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IR-4 Ornamental Horticulture Program Sulfentrazone Crop Safety

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Acknowledgements

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Abstract

Since 1996 IR-4 has completed 247 trials with products containing sulfentrazone (Sulfentrazone 0.2G and Sulfentrazone 4F) on 111 crops. The data contained in this report was generated to register uses of sulfentrazone on and around ornamental horticulture plants with over-the-top applications. The sulfentrazone rates in the testing programs were 0.125, 0.25 and 0.5 pounds active ingredient per acre (lb ai per A) as the 1X, 2X and 4X rates. Sulfentrazone 0.2G had been applied to 54 plant genera or species. Of these, 12 exhibited no or minimal transient injury after application at all three rates. One crop exhibited no phytotoxicity at 0.125 and 0.25 lb ai per acre, but did have some injury at 0.5 lb ai per acre. Only 3 crops (*Canna sp.*, *Echinacea purpurea*, and *Hosta sp.*) exhibited phytotoxicity at even the lowest rate. Sulfentrazone 4F has been applied to 57 crops since 1996. Of these only 6 (*Buxus sp.*, *Ilex vomitoria 'nana'*, *Juniperus horizontalis*, *Rosa sp.*, *Taxus sp.*, and *Thuja sp.*) exhibited no damage with over the top applications at all tested rates. Seven crops had minimal, transitory damage at the lower rates but some phytotoxicity at the 4X rate and 15 crops exhibited damage at all tested rates.

Introduction

Control of broadleaved weeds and sedges in the production of woody and herbaceous perennials can be problematic because nurseries grow many different types of plants and not all genera or species are listed on labels. These weeds can also be difficult to control in landscape settings for the same reason. IR-4 has undertaken developing crop safety on these and other crops with several herbicides. This summary covers the results from Sulfentrazone 0.2G and 4F during 2006 and 2007, supplemented with reports from earlier years.

Materials and Methods

In the 2006 protocol, two applications of Sulfentrazone 0.2G or Sulfentrazone 4F were made approximately 30 days apart. The application rates were 0.125, 0.25 and 0.5 lb ai per acre, plus a water treated control. A minimum of four plants (replicate treatments) were required with many researchers exceeding this minimum. Phytotoxicity was recorded on a scale of 0 to 10 (0 = No phytotoxicity; 10 = Complete kill) at 1, 2, 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, please see Appendix 1: Protocols.

Sulfentrazone 0.2G and Sulfentrazone 4F were supplied to researchers (See list of researchers in Appendix 2) by FMC Corporation.

Results and Summary

Phytotoxicity

Based on the type and nature of injury seen with Sulfentrazone 0.2G and 4F applications in the conducted research, tested plant species were placed into four categories: 1) no significant phytotoxicity or growth differences from the untreated check or any injury was transitory, 2) no or minimal transitory injury seen at the 1X rate, but the 2X and/or 4X 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.

Sulfentrazone 4F exhibited no or minimal negative impact on six plant species: *Abies fraseri*, *Buxus sp.*, *Ilex vomitoria 'nana'*, *Juniperus horizontalis*, *Rosa sp.*, and *Thuja sp.* (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. For 7 crop species, there was no or little injury exhibited at the lower rate(s) tested, but significant phytotoxicity occurred at higher rate(s) (Table 2). It may be prudent to either conduct additional trials or place language on the label indicating applications of Sulfentrazone 4F do not cause injury at lower rates but higher rates may cause unacceptable injury. Fifteen crops in this report exhibited damage sufficient to recommend growers not utilize Sulfentrazone 4F as an over-the-top treatment: *Acer rubrum*, *Chasmanthium latifolium*, *Coreopsis lanceolata*, *Cuphea hyssopifolia*, *Echinacea purpurea*, *Phalaris arundinacea*, *Phlox subulata*, *Prunus avium*, *Rudbeckia hirta*, *Rudbeckia fulgida speciosa*, *Trachelospermum jasminoides*, *Verbena Canadensis*, *Viburnum dentatum*, *V. carlesii*, and *V. tinus compacta* (Table 3). For 29 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).

Please see Table 9 for a list of individual trial summaries on Sulfentrazone 4F.

Table 1. List of Sulfentrazone 4F treated crops with no or minimal transitory injury.

| | |
|-----------------------------------|-------------------------------|
| <i>Abies fraseri</i> ¹ | <i>Juniperus horizontalis</i> |
| <i>Buxus sp.</i> | <i>Rosa sp.</i> |
| <i>Ilex vomitoria</i> ‘nana’ | <i>Thuja sp.</i> |

¹For one in-ground application, moderate injury was observed.

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

| | |
|-----------------------------|------------------------------|
| <i>Abelia X grandiflora</i> | <i>Pseudotsuga menziesii</i> |
| <i>Buddleia davidii</i> | <i>Rhododendron sp.</i> |
| <i>Lagerstroemia indica</i> | <i>Spirea sp.</i> |
| <i>Lirope muscari</i> | |

Table 3. List of Sulfentrazone 4F treated crops exhibiting significant injury.

| | |
|--------------------------------|------------------------------------|
| <i>Acer rubrum</i> | <i>Rudbeckia hirta</i> |
| <i>Chasmanthium latifolium</i> | <i>Rudbeckia fulgida speciosa</i> |
| <i>Coreopsis lanceolata</i> | <i>Trachelospermum jasminoides</i> |
| <i>Cuphea hyssopifolia</i> | <i>Verbena canadensis</i> |
| <i>Echinacea purpurea</i> | <i>Viburnum dentatum</i> |
| <i>Phalaris arundinacea</i> | <i>Viburnum carlesii</i> |
| <i>Phlox subulata</i> | <i>Viburnum tinus compacta</i> |
| <i>Prunus avium</i> | |

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

| | |
|---------------------------------------|--|
| <i>Calamagrostis acutiflora</i> | <i>Hosta sp.</i> |
| <i>Cotoneaster horizontalis</i> | <i>Hydrangea sp.</i> |
| <i>Euonymus alatus</i> | <i>Ilex crenata</i> |
| <i>Euonymus fortunei</i> ² | <i>Ilex cornuta</i> |
| <i>Euonymus japonicus</i> | <i>Ilex rotunda</i> ¹ |
| <i>Gaillardia pulchella</i> | <i>Ilex x meserveae</i> |
| <i>Gardenia augusta</i> | <i>Illicium parviflorum</i> ¹ |
| <i>Gypsophila elegans</i> | <i>Lantana sp.</i> ³ |
| <i>Hedera helix</i> | <i>Ligustrum sp.</i> |

*Magnolia grandiflora*¹
Muhlenbergia capillaris
Panicum virgatum
Pennisetum setaceum
Picea abies
Quercus rubra

Ruellia brittoniana
Schizachyrium scoparium
*Taxodium distichum*¹
*Trachycarpus fortunei*¹
Vinca sp.

¹ No or minimal transient injury in two trials.

² Differential response may be due to different cultivars.

Sulfentrazone 0.2G exhibited no or minimal negative impact on 12 plant species with over the top applications (Table 5). 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. In the research presented here, one plant exhibited significant injury at higher rates consistently among the research sites (Table 6). Only three crops exhibited damage sufficient to recommend growers not utilize Sulfentrazone 0.2G as an over-the-top treatment for pre-emergent weed control: *Canna sp.*, *Echinacea purpurea*, and *Hosta sp.* (Table 7). For 38 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 8).

Please see Tables 10 for a list of individual trial summaries on Sulfentrazone 0.2G.

Table 5. List of Sulfentrazone 0.2G treated crops with no or minimal transitory injury.

| | |
|----------------------------------|----------------------------------|
| <i>Abies fraseri</i> | <i>Quercus rubra</i> |
| <i>Acer rubrum</i> | <i>Rhododendron sp.</i> |
| <i>Buxus microphylla</i> | <i>Rosa sp. (See Lieth 2006)</i> |
| <i>Chamaebatiaria sp.</i> | <i>Spiraea x bumalda</i> |
| <i>Delosperma sp.</i> | <i>Thuja occidentalis</i> |
| <i>Gardenia augusta radicans</i> | |
| <i>Helleborus niger</i> | |

Table 6. List of Sulfentrazone 0.2G treated crops with no or minimal transitory injury seen at the 1X rate, but the 2X or 4X rate did cause significant phytotoxicity

Pseutostuga menziesii (See Frieberger 2006; Lieth 2007)

Table 7. List of Sulfentrazone 0.2G treated crops exhibiting significant injury.

| | | |
|------------------|---------------------------|------------------|
| <i>Canna sp.</i> | <i>Echinacea purpurea</i> | <i>Hosta sp.</i> |
|------------------|---------------------------|------------------|

Table 8. List of Sulfentrazone 0.2G treated crops where more information is needed.

| | |
|--|---|
| <i>Abelia X grandiflora</i> ¹ | <i>Lillium longiflorum</i> |
| <i>Cotoneaster dammeri</i> | <i>Liriope muscari</i> |
| <i>Cotoneaster horizontalis</i> | <i>Magnolia grandiflora</i> |
| <i>Cuphea hyssopifolia</i> | <i>Ophiopogon japonicus</i> |
| <i>Euonymus alatus</i> ² | <i>Pentas sp.</i> |
| <i>Euonymus japonicus</i> ² | <i>Picea abies</i> |
| <i>Euonymus patens</i> ² | <i>Prunus avium</i> |
| <i>Gypsophila elegans</i> | <i>Prunus serotina</i> |
| <i>Hedera helix</i> | <i>Rudbeckia fulgida</i> |
| <i>Illicium parviflorum</i> | <i>Salvia sp.</i> |
| <i>Ilex cornuta</i> ² | <i>Spiraea decumbent s</i> ² |
| <i>Ilex crenata</i> ² | <i>Spiraea japonica</i> ² |
| <i>Ilex rotunda</i> ² | <i>Taxodium distichum</i> |
| <i>Ilex x meserveae</i> ² | <i>Trachelospermum asiaticum</i> |
| <i>Ilex vomitoria 'nana'</i> ² | <i>Trachycarpus fortunei</i> |
| <i>Juniperus conferta</i> | <i>Viburnum carlesii</i> ² |
| <i>Juniperus horizontalis</i> ² | <i>Viburnum dentatum</i> ¹ |
| <i>Lagerstroemia indica</i> ² | <i>Viburnum tinus</i> ² |
| <i>Lantana sp.</i> | <i>Vinca minor</i> |

¹ No or minimal transient injury in two trials.

² This species did not exhibit injury across 2 or more species in the same genera with Sulfentrazone 0.2G formulation and/or did not demonstrate injury with Sulfentrazone 4F formulation.

Table 9. Detailed Summary of Crop Safety Testing with Sulfentrazone 4F.

