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IR-4 Ornamental Horticulture Program Flumioxazin Crop Safety

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Acknowledgements

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Abstract

Flumioxazin has been registered in the United States since 2003 for uses in and around ornamental plants in production nurseries and in landscapes. Between 2001 and 2006, the IR-4 Project has conducted over 400 trials using two granular formulations (BroadStar 0.17G, BroadStar 0.25G) and a wettable dry granular formulation (SureGuard 51.1WDG). This is the first summary across all the available data generated through IR-4.

Thirteen plant species or genera exhibited no or minimal, transitory phytotoxicity to over the top applications of SureGuard 51.1WDG formulations. Of these, 10 species or genera are not currently on this label.

Three species exhibited no phytotoxicity with over the top SureGuard 51.1WDG applications at 0.25 to 0.375 lb ai per acre, but at higher rates there was some damage.

Twenty-seven species demonstrated significant phytotoxicity at all tested rates of SureGuard 51.1WDG. Several crops and cultivars are not currently listed as sensitive crops; it is recommended that these be added to this list on the SureGuard 51.1WDG label.

Thirty-four plant species or genera exhibited no or minimal transitory phytotoxicity to applications of BroadStar G formulations. Of these, 12 are not currently listed on the label. It is recommended that these be placed on the labels.

Eleven crops exhibited significant damage after over the top applications of BroadStar G.

Introduction

Flumioxazin has been registered in the United States since 2003 for uses in and around ornamental plants in production nurseries and in landscapes. Between 2001 and 2006, the IR-4 Project has conducted over 400 trials using two granular formulations (BroadStar 0.17G, BroadStar 0.25G) and a wettable dry granular formulation (SureGuard 51.1WDG). This is the first summary across all the available data generated through IR-4. While flumioxazin labels in the United States are fairly broad with many listed crops, this document will lead to amendments placing new crops on these labels as well as provide supporting information for registration in Canada for ornamental horticulture plants.

Materials and Methods

Because this research was conducted over several years with different protocols, application rates and whether repeat applications were made varied. Rates ranged from 0.17 to 1.5 lb ai per acre and either 1 or 2 applications were made.

BroadStar 0.17G, BroadStar 0.25G and SureGuard 51.1WDG were supplied to researchers by Valent Corporation.

Results and Summary

Based on the type and nature of injury seen with flumioxazin applications, tested plant species were placed into three 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 these prodiamine formulations.

Phytotoxicity of SureGuard 51.1% WDG

In general, SureGuard 51.1WDG exhibited no or minimal negative impact on conifers and three other plant species (Table 1). Thirteen plant genera or species fell into this category. Some minimal injury may be acceptable for growers if applications are made several weeks to months in advance of crop sale particularly for woody ornamental crops. For 3 crop species, there was no or little injury exhibited at the 0.25 or 0.375 lb ai per acre rates, but significant phytotoxicity occurred at 0.5 lb ai per acre or higher (Table 2).

In the IR-4 research program, 27 crops exhibited sufficient damage to not recommend SureGuard 51.1WDG over the top applications. (Table 3).

In Table 4, 29 ornamental genera or species are listed where only 1 or 2 trials were conducted through IR-4. The 17 crops with asterisks exhibited no or minimal transitory injury.

Please see Table 9 for a list of research and a summary of the individual trial results with SureGuard 51.1WDG.

Phytotoxicity of BroadStar G Formulations

In general, BroadStar G formulations exhibited no or minimal negative impact on a wide range of plant species (Table 5). Thirty-four plant genera or species fell into this category. Some minimal injury may be acceptable for growers if applications are made several weeks to months in advance of crop sale particularly for woody ornamental crops. For 8 crop species, there was no or little injury exhibited at the 0.17 to 0.375 lb ai per acre rates, but significant phytotoxicity occurred at 0.5 lb ai per acre or higher (Table 6).

Since 2000 only 11 crops exhibited sufficient damage to not recommend BroadStar G over the top applications: *Achillea millefolium*, *Athyrium georingianum*, *Cuphea hyssopifolia*, *Hosta sp.*, *Hydrangea arborescens*, *Hydrangea quercifolia*, *Ilex crenata* 'Green Lustre', *Jasminum nudiflorum*, *Phalaris arundinacea*, *Phlox sp.*, and *Ruellia carolinensis* (Table 7).

In Table 8, 63 ornamental genera or species are listed where only 1 or 2 trials were conducted through IR-4. The 43 crops with asterisks exhibited no or minimal transitory injury.

Please see Table 9 for a list of research on BroadStar G and a summary of the individual trial results.

Table 1. List of SureGuard 51.1% WDG treated crops with no or minimal transitory injury with applications over dormant or actively growing plants.

<i>Abies balsamea</i> (0.17 – 1.0 lb ai/acre)	<i>Juniperus squamata</i> (0.17 – 1.0 lb ai/acre)
<i>Abies fraseri</i> (0.25 – 0.68 lb ai/acre) *	<i>Pinus mugo</i> (0.25 – 1.0 lb ai/acre)
<i>Buxus macrophylla japonica</i> (0.25 – 1.0 lb ai/acre)	<i>Pinus nigra</i> (0.25 – 1.0 lb ai/acre)
<i>Festuca ovina glauca</i>	<i>Pinus eliottii</i> (0.17 – 0.68 lb ai/acre)
<i>Juniperus communis</i> (0.25 – 1.0 lb ai/acre)	<i>Pinus thunbergiana</i> (0.25 – 1.0 lb ai/acre)
<i>Juniperus horizontalis</i> (0.17 – 0.34 lb ai/acre)	<i>Quercus rubra</i> (0.17 – 1.5 lb ai/acre)
	<i>Thuja sp.</i> (0.25 – 1.0 lb ai/acre)

* Applications on actively growing plant material cause injury.

Table 2. List of SureGuard 51.1% WDG treated crops with no or minimal transitory injury seen at the 1X rate, but the 2X or 4X rate did cause significant phytotoxicity

<i>Berberis thunbergii</i> (0.25 – 1.0 lb ai/acre)*	<i>Vinca minor</i> (0.375 – 1.5 lb ai/acre)
<i>Clethra alnifolia</i> (0.25 – 1.0 lb ai/acre)	

* Application during bud break caused injury, but no visible injury occurred with applications to mature foliage.

Table 3. List of SureGuard 51.1% WDG treated crops exhibiting significant injury.

