

Development of a feedforward chlorine-dosing program to control free chlorine level during commercial produce washing operations

The reaction of chlorine with organic exudate that enters the water during washing of fresh-cut produce depletes the active sanitizing form of chlorine ("free chlorine") and leaves wash systems vulnerable to pathogen survival. Maintaining adequate free chlorine levels can prevent cross-contamination of produce in commercial produce wash systems, but is challenging. Currently, most fresh-cut processors either add excess chlorine to prevent cross-contamination, or add chlorine intermittently and test the water on a trial-and-error basis. The chlorine-dosing technology developed by our team transforms chlorine control from a feedback approach, in which chlorine is added after the free chlorine level has decreased below the required target level, to a feedforward approach, in which chlorine is added according to an algorithm that predicts when the level would otherwise fall below the target. Our feedforward algorithm uses measured values of critical parameters, and is based on quantifiable dynamic interactions involving added chlorine, organic load, pH, residual free chlorine, and oxygen reduction potential. This technology is expected to transform commercial chlorine dosing practices, making it possible to maintain target chlorine levels throughout wash operations, and thus resulting in safer produce for consumers, and a safer working environment for employees.