

Integration and Persistence of *Escherichia coli* O157:H7 86-24 in a Naturally-Occurring Water Well Biofilm

© Debbie Kolozsvari 2005

Master of Applied Science
Environmental Applied Science and Management
Ryerson University

Abstract

Studies to determine how a microbe can persist in a foreign environment are essential in understanding water contamination by infectious agents. Two annular reactors were designed, constructed, and used as a laboratory-based model to study naturally-occurring biofilms. Untreated groundwater was used as the bulk liquid, and a foreign microbe with a green fluorescent protein (GFP) marker was used to monitor its persistence within the biofilm. It was demonstrated that under oligotrophic conditions *Escherichia coli* O157:H7 strain 86-24 did not grow planktonically. The microbe demonstrated an ability to integrate into the existing biofilm. Various environmentally-relevant concentrations of nitrogen and phosphate were also used as amendments to detect any effects on *E.coli* O157's persistence. The results suggest that the persistence of the *E.coli* O157 was enhanced when the bulk fluid was adjusted to contain 100 ppm nitrate, and hindered with a bulk fluid concentration of 0.2 ppm phosphate. To utilize available molecular tools, polymerase chain reaction (PCR) coupled with denaturing high performance liquid chromatography (DHPLC) was also used. It was found that the *E.coli* O157-specific primers were not as reliable in detecting *E.coli* O157 within the biofilm when compared to detection using the GFP marker. PCR using 16S rRNA primers were also used to gain insight into the microbial diversity of the biofilm.