<i>Cotoneaster dammeri</i>	<i>Pennisetum setaceum</i>	<i>Salvia sylvestris</i>
<i>Deutzia gracilis</i>	<i>Phalaris arundinacea</i>	<i>Spirea nipponica</i>
<i>Helleborus niger</i>	<i>Picea abies</i>	<i>Spirea x vanhouttei</i>
<i>Hemerocallis sp.</i>	<i>Picea glauca</i>	<i>Vaccinium ashei</i>
<i>Iberis sp.</i>	<i>Pieris japonica</i>	<i>Viburnum dentatum</i>
<i>Ilex crenata</i>	<i>Potentilla fruticosa</i>	<i>Viburnum carlesii</i>
<i>Ilex x meserveae</i>	<i>Quercus rubra</i>	<i>Viburnum plicatum</i>
<i>Lagerstroemia indica</i>	<i>Rhododendron sp.</i>	<i>Viburnum x bodnantense</i>
<i>Liriope muscari</i>	<i>Rosa sp.</i>	
<i>Liriope spicata</i>	<i>Rudbeckia fulgida speciosa</i>	

Table 4. List of SureGuard 51.1% WDG treated crops where more information is needed.

<i>Abies grandis</i>	<i>Chamaecyparis obtusa</i> *	<i>Pseudotsuga menziesii</i>
<i>Abies bornmuelleriana</i> *	<i>Cleyera japonica</i> *	<i>Sequoiadendron</i>
<i>Abies lasiocarpa</i>	<i>Cortaderia sp.</i>	<i>giganteum</i>
<i>Abies procera</i>	<i>Cotinus coggygia</i> *	<i>Taxus cuspidata</i> *
<i>Acer rubrum</i> *	<i>Euonymus alatus</i> *	<i>Trachelospermum</i>
<i>Achillea millefolium</i> *	<i>Fraxinus pennsylvanica</i> *	<i>asiaticum</i> *
<i>Buddleia davidii</i> *	<i>Hosta sp.</i> *	<i>Verbena sp.</i> *
<i>Carex buchananii</i>	<i>Hydrangea quercifolia</i>	<i>Viburnum nudum</i>
<i>Cedrus deodoara</i> *	<i>Juniperus virginiana</i>	<i>Viburnum trilobum</i> *
<i>Ceratiola ericoides</i> *	<i>Nandina domestica</i>	
<i>Chamaecyparis pisifera</i> *	<i>Plumbago auriculata</i>	

* For these plants, the one or two trials presented here indicate no phytotoxicity or slight, transient injury, but these findings need to be confirmed.

Table 5. List of BroadStar G treated crops with no or minimal transitory injury with applications over dormant or actively growing plants.

<i>Abelia x grandiflora</i> (0.25 – 1.0 lb ai/acre)	<i>Juniperus communis</i> (0.25 – 1.0 lb ai/acre)
<i>Acer ginnala</i> (0.17 – 0.68 lb ai/acre)	<i>Juniperus conferta</i> (0.17 – 1.5 lb ai/acre)
<i>Acer palmatum</i> (0.17 – 1.0 lb ai/acre)	<i>Juniperus horizontalis</i> (0.17 – 1.0 lb ai/acre)
<i>Acer pennsylvanicum</i> (0.17 – 0.68 lb ai/acre)	<i>Juniperus ridigia</i> (0.17 – 0.68 lb ai/acre)
<i>Acer rubrum</i> (0.17 – 0.68 lb ai/acre)	<i>Juniperus squamata</i> (0.17 – 1.0 lb ai/acre)
<i>Artemisia lactiflora</i> (0.25 – 1.0 lb ai/acre)	<i>Lagerstroemia indica</i> (0.17 – 1.5 lb ai/acre)
<i>Berberis thunbergii</i> (0.17 – 1.0 lb ai/acre)*	<i>Picea sp.</i> (0.17 – 1.0 lb ai/acre)
<i>Buddleia davidii</i> (0.17 – 1.0 lb ai/acre)	<i>Pinus mugo</i> (0.17 – 1.0 lb ai/acre)
<i>Buxus microphylla</i> (0.17 – 1.0 lb ai/acre)	<i>Pinus nigra</i> (0.25 – 1.0 lb ai/acre)
<i>Buxus sp.</i> (0.17 – 1.0 lb ai/acre)	<i>Potentilla sp.</i> (0.17 – 1.0 lb ai/acre)
<i>Cotoneaster sp.</i> (0.17 – 1.0 lb ai/acre)	<i>Prunus sp.</i> (0.17 – 1.0 lb ai/acre)
<i>Festuca ovina glauca</i> (0.17 – 1.0 lb ai/acre)	<i>Pseudotsuga menziesii</i> (0.17 – 1.0 lb ai/acre)
<i>Gypsophila elegans</i> (0.17 – 0.68 lb ai/acre)	<i>Quercus rubra</i> (0.17 – 0.68 lb ai/acre)
<i>Hedera helix</i> (0.17 – 1.0 lb ai/acre)	<i>Taxus x media</i> (0.25 – 1.0 lb ai/acre)
<i>Ilex cornuta</i> (0.25 – 1.0 lb ai/acre)	<i>Thuja occidentales</i> (0.17 – 1.0 lb ai/acre)
<i>Ilex crenata 'Compacta'</i> (0.17 – 1.0 lb ai/acre)	<i>Verbena sp.</i> (0.17 – 1.5 lb ai/acre)
<i>Ilex x meserveae</i> (0.17 – 1.0 lb ai/acre)	<i>Viburnum sp.</i> (0.17 – 1.0 lb ai/acre)

*No injury when applied to mature foliage, but injury did occur when applied at bud break

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

<i>Clethra alnifolia</i> (0.17 – 1.5 lb ai/acre)	<i>Liriope muscari</i> (0.17 – 1.5 lb ai/acre)
<i>Cleyera japonica</i> (0.17 – 1.0 lb ai/acre)	<i>Pieris japonica</i> (0.17 – 1.0 lb ai/acre)
<i>Cortaderia selloana</i> (0.25 – 1.5 lb ai/acre)	<i>Rhododendron sp.</i> (0.17 – 1.0 lb ai/acre)
<i>Hemerocallis sp.</i> (0.17 – 1.0 lb ai/acre)	<i>Spirea sp.</i> (0.17 – 1.0 lb ai/acre)

Table 7. List of BroadStar G treated crops exhibiting significant injury.