Notes: Table entries are sorted by crop Latin name. Only those trials with research reports received by 4/29/09 are listed below.

| PR # | Crop | | | Production Site | Researcher(s) | Year | Application Method | Results Summary | File Name |
|-------|----------------|------------------|--------------------------------|-----------------|----------------|------|--------------------|--|---------------|
| | Common Name | Latin Name | Cultivar | | | | | | |
| 26620 | Abelia | Abelia sp. | A. x grandiflora 'John Creech' | Field Container | Neal | 2006 | Over the top | Slight transient injury at 0.125 lb ai per acre and moderate, unacceptable injury at 0.25 and 0.5 lb ai per acre. | 20070225f.pdf |
| 25916 | Fir, Fraser | Abies fraseri | | Field Container | Altland | 2006 | Over the top | No significant injury at 0.125, 0.25, and 0.5 lb ai per acre. | 20070110p.pdf |
| 25916 | Fir, Fraser | Abies fraseri | | Field Container | Lieth | 2007 | Over the top | No injury significantly different from untreated at 0.125, 0.25, and 0.5 lb ai per acre, however, sun damage did occur on all treatments after 4 WAT masking potential injury. | 20080227m.pdf |
| 25916 | Fir, Fraser | Abies fraseri | | Field Container | Freiberger | 2006 | Over the top | Virtually no injury at all rates (0.125, 0.25 and 0.5 lb ai per acre) after 1st, moderate after 2nd application; no growth reduction | 20070405.pdf |
| 25916 | Fir, Fraser | Abies fraseri | | Field Container | Freiberger | 2007 | Over the top | No injury at 0.125 and 0.25, slight injury at 0.5 lb ai per acre | 20080227i.pdf |
| 25937 | Fir, Fraser | Abies fraseri | | Field In-Ground | Ahrens/Mervosh | 2006 | Over the top | No injury to dormant trees, slight to moderate injury to actively growing trees at all rates (0.125, 0.25 and 0.5 lb ai per acre) | 20070418e.pdf |
| 25934 | Maple, Red | Acer rubrum | | Field Container | Freiberger | 2006 | Over the top | High injury at all rates (0.125, 0.25 and 0.5 lb ai per acre) | 20070405.pdf |
| 25934 | Maple, Red | Acer rubrum | 'Red Sunset' | Field Container | Williams | 2007 | Over the top | Virtually no injury at 0.125, slight at 0.25 and 0.5 lb ai per acre | 20081014a.pdf |
| 25003 | Butterfly Bush | Buddleia davidii | 'Black Knight' | Field Container | Derr | 2005 | | Low injury at 0.25 and 0.5 lb ai per acre, unacceptable at 1.0 lb ai per acre. | 20060217p.pdf |
| 25884 | Boxwood | Buxus sp. | | Field Container | Derr | 2005 | Over the top | No injury at 0.25, 0.5, and 1.0 lb ai per acre. | 20060217p.pdf |
| 25884 | Boxwood | Buxus sp. | B. 'Green Velvet' | Field Container | Williams | 2007 | Over the top | No significant injury at 0.125, 0.25, and 0.5 lb ai per acre. | 20081014a.pdf |
| 25884 | Boxwood | Buxus sp. | B. microphylla 'Green Beauty' | Field Container | Wilén | 2006 | Over the top | Acceptable injury at all rates (0.125, 0.25, 0.5 lb ai per acre). | 20061201i.pdf |

| PR # | Crop | | | Production Site | Researcher(s) | Year | Application Method | Results Summary | File Name |
|-------|--|-----------------------------|---------------------------------|-----------------|----------------|------|--------------------|--|---------------|
| | Common Name | Latin Name | Cultivar | | | | | | |
| 25884 | Boxwood | Buxus sp. | 'Green Mountain' | Field Container | Marshall | 2006 | Over the top | No injury at all rates (0.125, 0.25, 0.5 lb ai per acre). | 20070110b.pdf |
| 25096 | Feather Reed Grass | Calamagrostis acutiflora | Karl Foerester | Field Container | Neal | 2005 | Broadcast | Slight and temporary injury at 0.125 and 0.25 lb ai per acre; moderate but temporary at 0.5 lb ai per acre. | 20060217j.pdf |
| 25106 | Northern Sea Oats, Wild Oats | Chasmanthium latifolium | | Field Container | Neal | 2005 | Broadcast | Severe injury at all rates (0.125, 0.25, 0.5 lb ai per acre). | 20060217j.pdf |
| 24526 | Lance Coreopsis | Coreopsis lanceolata | | Field In-Ground | Norcini | 2005 | | Moderate to severe injury increasing with rate (0.125, 0.25, 0.5 lb ai per acre). | 20060217s.pdf |
| 25955 | Cotoneaster | Cotoneaster sp. | | Field Container | Williams | 2007 | Over the top | No injury at 0.125, slight at 0.25 and 0.5 lb ai per acre | 20081014a.pdf |
| 25955 | Cotoneaster | Cotoneaster sp. | C. horizontalis | Field Container | Neal | 2006 | Over the top | No significant injury at 0.125, 0.25, 0.5 lb ai per acre. | 20070225f.pdf |
| 25793 | Mexican Heather, False Heather, Elfin Herb | Cuphea hyssopifolia | | Field In-Ground | Chen | 2005 | Foliar | Moderate to severe injury (0.25, 0.5, 1.0 lb ai per acre). | 20060202r.pdf |
| 25965 | Purple Coneflower | Echinacea sp. | 'Ruby Star' | Field Container | Derr | 2007 | Over the top | Significant injury at 0.125, 0.25 and 0.5 lb ai per acre with 4F and at the highest rate with G formulations; poor yellow nutsedge control | 20071219d.pdf |
| 25983 | Euonymus | Euonymus sp. | E. alatus 'Compacta' | Field Container | Williams | 2007 | Over the top | Moderate injury at 0.125, 0.25 and 0.5 lb ai per acre | 20081014a.pdf |
| 25983 | Euonymus | Euonymus sp. | E. alatus 'Compactus' | Field Container | Ahrens/Mervosh | 2006 | Over the top | Slight injury at all rates (0.125, 0.25 and 0.5 lb ai per acre) | 20070418c.pdf |
| 25983 | Euonymus | Euonymus sp. | E. fortunei | Field Container | Derr | 2005 | Over the top | No injury at all rates (0.25, 0.5, 1.0 lb ai per acre). | 20060217p.pdf |
| 25983 | Euonymus | Euonymus sp. | E. fortunei 'Coloratus' | Field Container | Williams | 2007 | Over the top | Virtually no injury at 0.125, 0.25 and 0.5 lb ai per acre | 20081014a.pdf |
| 25983 | Euonymus | Euonymus sp. | E. japonicus 'Aureo Marginatus' | Field Container | Wilen | 2006 | Over the top | Acceptable injury at all rates (0.125, 0.25, 0.5 lb ai per acre). | 20061201i.pdf |
| 24528 | Blanket Flower | Gaillardia sp. | G. pulchella | Field In-Ground | Norcini | 2005 | | Moderate, transient injury increasing with rate (0.125, 0.25, 0.5 lb ai per acre). | 20060217s.pdf |
| 26549 | Cape Jasmine, Radicans | Gardenia augusta 'Radicans' | | Field Container | Czarnota | 2006 | Over the top | No injury at 0.25 and 0.38 lb ai per acre. | 20070225c.pdf |
| 25953 | Baby's-Breath | Gypsophila elegans | | Field Container | Senesac | 2006 | Over the top | No injury at all rates (0.125, 0.25, 0.5 lb ai per acre). | 20061108f.pdf |
| 26690 | English Ivy | Hedera helix L. ssp. Helix | | Field Container | Derr | 2005 | | Very slight injury at all rates (0.25, 0.5, 1.0 lb ai per acre). | 20060217p.pdf |

| PR # | Crop | | | Production Site | Researcher(s) | Year | Application Method | Results Summary | File Name |
|-------|---------------------|----------------------------|--------------------------------|-----------------|---------------|------|--------------------|--|---------------|
| | Common Name | Latin Name | Cultivar | | | | | | |
| 26690 | English Ivy | Hedera helix L. ssp. Helix | 'Thorndale' | Field Container | Williams | 2007 | Over the top | Virtually no injury at 0.125, 0.25 and 0.5 lb ai per acre | 20081014a.pdf |
| 26691 | Hosta | Hosta sp. | 'Halcyon' | Field Container | Derr | 2005 | | Very low phyto at 0.25 and 0.5 lb ai per acre; low phyto at 1.0 lb ai per acre. | 20060217p.pdf |
| 24529 | Hydrangea | Hydrangea sp. | H. paniculata 'Pink Diamond' | Field Container | Norcini | 2005 | | Moderate to severe increasing with rate (0.125, 0.25, 0.5 lb ai per acre). | 20060217q.pdf |
| 24529 | Hydrangea | Hydrangea sp. | Variegated | Field Container | Derr | 2005 | | Very slight injury at all rates (0.25, 0.5, 1.0 lb ai per acre). | 20060217p.pdf |
| 25958 | Holly | Ilex sp. | | Field Container | Trader | 2007 | Over the top | No injury or growth reduction at 0.125, 0.25 and 0.5 lb ai per acre | 20080116i.pdf |
| 25958 | Holly | Ilex sp. | I. cornuta 'bufordii nana' | Field Container | Neal | 2006 | Over the top | No significant injury at 0.125, 0.25, 0.5 lb ai per acre. | 20070225f.pdf |
| 25958 | Holly | Ilex sp. | I. crenata 'Green Luster' | Field Container | Whitwell | 2007 | Over the top | No injury at 0.125, 0.25 and 0.5 lb ai per acre after 1st, significant injury with quick recovery after 2nd application; no growth reduction | 20071106h.pdf |
| 26583 | Holly | Ilex sp. | I. rotunda | Field In-Ground | Czarnota | 2005 | Over the top | Slight injury increasing with rate (0.094, 0.188, 0.375, 0.75 lb ai per acre). | 20070225c.pdf |
| 26583 | Holly | Ilex sp. | I. rotunda | Field In-Ground | Czarnota | 2006 | Over the top | No injury at 0.25 and 0.38 lb ai per acre. | 20070225c.pdf |
| 25958 | Holly | Ilex sp. | I. x meserveae 'Blue Princess' | Field Container | Altland | 2006 | Over the top | Slight to moderate, transient injury increasing with rate (0.125, 0.25, 0.5 lb ai per acre). | 20070110p.pdf |
| 25958 | Holly | Ilex sp. | 'Ivory queen' | Field Container | Marshall | 2006 | | Slight to moderate injury increasing with rate (0.125, 0.25, 0.5 lb ai per acre). | 20070110b.pdf |
| 25929 | Holly, Dwarf Yaupon | Ilex vomitoria 'nana' | | Field Container | Neal | 2006 | Over the top | No significant injury at 0.125, 0.25, 0.5 lb ai per acre. | 20070225f.pdf |
| 25929 | Holly, Dwarf Yaupon | Ilex vomitoria 'nana' | | Field Container | Lieth | 2007 | Over the top | No injury or growth reduction at 0.125, 0.25 and 0.5 lb ai per acre | 20080128c.pdf |
| 25929 | Holly, Dwarf Yaupon | Ilex vomitoria 'nana' | | Field Container | Trader | 2007 | Over the top | No injury at 0.125, 0.25 and 0.5 lb ai per acre; very slight growth reduction at 4X | 20080116i.pdf |
| 25929 | Holly, Dwarf Yaupon | Ilex vomitoria 'nana' | 'Schillings' | Field Container | Whitwell | 2007 | Over the top | No injury or growth reduction at 0.125, 0.25 and 0.5 lb ai per acre | 20071106h.pdf |

