



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

**IR-4 Ornamental Horticulture Program
Acetic Acid Crop Safety**

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Date: August 19, 2015**

Acknowledgements

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Abstract

From 2010 to 2013, IR-4 completed 38 trials on WeedPharm (Acetic acid). 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 WeedPharm rates in this testing program were at 5 and 10 % active ingredient as the 1X and 2X rates. It had been applied to 18 plant genera or species. Results showed WeedPharm 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. Eight (8) crops showed significant injury after the second application. Of the ten (10) crops that still need additional information, there are three (3) genera or species in which one or two trials did not show significant injury at 1X and 2X rates, and three (3) 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 on over ## different plant species.

Materials and Methods

In the 2010 protocol, two applications of WeedPharm were made approximately 4 weeks apart. In the 2012 and 2013 protocols, two applications of WeedPharm 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 (CA and VA), applications were made when plants were already growing. The application rates were 5 and 10 % 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>.

WeedPharm was supplied to researchers (See list of researchers in Appendix 1) by Pharm Solutions, Inc.

Results and Summary

Phytotoxicity

Based on the type and nature of injury seen with WeedPharm 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.

WeedPharm caused sufficient injury on five genera/species to recommend growers not utilize WeedPharm as an over-the-top treatment on actively growing plants for liverwort control (Table 3). For ten genera/species, more information is needed because only 1 or 2 trials were conducted to date (Table 4). Of these ten (10) crops that still need additional information, there are three (3) genera or species in which one or two trials did not show significant injury at 1X and 2X rates, and three (3) genera/species showing variable response at the 1X rate.

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

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

None

Table 2. List of WeedPharm 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 WeedPharm treated crops exhibiting significant injury.

Berberis thunbergii

Buxus microphylla

Forsythia sp.

Heuchera sanguinea

Hydrangea sp.

Liriope sp.

Perovskia atriplicifolia

Syringa sp.

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

*Delosperma sp.*²

Dryopteris erythrosora

Euonymus alatus

*Hemerocallis sp.*¹

Hibiscus sp.

*Hosta sp.*²

*Ilex verticillata*²

*Osmunda regalis*¹

*Thuja sp.*¹

Viburnum rhytidophyllum

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 WeedPharm (acetic acid)

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)	Crop	ProductionSite	Researcher	State	Year	ApplicationType	Results
30135	Weed Pharm (Acetic acid)	Japanese Barberry (<i>Berberis thunbergii</i>) B. 'Crimson Pygmy'	Greenhouse	Mathers	MI	2010	Over the top	Little to no crop injury with 10% v/v.
30135	Weed Pharm (Acetic acid)	Japanese Barberry (<i>Berberis thunbergii</i>) 'Orange Rocket'	Greenhouse	Mathers	OH	2013	Over the top	Decker: Acceptable injury when applied dormant at 10 % v/v, unacceptable when applied during active plant growth.
30134	Weed Pharm (Acetic acid)	Boxwood, Japanese (<i>Buxus microphylla</i>) B. 'Green Velvet'	Greenhouse	Mathers	MI	2010	Over the top	Little to no crop injury with 10% v/v.
30134	Weed Pharm (Acetic acid)	Boxwood, Japanese (<i>Buxus microphylla</i>) 'Wintergem'	Greenhouse	Mathers	MI	2013	Over the top	Decker: Unacceptable injury when applied dormant or during active growth at 10 % v/v.
30813	Weed Pharm (Acetic acid)	Delosperma sp. (<i>Delosperma</i> sp.) 'Cooper's Ice'	Greenhouse	Wilén	CA	2012	Over the top	Significant injury with 5 and 10 %, more injury at high rate; good and excellent liverwort control.
30813	Weed Pharm (Acetic acid)	Delosperma sp. (<i>Delosperma</i> sp.) D. cooperi 'Fire Spinner'	Greenhouse	Derr	VA	2012	Over the top	Minor injury at 25 and 50 % v/v w/ or w/o irrigation. Good to excellent liverwort control at low rate w/o irrigation and high rate w/ or w/o irrig.
30813	Weed Pharm (Acetic acid)	Delosperma sp. (<i>Delosperma</i> sp.) D. nubigenum 'Basutoland'	Greenhouse	Senesac	NY	2012	Over the top	Low injury with 10% w/ irrig. after 2nd applic.; moderate or high at 25 % v/v w/ of w/o irrig., good to excellent liverwort control with 2 applications.
30814	Weed Pharm (Acetic acid)	Fern, Autumn & Wood (<i>Dryopteris</i> sp.)	Greenhouse	Mathers	OH	2013	Over the top	
30814	Weed Pharm (Acetic acid)	Fern, Autumn & Wood (<i>Dryopteris</i> sp.) D. erythrosora	Greenhouse	Mathers	OH	2012	Over the top	No injury with 5 % conc. applied twice; good liverwort control.
30814	Weed Pharm (Acetic acid)	Fern, Autumn & Wood (<i>Dryopteris</i> sp.) D. erythrosora	Greenhouse	Senesac	NY	2012	Over the top	Slight to moderate injury of evergreen/past season foliage with 10 % and 25 % applied twice, no injury of new growth; good to excellent liverwort control with 2 applications.
30580	Weed Pharm (Acetic acid)	Winged Burning Bush (<i>Euonymus alatus</i>) 'Unforgettable Fire'	Greenhouse	Mathers	MI	2012	Over the top	Data not reliable because of high injury to untreated check; good liverwort control with 5 %, excellent with 10 % conc.
30818	Weed Pharm (Acetic acid)	Golden Bells (<i>Forsythia</i> sp.) 'Show Off Sugar Baby'	Field Container	Mathers	MI	2013	Over the top	Spring Meadows: Acceptable injury when applied dormant at 10 % v/v, unacceptable when applied during active plant growth; good liverwort control.
30820	Weed Pharm (Acetic acid)	Daylily (<i>Hemerocallis</i> sp.) 'Mini Pearl'	Greenhouse	Senesac	NY	2012	Over the top	Very low injury with 10 and 25 % v/v applied twice; good to excellent liverwort control with 2 applications.
30821	Weed Pharm (Acetic acid)	Coral Bells, Alumroot (<i>Heuchera sanguinea</i>) 'Big Top Gold'	Greenhouse	Czarnota	GA	2012	Over the top	Slight to moderate injury with complete recovery w/ or w/o irrig. at 3 and 6 % v/v; poor liverwort control.