<i>Achillea millefolium</i>	<i>Hydrangea arborescens</i>	<i>Jasminum nudiflorum</i>
<i>Athyrium georingianum</i>	<i>Hydrangea quercifolia</i>	<i>Phalaris arundinacea</i>
<i>Cuphea hyssopifolia</i>	<i>Ilex crenata</i> ‘Green Lustre’	<i>Phlox sp.</i>
<i>Hosta sp.</i>		<i>Ruellia carolinensis</i>

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

<i>Abies koreana</i> *	<i>Gazania sp.</i> *	<i>Pinus bungeana</i>
<i>Calluna vulgaris</i> *	<i>Gelsemium sp.</i>	<i>Pittosporum tobira</i>
<i>Camellia sp.</i> *	<i>Gleditsia tricanthos</i> *	<i>Podocarpus</i>
<i>Carex buchananii</i> *	<i>Hakonechloa sp.</i> *	<i>macrophyllus</i> *
<i>Cedrus deodara</i> *	<i>Hydrangea macrophylla</i>	<i>Rhus sp.</i> *
<i>Cerastium tomentosum</i>	<i>Iberis sp.</i> *	<i>Rosmarinus officinalis</i> *
<i>Chamaecyparis obtusa</i> *	<i>Ilex crenata</i> ‘Honey Bee’	<i>Salvia daghestanica</i> *
<i>Clethra japonica</i>	<i>Ilex glabra</i> *	<i>Salvia sylvestris</i> *
<i>Cornus florida</i> *	<i>Lantana sp.</i>	<i>Scutellaria racemosa</i> *
<i>Cornus sericea</i> *	<i>Ligustrum sp.</i>	<i>Syringa sp.</i> *
<i>Cupressus sp.</i> *	<i>Liriope spicata</i>	<i>Taxus cuspidata</i> *
<i>Cytisus sp.</i> *	<i>Lonicera sp.</i>	<i>Ternstroemia sp.</i>
<i>Daphne sp.</i> *	<i>Loropetalum sp.</i>	<i>Thuja plicata</i>
<i>Delosperma alba</i> *	<i>Mahonia aquifolium</i> *	<i>Trachelospermum</i>
<i>Deschampsia sp.</i> *	<i>Myrica pennsylvanica</i> *	<i>asiaticum</i> *
<i>Duetzia sp.</i>	<i>Myrica cerifera</i> *	<i>Tsuga sp.</i> *
<i>Elaeagnus angustifolia</i> *	<i>Nandina domestica</i>	<i>Vaccicum sp.</i>
<i>Erica cinerea</i> *	<i>Ophiopogon japonicus</i>	<i>Veronica sp.</i> *
<i>Euonymus alatus</i> *	<i>Origanum libanoticum</i> *	<i>Vinca sp.</i>
<i>Forsythia sp.</i> *	<i>Osteopermum sp.</i> *	<i>Weigela sp.</i> *
<i>Fraxinus sp.</i> *	<i>Pachysandra terminalis</i> *	<i>Yucca filamentosa</i> *
<i>Gardenia sp.</i> *	<i>Pennisetum setaceum</i> *	

* For these plants, the one or two trials presented here indicate no phytotoxicity or slight, transient injury, but these findings need to be confirmed.

Table 9. Detailed Summary of Crop Safety Testing with Flumioxazin 51.1% WDG.

Notes: Table entries are sorted by crop Latin name. Only flumioxazin reports received by 4/15/2007 are included in this table.

PR #	Product	Crop			Production Site	Researcher	Year	Application Method	Results Summary
		Common Name	Latin Name	Cultivar					
23651	SureGuard 51WDG	Fir, Balsam	<i>Abies balsamea</i>		Field Container	Altland	2003	Over the top	Plants were of poor quality, however applications on actively growing plant material did cause minor to moderate injury at all rates (0.25, 0.5, 1.0 lb ai per acre).
23948	SureGuard 51WDG	Fir, Balsam	<i>Abies balsamea</i>		Field In-Ground	Ahrens/Mer vosh	2001	Over the top - dormant	No injury at 0.34 or 0.68 lb ai per acre; no control of established fleabane (<i>Erigeron</i> spp.) and cheat (<i>Bromus secalinus</i>).
23948	SureGuard 51WDG	Fir, Balsam	<i>Abies balsamea</i>	A. balsamea var. phanerolepsis	Field In-Ground	Ahrens/Mer vosh	2001	Over the top - dormant	No specific injury at 0.17, 0.34 or 0.68 lb ai per acre, some mortality but not related to treatment; 70 - 80 % control of weeds in transplant beds.
23948	SureGuard 51WDG	Fir, Balsam	<i>Abies balsamea</i>	A. balsamea var. phanerolepsis	Field In-Ground	Ahrens/Mer vosh	2001	Over the top - early bud break	No injury at 0.34 or 0.68 lb ai per acre; no control of established fleabane (<i>Erigeron</i> spp.) and cheat (<i>Bromus secalinus</i>).
20428	SureGuard 51WDG	Fir, Fraser	<i>Abies fraseri</i>		Field In-Ground	Ahrens/Mer vosh	2001	Over the top - dormant	No injury at 0.25, 0.375, and 0.68 lb ai per acre; excellent control of crabgrass and ragweed, fair control of horseweed.
20428	SureGuard 51WDG	Fir, Fraser	<i>Abies fraseri</i>		Field In-Ground	Ahrens/Mer vosh	2001	Over the top - dormant	No injury at 0.34 or 0.68 lb ai per acre; no control of established fleabane (<i>Erigeron</i> spp.) and cheat (<i>Bromus secalinus</i>).
20428	SureGuard 51WDG	Fir, Fraser	<i>Abies fraseri</i>		Field In-Ground	Ahrens/Mer vosh	2001	Over the top - dormant	No injury at 0.25 or 0.5 lb ai per acre; excellent control of asiatic dayflower (<i>commelina communis</i>).
20428	SureGuard 51WDG	Fir, Fraser	<i>Abies fraseri</i>		Field In-Ground	Ahrens/Mer vosh	2001	Over the top - dormant	No injury at 0.25, 0.34 or 0.68 lb ai per acre when applied the second year on the same plants; good red sorrel and smooth bedstraw control in July but not in September.

PR #	Product	Crop			Production Site	Researcher	Year	Application Method	Results Summary
		Common Name	Latin Name	Cultivar					
23650	SureGuard 51WDG	Fir, Grand; Giant Fir	<i>Abies grandis</i>		Field Container	Altland	2003	Over the top	Poor quality plants, however applications in the middle of the season did contribute to poorer quality than untreated (0.25, 0.5, and 1.0 lb ai per acre).
23654	SureGuard 51WDG	Fir, Alpine	<i>Abies lasiocarpa</i>	'Arizonica'	Field Container	Altland	2003	Over the top	No injury at 0.25, 0.5, and 1.0 lb ai per acre.
20418	SureGuard 51WDG	Fir	<i>Abies sp.</i>	A. bornmuelleriana	Field Container	Altland	2003	Over the top	No injury after single application (0.25, 0.5, and 1.0 lb ai per acre), but after the second application injury was slight and sporadic.
19883	SureGuard 51WDG	Fir	<i>Abies sp.</i>	A. fraseri	Field In-Ground	Ahrens/Mer vosh	2000	Broadcast over the top	Applications prior to bud break caused no injury, but applications after budbreak caused severe phytotoxicity on new growth with no injury to mature foliage; suppression but poor control of perennial grasses.
19883	SureGuard 51WDG	Fir	<i>Abies sp.</i>	A. fraseri	Field In-Ground	Ahrens/Mer vosh	2000	Broadcast over the top	Moderate to severe injury on actively growing foliage; little impact on emerged common ragweed and horseweed, but effective pre-emergent control of large crabgrass.
20418	SureGuard 51WDG	Fir	<i>Abies sp.</i>	A. procera	Field Container	Altland	2003	Over the top	Poor quality plants led to confounding results for dormant applications, but there was clear evidence of moderate injury increasing with rate (0.25, 0.5, and 1.0 lb ai per acre) for applications onto actively growing plants.
25324	SureGuard 51WDG	Maple, Red	<i>Acer rubrum</i>		Field Container	Altland	2006	Over the top	Significant injury (bud blackening), no growth reduction at all rates (0.25, 0.5, 1.0 lb ai per acre); recommends further testing
25324	SureGuard 51WDG	Maple, Red	<i>Acer rubrum</i>		Field Container	Senesac	2006	Over the top	No injury at 0.375, 0.75, and 1.5 lb ai per acre.
20429	SureGuard 51WDG	Maple	<i>Acer sp.</i>	A. rubrum	Field In-Ground	Hart	2001	Directed	No injury at 0.17, 0.34 or 0.68 lb ai per acre.
20429	SureGuard 51WDG	Maple	<i>Acer sp.</i>	A. rubrum	Field In-Ground	Kuhns	2003	Directed	No injury at 0.25, 0.5 or 1.0 lb ai per acre; excellent control at all rates.
20484	SureGuard 51WDG	Yarrow	<i>Achillea millefolium</i>	'Moonshine'	Field Container	Boydston	2003	Broadcast foliar - dormant	Slight delay of regrowth, but by 10 WAT no visible difference between untreated at all rates (0.25, 0.5, and 1.0 lb ai per acre).