| PR # | Crop | | | Production Site | Researcher(s) | Year | Application Method | Results Summary | File Name |
|-------|--------------------------|----------------------|------------------------------|-----------------|---------------|------|--------------------|--|---------------|
| | Common Name | Latin Name | Cultivar | | | | | | |
| 26577 | Anise Tree | Illicium sp. | I. parviflorum | Field In-Ground | Czarnota | 2005 | Over the top | Very slight injury at all rates (0.094, 0.188, 0.375, 0.75 lb ai per acre). | 20070225c.pdf |
| 26577 | Anise Tree | Illicium sp. | I. parviflorum | Field In-Ground | Czarnota | 2006 | Over the top | No injury at 0.25 and 0.38 lb ai per acre. | 20070225c.pdf |
| 12113 | Juniper | Juniperus sp. | J. horizonatis 'Bar Harbor' | Field In-Ground | Derr | 2005 | | No injury at all rates (0.125, 0.25, 0.5 lb ai per acre). | 20060217p.pdf |
| 12113 | Juniper | Juniperus sp. | J. horizontalis 'Plumosa' | Field In-Ground | Ahrens | 1996 | | No injury (0.125, 0.25, 0.5 lb ai per acre). NOTE: this trial used Spartan 75DF. | 20080818a.pdf |
| 12113 | Juniper | Juniperus sp. | J. horizontalis 'Wiltoni' | Field In-Ground | Norcini | 2005 | | No injury (0.25, 0.5, 1.0 lb ai per acre). | 20060217q.pdf |
| 24530 | Crape Myrtle | Lagerstroemia indica | | Field In-Ground | Czarnota | 2005 | Over the top | No injury at 0.094, 0.188, 0.375, and 0.75 lb ai per acre. | 20070225c.pdf |
| 24530 | Crape Myrtle | Lagerstroemia indica | | Field In-Ground | Czarnota | 2006 | Over the top | No injury at 0.25 and 0.38 lb ai per acre. | 20070225c.pdf |
| 24518 | Crape Myrtle | Lagerstroemia indica | 'Cheyenne' | Field Container | Norcini | 2005 | | Moderate injury, plants recovered by 12 WAT (0.125, 0.25, 0.5 lb ai per acre). | 20060217q.pdf |
| 24518 | Crape Myrtle | Lagerstroemia indica | L. x Tuscarora | Field Container | Neal | 2006 | Over the top | Moderate to significant injury increasing with rate (0.125, 0.25, 0.5 lb ai per acre). | 20070225f.pdf |
| 24737 | Shrub Verbena | Lantana sp. | | Field In-Ground | Williams | 2007 | Over the top | No injury at 0.125, very slight at 0.25 and 0.5 lb ai per acre | 20081014a.pdf |
| 24737 | Shrub Verbena | Lantana sp. | 'New Gold' | Field In-Ground | Chen | 2005 | Foliar | Moderate to severe injury (0.25, 0.5, 1.0 lb ai per acre). | 20060202r.pdf |
| 25014 | Privet | Ligustrum sp. | 'Chinense' | Field Container | Derr | 2005 | | Low phyto at 0.25 and 0.5 lb ai per acre; unacceptable at 1.0 lb ai per acre. | 20060217p.pdf |
| 25299 | Lilyturf, Big Blue;Giant | Liriope muscari | 'Big Blue' | Field In-Ground | Chen | 2005 | Foliar | Moderate to severe (0.25, 0.5, 1.0 lb ai per acre). | 20060202r.pdf |
| 25962 | Lilyturf, Creeping | Liriope sp. | L. muscari variegata | Field Container | Derr | 2005 | | Low at 0.25 and 0.5 lb ai per acre; unacceptable at 1 lb per acre. | 20060217p.pdf |
| 25962 | Lilyturf, Creeping | Liriope sp. | L. muscari variegata | Field Container | Neal | 2006 | Over the top | Slight transient injury at 0.125 and 0.25 lb ai per acre and moderate unacceptable injury at 0.5 lb ai per acre. | 20070225f.pdf |
| 25962 | Lilyturf, Creeping | Liriope sp. | L. muscari variegata 'Aztec' | Field Container | Derr | 2007 | Over the top | Slight injury at 0.125, 0.25 and 0.5 lb ai per acre. | 20071219d.pdf |
| 26558 | Magnolia, Southern | Magnolia grandiflora | | Field In-Ground | Czarnota | 2005 | Over the top | No injury at 0.094, 0.188, 0.375, and 0.75 lb ai per acre. | 20070225c.pdf |
| 26558 | Magnolia, Southern | Magnolia grandiflora | | Field In-Ground | Czarnota | 2006 | Over the top | No injury at 0.25 and 0.38 lb ai per acre. | 20070225c.pdf |

| PR # | Crop | | | Production Site | Researcher(s) | Year | Application Method | Results Summary | File Name |
|-------|---------------------------------|-------------------------|----------------------------|-----------------|---------------|------|--------------------|---|---------------|
| | Common Name | Latin Name | Cultivar | | | | | | |
| 25288 | Muhly, hairyawn | Muhlenbergia capillaris | | Field Container | Neal | 2005 | Broadcast | No injury at 0.125 lb ai per acre, slight and transient at 0.25 lb ai per acre, moderate at 0.5 lb ai per acre. | 20060217j.pdf |
| 25792 | None | None | | Field In-Ground | Chen | 2005 | Foliar | | 20030202r.pdf |
| 25792 | None | None | | Field In-Ground | Senesac | 2007 | Post + 4 weeks | Good to excellent control at 0.125 lb ai per acre | 20080128a.pdf |
| 25098 | Switch-Grass | Panicum virgatum | 'Shenandoah' | Field Container | Neal | 2005 | Broadcast | Moderate but temporary injury at all rates (0.125, 0.25, 0.5 lb ai per acre). | 20060217j.pdf |
| 25100 | Fountain Grass | Pennisetum setaceum | 'Cassian' | Field Container | Neal | 2005 | Broadcast | Slight but temporary injury at 0.125 lb ai per acre, moderate but temporary at 0.25 and 0.5 lb ai per acre. | 20060217j.pdf |
| 25287 | Ribbon-Grass, Gardeners-Garters | Phalaris arundinacea | 'Strawberries and Cream' | Field Container | Neal | 2005 | Broadcast | Moderate to severe injury at all rates (0.125, 0.25, 0.5 lb ai per acre). | 20060217j.pdf |
| 24767 | Phlox | Phlox sp. | P. subulata 'Emerald Blue' | Field Container | Derr | 2005 | | Plants outgrew visible damage but there appeared to be reduction in fresh shoot weight (0.25, 0.5, 1.0 lb ai per acre) | 20060217p.pdf |
| 25301 | Creeping Phlox, Moss Pink | Phlox subulata | 'Candy Strip' | Field In-Ground | Chen | 2005 | Foliar | Slight to moderate injury (0.25, 0.5, 1.0 lb ai per acre). | 20060202r.pdf |
| 25932 | Spruce, Norway | Picea abies | | Field Container | Altland | 2006 | Over the top | No injury after the first application and only very slight injury at the highest rate after the second (0.125, 0.25, 0.5 lb ai per acre). | 20070110p.pdf |
| 25932 | Spruce, Norway | Picea abies | | Field Container | Freiberger | 2006 | Over the top | No injury at all rates (0.125, 0.25 and 0.5 lb ai per acre) after 1st, moderate after 2nd application; no growth reduction | 20070405.pdf |
| 25931 | Cherry (Non-Bearing) | Prunus sp. | P. avium | Field Container | Altland | 2006 | Over the top | Moderate injury increasing with rate along with decrease in plant height and caliper (0.125, 0.25, 0.5 lb ai per acre). | 20070110p.pdf |
| 25915 | Fir, Douglas | Pseudotsuga menziesii | | Field Container | Altland | 2006 | Over the top | Minor injury after the first application at all rates, but no injury after the second (0.125, 0.25, 0.5 lb ai per acre). | 20070110p.pdf |

| PR # | Crop | | | Production Site | Researcher(s) | Year | Application Method | Results Summary | File Name |
|-------|------------------------|------------------------------|----------------------------|-----------------|----------------|------|--------------------|---|---------------|
| | Common Name | Latin Name | Cultivar | | | | | | |
| 25915 | Fir, Douglas | <i>Pseudotsuga menziesii</i> | | Field Container | Lieth | 2007 | Over the top | No significant injury at 0.125 lb ai per acre after a single application; however chlorotic shoot tips and nectoric needles were observed after the second application. | 20080227m.pdf |
| 25941 | Fir, Douglas | <i>Pseudotsuga menziesii</i> | | Field In-Ground | Ahrens/Mervosh | 2006 | Over the top | No injury to dormant trees, acceptable injury to actively growing trees at all rates (0.125, 0.25 and 0.5 lb ai per acre) | 20070418d.pdf |
| 25915 | Fir, Douglas | <i>Pseudotsuga menziesii</i> | <i>P. menziesii glauca</i> | Field Container | Freiberger | 2006 | Over the top | Slight injury at 0.125 and 0.25 lb ai per acre, moderate at 4X rate; no growth reduction | 20070405.pdf |
| 25915 | Fir, Douglas | <i>Pseudotsuga menziesii</i> | <i>P. menziesii glauca</i> | Field Container | Freiberger | 2007 | Over the top | Slight to moderate injury at 0.125 and 0.25, moderate to high at 0.5 lb ai per acre | 20080227i.pdf |
| 25930 | Oak, Northern Red | <i>Quercus rubra</i> | | Field Container | Altland | 2006 | Over the top | Slight transient injury after the first application, but no significant injury after the second (0.125, 0.25, 0.5 lb ai per acre). | 20070110p.pdf |
| 25930 | Oak, Northern Red | <i>Quercus rubra</i> | | Field Container | Freiberger | 2006 | Over the top | Moderate injury at all rates (0.125, 0.25 and 0.5 lb ai per acre) | 20070405.pdf |
| 25952 | Azalea, & Rhododendron | <i>Rhododendron</i> sp. | 'Amelia Rose' | Field Container | Gilliam | 2007 | Over the top | Slight injury after 1st but none after 2nd application only at 0.5 lb ai per acre (4X); no growth reduction | 20071219j.pdf |
| 25952 | Azalea, & Rhododendron | <i>Rhododendron</i> sp. | 'Ex Cannons Double PK' | Field Container | Marshall | 2006 | Over the top | No to slight injury increasing with rate, but no difference in plant growth (0.125, 0.25, 0.5 lb ai per acre). | 20070110b.pdf |
| 25952 | Azalea, & Rhododendron | <i>Rhododendron</i> sp. | 'Fashion' | Field Container | Norcini | 2005 | | Slight transient injury (0.25, 0.5, 1.0 lb ai per acre). | 20060217q.pdf |
| 25952 | Azalea, & Rhododendron | <i>Rhododendron</i> sp. | 'Formosa' | Field Container | Derr | 2005 | | Moderate but transient injury at all rates (0.25, 0.5, 1.0 lb ai per acre). | 20060217p.pdf |
| 25952 | Azalea, & Rhododendron | <i>Rhododendron</i> sp. | 'George Tabor' | Field Container | Derr | 2007 | Over the top | Very slight injury at 0.125, 0.25 and 0.5 lb ai per acre with G and 4F formulations; poor yellow nutsedge control | 20071219d.pdf |
| 25952 | Azalea, & Rhododendron | <i>Rhododendron</i> sp. | 'Nuccio's Wild Cherry' | Field Container | Wilén | 2006 | Over the top | Unacceptable injury at all rates (0.125, 0.25, 0.5 lb ai per acre). | 20061201i.pdf |