PR#	Product (Active Ingredients)	Crop	ProductionSite	Researcher	State	Year	ApplicationType	Results
30821	Weed Pharm (Acetic acid)	Coral Bells, Alumroot (Heuchera sanguinea) H. micrantha 'Purple Palace'	Greenhouse	Wilén	CA	2012	Over the top	Acceptable crop safety only with 5 % when irrigated, unacceptable at 10 %; good and excellent liverwort control.
30821	Weed Pharm (Acetic acid)	Coral Bells, Alumroot (Heuchera sanguinea) H. villosa 'Caramel'	Greenhouse	Senesac	NY	2012	Over the top	Low injury with recovery after 1st application with 10 and 25 % v/v, severe injury at high rate w/o irrigation after 2nd applic.; good to excellent liverwort control with 2 applications.
30822	Weed Pharm (Acetic acid)	Mallow, Rose Mallow (Hibiscus sp.) 'Blue Satin'	Field Container	Mathers	MI	2013	Over the top	Spring Meadows: Acceptable injury when applied dormant at 10 % v/v, unacceptable when applied during active plant growth; good liverwort control.
30823	Weed Pharm (Acetic acid)	Hosta (Hosta sp.)	Greenhouse	Mathers	OH	2013	Over the top	
30823	Weed Pharm (Acetic acid)	Hosta (Hosta sp.) 'Blue Hawaii'	Greenhouse	Derr	VA	2013	Over the top	Low injury with 5 and 10 % v/v w/ or w/o irrigation. High liverwort control from low rate w/o, and high rate w/ or w/o irrig.
30823	Weed Pharm (Acetic acid)	Hosta (Hosta sp.) 'Halcyon'	Greenhouse	Mathers	OH	2012	Over the top	Moderate injury with good recovery at 5 % conc. applied twice; good liverwort control.
30133	Weed Pharm (Acetic acid)	Hydrangea (Hydrangea sp.) H. 'Invicibelleamorences'	Greenhouse	Mathers	MI	2010	Over the top	Little to no crop injury with 10% v/v.
30133	Weed Pharm (Acetic acid)	Hydrangea (Hydrangea sp.) H. macrophylla 'Blue Danube'	Greenhouse	Senesac	NY	2012	Over the top	Low injury with 10 % w/ and w/o irrig after 2nd applic., moderate with 25 %; good to excellent liverwort control with 2 applications.
30133	Weed Pharm (Acetic acid)	Hydrangea (Hydrangea sp.) H. paniculata 'Limelight'	Greenhouse	Mathers	MI	2013	Over the top	Spring Meadows: Acceptable injury when applied dormant at 10 % v/v, unacceptable when applied during active plant growth; good liverwort control.
30133	Weed Pharm (Acetic acid)	Hydrangea (Hydrangea sp.) 'Incrediball'	Greenhouse	Mathers	OH	2013	Over the top	Decker: Acceptable injury when applied dormant at 10 % v/v, unacceptable when applied during active plant growth.
30133	Weed Pharm (Acetic acid)	Hydrangea (Hydrangea sp.) 'Invicibelle Spirit'	Greenhouse	Mathers	MI	2012	Over the top	Slight injury with 5, moderate with 10 % conc. applied twice; good liverwort control with 5 %, excellent with 10 % conc.
30824	Weed Pharm (Acetic acid)	Holly (Ilex sp.) I. verticillata 'Winter Red'	Greenhouse	Mathers	MI	2012	Over the top	Moderate injury with 5 and 10 % conc. applied twice, not significantly different from untreated check; good liverwort control with 5 %, excellent with 10 % conc.
30136	Weed Pharm (Acetic acid)	Holly, Blue (Ilex x meserveae) I. 'China Girl'	Greenhouse	Mathers	MI	2010	Over the top	Little to no crop injury with 10% v/v.
30638	Weed Pharm (Acetic acid)	Lilyturf, Creeping (Liriope sp.)	Greenhouse	Mathers	OH	2013	Over the top	Crop not included in trial.
30638	Weed Pharm (Acetic acid)	Lilyturf, Creeping (Liriope sp.) L. spicata	Greenhouse	Mathers	MI	2012	Over the top	Moderate injury with 5 % conc. applied twice; good liverwort control.
31878	Weed Pharm (Acetic acid)	Fern, Royal (Osmundaregalis)	Greenhouse	Derr	VA	2013	Over the top	Low injury with 25 and 50 % v/v w/ or w/o irrigation. High liverwort control from low rate w/o, and high rate w/ or w/o, irrig.

