

Title Efficacy of Ultraviolet Light in Combination with Chemical Preservatives for the Reduction of *Escherichia coli* in Apple Cider

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Abstract

Inactivation of *Escherichia coli* in apple cider treated with ultraviolet light (UV) in combination with chemical preservatives was evaluated. *Escherichia coli* ATCC 25922 was suspended (~ 7 log CFU/ml) in apple cider. Inoculated cider (4°C) containing sodium benzoate (NaB; 1000 and 500 ppm), potassium sorbate (KS; 1000 and 500 ppm), hydrogen peroxide (HP; 150 and 75 ppm) or dimethyl dicarbonate (DMDC; 150 and 75 ppm) was treated with ultraviolet light (peak output = 254 nm) in a thin-film UV treatment unit. UV treatment was performed either before or after application of chemical preservatives. Cider that received UV treatment but contained no added preservatives served as a control. Surviving populations of *E. coli* were determined on TSA prior to UV exposure and at 0, 24, 48 and 72 h after treatment. Greater reductions in *E. coli* populations were observed when preservatives were added to cider after UV treatment rather than before ($P < 0.05$). Combined treatments of UV and DMDC or HP were better than controls for reducing *E. coli* populations ($P < 0.05$). However, inactivation of *E. coli* was less in juices inoculated with KS before UV treatment than in controls ($P < 0.05$). This work demonstrates potential benefits of combining chemical preservatives with UV treatment for the inactivation of *E. coli* in juices.