



[Environment Horticulture Program Research Summaries](#)

IR-4 Environmental Horticulture Program Halosulfuron Crop Safety

Authors: Cristi L. Palmer, Kathleen Hester, and Ely Vea
Date: October 12, 2020

Acknowledgements

Susan Bierbrunner
Lori Harrison
Karen Sims

This material is based upon work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award numbers 2015-34383-23710, 2017-34383-27100, and 2019-34383-29973 with substantial cooperation and support from the State Agricultural Experiment Stations and USDA-ARS.

Table of Contents

Table of Contents	2
Table of Tables	3
Abstract	4
Introduction	4
Materials and Methods	4
Results and Summary	5
Efficacy	5
Phytotoxicity	5
Label Suggestions	37
Appendix 1: Contributing Researchers	39

Table of Tables

Table 1.	List of Halosulfuron treated crops grown in-ground with no or minimal transitory injury.....	6
Table 2.	List of Halosulfuron treated in-ground crops with no or minimal transitory injury seen at the 1X rate, but the 2X or 4X rate did cause significant phytotoxicity.....	6
Table 3.	List of Halosulfuron treated in-ground crops exhibiting significant injury.....	6
Table 4.	List of Halosulfuron treated in-ground crops where more information is needed.....	7
Table 5.	List of Halosulfuron treated container grown crops with no or minimal transitory injury.....	7
Table 6.	List of Halosulfuron treated container grown crops with no or minimal transitory injury seen at the 1X rate, but the 2X or 4X rate did cause significant phytotoxicity..	8
Table 7.	List of Halosulfuron treated container grown crops exhibiting significant injury.....	8
Table 8.	List of Halosulfuron treated container grown crops where more information is needed.	8
Table 9.	Detailed Summary of Crop Safety Testing with Halosulfuron in Field Containers.....	9
Table 10.	Detailed Summary of Crop Safety Testing with Halosulfuron in Field In Ground....	21

Abstract

Since 1995, IR-4 has completed 391 trials with products containing halosulfuron (Sedgehammer, Manage) on 137 crops. The data contained in this report was generated to expand the current SedgeHammer label to include both directed and over the top applications on certain plant species along with adding nursery production sites. The halosulfuron rates in the 2006 and 2007 testing program were 0.045, 0.09 and 0.18 pounds active ingredient per acre (lb ai per A) as the 1X, 2X and 4X rates. In 2008, 2009, 2010 and 2011, halosulfuron rates were 0.031, 0.063, and 0.125 lb ai per acre; the lowest registered rate is 0.031 lb ai per acre.

Of the 137 in-ground or container grown plant genera or species examined, 36 crops exhibited no or minimal transient injury after application at all three rates. Eleven crops exhibited no phytotoxicity at 0.045 lb ai per acre but did have some injury at the higher rates. Twenty four crops exhibited phytotoxicity at even the lowest rate.

Introduction

Postemergence 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. Three herbicides, SedgeHammer, Sulfentrazone, and V-10142 75WDG were chosen for 2006 research activities on crop safety. Additional research was conducted with Sedgehammer from 2007 to 2010. This report covers the results from SedgeHammer on 134 crop genera/species from 1996 through 2019.

SedgeHammer is the same formulation as Manage. This formulation was transferred to Gowan from Dow. While research was conducted under both names and Table 9 contains both names, the report text uses the trade name SedgeHammer throughout.

Materials and Methods

In 2008 to 2010 the post-emergence application rates were 0.031, 0.061, 0.125 lb ai per acre. In the 2006 and 2019 protocols, slightly higher rates were tested including 0.045, 0.09, and 0.18 lb ai per acre. All protocols called for two applications of SedgeHammer made approximately 30 days apart. 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, 4, 8, and 12 weeks after initial application. Some researchers also included readings 3 to 4 days after the initial and second applications. For more detailed materials and methods and available protocols from previous years' research activities, please go to <https://www.ir4project.org/ehc/ehc-registration-support-research/env-hort-researcher-resources/#Protocols> to view and download these protocols.

SedgeHammer and Manage were supplied to researchers (See list of researchers in Appendix 1) by Gowan and Dow AgroSciences, respectively.

Results and Summary

Efficacy

There are several reports of efficacy throughout the researcher reports. However, the main impetus to the research contained here was crop safety and the efficacy results cannot be considered exhaustive. Please see Table 9 for details on efficacy.

Phytotoxicity

Field research conducted since 1995 involved both in-ground crops and crops grown in containers. Data has been separated by in-ground (Tables 1-4) or container crops (Tables 5-8) based on the type and nature of injury seen with SedgeHammer applications. 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 and/or 4X rates did cause significant phytotoxicity, 3) significant injury sufficient to recommend growers not utilize this product, and 4) more trials are needed to clarify response.

For in-ground field trials, SedgeHammer exhibited no or minimal negative impact on a wide range of plant species (Table 1). Seventeen plant genera or species fell into this category. Some minimal injury may be acceptable for growers if applications are made several weeks to months in advance of crop sale particularly for woody ornamental crops. For 11 crop species, there was no or little injury exhibited at the lowest tested rates, but significant phytotoxicity occurred at the higher rates (Table 2). Seventeen crops exhibited damage sufficient to recommend growers not utilize SedgeHammer as an over-the-top treatment (Table 3). Table 4 contains a list of plants where either only one trial was conducted or there were sufficiently divergent results among researchers to recommend additional testing.

For trials involving container crops in field production, SedgeHammer exhibited no or minimal negative impact on a wide range of plant species (Table 5). Eighteen plant genera or species fell into this category. Some minimal injury may be acceptable for growers if applications are made several weeks to months in advance of crop sale particularly for woody ornamental crops. Two crops exhibited little or no injury at the lowest tested rates but significant phytotoxicity occurred at the higher rates (

Table 6). Twelve crops exhibited damage sufficient to recommend growers not utilize SedgeHammer as an over-the-top treatment (Table 7). Table 8 contains a list of plants where either only one trial was conducted or there were sufficiently divergent results among researchers to recommend additional testing.

The level of safety for field in-ground crops versus container grown crops may differ as herbicides may dissipate more rapidly in soilless media commonly used by container nurseries compared to field soils (Neal, J. 2011 Horticulture Science Research Station Outcomes and Impacts, Part 2).

Please see Table 9 and 10 for lists of research on SedgeHammer and the summary of the results.

Table 1. List of Halosulfuron treated crops grown in-ground with no or minimal transitory injury.

<i>Cupressus</i> sp.	<i>Lagerstroemia indica</i>	<i>Quercus alba</i>
<i>Hemerocallis</i> sp.	<i>Loropetalum</i> sp.	<i>Quercus rubra</i>
<i>Ilex cornuta</i>	<i>Magnolia</i> sp.	<i>Thuja occidentales</i>
<i>Ilex vomitoria</i> 'nana'	<i>Pinus nigra</i>	<i>Vinca minor</i> (see Lieth)
<i>Juglans nigra</i>	<i>Pinus resinosa</i>	
<i>Juniperus chinensis</i>	<i>Pinus strobus</i> (see Beste &	
<i>Juniperus horizontalis</i>	Frank)	

¹Other species may be added based on container data (see tables 5 and 9)

Table 2. List of Halosulfuron treated in-ground crops with no or minimal transitory injury seen at the 1X rate, but the 2X or 4X rate did cause significant phytotoxicity

<i>Acer rubrum</i>	<i>Myrica pensylvanica</i>	<i>Pinus taeda</i>
<i>Acer saccharum</i>	<i>Picea abies</i> (see Beste &	<i>Quercus acutissima</i>
<i>Betula</i> sp.	Frank)	<i>Quercus velutina</i>
<i>Metasequoia</i> sp.	<i>Picea glauca</i>	<i>Rhodoendron catawbiense</i>

Table 3. List of Halosulfuron treated in-ground crops exhibiting significant injury.

<i>Buddleia davidii</i>	<i>Prunus serótina</i>
<i>Chamaecyparis thyoides</i>	<i>Prunus americana</i>
<i>Chrysanthemum</i> (garden mum)	<i>Prunus avium</i>
<i>Cornus florida</i>	<i>Pseudotsuga menziesii</i> ¹
<i>Iris xiphium</i>	<i>Robinia pseudoacacia</i>
<i>Juniperus virginiana</i>	<i>Rhododendron catawbiense</i>
<i>Ligustrum</i> sp.	<i>Taxus</i> sp.
<i>Myrica pensylvanica</i>	<i>Viburnum</i> sp.
<i>Plantanus occidentalis</i>	

¹No injury to dormant trees; more study needed on actively growing trees.

Table 4. List of Halosulfuron treated in-ground crops where more information is needed.

<i>Abies</i> sp. ³	<i>Gardenia augusta</i> ¹	<i>Phlox</i> sp.
<i>Acer saccharinum</i>	<i>Gleditsia triacanthos</i>	<i>Prunus caroliniana</i>
<i>Amelanchier canadensis</i>	<i>Hosta fortunei</i>	<i>Quercus acutissima</i>
<i>Amelanchier</i> sp.	<i>Hydrangea arborescens</i>	<i>Quercus ilex</i>
<i>Aronia arbutifolia</i>	<i>Hydrangea</i> sp. ¹	<i>Quercus nuttali</i>
<i>Aronia melanocarpa</i>	<i>Ilex crenata</i>	<i>Quercus prinus</i>
<i>Aster ericoides</i>	<i>Ilex rotunda</i>	<i>Quercus virginiana</i>
<i>Betula</i> sp.	<i>Ilex verticillata</i>	<i>Rhaphiolepis indica</i>
<i>Buxus</i> sp.	<i>Illicium parviflora</i>	<i>Rhus lancea</i>
<i>Buxus microphylla</i>	<i>Itea virginica</i>	<i>Rosa</i> sp. ²
<i>Callistemon</i> sp.	<i>Juglans nigra</i>	<i>Rudbeckia fulgida</i>
<i>Carya</i> sp.	<i>Laurus nobilis</i>	<i>Spirea prunifolia</i>
<i>Cercis canadensis</i>	<i>Liquidambar styraciflua</i>	<i>Symphyotrichum ericoides</i>
<i>Cornus</i> sp.	<i>Lirodendron tulipifera</i>	<i>Taxodium distichum</i>
<i>Cryptomeria japonica</i>	<i>Lonicera japonica</i>	<i>Trachycarpus fortunei</i>
<i>Elaeocarpus decipiens</i>	<i>Lonicera sempervirens</i>	<i>Tradescantia x</i>
<i>Euonymus radicans</i> ¹	<i>Malus baccata</i>	<i>andersoniana</i>
<i>Forsythia</i> sp.	<i>Olea wilsonii</i>	<i>Tsuga canadensis</i>
<i>Fraxinus pensylvanica</i>	<i>Penstemon</i> sp.	<i>Vinca minor</i> ¹

¹Other species may be added based on container data (see tables 5 and 9)

² Response varied by cultivar

Table 5. List of Halosulfuron treated container grown crops with no or minimal transitory injury.

<i>Euonymus fortunei</i>	<i>Ilex vomitoria</i> 'nana'
<i>Euonymus alatus</i>	<i>Juniperus conferta</i>
<i>Gardenia augusta</i>	<i>Juniperus horizontalis</i>
<i>Helleborus niger</i>	<i>Lagerstroemia indica</i>
<i>Hemerocallis</i> sp. (see Gilliam)	<i>Liriope muscari</i> (See Neal 2006)
<i>Hosta</i> sp.	<i>Quercus rubra</i>
<i>Ilex cornuta</i>	<i>Rhododendron</i> sp.
<i>Ilex crenata</i>	<i>Spirea bumalda</i> (see Ahrens & Mervosh)
<i>Ilex x meserveae</i>	<i>Trachelospermum asiaticum</i> (See Lieth 2006)

Table 6. List of Halosulfuron treated container grown crops with no or minimal transitory injury seen at the 1X rate, but the 2X or 4X rate did cause significant phytotoxicity

Delosperma sp.
Echinacea sp.

Table 7. List of Halosulfuron treated container grown crops exhibiting significant injury.

<i>Abelia x grandiflora</i>	<i>Gypsophila elegans</i>
<i>Abies balsamea</i>	<i>Hedera helix</i>
<i>Acer rubrum</i>	<i>Hydrangea arborescens</i>
<i>Chamaebatiaria</i> sp.	<i>Salvia elegans</i>
<i>Cotoneaster dammeri</i>	<i>Salvia nemorosa</i>
<i>Cotoneaster horizontalis</i>	<i>Viburnum</i> sp.

Table 8. List of Halosulfuron treated container grown crops where more information is needed.

<i>Abies fraseri</i>	<i>Hylotelephium telephium</i>	<i>Pentas</i> sp.
<i>Arenaria</i> sp	<i>Juniperus chinensis</i>	<i>Phlox subulata</i>
<i>Berberis</i> sp.	<i>procumbans</i>	<i>Picea abies</i> (seedlings)
<i>Betula</i> sp.	<i>Lamiastrum galeobdolon</i>	<i>Prunus</i> sp.
<i>Buddleia davidii</i>	<i>Lantana</i> sp.	<i>Pseudotsuga menziesii</i>
<i>Buxus</i> sp.(see Gilliam)	<i>Leymus arenarius</i>	<i>Rosa</i> sp. ¹
<i>Caladium</i> sp.	<i>Ligustrum</i> sp.	<i>Rudbeckia fulgida</i>
<i>Canna</i> sp.	<i>Lilium longiflorum</i>	<i>Rudbeckia hirta</i>
<i>Chamacyparis obtusa</i>	<i>Liriodendron tulipifera</i>	<i>Sorghastrum nutans</i>
<i>Cuphea hyssopifolia</i>	<i>Magnolia stellate</i>	<i>Spirea japonica</i>
<i>Dichanthelium clandestinum</i>	<i>Mahonia aquifolium</i>	<i>Spirea decumbens</i>
<i>Fragaria</i> sp.	<i>Mazus reptans</i>	<i>Taxus</i> sp.
<i>Gypsophila</i> sp.	<i>Nandina domestica</i>	<i>Thuja occidentalis</i>
<i>Hierochloe odorata</i>	<i>Narcisus</i> sp.	<i>Thymus praecox</i>
<i>Hosta</i> sp.	<i>Nepeta cataria</i>	<i>Vinca minor</i>
<i>Hydrangea</i> sp.	<i>Ophiopogon japonicus</i>	

¹ Response varied by cultivar.

Table 9. Detailed Summary of Crop Safety Testing with Halosulfuron in Field Containers

Notes: Table entries are sorted by crop Latin name. Only those trials with research reports received by 8/27/2020 are listed below.

