

NURSERY PAPERS

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Managing Liverworts and Mosses in Nurseries

In this Nursery Paper Robert Chin, NGIV Nursery Industry Development Officer takes a closer look at liverworts and mosses. He shows the detrimental effects they have on the nursery industry as well as their general environmental implications. He also suggests preventative measures and cultural techniques and treatments to best manage them on your nursery premises.



Managing Liverworts and Mosses in Nurseries

What is a Liverwort?

Liverworts are an ancient bryophyte from the class Hepatopsidae. The name represents over 8,000 species of small, nonvascular, spore-producing land plants constituting part of the division Bryophyta. They include the thallose liverworts that show branching, ribbon like gametophytes and the leafy liverworts. Thalloid liverworts are strap-shaped while leafy liverworts have a "stem-and-leaf" form similar to mosses. These are a very primitive form of photosynthetic plants.

Their name is simply derived from 'liver' + 'wort' - an old English word meaning 'plant'. This naming was due to the belief that some species looked like livers and were useful for treating the liver medicinally.

Liverworts and mosses are primitive plants that lack true roots with water and nutrients being absorbed by the vegetative organs of the plant.

They can be propagated and spread vegetatively or sexually by spores.

In nurseries spores can be found airborne in nursery sites, in recycled irrigation water and are also likely in potting mix if stored uncovered near a liverwort or moss infestation. Liverworts can be particularly difficult to control and while it is probably impossible to stop liverwort arriving at your nursery, with perseverance and diligence, you can treat the issue and prevent it from spreading further.

Most products that have been used in the recent past for the control of these pests have been based on basic copper compounds. We now understand that copper containing compounds run the dual risk of adding excess amounts of copper into irrigation run-off water which may lead to a build up of copper in onsite water storages. There is also the possibility of pollution

in nearby waterways if this water leaves the property. Elevated copper is known to be phytotoxic and requires careful on-site management.

It should also be noted that it is unlikely that common disinfecting systems used in recycling nursery irrigation water (e.g. chlorination, bromine injection, ozonation) are always effective in killing the spores of liverworts and mosses.



Why do they matter?

Liverworts and mosses cause a range of problems in both production nurseries and retail garden centres. Their effects can be found in not only pots, trays, and other containers, but also on pathways, benches, in your water or even inside greenhouses.

Some common problems caused by liverwort and mosses in nurseries are:

- Liverworts can form a thatch or mat on the growing media (in a pot) or soil surface. These mats repel water from penetrating the media causing the pots to dry.
- Heavy infestations on the growing media surface can also cause irrigation water (and any liquid fertilizers) to bypass the growing substrate, instead going down the side of the pot (pathway of least resistance), washing out the containers drain holes before it can soak into the growing media.
- Heavy liverwort infestations will lead to a need for more water, fertilisers and pesticides to be used – increasing environmental as well as financial impact on businesses.
- Liverworts and mosses provide a hiding and overwintering space for fungus gnats which are another significant pest for growers.

- Infestations increase weeding and maintenance costs.
- There can be a reduced appeal of plants from plant buyers who may not accept infested specimens.
- Liverworts and mosses can use significant amounts of nitrogen and water for their growth, competing for this with the plants that you are trying to grow.
- If in pots they can cause potting mix losses by the action of manual hand weeding.

- Moss build up on walkways creates unsightly and dangerous conditions (footing can be slippery). This creates an Occupational Health and Safety hazard.
- Importantly – if you get a minor infestation of liverwort – it spreads and spreads fast. You must control it or it will persist – chances are you will even spread it too your customers.

It is thought that spores can remain viable at room temperature for up to 12 months so this is a problem that needs to be considered all year round.



Knowing the problem – helps you control it

The key to controlling liverworts and mosses is understanding the conditions in the nursery that help promote their growth. The high moisture, light and temperatures necessary for successful crop production will also favour the growth of these 'primitive' plants. Add excessive amounts of fertiliser to these favourable growing conditions and growth of these pest plant populations will be enhanced significantly.



Control and management

Water and fertiliser are crucial to nursery plant growth but are also conducive to moss and liverwort growth. A dilemma which means that an integrated program of irrigation and fertility management, supplemented with physical and chemical controls is necessary to reduce and possibly eliminate liverwort and moss. Here are some approaches to managing and possibly even eliminating liverwort. It is also true that what works in one nursery does not necessarily work

everywhere. Persistent infestations may require changes in cultural practices to achieve effective control.

It may not appear initially obvious but the appropriate control of these unwanted plants is dependent upon where they are growing. Walkways, pots and benches can be treated with some chemicals, but these chemicals can be toxic to plants. Different infestations may require different treatment. Stronger or alternative

control agents are available for control on non-living surfaces such as walkways, bench tops and empty pots. Whereas control agents used in areas with plants/plugs will require an entirely different treatment. For further advice on chemical treatment options, contact your regional Industry Development Officer.

1. Prevention is better than cure

- Always inspect purchased plants and new stock – this is the most common source of new infestations – be extra cautious of tubes or smaller pots with fresh potting mix on the surface. Isolate new stock contaminated with liverwort if you can or record its progress through the nursery if you are suspicious of the supplier.
- Do not overwater. If the nursery crop will tolerate drying, allow the surface of the growing medium to dry between irrigation cycles. If possible, switch to subirrigation systems. Capillary or sub-surface watering is an ideal mode of irrigation to achieve this.
- Do not over fertilise – particularly nitrates and phosphates. Levels above the “required” amount for your crops are often optimal for liverwort growth as is top-dressing as the fertiliser at the surface is ideal for liverwort growth.
- Liverwort spores/gametes have been known to occur in recycled water. You must ensure that if you are re-using water that has been sanitised/ treated.

- Liverworts generally die if the crop’s canopy provides sufficient cover to shade them completely.
- A combination of reduced irrigation frequency, reduced nitrogen and phosphorus application, and a surface-preventative fertilizer (slow-release iron sulfate) has provided nearly 80% control of liverwort infestations. Several nurseries have

nearly eliminated their liverwort weeds by changing irrigation practices and ‘spot-treating’ wet areas (walkways, under benches, driveways, etc.) within the production area. Use of subirrigation greatly reduces the establishment of liverworts.

- Surface mulches that dry rapidly will reduce liverwort establishment.



2. Control once infested

- Mulches and mulch mats have been used successfully to suppress outbreaks.
- These types of infestations have been known to be controlled by some pre-emergent herbicides (check local registrations).
- Vinegar and other acetic acid based products have been used successfully to burn-down liverwort but will not normally prevent it re-occurring. Please consult with your Industry Development Officer for further information on these and other organic or less environmental impact control techniques.
- An old fashioned but tested method - established plants can be manually removed by hand.
- Applications of chemical control agents. There are a range of these products. Not all of them have registrations for liverwort – many do for mosses which are closely related and known to be effective. Care should be taken when applying these as several are phytotoxic and will affect the foliage of plants you are growing if not applied correctly. There are a range of chemical control agents that have been used successfully in this area. Please consult with your Industry Development Officer for more information with regards to products to suit your situation.



So whilst liverworts and mosses are not always preventable you can and should minimise their impact on your nursery premises. Like most persistent nursery problems it will take time and a range of management techniques. The old adage of weed management applies with liverwort – one year of laziness means seven years of work.

References and further information

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