

NURSERY PAPERS

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Management of contaminant fungi in growing media

Fungi are highly diverse organisms that readily colonise both growing media and soil.

Some fungi, like mycorrhizae and *Trichoderma*, are beneficial to plant growth, aiding in nutrient uptake. Others, however, are plant pathogens that can damage plant tissues, while a third group, saprophytes, thrive by feeding on dead and decaying organic matter.

At low levels, saprophytic fungi may have minor benefits for plants by filling growing media with mycelium, which can help reduce colonisation by plant pathogens. They may also aid in the decomposition of organic matter and enhance nutrient uptake.

These benefits, however, are only observed when the fungi are present at relatively low levels. When their populations become excessive, they are considered contaminants that can inhibit plant growth by altering growing media properties. Once established, they can spread rapidly throughout nursery growing areas and are often challenging to eradicate.

This Nursery Paper will discuss how contaminant fungi enter the nursery environment, how to recognise them, and how they affect the properties of growing media. It will also provide guidelines on preventative measures to minimise the risk of contamination, as well as remedial actions to address infestations when they occur.



Mushrooms (*Deconica* sp.) can be unsightly and reduce plant saleability.

WHAT FUNGI CAN BECOME CONTAMINANTS?

Several fungal species can become contaminants in growing media, some of which include *Aspergillus*, *Penicillium*, *Paecilomyces*, *Peziza* (cup fungi), *Simplicillium*, *Sphaerobolus* (shotgun fungi) and mushroom-forming species like *Leucocoprinus*. Any fungus that proliferates to the point of altering the properties of the growing media or creating an unpleasant appearance should be classified as a contaminant.

Mushrooms and fungal fruiting bodies in the media are also considered contaminants. As well as being unsightly and potentially reducing saleability, some of these fungi can cause the growing media to become hydrophobic. Shotgun fungi can propel their fruiting bodies 2-6 metres, often landing on the lower leaves of plants. Although these fruiting bodies are epiphytic (that is, they grow on a plant only for physical support and do not harm the leaves), they can still be unappealing or be mistaken for fungal pathogens or scale insects.



Bougainvillea infested with *Leucocoprinus* fungi causing the media to become hydrophobic.



How to recognise fungal contaminants

Saprophytic fungal growth at low levels in growing media is often hard to detect, as it typically does not alter the composition, structure or colour of the media. In contrast, contaminant fungal growth is thick, superabundant and visually distinct, appearing white, brown, green, yellow or orange. It may be visible on the surface of infested media or hidden below, often causing the media to clump together like the roots of a pot-bound plant.

Contaminant fungi frequently produce many spores, which can emit a noticeable odour. When disturbed, these spores may become airborne, creating a smoke-like appearance. Additionally, some species produce mushrooms, often yellow, cream or brown. Cup fungi and other fungal structures may also form on the media's surface. Shotgun fungi, with their dark fruiting bodies – usually around one to two millimetres in diameter, are typically found on the undersides of leaves.

CONTAMINANT FUNGI CAN BE A RESPIRATORY HAZARD

Certain species produce a lot of spores that easily become airborne, often accompanied by an unpleasant musty odour. These spores can be harmful, particularly to individuals with compromised immune systems, as they may lead to respiratory infections. Wear appropriate respiratory personal protective equipment when handling or removing.

SOURCES OF CONTAMINANT FUNGI

The greatest risk of introducing contaminated media into a nursery comes from the media itself. Improper storage can expose media to infested organic matter or moisture, leading to contamination. Organic matter, such as soil, often harbors fungi that can infiltrate the media on contact.

Coir that becomes wet during storage is particularly vulnerable as it is typically wrapped in plastic. This can lead to thick fungal contamination which may spread across all connected coir bricks.

Plant derived media that has not been properly composted could carry contaminant fungi when purchased.

Nurseries with organic matter in or near growing areas can support weeds, pathogens and saprophytic fungal growth that may colonise container plants.

Unsealed wood materials that are regularly wet promote the growth of wood-rot fungi that can become contaminant fungi. Fungal growth is generally encouraged by warm, humid environments. So, nurseries with excess water or pooling are at higher risk.

Last, but certainly not least, every container plant brought into the nursery represents a potential source of contaminant fungal growth.



Sphaerobolus shotgun fungus fruiting bodies on *Anthurium*.



How does growing media change?

The most common and serious issue caused by superabundant fungal growth in growing media is irreversible hydrophobicity. This prevents even water distribution through the pot, leading to stunted plant growth. Some fungal species can also significantly lower the pH of the growing media.



Fruiting bodies of a mushroom fungus (family Agaricaceae) growing thickly on the roots of *Syzygium*.

PREVENTATIVE ACTIONS

STORAGE GUIDELINES

- Store media in a cool, dry place, ideally in a low-light, purpose-built shed or similar structure.
- Exclude organic matter like leaves, branches, weed seeds and soil.
- Protect media from all water sources, including irrigation, rain and runoff.
- Keep packaged media sealed and dry and store it off the ground.
- Handle moist or inundated bagged media or coir bricks with caution – use it promptly or discard it.
- If using a tarp to cover media outdoors, ensure there is enough ventilation to prevent moisture buildup.
- Use growing media promptly after production and delivery. Avoid storing for more than six months, as composition may change – consult your supplier for best-before dates.
- Turn bulk media regularly if being kept for relatively long periods of time.
- Control rodents and other animals, as their waste can introduce fungal contaminants.
- Keep storage areas clean and free of organic matter, soil and debris.
- After media bays have been emptied, clean and dry the storage area before introducing a new batch.
- Avoid direct contact between media and wood or porous materials – seal or cover these surfaces if necessary.