PR #	Product	Crop	Production Site	Researcher	State	Year	Application Type	Results
11770	Manage (Halosulfuron)	Azalea (Rhododendron sp.) 'Congo'	Field Container	Gilliam	AL	2006	Over the top	No injury at any rate until 8 weeks after treatment when slight purpling of leaves was exhibited increasing with rate (0.047, 0.094, 0.188 lb ai per acre) and plants were slightly stunted.
11770	Manage (Halosulfuron)	Azalea (Rhododendron sp.) 'Fashion'	Field Container	Gilliam	AL	1996	Over the top	No significant injury at 0.063 and 0.126 lb ai per acre and slight injury at 0.252 lb ai per acre, but no differences occurred in growth indices.
11770	Manage (Halosulfuron)	Azalea (Rhododendron sp.) 'Fashion'	Field Container	Norcini	FL	2005	Over the top	Slight to moderate injury increasing with rate (0.045, 0.09, 0.18 lb ai per acre).
11770	Manage (Halosulfuron)	Azalea (Rhododendron sp.) 'Formosa'	Field Container	Derr	VA	2002	Over the top	Slight injury increasing with rates and reduction of fresh weight (0.045, 0.09, 0.18 lb ai per acre).
11770	Manage (Halosulfuron)	Azalea (Rhododendron sp.) 'Midnight Flare'	Field Container	Gilliam	AL	2005	Over the top	No visible injury (0.045, 0.09, 0.18 lb ai per acre).
11770	Manage (Halosulfuron)	Azalea (Rhododendron sp.) 'Nuccio's Wild Cherry'	Field Container	Wilen	CA	2006	Over the top	Acceptable injury at all rates (0.045, 0.09, 0.18 lb ai per acre).
11770	Manage (Halosulfuron)	Azalea (Rhododendron sp.) 'Pink Gumpo'	Field Container	Neal	NC	2006	Over the top	No significant injury at 0.047, 0.094 and 0.188 lb ai per acre.
11770	Manage (Halosulfuron)	Azalea (Rhododendron sp.) R. obtusum 'Delaware Valley White'	Field Container	Beste (ARS)	MD	1998	Over the top	Slight to moderate transient chlorosis increasing with rate (0.031, 0.063, 0.125 lb ai per acre) with only the 0.125 lb ai per acre treatment causing growth reduction.
11770	Manage (Halosulfuron)	Azalea (Rhododendron sp.) R. obtusum 'Hershey Red'	Field Container	Beste (ARS)	MD	1998	Over the top	Slight to moderate transient chlorosis increasing with rate (0.031, 0.063, 0.125 lb ai per acre) with growth reduction in the 0.063 and 0.125 lb ai per acre treatments.
11770	Manage (Halosulfuron)	Azalea (Rhododendron sp.) R. obtusum 'Hershey Red'	Field Container	Beste (ARS)	MD	2003	Over the top	Slight chlorosis increasing with rate which disappeared within 2 weeks after treatment (0.045, 0.09, 0.18 lb ai per acre).
11770	Manage (Halosulfuron)	Azalea (Rhododendron sp.) R. obtusum 'Hinocrimson'	Field Container	Beste (ARS)	MD	2003	Over the top	Slight to moderate chlorosis increasing with rate which disappeared within 2 weeks after treatment (0.045, 0.09, 0.18 lb ai per acre).

PR #	Product	Crop	Production Site	Researcher	State	Year	Application Type	Results
11770	Manage (Halosulfuron)	Azalea (Rhododendron sp.) rhododendron	Field Container	Fraelich	GA	1996	Broadcast	No injury at 0.031 and 0.062 lb ai per acre and very slight injury at 0.125 lb ai per acre; moderate to excellent control of nutsedge increasing with rate.
21443	Manage (Halosulfuron)	Boxwood (Buxus sp.) B. microphylla 'Green Velvet'	Field Container	Senesac	NY	2001	Over the top	Slight, transient injury increasing with rate (0.031, 0.062, 0.124 lb ai per acre).
21443	Manage (Halosulfuron)	Boxwood (Buxus sp.) B. microphylla var japonica	Field Container	Derr	VA	2002	Over the top	Slight injury increasing with rate (0.045, 0.09, 0.18 lb ai per acre) and with reduction of fresh weight at highest rate; poor pre-emergent control of large crabgrass and spotted spurge.
21443	Manage (Halosulfuron)	Boxwood (Buxus sp.) B. microphylla var koreana	Field Container	Gilliam	AL	2006	Over the top	No injury until 4 weeks after initial treatment when pronounced chlorosis appeared at all rates (0.047, 0.094, 0.188 lb ai per acre) and plants were significantly stunted.
25002	Manage (Halosulfuron)	Butterfly Bush (Buddleia davidii) 'Black Knight'	Field Container	Derr	VA	2005	Over the top	Very low injury at 0.045 lb ai per acre, low at 0.09 and 0.18 lb ai per acre.
24989	Manage (Halosulfuron)	Crape Myrtle (Lagerstroemia indica) 'Acoma'	Field Container	Gilliam	AL	2005	Over the top	No injury at 0.045, 0.09, 0.18 lb ai per acre.
24989	Manage (Halosulfuron)	Crape Myrtle (Lagerstroemia indica) 'Cheyenne'	Field Container	Norcini	FL	2005	Over the top	Very low injury at all rates (0.045, 0.09, 0.18 lb ai per acre); Virtually no control of spurge, woodsorrel and crabgrass.
24989	Manage (Halosulfuron)	Crape Myrtle (Lagerstroemia indica) L. x Tuscarora	Field Container	Neal	NC	2006	Over the top	No significant injury at 0.047, 0.094, and 0.188 lb ai per acre.
11772	Manage (Halosulfuron)	Daylily (Hemerocallis sp.)	Field Container	Gilliam	AL	2005	Over the top	No injury (0.045, 0.09, 0.18 lb ai per acre).
11772	Manage (Halosulfuron)	Daylily (Hemerocallis sp.)	Field Container	Neal	NC	2001	Over the top	Minor to moderate injury increasing with rate (0.045, 0.09, 0.18 lb ai per acre).
11772	Manage (Halosulfuron)	Daylily (Hemerocallis sp.) 'Happy Returns'	Field Container	Senesac	NY	2001	Over the top	Slight injury 6 weeks after treatment with all rates (0.045, 0.09, 0.18 lb ai per acre).
11772	Manage (Halosulfuron)	Daylily (Hemerocallis sp.) hemerocallis	Field Container	Fraelich	GA	1996	Broadcast	Very slight injury at 0.062 and 0.125 lb ai per acre with no injury at 0.031 lb ai per acre; good to excellent nutsedge control increasing with rate.
11772	Manage (Halosulfuron)	Daylily (Hemerocallis sp.) 'Little Red Hot'	Field Container	Gilliam	AL	1996	Over the top	Significant visible injury and growth reduction increasing with rate (0.063, 0.126, 0.252 lb ai per acre).
11772	Manage (Halosulfuron)	Daylily (Hemerocallis sp.) 'Stella D'Oro'	Field Container	Derr	VA	2001	Over the top	Slight, transient injury at all rates with only the highest reducing shoot fresh weight (0.045, 0.09, 0.18 lb ai per acre); fair to good pre-emergent oxalis control.
23738	Manage (Halosulfuron)	Deertongue (Panicum clandestinum)	Field Container	Senesac	NY	2003	Over the top	No injury at 0.045 lb ai per acre; slight injury at 0.090 and 0.18 lb ai per acre.

PR #	Product	Crop	Production Site	Researcher	State	Year	Application Type	Results
11773	Manage (Halosulfuron)	Holly (Ilex sp.) I. cornuta 'bufordii nana'	Field Container	Neal	NC	2006	Over the top	No significant injury at 0.047, 0.094, and 0.188 lb ai per acre.
11773	Manage (Halosulfuron)	Holly (Ilex sp.) I. crenata 'Chesapeake'	Field Container	Beste (ARS)	MD	2003	Over the top	Slight to moderate injury increasing with rate (0.045, 0.09, 0.18 lb ai per acre).
11773	Manage (Halosulfuron)	Holly (Ilex sp.) I. crenata 'Compacta'	Field Container	Derr	VA	2002	Over the top	Virtually no injury at all rates (0.045, 0.09, 0.18 lb ai per acre); poor pre-emergent control of large crabgrass and spotted spurge.
11773	Manage (Halosulfuron)	Holly (Ilex sp.) I. crenata 'Green Lustre'	Field Container	Norcini	FL	2005	Over the top	Very slight injury decreasing over time at all rates (0.045, 0.09, 0.18 lb ai per acre); Virtually no control of spurge, woodsorrel, crabgrass and coreopsis.
11773	Manage (Halosulfuron)	Holly (Ilex sp.) I. crenata 'Helleri'	Field Container	Beste (ARS)	MD	2003	Over the top	Slight chlorosis increasing with rate which decreased over time (0.045, 0.09, 0.18 lb ai per acre).
11773	Manage (Halosulfuron)	Holly (Ilex sp.) I. meserveae	Field Container	Gilliam	AL	2005	Over the top	No injury at all rates (0.045, 0.09, 0.18 lb ai per acre).
11773	Manage (Halosulfuron)	Holly (Ilex sp.) I. x meserveae 'Blue Princess'	Field Container	Altland	OR	2006	Over the top	No injury at any rate (0.047, 0.094 and 0.188 lb ai per acre)
11773	Manage (Halosulfuron)	Holly (Ilex sp.) I. x meserveae 'China Girl'	Field Container	Gilliam	AL	1996	Over the top	No significant visible injury or difference in growth indices with 0.063, 0.126, and 0.252 lb ai per acre.
11773	Manage (Halosulfuron)	Holly (Ilex sp.) ilex	Field Container	Fraelich	GA	1996	Broadcast	Very slight injury at 0.062 and 0.125 lb ai per acre with no injury at 0.031 lb ai per acre; good to excellent control of nutsedge and oxalis increasing with rate.
23508	Manage (Halosulfuron)	Indian Grass; Wood Grass (Sorghastrum sp.) S. nutans	Field Container	Senesac	NY	2003	Over the top	No injury at 0.045, 0.090 and 0.018 lb ai per acre.
11769	Manage (Halosulfuron)	Juniper (Juniperus sp.) J. chinensis procumbens	Field Container	Gilliam	AL	1996	Over the top	No injury at 0.063, 0.126, and 0.252 lb ai per acre.
11769	Manage (Halosulfuron)	Juniper (Juniperus sp.) J. conferta 'Blue Pacific'	Field Container	Gilliam	AL	2005	Over the top	No injury at all rates (0.045, 0.09, 0.18 lb ai per acre).
11769	Manage (Halosulfuron)	Juniper (Juniperus sp.) J. conferta 'Blue Pacific'	Field Container	Gilliam	AL	2006	Over the top	No significant visible injury at any rate (0.047, 0.094, 0.188 lb ai per acre) but there was a reduction in plant size.
11769	Manage (Halosulfuron)	Juniper (Juniperus sp.) J. conferta 'Blue Pacific'	Field Container	Senesac	NY	2001	Over the top	Slight injury at all rates (0.031, 0.062, 0.124 lb ai per acre).
11769	Manage (Halosulfuron)	Juniper (Juniperus sp.) J. horizontalis 'Bar Harbor'	Field Container	Derr	VA	2005	Over the top	No injury at 0.045, 0.09, 0.18 lb ai per acre.
11769	Manage (Halosulfuron)	Juniper (Juniperus sp.) J. horizontalis 'Bar Harbor'	Field Container	Senesac	NY	2001	Over the top	No injury at any rate (0.031, 0.063, 0.0124 lb ai per acre).
11769	Manage (Halosulfuron)	Juniper (Juniperus sp.) J. horizontalis 'Wiltonii'	Field Container	Gilliam	AL	2005	Over the top	No injury at all rates (0.045, 0.09, 0.18 lb ai per acre).

PR #	Product	Crop	Production Site	Researcher	State	Year	Application Type	Results
11769	Manage (Halosulfuron)	Juniper (Juniperus sp.) J. horizontalis 'Wiltonii'	Field Container	Neal	NC	2001	Over the top	Slight tip chlorosis and necrosis at all rates with recovery over time (0.045, 0.09, 0.18 lb ai per acre).
11769	Manage (Halosulfuron)	Juniper (Juniperus sp.) J. horizontalis 'Wiltonii'	Field Container	Norcini	FL	2005	Over the top	No injury at all rates (0.045, 0.09, 0.18 lb ai per acre); No control of spurge, woodsorrel, eclipta, hawkweed, and coreopsis.
11769	Manage (Halosulfuron)	Juniper (Juniperus sp.) juniperus	Field Container	Fraelich	GA	1996	Broadcast	No injury at 0.031, 0.062, and 0.125 lb ai per acre; good to excellent control of nutsedge increasing with rate.
25012	Manage (Halosulfuron)	Phlox (Phlox sp.) P. subulata 'Emerald Blue'	Field Container	Derr	VA	2005	Over the top	Low injury at 0.045, 0.09, 0.18 lb ai per acre; good to excellent control of bittercress and common groundsel
25013	Manage (Halosulfuron)	Privet (Ligustrum sp.) 'Chinense'	Field Container	Derr	VA	2005	Over the top	Low injury at 0.045 and 0.09 lb ai per acre, moderate at 0.18 lb ai per acre.
11775	Manage (Halosulfuron)	Red Cedar, Arborvitae (Thuja sp.) T. occidentalis 'Elegantissima'	Field Container	Czarnota	GA	2006	Over the top	No injury at 0.042 lb ai per acre.
11775	Manage (Halosulfuron)	Red Cedar, Arborvitae (Thuja sp.) T. occidentalis nigra	Field Container	Gilliam	AL	1996	Over the top	No injury or differences in growth indices at all rates (0.063, 0.126, 0.262 lb ai per acre).
11774	Manage (Halosulfuron)	Rhododendron (Rhododendron sp.) 'Formosa'	Field Container	Derr	VA	2005	Over the top	Very slight, but transient injury at all rates (0.045, 0.09, 0.18 lb ai per acre).
11774	Manage (Halosulfuron)	Rhododendron (Rhododendron sp.) 'R. catawbiense 'Nova Zembla'	Field Container	Gilliam	AL	1996	Over the top	No injury at 0.063 lb ai per acre, but 0.126 and 0.252 lb ai per acre exhibited minor but transient injury.
11774	Manage (Halosulfuron)	Rhododendron (Rhododendron sp.) 'Tradition'	Field Container	Czarnota	GA	2006	Over the top	No injury at 0.042 lb ai per acre.
23504	Manage (Halosulfuron)	Sweet Grass (Hierochloa odorata)	Field Container	Senesac	NY	2003	Over the top	No injury at 0.045, 0.090 and 0.018 lb ai per acre.
11768	Manage (Halosulfuron)	Yew (Taxus sp.) T. cuspidata	Field Container	Fraelich	GA	2006	Over the top	No injury or growth reduction at all rates (0.045, 0.09, 0.18 lb ai per acre with NIS).
11768	Manage (Halosulfuron)	Yew (Taxus sp.) T. media 'Fairview'	Field Container	Lieth	CA	2006	Over the top	No injury but reduced plant growth at 0.047, 0.94 and 0.188 lb ai per acre.
11768	Manage (Halosulfuron)	Yew (Taxus sp.) T. x media 'Fairview'	Field Container	Senesac	NY	2001	Over the top	Slight to moderate injury increasing with rate (0.031, 0.062, 0.124) and applications at end of season.
13670	SedgeHammer (Halosulfuron)	Abelia (Abelia sp.) A. x grandiflora 'John Creech'	Field Container	Neal	NC	2006	Over the top	Moderate to significant injury increasing with rate (0.047, 0.094, 0.188 lb ai per acre).
13670	SedgeHammer (Halosulfuron)	Abelia (Abelia sp.) A. x grandiflora 'Little Richard'	Field Container	Gilliam	AL	2006	Over the top	Slight to moderate injury increasing with rate and time (0.047, 0.094, 0.188 lb ai per acre).

