorum*, *Ph. sojae* and *Pythium ultimum* genomes compared to growth of these species on a range of different carbon sources. Growth on these carbon sources indicates that the size of enzyme families involved in degradation of cell-wall related substrates like cellulose, xylan and pectin is not always a good predictor of growth on these substrates. While a capacity to degrade xylan and cellulose exists the products are not fully saccharified and used as a carbon source. The *Phytophthora* genomes encode larger CAZyme sets when compared to *Py. ultimum*, and encode putative cutinases, GH12 xyloglucanases and GH10 xylanases that are missing in the *Py. ultimum* genome. *Phytophthora* spp. also encode a larger number of enzyme families and genes involved in pectin degradation. No loss or gain of complete enzyme families was found between the *Phytophthora* genomes, but there are some marked differences in the size of some enzyme families. (C) 2014 Elsevier Inc. All rights reserved.

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