



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

**IR-4 Ornamental Horticulture Program
Ammonium nonanoate Crop Safety**

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Date: August 19, 2014**

Acknowledgements

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Abstract

From 2010 to 2013, IR-4 completed 24 trials on Racer (Ammonium nonanoate). 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 Racer rates in this testing program were at 3 and 6 % v/v as the 1X and 2X rates. It had been applied to 16 plant genera or species. Results showed Racer 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. Four (4) crops showed significant injury after the second application. Of the twelve (12) crops that still need additional information, there are six (6) genera or species in which one or two trials did not show significant injury at 1X and 2X rates.

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 Racer were made approximately 4 weeks apart. In the 2012 and 2013 protocols, two applications of Racer 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, GA, NC and VA), applications were made when plants were already growing. In 2013 trials, the product Emery Agro 7000 was used instead of Racer. The application rates were 3 and 6 % v/v, 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>.

Racer was supplied to researchers (See list of researchers in Appendix 1) by Falcon Lab LLC.

Results and Summary

Phytotoxicity

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

Racer caused sufficient injury on four genera/species to recommend growers not utilize Racer as an over-the-top treatment on actively growing plants for liverwort control (Table 3). For twelve genera/species, more information is needed because only 1 or 2 trials were conducted to date (Table 4). Of these twelve (12) crops that still need additional information, there are six (6) genera or species in which one or two trials did not show significant injury at 1X and 2X rates.

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

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

None

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

Rhododendron x indica

Syringa sp.

Ophiopogon japonicas

Dryopteris erythrosora

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

Alchemilla erythropoda
*Berberis thunbergii*¹
Buxus microphylla
Delosperma sp.
*Hemerocallis sp.*¹
*Heuchera sanguinea*¹

*Hosta sp.*¹
*Hydrangea macrophylla*¹
Ilex x meserveae
*Osmunda regalis*¹
*Sedum sp.*¹
Thuja sp.

¹ Little to no injury observed in one or two container trial(s).

Table 5. Detailed Summary of Crop Safety Testing with Racer (Ammonium nonanoate)

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
31126	Emery Agro 7000 Concentrate (Ammonium nonanoate)	Lady's-Mantle (Alchemilla sp.) A. erythropoda 'Alma'	Greenhouse	Senesac	NY	2013	Over the top	No to moderate injury with 3 and 6% with and without irrigation after the first application. Moderate to severe transient injury after the second application.
30787	Emery Agro 7000 Concentrate (Ammonium nonanoate)	Mondo Grass, Lilyturf, Ker-Gawl (Ophiopogon sp.) O. japonicus 'Dwarf Black'	Greenhouse	Senesac	NY	2013	Over the top	Virtually no to moderate injury with 3 and 6% with and without irrigation after the second application.
30787	Emery Agro 7000 Concentrate (Ammonium nonanoate)	Mondo Grass, Lilyturf, Ker-Gawl (Ophiopogon sp.) O. japonicus 'Nana'	Greenhouse	Wilén	CA	2013	Over the top	Unacceptable injury with 3 and 6 % v/v; poor liverwort control.
31875	Emery Agro 7000 Concentrate (Ammonium nonanoate)	Fern, Royal (Osmunda regalis)	Greenhouse	Derr	VA	2013	Over the top	Low injury but poor liverwort control with 3 and 6 % v/v w/ irrigation, unacceptable injury at both rates w/o irrig.
30790	Emery Agro 7000 Concentrate (Ammonium nonanoate)	Stonecrop (Sedum sp.) S. spurium 'John Creech'	Greenhouse	Senesac	NY	2013	Over the top	Virtually no to minor injury with 3 and 6% with and without irrigation after second application.
30117	Racer Herbicide (Ammonium nonanoate)	Japanese Barberry (Berberis thunbergii) B. 'Crimson Pygmy	Greenhouse	Mathers	MI	2010	Over the top	No crop injury throughout trial with 0.2 % v/v.
30116	Racer Herbicide (Ammonium nonanoate)	Boxwood, Japanese (Buxus microphylla) B. 'Green Velvet'	Greenhouse	Mathers	MI	2010	Over the top	Moderate crop injury (40%) at 2WAT but little to no injury at all other evaluations with 0.2% v/v. Timing may have impacted bud break.
30778	Racer Herbicide	Delosperma sp. (Delosperma sp.) 'Cooper's Ice'	Greenhouse	Wilén	CA	2012	Over the top	Significant injury with some recovery at 3 and 6 % v/v, more injury at high rate; poor liverwort control.

