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IR-4 Ornamental Horticulture Program
Mesotrione Crop Safety

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Abstract

From 2007 to 2011, IR-4 completed 144 trials on Mesotrione SC. The data contained in this report was generated to register uses of mesotrione on and around ornamental horticulture plants with over-the-top applications. The mesotrione rates were 0.187, 0.25 and 0.37 pounds active ingredient per acre (lb ai per A) as the 1X, 1.5X and 2X rates. Mesotrione SC had been applied to 48 plant genera or species. Of these, nine exhibited no or minimal transient injury after application at all three rates. Twenty one crops exhibited significant phytotoxicity at even the lowest rate: *Buddleia davidii, Cortaderia selloana, Dianthus gratianopolitanus, Echinacea purpurea, Hydrangea quercifolia, Ilex sp., Lagerstroemia indica, Liriope sp., Ophiopogon sp., Phlox paniculata, Phlox subulata, Picea sp., Pseudotsuga menziesii, Rosa sp., Salvia sylvestris, Spiraea sp., Taxus sp., Thuja occidentalis, Veronica sp., Viburnum sp.,* and *Vinca sp.*

Introduction

Control of broadleaved weeds and sedges in the production of woody and herbaceous perennials can be problematic because nurseries grow many different types of plants and not all genera or species are listed on labels. These weeds can also be difficult to control in landscape settings for the same reason. Starting in 2007, crop safety for the new active ingredient mesotrione was investigated. Both Mesotrione G and Mesotrione SC were examined.

Materials and Methods

Two applications of Mesotrione SC were made approximately 4 or 6 weeks apart. The application rates were 0.187, 0.25 and 0.37 lb ai per acre, plus a water treated control. Mesotrione G was applied at similar rates in single trial. 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 = Plant death) 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 IR-4 testing, the following protocols were used: 07-009, 09-011, 10-018, and 11-023. Please visit http://ir4.rutgers.edu/ornamental/OrnamentalDrafts.cfm to view and download these protocols.

Mesotrione G and Mesotrione SC were supplied to researchers (See list of researchers in Appendix 1) by Syngenta Corporation.

Results and Summary

Phytotoxicity

Based on the type and nature of injury seen with Mesotrione SC applications in the conducted research, tested plant species were placed into four categories: 1) no significant phytotoxicity or growth differences from the untreated check or any injury was transitory, 2) no or minimal transitory injury seen at the 1X rate, but the 1.5X and/or 2X rates did cause significant phytotoxicity, 3) significant injury sufficient to recommend growers not utilize this product, and 4) more data is needed to make informed recommendations.

Mesotrione SC exhibited no or minimal negative impact on nine plant genera or species with over the top applications (Table 1). 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; five crops exhibited minor transient injury (Table 2). Twenty one tested crops exhibited damage sufficient to recommend growers not utilize Mesotrione SC as an over-the-top treatment for pre-emergent weed control (Table 3): *Buddleia davidii, Cortaderia selloana, Dianthus gratianopolitanus, Echinacea purpurea , Hydrangea quercifolia, Ilex sp., Lagerstroemia indica, Liriope sp. , Ophiopogon sp., Phlox paniculata, Phlox subulata, Picea sp., Pseudotsuga menziesii , Rosa sp., Salvia sylvestris, Spiraea sp., Taxus sp., Thuja occidentalis, Veronica sp., Viburnum sp.*, and *Vinca sp*. For 11 genera/species, more information is needed either because only 1 or 2 trials were conducted or because consistent results were not achieved among the research sites (Table 4).

A single trial was conducted with Mesotrione G on *Viburnum opulus*. No phytotoxicity symptoms were observed, but plants at the two higher rates were stunted.
See Table 5 for a list of completed trials.

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

Abies fraseri (see Marshall)
Berberis thunbergii (see Williams)
Buxus sempervirens
Calamagrostis acutiflora
Festuca ovina glauca (see Klett)
Juniperus sp.
Miscanthus sinensis
Pennisetum alopecuroides
Rhododendron sp.[1]

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

Euonymus sp. (see Boydston)
Thuja plicata
Hemerocallis sp.
Tsuga heterophylla
Hydrangea macrophylla

Table 3. List of Mesotrione SC treated crops exhibiting significant injury.

Buddleia davidii
Cortaderia selloana
Dianthus gratianopolitanus
Echinacea purpurea
Hydrangea quercifolia
Ilex sp.
Lagerstroemia indica
Liriope sp.
Ophiopogon sp.
Phlox paniculata
Phlox subulata
Picea sp. [1]
Pseudotsuga menziesii [1]
Rosa sp. [1]
Salvia sylvestris
Spiraea sp.
Taxus sp. [1]
Thuja occidentalis [1]
Veronica sp.
Viburnum sp.
Vinca sp.

