

BOLTON, MELVIN D., USDA – ARS, Northern Crop Science Laboratory, 1605 Albrecht Blvd. N, Fargo ND 58102-2765. **Cercosporin biosynthesis 2.0 – the new and improved cercosporin biosynthesis cluster from *Cercospora beticola*.**

Cercosporin is a light-activated secondary metabolite effector produced by many *Cercospora* species that contributes to fungal virulence. The metabolic pathway for cercosporin production has been well-characterized and was previously thought to consist of eight cercosporin toxin biosynthesis (*CTB*) genes. By comparing genome sequences of several ascomycetes, we found that the *CTB* cluster has experienced a number of horizontal transfers across a spectrum of plant pathogenic fungi during evolution. Surprisingly, we noticed that these species also harbored an additional complement of genes on one flank of the established *CTB* cluster. Extensive microsynteny outside of the established cercosporin cluster prompted us to test whether the flanking genes in *C. beticola* are also required for cercosporin biosynthesis. Gene disruption of three genes led to the inability of the fungus to produce cercosporin. Taken together, our findings suggest that the *CTB* cluster includes more genes than previously known. A detailed characterization of these novel genes will be reported.