PR#	Product (Active Ingredients)	Crop	ProductionSite	Researcher	State	Year	ApplicationType	Results
31442	Weed Pharm (Acetic acid)	Sage, Russian;Blue Spire (Perovskia sp.) P. atriplicifolia	Greenhouse	Mathers	OH	2012	Over the top	Severe injury with 5 % conc. applied twice; good liverwort control.
30132	Weed Pharm (Acetic acid)	Lilac (Syringa sp.)	Greenhouse	Mathers	OH	2013	Over the top	
30132	Weed Pharm (Acetic acid)	Lilac (Syringa sp.) 'Miss Kim'	Greenhouse	Mathers	MI	2012	Over the top	Spring Meadow Nursery. Moderate injury with 5 and 10 % conc. applied twice; good liverwort control with 5 %, excellent with 10 %.
30132	Weed Pharm (Acetic acid)	Lilac (Syringa sp.) S. meyeri 'Palibin'	Greenhouse	Mathers	MI	2012	Over the top	Northland Farms. Severe injury with 5 % conc. applied twice; good liverwort control.
30132	Weed Pharm (Acetic acid)	Lilac (Syringa sp.) S. 'Paliban'	Greenhouse	Mathers	MI	2010	Over the top	Moderate crop injury throughout the experiment with 10% v/v.
30137	Weed Pharm (Acetic acid)	Arborvitae (Thuja sp.) T. 'Techny'	Greenhouse	Mathers	MI	2010	Over the top	Little to no crop injury with 10% v/v.
30829	Weed Pharm (Acetic acid)	Arrowwood (Viburnum sp.) V. dentatum 'Blue Muffin'	Greenhouse	Mathers	MI	2013	Over the top	Spring Meadows: Acceptable injury when applied dormant at 10 % v/v, unacceptable when applied during active plant growth; good liverwort control.
30829	Weed Pharm (Acetic acid)	Arrowwood (Viburnum sp.) V. rhytidophyllum 'Cree'	Greenhouse	Mathers	MI	2012	Over the top	Data not reliable because of high injury to untreated check; good liverwort control with 5 %, excellent with 10 % conc.

Label Suggestions

For WeedPharm, data suggest no change in its current label recommendations to avoid contact with desirable plants.

Appendix 1: Contributing Researchers

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