PR #	Product	Crop	Production Site	Researcher	State	Year	Application Type	Results
26502	SedgeHammer (Halosulfuron)	Arrowwood (Viburnum sp.) V. carlesii	Field Container	Altland	OR	2006	Over the top	Significant injury with single application at all rates (0.047, 0.094 and 0.188 lb ai per acre).
26502	SedgeHammer (Halosulfuron)	Arrowwood (Viburnum sp.) V. tinus compacta	Field Container	Neal	NC	2006	Over the top	Moderate unacceptable injury at all rates (0.125, 0.25, 0.5 lb ai per acre).
25673	SedgeHammer (Halosulfuron)	Baby's Breath (Gypsophila elegans)	Field Container	Senesac	NY	2006	Over the top	Unacceptable injury at all rates (0.045, 0.09, 0.18 lb ai per acre with NIS).
26038	SedgeHammer (Halosulfuron)	Baby's Breath (Gypsophila paniculata) 'Festival Star'	Field Container	Lieth	CA	2006	Over the top	Unacceptable injury and growth reduction at 0.047, 0.094 and 0.188 lb ai per acre.
13674	SedgeHammer (Halosulfuron)	Barberry (Berberis sp.) B. thunbergii 'Rosy Glow'	Field Container	Derr	VA	2002	Over the top	Moderate to significant injury increasing with rate (0.045, 0.09, 0.18 lb ai per acre).
21448	SedgeHammer (Halosulfuron)	Barberry, Hollyleaved (Mahonia aquifolium) M. repens	Field Container	Senesac	NY	2001	Over the top	Slight to moderate injury increasing with rate (0.031, 0.062, 0.124 lb ai per acre).
25349	SedgeHammer (Halosulfuron)	Birch (Betula sp.) B. nigrens 'Heritage'	Field Container	Williams	IL	2007	Over the top	Virtually no injury at 0.047, slight at 0.094 and 0.188 lb ai per acre
34357	SedgeHammer (Halosulfuron)	Black-Eyed Susan (Rudbeckia hirta) 'Becky'	Field Container	Derr	VA	2006	Over the top	No significant injury at 0.045 and 0.09 lb ai per acre, moderate at 0.18 lb ai per acre.
34357	SedgeHammer (Halosulfuron)	Black-Eyed Susan (Rudbeckia hirta) 'Speedy Smiley'	Field Container	Derr	VA	2019	Over the top	Moderate injury with 1 Oz per acre + Capsil applied twice.
25341	SedgeHammer (Halosulfuron)	Bridal-Wreath (Spiraea sp.) 'Goldflame'	Field Container	Ahrens/Mervosh	CT	2006	Over the top	Severe injury and stunting at all rates (0.047, 0.094 and 0.188 lb ai per acre).
25341	SedgeHammer (Halosulfuron)	Bridal-Wreath (Spiraea sp.) S. bumalda 'Anthony Waterer'	Field Container	Beste/Frank (ARS)	MD	2006	Over the top	No injury or growth reduction at all rates (0.047, 0.094 and 0.188 lb ai per acre with NIS) by trial's end; all plants marketable.
25341	SedgeHammer (Halosulfuron)	Bridal-Wreath (Spiraea sp.) S. decumbens	Field Container	Senesac	NY	2006	Over the top	Virtually no injury at 0.045 lb ai per acre with NIS, slight with complete recovery at 0.09 and 0.18 lb ai per acre.
25341	SedgeHammer (Halosulfuron)	Bridal-Wreath (Spiraea sp.) S. japonica 'Little Princess'	Field Container	Neal	NC	2006	Over the top	Slight transient injury at 0.047 and 0.094 lb ai per acre and moderate unacceptable injury at 0.188 lb ai per acre.
25341	SedgeHammer (Halosulfuron)	Bridal-Wreath (Spiraea sp.) S. x bumalda 'Gold Mound'	Field Container	Derr	VA	2006	Over the top	No significant injury at 0.045 and 0.09 lb ai per acre; unacceptable at 0.18 lb ai per acre.
25341	SedgeHammer (Halosulfuron)	Bridal-Wreath (Spiraea sp.) S. x bumalda 'Goldmound'	Field Container	Mathers (OSU)	OH	2006	Over the top	Slight to moderate injury increasing with time and second application (0.047, 0.094, 0.188 lb ai per acre).
25350	SedgeHammer (Halosulfuron)	Canna (Canna sp.) 'Cherry'	Field Container	Fraelich	GA	2006	Over the top	Slight, moderate and high injury at 0.045, 0.09, 0.18 lb ai per acre with NIS.
25352	SedgeHammer (Halosulfuron)	Cape Jasmine (Gardenia augusta)	Field Container	Czarnota	GA	2006	Over the top	No injury at 0.042 lb ai per acre.
25352	SedgeHammer (Halosulfuron)	Cape Jasmine (Gardenia augusta)	Field Container	Derr	VA	2006	Over the top	No injury at all rates (0.045, 0.09, 0.18 lb ai per acre).
25352	SedgeHammer (Halosulfuron)	Cape Jasmine (Gardenia augusta) 'Radicans'	Field Container	Fraelich	GA	2006	Over the top	No injury or growth reduction at all rates (0.045, 0.09, 0.18 lb ai per acre with NIS).

PR #	Product	Crop	Production Site	Researcher	State	Year	Application Type	Results
21441	SedgeHammer (Halosulfuron)	Catnip (<i>Nepeta cataria</i>) N. x <i>faassenii</i> 'Walker's Low'	Field Container	Senesac	NY	2001	Over the top	No injury at 0.045 lb ai per acre and minor injury at 0.09 and 0.18 lb ai per acre.
20860	SedgeHammer (Halosulfuron)	Coneflower, Orange, var. <i>speciosa</i> (<i>Rudbeckia fulgida</i> var. <i>speciosa</i>)	Field Container	Williams	IL	2007	Over the top	Slight injury at 0.047, moderate at 0.094 and 0.188 lb ai per acre.
13655	SedgeHammer (Halosulfuron)	Cotoneaster (<i>Cotoneaster</i> sp.) <i>C. dammeri</i> 'Skolghshomen'	Field Container	Beste/Frank (ARS)	MD	2006	Over the top	Significant but transient injury with all rates (0.047, 0.094, 0.188) and plants were stunted in comparison to the untreated ones.
13655	SedgeHammer (Halosulfuron)	Cotoneaster (<i>Cotoneaster</i> sp.) <i>C. horizontalis</i>	Field Container	Neal	NC	2006	Over the top	Moderate to significant injury increasing with rate (0.047, 0.094, 0.188 lb ai per acre).
34359	SedgeHammer (Halosulfuron)	Daffodil (<i>Narcissus</i> sp.)	Field Container	Derr	VA	2019	Over the top	Minor leaf injury with 1 oz per acre + Capsil applied twice.
25342	SedgeHammer (Halosulfuron)	Delosperma (<i>Delosperma</i> sp.) 'Kelaidis'	Field Container	Klett	CO	2006	Over the top	Experiment A: Moderate to high injury with increasing rates (0.047, 0.094 and 0.188 lb ai per acre with Capsil surfactant).
25342	SedgeHammer (Halosulfuron)	Delosperma (<i>Delosperma</i> sp.) 'Kelaidis'	Field Container	Klett	CO	2006	Over the top	Experiment B: Significant injury with almost complete recovery at end of trial at all rates (0.047, 0.094 and 0.188 lb ai per acre with Capsil surfactant)
25342	SedgeHammer (Halosulfuron)	Delosperma (<i>Delosperma</i> sp.) 'Kelaidis'	Field Container	Klett	CO	2006	Over the top	Experiment C: Slight injury at 0.047 lb ai per acre with Capsil surfactant, moderate at 0.094 and 0.188 lb ai.
25344	SedgeHammer (Halosulfuron)	Desert Sweet (<i>Chamaebatiaria</i> sp.)	Field Container	Klett	CO	2006	Over the top	Experiment A: Slight to moderate injury at 0.047 lb ai per acre with Capsil surfactant, high at 0.094 and 0.188 lb ai per acre
25344	SedgeHammer (Halosulfuron)	Desert Sweet (<i>Chamaebatiaria</i> sp.)	Field Container	Klett	CO	2006	Over the top	Experiment B: Severe injury at all rates (0.047, 0.094 and 0.188 lb ai per acre with Capsil surfactant)
25344	SedgeHammer (Halosulfuron)	Desert Sweet (<i>Chamaebatiaria</i> sp.)	Field Container	Klett	CO	2006	Over the top	Experiment C: Moderate to high injury at all rates (0.047, 0.094 and 0.188 lb ai per acre with Capsil surfactant)
34356	SedgeHammer (Halosulfuron)	Elephant's-Ear, Angel-Wings (<i>Caladium</i> sp.) 'Apple Blossom'	Field Container	Derr	VA	2019	Over the top	Moderate injury with 1 Oz per acre + Capsil applied twice.
25346	SedgeHammer (Halosulfuron)	False Heather, Elfin Herb, Mexican Heather (<i>Cuphea hyssopifolia</i>) <i>C. allyson</i>	Field Container	Derr	VA	2006	Over the top	Slight injury at all rates with complete recovery at the lower rates (0.045, 0.09, 0.18 lb ai per acre).
25346	SedgeHammer (Halosulfuron)	False Heather, Elfin Herb, Mexican Heather (<i>Cuphea hyssopifolia</i>) 'Itsy Bitsy White'	Field Container	Lieth	CA	2006	Over the top	Moderate injury and growth reduction at all rates (0.045, 0.09, 0.18 lb ai per acre).
26166	SedgeHammer (Halosulfuron)	Fir, Douglas (<i>Pseudotsuga menziesii</i>)	Field Container	Lieth	CA	2007	Over the top	Moderate injury and growth reduction at 0.047, 0.094 and 0.188 lb ai per acre.

PR #	Product	Crop	Production Site	Researcher	State	Year	Application Type	Results
26166	SedgeHammer (Halosulfuron)	Fir, Douglas (Pseudotsuga menziesii) P. menziesii glauca	Field Container	Freiberger	NJ	2006	Over the top	Very slight injury after 1st, high after 2nd application at all rates (0.045, 0.09, 0.18 lb ai per acre)
26165	SedgeHammer (Halosulfuron)	Fir, Fraser (Abies fraseri)	Field Container	Freiberger	NJ	2006	Over the top	No to very slight injury at 0.045 lb ai per acre, slight to moderate at higher rates; no growth reduction
26165	SedgeHammer (Halosulfuron)	Fir, Fraser (Abies fraseri)	Field Container	Lieth	CA	2007	Over the top	Moderate injury and growth reduction at 0.047, 0.094 and 0.188 lb ai per acre.
25345	SedgeHammer (Halosulfuron)	Hellebore, Black (Helleborus niger)	Field Container	Klett	CO	2006	Over the top	Experiment A: No significant injury after 1st application at all rates (0.047, 0.094 and 0.188 lb ai per acre with Capsil surfactant), significant after 2nd application at 4X
25345	SedgeHammer (Halosulfuron)	Hellebore, Black (Helleborus niger)	Field Container	Klett	CO	2006	Over the top	Experiment B: No significant injury after 1st application at all rates (0.047, 0.094 and 0.188 lb ai per acre with Capsil surfactant), significant after 2nd application at 4X
25345	SedgeHammer (Halosulfuron)	Hellebore, Black (Helleborus niger)	Field Container	Klett	CO	2006	Over the top	Experiment C: Slight injury at 0.047 and 0.094 lb ai per acre with Capsil surfactant, moderate at 0.188 lb ai per acre.
25345	SedgeHammer (Halosulfuron)	Hellebore, Black (Helleborus niger) 'Pink Lady'	Field Container	Boydston	WA	2006	Over the top	Virtually no injury at 0.047, 0.094 and 0.188 lb ai per acre; most plants did not survive severe winter.
21445	SedgeHammer (Halosulfuron)	Hinoki False Cypress (Chamaecyparis obtusa) C. pisifera 'Filifera Aurea'	Field Container	Senesac	NY	2001	Over the top	No injury at 0.031, 0.062, and 0.124 lb ai per acre.
25010	SedgeHammer (Halosulfuron)	Hydrangea (Hydrangea sp.)	Field Container	Derr	VA	2005	Over the top	Very low injury at all rates (0.045, 0.09, 0.18 lb ai per acre).
25010	SedgeHammer (Halosulfuron)	Hydrangea (Hydrangea sp.) H. paniculata 'Pink Diamond'	Field Container	Norcini	FL	2005	Over the top	No phytotoxicity at 0.045 lb ai per acre and 0.09 and 0.18 lb ai per acre plants recovered by 12 WAT.
33909	SedgeHammer (Halosulfuron)	Hydrangea. Wild (Hydrangea arborescens)	Field Container	Derr	VA	2018	Over the top	Poor control with 1 fl oz per acre + Capsil applied twice. Severe crop injury.
33912	SedgeHammer (Halosulfuron)	Hydrangea. Wild (Hydrangea arborescens)	Field Container	Derr	VA	2018	Over the top	Great control with 1 fl oz per acre + Capsil applied twice. Severe crop injury.
25004	SedgeHammer (Halosulfuron)	Ivy, English (Hedera helix)	Field Container	Boydston	WA	2006	Over the top	Delayed, but severe, injury at all rates (0.045, 0.09, 0.18 lb ai per acre).
25004	SedgeHammer (Halosulfuron)	Ivy, English (Hedera helix)	Field Container	Derr	VA	2005	Over the top	Significant injury increasing with rate (0.045, 0.09, 0.18 lb ai per acre).
25004	SedgeHammer (Halosulfuron)	Ivy, English (Hedera helix) 'Glacier Ivy'	Field Container	Fraelich	GA	2006	Over the top	Moderate injury at 0.045 and 0.09 lb ai per acre with NIS, severe at 0.18 lb ai per acre; severe stunting at all rates.
25339	SedgeHammer (Halosulfuron)	Jasmine, Asian Star (Trachelospermum asiaticum)	Field Container	Gilliam	AL	2006	Over the top	No visible injury and no impact on plant size with any rate (0.047, 0.094, 0.188 lb ai per acre).

PR #	Product	Crop	Production Site	Researcher	State	Year	Application Type	Results
25339	SedgeHammer (Halosulfuron)	Jasmine, Asian Star (Trachelospermum asiaticum)	Field Container	Lieth	CA	2006	Over the top	High injury and growth reduction at all rates (0.045, 0.09, 0.18 lb ai per acre); plants unmarketable.
25339	SedgeHammer (Halosulfuron)	Jasmine, Asian Star (Trachelospermum asiaticum) 'Green'	Field Container	Fraelich	GA	2006	Over the top	No injury or growth reduction at all rates (0.045, 0.09, 0.18 lb ai per acre with NIS).
26462	SedgeHammer (Halosulfuron)	Jasmine, Confederate (Trachelospermum jasminoides)	Field Container	Wilen	CA	2006	Over the top	Acceptable injury at all rates (0.045, 0.09, 0.18 lb ai per acre).
25353	SedgeHammer (Halosulfuron)	Lantana (Lantana sp.)	Field Container	Derr	VA	2006	Over the top	Slight injury at all rates (0.045, 0.09, 0.18 lb ai per acre).
25353	SedgeHammer (Halosulfuron)	Lantana (Lantana sp.)	Field Container	Williams	IL	2007	Over the top	No injury at 0.047, slight at 0.094 and 0.188 lb ai per acre.
25343	SedgeHammer (Halosulfuron)	Lily, Easter; Trumpet Lily (Lilium longiflorum) 'Nellie White'	Field Container	Lieth	CA	2006	Over the top	Unacceptable injury and growth reduction at 0.047, 0.094 and 0.188 lb ai per acre.
25011	SedgeHammer (Halosulfuron)	Lilyturf (Liriope sp.) L. muscari variegata	Field Container	Derr	VA	2005	Over the top	No injury 44 DAT with all rates (0.045, 0.09, 0.18 lb ai per acre).
25011	SedgeHammer (Halosulfuron)	Lilyturf (Liriope sp.) L. muscari variegata	Field Container	Neal	NC	2006	Over the top	Significant injury at all rates (0.047, 0.098, 0.188 lb ai per acre)
25011	SedgeHammer (Halosulfuron)	Lilyturf (Liriope sp.) L. muscari variegata 'Aztec'	Field Container	Derr	VA	2006	Over the top	No to slight injury but shoot weight decreased significantly as rate increased (0.045, 0.09, 0.18 lb ai per acre).
25670	SedgeHammer (Halosulfuron)	Lilyturf, Big Blue (Liriope muscari)	Field Container	Gilliam	AL	2005	Over the top	No visible injury, but plant growth was significantly suppressed at 0.09 lb ai per acre.
25670	SedgeHammer (Halosulfuron)	Lilyturf, Big Blue (Liriope muscari)	Field Container	Williams	IL	2007	Over the top	No injury at 0.047, very slight at 0.094 and 0.188 lb ai per acre.
20871	SedgeHammer (Halosulfuron)	Magnolia, Star (Magnolia stellata) 'Pinkie'	Field Container	Senesac	NY	2001	Over the top	No injury with 0.031, 0.062 and 0.124 lb ai per acre.
25476	SedgeHammer (Halosulfuron)	Maple, Red (Acer rubrum)	Field Container	Altland	OR	2006	Over the top	Moderate injury with single application at all rates (0.047, 0.094 and 0.188 lb ai per acre)
25476	SedgeHammer (Halosulfuron)	Maple, Red (Acer rubrum)	Field Container	Freiberger	NJ	2006	Over the top	High injury at all rates (0.045, 0.09, 0.18 lb ai per acre)
25476	SedgeHammer (Halosulfuron)	Maple, Red (Acer rubrum) 'Red Sunset'	Field Container	Williams	IL	2007	Over the top	Virtually no injury at 0.047, 0.094 and 0.188 lb ai per acre
21440	SedgeHammer (Halosulfuron)	Miquel's Mazus (Mazus reptans)	Field Container	Senesac	NY	2001	Over the top	Slight to moderate injury increasing with rate (0.045, 0.09, 0.18 lb ai per acre) abating slightly with time.
25463	SedgeHammer (Halosulfuron)	Mondo Grass; Lilyturf; Ker-Gawl (Ophiopogon sp.) O. japonicus variegata	Field Container	Derr	VA	2006	Over the top	No injury at all rates (0.045, 0.09, 0.18 lb ai per acre).