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

Acer rubrum
Cladrastis sp.
Hibiscus sp.
Hosta sp.[2]
Hydrangea paniculata
Iris siberica
Loropetalum chinensis
Magnolia grandiflora
Magnolia soulangeana
Muhlenbergia capillaris
Tsuga canadensis

[1] *Differential response possibly due to different cultivars.*
[2] *In two trials, no injury after 2 applications at all rates.*

Table 5. Detailed Summary of Crop Safety Testing with Mesotrione SC

Notes: Table entries are sorted by crop Latin name. Only those trials with research reports received by 10/1/11 are listed below.

PR #	Crop	Production Site	Researcher	State	Trial Year	Application Type	Results
26540	Fir, Fraser (Abies fraseri)	Field In-Ground	Ahrens/ Mervosh	CT	2007	Over the top	No injury at 0.187, 0.25 and 0.374 lb ai per acre
26540	Fir, Fraser (Abies fraseri)	Field In-Ground	Ahrens/ Mervosh	CT	2010	Over the top	Little to no crop injury with two sequential applications at 0.188, 0.25, 0.375 lb ai per acre.
26540	Fir, Fraser (Abies fraseri)	Field In-Ground	Beste/Frank (ARS)	MD	2007	Over the top	Data indicated no significant injury and growth reduction at 0.187, 0.25 and 0.37 lb ai per acre
26323	Fir, Fraser (Abies fraseri)	Field Container	Freiberger	NJ	2007	Over the top	No significant injury at 0.187, 0.25 and 0.37 lb ai per acre
26323	Fir, Fraser (Abies fraseri)	Field Container	Peachey	OR	2011	Over the top	No injury or growth reduction with 0.187, 0.257 and 0.370 lb ai per acre.
26323	Fir, Fraser (Abies fraseri) 'Roan Mountain'	Field Container	Marshall	MI	2007	Over the top	One application. Slight injury at 0.187 and 0.25, moderate at 0.37 lb ai per acre
26197	Maple, Red (Acer rubrum)	Field Container	Freiberger	NJ	2007	Over the top	Slight injury at 0.187 and 0.25, moderate at 0.37 lb ai per acre
26197	Maple, Red (Acer rubrum) 'Red Sunset'	Field Container	Williams	IL	2007	Over the top	Virtually no injury at 0.187 and 0.25, very slight at 0.38 lb ai per acre
26286	Barberry (Berberis sp.) B. thunbergi 'Crimson Pygmy'	Field Container	Williams	IL	2007	Over the top	Very slight injury at 0.187, moderate at 0.25 and 0.38 lb ai per acre
26286	Barberry (Berberis sp.) B. thunbergii 'Atropurpurea'	Field Container	Beste/Frank (ARS)	MD	2007	Over the top	No significant injury or growth reduction at 0.187, 0.25 and 0.37 lb ai per acre; all plants marketable; poor control of oxalis, no control of Pennsylvania bittercress and spotted spurge
26286	Barberry (Berberis sp.) B. x gladwynsis 'William Penn'	Field Container	Czarnota	GA	2009	Over the top	No significant injury at 0.187, 0.25 and 0.37 lb ai per acre.
26338	Butterfly Bush (Buddleia davidii) 'Pink Delight'	Field Container	Williams	IL	2007	Over the top	Moderate injury at 0.187, high at 0.25 and 0.38 lb ai per acre
26338	Butterfly Bush (Buddleia davidii) 'White Ball'	Field Container	Marshall	MI	2007	Over the top	One application. Moderate to high injury at 0.187, 0.25 and 0.37 lb ai per acre
26307	Boxwood (Buxus sp.)	Field Container	Mathers (OSU)	OH	2007	Over the top	No or slight visible injury at 6, 8 and 12 oz per acre
26307	Boxwood (Buxus sp.) B. sempervirens 'Green Mountain'	Field Container	Beste/Frank (ARS)	MD	2007	Over the top	No significant injury or growth reduction at 0.187, 0.25 and 0.37 lb ai per acre; all plants marketable; poor control of oxalis, no control of spotted spurge
26307	Boxwood (Buxus sp.) 'Green Velvet'	Field Container	Marshall	MI	2007	Over the top	One application. Slight injury at 0.187, 0.25 and 0.37 lb ai per acre