PR #	Product	Crop			Production Site	Researcher	Year	Application Method	Results Summary
		Common Name	Latin Name	Cultivar					
20494	SureGuard 51WDG	Barberry	<i>Berberis sp.</i>	B. thunbergii 'Rosie Glow'	Field Container	Altland	2002	Over the top at bud break	Significant damage some mortality with all rates (0.25, 0.5, 1.0 lb ai per acre) applied at bud break, but after the second application on mature foliage only the high rate caused damage.
20494	SureGuard 51WDG	Barberry	<i>Berberis sp.</i>	'Rosy Glow'	Field Container	Derr	2002	Over the top	Slight to significant injury increasing with rate (0.25, 0.5 and 1.0 lb ai per acre); excellent control of spotted spurge and large crabgrass.
20440	SureGuard 51WDG	Birch, River	<i>Betula nigra</i>	'Heritage' and 'Duratree'	Field In-Ground	Kuhns	2003	Directed	No visible injury with directed spray for any rate (0.25, 0.5 and 1.0 lb ai per acre); some control of a number of weeds except common ragweed and giant foxtail.
20432	SureGuard 51WDG	Butterfly Bush	<i>Buddleia davidii</i>	'Lochinich'	Field In-Ground	Anderson	2002	Directed spray	No injury with 0.25, 0.5 or 1.0 lb ai per acre.
20495	SureGuard 51WDG	Boxwood	<i>Buxus sp.</i>	B. microphylla japonica	Field Container	Fraelich	2001	Over the top	Very slight injury only observed with 0.68 lb ai per acre, but these plants and the ones treated with 0.17 and 0.34 lb ai per acre were fully marketable.
20495	SureGuard 51WDG	Boxwood	<i>Buxus sp.</i>	B. microphylla var. japonica	Field Container	Derr	2002	Over the top	Slight to moderate injury increasing with rate (0.25, 0.5, 1.0 lb ai per acre); excellent control of spotted spurge and large crabgrass.
19905	SureGuard 51WDG	Sedge	<i>Carex sp.</i>	C. buchananii	Field Container	Boydston	2003	Broadcast foliar	No data available due to winter kill of all plants including untreated; excellent control of moss, pigwee, kochia, and bittercress, but no control of green foxtail and liverwort.
23646	SureGuard 51WDG	Cedar	<i>Cedrus deodara</i>		Field Container	Altland	2003	Over the top	No injury at 0.25, 0.5, and 1.0 lb ai per acre.
19496	SureGuard 51WDG	Sand Heath, Rosemary	<i>Ceratiola ericoides</i>		Field Container	Anderson	2002	Directed spray	No injury with 0.25, 0.5 or 1.0 lb ai per acre.
23641	SureGuard 51WDG	False cypress	<i>Chamaecyparis obtusa</i>	C. pisifera 'Fifilera Aurea'	Field Container	Altland	2003	Over the top	No injury at 0.25, 0.5, and 1.0 lb ai per acre.
23641	SureGuard 51WDG	False cypress	<i>Chamaecyparis obtusa</i>	'Templehof'	Field Container	Altland	2003		No injury at 0.25, 0.5, and 1.0 lb ai per acre.
20552	SureGuard 51WDG	Summersweet	<i>Clethra alnifolia</i>		Field In-Ground	Beste/Frank	2005	Ground	No significant injury at 0.25, 0.5 and 1.0 lb ai per acre.
20502	SureGuard 51WDG	Summersweet	<i>Clethra alnifolia</i>	'Ruby Spice'	Field Container	Beste/Frank	2005	Broadcast	No injury at 0.25 lb ai per acre, significant injury at 0.5 and 1.0 lb ai per acre but plants recovered