PR #	Product	Crop	Production Site	Researcher	State	Year	Application Type	Results
21442	SedgeHammer (Halosulfuron)	Mother of Thyme; Thyme (Thymus praecox) 'Albiflorus'	Field Container	Senesac	NY	2001	Over the top	No injury at 0.045 and 0.09 lb ai per acre, but slight injury occurred at 0.18 lb ai per acre.
25459	SedgeHammer (Halosulfuron)	Oak, Red (Quercus rubra)	Field Container	Altland	OR	2006	Over the top	Virtually no injury at any rate (0.047, 0.094 and 0.188 lb ai per acre).
25459	SedgeHammer (Halosulfuron)	Oak, Red (Quercus rubra)	Field Container	Fraelich	GA	2006	Over the top	No injury at 0.045 lb ai per acre with NIS, very slight at 0.09 and 0.18 lb ai per acre; no growth reduction.
25459	SedgeHammer (Halosulfuron)	Oak, Red (Quercus rubra)	Field Container	Freiberger	NJ	2006	Over the top	Very slight injury and no growth reduction at all rates (0.045, 0.09, 0.18 lb ai per acre).
25354	SedgeHammer (Halosulfuron)	Pentas (Pentas sp.)	Field Container	Williams	IL	2007	Over the top	No injury at 0.047, slight at 0.094 and moderate at 0.188 lb ai per acre.
25354	SedgeHammer (Halosulfuron)	Pentas (Pentas sp.) 'Ruby Red'	Field Container	Derr	VA	2006	Over the top	Slight injury 0.045 and 0.09 lb ai per acre and moderate at 0.18 lb ai per acre.
25017	SedgeHammer (Halosulfuron)	Periwinkle (Vinca sp.) V. minor 'Bowles'	Field Container	Lieth	CA	2006	Over the top	Virtually no injury but significant growth reduction at all rates (0.045, 0.09, 0.18 lb ai per acre); plants remained similar heights, but treated plants were not as wide.
25008	SedgeHammer (Halosulfuron)	Plantain Lily (Hosta sp.)	Field Container	Gilliam	AL	2005	Over the top	No visible injury at any rate; increased growth observed with 0.18 lb ai per acre.
25008	SedgeHammer (Halosulfuron)	Plantain Lily (Hosta sp.) 'Francee'	Field Container	Derr	VA	2001	Over the top	Minor visible injury with significant fresh weight reduction at all rates (0.045, 0.09, 0.18 lb ai per acre); poor to great spotted spurge control.
25008	SedgeHammer (Halosulfuron)	Plantain Lily (Hosta sp.) 'Gold Standard'	Field Container	Fraelich	GA	2006	Over the top	Slight injury at 0.045 and 0.09 lb ai per acre with NIS, moderate at 0.18 lb ai per acre; growth reduction at all rates.
25008	SedgeHammer (Halosulfuron)	Plantain Lily (Hosta sp.) 'Golden Tiara'	Field Container	Mathers (OSU)	OH	2006	Over the top	No injury after first application with only very slight injury occurring at the highest rate after the second application (0.047, 0.094, 0.188 lb ai per acre).
25008	SedgeHammer (Halosulfuron)	Plantain Lily (Hosta sp.) H. plantaginea 'Royal Standard'	Field Container	Gilliam	AL	2006	Over the top	Slight transient injury increasing with rate (0.047, 0.094, 0.188 lb ai per acre) with a slight reduction in plant size.
25008	SedgeHammer (Halosulfuron)	Plantain Lily (Hosta sp.) 'Halcyon'	Field Container	Derr	VA	2005	Over the top	Very slight injury at all rates (0.045, 0.09, 0.18 lb ai per acre).
25008	SedgeHammer (Halosulfuron)	Plantain Lily (Hosta sp.) 'So Sweet'	Field Container	Derr	VA	2019	Over the top	Minor injury with 1 Oz per acre + Capsil applied twice.
13735	SedgeHammer (Halosulfuron)	Plum (Prunus sp.) P. avium	Field Container	Altland	OR	2006	Over the top	Significant injury with single application at all rates (0.047, 0.094 and 0.188 lb ai per acre).
25351	SedgeHammer (Halosulfuron)	Purple Coneflower (Echinacea sp.)	Field Container	Klett	CO	2006	Over the top	Experiment A: Severe injury at all rates (0.047, 0.094 and 0.188 lb ai per acre with Capsil surfactant).

PR #	Product	Crop	Production Site	Researcher	State	Year	Application Type	Results
25351	SedgeHammer (Halosulfuron)	Purple Coneflower (Echinacea sp.)	Field Container	Klett	CO	2006	Over the top	Experiment B: Significant injury with complete recovery at 0.047 lb ai per acre with Capsil surfactant, high at 0.094 and 0.188 lb ai.
25351	SedgeHammer (Halosulfuron)	Purple Coneflower (Echinacea sp.)	Field Container	Klett	CO	2006	Over the top	Experiment C: No significant injury at 0.047 lb ai per acre with Capsil surfactant, high at 0.094 and 0.188 lb ai per acre.
25351	SedgeHammer (Halosulfuron)	Purple Coneflower (Echinacea sp.) E. purpurea magnus	Field Container	Fraelich	GA	2006	Over the top	Very slight injury with complete recovery at higher rates; no growth reduction (0.045, 0.09, 0.18 lb ai per acre with NIS).
25351	SedgeHammer (Halosulfuron)	Purple Coneflower (Echinacea sp.) E. purpurea 'Magnus'	Field Container	Boydston	WA	2006	Over the top	Severe injury after one application (0.045, 0.09, 0.18 lb ai per acre).
25351	SedgeHammer (Halosulfuron)	Purple Coneflower (Echinacea sp.) 'Magnus Superior'	Field Container	Derr	VA	2019	Over the top	Moderate injury with 1 Oz per acre + Capsil applied twice.
25340	SedgeHammer (Halosulfuron)	Rose (Rosa sp.) 'Beloved'	Field Container	Gilliam	AL	2006	Over the top	No visible injury and no significant impact on plant size (0.047, 0.094, 0.188 lb ai per acre).
25340	SedgeHammer (Halosulfuron)	Rose (Rosa sp.) 'Moonshadow'	Field Container	Gilliam	AL	2006	Over the top	No visible injury and no impact on plant size with any rate (0.047, 0.094, 0.188 lb ai per acre).
25340	SedgeHammer (Halosulfuron)	Rose (Rosa sp.) 'Nearly Wild'	Field Container	Lieth	CA	2006	Over the top	High injury and growth reduction at all rates (0.045, 0.09, 0.18 lb ai per acre); plants unmarketable.
25340	SedgeHammer (Halosulfuron)	Rose (Rosa sp.) 'Oranges & Lemons'	Field Container	Mathers (OSU)	OH	2006	Over the top	Moderate injury at all rates (0.047, 0.094, 0.188 lb ai per acre).
25340	SedgeHammer (Halosulfuron)	Rose (Rosa sp.) R. multiflora	Field Container	Freiberger	NJ	2006	Over the top	High injury at all rates (0.045, 0.09, 0.18 lb ai per acre).
25340	SedgeHammer (Halosulfuron)	Rose (Rosa sp.) 'Sea Foam'	Field Container	Senesac	NY	2006	Over the top	Unacceptable injury at all rates (0.045, 0.09, 0.18 lb ai per acre with NIS).
25340	SedgeHammer (Halosulfuron)	Rose (Rosa sp.) 'Solstice'	Field Container	Gilliam	AL	2006	Over the top	No visible injury and no impact on plant size with any rate (0.047, 0.094, 0.188 lb ai per acre).
21439	SedgeHammer (Halosulfuron)	Ryegrass, Sand (Leymus arenarius) 'Blue Dune'	Field Container	Senesac	NY	2001	Over the top	Very slight injury increasing with rate (0.045, 0.09, 0.18 lb ai per acre).
25779	SedgeHammer (Halosulfuron)	Sacred Bamboo (Nandina domestica) 'Nana'	Field Container	Gilliam	AL	2005	Over the top	No injury at 0.045, 0.09, 0.18 lb ai per acre.
21436	SedgeHammer (Halosulfuron)	Sandwort (Arenaria sp.) A. montana	Field Container	Senesac	NY	2001	Over the top	Minor to moderate phytotoxicity at all rates, with only the lowest rate recovering by 6 weeks after treatment (0.045, 0.09, 0.18 lb ai per acre).
25015	SedgeHammer (Halosulfuron)	Southern Arrowwood; Arrowwood Viburnum (Viburnum dentatum)	Field Container	Freiberger	NJ	2006	Over the top	High injury and growth reduction at all rates (0.045, 0.09, 0.18 lb ai per acre).

PR #	Product	Crop	Production Site	Researcher	State	Year	Application Type	Results
25015	SedgeHammer (Halosulfuron)	Southern Arrowwood; Arrowwood Viburnum (Viburnum dentatum) 'Autumn Jazz'	Field Container	Altland	OR	2006	Over the top	Moderate injury with single application at all rates (0.047, 0.094 and 0.188 lb ai per acre).
25015	SedgeHammer (Halosulfuron)	Southern Arrowwood; Arrowwood Viburnum (Viburnum dentatum) 'Chicago Lustre'	Field Container	Beste/Frank (ARS)	MD	2006	Over the top	Unacceptable injury and growth reduction at all rates (0.047, 0.094 and 0.188 lb ai per acre with NIS).
25015	SedgeHammer (Halosulfuron)	Southern Arrowwood; Arrowwood Viburnum (Viburnum dentatum) 'Mirrorleaf'	Field Container	Derr	VA	2005	Over the top	Very little to minor injury increasing with rate (0.045, 0.09, 0.18 lb ai per acre).
25006	SedgeHammer (Halosulfuron)	Spindletree (Euonymus sp.) E. alatus 'Compacta'	Field Container	Williams	IL	2007	Over the top	Virtually no injury at 0.047 and 0.094, very slight at 0.188 lb ai per acre.
25006	SedgeHammer (Halosulfuron)	Spindletree (Euonymus sp.) E. fortunei	Field Container	Derr	VA	2005	Over the top	Very slight injury at all rates (0.045, 0.09, 0.18 lb ai per acre).
25006	SedgeHammer (Halosulfuron)	Spindletree (Euonymus sp.) E. fortunei 'Coloratus'	Field Container	Williams	IL	2007	Over the top	Virtually no injury at 0.047, 0.094 and 0.188 lb ai per acre.
25347	SedgeHammer (Halosulfuron)	Spruce, Norway (Picea abies)	Field Container	Altland	OR	2006	Over the top	Slight injury after 2nd application only at 2X, rates (0.047, 0.094 and 0.188 lb ai per acre).
25347	SedgeHammer (Halosulfuron)	Spruce, Norway (Picea abies)	Field Container	Freiberger	NJ	2006	Over the top	Very slight injury and no growth reduction at all rates (0.045, 0.09, 0.18 lb ai per acre).
21437	SedgeHammer (Halosulfuron)	Strawberry (Non-Bearing) (Fragaria sp.) F. x ananassa 'Pink Panda'	Field Container	Senesac	NY	2001	Over the top	Moderate injury increasing with rate (0.045, 0.09, 0.18 lb ai per acre).
33915	SedgeHammer (Halosulfuron)	Witch's Moneybags (Hylotelephium telephium)	Field Container	Derr	VA	2018	Over the top	Acceptable crop injury with 1 oz per acre + Capsil applied twice.
33915	SedgeHammer (Halosulfuron)	Witch's Moneybags (Hylotelephium telephium)	Field Container	Derr	VA	2019	Over the top	
25348	SedgeHammer (Halosulfuron)	Woodland Sage (Salvia x sylvestris) S. elegans 'Tangerine'	Field Container	Derr	VA	2006	Over the top	Slight, moderate and unacceptable injury as rate increased (0.045, 0.09, 0.18 lb ai per acre).
25348	SedgeHammer (Halosulfuron)	Woodland Sage (Salvia x sylvestris) S. nemorosa 'May Night'	Field Container	Lieth	CA	2006	Over the top	Moderate injury and growth reduction at all rates (0.045, 0.09, 0.18 lb ai per acre).
25348	SedgeHammer (Halosulfuron)	Woodland Sage (Salvia x sylvestris) S. nemorosa 'Snow Hill'	Field Container	Boydston	WA	2006	Over the top	Severe injury at all rates (0.045, 0.09, 0.18 lb ai per acre).
25426	SedgeHammer (Halosulfuron)	Yaupon (Ilex vomitoria)	Field Container	Gilliam	AL	2006	Over the top	No visible injury and no impact on plant size with any rate (0.047, 0.094, 0.188 lb ai per acre).
25426	SedgeHammer (Halosulfuron)	Yaupon (Ilex vomitoria)	Field Container	Neal	NC	2006	Over the top	No significant injury at 0.047, 0.94 and 1.88 lb ai per acre.

PR #	Product	Crop	Production Site	Researcher	State	Year	Application Type	Results
21438	SedgeHammer (Halosulfuron)	Yellow Archangel (Lamiastrum galeobdolon) 'Herman's Pride'	Field Container	Senesac	NY	2001	Over the top	Slight to moderate transient injury increasing with rate (0.045, 0.09, 0.18 lb ai per acre).

Table 10. Detailed Summary of Crop Safety Testing with Halosulfuron in Field In Ground

Notes: Table entries are sorted by crop Latin name. Only those trials with research reports received by 8/27/2020 are listed below.