PR #	Crop	Production Site	Researcher	State	Trial Year	Application Type	Results
26207	Feather Reed Grass (Calamagrostis acutiflora)	Field Container	Trader	MS	2007	Over the top	No injury or growth reduction at 0.187, 0.25 and 0.37 lb ai per acre
26207	Feather Reed Grass (Calamagrostis acutiflora) 'Karl Forester'	Field Container	Boydston	WA	2007	Over the top	No injury or significant growth reduction at 0.187, 0.25 and 0.37 lb ai per acre
26207	Feather Reed Grass (Calamagrostis acutiflora) 'Karl Forester'	Field Container	Boydston	WA	2008	Over the top	No injury or growth reduction at 0.187, 0.25 and 0.37 lb ai per acre; all plants saleable
26319	Yellowwood (Cladrastis sp.) C. kentukea	Field Container	Freiberger	NJ	2007	Over the top	Slight injury at 0.187, 0.25 and 0.37 lb ai per acre
28167	Pampas Grass (Cortaderia sp.) C. selloana	Field Container	Gilliam	AL	2010	Over the top	Minor to severe injury with increasing with rate (2.62, 5.25, and 10.5 lb ai per acre) and significant growth reduction at 2x and 4x.
28167	Pampas Grass (Cortaderia sp.) C. selloana	Field Container	Uber	CA	2010	Over the top	Slight to moderate injury with 6, 8, 12 fl oz per acre.
26243	Pinks (Dianthus sp.) 'Fire Witch'	Field Container	Williams	IL	2007	Over the top	High injury at 0.187, 0.25 and 0.38 lb ai per acre
26243	Pinks (Dianthus sp.) D. deltoides 'Brilliant'	Field Container	Senesac	NY	2007	Over the top	Slight injury after first, severe injury after 2nd application at 0.187, 0.25 and 0.37 lb ai per acre
26243	Pinks (Dianthus sp.) 'Firewitch'	Field Container	Boydston	WA	2007	Over the top	No injury after first, significant injury after 2nd application at 0.187, 0.25 and 0.37 lb ai per acre; 0.187 and 0.25 lb treated plants saleable
26357	Purple Coneflower (Echinacea sp.)	Field Container	Trader	MS	2007	Over the top	Severe injury and growth reduction at 0.187, 0.25 and 0.37 lb ai per acre
26357	Purple Coneflower (Echinacea sp.) E. purpurea	Field Container	Mathers (OSU)	OH	2007	Over the top	Severe injury at 0.187, 0.25 and 0.37 lb ai per acre
26357	Purple Coneflower (Echinacea sp.) E. purpurea	Field Container	Williams	IL	2007	Over the top	Severe injury at 0.187, 0.25 and 0.38 lb ai per acre
26357	Purple Coneflower (Echinacea sp.) E. purpurea 'Magnus'	Field Container	Fraelich	GA	2007	Over the top	Moderate to severe injury at 0.187, 0.25 and 0.37 lb ai per acre
26357	Purple Coneflower (Echinacea sp.) E. purpurea 'Magnus'	Field Container	Wade	SC	2007	Over the top	No injury at 0.187, 0.25 and 0.37 lb ai per acre
26357	Purple Coneflower (Echinacea sp.) E. purpurea 'White Swan'	Field Container	Boydston	WA	2007	Over the top	High injury at 0.187, 0.25 and 0.37 lb ai per acre
28014	Winged Burning Bush (Euonymus alatus) 'Compacta'	Field Container	Beste/Frank (ARS)	MD	2011	Over the top	Slight, transient injury with 0.187, 0.25 and 0.370 lb ai per acre after 1st application; no significant growth reduction; need additional trial.
28014	Winged Burning Bush (Euonymus alatus) 'Compacta'	Field Container	Williams	IL	2007	Over the top	Slight injury at 0.187, 0.25 and 0.38 lb ai per acre
28014	Winged Burning Bush (Euonymus alatus) E. alatus 'Compacta'	Field Container	Mathers (OSU)	OH	2010	Over the top	Minor to moderate injury at 0.187 and 0.25 lb ai per acre; significant injury at 0.5 lb ai per acre.
28014	Winged Burning Bush (Euonymus alatus) E. alatus 'compactus'	Field Container	Boydston	WA	2010	Over the top	Significant injury at 0.187, 0.25, 0.37 lb ai per acre at 4WAT and 4WAT2. Most 1x plants saleable. Half 1.3x and all 2x plants not saleable.
28015	Purpleleaf Wintercreeper (Euonymus radicans) E. fortunei 'Coloratus'	Field Container	Williams	IL	2007	Over the top	Slight injury at 0.187, 0.25 and 0.37 lb ai per acre

