http://ir4.rutgers.edu/Ornamental/ornamentalSummaryReports.cfm

IR-4 Ornamental Horticulture Program
Oregano Oil Crop Safety

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Abstract

From 2010 to 2013, IR-4 completed 28 trials on Bryophyter (Oregano oil). The data contained in this report was generated to register uses of active ingredient on and around ornamental horticulture plants with broadcast applications, including over the top of established plants. The Bryophyter rates in this testing program were at 1 and 2 % active ingredient as the 1X and 2X rates. It had been applied to 21 plant genera or species. Results showed Bryophyter causing no injury when applied to these crops in the dormant stage of growth. Of these genera and species, none exhibited no or minimal transient injury after the second application at both rates. Seven (7) crops showed significant injury after the second application. Of the fourteen (14) crops that still need additional information, there are eight (8) genera or species in which one trial did not show significant injury at 1X and 2X rates, and two (2) genera/species showing variable response at the 1X rate.

Introduction

Control of broadleaved weeds and sedges in the production of woody and herbaceous perennials can be problematic because nurseries grow many different types of plants and not all genera or species are listed on labels. These weeds can also be difficult to control in landscape settings for the same reason. Five herbicides, acetic acid (WeedPharm), d-limonene (Avenger Ag), oregano oil (Bryophyter), pelargonic acid (Scythe), and ammonium nonanoate (Emery Agro / Racer), were chosen for research activities into level of crop safety with over the top applications.

Materials and Methods

In the 2010 protocol, two applications of Bryophyter were made approximately 4 weeks apart. In the 2012 and 2013 protocols, two applications of Bryophyter were made approximately 8 weeks apart, with the first made under winter conditions and the second application when crop demonstrated active growth. In some trials (AL, CA, NC and VA), applications were made when plants were already growing. The application rates were 1 and 2 % active ingredient, plus a water treated control. A minimum of four plants (replicate treatments) were required with many researchers exceeding this minimum. Phytotoxicity was recorded on a scale of 0 to 10 (0 = No phytotoxicity; 10 = Complete kill) at 1, 2, and 4 weeks after each application. Some researchers also included readings at 8 weeks after the initial and second applications. For more detailed materials and methods, please see protocols at http://ir4.rutgers.edu/Ornamental/Ornamentals.cfm.

Bryophyter was supplied to researchers (See list of researchers in Appendix 1) by Moss Buster LLC.

Results and Summary

Phytotoxicity

Based on the type and nature of injury seen with Bryophyter applications in the conducted research, tested plant species were placed into four categories: 1) no significant phytotoxicity or growth differences from the untreated check or any injury was transitory, 2) no or minimal transitory injury seen at the 1X rate, but the 2X rate did cause significant phytotoxicity, 3) significant injury sufficient to recommend growers not utilize this product, and 4) more data is needed to make informed recommendations.

Bryophyter caused sufficient injury on two genera/species to recommend growers not utilize Bryophyter as an over-the-top treatment on actively growing plants for liverwort control (Table 3). For thirteen genera/species, more information is needed because only 1 or 2 trials were conducted to date (Table 4). Of these fourteen (14) crops that still need additional information, there are eight (8) genera or species in which one trial did not show significant injury at 1X and 2X rates, and two (2) genera/species showing variable response at the 1X rate.

Please see Table 5 for a list of individual trial summaries on Bryophyter.

Table 1. List of Bryophyter treated crops with no or minimal transitory injury.

None

Table 2. List of Bryophyter treated crops with no or minimal transitory injury seen at the 1X rate, but the 2X rate did cause significant phytotoxicity

None

Table 3. List of Bryophyter treated crops exhibiting significant injury.

Buxus microphylla
Chaenomeles sp.
Delosperma sp.
Ilex x meserveae
Hydrangea macrophylla
Liriope sp.
Syringia sp.

Table 4. List of Bryophyter treated crops where more information is needed.

Alchemilla erythropoda [1]
Berberis thunbergii [1]
Dryopteris erythrosora
Euonymus alatus [1]
Hemerocallis sp.
Heuchera sp. [2]
Hosta sp. [2]
Juniperus horizontalis [1]
Ophiopogon japonicas [1]
Osmunda regalis [1]
Rhododendron x indica
Sedum sp. [1]
Thuja sp. [1]
Viburnum dentatum

[1] Little to no injury observed in one or two container trial(s).
[2] Variable response observed with crops exhibiting little to no injury at 1X in some trials but exhibiting moderate injury at 1X in others.

Table 5. Detailed Summary of Crop Safety Testing with Bryophyter (oregano oil).

