

OPTIMISE YOUR SANITISER AND DISINFECTANT

Warwick Gill, Tasmanian Institute of Agriculture, University of Tasmania, Hobart

Judy Allan, Pest and Disease Management Service

INTRODUCTION

With mounting consumer opposition to pesticide residues in food products and the increasing awareness of their environmental impact, industry access to traditional disease control chemicals is declining world-wide. Achieving effective on-farm disease management is therefore becoming increasingly reliant on whole-farm preventative hygiene.

One of the fundamental aims of preventative hygiene is to 'start clean'. That is, to begin a new crop in a grow room free of mushroom pests and pathogens. Effective grow room sanitation is achieved by a multi-stage process (**Gill 2017**) with disinfection being a key step. Because it is the disinfectants and sanitisers which kill mushroom pathogens, it is important that these products are given optimal conditions to work.

SANITISER OR DISINFECTANT?

When talking about mushroom farm hygiene, we often use the terms 'cleaning', 'sanitising' and 'disinfecting' without thinking about what they mean. But they do mean different things and it is important to understand these differences in what we are trying to achieve with our farm hygiene. Broadly speaking, cleaning removes organic material from a surface, sanitisers reduce the number of microbes on a surface to a safe level depending on the situation, while disinfectants kill all the microbes on a surface. It is useful to think of the relationship between cleaning, sanitising, and disinfecting as an activity spectrum, with cleaning at one end and disinfection at the other (Table 1).

For some situations such as medical research facilities, hospital operating theatres, and food contact surfaces, the total removal of microbes, or disinfection, is required. But on a mushroom farm, effective disease management

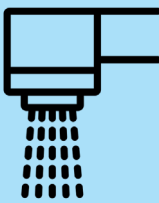




is all about keeping the populations of mushroom pathogens below the farm's threshold level for disease expression. In addition to cleaning, we therefore ought to talk about sanitising as part of our hygiene program rather than disinfecting, noting that some farms may have post-harvest operations requiring a disinfectant. Nevertheless, both 'disinfectant' and 'sanitiser' are also used interchangeably on the farm and for our purposes this is acceptable. In fact, the terms 'disinfectant' and 'sanitiser' are used interchangeably by the government agricultural regulatory body, the Australian Pesticide and Veterinary Medicines Authority (APVMA) on its website, sometimes at odds with the manufacturer's product label.

WHICH SANITISER OR DISINFECTANT CAN I USE?

Because sanitisers and disinfectants claim to kill, they must be registered for use in association with food crops. The sanitisers and disinfectants that

Table 1. Hygiene processes compared

		
CLEANING	SANITISING	DISINFECTING
<ul style="list-style-type: none"> • Cleaning physically removes most microbes, dirt, soil, and other organic material from objects and surfaces • Use soap or detergents with water to scrub, wash, and rinse 	<ul style="list-style-type: none"> • Sanitising reduces the number of microbes on objects and surfaces to levels considered safe for a specific application • Objects and surfaces should be cleaned first before sanitising 	<ul style="list-style-type: none"> • Disinfecting kills remaining microbes on surfaces. Killing microbes can further lower the risk of spreading disease • Objects and surfaces should be cleaned first before disinfecting

Adapted from the Centre for Disease Control, USA

are registered by the APVMA for use on Australian mushroom farms and their recommended applications are presented below (Table 2, p40). Note that not all products are recommended for use in all situations and the legally acceptable method of application may vary; for example, not all products are registered for fogging.

OPTIMISING MY SANITISER

Effective grow room sanitation follows a described process (Gill 2021), but the efficacy of the sanitiser can be affected by the physical characteristics of the farm which can vary from site to site. However, one factor that severely impacts *all* registered sanitisers, irrespective of the farm, is the presence of organic material (Table 2). Organic material reduces the activity of disinfectants and sanitisers by adhering to the microbe's surface, blocking the adsorption sites necessary for the disinfectant to act or by forming inactive chemical complexes with components of the disinfectant. For disinfectants and sanitisers to work effectively, organic material – mushroom farm compost, casing, mushroom debris, and dust – must first be removed and the sanitiser applied to the clean surface.