PR #	Crop	Production Site	Researcher	State	Trial Year	Application Type	Results
26210	Blue Fescue (Festuca glauca)	Field Container	Klett	CO	2007	Over the top	Two trials; slight injury (leaf discoloration) after the 2nd application at 0.187, 0.25 and 0.37 lb ai per acre; no growth reduction
26210	Blue Fescue (Festuca glauca)	Field Container	Trader	MS	2007	Over the top	No injury or growth reduction at 0.187, 0.25 and 0.37 lb ai per acre
26210	Blue Fescue (Festuca glauca) 'Elijah Blue'	Field Container	Boydston	WA	2007	Over the top	No injury or growth reduction at 0.187, 0.25 and 0.37 lb ai per acre; treated plants saleable
26210	Blue Fescue (Festuca glauca) 'Elijah Blue'	Field Container	Boydston	WA	2008	Over the top	No injury or growth reduction at 0.187, 0.25 and 0.37 lb ai per acre
26345	Daylily (Hemerocallis sp.)	Field Container	Fraelich	GA	2007	Over the top	No injury at 0.187, 0.25 and 0.37 lb ai per acre
26345	Daylily (Hemerocallis sp.) 'Second Glance'	Field Container	Lieth	CA	2007	Over the top	Moderate to high injury at 0.187, 0.25 and 0.37 lb ai per acre
26345	Daylily (Hemerocallis sp.) 'Stella d'Oro'	Field Container	Wade	SC	2007	Over the top	Some chlorosis at 0.187, 0.25 and 0.37 lb ai per acre after 1st application; complete recovery in 2 weeks
26301	Mallow, Rose Mallow (Hibiscus sp.) H. rosa-sinensis 'Butterfly Yellow'	Field Container	Uber	CA	2010	Over the top	Moderate but transient crop injury with 6, 8, 12 fl oz per acre.
26301	Mallow, Rose Mallow (Hibiscus sp.) H. syriacus	Field Container	Czarnota	GA	2010	Over the top	Severe crop injury with 6, 8, 12 oz per acre.
26264	Hosta (Hosta sp.) H. fortunei 'Francee'	Field Container	Wade	SC	2007	Over the top	No injury at 0.187, 0.25 and 0.37 lb ai per acre
26264	Hosta (Hosta sp.) 'Krossa Regal'	Field Container	Fraelich	GA	2007	Over the top	No injury at 0.187, 0.25 and 0.37 lb ai per acre
26253	Hydrangea (Hydrangea sp.)	Field Container	Mathers (OSU)	OH	2007	Over the top	No visible injury at 6, 8 and 12 oz per acre
26253	Hydrangea (Hydrangea sp.) H. macrophylla ‘Week End’	Field Container	Williams	IL	2007	Over the top	Slight injury at 0.187 and 0.25, moderate at 0.38 lb ai per acre
26253	Hydrangea (Hydrangea sp.) H. macrophylla 'Endless Summer'	Field Container	Wade	SC	2007	Over the top	Some chlorosis at 0.187, 0.25 and 0.37 lb ai per acre after 1st application; complete recovery in 2 weeks
26253	Hydrangea (Hydrangea sp.) H. macrophylla 'Nikko Blue'	Field Container	Beste/Frank (ARS)	MD	2007	Over the top	Severe injury (chlorosis) and growth reduction at 0.187, 0.25 and 0.37 lb ai per acre; treated plants not marketable
26253	Hydrangea (Hydrangea sp.) H. macrophylla 'Nikko Blue'	Field Container	Fraelich	GA	2007	Over the top	Slight injury (chlorosis) at 0.187, 0.25 and 0.37 lb ai per acre; only one plant at 2X rate not marketable
26253	Hydrangea (Hydrangea sp.) H. paniculata ‘Pee Wee’	Field Container	Williams	IL	2007	Over the top	Virtually no injury at 0.187, slight at 0.25 and 0.38 lb ai per acre
26253	Hydrangea (Hydrangea sp.) H. quercifolia 'Alice'	Field Container	Senesac	NY	2007	Over the top	Severe injury at 0.187, 0.25 and 0.37 lb ai per acre
26334	Holly (Ilex sp.) I. cornuta 'Carissa'	Field Container	Fraelich	GA	2007	Over the top	No injury at 0.187, 0.25 and 0.37 lb ai per acre
26334	Holly (Ilex sp.) I. verticillata 'Winter Gold'	Field Container	Senesac	NY	2007	Over the top	Severe injury at 0.187, 0.25 and 0.37 lb ai per acre
26334	Holly (Ilex sp.) I. x meserveae 'China Girl'	Field Container	Trader	MS	2007	Over the top	Unacceptable injury and growth reduction at 0.187, 0.25 and 0.37 lb ai per acre
27676	Holly, Dwarf Yaupon (Ilex vomitoria ‘nana’)	Field Container	Czarnota	GA	2010	Over the top	Moderate to severe crop injury with 6, 8, 12 oz per acre.
27676	Holly, Dwarf Yaupon (Ilex vomitoria ‘nana’)	Field Container	Trader	MS	2007	Over the top	Moderate to severe injury at 0.187, 0.25 and 0.37 lb ai per acre.

