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Mycotoxins and fungi food decontamination by GRAS methods

The food producing regions in the world are mainly concentrated in zones where excess rainfall, together with high and/or extreme variation of temperatures occur, which induce biological contaminants (insects, mites and fungi - including toxigenic strains) proliferation. To control them, pesticide application can be performed both in the field and during storage of grains, including food packaging. However, if applied inappropriately, it can also turn as a contamination problem (pesticide residues persistence). Moreover, some contaminants are resistant to milling and heating processes and may remain in the food products, thus getting into the food chain. Although the prevention of fungi proliferation and mycotoxin formation in the field are the main goals, under certain environmental conditions their contamination (Fusarium / Alternaria / Aspergillus / Penicillium – DON / FBs / ZON / A-OH / A-ME / AFLs / OTA / PTL) are unavoidable for producers. Thus, decontamination procedures are useful in order to recuperate fungi and mycotoxin contaminated commodities. The ideal decontamination procedure acceptable from the environmental/health point of view must (a) react specifically with the living organism / compound to be destroyed/degraded; (b) not form toxic by-products (with toxicity equal to, or higher than the target contaminant); (c) not alter the food nutritional & palatability properties and be (d) inexpensive / easy to obtain. The increasing concern on environmental safety and human health has stimulated the development and/or improvement of non-aggressive food disinfection / decontamination substances in order to avoid and/or minimize their application impact. To date new technologies for fungi and their toxins decontamination have been developed involving different approaches, including micro-nutrients (zinc, at nano and regular particle sizes), gases absorber pads (O2 scavenger in packaged food), plant extracts (post harvest application), radiations (different wavelengths & pulse) and hermetic/controlled atmosphere environments (vacuum, CO_2 / N_2 at storage/package level). Several of them are GRAS (generally recognized as safe). Different oxidizing agents have been also reported and applied as decontaminants to destroy living organisms (apart from insects mites and fungi, also bacteria, viruses and protozoa,) and/or degrade toxic compounds (pesticides, mycotoxins and industry toxic wastes). The chemical compounds most commonly used are: hydrogen peroxide, chlorine, chlorine dioxide, sodium hypochlorite and potassium permanganate. The green method that has been shown its decontamination efficiency to post-harvest high (fruits / vegetables) and low (grain / nuts / pulses) humidity food, without leaving residue is ozone (O_3), both as gas or in the liquid form. As O_3 gas is internationally recognized as safe (GRAS) and does not leave residues in food, it can be a promising method for fungi and toxin inactivation & degradation (either solely or in combination with other decontamination methods) in storage units and industries to avoid food security and safety problems.

Biography

Vildes Scussel is working as a Professor at the Department of Food Science & Technology, University of Santa Catarina, Brazil. Her experience includes various programs, contributions and participation in different countries for diverse fields of study. Her research interests reflect in her wide range of publications in various national and international journals.

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