By physically removing the organic material, good cleaning eradicates up to 85% of the microbes – including mushroom pathogens that are both living inside and adhering to the outside of soil particles – from the grow room environment. This allows

disinfectants to work at full killing power and to also attack pathogens directly rather than through a protective barrier of organic material. Effective cleaning also removes pathogen reservoirs present as established biofilms, prevents the establishment of new ones, and removes macromolecules which may serve as a nutrient source for mushroom pathogens.

While the presence of organic material impacts the efficacy of all sanitiser products registered for use on mushroom farms, other factors such as the presence of rubber and plastic, pH and water may affect the efficacy of specific products. These factors will be discussed in a later article.

EFFECTIVE CLEANING REQUIRES DETERGENT

If you feel your sanitisers are not performing very well, it is highly likely that your cleaning is not thorough enough. Detergents are a critical component of effective cleaning as they lift organic matter from surfaces and hold it in suspension so that it can be rinsed away. Because they do not claim to kill, detergents do not need to be registered so there is a wide range of products available. For mushroom farms, the composition of the detergent is important (Gill 2021). Be aware of detergents that claim to also sanitise or disinfect as any claim to kill may require registration by the APVMA and use of them can be problematic.

Table 2. Disinfectants registered for use on Australian mushroom farms

REGISTERED PRODUCT	ACTIVE CHEMICAL GROUP	APPLICATION	IMPACT OF ORGANIC*
Bacrasan phenolic sanitiser	Phenol	Knives, tools, machinery, benches, floors, walls, footbaths, and most other surfaces	Severe
Des-O-Germ disinfectant	Quaternary ammonium	Mushroom sheds as a spray or fog For control of <i>Trichoderma atroviride</i>	Severe
Hypochlor chlorine cartridge	Chlorine as calcium hypochlorite	For control of bacterial blotch (<i>Pseudomonas tolaasii</i>)	Severe
Pathocide sanitiser/disinfectant	Chlorine as sodium hypochlorite	For control of bacterial blotch (<i>Pseudomonas tolaasii</i>)	Severe
San-i-mush foaming iodophor sanitiser	Iodine complexes inc. phosphoric acid	Growing trays, sheds and service areas, misting of walls, ceilings, fixtures etc, foot baths, and hand baths	Severe
Vibrex Horticare sanitiser	Chlorine as chlorine dioxide	Terminal sanitising rinse for stainless steel tanks, transfer lines, on-line equipment, picking baskets, picking utensils and other food contact surfaces Control of mould and slime forming bacteria on walls, floors, ceilings, and post-crop mushroom growing surfaces	Severe
Zydox PC2 sanitiser	Chlorine as chlorine dioxide	Terminal sanitising rinse for stainless steel tanks, transfer lines, on-line equipment, picking baskets, picking utensils and other food contact surfaces Control of mould and slime forming bacteria on walls, floors, ceilings, and post-crop mushroom growing surfaces	Severe

* Collated from Gilmore et al (2011)

READ MORE

[Gill W \(2017\) Grow room sanitation: start clean, crack down on disease. Australian Mushrooms Journal Winter:20-28](#)

[Gill W \(2021\) Detergent and farm sanitation. Australian Mushrooms Journal 2:16-21](#)

FOR FURTHER INFORMATION CONTACT
THE PROJECT TEAM

Judy Allan | judyalan@bigpond.com | 0422 971 037
Warwick Gill | warwick.gill@utas.edu.au | 0417 766 588

UNIVERSITY of TASMANIA



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Tasmanian Institute of Agriculture

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Gilmore BF, Ceri H, Gorman SP (2011) Chemical disinfectants, antiseptics and preservatives. Chapter 19 in: *Hugo and Russell's Pharmaceutical Microbiology* 8th edition (SP Denyer, N Hodges, SP Gorman, BF Gilmore, eds). Blackwell Publishing