Investigating the co-occurrence of *Verticillium longisporum* and *Leptosphaeria maculans* in Canola and their interactions

Z. Shahedi[1], M.C. Dayarathne[1], M. Sayari[1], J. Mzabi[1], L. Wu[2], S.F. Hwang[2], R. Fredua-Agyeman[2], S.E. Strelkov[2], F. Daayf[1]

Verticllium longisporum (VL) and *Leptosphaeria maculans* (LM) are major Canola pathogens that frequently co-occur across the Canadian prairies. Their interactions within the host and in vitro remain poorly studied. In this study, we examined their competitive dynamics, the outcomes of co-infection, and the aggressiveness of individual isolates under controlled conditions.

Pathogenicity tests on cultivars “45M35” and “Westar” showed clear variability in aggressiveness among isolates of both pathogens, allowing us to identify both highly aggressive and weakly aggressive candidates. These isolates were then used in dual inoculation experiments which produced intermediate disease ratings without evidence of synergistic or additive interactions. Our findings indicate predominantly competitive, rather than cooperative, interactions in planta. Dual-culture assays also demonstrated strong isolate-specific antagonism on potato dextrose agar (PDA) and V8 media. However, when the medium contained canola extract, antagonism was reduced and, in some cases, slight growth stimulation occurred, suggesting that host-derived metabolites can mitigate inhibitory interactions.

Overall, these findings show that the coexistence of LM and VL in Canola is governed by pathogen isolate identity, nutritional environment, and host-associated factors, which collectively moderate competition and contribute to stable co-infection outcomes. This work provides new insight into the ecological and biochemical factors shaping interactions between co-infecting pathogens in canola.