	(Ammonium nonanoate)							
30778	Racer Herbicide (Ammonium nonanoate)	Delosperma sp. (Delosperma sp.) D. cooperi 'Fire Spinner'	Greenhouse	Derr	VA	2012	Over the top	Minor injury with 3 % v/v w/ or w/o irrigation; unacceptable initial injury only with high rate (6 % v/v) w/o irrig, but plants quickly outgrew injury. Acceptable liverwort control only with high rate w/o irrig.
30778	Racer Herbicide (Ammonium nonanoate)	Delosperma sp. (Delosperma sp.) D. nubigenum 'Basutoland'	Greenhouse	Senesac	NY	2012	Over the top	Low or moderate injury with 3 % w/ or w/o irrig. after 2nd applic., moderate with 6 % v/v , poor to fair liverwort control with 2 applications.
30779	Racer Herbicide (Ammonium nonanoate)	Fern, Autumn & Wood (Dryopteris sp.) D. erythrosora	Greenhouse	Neal	NC	2012	Over the top	Mediocre liverwort control and unacceptable injury with 3 and 6% v:v applied twice and irrigated 15 or 2 hr postapplication.
30779	Racer Herbicide (Ammonium nonanoate)	Fern, Autumn & Wood (Dryopteris sp.) D. erythrosora	Greenhouse	Senesac	NY	2012	Over the top	Slight to moderate injury of evergreen/past season foliage with 3 % and 6 % applied twice, no injury of new growth; poor to fair liverwort control with 2 applications.
30782	Racer Herbicide (Ammonium nonanoate)	Daylily (Hemerocallis sp.) 'Mini Pearl'	Greenhouse	Senesac	NY	2012	Over the top	Low injury with 3 % and 6 % v/v w/ or w/o irrig. after 2nd applic.; poor to fair liverwort control with 2 applications.
30783	Racer Herbicide (Ammonium nonanoate)	Coral Bells, Alumroot (Heuchera sanguinea) 'Big Top Gold'	Greenhouse	Czarnota	GA	2012	Over the top	Slight injury with complete recovery w/ or w/o irrig. at 3 and 6 % v/v; good liverwort control for 2 WAT.
30783	Racer Herbicide (Ammonium nonanoate)	Coral Bells, Alumroot (Heuchera sanguinea) H. micrantha 'Purple Palace'	Greenhouse	Wilen	CA	2012	Over the top	Acceptable crop safety only with 3 % v/v when irrigated, unacceptable at 6 % v/v; poor liverwort control.
30783	Racer Herbicide (Ammonium nonanoate)	Coral Bells, Alumroot (Heuchera sanguinea) H. villosa 'Caramel'	Greenhouse	Senesac	NY	2012	Over the top	Low injury at 3 % and 6 % v/v with irrig., moderate w/o; excellent liverwort control with 2 applications.
30785	Racer Herbicide (Ammonium nonanoate)	Hosta (Hosta sp.) 'Blue Hawaii'	Greenhouse	Derr	VA	2013	Over the top	Low injury with 3 and 6 % v/v w/ irrigation, unacceptable injury at both rates w/o irrig. Low injury and high liverwort control only from high rate w/ irrig.
30785	Racer Herbicide (Ammonium nonanoate)	Hosta (Hosta sp.) 'Gold Standard'	Greenhouse	Senesac	NY	2012	Over the top	Low injury with 3 % w/ or w/o irrig. and 6% w/ irrig. after 2nd applic.; poor to fair liverwort control with 2 applications.
30115	Racer Herbicide (Ammonium nonanoate)	Hydrangea (Hydrangea sp.) H. 'Invincibelleamourences'	Greenhouse	Mathers	MI	2010	Over the top	Minor crop injury with 0.2% v/v.

30115	Racer Herbicide (Ammonium nonanoate)	Hydrangea (Hydrangea sp.) H. macrophylla 'Blue Danube'	Greenhouse	Senesac	NY	2012	Over the top	Low injury with 3 and 6% w/ or w/o irrig. after 2nd applic., high w/o irrig.; poor to fair liverwort control with 2 applications.
30118	Racer Herbicide (Ammonium nonanoate)	Holly, Blue (Ilex x meserveae) I. 'China Girl'	Greenhouse	Mathers	MI	2010	Over the top	Little to no crop injury with 0.2% v/v.
30788	Racer Herbicide (Ammonium nonanoate)	Azalea (Rhododendron sp.) R. × indica 'Judge Solomon'	Greenhouse	Gilliam	AL	2012	Over the top	Good to excellent control of liverwort, but unacceptable injury with 3 and 6 % rates with and w/o immediate irrigation.
30114	Racer Herbicide (Ammonium nonanoate)	Lilac (Syringa sp.) S. 'Paliban'	Greenhouse	Mathers	MI	2010	Over the top	Significant crop injury (53-68%) throughout evaluation period with 0.2% v/v. No ratings were taken in first and second WAT due to dormancy.
30119	Racer Herbicide (Ammonium nonanoate)	Arborvitae (Thuja sp.) T. 'Techny'	Greenhouse	Mathers	MI	2010	Over the top	Moderate crop injury up to 28% with 0.2% v/v through out the trial.

Label Suggestions

For Racer, data suggest no change in current label 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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