PR #	Crop	Production Site	Researcher	State	Trial Year	Application Type	Results
26351	Flag (Iris sp.) I. siberica 'Harpswell Happiness'	Field Container	Beste/Frank (ARS)	MD	2007	Over the top	Minor injury with some recovery, no significant growth reduction at 0.187, 0.25 and 0.37 lb ai per acre; plants marketable at 1X and 2X rates
26271	Juniper (Juniperus sp.)	Field Container	Mathers (OSU)	OH	2007	Over the top	No visible injury at 6, 8 and 12 oz per acre
26271	Juniper (Juniperus sp.) J. communis 'Gold Totem Pole'	Field Container	Senesac	NY	2007	Over the top	No injury at 0.187, 0.25 and 0.37 lb ai per acre
29508	Juniper (Juniperus sp.) J. horizontalis	Field In-Ground	Ahrens/ Mervosh	CT	2010	Over the top	No crop injury with two sequential applications at 0.188, 0.250, 0.375 lb ai per acre.
26271	Juniper (Juniperus sp.) J. horizontalis 'Wiltonii'	Field Container	Fraelich	GA	2007	Over the top	No injury at 0.187, 0.25 and 0.37 lb ai per acre
26271	Juniper (Juniperus sp.) J. squamata 'Blue Star'	Field Container	Ahrens/ Mervosh	CT	2007	Over the top	No injury after 1st, slight to moderate injury after 2nd application at 0.187, 0.25 and 0.375 lb ai per acre
26342	Crape Myrtle (Lagerstroemia indica)	Field Container	Trader	MS	2007	Over the top	Severe injury and growth reduction at 0.187, 0.25 and 0.37 lb ai per acre
26435	Lilyturf, Creeping (Liriope sp.)	Field Container	Trader	MS	2007	Over the top	Severe injury and growth reduction at 0.187, 0.25 and 0.37 lb ai per acre
26330	Loropetalum (Loropetalum sp.) L. chinensis 'Ruby	Field Container	Gilliam	AL	2010	Over the top	Minor crop injury with one and two applications at 0.187, 0.25 and 0.37 lb ai per acre increasing wit rate but decreasing with time. No growth reduction.
26315	Magnolia (Magnolia sp.) M. grandiflora 'Majestic Beauty'	Field Container	Uber	CA	2010	Over the top	No crop injury with 0.187, 0.25 and 0.37 lb ai per acre.
26315	Magnolia (Magnolia sp.) M. soulangeana 'Jon Jon'	Field Container	Gilliam	AL	2010	Over the top	Moderate to significant crop injury with one and two applications at 0.187, 0.25 and 0.37 lb ai per acreand growth reduction at 2x and 4x.
26213	Silver Grass (Miscanthus sp.)	Field Container	Trader	MS	2007	Over the top	No injury or growth reduction at 0.187, 0.25 and 0.37 lb ai per acre
26213	Silver Grass (Miscanthus sp.) M. sinensis	Field Container	Boydston	WA	2007	Over the top	No injury or growth reduction at 0.187, 0.25 and 0.37 lb ai per acre; plants saleable
26213	Silver Grass (Miscanthus sp.) M. sinensis 'Graziella'	Field Container	Mathers (OSU)	OH	2007	Over the top	No injury at 0.187 and 0.25 lb ai per acre, slight injury with complete recovery at 0.37 lb ai
28169	Muhly, hairyawn (Muhlenbergia capillaris)	Field Container	Boydston	WA	2011	Over the top	Very slight crop injury and reduction in growth with two applications at 0.187, 0.25, 0.37 lb ai per acre.
28169	Muhly, hairyawn (Muhlenbergia capillaris)	Field Container	Uber	CA	2009	Over the top	Slight, acceptable injury at 0.187, 0.25 and 0.37 lb ai per acre.
26438	Mondo Grass, Lilyturf, Ker-Gawl (Ophiopogon sp.)	Field Container	Trader	MS	2007	Over the top	Unacceptable injury at 0.187, 0.25 and 0.37 lb ai per acre
28170	Feathergrass (Pennisetum sp.)	Field Container	Uber	CA	2010	Over the top	No crop injury with 6, 8, 12 fl oz/A.
28170	Feathergrass (Pennisetum sp.) P. alopecuroides 'Hamlin'	Field Container	DeFrancesco	OR	2011	Over the top	Slight injury, no growth reduction with 0.187, 0..25 and 0.37 lb ai per acre.
28170	Feathergrass (Pennisetum sp.) P. alopecuroides var. viridescens	Field Container	Boydston	WA	2009	Over the top	No injury or growth reduction at 0.187, 0.25 and 0.37 lb ai per acre; all plants saleable.
26216	Phlox, Perennial (Phlox paniculata) P. paniculata 'Robert Poore'	Field Container	Senesac	NY	2007	Over the top	Severe injury at 0.187, 0.25 and 0.37 lb ai per acre