PR #	Product	Crop			Production Site	Researcher	Year	Application Method	Results Summary
		Common Name	Latin Name	Cultivar					
20503	SureGuard 51WDG	Cleyera	<i>Cleyera japonica</i>		Field Container	Gilliam	2001	Over the top	Moderate, but transient, injury at all rates (0.17, 0.34 and 0.68 lb ai per acre); excellent weed control.
20389	SureGuard 51WDG	Pampas Grass	<i>Cortaderia</i>	C. selloana	Field In-Ground	Beste/Frank	2005	Directed spray	No significant injury after the first application (0.25, 0.5, 1.0 lb ai per acre) with slight transient injury after the second; great to excellent weed control (see report for detailed list of weed species).
19876	SureGuard 51WDG	Pampas Grass	<i>Cortaderia</i>	C. selloana 'Hoffman No. 5'	Field Container	Beste/Frank	2005	Broadcast	Moderate to significant injury increasing with rate (0.25, 0.5, 1.0 lb ai per acre) with plants recovering over time due to sloughing off of older leaves, but plants at the highest rate did exhibit reduced growth.
19876	SureGuard 51WDG	Pampas Grass	<i>Cortaderia</i>	C. selloana 'Rosea'	Field Container	Ahrens/Mer vosh	2003	Over the top	Significant unacceptable injury at 0.25, 0.5 and 1.0 lb ai per acre; excellent control of large crabgrass and common groundsel.
20505	SureGuard 51WDG	Smoke Tree, European	<i>Cotinus coggygria</i>		Field Container	Anderson	2002	Directed spray	No injury with 0.25, 0.5 or 1.0 lb ai per acre.
20506	SureGuard 51WDG	Cotoneaster	<i>Cotoneaster sp.</i>	C. dammeri 'Skoigshomen'	Field Container	Beste/Frank	2006	Over the top	Moderate to significant phytotoxicity increasing with rate (0.375, 0.75, 1.5 lb ai per acre), and stunting was also observed.
20509	SureGuard 51WDG	Pride-of-Rochester	<i>Deutzia sp.</i>	'Nikko'	Field Container	Anderson	2002	Directd spray	Significant necrosis with all rates (0.25, 0.5, 1.0 lb ai per acre).
20580	SureGuard 51WDG	Winged Burning Bush	<i>Euonymus alatus</i>	'Compactus'	Field Container	Senesac	2006	Over the top	No injury at 0.375 and 0.75 lb ai per acre, slight at 1.5 lb ai per acre.
19877	SureGuard 51WDG	Blue Fescue	<i>Festuca ovina glauca</i>		Field Container	Boydston	2003	Broadcast foliar	No injury at 0.25, 0.5 and 1.0 lb ai per acre; excellent control of kochia, but little impact on annual grasses.
19877	SureGuard 51WDG	Blue Fescue	<i>Festuca ovina glauca</i>	'Elijah Blue'	Field Container	Ahrens/Mer vosh	2003	Over the top	No injury at 0.25 lb ai per acre and very slight injury at 0.5 and 1.0 lb ai per acre; excellent control of large crabgrass and common groundsel.
26667	SureGuard 51WDG	Ash	<i>Fraxinus sp.</i>	F. pennsylvanica	Field In-Ground	Hitcher	2001	Broadcast	No injury at 0.17, 0.34 or 0.68 lb ai per acre.
25332	SureGuard 51WDG	Hellebore, Christmas rose, Lenten Rose	<i>Helleborus niger</i>	H. orientalis	Field Container	Senesac	2006	Over the top	Unacceptable injury at all rates (0.375, 0.75, 1.5 lb ai per acre).

PR #	Product	Crop			Production Site	Researcher	Year	Application Method	Results Summary
		Common Name	Latin Name	Cultivar					
19911	SureGuard 51WDG	Daylily	<i>Hemerocallis sp.</i>		Field Container	Fraelich	2001	Over the top	No injury at 0.17 lb ai per acre, but slight injury and stunting was observed with 0.34 and 0.68 lb ai per acre.
19911	SureGuard 51WDG	Daylily	<i>Hemerocallis sp.</i>		Field Container	Gilliam	2001	Broadcast	Significant transient injury at all rates (0.17, 0.34, 0.68 lb ai per acre); excellent spurge control.
19911	SureGuard 51WDG	Daylily	<i>Hemerocallis sp.</i>	'Stella d'Oro'	Field Container	Neal	2001	Over the top	Severe injury at 0.34 lb ai per acre.
19921	SureGuard 51WDG	Hosta	<i>Hosta sp.</i>		Field Container	Boydston	2003	Broadcast foliar	No injury at 0.25, 0.5 and 1.0 lb ai per acre; excellent control of bittercress, common chickweed, barnyard grass, and kochia.
20579	SureGuard 51WDG	Hydrangea, French	<i>Hydrangea macrophylla</i>	H. quercifolia 'Alice'	Field Container	Senesac	2006	Over the top	Slight injury at 0.375 lb ai per acre and unacceptable at 0.75 and 1.5 lb ai per acre.
20351	SureGuard 51WDG	Candytuft	<i>Iberis sp.</i>	'Alexander's White'	Field Container	Boydston	2003	Broadcast foliar	No visible injury, but single application decreased plant growth and number of flowers at all rates (0.25, 0.5, 1.0 lb ai per acre); excellent pre-emergent control of common lambsquarter and kochia but little control of barnyardgrass and green foxtail.
20518	SureGuard 51WDG	Holly	<i>Ilex sp.</i>	I. crenata compacta	Field Container	Derr	2002	Over the top	Slight but transient injury increasing with rate (0.25, 0.5 and 1.0 lb ai per acre); excellent control of spotted spurge and large crabgrass.
20518	SureGuard 51WDG	Holly	<i>Ilex sp.</i>	I. crenata 'Compacta'	Field Container	Gilliam	2001	Over the top	Significant injury at all rates (0.17, 0.34, 0.68 lb ai per acre) exhibited by leaf drop and discoloration; excellent weed control.
20566	SureGuard 51WDG	Holly	<i>Ilex sp.</i>	I. x meserveae 'Blue Girl' 'Blue Boy'	Field In-Ground	Ahrens/Mer vosh	2000	Broadcast over the top	Unacceptable injury at 0.17 and 0.34 lb ai per acre; excellent control of common chickweed, annual bluegrass, and knawel.
20518	SureGuard 51WDG	Holly	<i>Ilex sp.</i>	I. x meserveae 'Blue Prince'	Field Container	Altland	2002	Over the top	Significant injury at all rates (0.25, 0.5, 1.0 lb ai per acre) with applications prior to bud break and onto mature foliage.
20518	SureGuard 51WDG	Holly	<i>Ilex sp.</i>	I. x meserveae 'Blue Princess'	Field Container	Altland	2006	Over the top	Leaves turned purple and bronze at all rates (0.375, 0.75, 1.5 lb ai per acre) and growth was reduced.