| PR # | Crop | | | Production Site | Researcher(s) | Year | Application Method | Results Summary | File Name |
|-------|------------------------|----------------------------|------------------------|-----------------|----------------|------|--------------------|--|---------------|
| | Common Name | Latin Name | Cultivar | | | | | | |
| 25952 | Azalea, & Rhododendron | Rhododendron sp. | 'Pink Gumpo' | Field Container | Neal | 2006 | Over the top | Slight transient injury at 0.125 lb ai per acre and moderate unacceptable injury at 0.25 and 0.5 lb ai per acre. | 20070307e.pdf |
| 25952 | Azalea, & Rhododendron | Rhododendron sp. | Rhododendron 'P.J.M.' | Field Container | Ahrens/Mervosh | 2006 | Over the top | Slight injury after 1st, no injury after 2nd application at all rates (0.125, 0.25 and 0.5 lb ai per acre) | 20070418f.pdf |
| 25952 | Azalea, & Rhododendron | Rhododendron sp. | 'Tradition' | Field Container | Czarnota | 2006 | Over the top | No injury at 0.25 and 0.38 lb ai per acre. | 20070225c.pdf |
| 25966 | Rose | Rosa sp. | | Field Container | Trader | 2007 | Over the top | No injury but slight growth reduction at 0.125, 0.25 and 0.5 lb ai per acre | 20080116i.pdf |
| 25966 | Rose | Rosa sp. | R. multiflora | Field Container | Freiberger | 2006 | Over the top | No to slight injury at all rates (0.125, 0.25 and 0.5 lb ai per acre) after 1st, moderate after 2nd application; no growth reduction | 20070405.pdf |
| 25966 | Rose | Rosa sp. | 'Sea Foam' | Field Container | Senesac | 2006 | Over the top | Slight, transient injury after second application (0.125, 0.25, 0.5 lb ai per acre). | 20061108f.pdf |
| 24527 | Black-Eyed Susan | Rudbeckia bicolor | R. hirta | Field In-Ground | Norcini | 2005 | Over the top | Moderate to severe initial injury increasing with rate (0.125, 0.25, 0.5 lb ai per acre). | 20060217s.pdf |
| 26062 | Coneflower, Orange | Rudbeckia fulgida speciosa | | Field Container | Williams | 2007 | Over the top | Slight injury at 0.125, moderate at 0.25 and 0.5 lb ai per acre | 20081014a.pdf |
| 26062 | Coneflower, Orange | Rudbeckia fulgida speciosa | 'Meadowbrite' | Field Container | Marshall | 2006 | Over the top | Moderate to significant injury as well as significant decrease in growth, increasing with rate (0.125, 0.25, 0.5 lb ai per acre). | 20070110b.pdf |
| 24789 | Mexican Petunia | Ruellia carolinensis | R. brittoniana 'Katie' | Field In-Ground | Chen | 2005 | Foliar | Slight injury (0.25, 0.5, 1.0 lb ai per acre). | 20060202r.pdf |
| 25684 | Little Blue Stem | Schizachyrium scoparium | | Field Container | Neal | 2005 | Broadcast | Slight and moderate but temporary injury at 0.125 and 0.25 lb ai per acre, but significant at 0.5 lb ai per acre. | 20060217j.pdf |
| 25954 | Bridal-Wreath | Spiraea sp. | 'Goldflame' | Field Container | Ahrens/Mervosh | 2006 | Over the top | Moderate to high injury after the 1st application at all rates (0.125, 0.25 and 0.5 lb ai per acre), less injury after 2nd application | 20070418a.pdf |

| PR # | Crop | | | Production Site | Researcher(s) | Year | Application Method | Results Summary | File Name |
|-------|---------------------------|-----------------------------|----------------------------------|-----------------|----------------|------|--------------------|--|---------------|
| | Common Name | Latin Name | Cultivar | | | | | | |
| 25954 | Bridal-Wreath | Spiraea sp. | S. decumbens | Field Container | Senesac | 2006 | Over the top | Significant injury especially at higher rates (0.125, 0.25, 0.5 lb ai per acre). | 20061108f.pdf |
| 25954 | Bridal-Wreath | Spiraea sp. | S. japonica 'Little Princess' | Field Container | Neal | 2006 | Over the top | Slight transient injury at 0.125 and 0.25 lb ai per acre and moderate unacceptable injury at 0.5 lb ai per acre. | 20070225f.pdf |
| 26554 | Bald Cypress | Taxodium distichum | | Field In-Ground | Czarnota | 2005 | Over the top | No injury at 0.094, 0.188, 0.375, and 0.75 lb ai per acre. | 20070225c.pdf |
| 26554 | Bald Cypress | Taxodium distichum | | Field In-Ground | Czarnota | 2006 | Over the top | No injury at 0.25 and 0.38 lb ai per acre. | 20070225c.pdf |
| 25914 | Arborvitae | Thuja sp. | 'Emerald Green' | Field Container | Ahrens/Mervosh | 2006 | Over the top | No injury at all rates (0.125, 0.25 and 0.5 lb ai per acre) | 20070418b.pdf |
| 12112 | Arborvitae | Thuja sp. | T. occidentalis | Field In-Ground | Czarnota | 2005 | | No injury at 0.088, 0.194, 0.375, and 0.75 lb ai per acre. | 20070225c.pdf |
| 12112 | Arborvitae | Thuja sp. | T. occidentalis | Field In-Ground | Czarnota | 2006 | Over the top | No injury at 0.25 and 0.38 lb ai per acre. | 20070225c.pdf |
| 25914 | Arborvitae | Thuja sp. | T. occidentalis 'Techney' | Field Container | Williams | 2007 | Over the top | No injury at 0.125, very slight at 0.25 and 0.5 lb ai per acre | 20081014a.pdf |
| 25914 | Arborvitae | Thuja sp. | T. occidentalis 'Elegantissima' | Field Container | Czarnota | 2006 | Over the top | No injury at 0.25 and 0.38 lb ai per acre. | 20070225c.pdf |
| 26463 | Jasmine, Star;Confederate | Trachelospermum jasminoides | | Field Container | Wilen | 2006 | Over the top | Slight to moderate unacceptable injury increasing with rate after single application, but second application yielded unacceptable injury at all rates (0.125, 0.25, 0.5 lb ai per acre). | 20061201i.pdf |
| 26571 | Palm, Windmill | Trachycarpus fortunei | | Field In-Ground | Czarnota | 2005 | Over the top | Very slight to slight injury at all rates (0.094, 0.188, 0.375, 0.75 lb ai per acre). | 20070225c.pdf |
| 26571 | Palm, Windmill | Trachycarpus fortunei | | Field In-Ground | Czarnota | 2006 | Over the top | No injury at 0.25 and 0.38 lb ai per acre. | 20070225c.pdf |
| 24753 | Vervain | Verbena sp. | V. canadensis 'Homestead Purple' | Field In-Ground | Chen | 2005 | Foliar | Moderate to severe injury (0.25, 0.5, 1.0 lb ai per acre) | 20060202r.pdf |
| 25016 | Viburnum, arrowwood | Viburnum dentatum | | Field Container | Freiberger | 2006 | Over the top | Slight to moderate injury at 0.125 and 0.25 lb ai per acre, high at 4X rate; some growth reduction | 20070405.pdf |
| 25016 | Viburnum, arrowwood | Viburnum dentatum | 'Autum Jazz' | Field Container | Altland | 2006 | Over the top | Moderate to significant injury with single application at all rates (0.125, 0.25, 0.5 lb ai per acre). | 20070110p.pdf |

| PR # | Crop | | | Production Site | Researcher(s) | Year | Application Method | Results Summary | File Name |
|--|------------------------|-------------------|---------------------------------|-----------------|----------------|------|--|---|---------------|
| | Common Name | Latin Name | Cultivar | | | | | | |
| 25016 | Viburnum, arrowwood | Viburnum dentatum | 'Mirrorleaf' | Field Container | Derr | 2005 | | Slight, transient injury at all rates (0.25, 0.5, 1.0 lb ai per acre) | 20060217p.pdf |
| 26525 | Arrowwood | Viburnum sp. | V. carlessi | Field Container | Altland | 2006 | Over the top | Moderate to significant injury with single application at all rates (0.125, 0.25, 0.5 lb ai per acre). | 20070110p.pdf |
| 26525 | Arrowwood | Viburnum sp. | V. tinus compacta | Field Container | Neal | 2006 | Over the top | Slight transient injury at 0.125 lb ai per acre and moderate, unacceptable injury at 0.25 and 0.5 lb ai per acre. | 20070225f.pdf |
| 25964 | Periwinkle | Vinca sp. | 'Alba' | Field Container | Marshall | 2006 | Over the top | No visible injury however plant growth was reduced increasing with rate (0.125, 0.25, 0.5 lb ai per acre). | 20070110b.pdf |
| 25964 | Periwinkle | Vinca sp. | V. minor | Field Container | Freiberger | 2007 | Over the top | No injury after 1st, slight injury after 2nd application at 0.125, 0.25 and 0.5 lb ai per acre | 20080227l.pdf |
| Sulfentrazone 75DF was used in the trials conducted below: | | | | | | | | | |
| 12114 | Azalea, & Rhododendron | Rhododendron sp. | R. catawbiense 'Roseum Elegans' | Field In-Ground | Ahrens | 1996 | 2nd app over actively growing material | No injury (0.125, 0.25, 0.5 lb ai per acre). | 20080818i.pdf |
| 12114 | Azalea, & Rhododendron | Rhododendron sp. | R. catawbiense 'Roseum Elegans' | Field In-Ground | Ahrens/Mervosh | 1995 | 1st app over actively growing material | No injury (0.125, 0.25, 0.5 lb ai per acre). NOTE: this trial used Spartan 75DF. | 20080818i.pdf |
| 12110 | Yew | Taxus sp. | T. cuspidata 'capitata' | Field In-Ground | Ahrens | 1996 | 1st app over dormant | No injury at 0.125, 0.25, and 0.275 lb ai per acre. | 20080818c.pdf |
| 12110 | Yew | Taxus sp. | T. cuspidata 'capitata' | Field In-Ground | Ahrens/Mervosh | 1997 | 2nd app over dormant | No injury at 0.125, 0.25, and 0.275 lb ai per acre. | 20080818d.pdf |
| 12112 | Arborvitae | Thuja sp. | T. occidentalis 'Globosa' | Field In-Ground | Ahrens | 1996 | 1st app over dormant | No injury at 0.125, 0.25 and 0.375 lb ai per acre; NOTE: this trial used Spartan 75DF. | 20080818f.pdf |
| 12112 | Arborvitae | Thuja sp. | T. occidentalis 'Globosa' | Field In-Ground | Ahrens | 1996 | | No injury at 0.125, 0.25 and 0.375 lb ai per acre; NOTE: this trial used Spartan 75DF. | 20080818e.pdf |
| 12112 | Arborvitae | Thuja sp. | T. occidentalis 'Globosa' | Field In-Ground | Ahrens/Mervosh | 1997 | 2nd app over dormant | No injury at 0.125, 0.25 and 0.375 lb ai per acre; NOTE: this trial used Spartan 75DF. | 20080818g.pdf |

| PR # | Crop | | | Production Site | Researcher(s) | Year | Application Method | Results Summary | File Name |
|-------|-------------|------------|---------------|-----------------|----------------|------|--|---|---------------|
| | Common Name | Latin Name | Cultivar | | | | | | |
| 12111 | Hemlock | Tsuga sp. | T. canadensis | Field In-Ground | Ahrens | 1996 | 2nd app over actively growing material | Minor injury to hemlock tips. NOTE: this trial used Spartan 75DF. | 20080818h.pdf |
| 12111 | Hemlock | Tsuga sp. | T. canadensis | Field In-Ground | Ahrens/Mervosh | 1995 | 1st app over actively growing material | Minor injury to hemlock tips. NOTE: this trial used Spartan 75DF. | 20080818h.pdf |

