

Table 12. Efficacy at Northland Farms, West Olive, MI for liverwort with selected products.

Treatment	Rate	1 WAT ^z	2 WAT	4 WAT	6 WAT	8 WAT
SureGuard	4 oz/ac	7.5 ^{wv} bc	7.3 ab	7.9 a	7.3 b	6.2 bc
Milstop	2.2 g/ft ²	8.7 a	8.6 a	9.0 a	8.4 a	7.4 ab
Marengo	9 oz/ac	6.6 cd	6.5 b	8.1 a	8.9 a	8.8 a
Untreated	--	5.5 d	4.2 c	4.8 b	5.7 c	5.0 c

z = weeks after treatment

w = Liverwort control ratings followed by the same letter in the same column are not significantly different, based on lsmeans ($\alpha = 0.05$)

v = Liverwort control ratings based on a 0-10 scale with 0 being no control and 10 perfect control with ≥ 7 commercially acceptable.

SureGuard at either 3 or 4 oz is an excellent choice for liverwort control in dormant species. There was no significant difference between the 3 and 4 oz rates for control and phytotoxicity was less with the 3 oz/ac rate. We recommended the 3 oz/ ac rate be used as it is more economical. Marengo is also an excellent choice for liverwort control if applied dormant and provides residual control up to 8-10 weeks much like the SureGuard. WeedPharm also provided excellent control. WeedPharm has no residual control unlike SureGuard and Marengo and required reapplication which was phytotoxic to several species. The baking soda and MilStop did not provide the level of control that we had seen in previous SCGBs, this was probably due to the rate being too low and half of other years. Some of the containers did show excellent control, indicating rate is important for controlling liverwort with these products. More work needs to be done with SureGuard and Marengo on dormant plants, with follow up applications of baking soda once active growth occurs.

Problems and Delays

There was little liverwort present at Northland Farms making it difficult to find enough plants to do several treatments and species. Northland Farms is using some of the controls we have advocated in previous SCGBs and thus their liverwort pressure has decreased significantly.

Overall Project Summary:

The 2012-13 project had three objectives dealing with three issues in the industry:

- A. Loss of Methyl Bromide soil fumigant
- B. Liner bed weed control with pre- and post-emergence herbicides for difficult weeds ex. *Rorippa sylvestris*

C. Liverwort control

Addressing objective A, the preemergence herbicides that we found to be effective in this project cost less than \$35.00/ ac. Products such as Treflan 1 p/act rate and Barricade 10 oz/ac could be used for herbaceous seedlings and Pendulum 2G in some crops. Treflan, Barricade and Pendulum 2G were also found to be acceptable for woody plant seedlings. We targeted to cut forest and herbaceous seedling growers weed control program cost by 30%. Using the herbicides listed above we have accomplished this target. More work is needed with preemergence herbicides in these industries due to the total phase out of MeBr by 2015. The lack of alternative soil fumigants and this being the first study of preemergence herbicide use in these industries also confirms the importance of this work.

Addressing objective B, in pre- project start surveys we found that liner bed growers in MI were using the following herbicides, Rout, Barricade, Snapshot, SureGuard, Pendulum, Round up, Goal, Tower, Lontrel and 2, 4-D. On average, they were spending \$250.00/ac to hand weed problem areas with difficult weeds such as *Rorippa*. We had targeted to reduce their weed program cost by 30%. We accomplished this goal. The acceptable use of Lontrel in this study provided 35% control, thus reducing hand weeding costs by 35%.

Addressing objective C, SureGuard at either 3 or 4 oz/ ac was found to be an excellent choice for liverwort control in dormant species. There was no significant difference between the 3 and 4 oz rates for control and phytotoxicity was less with the 3 oz/ac rate. We recommended the 3 oz/ ac rate be used as it is more economical. Marengo was also an excellent choice for liverwort control if applied dormant and provides residual control up to 8-10 weeks much like the SureGuard. Work with these two herbicide applied dormant needs to continue in conjunction with supplemental baking soda or potassium bicarbonate application in the growing season.

Problems and Delays:

In the proposal we there was \$26,120.00 for a flat rate contractor James Beaver who works for MESS. Mr. Beaver was unable to work on this project in 2013 and this portion of the project was allocated to Dr. Mathers also of MESS in a consulting capacity and the remainder went to Luke Case of OSU. In the proposal there was \$5,640.05 for travel; however, due to the extensive number of trials that we did in this project the number of evaluations required was more than expected. We actually spent less in salary and more in travel than proposed.

