

Title: Decrease in Sanitizer Efficacy of Peracetic Acid (PAA) and Sodium Hypochlorite in the Presence of Nitrogen-Based Fertilizers Used on Leafy Greens

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Introduction:

Recent *E. coli* outbreaks linked to contaminated irrigation water have elicited new auditing schemes that mandate the use of water treatment to minimize risk. However, little information is currently known with respect to potential interactions of commonly used crop-products such as fertilizers and water treatment chemicals such as Peracetic Acid (PAA) or Sodium Hypochlorite (Chlorine).

Purpose:

To assess the decrease in antimicrobial efficacy of two commonly used sanitizers in the presence of nitrogen-based fertilizers.

Methods:

Agricultural irrigation water was collected from irrigation canals in Maricopa, AZ. Chlorine or PAA were applied in doses ranging from 2ppm to 8ppm in 1L samples of collected water in the presences of either UAN32 or CAN17. Trials were done in triplicate for each sanitizer and fertilizer pair. Five minutes of contact time was allowed prior to neutralization. Pre- and post-treatment samples (100mL) along with appropriate controls were assessed for Total Coliform bacteria (TC) and *Escherichia coli* (EC) using the IDEXX Colilert Quanti-tray method.

Results:

Overall, Chlorine was more impacted by the presence of fertilizer than PAA. At low doses, Chlorine was roughly half as effective at sanitizing in the presence of fertilizer. At the highest dose, Chlorine's antimicrobial efficacy decreased by 1.36 log when fertilizer was introduced. In contrast, PAA's antimicrobial efficacy ranged from 1.69 to 2.78 and indicated a 0.4 log increase in efficacy for both doses with UAN32. When introduced to fertilizer, PAA showed little to no interaction, while Chlorine indicated a dramatic decrease in antimicrobial efficacy.

Significance:

This research demonstrates the importance for industry to monitor their fertilizers' impact on antimicrobial efficacy. Possible solutions include the use of PAA when fertilizer is applied, restricted fertilizer use during water treatment, or use of an alternate method to reduce risk when using fertilizer and sanitizer together.