

In vitro evaluations of microbial biofilms and their responses to chemical disinfectants

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Abstract

For many pathogenic microbes, biofilm formation is a critical component of the disease cycle and is required for pathogenicity or full virulence. Recent innovation in in vitro biofilm reactors has allowed high throughput evaluation and testing of chemical treatments against microbial biofilms. For example, the BEST™ Assay is a versatile and specialized biofilm reactor capable of culturing bacterial and fungal biofilms in a replicated, high throughput, multi-well format. The microorganism forms a biofilm on the surfaces of pegs extending into liquid media contained within the microtitre plate wells. Additionally, planktonic cells also grow within the media in each well which allows simultaneous growth of biofilms and planktonic cultures within the wells of each reactor. Comparisons and evaluations of microbial biofilms on different surface materials can also be performed. For example, the bacterial ring rot pathogen *Clavibacter michiganensis* subsp. *sepedonicus* was studied in the BEST™ Assay to determine the conditions that promote growth in the biofilm form, the sensitivities of biofilm and planktonic cells to biocides, and the effects of biocide concentrations, exposure times and substrate types on efficacy. Technologies such as the BEST™ Assay excel at efficacy testing of chemical and biological agents being screened or developed for control of plant diseases, including postharvest diseases. Plant pathology research, phenotype screening, evaluating and formulating biological control products and protocols often ignore the critical aspect of biofilm potential. As a result, biofilm biology remains uncharacterized or unconfirmed for many plant-pathogen interactions and for most biocontrol agents. Biofilm reactors, such as the BEST™ Assay, provide technology for characterizing and evaluating these important issues.