Notes: Table entries are sorted by crop Latin name. Only those trials with research reports received by 8/01/14 are listed below. Table entries with blank results have been received but not yet cataloged in the database.

PR#	Product (Active Ingredients)s	Crop	ProductionSite	Researcher	State	Year	ApplicationType	Results
31121	Bryophyter (Oregano oil)	Lady's-Mantle (Alchemilla sp.) A. erythropoda 'Alma'	Greenhouse	Senesac	NY	2013	Over the top	Very little injury with 1 % and 2 % concentration with irrigation. Moderate transient injury with 100% concentration without irrigation
30101	Bryophyter (Oregano oil)	Japanese Barberry (Berberis thunbergii) B. 'Crimson Pygmy'	Greenhouse	Mathers	MI	2010	Over the top	No crop injury over the evaluation period with two applications at 1% v/v.
30100	Bryophyter (Oregano oil)	Boxwood (Buxus sp.) B. microphylla 'Green Velvet'	Greenhouse	Mathers	MI	2010	Over the top	Severe crop injury (80%) 2WAT with 1% v/v which decreased over time. Treatment may have impacted bud break as no injury was observed at later evaluations.
30107	Bryophyter (Oregano oil)	Flowering Quince (Chaenomeles sp.) C. 'Double Take Pink Storm'	Greenhouse	Mathers	MI	2010	Over the top	Moderate (20-23%) crop injury over majority of evaluation period with 1% v/v.
30765	Bryophyter (Oregano oil)	Delosperma sp. (Delosperma sp.) 'Cooper's Ice'	Greenhouse	Wilen	CA	2012	Over the top	Crop safety marginally acceptable with 1 %, unacceptable with 2 %; good liverwort control only at high rate.
30765	Bryophyter (Oregano oil)	Delosperma sp. (Delosperma sp.) D. cooperi 'Fire Spinner'	Greenhouse	Derr	VA	2012	Over the top	Minor injury with 1 % v/v w/ or w/o irrigation; unacceptable initial injury only with 2 % w/o irrig, but plants quickly outgrew injury. Best overall liverwort control and limited injury with high rate w/o irrig.
30765	Bryophyter (Oregano oil)	Delosperma sp. (Delosperma sp.) D. nubigenum 'Basutoland'	Greenhouse	Senesac	NY	2012	Over the top	Moderate injury at 1 % RTU w/ or w/o irrig. after 2nd applic.; severe at 2 % RTU ; excellent liverwort control with 2 applications.
30766	Bryophyter (Oregano oil)	Fern, Autumn & Wood (Dryopteris sp.) D. erythrosora	Greenhouse	Neal	NC	2012	Over the top	Good liverwort control but unacceptable injury with 1 and 2% v:v applied twice and irrigated 15 or 2 hrpostapplication.
30766	Bryophyter (Oregano oil)	Fern, Autumn & Wood (Dryopteris sp.) D. erythrosora	Greenhouse	Senesac	NY	2012	Over the top	Slight to moderate injury of evergreen/past season foliage with 1 % and 2 % RTU applied twice, no injury of new growth; excellent liverwort control with 2 applications.
30104	Bryophyter (Oregano oil)	Winged Burning Bush (Euonymus alatus) E. 'White Album'	Greenhouse	Mathers	MI	2010	Over the top	Slight injury initially (18%) 1WAT decreasing with time from 1% v/v.
30769	Bryophyter (Oregano oil)	Daylily (Hemerocallis sp.) 'Mini Pearl'	Greenhouse	Senesac	NY	2012	Over the top	Low injury with 1 % RTU w/ or w/o irrig. after 2nd applic., moderate with 2 % RTU w/o irrigation applied twice; excellent liverwort control with 2 applications.