PR #	Crop	Production Site	Researcher	State	Trial Year	Application Type	Results
26216	Phlox, Perennial (Phlox paniculata) 'Starfire'	Field Container	Boydston	WA	2007	Over the top	High injury and significant growth reduction at 0.187, 0.25 and 0.37 lb ai per acre; plants not saleable
26218	Creeping Phlox, Moss Pink (Phlox subulata) 'McDaniels Cushion'	Field Container	Boydston	WA	2007	Over the top	Slight injury at 0.187, 0.25 and 0.37 lb ai per acre; plants saleable
26218	Creeping Phlox, Moss Pink (Phlox subulata) P. subulata 'Emerald Blue'	Field Container	Senesac	NY	2007	Over the top	Severe injury at 0.187, 0.25 and 0.37 lb ai per acre
29504	Spruce (Picea sp.)	Field In-Ground	Peachey	OR	2011	Over the top	No injury with 0.187, minor with 0.257 and 0.370 lb ai per acre; no growth reduction.
29504	Spruce (Picea sp.) P. abies	Field In-Ground	Ahrens/ Mervosh	CT	2010	Over the top	No crop injury with two sequential applications at 0.188, 0.250, 0.375 lb ai per acre.
29504	Spruce (Picea sp.) P. glauca	Field In-Ground	Ahrens/ Mervosh	CT	2010	Over the top	No crop injury with two sequential applications at 0.188, 0.250, 0.375 lb ai per acre.
26294	Spruce (Picea sp.) P. glauca	Field Container	Freiberger	NJ	2007	Over the top	Moderate to severe injury at 0.187, 0.25 and 0.37 lb ai per acre
26294	Spruce (Picea sp.) P. glauca 'Conica'	Field Container	Mathers (OSU)	OH	2009	Over the top	Moderate injury at 0.187, 0.25 and 0.37 lb ai per acre
29504	Spruce (Picea sp.) P. pungens	Field In-Ground	Ahrens/ Mervosh	CT	2010	Over the top	Little to no crop injury with two sequential applications of 0.188, 0.250, 0.375 lb ai per acre.
26294	Spruce (Picea sp.) P. pungens	Field Container	Senesac	NY	2007	Over the top	No injury after 1st, slight to moderate injury after 2nd application at 0.187, 0.25 and 0.37 lb ai per acre; complete recovery 8 weeks after 2nd application
29510	Pine (Pinus sp.) P. strobus	Field In-Ground	Ahrens/ Mervosh	CT	2010	Over the top	No crop injury with two sequential applications at 0.188, 0.250, 0.375 lb ai per acre.
26225	Fir, Douglas (Pseudotsuga menziesii)	Field Container	Boydston	WA	2007	Over the top	No injury at 0.187, significant injury at 0.25 and 0.37 lb ai per acre; 0.187 lb treated plants saleable
26225	Fir, Douglas (Pseudotsuga menziesii)	Field Container	DeFrancesco	OR	2011	Over the top	No injury after 1st applic., very slight after 2nd applic. with 0.187, 0..25 and 0.37 lb ai per acre; significant growth reduction with the higher rates.
29505	Fir, Douglas (Pseudotsuga menziesii)	Field In-Ground	Peachey	OR	2011	Over the top	Moderate injury early, becoming minor after the 2nd applic., with 0.187, 0.257 and 0.370 lb ai per acre; no growth reduction.
26225	Fir, Douglas (Pseudotsuga menziesii) 'Blue'	Field Container	Marshall	MI	2007	Over the top	One application. Slight injury at 0.187, 0.25 and 0.37 lb ai per acre
29505	Fir, Douglas (Pseudotsuga menziesii) P. menziesii	Field In-Ground	Ahrens/ Mervosh	CT	2010	Over the top	Little to no crop injury with two sequential applications of 0.188, 0.250, 0.375 lb ai per acre. 4x rate had slight whitening effect on new needles which dissipated with time.
26225	Fir, Douglas (Pseudotsuga menziesii) P. menziesii glauca	Field Container	Freiberger	NJ	2007	Over the top	Severe injury at 0.187, 0.25 and 0.37 lb ai per acre
28149	Oak, Northern Red (Quercus rubra)	Field In-Ground	Beste/Frank (ARS)	MD	2011	Over the top	Moderate to high injury and height reduction with 0.19, 0.25 and 0.375 lb ai per acre appplied twice; plants not marketable.
26290	Azalea (Rhododendron sp.) 'Fashion'	Field Container	Fraelich	GA	2007	Over the top	Very slight injury (chlorosis) at 0.187, 0.25 and 0.37 lb ai per acre; all plants marketable