Table 10. Detailed Summary of Crop Safety Testing with Sulfentrazone 0.2G

Notes: Table entries are sorted by crop Latin name. Only those trials with research reports received by 4/29/09 are listed below.

| PR # | Crop | | | Production Site | Researcher(s) | Year | Application Method | Results Summary | File Name |
|-------|-------------|---------------|-----------------------------------|-----------------|---------------|------|--------------------|--|---------------|
| | Common Name | Latin Name | Cultivar | | | | | | |
| 25372 | Abelia | Abelia sp. | A. x grandiflora 'John Creech' | Field Container | Neal | 2006 | Over the top | No injury at 0.125 and 0.25 lb ai per acre with slight, transient injury at 0.5 lb ai per acre. | 20070225f.pdf |
| 25372 | Abelia | Abelia sp. | A. x grandiflora 'Little Richard' | Field Container | Gilliam | 2006 | Over the top | No injury or growth reduction at 0.125, 0.25, and 0.5 lb ai per acre. | 20070212a.pdf |
| 25366 | Fir, Fraser | Abies fraseri | | Field Container | Altland | 2006 | Over the top | No significant injury at 0.125, 0.25, and 0.5 lb ai per acre. | 20070110p.pdf |
| 25366 | Fir, Fraser | Abies fraseri | | Field Container | Lieth | 2007 | Over the top | No injury significantly different from untreated at 0.125, 0.25, and 0.5 lb ai per acre, however, sun damage did occur on all treatments after 4 WAT masking potential injury. | 20080227m.pdf |
| 25366 | Fir, Fraser | Abies fraseri | | Field Container | Freiberger | 2007 | Over the top | No injury at 0.125, 0.25 and 0.5 lb ai per acre | 20080227l.pdf |
| 25359 | Maple, Red | Acer rubrum | | Field Container | Mathers | 2006 | Over the top | No significant injury at 0.125, 0.25, and 0.5 lb ai per acre. | 20070110l.pdf |
| 25923 | Maple, Red | Acer rubrum | | Field In-Ground | Beste/Frank | 2006 | | Slight to moderate, but transient, injury increasing with rate (0.125, 0.25, and 0.5 lb ai per acre); all plants marketable at end of experiment. | 20070412e.pdf |
| 25359 | Maple, Red | Acer rubrum | | Field Container | Fraelich | 2006 | Over the top | No injury or growth reduction at all rates (0.125, 0.25, 0.5 lb ai per acre). | 20061211f.pdf |
| 25322 | Boxwood | Buxus sp. | B. microphylla 'Green Beauty' | Field Container | Wilen | 2006 | Over the top | Acceptable injury at all rates (0.125, 0.25, 0.5 lb ai per acre). | 20061201i.pdf |
| 25322 | Boxwood | Buxus sp. | B. microphylla 'Green Velvet' | Field Container | Beste/Frank | 2006 | Over the top | No significant injury or growth reduction at all rates (0.125, 0.25 and 0.5 lb ai/A); all plants marketable | 20070111n.pdf |
| 25322 | Boxwood | Buxus sp. | B. microphylla var koreana | Field Container | Gilliam | 2006 | Over the top | No injury or growth reduction at 0.125, 0.25, and 0.5 lb ai per acre. | 20070212a.pdf |

| PR # | Crop | | | Production Site | Researcher(s) | Year | Application Method | Results Summary | File Name |
|-------|--|---------------------|------------------------------------|-----------------|---------------|------|--------------------|---|---------------|
| | Common Name | Latin Name | Cultivar | | | | | | |
| 25322 | Boxwood | Buxus sp. | 'Green Mountain' | Field Container | Mathers | 2006 | Over the top | No injury at 0.125 lb ai per acre, moderate injury at 0.25 lb ai per acre, and slight injury at 0.5 lb ai per acre. | 20070110l.pdf |
| 25374 | Canna | Canna sp. | 'Cherry' | Field Container | Fraelich | 2006 | Over the top | Moderate injury at 1X and 2X rates, severe at 4X; growth reduction at all rates | 20061211g.pdf |
| 25365 | Fernbush | Chamaebatiaria sp. | | Field Container | Klett | 2006 | Over the top | Experiment A: No significant injury at all rates (0.125, 0.25 and 0.5 lb ai per acre) | 20070108a.pdf |
| 25365 | Fernbush | Chamaebatiaria sp. | | Field Container | Klett | 2006 | Over the top | Experiment B: No significant injury at all rates (0.125, 0.25 and 0.5 lb ai per acre) | 20070108a.pdf |
| 25365 | Fernbush | Chamaebatiaria sp. | | Field Container | Klett | 2006 | Over the top | Experiment C: No significant injury at all rates (0.125, 0.25 and 0.5 lb ai per acre) | 20070108a.pdf |
| 25375 | Cotoneaster | Cotoneaster sp. | C. dammeri 'Skoldshomen' | Field Container | Beste/Frank | 2006 | Over the top | No significant injury or growth reduction at all rates (0.125, 0.25 and 0.5 lb ai/A); all plants marketable | 20070111s.pdf |
| 25375 | Cotoneaster | Cotoneaster sp. | C. horizontalis | Field Container | Neal | 2006 | Over the top | No significant injury at 0.125, 0.25, 0.5 lb ai per acre. | 20070225f.pdf |
| 25293 | Mexican Heather, False Heather, Elfin Herb | Cuphea hyssopifolia | C. allyson | Field Container | Derr | 2006 | Over the top | No injury at all rates (0.125, 0.25, 0.5 lb ai per acre). | 20061110l.pdf |
| 25293 | Mexican Heather, False Heather, Elfin Herb | Cuphea hyssopifolia | C. hyssopifolia 'Itsy Bitsy White' | Field Container | Lieth | 2006 | Over the top | High injury and growth reduction at all rates; plants unmarketable (0.125, 0.25, 0.5 lb ai per acre). | 20061201d.pdf |
| 25363 | Delosperma sp. | Delosperma sp. | 'Kelaidis' | Field Container | Klett | 2006 | Over the top | Experiment A: No significant injury at all rates (0.125, 0.25 and 0.5 lb ai per acre) | 20070108a.pdf |
| 25363 | Delosperma sp. | Delosperma sp. | 'Kelaidis' | Field Container | Klett | 2006 | Over the top | Experiment B: No significant injury at all rates (0.125, 0.25 and 0.5 lb ai per acre) | 20070108a.pdf |
| 25363 | Delosperma sp. | Delosperma sp. | 'Kelaidis' | Field Container | Klett | 2006 | Over the top | Experiment C: No significant injury at 0.125 and 0.25 lb ai per acre, slight at 0.5 lb ai | 20070108a.pdf |
| 25377 | Purple Coneflower | Echinacea sp. | | Field Container | Klett | 2006 | Over the top | Experiment A: Severe injury at all rates (0.125, 0.25 and 0.5 lb ai per acre) | 20070108a.pdf |
| 25377 | Purple Coneflower | Echinacea sp. | | Field Container | Klett | 2006 | Over the top | Experiment B: Severe injury at all rates (0.125, 0.25 and 0.5 lb ai per acre) | 20070108a.pdf |

| PR # | Crop | | | Production Site | Researcher(s) | Year | Application Method | Results Summary | File Name |
|-------|------------------------|-----------------------------|---------------------------------|-----------------|----------------|------|--------------------|---|---------------|
| | Common Name | Latin Name | Cultivar | | | | | | |
| 25377 | Purple Coneflower | Echinacea sp. | | Field Container | Klett | 2006 | Over the top | Experiment C: Severe injury at all rates (0.125, 0.25 and 0.5 lb ai per acre) | 20070108a.pdf |
| 25377 | Purple Coneflower | Echinacea sp. | E. purpurea magnus | Field Container | Fraelich | 2006 | Over the top | Severe injury and stunting at all rates (0.125, 0.25, 0.5 lb ai per acre). | 20061211h.pdf |
| 25377 | Purple Coneflower | Echinacea sp. | E. purpurea 'Magnus' | Field Container | Boydston | 2006 | Over the top | Significant injury and growth reduction at all rates (0.125, 0.25, 0.5 lb ai per acre). | 20061109d.pdf |
| 25377 | Purple Coneflower | Echinacea sp. | 'Ruby Star' | Field Container | Derr | 2007 | Over the top | Significant injury at 0.5 lb ai per acre. | 20071219d.pdf |
| 25007 | Euonymus | Euonymus sp. | E. alata 'Compacta' | Field Container | Mathers | 2006 | Over the top | Very slight injury at all rates (0.125, 0.25, 0.5 lb ai per acre). | 20070110l.pdf |
| 25007 | Euonymus | Euonymus sp. | E. alatus 'Compactus' | Field Container | Ahrens/Mervosh | 2006 | Over the top | Virtually no injury at all rates (0.125, 0.25 and 0.5 lb ai per acre) | 20070418c.pdf |
| 25007 | Euonymus | Euonymus sp. | E. japonicus 'Aureo Marginatus' | Field Container | Wilén | 2006 | Over the top | Acceptable injury at all rates (0.125, 0.25, 0.5 lb ai per acre). | 20061201i.pdf |
| 25007 | Euonymus | Euonymus sp. | E. patens 'Manhattan' | Field Container | Beste/Frank | 2006 | Over the top | No significant injury or growth reduction at all rates (0.125, 0.25 and 0.5 lb ai/A); all plants marketable | 20070111q.pdf |
| 25378 | Cape Jasmine, Radicans | Gardenia augusta 'Radicans' | | Field Container | Czarnota | 2006 | Over the top | No injury at 0.25 and 0.38 lb ai per acre. | 20070225c.pdf |
| 25378 | Cape Jasmine, Radicans | Gardenia augusta 'Radicans' | | Field Container | Derr | 2006 | Over the top | No injury at all rates (0.125, 0.25, 0.5 lb ai per acre). | 20061110l.pdf |
| 25378 | Cape Jasmine, Radicans | Gardenia augusta 'Radicans' | 'Radicans' | Field Container | Fraelich | 2006 | Over the top | No injury or growth reduction at all rates (0.125, 0.25, 0.5 lb ai per acre). | 20061211i.pdf |
| 25358 | Baby's-Breath | Gypsophila elegans | | Field Container | Senesac | 2006 | Over the top | No injury at lower rates; very slight, transient injury at highest (0.125, 0.25, 0.5 lb ai per acre). | 20061108g.pdf |
| 26036 | Baby's Breath | Gypsophila paniculata | 'Festival Star' | Field Container | Lieth | 2006 | Over the top | Unacceptable injury and growth reduction at 0.125, 0.25 and 0.50 lb ai per acre | 20070717c.pdf |
| 25005 | English Ivy | Hedera helix L. ssp. Helix | | Field Container | Boydston | 2006 | Over the top | No injury but delayed growth; plants marketable (0.125, 0.25, 0.5 lb ai per acre). | 20061109a.pdf |
| 25005 | English Ivy | Hedera helix L. ssp. Helix | 'Glacier Ivy' | Field Container | Fraelich | 2006 | Over the top | Slight injury at 1X and 2X rates, moderate at 4X; no growth reduction | 20061211c.pdf |