PR #	Product	Crop	Production Site	Researcher	State	Year	Application Type	Results
11761	Manage (Halosulfuron)	Azalea (Rhododendron sp.) 'Formosa'	Field In-Ground	Derr	VA	2005	Over the top	No injury at 0.045, 0.09, 0.18 lb ai per acre.
11761	Manage (Halosulfuron)	Azalea (Rhododendron sp.) R. obtusum 'Hino Crimson'	Field In-Ground	Beste (ARS)	MD	1997	Over the top	Slight transient visible injury at all rates (0.031, 0.062, 0.125 lb ai per acre) with reduction in growth exhibited at all rates.
11761	Manage (Halosulfuron)	Azalea (Rhododendron sp.) R. obtusum 'Kaempo'	Field In-Ground	Beste (ARS)	MD	1997	Over the top	No visible injury or growth reduction at any rate (0.031, 0.062, 0.125 lb ai per acre); no control of Pennsylvania smartweed, reduction of eclipta and yellownutsedge.
13668	Manage (Halosulfuron)	Fir (Abies sp.) A. balsamea	Field In-Ground	Ahrens/Mervosh	CT	2001	Over the top	Moderate injury (chlorosis and necrosis) at all rates (0.045, 0.09, 0.18 lb ai per acre); poor control of Asiatic dayflower.
13668	Manage (Halosulfuron)	Fir (Abies sp.) A. lasiocarpa 'Arizona'	Field In-Ground	Beste/Frank (ARS)	MD	2009	Over the top	Data not reliable. No significant injury at 0.031, 0.063 and 0.125 lb ai per acre early in the season.
11762	Manage (Halosulfuron)	Hemlock (Tsuga sp.) T. canadensis	Field In-Ground	Ahrens	CT	1996	Over the top	No significant injury at any rate (0.031, 0.063, 0.125 lb ai per acre)' excellent control of annual sedge and horseweed, moderate to good control of prostrate spurge and poor to good control of carpetweed.
11762	Manage (Halosulfuron)	Hemlock (Tsuga sp.) T. canadensis	Field In-Ground	Ahrens/Mervosh	CT	1995	Broadcast	No significant injury at any rate (0.031, 0.063, 0.125 lb ai per acre).
11764	Manage (Halosulfuron)	Holly (Ilex sp.) I. crenata 'Rotundifolia'	Field In-Ground	Beste (ARS)	MD	1997	Over the top	No significant injury or reduction in growth at any rate (0.031, 0.062, 0.125 lb ai per acre); good to excellent control of yellow nutsedge, but little control of morningglory or henbit.
11764	Manage (Halosulfuron)	Holly (Ilex sp.) I. rotunda	Field In-Ground	Czarnota	GA	2005	Over the top	Very slight injury at 0.0675, 0.135, and 0.27 lb ai per acre.
11764	Manage (Halosulfuron)	Holly (Ilex sp.) I. rotunda	Field In-Ground	Czarnota	GA	2006	Over the top	No injury at 0.042 lb ai per acre.

PR #	Product	Crop	Production Site	Researcher	State	Year	Application Type	Results
11764	Manage (Halosulfuron)	Holly (Ilex sp.) I. verticillata	Field In-Ground	Beste/Frank (ARS)	MD	2005	Over the top	No injury after single application but slight injury after second application, increasing with rate with no impact marketability at end of experiment (0.045, 0.09, 0.18 lb ai per acre with NIS).
11764	Manage (Halosulfuron)	Holly (Ilex sp.) I. verticillata	Field In-Ground	Beste/Frank (ARS)	MD	2009	Over the top	No significant injury or growth reduction at 0.031, 0.063 and 0.125 lb ai per acre; all treated plants marketable.
11760	Manage (Halosulfuron)	Juniper (Juniperus sp.) J. horizontalis 'Plumosa Compacta'	Field In-Ground	Ahrens	CT	1996	Broadcast	No injury at 0.031, 0.063, and 0.125 lb ai per acre with second-year applications to the same plants; excellent control of annual sedges and horseweed, moderate to good control of prostrate spurge, and poor control of carpet weed.
11760	Manage (Halosulfuron)	Juniper (Juniperus sp.) J. horizontalis 'Plumosa Compacta'	Field In-Ground	Ahrens/Mervosh	CT	1995	Broadcast	No injury at 0.031, 0.063, and 0.125 lb ai per acre; moderate control of crabgrass and moderate to good control of annual sedges increasing with rate.
11765	Manage (Halosulfuron)	Red Cedar, Arborvitae (Thuja sp.) T. occidentalis	Field In-Ground	Ahrens	CT	1996	Over the top	Minor to moderate injury at all rates (0.031, 0.063, 0.125 lb ai per acre); excellent control of annual sedges and horseweed, moderate to great control of prostrate spurge and poor to good control of carpetweed.
11765	Manage (Halosulfuron)	Red Cedar, Arborvitae (Thuja sp.) T. occidentalis	Field In-Ground	Ahrens/Mervosh	CT	1995	Broadcast	Minor injury decreasing over time at all rates (0.031, 0.063, 0.125 lb ai per acre).
11765	Manage (Halosulfuron)	Red Cedar, Arborvitae (Thuja sp.) T. occidentalis	Field In-Ground	Czarnota	GA	2005	Over the top	Very slight injury at 0.0675, 0.135, and 0.27 lb ai per acre.
11765	Manage (Halosulfuron)	Red Cedar, Arborvitae (Thuja sp.) T. occidentalis	Field In-Ground	Czarnota	GA	2006	Over the top	No injury at 0.042 lb ai per acre.
11765	Manage (Halosulfuron)	Red Cedar, Arborvitae (Thuja sp.) T. occidentalis globosa	Field In-Ground	Ahrens	CT	1996	Over the top	Moderate injury at all rates (0.031, 0.063, 0.125 lb ai per acre); poor control of quackgrass and horseweed.
11765	Manage (Halosulfuron)	Red Cedar, Arborvitae (Thuja sp.) T. occidentalis globosa	Field In-Ground	Ahrens/Mervosh	CT	1997	Over the top	Moderate injury at all rates (0.031, 0.063, 0.125 lb ai per acre) with the second-year application to plants; poor control of quackgrass and moderate to good control of hawksbeard and horseweed.

PR #	Product	Crop	Production Site	Researcher	State	Year	Application Type	Results
11766	Manage (Halosulfuron)	Rhododendron (Rhododendron sp.) R. catawbiense 'Roseum Elegans'	Field In-Ground	Ahrens	CT	1996	Broadcast	Moderate injury increasing with rate with second-year applications on same plants (0.031, 0.063, 0.125 lb ai per acre); excellent control of annual sedge and horseweed, moderate to great control of prostrate spurge, and poor to good control of carpetweed.
11766	Manage (Halosulfuron)	Rhododendron (Rhododendron sp.) R. catawbiense 'Roseum elegans'	Field In-Ground	Ahrens	CT	1997	Over the top	Unacceptable injury at 0.031, 0.062 and 0.125 lb ai per acre.
11766	Manage (Halosulfuron)	Rhododendron (Rhododendron sp.) R. catawbiense 'Roseum Elegans'	Field In-Ground	Ahrens/Mervosh	CT	1995	Broadcast	Minor but transient injury at 0.031, 0.063, and 0.125 lb ai per acre; moderate control of crabgrass and moderate to good control of annual sedges increasing with rate.
11766	Manage (Halosulfuron)	Rhododendron (Rhododendron sp.) R. catawbiense 'Roseum Elegans'	Field In-Ground	Beste (ARS)	MD	1997	Over the top	Slight transient injury at all rates (0.031, 0.062, 0.125 lb ai per acre) with the highest rate exhibiting stunting; excellent control of yellow nutsedge at all rates.
11759	Manage (Halosulfuron)	Yew (Taxus sp.) T. cuspidata	Field In-Ground	Ahrens	CT	1996	Broadcast	Moderate damage increasing with rate (0.031, 0.063, 0.125 lb ai per acre) with second year applications to same plants; excellent control of annual sedges and horseweed, moderate to good control of prostrate spurge, and poor to good control of carpetweed.
11759	Manage (Halosulfuron)	Yew (Taxus sp.) T. cuspidata	Field In-Ground	Ahrens/Mervosh	CT	1995	Broadcast	Moderate damage increasing with rate (0.031, 0.063, 0.125 lb ai per acre) and plants were not marketable.
11759	Manage (Halosulfuron)	Yew (Taxus sp.) T. cuspidata capitata	Field In-Ground	Ahrens	CT	1996	Over the top	No injury at 0.031 lb ai per acre, but commercially unacceptable damage occurred at 0.063 and 0.125 lb ai per acre; poor to good control of horseweed and annual bluegrass.
11759	Manage (Halosulfuron)	Yew (Taxus sp.) T. cuspidata capitata	Field In-Ground	Ahrens/Mervosh	CT	1997	Over the top	Moderate, commercially unacceptable damage at all rates (0.031, 0.063, 0.125 lb ai per acre); no control of annual bluegrass, poor control of horseweed at 0.031 lb ai per acre with excellent at the two higher rates, and excellent control of hawksbeard at
13713	SedgeHammer (Halosulfuron)	American Redbud, Eastern Redbud (Cercis canadensis)	Field In-Ground	Beste/Frank (ARS)	MD	2005	Over the top	Unacceptable injury (0.045, 0.09, 0.18 lb ai per acre with NIS).

PR #	Product	Crop	Production Site	Researcher	State	Year	Application Type	Results
13713	SedgeHammer (Halosulfuron)	American Redbud, Eastern Redbud (<i>Cercis canadensis</i>)	Field In-Ground	Beste/Frank (ARS)	MD	2009	Over the top	Slight injury at 0.031 and 0.063, moderate at 0.125 lb ai per acre.
26580	SedgeHammer (Halosulfuron)	Anise Tree (<i>Illicium</i> sp.) I. parviflorum	Field In-Ground	Czarnota	GA	2005	Over the top	Very slight injury at 0.0675, 0.135, and 0.27 lb ai per acre.
26580	SedgeHammer (Halosulfuron)	Anise Tree (<i>Illicium</i> sp.) I. parviflorum	Field In-Ground	Czarnota	GA	2006	Over the top	No injury at 0.042 lb ai per acre.
12459	SedgeHammer (Halosulfuron)	Apple (<i>Malus</i> sp.) <i>M. baccata</i>	Field In-Ground	Beste/Frank (ARS)	MD	2005	Over the top	Unacceptable injury at all rates (0.045, 0.09, 0.18 lb ai per acre with NIS).
12459	SedgeHammer (Halosulfuron)	Apple (<i>Malus</i> sp.) Sargent crabapple	Field In-Ground	Derr	VA	2009	Over the top	No significant injury or growth reduction at 0.031, 0.063, 0.125 lb ai per acre.
12461	SedgeHammer (Halosulfuron)	Arrowwood (<i>Viburnum</i> sp.)	Field In-Ground	Derr	VA	2008	Directed	Unacceptable injury at 0.063 lb ai per acre; complete yellow nutsedge control.
12461	SedgeHammer (Halosulfuron)	Arrowwood (<i>Viburnum</i> sp.)	Field In-Ground	Derr	VA	2008	Over the top	Unacceptable injury at 0.031, 0.063 and 0.125 lb ai per acre; complete yellow nutsedge control.
13232	SedgeHammer (Halosulfuron)	Ash, Green (<i>Fraxinus pennsylvanica</i>)	Field In-Ground	Beste/Frank (ARS)	MD	2005	Over the top	Low to moderate injury and reduced plant growth increasing with rate (0.045, 0.09, 0.18 lb ai per acre with NIS).
13232	SedgeHammer (Halosulfuron)	Ash, Green (<i>Fraxinus pennsylvanica</i>)	Field In-Ground	Beste/Frank (ARS)	MD	2009	Over the top	Significant early season injury which lasted seasonlong at 0.031, 0.063, and 0.125 lb ai per acre; plants not marketable.
20863	SedgeHammer (Halosulfuron)	Aster, White Heath (<i>Symphotrichum ericoides</i>) A. 'Snow Flurry'	Field In-Ground	Senesac	NY	2009	Over the top	Little to no crop injury with two applications at 0.031, 0.063, and 0.125 lb ai/A plus 0.25% v/v NIS.
27856	SedgeHammer (Halosulfuron)	Azalea (<i>Rhododendron</i> sp.)	Field In-Ground	Derr	VA	2008	Directed	No significant injury or growth reduction at 0.063 lb ai per acre; complete yellow nutsedge control.
27856	SedgeHammer (Halosulfuron)	Azalea (<i>Rhododendron</i> sp.)	Field In-Ground	Derr	VA	2008	Over the top	No significant injury or growth reduction at 0.031, 0.063 and 0.125 lb ai per acre; complete yellow nutsedge control.
27856	SedgeHammer (Halosulfuron)	Azalea (<i>Rhododendron</i> sp.)	Field In-Ground	Gilliam	AL	2008	Over the top	Slight injury with complete recovery at 0.031, 0.063 and 0.125 lb ai per acre; no growth reduction.
13233	SedgeHammer (Halosulfuron)	Bald Cypress (<i>Taxodium distichum</i>)	Field In-Ground	Beste/Frank (ARS)	MD	2005	Over the top	Unacceptable injury at all rates (0.045, 0.09, 0.18 lb ai per acre with NIS).
13233	SedgeHammer (Halosulfuron)	Bald Cypress (<i>Taxodium distichum</i>)	Field In-Ground	Beste/Frank (ARS)	MD	2009	Over the top	Severe injury at 0.031, 0.063 and 0.125 lb ai per acre.
13233	SedgeHammer (Halosulfuron)	Bald Cypress (<i>Taxodium distichum</i>)	Field In-Ground	Czarnota	GA	2005	Over the top	No injury at 0.0675, 0.135, and 0.27 lb ai per acre.

PR #	Product	Crop	Production Site	Researcher	State	Year	Application Type	Results
13233	SedgeHammer (Halosulfuron)	Bald Cypress (Taxodium distichum)	Field In-Ground	Czarnota	GA	2006	Over the top	No injury at 0.042 lb ai per acre.
27992	SedgeHammer (Halosulfuron)	Bay, Sweet (Laurus nobilis)	Field In-Ground	Uber	CA	2008	Over the top	Significant but commercially acceptable injury at 0.031, 0.063 and 0.125 lb ai per acre; no growth reduction.
13698	SedgeHammer (Halosulfuron)	Bayberry, Northern (Myrica pensylvanica)	Field In-Ground	Beste/Frank (ARS)	MD	2005	Over the top	Unacceptable injury at all rates (0.045, 0.09, 0.18 lb ai per acre with NIS).
13698	SedgeHammer (Halosulfuron)	Bayberry, Northern (Myrica pensylvanica)	Field In-Ground	Beste/Frank (ARS)	MD	2009	Over the top	Significant injury and high growth reduction at 0.031, 0.063 and 0.125 lb ai per acre.
20868	SedgeHammer (Halosulfuron)	Beard-Tongue (Penstemon sp.) 'Husker Red'	Field In-Ground	Derr	VA	2009	Over the top	No significant injury or growth reduction at 0.031, 0.063, 0.125 lb ai per acre.
13710	SedgeHammer (Halosulfuron)	Birch (Betula sp.)	Field In-Ground	Beste/Frank (ARS)	MD	2005	Over the top	Moderate but transient injury at all rates (0.045, 0.09, 0.18 lb ai per acre with NIS).
13710	SedgeHammer (Halosulfuron)	Birch (Betula sp.) B.nigra	Field In-Ground	Beste/Frank (ARS)	MD	2009	Over the top	Significant injury with some recovery at 0.031, 0.063 and 0.125 lb ai per acre.
13710	SedgeHammer (Halosulfuron)	Birch (Betula sp.) 'Heritage' and 'Duratree'	Field In-Ground	Kuhns	PA	2003	Directed	No injury at 0.045, 0.09, and 0.18 lb ai per acre; good weed control at 4 weeks after treatment, but not at 9 weeks after treatment.
12460	SedgeHammer (Halosulfuron)	Black Locust (Robinia pseudoacacia)	Field In-Ground	Beste/Frank (ARS)	MD	2005	Over the top	Unacceptable injury at all rates (0.045, 0.09, 0.18 lb ai per acre with NIS).
12460	SedgeHammer (Halosulfuron)	Black Locust (Robinia pseudoacacia)	Field In-Ground	Beste/Frank (ARS)	MD	2009	Over the top	Slight to severe injury at 0.031, 0.063 and 0.125 lb ai per acre.
13688	SedgeHammer (Halosulfuron)	Bottlebrush (Callistemon sp.) C. violac	Field In-Ground	Derr	VA	2009	Over the top	No injury or growth reduction at 0.031, 0.063, 0.125 lb ai per acre.
27858	SedgeHammer (Halosulfuron)	Boxwood (Buxus sp.) B. 'Green Mountain'	Field In-Ground	Mathers (OSU)	MI	2010	Over the top	Zelenka: Moderate injury especially with second application 0.031, .063, 0.125 lb ai per acre.
27858	SedgeHammer (Halosulfuron)	Boxwood (Buxus sp.) B. macrophylla 'Winter Green'	Field In-Ground	Gilliam	AL	2010	Over the top	No differences in phytotoxicity or reduction in growth with one or two applications at 0.67, 1.33, 2.66 oz/A at anytime during the 10 month evaluation period.
27858	SedgeHammer (Halosulfuron)	Boxwood (Buxus sp.) B. microphylla 'Green Mountain'	Field In-Ground	Senesac	NY	2009	Over the top	Little to no injury with two applications at 0.031, 0.063, and 0.125 lb ai/A plus 0.25% v/v NIS.
12462	SedgeHammer (Halosulfuron)	Bridal-Wreath (Spiraea sp.) S. prunifolia	Field In-Ground	Freiberger	NJ	2009	Broadcast	Very minor injury, comparable to untreated, at 0.12 lb ai per acre.