HYGIENE PRACTICES

- Regularly clean potting areas, machines and tools to remove old media from floors, benches and surfaces.
- Keep growing areas free of organic matter, spilled media, weeds and soil.
- Ensure container plants do not contact soil and avoid placing containers near unsealed wood products.
- Remove unsaleable stock promptly and pot up plants at appropriate intervals.
- Disinfest growing areas and benches at the end of each crop cycle.
- Use clean or properly disinfested pots and trays – heat disinfestation preferred over chlorine.
- Regularly disinfest tools, equipment, trailers and trolleys that contact container plants.
- Ensure proper drainage in growing areas to avoid water pooling.
- Avoid overwatering and maintain clean growing areas, tools, equipment and footwear.
- Manage roadways, walkways and non-growing areas to minimise dust.
- Monitor the condition of growing media as part of routine plant health checks.
- Proactively manage fungus gnats.



REMEDIAL ACTIONS

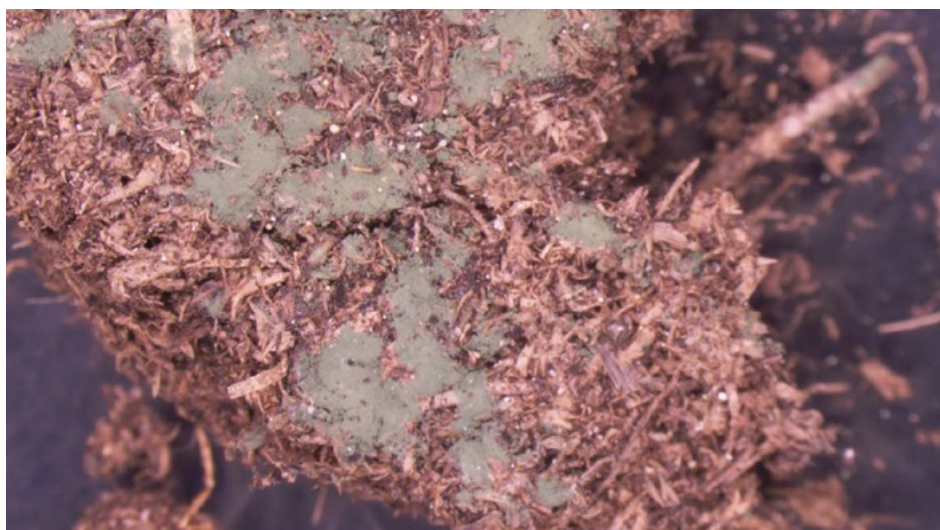
If you discover fungal contamination in unused growing media, do not use it for container plants. If you're uncertain, send photos or samples to a diagnostic provider. Grow Help Australia offers six free diagnostic samples each year to production nurseries and growing media producers through 2025.

Dispose of contaminated media offsite via deep burial, such as through council waste services. Avoid composting on site to prevent reinfestation of plants or media.

If fungal contamination has affected container plants, compromising their health or media wettability, it's best not to sell the plants. Fungicides are generally ineffective at eliminating the infestation. For valuable plants, bare-rooting and repotting may be an option, though it's often costly and unlikely to offer a long-term solution.

Eliminating fungal contaminants

- Quarantine plants that may be contaminated and monitor regularly.
- Discard unsaleable plants with fungal growth, disposing of them hygienically offsite via deep burial, and avoid on-site composting to reduce reinfection risk.
- Keep new plant batches with clean media separate from contaminated stock.
- Increase hygiene practices to keep growing areas free of organic matter.



Green fungal growth, *Trichoderma* sp., that disappeared shortly after use and never returned.

- Regularly disinfect growing areas, benches, tools, and equipment that have been exposed to contaminated plants. Copper products, bleach, and quaternary ammonium are generally effective against fungi and may reduce the inoculum load in the area.
- Take extra precautions to prevent fungus gnat infestations, as they can spread fungal contaminants.
- Discard pots and trays that have contacted contaminant fungi – reusing them poses a high risk.
- Be mindful that some contaminant fungi are waterborne. Ensure your water disinfection systems are functioning properly, and test water as needed with Grow Help, NSW DPI or a similar diagnostic lab.

For container plants affected by mushrooms or shotgun fungi, removing the mushrooms can reduce the spread but won't eliminate the infestation. Dispose of mushrooms promptly in sealed bags. Repotting with fresh media may temporarily reduce mushrooms but won't eradicate them.

To completely eradicate fungi, you need to remove the infested plants from the nursery, following the disposal recommendations above.

SUMMARY

Saprophytic fungi can become superabundant, contaminate growing media and be detrimental to plant growth. In most cases, managing growing media and plant production using best practice guidelines will prevent fungal contamination.

To check whether you have contaminant fungus in your media, contact your local plant pest diagnostic service or Grow Help Australia. Don't forget, all production nurseries receive six free samples per year until the end of 2025.

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MORE INFORMATION

Download past nursery papers from the Greenlife Industry Australia website at www.greenlifeindustry.com.au/communications-centre?category=nursery-papers (especially the best practice storage of growing media nursery paper at www.greenlifeindustry.com.au/static/uploads/files/ngia-np-2014-05-june-wftiwoonxmjt.pdf)

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