PR #	Product	Crop			Production Site	Researcher	Year	Application Method	Results Summary
		Common Name	Latin Name	Cultivar					
25425	SureGuard 51WDG	Holly, Dwarf Yaupon	<i>Ilex vomitoria 'nana'</i>	I. x meserveae 'Blue Princess'	Field Container	Altland	2006	Over the top	Unacceptable injury at all rates (0.375, 0.5, 1.5 lb ai per acre).
20413	SureGuard 51WDG	Juniper	<i>Juniperus sp.</i>	J. communis 'Effusa'	Field Container	Altland	2002	Over the top	No injury with 0.25, 0.5 or 1.0 lb ai per acre.
20413	SureGuard 51WDG	Juniper	<i>Juniperus sp.</i>	J. horizontalis 'Bar Harbor'	Field Container	Ahrens/Mer vosh	2000	Broadcast	No injury with 0.17 and 0.34 lb ai per acre; excellent weed control.
20413	SureGuard 51WDG	Juniper	<i>Juniperus sp.</i>	J. horizontalis 'Bar Harbor'	Field Container	Ahrens/Mer vosh	2001	Broadcast - Actively growing foliage	No injury with 0.17 and 0.34 lb ai per acre; good weed control.
20413	SureGuard 51WDG	Juniper	<i>Juniperus sp.</i>	J. squamata 'Blue Star'	Field Container	Ahrens/Mer vosh	2000	Broadcast over the top	No injury with 0.17 and 0.34 lb ai per acre; excellent weed control.
20413	SureGuard 51WDG	Juniper	<i>Juniperus sp.</i>	J. squamata 'Blue Star'	Field Container	Ahrens/Mer vosh	2001	Broadcast - Actively growing	No injury with 0.17 and 0.34 lb ai per acre; good weed control.
20413	SureGuard 51WDG	Juniper	<i>Juniperus sp.</i>	J. squamata 'Blue Star'	Field Container	Altland	2003		No injury at 0.25, 0.5, and 1.0 lb ai per acre.
20452	SureGuard 51WDG	Cedar, Red	<i>Juniperus virginiana</i>	'Emerald Sentinel'	Field In-Ground	Hart	2003	Directed Spray	No injury with dormant applications, but minor transient tip burn was observed at all rates (0.25, 0.5 and 1.0 lb ai per acre) after second application to new growth.
20434	SureGuard 51WDG	Crape Myrtle	<i>Lagerstroemia indica</i>	'Tuscarora'	Field Container	Gilliam	2001	Broadcast	Moderate to significant injury increasing with rate (0.17, 0.34, 0.68 lb ai per acre); excellent weed control.
20356	SureGuard 51WDG	Lilyturf, Big Blue;Giant	<i>Liriope muscari</i>	L. spicata 'Big Blue'	Field Container	Gilliam	2001	Broadcast	Minor to moderate, transient injury increasing with rate (0.17, 0.34, 0.68 lb ai per acre); excellent weed control.
20433	SureGuard 51WDG	Lilyturf, Creeping	<i>Liriope sp.</i>	L. muscari 'Blue Boy'	Field Container	Beste/Frank	2005	Ground broadcast foliar	Extensive injury increasing with rate (0.025, 0.5, 1.0 lb ai per acre).
20357	SureGuard 51WDG	Lilyturf, Creeping	<i>Liriope sp.</i>	L. spicata	Field Container	Beste/Frank	2005	Ground broadcast foliar	Extensive injury and some stunting at all rates (0.25, 0.5, 1.0 lb ai per acre).
20522	SureGuard 51WDG	Heavenly Bamboo	<i>Nandina domestica</i>		Field Container	Beste/Frank	2005	Ground broadcast foliar	Significant phyto but plants recovered and were marketable at all rates (0.25, 0.5, 1.0 lb ai per acre).
20569	SureGuard 51WDG	Heavenly Bamboo	<i>Nandina domestica</i>	'Fire Power'	Field In-Ground	Beste/Frank	2005	Ground directed shielded & banded spray	No significant injury (0.25, 0.5, 1.0 lb ai per acre).

PR #	Product	Crop			Production Site	Researcher	Year	Application Method	Results Summary
		Common Name	Latin Name	Cultivar					
20363	SureGuard 51WDG	Fountain Grass	<i>Pennisetum setaceum</i>	'Hamelin'	Field Container	Boydston	2003	Broadcast foliar	Moderate to significant injury increasing with rate (0.25, 0.5 and 1.0 lb ai per acre); excellent control of common chickweed, kochia and barnyardgrass.
20406	SureGuard 51WDG	Fountain Grass	<i>Pennisetum setaceum</i>	'Tall Tails'	Field In-Ground	Beste/Frank	2005	Ground directed shielded & banded spray	Significant, transient injury but plants marketable at 0.25 and 0.5 lb ai per acre
20364	SureGuard 51WDG	Ribbon-Grass, Gardeners-Garters	<i>Phalaris arundinacea</i>	'Feesey's Form'	Field Container	Anderson	2002	Directed spray	Moderate to severe chlorosis and necrosis increasing with rate (0.25, 0.5, and 1.0 lb ai per acre).
20416	SureGuard 51WDG	Spruce	<i>Picea sp.</i>	P. abies 'Nidiformis'	Field Container	Altland	2003	Over the top	Young and actively growing plants are susceptible to damage at all rates (0.25, 0.5, 1.0 lb ai per acre).
20416	SureGuard 51WDG	Spruce	<i>Picea sp.</i>	P. glauca	Field Container	Altland	2003	Over the top	Young and actively growing plants are susceptible to damage at all rates (0.25, 0.5, 1.0 lb ai per acre).
20571	SureGuard 51WDG	Andromeda	<i>Pieris sp.</i>		Field In-Ground	Beste/Frank	2005	Ground directed shielded & banded spray	No significant injury (0.25, 0.5, 1.0 lb ai per acre).
20526	SureGuard 51WDG	Andromeda	<i>Pieris sp.</i>	P. japonica 'Valley Valentine'	Field Container	Altland	2002	Over the top	Slight to severe injury including mortality increasing with rate after single application (0.25, 0.5, 1.0 lb ai per acre).
20527	SureGuard 51WDG	Pine, Mugo & Mugho	<i>Pinus mugo ssp. Mugo</i>	'pumilo'	Field Container	Altland	2003	Over the top	No injury at 0.25, 0.5, and 1.0 lb ai per acre.
23643	SureGuard 51WDG	Pine, Austrian	<i>Pinus nigra</i>		Field Container	Altland	2003	Over the top	No injury at 0.25, 0.5, and 1.0 lb ai per acre.
20462	SureGuard 51WDG	Pine, Austrian	<i>Pinus nigra</i>		Field In-Ground	Beste/Frank	2005	Ground directed broadcast spray	Virtually no injury at all rates (0.25, 0.5, 1.0 lb ai per acre).
20417	SureGuard 51WDG	Pine	<i>Pinus sp.</i>	P. eliottii	Field Container	Fraelich	2001	Over the top	No injury at 0.17, 0.34 and 0.68 lb ai per acre.
23653	SureGuard 51WDG	Pine, Jap. Black	<i>Pinus thunbergiana</i>		Field Container	Altland	2003	Over the top	No injury at 0.25, 0.5, and 1.0 lb ai per acre.