PR #	Crop	Production Site	Researcher	State	Trial Year	Application Type	Results
26290	Azalea (Rhododendron sp.) 'Gwenda'	Field Container	Wade	SC	2007	Over the top	Some chlorosis at 0.187, 0.25 and 0.37 lb ai per acre after 1st application; complete recovery in 2 weeks
26290	Azalea (Rhododendron sp.) R. x 'Crete' (Yakushimanum hybrid)	Field Container	Senesac	NY	2007	Over the top	Slight to moderate injury at 0.187, 0.25 and 0.37 lb ai per acre
26290	Azalea (Rhododendron sp.) 'Vulcan'	Field Container	Regan	OR	2007	Over the top	No significant injury or growth reduction at 0.187, 0.25 and 0.37 lb ai per acre
26200	Rose (Rosa sp.)	Field Container	Trader	MS	2007	Over the top	Unacceptable injury and growth reduction at 0.187, 0.25 and 0.37 lb ai per acre
26200	Rose (Rosa sp.) 'Nearly Wild'	Field Container	Wade	SC	2007	Over the top	Some chlorosis at 0.187, 0.25 and 0.37 lb ai per acre after 1st application; complete recovery in 2 weeks
26200	Rose (Rosa sp.) R. meiglise 'White Drift'	Field Container	Boydston	WA	2007	Over the top	High injury at 0.187, 0.25 and 0.37 lb ai per acre; plants not saleable
26200	Rose (Rosa sp.) R. virginiana	Field Container	Senesac	NY	2007	Over the top	Moderate to severe injury at 0.187, 0.25 and 0.37 lb ai per acre
26200	Rose (Rosa sp.) R. x hybrida ‘Knockout’	Field Container	Williams	IL	2007	Over the top	Virtually no injury at 0.187, slight at 0.25 and 0.38 lb ai per acre
26200	Rose (Rosa sp.) R. x hybrida ‘Nearly Wild’	Field Container	Williams	IL	2007	Over the top	Very slight to slight injury increasing with rate (0.17, 0.25, 0.38 lb ai per acre).
26204	Sage, Ramona (Salvia sylvestris) 'East Friesland'	Field Container	Boydston	WA	2007	Over the top	High injury at 0.187, 0.25 and 0.37 lb ai per acre
26204	Sage, Ramona (Salvia sylvestris) 'Rhea'	Field Container	Beste/Frank (ARS)	MD	2007	Over the top	Severe injury and growth reduction at 0.187, 0.25 and 0.37 lb ai per acre; treated plants with greatly reduced quality and marketability
26204	Sage, Ramona (Salvia sylvestris) S. sylvestris ‘May Night’	Field Container	Williams	IL	2007	Over the top	Severe injury at 0.187, 0.25 and 0.37 lb ai per acre.
29248	Elder, Elderberry (Sambucus sp.) S. canadensis 'Aurea'	Field Container	Czarnota	GA	2008	Over the top	Very high rates. No injury at 2.1, 4.2 and 6.3 lb ai per acre
26282	Bridal-Wreath (Spiraea sp.) S. decumbens	Field Container	Senesac	NY	2007	Over the top	Slight to moderate injury at 0.187, 0.25 and 0.37 lb ai per acre
26282	Bridal-Wreath (Spiraea sp.) S. prunifolia	Field Container	Freiberger	NJ	2007	Over the top	Moderate to severe injury increasing with rates at 0.187, 0.25 and 0.37 lb ai per acre
26282	Bridal-Wreath (Spiraea sp.) Spiraea x bumalda 'Gold Mound'	Field Container	Ahrens/ Mervosh	CT	2007	Over the top	Moderate to high injury at 0.187, 0.25 and 0.375 lb ai per acre
29509	Yew (Taxus sp.)	Field In-Ground	Peachey	OR	2011	Over the top	Moderate injury with 0.187, 0.257 and 0.370 lb ai per acre; no growth reduction.
26311	Yew (Taxus sp.) T. baccata	Field Container	Senesac	NY	2007	Over the top	Slight to moderate injury at 0.187, 0.25 and 0.37 lb ai per acre
26311	Yew (Taxus sp.) T. baccata fasigata	Field Container	Freiberger	NJ	2007	Over the top	Slight to high injury increasing with rates at 0.187, 0.25 and 0.37 lb ai per acre
29509	Yew (Taxus sp.) T. media	Field In-Ground	Ahrens/ Mervosh	CT	2010	Over the top	Little to no crop injury with two sequential applications of 0.188, 0.250, 0.375 lb ai per acre.
26229	Cedar, Western Red (Thuja plicata)	Field Container	Boydston	WA	2010	Over the top	Slight injury at 0.187, slight to moderate at 0.25 and 0.37 lb ai per acre; no growth reduction; all treated plants saleable.