PR #	Product	Crop	Production Site	Researcher	State	Year	Application Type	Results
13675	SedgeHammer (Halosulfuron)	Butterfly Bush (Buddleia davidii)	Field In-Ground	Derr	VA	2008	Directed	Unacceptable injury and growth reduction at 0.063 lb ai per acre; complete yellow nutsedge control.
13675	SedgeHammer (Halosulfuron)	Butterfly Bush (Buddleia davidii)	Field In-Ground	Derr	VA	2008	Over the top	Unacceptable injury and growth reduction at 0.031, 0.063 and 0.125 lb ai per acre; complete yellow nutsedge control.
13675	SedgeHammer (Halosulfuron)	Butterfly Bush (Buddleia davidii) B. 'Black Knight'	Field In-Ground	Senesac	NY	2009	Over the top	Dramatic crop injury approaching mortality with two applications at 0.031, 0.063, and 0.125 lb ai/A plus 0.25% v/v NIS.
13675	SedgeHammer (Halosulfuron)	Butterfly Bush (Buddleia davidii) 'Nanho White'	Field In-Ground	Derr	VA	2009	Over the top	No significant injury but reduced growth and flowering at 0.031, 0.063, 0.125 lb ai per acre.
27986	SedgeHammer (Halosulfuron)	Carolina Cherry-Laurel (Prunus caroliniana)	Field In-Ground	Uber	CA	2008	Over the top	Significant but commercially acceptable injury at 0.031, 0.063 and 0.125 lb ai per acre; no significant growth reduction.
13216	SedgeHammer (Halosulfuron)	Cedar, Eastern Red (Juniperus virginiana)	Field In-Ground	Beste/Frank (ARS)	MD	2005	Over the top	Unacceptable injury at all rates (0.045, 0.09, 0.18 lb ai per acre with NIS).
29228	SedgeHammer (Halosulfuron)	Cherry, Black (Non-Bearing) (Prunus serotina)	Field In-Ground	Beste/Frank (ARS)	MD	2009	Over the top	Moderate to high injury and growth reduction at 0.031, 0.063 and 0.125 lb ai per acre.
13673	SedgeHammer (Halosulfuron)	Chokeberry (Aronia sp.) A. arbutifolia 'Brilliantissima'	Field In-Ground	Senesac	NY	2009	Over the top	Minor but acceptable crop injury with two applications at 0.031, 0.063, and 0.125 lb ai/A plus 0.25% v/v NIS.
13673	SedgeHammer (Halosulfuron)	Chokeberry (Aronia sp.) A. melanocarpa	Field In-Ground	Czarnota	GA	2010	Over the top	Moderate (but likely acceptable) crop injury with two applications at 0.031, 0.063, 0.125 lb ai per acre.
13736	SedgeHammer (Halosulfuron)	Chrysanthemum, Garden (Chrysanthemum/Dendranthema sp.)	Field In-Ground	Derr	VA	2008	Directed	Unacceptable injury and growth reduction at 0.063 lb ai per acre; complete yellow nutsedge control
13736	SedgeHammer (Halosulfuron)	Chrysanthemum, Garden (Chrysanthemum/Dendranthema sp.)	Field In-Ground	Derr	VA	2008	Over the top	Unacceptable injury and growth reduction at 0.031, 0.063 and 0.125 lb ai per acre; complete yellow nutsedge control
13694	SedgeHammer (Halosulfuron)	Crape Myrtle (Lagerstroemia indica)	Field In-Ground	Czarnota	GA	2005	Over the top	No injury at 0.0675, 0.135, and 0.27 lb ai per acre.
13694	SedgeHammer (Halosulfuron)	Crape Myrtle (Lagerstroemia indica)	Field In-Ground	Czarnota	GA	2005	Over the top	No injury at 0.0675, 0.135, and 0.27 lb ai per acre.
13694	SedgeHammer (Halosulfuron)	Crape Myrtle (Lagerstroemia indica)	Field In-Ground	Czarnota	GA	2006	Over the top	No injury at 0.042 lb ai per acre.

PR #	Product	Crop	Production Site	Researcher	State	Year	Application Type	Results
13694	SedgeHammer (Halosulfuron)	Crape Myrtle (<i>Lagerstroemia indica</i>)	Field In-Ground	Derr	VA	2008	Directed	Very slight injury with quick recovery at 0.063 lb ai per acre; complete yellow nutsedge control.
13694	SedgeHammer (Halosulfuron)	Crape Myrtle (<i>Lagerstroemia indica</i>)	Field In-Ground	Derr	VA	2008	Over the top	Very slight injury with quick recovery at 0.031, 0.063 and 0.125 lb ai per acre; complete yellow nutsedge control.
13694	SedgeHammer (Halosulfuron)	Crape Myrtle (<i>Lagerstroemia indica</i>)	Field In-Ground	Gilliam	AL	2008	Over the top	Slight injury after the 2nd application at 0.031, 0.063 and 0.125 lb ai per acre; no growth reduction.
13665	SedgeHammer (Halosulfuron)	Cypress (<i>Cupressus</i> sp.)	Field In-Ground	Czarnota	GA	2010	Over the top	Minor crop injury with two applications at 0.031, 0.063, 0.125 lb ai per acre.
13665	SedgeHammer (Halosulfuron)	Cypress (<i>Cupressus</i> sp.)	Field In-Ground	Gilliam	AL	2008	Over the top	Slight injury with quick recovery after the 2nd application at 0.031, 0.063 and 0.125 lb ai per acre; no growth reduction.
27987	SedgeHammer (Halosulfuron)	Cypress, Mediterranean (<i>Cupressus sempervirens</i>)	Field In-Ground	Czarnota	GA	2010	Over the top	Minor crop injury with two applications at 0.031, 0.063, or 0.125 lb ai per acre.
27987	SedgeHammer (Halosulfuron)	Cypress, Mediterranean (<i>Cupressus sempervirens</i>)	Field In-Ground	Uber	CA	2008	Over the top	No injury at 0.031, 0.063 and 0.125 lb ai per acre; significant growth reduction at 4X.
13669	SedgeHammer (Halosulfuron)	Dawn Redwood (<i>Metasequoia</i> sp.) <i>M. glyptostroboides</i>	Field In-Ground	Beste/Frank (ARS)	MD	2009	Over the top	Severe injury at 0.031, 0.063 and 0.125 lb ai per acre.
27865	SedgeHammer (Halosulfuron)	Daylily (<i>Hemerocallis</i> sp.)	Field In-Ground	Derr	VA	2008	Directed	Slight injury and growth reduction at 0.063 lb ai per acre; complete yellow nutsedge control.
27865	SedgeHammer (Halosulfuron)	Daylily (<i>Hemerocallis</i> sp.)	Field In-Ground	Derr	VA	2008	Over the top	Slight injury and growth reduction at 0.031, 0.063 and 0.125 lb ai per acre; complete yellow nutsedge control.
27865	SedgeHammer (Halosulfuron)	Daylily (<i>Hemerocallis</i> sp.) 'Lavender'	Field In-Ground	Derr	VA	2009	Over the top	No significant injury at 0.031, 0.063, 0.125 lb ai per acre after 1st, slight at 1X and 2X, moderate at 4X after 2nd application; growth reduction at all rates.
27865	SedgeHammer (Halosulfuron)	Daylily (<i>Hemerocallis</i> sp.) 'Stella'	Field In-Ground	Freiberger	NJ	2009	Broadcast	Very minor injury, comparable to untreated, at 0.12 lb ai per acre.
13681	SedgeHammer (Halosulfuron)	Dogwood, Flowering (<i>Cornus florida</i>)	Field In-Ground	Beste/Frank (ARS)	MD	2005	Over the top	Unacceptable injury (0.045, 0.09, 0.18 lb ai per acre with NIS).
13215	SedgeHammer (Halosulfuron)	Fir, Douglas (<i>Pseudotsuga menziesii</i>)	Field In-Ground	Ahrens/Mervosh	CT	2006	Over the top	No injury to dormant trees, slight to moderate injury to actively growing trees at all rates (0.047, 0.094 and 0.188 lb ai per acre with NIS)
13215	SedgeHammer (Halosulfuron)	Fir, Douglas (<i>Pseudotsuga menziesii</i>)	Field In-Ground	Garrett	MD	1998	Over the top	All rates caused significant damage to actively growing seedlings (0.031, 0.062, and 0.125 lb ai per acre).

PR #	Product	Crop	Production Site	Researcher	State	Year	Application Type	Results
25474	SedgeHammer (Halosulfuron)	Fir, Fraser (Abies fraseri)	Field In-Ground	Ahrens/Mervosh	CT	2006	Over the top	No injury to dormant trees, unacceptable injury to actively growing trees at all rates (0.047, 0.094 and 0.188 lb ai per acre with NIS)
25474	SedgeHammer (Halosulfuron)	Fir, Fraser (Abies fraseri)	Field In-Ground	Beste/Frank (ARS)	MD	2009	Over the top	Data unreliable due to high temperatures; crop appears to be tolerant with 0.31, 0.063 and 0.125 lb ai per acre; researchers recommend repeating trial.
13687	SedgeHammer (Halosulfuron)	Forsythia (Forsythia sp.) F. intermedia 'Golden Bells'	Field In-Ground	Gilliam	AL	2010	Over the top	Very slight injury at 2WAT decreasing with time from one to two applications at 0.045, 0.09, 0.18 lb ai per acre; untreated plants and 4X were larger than 1X and 2X treated plants.
13687	SedgeHammer (Halosulfuron)	Forsythia (Forsythia sp.) 'Lynwood Gold'	Field In-Ground	Derr	VA	2009	Over the top	Slight injury and moderate growth reduction at 0.031, 0.063, 0.125 lb ai per acre.
27859	SedgeHammer (Halosulfuron)	Gardenia (Gardenia sp.) 'August Beauty'	Field In-Ground	Derr	VA	2009	Over the top	No injury or growth reduction at 0.031, 0.063, 0.125 lb ai per acre.
13664	SedgeHammer (Halosulfuron)	Hinoki False Cypress (Chamaecyparis obtusa) C. thyoides	Field In-Ground	Beste/Frank (ARS)	MD	2005	Over the top	Unacceptable injury (0.045, 0.09, 0.18 lb ai per acre with NIS).
13664	SedgeHammer (Halosulfuron)	Hinoki False Cypress (Chamaecyparis obtusa) C. thyoides 'White Cedar'	Field In-Ground	Beste/Frank (ARS)	MD	2006	Over the top	Unacceptable injury and growth reduction at all rates (0.045, 0.09 and 0.18 lb ai per acre + NIS)
27862	SedgeHammer (Halosulfuron)	Holly, Chinese (Ilex cornuta)	Field In-Ground	Czarnota	GA	2010	Over the top	No crop injury with two applications of 0.031, 0.063, 0.125 lb ai per acre.
27862	SedgeHammer (Halosulfuron)	Holly, Chinese (Ilex cornuta)	Field In-Ground	Gilliam	AL	2010	Over the top	No crop injury with one or two applications at 0.031, 0.063, 0.125 lb ai per acre. All treated plants were smaller compared to the untreated at 10 months after application.
27862	SedgeHammer (Halosulfuron)	Holly, Chinese (Ilex cornuta) 'Buford Nana'	Field In-Ground	Gilliam	AL	2008	Over the top	No injury or growth reduction at 0.031, 0.063 and 0.125 lb ai per acre.
27863	SedgeHammer (Halosulfuron)	Holly, Kurogane (Ilex rotunda)	Field In-Ground	Czarnota	GA	2010	Over the top	No crop injury with two applications of 0.031, 0.063, 0.125 lb ai per acre.
13684	SedgeHammer (Halosulfuron)	Honeysuckle (Lonicera sp.) L. japonica	Field In-Ground	Gilliam	AL	2010	Over the top	Crop injury first observed 2WAT with 0.031, 0.063, 0.125 lb ai per acre. By 4WAT all plants including untreated began to decline and no additional injury ratings taken. Some differences in growth among treatments.
13684	SedgeHammer (Halosulfuron)	Honeysuckle (Lonicera sp.) L. sempervirens	Field In-Ground	Derr	VA	2009	Over the top	Slight to moderate injury at 0.031, 0.063, 0.125 lb ai per acre; no growth reduction.

PR #	Product	Crop	Production Site	Researcher	State	Year	Application Type	Results
25928	SedgeHammer (Halosulfuron)	Hybrid Hickory (Carya sp.) Pecan	Field In-Ground	Beste/Frank (ARS)	MD	2006	Over the top	Slight injury only at 4X rate but unacceptable growth reduction at all rates (0.045, 0.09, 0.18 lb ai per acre with NIS).
13690	SedgeHammer (Halosulfuron)	Hydrangea (Hydrangea sp.) H. arborescens 'Hayes Starburst'	Field In-Ground	Senesac	NY	2009	Over the top	Minor to moderate crop injury but acceptable with 0.031 and 0.063 lb ai per acre. Unacceptable injury with 0.125 lb ai per acre.
13690	SedgeHammer (Halosulfuron)	Hydrangea (Hydrangea sp.) oakleaf hydrangea	Field In-Ground	Derr	VA	2009	Over the top	No significant injury or growth reduction at 0.031, significant at 0.063 and 0.125 lb ai per acre.
28143	SedgeHammer (Halosulfuron)	Indian Hawthorn (Raphiolepis indica)	Field In-Ground	Derr	VA	2008	Directed	Slight injury but no growth reduction at 0.063 lb ai per acre; complete yellow nutsedge control.
28143	SedgeHammer (Halosulfuron)	Indian Hawthorn (Raphiolepis indica)	Field In-Ground	Derr	VA	2008	Over the top	Slight injury but no growth reduction at 0.031, 0.063 and 0.125 lb ai per acre; complete yellow nutsedge control.
28143	SedgeHammer (Halosulfuron)	Indian Hawthorn (Raphiolepis indica)	Field In-Ground	Gilliam	AL	2010	Over the top	Minor injury beginning at 2WAT1 and ending with significant injury by 4WAT2.
13741	SedgeHammer (Halosulfuron)	Iris, Spanish (Iris xiphium) 'Louisiana Purple'	Field In-Ground	Derr	VA	2009	Over the top	Severe injury and significant growth reduction at 0.031, 0.063, 0.125 lb ai per acre.
27991	SedgeHammer (Halosulfuron)	Japanese Blueberry Tree (Elaeocarpus decipiens)	Field In-Ground	Uber	CA	2008	Over the top	Significant but commercially acceptable injury at 0.031 and 0.063, marginal at 0.125 lb ai per acre; no significant growth reduction.
13666	SedgeHammer (Halosulfuron)	Japanese Cedar (Cryptomeria japonica)	Field In-Ground	Czarnota	GA	2010	Over the top	Minor crop injury with two applications at 0.031, 0.063, 0.125 lb ai per acre.
27857	SedgeHammer (Halosulfuron)	Juniper (Juniperus sp.) J. chinensis	Field In-Ground	Freiberger	NJ	2009	Broadcast	No injury at 0.12 lb ai per acre
27857	SedgeHammer (Halosulfuron)	Juniper (Juniperus sp.) J. chinensis 'Parsonii'	Field In-Ground	Gilliam	AL	2008	Over the top	No injury or growth reduction at 0.031, 0.063 and 0.125 lb ai per acre
13740	SedgeHammer (Halosulfuron)	Lily, Plantain (Hosta fortunei)	Field In-Ground	Czarnota	GA	2010	Over the top	Minor to moderate crop injury with two applications at 0.031, 0.063, 0.125 lb ai per acre.
13740	SedgeHammer (Halosulfuron)	Lily, Plantain (Hosta fortunei) 'Fragrant Blue'	Field In-Ground	Derr	VA	2009	Over the top	No significant injury or growth reduction at 0.031, slight to moderate at 0.063, 0.125 lb ai per acre.
13722	SedgeHammer (Halosulfuron)	Locust (Gleditsia sp.) G. triacanthos var inermis 'Skyline'	Field In-Ground	Kuhns	PA	2003	Directed	No injury at 0.045, 0.09, and 0.18 lb ai per acre; good weed control at 4 weeks after treatment, but not at 9 weeks after treatment.