Funding: Proposed

Personnel (Salary and Fringes)	<u>\$46,620.00</u>
Travel	<u>\$ 5,640.05</u>
Total	<u>\$52,260.05</u>

Funding: Expended

Personnel (Salary and Fringes)	<u>\$45,637.74</u>
Travel	<u>\$ 6,622.31</u>
Total	<u>\$52,260.05</u>

Budget:

Table 13. Budget details and reimbursements requested for this reporting period (11/2012 to 11/2013) for details see Table 12.

Budget details for this reporting period		Matching Funds for this reporting period (at least 25% of total project)		
Type of Expense	Grant Reimbursement Amount	Cash Funds	In-Kind	Total Cost
<i>Personnel</i>	\$23,826.60 – MESS (Mathers) \$21,811.14 – OSU (Case)	\$6,080.00		
<i>Travel</i>	\$2,193.42 – MESS (Mathers) \$4,428.89 – OSU (Case)	\$1,000.00	\$3,000.00	
<i>Equipment</i>			\$2,000.00	
<i>Contractual Services</i>				
<i>Supplies & Materials</i>			\$6,000.00	
<u>Totals</u>	<u>\$52,260.05</u>	<u>\$7,080.00</u>	<u>\$11,000.00</u>	<u>\$70,340.05</u>

- **\$26,020.02 is payable to Hannah Mathers** for hours of works as a consultant indicated in Table 13 and \$2193.42 for travel reimbursement, necessary hotel receipts attached.
- **\$26,240.03 is payable to Ohio State University** for \$21,811.14 worth of labor and fringe benefits plus \$4,428.89 worth of travel indicated in Table 13.

Table 14. Salaries summary for OSU and Hannah Mathers (Consultant) details in Table 15.

Employee	Rate	Fringe	Hours Worked	Note
Hannah Mathers	\$72.00		330.925	Note fringe is rolled into hourly rate for consulting services.
Luke Case	\$20.50	\$7.529	776.60	

Table 15. Summary of nursery assignments made for trial design, initiation, evaluations, reapplications, and summaries with nursery specified by employees conducting the work, dates conducted, mileage to sites, hours worked and respective salary and fringe allocated.

Date	Nursery	Employee	Hours	Salary	Fringe	Mileage	\$0.56 /mi Reimbursement	Hotel	Meals Per diem for Grand Haven, MI
1/21-24/13	Ann Arbor Workshop- pre-project surveys, PowerPoint, handout, agenda, survey preparations and survey result compilation	Mathers	40	\$2880.00		0.00		0.00 (3 rd party pd.)	3 rd. party pd.
1/10 to 1/22/13	Ann Arbor Workshop, PowerPoint preparation, handouts, collecting samples, speaking	Case	60	\$1230.00	\$451.74	213.20	\$119.39	0.00 (3 rd party pd.)	3 rd. party pd.
1/24-30/13	West Olive Workshop- pre-project surveys, Powerpoint, handout, agenda, survey preparations, and survey result compilation.	Mathers	40	\$2880.00		724.2	\$405.45	0.00 (3 rd party pd.)	(1st and last day = \$42.00 and day of = \$56.00) \$42.00
1/10 1/29/13	West Olive Workshop preparation sample collection and speaking	Case	60	\$1230.00	\$451.74	400.9	\$224.50	0.00 (3 rd party pd.)	3 rd. party pd.

