

**Oregon Department of Agriculture and Oregon Association of Nurseries  
Nursery Research Pre-proposal**

**Date:** November 15, 2019.

**Project Title:** Liverwort control in greenhouses with mustard seed meal and mulches

**Principal Investigator(s):**

Marcelo L Moretti (PI)  
Assistant Professor  
Oregon State University  
Department of Horticulture  
Marcelo.moretti@oregonstate.edu

4017 Agriculture and Life Sciences Bldg.  
2750 SW Campus Way, Corvallis, OR  
97331  
Telephone: (541) 737-5454  
FAX: (541) 737-3479

**Cooperator(s):** TBD

**Project background:**

Liverwort is a problematic weed in nurseries of the Pacific Northwest. In greenhouses and enclosed structures, control options are very limited and nurseries are looking for more tools. Research efforts are ongoing to evaluate pre and post emergence herbicides in greenhouses through IR-4. Although the chemical options might be helpful in controlling liverwort, additional control practices will likely be required to address management gaps. Two of these practices are mulching and natural pesticides.

This project was funded to evaluate mulching types and granulometry. Initial tests are ongoing at North Willamette Station, comparing hazelnut shells and bark mulches of different

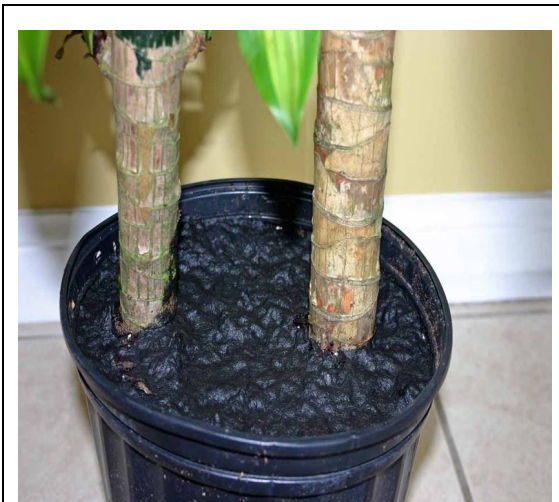


Figure 1. Example of ornamental plant treated with liquid mulch. Picture from AMPolymers.

particle sizes. For 2020, we would like to propose the addition of liquid mulches. Liquid mulches are an effective method to suppress weed germination in container-grown ornamental crops (Shen and Zheng, 2017). Here we propose to test a commercially available biodegradable liquid mulch manufactured by AM Polymers (<http://www.ampolymers.com/>). The products are cellulose-based, and OMRI certified and are applied by pouring the “slurry” over the pots. The liquid mulch binds to the pots and degrades in 3 to 8 months (figure 1). This would eliminate the problem of mulch loss observed with fine particles like rice hulls or hazelnut shells. No information is currently available if the liquid mulch is a suitable option for propagation trays and the mulch impact on liverwort.

The second weed control tool that this proposal aims to study is the mustard seed meal.

Mustard seed meal or meadowfoam seed meal is naturally high in glucosinolates, a compound that when hydrolyzed forms isothiocyanates that have activities against fungi, weeds, insects. Mustard seed meals were reported to be effective in controlling weeds and safe to ornamental crops grown in containers (Boydston et al., 2008). We expect that mustard seed meal to be active in liverwort as well. Mustard seed meal can be

sourced in the Western USA through farm Fuel Inc. (<http://www.farmfuelinc.com/>). It is possible that by combining the liquid mulches with mustard seed meal, the liverwort control and other weeds will be improved. No information is currently available on this matter.

**Project objectives:**

- 1) Evaluate efficacy and crop safety of liquid mulches and mustard seed meal for controlling liverwort in greenhouse plants.

**Methods & Timeline:**

Objective 1) The greenhouse experiments will be conducted at the OSU Corvallis facilities during the year of 2020. Small rooted plugs of boxwood and hydrangea will be used for comparison. Plugs will be treated with liquid mulches at rates by pouring the slurry over the plants. Mustard seed meal granular will be mixed with the liquid mulch before application. The experimental design will be a randomized complete block design organized in four by four factorial. The first factors will be four levels of liquid mulch (LM1 3.5%) at 0; 0.5; 1; and 2 kg/m<sup>2</sup>, and the second factor will be mustard seed meal levels a 0, 250, 450, and 900 g m<sup>2</sup>). Liverwort will be inoculated over the pots and also grown next to the pots to produce a high infestation level. Assessments will include crop height and injury, and liverwort coverage and control monthly. At the end of 20 weeks, the liverwort biomass will be collected. The crop shoot and root length will be measured, and the dry weight recorded.

**The benefit to Nursery Industry:**

The findings of this project will support an integrated approach to control liverwort and other pests with lower inputs. The findings of this project will have immediate impacts on liverwort management in greenhouses as all products tested here are commercially available to growers and do not require registrations.

**Budget summary:**

	Description	OSU Matched	Requested
<b>Personnel</b>			
Salary			\$10,000
Employee benefits (OPE)	72%		\$7,200
<b>Supplies and Expenses</b>			
Miscellaneous	Plants, potting media, seed meal, liquid mulch		\$890
	greenhouse (yearly basis)		\$ 980
<b>TOTAL REQUEST</b>			<b>\$19,070</b>

**References**

Boydston RA, Anderson T, Vaughn SF (2008) Mustard (*Sinapis alba*) seed meal suppresses weeds in container-grown ornamentals. HortScience 43:800-803

Shen K, Zheng Y (2017) Efficacy of Bio-based Liquid Mulch on Weed Suppression and Water Conservation in Container Nursery Production1. Journal of Environmental Horticulture 35:161-167