PR #	Product	Crop	Production Site	Researcher	State	Year	Application Type	Results
28142	SedgeHammer (Halosulfuron)	Loropetalum (Loropetalum sp.)	Field In-Ground	Derr	VA	2008	Directed	No significant injury or growth reduction at 0.063 lb ai per acre; complete yellow nutsedge control.
28142	SedgeHammer (Halosulfuron)	Loropetalum (Loropetalum sp.)	Field In-Ground	Derr	VA	2008	Over the top	No significant injury or growth reduction at 0.031, 0.063 and 0.125 lb ai per acre; complete yellow nutsedge control.
28142	SedgeHammer (Halosulfuron)	Loropetalum (Loropetalum sp.) Burgundy loropetalum	Field In-Ground	Derr	VA	2009	Over the top	No significant injury or growth reduction at 0.031, 0.063, 0.125 lb ai per acre.
13659	SedgeHammer (Halosulfuron)	Magnolia (Magnolia sp.)	Field In-Ground	Czarnota	GA	2006	Over the top	No injury at 0.042 lb ai per acre.
13659	SedgeHammer (Halosulfuron)	Magnolia (Magnolia sp.)	Field In-Ground	Gilliam	AL	2008	Over the top	Slight injury at 0.031, moderate at 0.063 and 0.125 lb ai per acre; growth reduction at 2X and 4X.
13659	SedgeHammer (Halosulfuron)	Magnolia (Magnolia sp.) M. grandiflora	Field In-Ground	Czarnota	GA	2005	Over the top	No injury at 0.0675, 0.135, and 0.27 lb ai per acre.
12457	SedgeHammer (Halosulfuron)	Maple (Acer sp.) A. saccharinum	Field In-Ground	Derr	VA	2009	Over the top	No significant injury or growth reduction at 0.031, 0.063, 0.125 lb ai per acre.
12457	SedgeHammer (Halosulfuron)	Maple (Acer sp.) A. saccharinum	Field In-Ground	Senesac	NY	2009	Over the top	Moderate but unacceptable crop injury with two applications at 0.031, 0.063, and 0.125 lab ai/A plus 0.25% v/v NIS.
12457	SedgeHammer (Halosulfuron)	Maple (Acer sp.) A.saccharum	Field In-Ground	Beste/Frank (ARS)	MD	2009	Over the top	Significant early season injury with complete recovery at 0.031, 0.063 and 0.125 lb ai per acre; all treated plants marketable.
12457	SedgeHammer (Halosulfuron)	Maple (Acer sp.) R. rubrum 'Red Sunset'	Field In-Ground	Kuhns	PA	2003	Directed	No injury at 0.045, 0.09, and 0.18 lb ai per acre; good weed control at 4 weeks after treatment, but not at 9 weeks after treatment.
27864	SedgeHammer (Halosulfuron)	Maple, Red (Acer rubrum)	Field In-Ground	Beste/Frank (ARS)	MD	2009	Over the top	Significant early season injury with complete recovery at 0.031, 0.063 and 0.125 lb ai per acre; all treated plants marketable.
27864	SedgeHammer (Halosulfuron)	Maple, Red (Acer rubrum)	Field In-Ground	Derr	VA	2008	Directed	Slight injury and growth reduction at 0.063 lb ai per acre; complete yellow nutsedge control
27864	SedgeHammer (Halosulfuron)	Maple, Red (Acer rubrum)	Field In-Ground	Derr	VA	2008	Over the top	Slight injury and growth reduction at 0.031, 0.063 and 0.125 lb ai per acre; complete yellow nutsedge control
27864	SedgeHammer (Halosulfuron)	Maple, Red (Acer rubrum)	Field In-Ground	Senesac	NY	2009	Over the top	Moderate but unacceptable crop injury with two applications at 0.031, 0.063, and 0.125 lab ai/A plus 0.25% v/v NIS.

PR #	Product	Crop	Production Site	Researcher	State	Year	Application Type	Results
12458	SedgeHammer (Halosulfuron)	Oak (Quercus sp.) Q. bicolor	Field In-Ground	Beste/Frank (ARS)	MD	2006	Over the top	Minor injury but no growth reduction at all rates (0.045, 0.09 and 0.18 lb ai per acre with NIS); no reduction in seedling marketability
12458	SedgeHammer (Halosulfuron)	Oak (Quercus sp.) Q. nuttalli	Field In-Ground	Beste/Frank (ARS)	MD	2006	Over the top	Minor injury with complete recovery, growth reduction at all rates (0.047, 0.094 and 0.188 lb ai per acre + NIS); no reduction in seedling market value
12458	SedgeHammer (Halosulfuron)	Oak (Quercus sp.) Q. prinus	Field In-Ground	Beste/Frank (ARS)	MD	2005	Over the top	Acceptable injury; plants marketable at all rates (0.045, 0.09, 0.18 lb ai per acre with NIS).
12458	SedgeHammer (Halosulfuron)	Oak (Quercus sp.) Q. prinus	Field In-Ground	Beste/Frank (ARS)	MD	2006	Over the top	Moderate injury after first application at 0.047, 0.094 and 0.188 lb ai per acre with NIS; plants recovered and were marketable at end of trial.
12458	SedgeHammer (Halosulfuron)	Oak (Quercus sp.) Q. rubra	Field In-Ground	Beste/Frank (ARS)	MD	2009	Over the top	No significant injury or growth reduction at 0.031, 0.063 and 0.125 lb ai per acre; all treated plants marketable.
13221	SedgeHammer (Halosulfuron)	Oak, Black (Quercus velutina)	Field In-Ground	Beste/Frank (ARS)	MD	2005	Over the top	Low injury and plants marketable at all rates (0.045, 0.09, 0.18 lb ai per acre with NIS).
13221	SedgeHammer (Halosulfuron)	Oak, Black (Quercus velutina)	Field In-Ground	Beste/Frank (ARS)	MD	2006	Over the top	Moderate injury and growth reduction at 0.047, 0.094 and 0.188 lb ai per acre with NIS; plants recovered and were marketable at end of trial
13221	SedgeHammer (Halosulfuron)	Oak, Black (Quercus velutina)	Field In-Ground	Beste/Frank (ARS)	MD	2009	Over the top	No significant injury at 0.031, 0.063 and 0.125 lb ai per acre; all treated plants marketable.
27988	SedgeHammer (Halosulfuron)	Oak, Holly (Quercus ilex)	Field In-Ground	Uber	CA	2008	Over the top	No significant injury or growth reduction at 0.031, 0.063 and 0.125 lb ai per acre; complete yellow nutsedge control.
13219	SedgeHammer (Halosulfuron)	Oak, Red (Quercus rubra)	Field In-Ground	Beste/Frank (ARS)	MD	2005	Over the top	Moderate but transient injury at all rates (0.045, 0.09, 0.18 lb ai per acre with NIS).
13219	SedgeHammer (Halosulfuron)	Oak, Red (Quercus rubra)	Field In-Ground	Beste/Frank (ARS)	MD	2006	Over the top	Moderate but transient injury and height reduction at all rates (0.047, 0.094, and 0.18 lb ai per acre with NIS).
13220	SedgeHammer (Halosulfuron)	Oak, Sawtooth (Quercus acutissima)	Field In-Ground	Beste/Frank (ARS)	MD	2005	Over the top	Low to moderate injury at all rates (0.045, 0.09, and 0.18 lb ai per acre with NIS); plants marketable.

PR #	Product	Crop	Production Site	Researcher	State	Year	Application Type	Results
13220	SedgeHammer (Halosulfuron)	Oak, Sawtooth (<i>Quercus acutissima</i>)	Field In-Ground	Beste/Frank (ARS)	MD	2006	Over the top	Minor injury and growth reduction at all rates (0.045, 0.09 and 0.18 lb ai per acre + NIS); no reduction in seedling marketability.
13220	SedgeHammer (Halosulfuron)	Oak, Sawtooth (<i>Quercus acutissima</i>)	Field In-Ground	Beste/Frank (ARS)	MD	2009	Over the top	Significant early injury with complete recovery at 0.031, 0.063 and 0.125 lb ai per acre; all treated plants marketable.
27989	SedgeHammer (Halosulfuron)	Oak, Southern Live (<i>Quercus virginiana</i>)	Field In-Ground	Uber	CA	2008	Over the top	No injury or growth reduction at 0.031, 0.063 and 0.125 lb ai per acre.
13217	SedgeHammer (Halosulfuron)	Oak, White (<i>Quercus alba</i>)	Field In-Ground	Beste/Frank (ARS)	MD	2005	Over the top	Acceptable injury and plants marketable at all rates (0.045, 0.09, 0.18 lb ai per acre with NIS).
13217	SedgeHammer (Halosulfuron)	Oak, White (<i>Quercus alba</i>)	Field In-Ground	Beste/Frank (ARS)	MD	2006	Over the top	Minor injury with complete recovery at all rates (0.045, 0.09 and 0.18 lb ai per acre + NIS); growth reduction at 2X and 4X rates; no reduction in seedling marketability
13217	SedgeHammer (Halosulfuron)	Oak, White (<i>Quercus alba</i>)	Field In-Ground	Beste/Frank (ARS)	MD	2009	Over the top	Significant injury with complete recovery at 0.031, 0.063 and 0.125 lb ai per acre; all treated plants marketable.
27985	SedgeHammer (Halosulfuron)	Olive, Fruitless (<i>Olea europaea</i> 'Wilsonii')	Field In-Ground	Uber	CA	2008	Over the top	Significant but commercially acceptable injury at 0.031, 0.063 and 0.125 lb ai per acre; no significant growth reduction.
26574	SedgeHammer (Halosulfuron)	Palm, Chinese Windmill (<i>Trachycarpus fortunei</i>)	Field In-Ground	Czarnota	GA	2005	Over the top	Slight injury at 0.0675, 0.135, and 0.27 lb ai per acre, increasing with rate and second application.
26574	SedgeHammer (Halosulfuron)	Palm, Chinese Windmill (<i>Trachycarpus fortunei</i>)	Field In-Ground	Czarnota	GA	2006	Over the top	No injury at 0.042 lb ai per acre.
13706	SedgeHammer (Halosulfuron)	Periwinkle (<i>Vinca</i> sp.)	Field In-Ground	Derr	VA	2008	Directed	No significant injury or growth reduction at 0.063 lb ai per acre; complete yellow nutsedge control.
13706	SedgeHammer (Halosulfuron)	Periwinkle (<i>Vinca</i> sp.)	Field In-Ground	Derr	VA	2008	Over the top	No significant injury or growth reduction at 0.031, 0.063 and 0.125 lb ai per acre; complete yellow nutsedge control.
13743	SedgeHammer (Halosulfuron)	Phlox (<i>Phlox</i> sp.) 'Emerald Blue'	Field In-Ground	Derr	VA	2005	Over the top	Significant injury 9 DAT, but plants grew out of it by 44 DAT.
13211	SedgeHammer (Halosulfuron)	Pine, Austrian (<i>Pinus nigra</i>)	Field In-Ground	Beste/Frank (ARS)	MD	2005	Over the top	No significant injury at all rates (0.045, 0.09, 0.18 lb ai per acre with NIS).
13211	SedgeHammer (Halosulfuron)	Pine, Austrian (<i>Pinus nigra</i>)	Field In-Ground	Beste/Frank (ARS)	MD	2006	Over the top	No significant injury and growth reduction at all rates (0.045, 0.09 and 0.18 lb ai per acre + NIS); no reduction in seedling marketability.

PR #	Product	Crop	Production Site	Researcher	State	Year	Application Type	Results
13209	SedgeHammer (Halosulfuron)	Pine, Eastern White (<i>Pinus strobus</i>)	Field In-Ground	Beste/Frank (ARS)	MD	2005	Over the top	No injury at 0.045 lb ai per acre with NIS; significant at 0.09 and 0.18 lb ai per acre but plants recovered.
13209	SedgeHammer (Halosulfuron)	Pine, Eastern White (<i>Pinus strobus</i>)	Field In-Ground	Beste/Frank (ARS)	MD	2006	Over the top	Minor but transient injury at all rates (0.045, 0.09 and 0.18 lb ai per acre + NIS); no reduction in growth or seedling marketability.
13209	SedgeHammer (Halosulfuron)	Pine, Eastern White (<i>Pinus strobus</i>)	Field In-Ground	Beste/Frank (ARS)	MD	2009	Over the top	No significant injury or growth reduction at 0.031, 0.063 and 0.125 lb ai per acre.
13209	SedgeHammer (Halosulfuron)	Pine, Eastern White (<i>Pinus strobus</i>)	Field In-Ground	Beste/Frank (ARS)	MD	2009	Over the top	Slight injury at 0.031, moderate at 0.063 and 0.125 lb ai per acre; 2X and 4X treated plants with reduced value.
13209	SedgeHammer (Halosulfuron)	Pine, Eastern White (<i>Pinus strobus</i>)	Field In-Ground	Garrett	MD	1998	Over the top	No injury at any rate (0.031, 0.062, 0.125 lb ai per acre); poor to good control increasing with rate.
12173	SedgeHammer (Halosulfuron)	Pine, Loblolly (<i>Pinus taeda</i>)	Field In-Ground	Beste/Frank (ARS)	MD	2005	Over the top	Significant injury; plants recovered and marketable at 0.09 and 0.018 lb ai per acre rates.
12173	SedgeHammer (Halosulfuron)	Pine, Loblolly (<i>Pinus taeda</i>)	Field In-Ground	Beste/Frank (ARS)	MD	2009	Over the top	Slight injury and significant stunting at 0.031, 0.063 and 0.125 lb ai per acre.
12173	SedgeHammer (Halosulfuron)	Pine, Loblolly (<i>Pinus taeda</i>)	Field In-Ground	Garrett	MD	1998	Over the top	No significant visible injury, but plants at the 0.063 and 0.125 lb ai per acre rates were stunted; moderate to excellent control of nutsedge increasing with rate.
13210	SedgeHammer (Halosulfuron)	Pine, Red (<i>Pinus resinosa</i>)	Field In-Ground	Beste/Frank (ARS)	MD	2005	Over the top	No injury at 0.045 and 0.09 lb ai per acre; significant at 0.18 lb ai per acre but plants recovered.
13210	SedgeHammer (Halosulfuron)	Pine, Red (<i>Pinus resinosa</i>)	Field In-Ground	Beste/Frank (ARS)	MD	2006	Over the top	No significant injury at all rates (0.045, 0.09 and 0.18 lb ai per acre + NIS); slight stunting but no reduced market value.
13727	SedgeHammer (Halosulfuron)	Plane Tree, Sycamore (<i>Platanus</i> sp.)	Field In-Ground	Beste/Frank (ARS)	MD	2005	Over the top	Moderate to significant injury at 0.045, 0.09 and 0.18 lb ai per acre with abatement by season's end, but all rates caused stunting.
13727	SedgeHammer (Halosulfuron)	Plane Tree, Sycamore (<i>Platanus</i> sp.) <i>P. occidentalis</i>	Field In-Ground	Beste/Frank (ARS)	MD	2005	Over the top	Unacceptable injury (0.045, 0.09, 0.18 lb ai per acre with NIS).
13727	SedgeHammer (Halosulfuron)	Plane Tree, Sycamore (<i>Platanus</i> sp.) <i>P. occidentalis</i>	Field In-Ground	Beste/Frank (ARS)	MD	2009	Over the top	Unacceptable injury at 0.031, 0.063 and 0.125 lb ai per acre after one application.