| PR # | Crop | | | Production Site | Researcher(s) | Year | Application Method | Results Summary | File Name |
|-------|--|------------------|------------------------------------|---------------------|---------------|------|--------------------|--|---------------|
| | Common Name | Latin Name | Cultivar | | | | | | |
| 25367 | Hellebore, Christmas rose, Lenten Rose | Helleborus niger | | Field Container | Klett | 2006 | Over the top | Experiment A: No significant injury at all rates (0.125, 0.25 and 0.5 lb ai per acre) | 20070108a.pdf |
| 25367 | Hellebore, Christmas rose, Lenten Rose | Helleborus niger | | Field Container | Klett | 2006 | Over the top | Experiment B: No significant injury at all rates (0.125, 0.25 and 0.5 lb ai per acre) | 20070108a.pdf |
| 25367 | Hellebore, Christmas rose, Lenten Rose | Helleborus niger | | Field Container | Klett | 2006 | Over the top | Experiment C: No significant injury after 1st application at all rates (0.125, 0.25 and 0.5 lb ai per acre), slight after 2nd application at 2X and 4X | 20070108a.pdf |
| 25367 | Hellebore, Christmas rose, Lenten Rose | Helleborus niger | 'Pink Lady' | Field Container | Boydston | 2006 | Over the top | Virtually no injury at 0.125, 0.25 and 0.5 lb ai per acre; most plants did not survive severe winter | 20071017h.pdf |
| 25009 | Hosta | Hosta sp. | 'Gold Standard' | Field Container | Fraelich | 2006 | Over the top | Severe injury at all rates; severe growth reduction at 2X and 4X rates | 20061211d.pdf |
| 25009 | Hosta | Hosta sp. | H. plantaginea 'Royal Standard' | Field Container | Gilliam | 2006 | Over the top | Slight to moderate injury increasing with rate (0.125, 0.25, 0.5 lb ai per acre), and there was a reduction in plant size. | 20070212a.pdf |
| 24531 | Holly | Ilex sp. | I. cornuta 'bufordii nana' | Field Container | Neal | 2006 | Over the top | No significant injury at 0.125, 0.25, 0.5 lb ai per acre. | 20070225f.pdf |
| 24531 | Holly | Ilex sp. | I. cornuta 'Carissa' | Field Container | Fraelich | 2006 | Over the top | No injury or growth reduction at all rates (0.125, 0.25, 0.5 lb ai per acre). | 20061211a.pdf |
| 24531 | Holly | Ilex sp. | I. crenata 'Compacta' | Field Container | Beste/Frank | 2006 | Over the top | No significant injury or growth reduction at all rates (0.125, 0.25 and 0.5 lb ai/A); all plants marketable | 20070111p.pdf |
| 24531 | Holly | Ilex sp. | I. crenata 'Green Lustre' | Field Container | Norcini | 2005 | | Very slight injury at all rates, but no impact on marketability (0.125, 0.25, 0.5 lb ai per acre). | 20060217q.pdf |
| 26582 | Holly | Ilex sp. | I. rotunda | Field In- Ground | Czarnota | 2006 | Over the top | No injury at 0.25 and 0.38 lb ai per acre. | 20070225c.pdf |
| 24531 | Holly | Ilex sp. | I. x meserveae 'Blue Prince' | Field Container | Mathers | 2006 | Over the top | No injury at any rate (0.125, 0.25, 0.5 lb ai per acre). | 20070110l.pdf |
| 24531 | Holly | Ilex sp. | I. x meserveae 'Blue Princess' | Field Container | Altland | 2006 | Over the top | No significant injury at 0.125, 0.25, 0.5 lb ai per acre. | 20070110p.pdf |

| PR # | Crop | | | Production Site | Researcher(s) | Year | Application Method | Results Summary | File Name |
|-------|---------------------------------|------------------------------|-------------------------------------|-----------------|---------------|------|--------------------|---|---------------|
| | Common Name | Latin Name | Cultivar | | | | | | |
| 25427 | Holly, Dwarf Yaupon | <i>Ilex vomitoria</i> 'nana' | | Field Container | Gilliam | 2006 | Over the top | No injury or growth reduction at 0.125, 0.25, 0.5 lb ai per acre. | 20070212a.pdf |
| 25427 | Holly, Dwarf Yaupon | <i>Ilex vomitoria</i> 'nana' | | Field Container | Neal | 2006 | Over the top | No significant injury at 0.125, 0.25, 0.5 lb ai per acre. | 20070225f.pdf |
| 26576 | Anise Tree | <i>Illicium</i> sp. | <i>I. parviflorum</i> | Field In-Ground | Czarnota | 2006 | Over the top | No injury at 0.25 and 0.38 lb ai per acre. | 20070225c.pdf |
| 24532 | Juniper | <i>Juniperus</i> sp. | <i>J. conferta</i> 'Blue Pacific' | Field Container | Gilliam | 2006 | Over the top | No injury or growth reduction at 0.125, 0.25, and 0.5 lb ai per acre. | 20070212a.pdf |
| 24532 | Juniper | <i>Juniperus</i> sp. | <i>J. horizontalis</i> 'Wiltonii' | Field Container | Fraelich | 2006 | Over the top | No injury or growth reduction at all rates (0.125, 0.25, 0.5 lb ai per acre). | 20061211b.pdf |
| 26561 | Crape Myrtle | <i>Lagerstroemia indica</i> | | Field In-Ground | Czarnota | 2006 | Over the top | No injury at 0.25 and 0.38 lb ai per acre. | 20070225c.pdf |
| 26621 | Crape Myrtle | <i>Lagerstroemia indica</i> | <i>L. x Tuscarora</i> | Field Container | Neal | 2006 | Over the top | No injury at 0.125, 0.25, and 0.5 lb ai per acre. | 20070225f.pdf |
| 25379 | Shrub Verbena | <i>Lantana</i> sp. | | Field Container | Derr | 2006 | Over the top | No injury at all rates (0.125, 0.25, 0.5 lb ai per acre). | 20061110l.pdf |
| 25364 | Lily, Easter | <i>Lilium longiflorum</i> | 'Nellie White' | Field Container | Lieth | 2006 | Over the top | Unacceptable injury and growth reduction at 0.125, 0.25 and 0.50 lb ai per acre | 20070717g.pdf |
| 24745 | Lilyturf, Creeping | <i>Liriope</i> sp. | <i>L. muscari variegata</i> | Field Container | Neal | 2006 | Over the top | Slight transient injury at 0.125 lb ai per acre and moderate unacceptable injury at 0.25 and 0.5 lb ai per acre. | 20070225f.pdf |
| 24745 | Lilyturf, Creeping | <i>Liriope</i> sp. | <i>L. muscari variegata</i> 'Aztec' | Field Container | Derr | 2006 | Over the top | No injury at all rates (0.125, 0.25, 0.5 lb ai per acre). | 20061110l.pdf |
| 24745 | Lilyturf, Creeping | <i>Liriope</i> sp. | <i>L. muscari variegata</i> 'Aztec' | Field Container | Derr | 2007 | Over the top | Slight injury at 0.125, 0.25 and 0.5 lb ai per acre. | 20071219d.pdf |
| 26557 | Magnolia, Southern | <i>Magnolia grandiflora</i> | | Field In-Ground | Czarnota | 2006 | Over the top | No injury at 0.25 and 0.38 lb ai per acre. | 20070225c.pdf |
| 25380 | Mondo Grass, Lilyturf, Ker-Gawl | <i>Ophiopogon</i> sp. | <i>O. japonicus variegata</i> | Field Container | Derr | 2006 | Over the top | No injury at all rates (0.125, 0.25, 0.5 lb ai per acre). | 20061110l.pdf |
| 25381 | Pentas | <i>Pentas</i> sp. | 'Ruby Red' | Field Container | Derr | 2006 | Over the top | No injury at all rates (0.125, 0.25, 0.5 lb ai per acre). | 2006110l.pdf |
| 25368 | Spruce, Norway | <i>Picea abies</i> | | Field Container | Altland | 2006 | Over the top | No injury at 0.125, 0.25, and 0.5 lb ai per acre. | 20070110p.pdf |
| 25369 | Cherry (Non-Bearing) | <i>Prunus</i> sp. | <i>P. avium</i> | Field Container | Altland | 2006 | Over the top | No significant visible injury, but caliper was decreased at the two higher rates (0.125, 0.25, 0.5 lb ai per acre). | 20070110p.pdf |

| PR # | Crop | | | Production Site | Researcher(s) | Year | Application Method | Results Summary | File Name |
|-------|------------------------|-----------------------|---------------------|-----------------|---------------|------|-------------------------|--|---------------|
| | Common Name | Latin Name | Cultivar | | | | | | |
| 25924 | Cherry (Non-Bearing) | Prunus sp. | P. serotina | Field In-Ground | Beste/Frank | 2006 | Over the top | Slight injury and growth reduction at all rates (0.125, 0.25 and 0.5 lb ai per acre); no reduction in seedling marketability | 20070412d.pdf |
| 25357 | Fir, Douglas | Pseudotsuga menziesii | | Field Container | Altland | 2006 | Over the top | No significant injury at 0.125, 0.25, and 0.5 lb ai per acre. | 20070110p.pdf |
| 25357 | Fir, Douglas | Pseudotsuga menziesii | | Field Container | Lieth | 2007 | Over the top | No significant injury at 0.125 and 0.25, but at 0.5 lb ai per acre chlorotic shoot tips and necrotic needles were observed. | 20080227m.pdf |
| 25357 | Fir, Douglas | Pseudotsuga menziesii | | Field Container | Boydston | 2006 | Over the top | No injury or growth differences at 0.125, 0.25, and 0.5 lb ai per acre. | 20061009b.pdf |
| 25357 | Fir, Douglas | Pseudotsuga menziesii | | Field Container | Boydston | 2007 | Over the top | No injury or growth reduction at 0.125, 0.25 and 0.5 lb ai per acre | 20071120i.pdf |
| 25357 | Fir, Douglas | Pseudotsuga menziesii | P. menziesii glauca | Field Container | Freiberger | 2007 | Over the top | Slight injury at 0.125, slight to moderate at 0.25 and 0.5 lb ai per acre | 20080227l.pdf |
| 25460 | Oak, Northern Red | Quercus rubra | | Field Container | Altland | 2006 | Over the top | No significant injury at 0.125, 0.25, 0.5 lb ai per acre. | 20070110p.pdf |
| 25460 | Oak, Northern Red | Quercus rubra | | Field Container | Fraelich | 2006 | Over the top | Slight, transient injury only at 0.5 lb ai per acre rate with no growth reduction. | 20061211j.pdf |
| 25919 | Oak, Northern Red | Quercus rubra | | Field In-Ground | Beste/Frank | 2006 | Ground broadcast foliar | No significant injury or plant size reduction at 0.125, 0.25 and 0.5 lb ai per acre; all plants marketable | 20070307c.pdf |
| 24533 | Azalea, & Rhododendron | Rhododendron sp. | 'Amelia Rose' | Field Container | Gilliam | 2007 | Over the top | No injury or growth reduction at 0.125, 0.25, and 0.5 lb ai per acre | 20071219j.pdf |
| 24533 | Azalea, & Rhododendron | Rhododendron sp. | 'Congo' | Field Container | Gilliam | 2006 | Over the top | No injury or growth reduction at 0.125, 0.25, and 0.5 lb ai per acre. | 20070212a.pdf |
| 24533 | Azalea, & Rhododendron | Rhododendron sp. | 'Girard Rose' | Field Container | Beste/Frank | 2006 | Over the top | No significant injury or growth reduction at all rates (0.125, 0.25 and 0.5 lb ai/A); all plants marketable | 20070111l.pdf |
| 24533 | Azalea, & Rhododendron | Rhododendron sp. | 'Pink Gumpo' | Field Container | Neal | 2006 | Over the top | No significant injury at 0.125, 0.25, 0.5 lb ai per acre. | 20070225f.pdf |

