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# Food Safety & Quality

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## Produce Protective Coatings

### **Food Conveyor Technology**

The newest generation in belting

### **CanadaGAP Program**

An On-Farm Food Safety initiative

### **Product Shelf Life Testing**

Optimizing consumer safety, satisfaction



# The Next Frontier

## Controlling airborne pathogenic cross-contamination

By Jimmy Lee

Of the many potential sources of harmful or unnecessary substances that threaten the air purity within the food industry, none is more persistent, pervasive or pernicious than bacteria and fungal contamination. Both bacteria and fungi are ubiquitous and adaptive. Multiplying rapidly, their growth can be exponential and uncontrollable. What's more, bacteria and fungi contamination is not always visible yet it is still capable of inflicting irreversible damage.

Another area of concern is ethylene gas. While generated naturally by most fruits and vegetables during ripening, premature exposure to this odourless, colourless gas can shorten the shelf life of produce by hastening ripening and causing spoilage. For instance, bananas placed next to ethylene sensitive products, such as apples or tomatoes, will produce enough gas to cause accelerated fruit ripening.

Air sanitation plays a critical role in protecting perishables from the destructive and hazardous potential of certain pathogenic microorganisms, including bacteria and fungi, and volatile organic compounds (VOCs) like ethylene gas, which can compromise food safety initiatives and potentially place consumers at risk. Improper or no method of air sanitation can adversely affect perishable shrinkage by as much as 39 per cent.

There is a wide range of devices that are promoted to clean, sanitize or sterilize the air. However, most on the market have testing documented for particulate (dust) removal using the limited performance measurement called CADR (clean air delivery rate), a measure of dust, pollen and smoke removal only.

In 2000, researchers came up with a new, innovative method to cleanse the air. Originally developed for the NASA space station program to successfully conduct astroculture experiments that required air free of mould spores and ethylene gas, AiroCide PPT technology has since been adapted to the food and beverage industry. Essentially, it "scrubs" the air of pathogens to inhibit airborne cross contamination and preserve perishables.

The commercial air purifying system combines two known pathogen-killing techniques, photocatalytic oxidation (PCO) and

ultraviolet light, which work in unison to break the bonds of VOCs and mineralize airborne microbes without using chemicals, ozone or oxygen ions. When these materials are exposed to ultraviolet light, hydroxyl radicals and super-oxide ions are formed. The radicals oxidize the VOCs to reduce them to trace elements of carbon dioxide and water. They also penetrate the cell membranes of both bacteria and mould spores to kill and decompose these organisms.

Tested in a variety of laboratory and clinical settings, this air sanitation technology has proven to be effective in destroying up to 99 per cent of airborne mould and bacteria along with eliminating harmful ethylene gas. Beyond the benefits of minimizing the potential incidence of product contamination by pathogens, resulting in an extension of product shelf life, improvement in food quality and reduction in food waste, this technology provides for a healthier food processing environment, reduces "red, itchy eye" and VOC fatigues and decreases allergic symptoms, including sinusitis, asthma, sore throat and coughing.

Unlike other air sanitation devices, this technology is not a filtering system. Complementing results of filtration systems like HEPA/MERV, it also does not need to be integrated or built into the HVAC system of a building. Rather, this freestanding technology can be attached to a wall or ceiling in any room of a building. The room's natural and forced air movement enhances the technology by dispersing the system's benefits to other rooms; in this way, air "communicates" throughout the interconnected and adjacent spaces.

Though first adapted for use in the perishable foods and beverage sectors, this air purifying system has caught the eye of others, including government, the health care industry and residential market. Like space, it appears AiroCide PPT has no bounds. ●●

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