PR #	Product	Crop	Production Site	Researcher	State	Year	Application Type	Results
13229	SedgeHammer (Halosulfuron)	Plum (Prunus sp.) P. americana	Field In-Ground	Beste/Frank (ARS)	MD	2005	Over the top	Significant, persistent injury at all rates (0.045, 0.09, 0.18 lb ai per acre with NIS).
13229	SedgeHammer (Halosulfuron)	Plum (Prunus sp.) P. serotina	Field In-Ground	Beste/Frank (ARS)	MD	2005	Over the top	Significant, persistent injury at all rates (0.045, 0.09, 0.18 lb ai per acre with NIS).
13695	SedgeHammer (Halosulfuron)	Privet (Ligustrum sp.)	Field In-Ground	Derr	VA	2008	Directed	Unacceptable injury and growth reduction at 0.063 lb ai per acre; complete yellow nutsedge control.
13695	SedgeHammer (Halosulfuron)	Privet (Ligustrum sp.)	Field In-Ground	Derr	VA	2008	Over the top	Unacceptable injury and growth reduction at 0.031, 0.063 and 0.125 lb ai per acre; complete yellow nutsedge control.
13695	SedgeHammer (Halosulfuron)	Privet (Ligustrum sp.)	Field In-Ground	Gilliam	AL	2008	Over the top	Moderate injury and growth reduction at 0.031, 0.063 and 0.125 lb ai per acre.
13702	SedgeHammer (Halosulfuron)	Rose (Rosa sp.) 'Black Cherry'	Field In-Ground	Derr	VA	2009	Over the top	Slight to moderate injury and reduced growth and flowering at 0.031, 0.063, 0.125 lb ai per acre.
13702	SedgeHammer (Halosulfuron)	Rose (Rosa sp.) 'Knockout'	Field In-Ground	Gilliam	AL	2005	Over the top	No injury (0.045, 0.09, 0.18 lb ai per acre).
13702	SedgeHammer (Halosulfuron)	Rose (Rosa sp.) 'Nearly Wild'	Field In-Ground	Freiberger	NJ	2009	Broadcast	No injury at 0.12 lb ai per acre.
13672	SedgeHammer (Halosulfuron)	Serviceberry (Amelanchier sp.) A. canadensis	Field In-Ground	Beste/Frank (ARS)	MD	2011	Over the top	High injury (foliar necrosis) and growth reduction with 0.031, 0.062 and 0.125 lb ai per acre w/ X-77 applied twice.
13672	SedgeHammer (Halosulfuron)	Serviceberry (Amelanchier sp.) Shadblow serviceberry	Field In-Ground	Derr	VA	2009	Over the top	No significant injury or growth reduction at 0.031, 0.063, 0.125 lb ai per acre.
20866	SedgeHammer (Halosulfuron)	Spiderwort (Tradescantia x andersoniana) 'Sweet Kate'	Field In-Ground	Derr	VA	2009	Over the top	No significant injury or growth reduction at 0.031, 0.063, 0.125 lb ai per acre.
13213	SedgeHammer (Halosulfuron)	Spruce, Norway (Picea abies)	Field In-Ground	Beste/Frank (ARS)	MD	2005	Over the top	Unacceptable injury at all rates (0.045, 0.09, 0.18 lb ai per acre with NIS).
13213	SedgeHammer (Halosulfuron)	Spruce, Norway (Picea abies)	Field In-Ground	Beste/Frank (ARS)	MD	2009	Over the top	Moderate injury and growth reduction at 0.031, 0.063 and 0.125 lb ai per acre.
13213	SedgeHammer (Halosulfuron)	Spruce, Norway (Picea abies)	Field In-Ground	Garrett	MD	1998	Over the top	Slight injury on seedlings at all rates (0.031, 0.062, 0.125 lb ai per acre); poor control of heavily infested nutsedge.
13214	SedgeHammer (Halosulfuron)	Spruce, White; Cat (Picea glauca)	Field In-Ground	Beste/Frank (ARS)	MD	2005	Over the top	Unacceptable injury at all rates (0.045, 0.09, 0.18 lb ai per acre with NIS).
13214	SedgeHammer (Halosulfuron)	Spruce, White; Cat (Picea glauca)	Field In-Ground	Beste/Frank (ARS)	MD	2009	Over the top	Moderate injury at 0.031, 0.063 and 0.125 lb ai per acre.

PR #	Product	Crop	Production Site	Researcher	State	Year	Application Type	Results
13214	SedgeHammer (Halosulfuron)	Spruce, White; Cat (<i>Picea glauca</i>)	Field In-Ground	Garrett	MD	1998	Over the top	No significant injury at 0.031, 0.062, and 0.125 lb ai per acre; some control of nutsedge increasing with rate.
27990	SedgeHammer (Halosulfuron)	Sumac, African (<i>Rhus lancea</i>)	Field In-Ground	Uber	CA	2008	Over the top	No significant injury or growth reduction at 0.031, 0.063 and 0.125 lb ai per acre.
13235	SedgeHammer (Halosulfuron)	Sweetgum (<i>Liquidambar sp.</i>) <i>L. styraciflua</i>	Field In-Ground	Beste/Frank (ARS)	MD	2009	Over the top	No significant injury but slight height reduction at 0.031, 0.063 and 0.125 lb ai per acre; all treated plants marketable.
13235	SedgeHammer (Halosulfuron)	Sweetgum (<i>Liquidambar sp.</i>) <i>L. styraciflua</i>	Field In-Ground	Beste/Frank (ARS)	MD	2010	Over the top	Two applications made 6 weeks apart at 0.031, 0.063, 0.125 lb ai per acre resulted in severe crop injury at 2x and 3x with reduced height.
13235	SedgeHammer (Halosulfuron)	Sweetgum (<i>Liquidambar sp.</i>) <i>L. styraciflua</i>	Field In-Ground	Beste/Frank (ARS)	MD	2011	Over the top	Commercially acceptable injury with virtually complete recovery at 0.031, 0.062 and 0.125 lb ai per acre w/ X-77 applied twice; treated plants smaller but expect no reduction in marketability.
13230	SedgeHammer (Halosulfuron)	Tulip Tree (<i>Liriodendron tulipifera</i>)	Field In-Ground	Beste/Frank (ARS)	MD	2005	Over the top	Low injury and plants marketable at all rates (0.045, 0.09, 0.18 lb ai per acre with NIS).
13692	SedgeHammer (Halosulfuron)	Virginia Sweetspire (<i>Itea virginica</i>)	Field In-Ground	Czarnota	GA	2010	Over the top	Little to no crop injury with two applications at 0.031, 0.063, 0.125 lb ai per acre.
13222	SedgeHammer (Halosulfuron)	Walnut, Black (Non-Bearing) (<i>Juglans nigra</i>)	Field In-Ground	Beste/Frank (ARS)	MD	2005	Over the top	Slight to minor injury increasing with rate (0.045, 0.09, 0.18 lb ai per acre), but by end of season no apparent injury except a reduction in height in the highest rate.
13222	SedgeHammer (Halosulfuron)	Walnut, Black (Non-Bearing) (<i>Juglans nigra</i>)	Field In-Ground	Beste/Frank (ARS)	MD	2005	Over the top	Slight to moderate injury increasing with rate and dissipating with time (0.045, 0.09, 0.18 lb ai per acre with NIS).
13222	SedgeHammer (Halosulfuron)	Walnut, Black (Non-Bearing) (<i>Juglans nigra</i>)	Field In-Ground	Beste/Frank (ARS)	MD	2006	Over the top	Moderate injury and growth reduction with complete recovery at trial's end at all rates (0.045, 0.09 and 0.18 lb ai per acre + NIS)
13222	SedgeHammer (Halosulfuron)	Walnut, Black (Non-Bearing) (<i>Juglans nigra</i>)	Field In-Ground	Beste/Frank (ARS)	MD	2009	Over the top	A soil or seed borne disease caused severe early season injury and death of seedlings.
13657	SedgeHammer (Halosulfuron)	Winter Creeper (<i>Euonymus radicans</i>) <i>E. fortunei</i>	Field In-Ground	Gilliam	AL	2005	Over the top	No injury (0.045, 0.09, 0.18 lb ai per acre).

PR #	Product	Crop	Production Site	Researcher	State	Year	Application Type	Results
13657	SedgeHammer (Halosulfuron)	Winter Creeper (Euonymus radicans) E. 'Purpleleaf Wintercreeper	Field In-Ground	Gilliam	AL	2010	Over the top	No crop injury or reduction in growth with one or two applications at 0.67, 1.33, 2.66 oz/A during 10 month evaluation period.
27860	SedgeHammer (Halosulfuron)	Yaupon (Ilex vomitoria)	Field In-Ground	Gilliam	AL	2008	Over the top	No injury or growth reduction at 0.031, 0.063 and 0.125 lb ai per acre.

Label Suggestions

It is recommended that in addition to the directed uses on established ornamental plantings in landscapes, certain over-the-top uses be added to the label as well as use in ornamental landscape and production nurseries. The following listed species can be added to the label as being tolerant to over-the-top applications of SedgeHammer:

Crop	In-ground Landscape/Nursery	Field Container Production
<i>Cupressus sp.</i>	4	--
<i>Euonymus sp.</i>	2	3
<i>Gardenia agusta</i>	1	3
<i>Helleborus niger</i>	--	4
<i>Hemerocallis sp.</i>	4	6
<i>Hosta sp.</i>	2	5
<i>Hydrangea sp.</i>	1	2
<i>Ilex crenata</i>	1	4
<i>Ilex cornuta</i>	3	1
<i>Ilex meserveae</i>	--	3
<i>Ilex rotunda</i>	3	--
<i>Ilex verticillata</i>	2	--
<i>Ilex vomitoria 'Nana'</i>	1	2
<i>Juglans nigra</i>	4	--
<i>Juniperus chinensis</i>	2	1
<i>Juniperus conferta</i>	--	3
<i>Juniperus horizontalis</i>	2	5
<i>Lagerstroemia indica</i>	6	3
<i>Liriope muscari (see Neal 2006)</i>	--	5
<i>Loropetalum sp.</i>	3	--
<i>Magnolia sp.</i>	3	1
<i>Picea abies (see Beste & Frank)</i>	3	2
<i>Pinus strobus</i>	5	--
<i>Quercus alba</i>	3	--
<i>Quercus rubra</i>	3	3
<i>Rhododendron sp.</i>	13	6
<i>Spiraea bumalda (see Ahrens & Mervosh)</i>	--	4
<i>Thuja occidentales</i>	6	2
<i>Trachelospermum asiaticum (see Lieth 2006)</i>	--	4
<i>Vinca minor (see Lieth)</i>	2	1

If these label changes are made, it is highly recommended that the following species be listed as not tolerant to over-the-top SedgeHammer applications:

Abelia x grandiflora

Buddleia davidii

Chamaebatiaria sp.

Chamaecyparis thyoides

Chrysanthemum (garden mum)

Cornus florida

Cotoneaster dammeri

Cotoneaster horizontalis

Gypsophila elegans

Hedera helix

Hydrangea arborescens

Iris xiphium

Juniperus virginiana

Ligustrum sp.

Myrica pensylvanica

Plantanus occidentalis

Prunus americana

Prunus avium

Prunus serótina

Robinia pseudoacacia

Rhododendron catawbiense

Salvia sylvestris

Taxus sp.

Viburnum sp.

Appendix 1: Contributing Researchers

Dr. John Ahrens <i>(retired)</i>	Connecticut Agricultural Experiment Station Valley Laboratory 153 Cook Hill Road, P.O. Box 248 Windsor, CT
Dr. James Altland <i>(past affiliate)</i>	Oregon State University 15210 NE Miley Rd. Aurora, OR 97002
Ms. Betsy Anderson <i>(retired)</i>	USDA-ARS Horticulture Insects Laboratory 1680 Madison Ave Wooster, OH 44691
Dr. Ed Beste <i>(retired)</i>	University of Maryland LESREC – Salisbury Facility 27664 Nanticoke Road Salisbury, MD 21801
Dr. Rick Boydston <i>(retired)</i>	USDA-ARS IAREC Rt 2 Box 2953-A Prosser, WA 99350
Mr. Luke Case <i>(past affiliate)</i>	The Ohio State University Dept. Hort. and Crop Science 2001 Fyffe Ct. Columbus, OH 43210
Dr. Mark Czarnota	University of Georgia Dept. of Horticulture 1109 Experiment St. Griffin, GA 30223
Dr. Jeffrey Derr	Hampton Roads Ag. Exp. Station 1444 Diamond Springs Road, Virginia Beach, VA 23455
Mr. Ben Fraelich	USDA-ARS CPES P.O. Box 748 Tifton, GA 31793

Dr. Ray Frank <i>(retired)</i>	6916 Boyers Mill Road New Market, MD 21774
Mr. Tom Freiburger	Rutgers University Cream Ridge Experiment Station 283 Rt. 539 Cream Ridge, NJ 08514
Dr. Richard Garrett <i>(retired)</i>	Maryland Department of Agriculture 3424 Gallagher Road Preston, MD 21655
Dr. Charles Gilliam <i>(retired)</i>	Auburn University Department of Horticulture 101 Funchess Hall Auburn, AL 36849
Dr. Jim Klett	Colorado State University Department of Horticulture and Landscape Architecture Fort Collins, CO 80523
Dr. Larry Kuhns <i>(retired)</i>	Penn State University Department of Horticulture 103 Tyson Building University Park, PA 16802
Dr. Heiner Lieth	Department of Plant Sciences University of California One Shield Avenue Davis, CA 95616
Dr. Hannah Mathers <i>(past affiliate)</i>	The Ohio State University Dept. Hort. and Crop Science 2001 Fyffe Ct. Columbus, OH 43210
Dr. Todd Mervosh <i>(past affiliate)</i>	Connecticut Agricultural Experiment Station Valley Laboratory 153 Cook Hill Road, P.O. Box 248 Windsor, CT

Dr. Joe Neal

North Carolina State University
Department of Horticultural Science
262 Kilgore Hall
Box 7609, NCSU
Raleigh, NC 27695-7609

Dr. Jeff Norcini

University of Florida
North Florida Research & Education Center
Rt 4 Box 4092
Monticello, FL 32344

Dr. Andy Senesac

Long Island Horticultural Research Laboratory
39 Sound Avenue
Riverhead, NY 11901

Dr. Cheryl Wilen

University of California, San Diego
5555 Overland Ave., Bldg. 4
San Diego, CA 92123