LIVERWORT MANAGEMENT PROGRAM FOR ORNAMENTAL HORTICULTURE

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Liverwort or *Marchantia polymorpha* has become a successful pest in many ornamental greenhouse and nursery production sites. A national survey of growers by the Society of American Florists ranked liverwort No. 7 on the list of worst nursery weeds. In Oregon, it is now widely regarded as the No. 1 container nursery weed problem.[1] In addition to being aesthetically unpleasing liverwort mats on pots can reduce water and nutrient uptake thus reducing crop production, as well as, harboring vectors of disease such as fungus gnats.

These non-vascular plants can propagate sexually through spore production or asexually by producing gemmae. Clones easily break off the parent and can be splashed around by water. Therefore, preventative control and good cultural practices, as well as, preemergent and postemergent control are appropriate.

Prevention: Inspect all new plant material as it comes into the facility; reject material that has known infestations of liverwort or thoroughly hand weed.

Sanitation: Good sanitation can reduce spore load. Remove contaminated plants, pots/flats, growing media from the greenhouse/nursery and surrounding area.

Photo by S. Tjosvold

Cultural Control: Liverwort thrive in warm moist locations with ample nitrogen and phosphorus. Where possible use water conserving types of irrigation such as drip irrigation and avoid overhead or sprinkler irrigation. Allow plants to dry out in between watering. Use loose growing media with good drainage to help manage soil moisture and maintain good ventilation to lower ambient humidity. Increasing pot spacing or opening greenhouse sidewalls will increase air circulation. (Atland) Since liverwort live on the surface of the potting media managing fertilizer efficiently may reduce nitrogen availability to this pest. Incorporating fertilizers or dibbling beneath the root ball rather than topdressing will reduce nutrient concentration on the soil surface. Fast drying mulches can also slow down infestations.

Chemical Control: The decision to use a herbicide and which one requires consideration of various factors such as location (greenhouse or field), application type (over the top vs. directed spray), conventional or organic practices, length of control needed, skilled/non-skilled labor, severity of the infestation and crop/variety.

Preemergence: Many preemergence herbicides commonly used in nurseries provide significant control of liverwort although none are currently registered for use on containers in greenhouses/covered structures. Among the preemergence herbicides evaluated at Auburn University (2004), Ronstar (oxadiazon) and BroadStar (flumioxazin) provided the best control. In 2005, Ahrens also reported preemergent applications of flumioxazin effectively controlled liverwort, pearlwort, and mosses.

Table 1. Herbicides found to be effective in preemergent control of liverwort.

Preemergence Active Ingredient	Product Trade Name	Product rate/A
Dimethenamid-p	Tower	21-32 fl oz/A
Dimethenamid-p + pendimethalin	Freehand	200 lb/A*
Flumioxazin	Broadstar	150 lb/A
	SureGuard	12 oz/A
Oxadiazon	Ronstar 2G	150 lb/A
Oxadiazon + oryzalin	Regal O-O	100 lb/A
Oxyfluorfen + pendimethalin	OH2	100 lb/A
Oryzalin + oxyfluorfen	Rout	100 lb/A

*not controlled in California.

Table 2. Postemergence Treatments found to be effective in controlling Liverwort[5]

Postemergence Herbicide active ingredient	Product Trade Name	Registered Use sites	Product Rate/A	Selectivity[4]	Type	Precautionary Category
Acetic acid	WeedPharm[1]	Greenhouse, ornamentals, shadehouse	20-30% v/v	Non-selective	Contact; biopesticide	Danger
Ammonium nonanoate	EmoryAgro 7010 RTU[1] (formerly Racer)	Greenhouse, ornamental, landscape, interiorscape	5% v/v	Non-selective	Contact OMRI - for gardening	Warning
Dimethenamid-p	Tower[2]	Ornamental, landscape	3.0 lb ai/A	Selective	Preemergent	Warning
d-Limonene	AvengerAG	Greenhouse, landscape, ornamental , crop, non-crop	20% v/v	Non-selective	Contact, OMRI	Caution
Flumioxazin	SureGuard[3]	Landscape, field grown conifers, woody ornamentals, deciduous trees	0.375 lb ai/A	Selective	Preemergent	Caution
Oregano oil	Bryophyter[1]	Landscape	2% v/v	Non-selective	Contact; biopesticide	Caution
Pelargonic acid	Scythe[4]	Greenhouse, landscape, ornamental	5-10% v/v	Non-selective	Contact	Warning

[1]Already registered as directed spray for liverwort control in the greenhouse.
[2] Current label lists preemergence field applications for control of liverwort in and around commercial ornamental production.
[3] Current label lists preemergence field applications for control of liverwort in container grown conifers, deciduous trees.
[4] Nonselective products require directed application as to avoid contact with desirable plants.
[5] Products were evaluated in IR-4 Project trials. For a full report see the Liverwort Efficacy Report: http://ir4.rutgers.edu/Ornamental/ornamentalSummaryReports.cfm

Note: It is unlawful to use any herbicide in a manner inconsistent with the label. Read product label, follow instructions. Pesticide registrations may change. It is the responsibility of the user to ascertain if a pesticide is registered by the appropriate local, state and federal agencies for an intended us. Trademarks for mentioned products and chemicals belong to their respective owners. Mention of a commercial or proprietary product or chemical does not constitute a recommendation or warranty of the product by the authors.

Citations and Suggested Reading:

[1] "Liver What?" by Laura Miller, Ornamental Outlook.com, July 2007, C:\Users\hester.CITS\Documents\Liverwort\Liverwort article The Florida Landscape.mht
"Liverwort control in containers of woody ornamentals." by Mervosh, T. L. and J. F. Ahrens, Northeastern Weed Science Society Proceedings 57, p. 37 (2003).
"Liverwort Control with Granular Preemergence Herbicides" by J. Atland, http://oregonstate.edu/dept/nursery-weeds/research/container_trials/lw.htm
"*Marchantia polymorpha* may be the most troublesome weed in containers (in Oregon)." By J. Atland, C:\Users\hester.CITS\Documents\Liverwort\Atland Oregon State liverwort in containters.mht
"Mulches for Weed Suppression in Container Herbaceous Perennials." by Mervosh, T. L. and J. Ahrens, Northeastern Weed Science Society Proceedings 56, p. 75 (2002)