2/27/13	Liverwort trial preparation, work plan, schedule, design	Mathers	6	\$432.00					
2/27 to 2/28/13	Initiate Liverwort trial at Spring Meadow Northland Farms	Case	30	\$615.00	\$225.87	420.0	\$235.20	0.00 (3 rd party pd.)	3 rd. party pd.
3/7/13	Spring Meadow Northland Farms	Case	16	\$328.00	\$120.46	420.0	\$235.20	0.00 (3 rd party pd.)	3 rd. party pd.
3/14/13	Spring Meadow Northland Farms	Case	16	\$328.00	\$120.46	420.0	\$235.20	0.00 (3 rd party pd.)	3 rd. party pd.
3/28/13	Spring Meadow Northland Farms	Case	16	\$328.00	\$120.46	420.0	\$235.20	0.00 (3 rd party pd.)	3 rd. party pd.
3/29/13	Difficult weed trial preparation, work plan, schedule, design	Mathers	10	\$720.00					
4/3 to 4/4/13	Initiate Pre- trial for Difficult weeds at BFN	Case	30	\$615.00	\$225.87	420.0	\$235.20	0.00 (3 rd party pd.)	3 rd. party pd.
4/11/13	Spring Meadow Northland Farms	Case	16	\$328.00	\$120.46	420.0	\$235.20	0.00 (3 rd party pd.)	3 rd. party pd.
4/24 to 4/25/13	Reapplication and eval. for Liverwort trial at Spring Meadow Northland Farms	Case	40	\$820.00	\$301.16	420.0	\$235.20	0.00 (3 rd party pd.)	3 rd. party pd.
5/1 to 5/2/13	Evaluation at Spring Meadow Northland Farms and BFN	Case	30	\$615.00	\$225.87	420.0	\$235.20	0.00 (3 rd party pd.)	3 rd. party pd.
5/9/13	BFN	Case	16	\$328.00	\$120.46	420.0	\$235.20	0.00 (3 rd party pd.)	3 rd. party pd.
5/15 to 5/16/13	Evaluation at Spring Meadow Northland Farms and BFN and Initiate Post BFN	Case	40	\$820.00	\$301.16	420.0	\$235.20	0.00 (3 rd party pd.)	\$42.00
5/17/13	MeBr loss trial preparation, work plan, schedule, design	Mathers	10	\$720.00					
5/21 to 5/22/13	Walter's Gardens and New Life Nursery trial initiation	Mathers	30	\$2160.00		700.7	\$392.40	0.00 (3 rd party pd.)	42.00+ 56.00= \$98.00

5/21 to 5/22/13	Walter's Gardens and New Life Nursery trial initiation	Case	40	\$615.00	\$225.87	420.0	\$235.20	0.00 (3 rd party pd.)	\$42.00
5/29 to 5/30/13	Final evaluation at Spring Meadow Northland Farms, 8 WAT eval. at BFN pre- and BFN 2 WAT post-trial	Case	40	\$820.00	\$301.16	420.0	\$235.20	0.00 (3 rd party pd.)	3 rd. party pd.
6/04 to 6/5/13	Walter's Gardens and New Life Nursery trial evaluation and meet with cooperators	Mathers	34	\$2448.00		700.7	\$392.40	\$173.15	1st and last day = \$42.00 and day of = \$56.00)
6/18 to 6/19/13	BFN – end Post, BFN – end Pre, 4 WAT – WG and NL	Case	40	\$820.00	\$301.16	420.0	\$235.20	0.00 (3 rd party pd.)	\$42.00
6/20 to 7/10/13	Data analyses, picture organization, draft M&M, tables of data for liverwort and BFN,	Case	40	\$1640.00	\$602.32				
7/2 to 7/3/13	Walters and New Life	Case	24.6	\$504.30	\$185.21	420.0	\$235.20	0.00 (3 rd party pd.)	\$42.00
7/10 to 7/11/13	Meeting with Growers, preparation of PowerPoint re results, speak at session, view trials	Mathers	40	\$2880.00		725.0	\$406.00	\$91.02	\$98.00
07/17/12	Walters and New Life	Case	16	\$328.00	\$120.46	420.0	\$235.20		\$42.00.
07/31/13	Walters and New Life	Case	16	\$328.00	\$120.46	420.0	\$235.20		\$40.60.
08/14/13	Walters and New Life	Case	16	\$328.00	\$120.46	420.0	\$235.20		\$0 - 3 rd party pd.
10/01 to 10/18/13	Analyses data, create tables, organize photos, drat materials and methods, first section, creation of annual report to disseminate results	Case	175	\$3587.50	\$1317.56				
10/21/13-11/01/13	Pictures, M&M, results, compilation of report and discussion	Mathers	120.925	\$8706.60					
				Mathers \$23,826.60 Case \$15,940.80 Total \$39,767.40	\$5870.34		\$5939.54	\$264.17	\$418.60
Grand Total: \$52,260.05									

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