| PR # | Crop | | | Production Site | Researcher(s) | Year | Application Method | Results Summary | File Name |
|-------|------------------------|----------------------------|---------------------------------|-----------------|----------------|------|--------------------|--|---------------|
| | Common Name | Latin Name | Cultivar | | | | | | |
| 24533 | Azalea, & Rhododendron | Rhododendron sp. | R. catawbiense 'English Roseum' | Field Container | Beste/Frank | 2006 | Over the top | No significant injury or growth reduction at all rates (0.125, 0.25 and 0.5 lb ai/A); all plants marketable | 20070111m.pdf |
| 24533 | Azalea, & Rhododendron | Rhododendron sp. | R. x 'Roseum Elegans' | Field Container | Mathers | 2006 | Over the top | Virtually no injury to slight injury increasing with rate (0.125, 0.25, 0.5 lb ai per acre). | 20070110l.pdf |
| 25935 | Azalea, & Rhododendron | Rhododendron sp. | R. x 'Roseum Elegans' | Field In-Ground | Mathers | 2006 | Over the top | Slight to moderate injury increasing with rate and with second application (0.125, 0.25, 0.5 lb ai per acre) | 20070110l.pdf |
| 25935 | Azalea, & Rhododendron | Rhododendron sp. | Rhododendron 'P.J.M.' | Field In-Ground | Ahrens/Mervosh | 2006 | Over the top | No injury at 0.125 lb ai per acre, slight at 0.25 and 0.5 lb ai | 20070418f.pdf |
| 24533 | Azalea, & Rhododendron | Rhododendron sp. | 'Tradition' | Field Container | Czarnota | 2006 | Over the top | No injury at 0.25 and 0.38 lb ai per acre. | 20070225c.pdf |
| 25360 | Rose | Rosa sp. | | Field Container | Senesac | 2006 | | Virtually no injury at all rates (0.125, 0.25, 0.5 lb ai per acre). | 20061108g.pdf |
| 25360 | Rose | Rosa sp. | 'Beloved' | Field Container | Gilliam | 2006 | Over the top | No injury or growth reduction at 0.125, 0.25, and 0.5 lb ai per acre. | 20070212a.pdf |
| 25360 | Rose | Rosa sp. | 'Moonshadow' | Field Container | Gilliam | 2006 | Over the top | No injury or growth reduction at 0.125, 0.25, and 0.5 lb ai per acre. | 20070212a.pdf |
| 25360 | Rose | Rosa sp. | 'Nearly Wild' | Field Container | Lieth | 2006 | Over the top | High injury and growth reduction at all rates; plants unmarketable (0.125, 0.25, 0.5 lb ai per acre). | 20061201b.pdf |
| 25360 | Rose | Rosa sp. | 'Oranges & Lemons' | Field Container | Mathers | 2006 | Over the top | Slight to moderate injury after first application with only very slight injury after second (0.125, 0.25, 0.5 lb ai per acre). | 20070110l.pdf |
| 25360 | Rose | Rosa sp. | 'Solstice' | Field Container | Gilliam | 2006 | Over the top | No injury or growth reduction at 0.125, 0.25, and 0.5 lb ai per acre. | 20070212a.pdf |
| 25370 | Coneflower, Orange | Rudbeckia fulgida speciosa | 'Becky' | Field Container | Derr | 2006 | Over the top | No significant injury at all rates (0.125, 0.25, 0.5 lb ai per acre). | 2006110l.pdf |

| PR # | Crop | | | Production Site | Researcher(s) | Year | Application Method | Results Summary | File Name |
|-------|--------------------|----------------------------|---------------------------------|-----------------|----------------|------|--------------------|---|---------------|
| | Common Name | Latin Name | Cultivar | | | | | | |
| 25370 | Coneflower, Orange | Rudbeckia fulgida speciosa | 'Viettas Little Suzie' | Field Container | Mathers | 2006 | Over the top | Very slight injury at 0.125 lb ai per acre even with second application; moderate, transient injury at 0.25 lb ai per acre; and moderate persisting injury with 0.5 lb ai per acre. | 20070110l.pdf |
| 25371 | Sage, Ramona | Salvia sylvestris | S. elegans 'Tangerine' | Field Container | Derr | 2006 | Over the top | No injury at all rates (0.125, 0.25, 0.5 lb ai per acre). | 2006110l.pdf |
| 25371 | Sage, Ramona | Salvia sylvestris | S. nemorosa 'May Night' | Field Container | Lieth | 2006 | Over the top | No significant injury at all rates (0.125, 0.25, 0.5 lb ai per acre). | 20061201f.pdf |
| 25371 | Sage, Ramona | Salvia sylvestris | S. nemorosa 'Snow Hill' | Field Container | Boydston | 2006 | Over the top | Significant injury at all rates (0.125, 0.25, 0.5 lb ai per acre). | 20061109c.pdf |
| 25361 | Bridal-Wreath | Spiraea sp. | 'Goldflame' | Field Container | Ahrens/Mervosh | 2006 | Over the top | Significant injury after the 1st but not after the 2nd application at all rates (0.125, 0.25 and 0.5 lb ai/A) | 20070418a.pdf |
| 25361 | Bridal-Wreath | Spiraea sp. | S. bumalda 'Anthony Waterer' | Field Container | Beste/Frank | 2006 | Over the top | No significant injury or growth reduction at all rates (0.125, 0.25 and 0.5 lb ai/A); all plants marketable | 20070111o.pdf |
| 25361 | Bridal-Wreath | Spiraea sp. | S. decumbens | Field Container | Senesac | 2006 | Over the top | No injury at 0.125 lb ai per acre; very slight, transient injury at 0.25 and 0.5 lb ai per acre after second application | 20061108g.pdf |
| 25361 | Bridal-Wreath | Spiraea sp. | S. japonica 'Little Princess' | Field Container | Neal | 2006 | Over the top | No significant injury at 0.125, 0.25, 0.5 lb ai per acre. | 20070225f.pdf |
| 25361 | Bridal-Wreath | Spiraea sp. | S. x bumalda 'Gold Mound' | Field Container | Derr | 2006 | Over the top | No injury at all rates (0.125, 0.25, 0.5 lb ai per acre) | 2006110l.pdf |
| 25361 | Bridal-Wreath | Spiraea sp. | S. x bumalda 'Goldmound' | Field Container | Mathers | 2006 | Over the top | Slight transient injury at all rates (0.125, 0.25, 0.5 lb ai per acre). | 20070110l.pdf |
| 25361 | Bridal-Wreath | Spiraea sp. | S. x bumalda 'Goldmound' | Field Container | Mathers | 2006 | Over the top | Very slight transient injury at high rate only (0.125, 0.25, 0.5 lb ai per acre) | 20070110l.pdf |
| 26553 | Bald Cypress | Taxodium distichum | | Field In-Ground | Czarnota | 2006 | Over the top | No injury at 0.25 and 0.38 lb ai per acre. | 20070225c.pdf |
| 25362 | Arborvitae | Thuja sp. | 'Emerald Green' | Field Container | Ahrens/Mervosh | 2006 | Over the top | No injury at all rates (0.125, 0.25 and 0.5 lb ai per acre) | 20070418b.pdf |
| 26566 | Arborvitae | Thuja sp. | T. occidentalis | Field In-Ground | Czarnota | 2006 | Over the top | No injury at 0.25 and 0.38 lb ai per acre. | 20070225c.pdf |
| 25362 | Arborvitae | Thuja sp. | T. occidentalis 'Elegantissima' | Field Container | Czarnota | 2006 | Over the top | No injury at 0.25 and 0.38 lb ai per acre. | 20070225c.pdf |

| PR # | Crop | | | Production Site | Researcher(s) | Year | Application Method | Results Summary | File Name |
|-------|---------------------|---------------------------|---------------------------------|-----------------|---------------|------|--------------------|---|---------------|
| | Common Name | Latin Name | Cultivar | | | | | | |
| 25362 | Arborvitae | Thuja sp. | T. occidentalis 'Emerald Green' | Field Container | Lieth | 2006 | Over the top | No injury or growth reduction at all rates (0.125, 0.25, 0.5 lb ai per acre) | 20061201c.pdf |
| 25356 | Jasmine, Asian | Trachelospermum asiaticum | | Field Container | Gilliam | 2006 | Over the top | No injury or growth reduction at 0.125, 0.25, and 0.5 lb ai per acre. | 20070212a.pdf |
| 25356 | Jasmine, Asian | Trachelospermum asiaticum | 'Green' | Field Container | Fraelich | 2006 | Over the top | No injury or growth reduction at all rates (0.125, 0.25, 0.5 lb ai per acre) | 20061211e.pdf |
| 26570 | Palm, Windmill | Trachycarpus fortunei | | Field In-Ground | Czarnota | 2006 | Over the top | No injury at 0.25 and 0.38 lb ai per acre. | 20070225c.pdf |
| 25451 | Viburnum, arrowwood | Viburnum dentatum | 'Autum Jazz' | Field Container | Altland | 2006 | Over the top | No significant injury at any rate (0.125, 0.25, 0.5 lb ai per acre). | 20070110p.pdf |
| 25451 | Viburnum, arrowwood | Viburnum dentatum | 'Chicago Lustre' | Field Container | Beste/Frank | 2006 | Over the top | No significant injury or growth reduction at all rates (0.125, 0.25 and 0.5 lb ai/A); all plants marketable | 20070111r.pdf |
| 26501 | Arrowwood | Viburnum sp. | V. carlesii | Field Container | Altland | 2006 | Over the top | No significant injury at any rate (0.125, 0.25, 0.5 lb ai per acre). | 20070110p.pdf |
| 26501 | Arrowwood | Viburnum sp. | V. tinus compacta | Field Container | Neal | 2006 | Over the top | No significant injury at 0.125, 0.25, 0.5 lb ai per acre. | 20070225f.pdf |
| 25018 | Periwinkle | Vinca sp. | V. minor | Field Container | Freiberger | 2007 | Over the top | No injury at 0.125 and 0.25 lb ai per acre, slight injury at 0.5 lb only after 2nd application | 200802271.pdf |
| 25018 | Periwinkle | Vinca sp. | Vinca minor 'Bowles' | Field Container | Lieth | 2006 | Over the top | Not possible to determine if product caused injury as untreated plants showed substantial injury | 20061201e.pdf |

Label Suggestions

For Sulfentrazone 4F, it is suggested that the initial label be quite restrictive with over-the-top applications along with fully listing those species exhibiting sensitivity to treatment. The following species should be added to the label for those materials grown in containers:

Abies fraseri

Buxus sp.