PR#	Product (Active Ingredients)s	Crop	ProductionSite	Researcher	State	Year	ApplicationType	Results
30770	Bryophyter (Oregano oil)	Coral Bells, Alumroot (Heuchera sanguinea) 'Big Top Gold'	Greenhouse	Czarnota	GA	2012	Over the top	Slight injury with complete recovery w/o irrig. at 1 and 2 % formulation, slight to moderate with complete recovery at both rates w/o irrig; fair to good liverwort control for 2 WAT.
30770	Bryophyter (Oregano oil)	Coral Bells, Alumroot (Heuchera sanguinea) H. micrantha 'Purple Palace'	Greenhouse	Wilen	CA	2012	Over the top	Inadequate crop safety with 1 and 2 %; good liverwort control only at high rate.
30770	Bryophyter (Oregano oil)	Coral Bells, Alumroot (Heuchera sanguinea) H. villosa 'Caramel'	Greenhouse	Senesac	NY	2012	Over the top	Low injury at 1 % and 2 % RTU with irrig., moderate w/o; excellent liverwort control with 2 applications.
30772	Bryophyter (Oregano oil)	Hosta (Hosta sp.) 'Blue Hawaii'	Greenhouse	Derr	VA	2013	Over the top	Minor injury with 1 % w/ or w/o, and 2 % v/v w/, irrigation; unacceptable injury only at high rate w/o irrig. Poor liverwort control when safe.
30772	Bryophyter (Oregano oil)	Hosta (Hosta sp.) 'Gold Standard'	Greenhouse	Senesac	NY	2012	Over the top	Moderate injury with 1 % 2 % RTU w/ or w/o irrig. after 2nd applic.; excellent liverwort control with 2 applications.
30099	Bryophyter (Oregano oil)	Hydrangea (Hydrangea sp.) H. 'Invincibelleamorence	Greenhouse	Mathers	MI	2010	Over the top	Slight (12-16%) crop injury throughout the evaluation period with 1% v/v.
30099	Bryophyter (Oregano oil)	Hydrangea (Hydrangea sp.) H. macrophylla 'Blue Danube'	Greenhouse	Senesac	NY	2012	Over the top	Moderate to severe injury with 1 % and 2 % RTU w/ or w/o irrig. after 2nd applic.; excellent liverwort control with 2 applications.
30102	Bryophyter (Oregano oil)	Holly, Blue (Ilex x meserveae) I. 'China Girl'	Greenhouse	Mathers	MI	2010	Over the top	Significant crop injury (65%) 2 WAT with 1% v/v decreasing over time. Timing of application may have impacted bud break.
30106	Bryophyter (Oregano oil)	Juniper, Creeping or Trailing (Juniperus horizontalis) J. 'Huges Gold'	Greenhouse	Mathers	MI	2010	Over the top	Slight initial injury (13%) 1WAT but no observable injury at later evaluations with 1% v/v.
30615	Bryophyter (Oregano oil)	Lilyturf, Creeping (Liriope sp.) L. muscari 'Variegata'	Greenhouse	Neal	NC	2012	Over the top	Good liverwort control but unacceptable injury with 1 and 2% v:v applied twice and irrigated 15 or 2 hr postapplication.
30774	Bryophyter (Oregano oil)	Mondo Grass, Lilyturf, Ker-Gawl (Ophiopogon sp.) O. japonicus 'Dwarf Black'	Greenhouse	Senesac	NY	2013	Over the top	Virtually no injury at 1 % and 2 % with and without irrigation.
31874	Bryophyter (Oregano oil)	Fern, Royal (Osmunda regalis)	Greenhouse	Derr	VA	2013	Over the top	Minor injury with 1 % v/v w/ or w/o irrigation; unacceptable injury only with 2 % v/v w/o irrig. Poor liverwort control when safe.
30775	Bryophyter (Oregano oil)	Azalea (Rhododendron sp.) R. × indica 'Judge Solomon'	Greenhouse	Gilliam	AL	2012	Over the top	Good control of liverwort, with very minor injury at 1 % rate; excellent control but unacceptable injury at 2 % rate; immediate irrigation slightly decreased efficacy at 1 %.
30092	Bryophyter (Oregano oil)	Stonecrop (Sedum sp.) S. spurium 'John Creech'	Greenhouse	Senesac	NY	2013	Over the top	Very little injury after the first application and for 1 % with and without irrigation and 2 % with irrigation after the second application.

PR#	Product (Active Ingredients)s	Crop	ProductionSite	Researcher	State	Year	ApplicationType	Results
30098	Bryophyter (Oregano oil)	Lilac (Syringa sp.) S. meyeri 'Paliban'	Greenhouse	Mathers	MI	2010	Over the top	Significant (79-86%) crop injury 4WAT through 4 WAT2 with 1% v/v. No ratings taken during 1 or 2 WAT due to slow emergence from dormancy.
30103	Bryophyter (Oregano oil)	Arborvitae (Thuja sp.) T. 'Techny'	Greenhouse	Mathers	MI	2010	Over the top	Little to no crop injury observed with 1% v/v.
30105	Bryophyter (Oregano oil)	Arrowwood (Viburnum sp.) V. dentatum 'Double Pink'	Greenhouse	Mathers	MI	2010	Over the top	Slight (18%) initial crop injury 1 WAT with no observable injury at later evalutions with 1% v/v.

Label Suggestions

For Bryophyter, data suggest a label with recommendations to avoid contact with desirable plants.

Appendix 1: Contributing Researchers

Dr. Mark Czarnota	University of Georgia Department of Horticulture 1109 Experiment St. Griffin, GA 30223
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