PR #	Crop	Production Site	Researcher	State	Trial Year	Application Type	Results
26229	Cedar, Western Red (Thuja plicata)	Field Container	Czarnota	GA	2010	Over the top	No crop injury with 6, 8, 12 oz/A during the evaluatio period.
26229	Cedar, Western Red (Thuja plicata)	Field Container	Peachey	OR	2011	Over the top	No injury or growth reduction with 0.187, 0.257 and 0.370 lb ai per acre.
26229	Cedar, Western Red (Thuja plicata) T. plicata 'Green Giant'	Field Container	Gilliam	AL	2010	Over the top	No crop injury with 0.187 lb ai per acre but moderate injury decreasing with time at 0.25 and 0.37 lb ai per acre. Growth reduction with the 4x rate.
26278	Arborvitae (Thuja sp.)	Field Container	Mathers (OSU)	OH	2007	Over the top	No injury at 6 and 8 oz per acre, but slight at 12 oz per acre.
29507	Arborvitae (Thuja sp.) T. occidentalis	Field In-Ground	Ahrens/ Mervosh	CT	2010	Over the top	No crop injury with two sequential applications at 0.188, 0.250, 0.375 lb ai per acre.
26278	Arborvitae (Thuja sp.) T. occidentalis 'Emerald Green'	Field Container	Ahrens/ Mervosh	CT	2007	Over the top	Moderate to high injury at 0.187, 0.25 and 0.375 lb ai per acre
26278	Arborvitae (Thuja sp.) T. occidentalis 'Emerald Green'	Field Container	Lieth	CA	2007	Over the top	Minor but unacceptable injury (bleaching, necrosis of shoot tips) and delayed/distorted growth at 0.187, 0.25 and 0.37 lb ai per acre
26278	Arborvitae (Thuja sp.) T. occidentalis 'Nigra'	Field Container	Senesac	NY	2007	Over the top	No injury at 0.187, 0.25 and 0.37 lb ai per acre
29506	Hemlock, Canada (Tsuga canadensis)	Field In-Ground	Ahrens/ Mervosh	CT	2010	Over the top	Little to no crop injury with two sequential applications of 0.188, 0.250, 0.375 lb ai per acre.
26240	Hemlock, Western (Tsuga heterophylla)	Field Container	Boydston	WA	2007	Over the top	No injury at 0.187, minor to moderate injury at 0.25 and 0.37 lb ai per acre; 0.187 lb treated plants saleable
26240	Hemlock, Western (Tsuga heterophylla)	Field Container	Boydston	WA	2009	Over the top	No injury or growth reduction at 0.19, 0.25 and 0.37 lb ai per acre; all treated plants saleable.
26240	Hemlock, Western (Tsuga heterophylla)	Field Container	Boydston	WA	2010	Over the top	All plants saleable after two sequential applications of Mesotrione 4SC applied 4 weeks apart at 0.187, 0.25, 0.37 lb ai per acre. However, 0.25 and 0.37 lb ai per acre caused chlorosis on plant tips but plant height and width were not affected.
26240	Hemlock, Western (Tsuga heterophylla)	Field Container	Peachey	OR	2011	Over the top	Minor injury, no growth reduction with 0.187, 0.257 and 0.370 lb ai per acre.
26267	Speedwell, Brooklime (Veronica sp.) 'Red Fox'	Field Container	Boydston	WA	2007	Over the top	High injury at 0.187, 0.25 and 0.37 lb ai per acre; plants not saleable
26267	Speedwell, Brooklime (Veronica sp.) 'Sunny Border Blue'	Field Container	Williams	IL	2007	Over the top	Severe injury at 0.187, 0.25 and 0.38 lb ai per acre
26267	Speedwell, Brooklime (Veronica sp.) V. peduncularis 'Waterperry'	Field Container	Senesac	NY	2007	Over the top	Slight to moderate injury at 0.187, 0.25 and 0.37 lb ai per acre
26257	Arrowwood (Viburnum sp.) V. dentatum ‘Chicago Lustre'	Field Container	Williams	IL	2007	Over the top	Slight injury at 0.187 and 0.25, moderate at 0.38 lb ai per acre
26257	Arrowwood (Viburnum sp.) V. nudum 'Winterthur'	Field Container	Senesac	NY	2007	Over the top	Moderate to severe injury at 0.187, 0.25 and 0.37 lb ai per acre
26257	Arrowwood (Viburnum sp.) V. opulus	Field Container	Regan	OR	2007	Over the top	High injury and growth reduction at 0.187, 0.25 and 0.37 lb ai per acre

PR #	Crop	Production Site	Researcher	State	Trial Year	Application Type	Results
26257	Arrowwood (Viburnum sp.) V. plicatum 'Shasta'	Field Container	Ahrens/ Mervosh	CT	2007	Over the top	Severe injury at 0.187, 0.25 and 0.375 lb ai per acre
26297	Periwinkle (Vinca sp.) 'Pinkstar'	Field Container	Wade	SC	2007	Over the top	Some chlorosis at 0.187, 0.25 and 0.37 lb ai per acre after 1st application; complete recovery in 2 weeks
26297	Periwinkle (Vinca sp.) V. major 'Maculata'	Field Container	Boydston	WA	2007	Over the top	High injury and stunting at 0.187, 0.25 and 0.37 lb ai per acre
26297	Periwinkle (Vinca sp.) V. minor	Field Container	Freiberger	NJ	2007	Over the top	Moderate to high injury increasing with rates at 0.187, 0.25 and 0.37 lb ai per acre
26297	Periwinkle (Vinca sp.) V. minor	Field Container	Senesac	NY	2007	Over the top	Slight to moderate injury at 0.187, 0.25 and 0.37 lb ai per acre; complete recovery 8 weeks after 2nd application

Label Suggestions

If either formulation will be commercialized for use on or around ornamental horticulture plants, it is suggested that the initial label(s) be quite restrictive with over-the-top applications along with fully listing those species exhibiting sensitivity to treatment.

For Mesotrione SC, it is suggested that the following five crop species exhibiting no injury in the testing with over-the-top applications be placed on the label. (Table 1)

Buxus sempervirens
Calamagrostis acutiflora
Juniperus sp.
Miscanthus sinensis
Pennisetum alopecuroides

The following species demonstrated safety in two or more trials but had one trial with slight to moderate injury.

Abies fraseri
Berberis thunbergii
Festuca ovina glauca
Rhododendron sp.

It is advisable to list the following 21 crops as sensitive to Mesotrione SC treatment. (Table 3)

Buddleia davidii
Cortaderia selloana
Dianthus gratianopolitanus
Echinacea purpurea
Hydrangea quercifolia
Ilex sp.
Lagerstroemia indica
Liriope sp.
Ophiopogon sp.
Phlox paniculata
Phlox subulata
Picea sp.
Pseudotsuga menziesii
Rosa sp. [1]
Salvia sylvestris
Spiraea sp.
Taxus sp.
Thuja occidentalis [1]
Veronica sp.
Viburnum sp.
Vinca sp.

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