PR #	Product	Crop			Production Site	Researcher	Year	Application Method	Results Summary
		Common Name	Latin Name	Cultivar					
20529	SureGuard 51WDG	Leadwort, Cape	<i>Plumbago auriculata</i>	Ceratostigma plumbagoioides	Field Container	Senesac	2006	Over the top	No data due to limited plant survival
20532	SureGuard 51WDG	Cinquefoil	<i>Potentilla sp.</i>	P. fruticosa 'Gold Finger'	Field Container	Ahrens/Mer vosh	2000	Over the top - actively growing	Moderate injury with 0.17 and 0.34 lb ai per acre after single application with less injury exhibited after second application; excellent weed control.
20532	SureGuard 51WDG	Cinquefoil	<i>Potentilla sp.</i>	P. fruticosa 'Gold Finger'	Field Container	Ahrens/Mer vosh	2001	Over the top - actively growing	Significant unacceptable injury with 0.17 and 0.34 lb ai per acre applied to actively growing cinquefoil.
23649	SureGuard 51WDG	Fir, Douglas	<i>Pseudotsuga menziesii</i>		Field Container	Altland	2003	Over the top	Plants were of poor quality; no conclusions can be made from this trial.
20475	SureGuard 51WDG	Oak, Northern Red	<i>Quercus rubra</i>		Field In-Ground	Hitcher	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
25461	SureGuard 51WDG	Oak, Northern Red	<i>Quercus rubra</i>		Field Container	Altland	2006	Over the top	No injury or growth reduction at any rate (0.375, 0.75, 1.5 lb ai per acre).
20475	SureGuard 51WDG	Oak, Northern Red	<i>Quercus rubra</i>		Field In-Ground	Beste/Frank	2006	Ground Broadcast Foliar	Unacceptable injury and growth reduction at 0.375, 0.75 and 1.5 lb ai per acre
19490	SureGuard 51WDG	Rhododendron	<i>Rhododendron sp.</i>	'Blue Peter'	Field Container	Altland	2002	Over the top	Significant unacceptable injury at all rates (0.25, 0.5, and 1.0 lb ai per acre).
19461	SureGuard 51WDG	Azalea	<i>Rhododendron sp.</i>	'Delaware Valley White'	Field Container	Ahrens/Mer vosh	2000	Broadcast	Unacceptable injury to actively growing azalea with 0.17 and 0.34 lb ai per acre; excellent weed control.
19461	SureGuard 51WDG	Azalea	<i>Rhododendron sp.</i>	'Delaware Valley White'	Field Container	Ahrens/Mer vosh	2001	Broadcast - Actively growing	Unacceptable injury to actively growing azalea with 0.17 and 0.34 lb ai per acre; good weed control.
19461	SureGuard 51WDG	Azalea	<i>Rhododendron sp.</i>	'Elsie Lee'	Field Container	Anderson	2002	Directed spray	No injury at 0.25, 0.5 or 1.0 lb ai per acre.
19461	SureGuard 51WDG	Azalea	<i>Rhododendron sp.</i>	'Formosa'	Field Container	Derr	2002	Over the top	Severe injury at all rates with complete mortality at 1.0 lb ai per acre; excellent control of spotted spurge and large crabgrass.
19490	SureGuard 51WDG	Rhododendron	<i>Rhododendron sp.</i>	R. catawbiense 'Roseum Elegans'	Field Container	Ahrens/Mer vosh	2000	Broadcast Over the top	Significant unacceptable injury with 0.17 and 0.34 lb ai per acre; excellent weed control.
19490	SureGuard 51WDG	Rhododendron	<i>Rhododendron sp.</i>	R. catawbiense 'Roseum Elegans'	Field Container	Ahrens/Mer vosh	2001	Broadcast - actively growing	Significant unacceptable injury with both rates (0.17 and 0.34 lb ai per acre) with over the top applications on actively growing Rhododendrons.

PR #	Product	Crop			Production Site	Researcher	Year	Application Method	Results Summary
		Common Name	Latin Name	Cultivar					
19461	SureGuard 51WDG	Azalea	<i>Rhododendron sp.</i>	R. eriocarpum 'Gumpo Pink'	Field Container	Gilliam	2001	Over the top	Minor to moderate transient injury increasing with rate (0.17, 0.34, 0.68 lb ai per acre); excellent weed control.
19461	SureGuard 51WDG	Azalea	<i>Rhododendron sp.</i>	'Stewartsonia'	Field Container	Altland	2002	Over the top	Moderate to severe injury increasing with rate (0.25, 0.5, 1.0 lb ai per acre).
25326	SureGuard 51WDG	Rose	<i>Rosa sp.</i>	'Nearly Wild'	Field Container	Lieth	2006	Over the top	Unacceptable injury and growth reduction at all rates
25326	SureGuard 51WDG	Rose	<i>Rosa sp.</i>	'Oranges & Lemons'	Field Container	Mathers	2006	Over the top	Significant damage increasing with rate (0.375, 0.75, 1.5 lb ai per acre).
25326	SureGuard 51WDG	Rose	<i>Rosa sp.</i>	R. virginiana	Field Container	Senesac	2006	Over the top	Very slight injury with complete recovery
25335	SureGuard 51WDG	Coneflower, Orange	<i>Rudbeckia fulgida speciosa</i>	'Goldstrum'	Field Container	Senesac	2006	Over the top	Slight injury increasing with rate (0.375, 0.75, 1.5 lb ai per acre), but plants were marketable.
25335	SureGuard 51WDG	Coneflower, Orange	<i>Rudbeckia fulgida speciosa</i>	'Viettas Little Suzie'	Field Container	Mathers	2006	Over the top	Significant injury increasing with rate (0.375, 0.75, 1.5 lb ai per acre) with mortality occurring in all treatments by 4 weeks after the second treatment.
20366	SureGuard 51WDG	Sage, Ramona	<i>Salvia sylvestris</i>		Field Container	Gilliam	2001	Ground	Mortality occurred with all rates (0.17, 0.34, and 0.68 lb ai per acre); excellent weed control.
23655	SureGuard 51WDG	Giant Sequoia; Red wood	<i>Sequoiadendron giganteum</i>		Field Container	Altland	2003	Over the top	No injury at 0.25, 0.5, and 1.0 lb ai per acre with a single application, but the second application during active growth did cause slight and sporadic injury.
19337	SureGuard 51WDG	Bridal-Wreath	<i>Spiraea sp.</i>	S. nipponica 'Snowmound'	Field Container	Ahrens/Mer vosh	2000	Broadcast over the top	Moderate injury with over the top applications of 0.17 and 0.34 lb ai per acre.
19337	SureGuard 51WDG	Bridal-Wreath	<i>Spiraea sp.</i>	S. nipponica 'Snowmound'	Field Container	Ahrens/Mer vosh	2001	Broadcast - actively growing	Moderate injury with over the top applications of 0.17 and 0.34 lb ai per acre on second year application of same plants; good weed control.
19337	SureGuard 51WDG	Bridal-Wreath	<i>Spiraea sp.</i>	S. x vanhouttei	Field Container	Altland	2002	Over the top	Slight to moderate injury increasing with rate (0.25, 0.5, 1.0 lb ai per acre).
20378	SureGuard 51WDG	Yew	<i>Taxus sp.</i>	T. cuspidata	Field In-Ground	Ahrens/Mer vosh	2000	Broadcast over the top	No injury at 0.17 and 0.34 lb ai per acre; great efficacy for large crabgrass and common ragweed.
20381	SureGuard 51WDG	Arborvitae	<i>Thuja sp.</i>	'Green Giant'	Field In-Ground	Hart	2003	Directed Spray	No injury with dormant applications and with second application at 0.25 and 0.5 lb ai per acre, but minor transient injury was observed after the second application of 1.0 lb ai per acre.

