

A new portable qPCR technology to identify *Cercospora beticola* in asymptomatic leaves of sugar beet

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Abstract:

Cercospora leaf spot (CLS) of sugar beet is caused by the fungal pathogen *Cercospora beticola*. Management of CLS relies on timely fungicide applications. Efficacy of most fungicides is enhanced when applied prior to *C. beticola* infection. However, host genetics and environmental dynamics make it difficult to predict when *C. beticola* will infect sugar beet in the field. Consequently, there is a need for diagnostic tools that are highly sensitive, specific, and ideally are portable so analyses can be carried out in the field. In this study, we used a portable magnetic induction cyler (MIC) and qPCR probes specific to *C. beticola* to identify the pathogen in asymptomatic leaves harvested from growers fields in southern Minnesota. The MIC has the capability of detecting fluorescent probes during short run times (under 50 min). Starting in the first week of June, leaf samples were harvested from sugarbeet fields over a five-week period. Detection occurred in the first week (10%) and increased throughout the sampling (34%). Fields with early detection eventually (within 14-21 days) had visual symptoms. Consequently, knowledge of asymptomatic *C. beticola* infection informed growers that fungicides should be applied as soon as possible to help minimize the impact of CLS. Since MIC can detect a range of probes, future work utilizing this machine to detect fungicide-resistant *C. beticola* isolates is under development. Taken together, recent advances in portable qPCR technology has laid the groundwork for highly sensitive detection of *C. beticola*.