Ilex vomitoria 'nana'

Juniperus horizontalis

Rosa sp.

Thuja sp.

For Sulfentrazone 0.2G, it is suggested that all 23 crop genera or species exhibiting no injury in the testing with Sulfentrazone 0.2G be placed on this label with over-the-top applications.

Abies fraseri

Acer rubrum

Buxus microphylla

Chamaebatiaria sp.

Delosperma sp.

Gardenia augusta radicans

Helleborus niger

Quercus rubra

Rhododendron sp.

Rosa sp. (See Lieth 2006)

Spiraea x bumalda

Thuja occidentalis

In addition, adding the following species and genera to the label can be considered even though there are fewer than three sites because of the breadth of species treated or that applications with Sulfentrazone 4F did not cause phytotoxicity.

*Euonymus alatus*²

*Euonymus japonicus*²

*Euonymus patens*²

*Ilex cornuta*²

*Ilex crenata*²

*Ilex rotunda*²

*Ilex x meserveae*²

*Ilex vomitoria 'nana'*²

Juniperus horizontalis

*Spiraea decumbent s*²

*Spiraea japonica*²

*Viburnum carlesii*²

*Viburnum tinus*²

It is also suggested that growers be cautioned not to use Sulfentrazone 0.2G over the top of the following three crops: *Canna sp.*, *Echinacea purpurea*, and *Hosta sp.*

Appendix 1: Protocols

Phytotoxicity to ornamental horticulture plants from tools to manage broadleaf weeds and sedges.

Ornamental Protocol Number: 06-010

Objective: Determine phytotoxicity of Manage (halosulfuron), Sulfentrazone 0.2G, and V-10142 to unlabelled perennial plants commonly grown in nurseries.

Experimental Design:

Plot Size: Must be adequate to reflect actual use conditions.

Replicates: Minimum of 3 replications (preferably 4) with 3 plants per replicate

Application Instructions: Apply first application over the top of plants just breaking dormancy or, under climates where plants do not go totally dormant, apply prior to active growth in the spring. See table for product specific information.

Plant Materials: See attached list of plant materials. Plants grown in field containers are preferred to in-ground.

Evaluations: Record plant height & width at initial and final evaluations. At 1, 2, and 4 weeks after each application, record phytotoxicity on a scale of 0 to 10 (0 = No phytotoxicity; 10 = Complete kill). If appropriate, also include ratings for chlorosis, defoliation, stunting or other growth effects on a scale of 0 to 10 (0 = No effect; 10 = Complete plant affected). If any phytotoxicity is observed in treated plants, take pictures comparing treated and untreated plant material.

If different application methods or evaluations are made, please clearly specify differences in final report and explain how they enhanced results.

Recordkeeping: Keep detailed records of weather conditions including temperature and precipitation, soil-type or soil-less media, application equipment, irrigation, liner size, plant height & width, and plant growth stage at application and data collection dates.

Treatments:

| Product | Rate | Special Instructions | Contact Information to obtain materials and any needed adjuvants |
|--|-------------------------------------|---|--|
| Sedgehammer 75WG (halosulfuron) | 1 oz per acre (0.047 lb ai) | Always use 0.25% v/v of a non ionic surfactant. If severe phyto symptoms do not occur and where feasible apply a second application 4-6 weeks later at identical rates. | Kory Wheeler 928-819-1592 Kwheeler@gowanco.com |
| | 2 oz per acre (0.094 lb ai) | | |
| | 4 oz per acre (0.188 lb ai) | | |
| Sulfentrazone 0.2G (sulfentrazone – 0.2% active) | 0.125 lb ai/acre | 2 applications on a 4 week interval | FMC, Bobby Walls, 919-735-3862, bobby_walls@fmc.com |
| | 0.25 lb ai/acre | | |
| | 0.5 lb ai/acre | | |
| V-10142 75WG | 0.5 lb ai/acre | 2 applications on a 4 week interval | Valent, Joe Chamberlin, 770-985-0303, jcham@valent.com |
| | 1.0 lb ai/acre | | |
| | 2.0 lb ai/acre | | |
| Untreated | -- | -- | |
| Comparison Treatment | | | |
| Sulfentrazone 4F | 4 fl oz per acre (0.125 lb ai/acre) | 2 applications on a 4 week interval | FMC, Bobby Walls, 919-735-3862, bobby_walls@fmc.com |
| | 8 fl oz per acre (0.25 lb ai/acre) | | |
| | 16 fl oz per acre (0.5 lb ai/acre) | | |

Reports:

Reports must include:

- Results summary (no more than one page)
- Summary table with appropriate statistical analyses
- Experimental design and materials and methods
- Appendices: raw data and recordkeeping information as listed above
- If pictures were taken, please include them.

A report submitted electronically is preferred but not required. If the report is provided electronically, the basic report can be sent in MS Word or WordPerfect, the recordkeeping information as pdf or other electronic documents, and the raw data in MS Excel or other suitable program such as ARM.

Please direct questions to: Cristi Palmer, IR-4 HQ, Rutgers University, 681 US Hwy 1 S, North Brunswick, NJ 08902-3390, Phone 732-932-9575 x629, palmer@aesop.rutgers.edu OR Ely Vea, 308 Aston Forest Lane, Crownsville, MD 21032, Phone & FAX#: 410-923-4880, E-mail: evvea@comcast.net.

Draft Date: 3/15/06
Revised By: CLP

Phytotoxicity to ornamental horticulture plants from tools to manage broadleaf weeds and sedges.

Ornamental Protocol Number: 07-011

Objective: Determine phytotoxicity of Sedgehammer (halosulfuron), Sulfentrazone 0.2G, and V-10142 to unlabelled perennial plants commonly grown in nurseries.

Experimental Design:

Plot Size: Must be adequate to reflect actual use conditions.

Replicates: Minimum of 3 replications (preferably 4) with 3 plants per replicate

Application Instructions: Apply first application over the top of plants just breaking dormancy or, under climates where plants do not go totally dormant, apply prior to active growth in the spring. For V-10142 75WG, apply directed spray instead of over the top. See table for product specific information.

Plant Materials: *Contact your Regional Coordinator for an up-to-date list.* Plants grown in field containers are preferred to in-ground.

Evaluations: Record plant height & width at initial and final evaluations. At 1, 2, and 4 weeks after each application, record phytotoxicity on a scale of 0 to 10 (0 = No phytotoxicity; 10 = Complete kill). If appropriate, also include ratings for chlorosis, defoliation, stunting or other growth effects on a scale of 0 to 10 (0 = No effect; 10 = Complete plant affected). If any phytotoxicity is observed in treated plants, take pictures comparing treated and untreated plant material.

If different application methods or evaluations are made, please clearly specify differences in final report and explain how they enhanced results.

Recordkeeping: Keep detailed records of weather conditions including temperature and precipitation, soil-type or soil-less media, application equipment, irrigation, liner size, plant height & width, and plant growth stage at application and data collection dates.

Treatments:

| Product | Rate | Special Instructions | Contact Information to obtain materials and any needed adjuvants |
|--|-------------------------------------|---|--|
| Sedgehammer 75WG (halosulfuron) | 1 oz per acre (0.047 lb ai) | Always use 0.25% v/v of a non ionic surfactant. If severe phyto symptoms do not occur and where feasible apply a second application 4-6 weeks later at identical rates. | Gowan, Julie Butcher, 928-819-1578, jbutcher@gowanco.com |
| | 2 oz per acre (0.094 lb ai) | | |
| | 4 oz per acre (0.188 lb ai) | | |
| Sulfentrazone 0.2G (sulfentrazone – 0.2% active) | 0.125 lb ai/acre | 2 applications on a 4 week interval | FMC, Bobby Walls, 919-735-3862, bobby_walls@fmc.com |
| | 0.25 lb ai/acre | | |
| | 0.5 lb ai/acre | | |
| Sulfentrazone 4F | 4 fl oz per acre (0.125 lb ai/acre) | 2 applications on a 4 week interval | FMC, Bobby Walls, 919-735-3862, bobby_walls@fmc.com |
| | 8 fl oz per acre (0.25 lb ai/acre) | | |
| | 16 fl oz per acre (0.5 lb ai/acre) | | |
| V-10142 0.5G | 150 lb per acre (0.75 lb ai/acre) | 2 over the top applications on a 4 week interval Apply 0.5" of irrigation immediately after application | Valent, Joe Chamberlin, 770-985-0303, jcham@valent.com |
| | 300 lb per acre (1.5 lb ai/acre) | | |
| | 600 lb per acre (3.0 lb ai/acre) | | |
| V-10142 75WG + surfactant | 1 lb per acre (0.75 lb ai/acre) | Only evaluate as directed spray on large shrubs or trees. Do not contact foliage with sprays. 2 directed applications on a 4 week | Valent, Joe Chamberlin, 770-985-0303, jcham@valent.com |
| | 2 lb per acre (1.5 lb ai/acre) | | |

| | | | |
|-----------|-----------------------------------|---|--|
| | 4 lb per acre (2.0 lb ai/acre) | interval Apply 0.5" of irrigation immediately after application | |
| Untreated | -- | -- | |

Reports:

Reports submitted on the standard IR-4 Ornamental Horticulture Research Report Form are preferred.

A report submitted electronically is preferred but not required. If the report is provided electronically, the basic report can be sent in MS Word or WordPerfect, the recordkeeping information as pdf or other electronic documents, and the raw data in MS Excel or other suitable program such as ARM.

Please direct questions to: Cristi Palmer, IR-4 HQ, Rutgers University, 500 College Road East, Suite 201W, Princeton, NJ 08540, Phone 732-932-9575 x4629, palmer@aesop.rutgers.edu.

Draft Date: 3/8/07
Revised By: CLP

Appendix 2: Contributing Researchers

| | |
|-------------------|---|
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| Dr. Rick Boydston | USDA-ARS IAREC Rt 2 Box 2953-A Prosser, WA 99350 |
| Mr. Luke Case | The Ohio State University Dept. Hort. and Crop Science 2001 Fyffe Ct. Columbus, OH 43210 |
| Dr. Yan Chen | LSU AgCenter Hammond Research Station 21549 Old Covington Hwy. Hammond, LA 70403 |
| 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 |
| Ms. Kristie Fenn | USDA-ARS US Vegetable Laboratory 2700 Savannah Highway Charleston, SC 29414 |

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Appendix 3: Submitted Data

Researcher reports included in the printed copy of this report and those received by 4/29/09.
Reports on following pages are in alphanumeric order of author PR number.