PR #	Product	Crop			Production Site	Researcher	Year	Application Method	Results Summary
		Common Name	Latin Name	Cultivar					
20296	SureGuard 51WDG	Arborvitae	<i>Thuja sp.</i>	'Smaragd'	Field Container	Altland	2003		No injury at 0.25, 0.5, and 1.0 lb ai per acre.
20296	SureGuard 51WDG	Arborvitae	<i>Thuja sp.</i>	T. occidentalis 'Smaragd'	Field Container	Altland	2002		No injury at 0.25, 0.5, and 1.0 lb ai per acre.
20368	SureGuard 51WDG	Jasmine, Asian	<i>Trachelospermum asiaticum</i>	'Green'	Field Container	Fraelich	2001	Over the top	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
20369	SureGuard 51WDG	Blueberry (Non-Bearing)	<i>Vaccinium sp.</i>	V. ashei 'Climax'	Field Container	Gilliam	2001	Ground	Moderate to severe injury increasing with rate (0.17, 0.34, 0.68 lb ai per acre); excellent weed control.
20370	SureGuard 51WDG	Vervain	<i>Verbena sp.</i>	'Homestead Purple'	Field Container	Anderson	2002	Directed spray	No injury at 0.25, 0.5, and 1.0 lb ai per acre.
25455	SureGuard 51WDG	Viburnum, arrowwood	<i>Viburnum dentatum</i>	'Autumn Jazz'	Field Container	Altland	2006	Over the top	Moderate injury at all rates (0.375, 0.75, 1.5 lb ai per acre).
25455	SureGuard 51WDG	Viburnum, arrowwood	<i>Viburnum dentatum</i>	V. dentatum L v 'Chicago Lustre'	Field Container	Beste/Frank	2006	Over the top	Moderate to significant injury at all rates (0.375, 0.75, 1.5 lb ai per acre); plants visibly recovered, however there was significant growth reductions.
25454	SureGuard 51WDG	Viburnum juddii	<i>Viburnum juddii</i>	V. carlesii	Field Container	Altland	2006	Over the top	High injury at 0.375, 0.75, and 1.5 lb ai per acre.
25454	SureGuard 51WDG	Viburnum juddii	<i>Viburnum juddii</i>	V. nudum 'Winterthur'	Field Container	Senesac	2006	Over the top	Slight injury at 0.375 lb ai per acre and moderate injury at 0.75 and 1.5 lb ai per acre.
20297	SureGuard 51WDG	Arrowwood	<i>Viburnum sp.</i>	V. carlesii	Field Container	Altland	2006	Over the top	Moderate to significant injury increasing with rate (0.375, 0.75, 1.5 lb ai per acre).
20297	SureGuard 51WDG	Arrowwood	<i>Viburnum sp.</i>	V. plicatum var tomentosum 'Mariesii'	Field Container	Neal	2001	Over the top	Significant injury at 0.34 lb ai per acre with little recovery.
20297	SureGuard 51WDG	Arrowwood	<i>Viburnum sp.</i>	V. x bodnantense 'Pink Dawn'	Field Container	Altland	2002	Over the top	Significant injury at 0.25, 0.5, and 1.0 lb ai per acre; excellent oxalis control.
25456	SureGuard 51WDG	Craneberry-bush	<i>Viburnum trilobum</i>	'Compactum'	Field Container	Senesac	2006	Over the top	No injury at 0.375, 0.75, and 1.0 lb ai per acre.
20371	SureGuard 51WDG	Periwinkle	<i>Vinca sp.</i>	V. minor	Field Container	Senesac	2006	Over the top	Slight injury at 0.375 lb ai per acre, moderate at 0.75 and 1.5 lb ai per acre.
20371	SureGuard 51WDG	Periwinkle	<i>Vinca sp.</i>	V. minor 'Bowles'	Field Container	Boydston	2003	Broadcast foliar	Slight delay in growth and flowering at 0.5 and 1.0 lb ai per acre, but by 10 WAT no differences were noted; excellent control of kochia with little control of grass weeds.

Table 10. Detailed Summary of Crop Safety Testing with Flumioxazin Granular Formulations.

Notes: Table entries are sorted by crop Latin name. Only flumioxazin reports received by 4/15/2007 are included in this table.

PR #	Product	Crop			Production Site	Researcher	Year	Application Method	Results Summary
		Common Name	Latin Name	Cultivar					
19951	BroadStar 0.17G	Abelia	<i>Abelia sp.</i>	A. grandiflora	Field Container	Gilliam	2002	Broadcast	No significant injury at 0.25, 0.5 or 1.0 lb ai per acre; excellent weed control.
19951	BroadStar 0.17G	Abelia	<i>Abelia sp.</i>	A. x grandiflora 'John Creech'	Field Container	Neal	2001	Broadcast	No injury after single application of 0.25, 0.5 and 1.0 lb ai per acre, but the highest rate did exhibit slight injury after the second application.
19951	BroadStar 0.17G	Abelia	<i>Abelia sp.</i>	A. x grandiflora 'Sherwoodii'	Field Container	Altland	2002	Broadcast - actively growing	Slight transient injury at all rates (0.25, 0.5, and 1.0 lb ai per acre).
19869	BroadStar 0.17G	Fir	<i>Abies sp.</i>	A. koreana	Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19954	BroadStar 0.17G	Maple, Amur	<i>Acer ginnala</i>		Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
20012	BroadStar 0.17G	Maple, Japanese	<i>Acer palmatum</i>		Field In-Ground	Anderson	2002	Broadcast to soil	No injury with 0.25, 0.5 or 1.0 lb ai per acre.
19955	BroadStar 0.25G	Maple, Japanese	<i>Acer palmatum</i>	'Atropurpureum'	Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19955	BroadStar 0.25G	Maple, Japanese	<i>Acer palmatum</i>	'Bloodgood'	Field Container	Anderson	2001	Broadcast over the top	No injury at 0.17, 0.34 or 0.68 lb ai per acre; good efficacy for hairy bittercress, yellow woodsorrel, hairy willowweed and dandelion.
19870	BroadStar 0.25G	Maple	<i>Acer sp.</i>	A. pennsylvanicum	Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19884	BroadStar 0.25G	Maple	<i>Acer sp.</i>	A. rubrum	Field In-Ground	Hart	2001	Ground broadcast	No injury at 0.17, 0.34 or 0.68 lb ai per acre.
19884	BroadStar 0.25G	Maple	<i>Acer sp.</i>	A. rubrum	Field In-Ground	Hitcher	2001	Ground broadcast	No injury at 0.17, 0.34 or 0.68 lb ai per acre.
19952	BroadStar 0.17G	Yarrow	<i>Achillea millefolium</i>	'Moonshine'	Field Container	Neal	2001	Broadcast	Injury observed at 0.17, 0.34, and 0.68 with some recovery seen at the two lower rates.
19952	BroadStar 0.17G	Yarrow	<i>Achillea millefolium</i>	'Red Beauty'	Field Container	Klett	2003	Soil	Fort Collins: Moderate injury to mortality occurred increasing with rate (0.25, 0.5, 1.0 lb ai per acre).
22935	BroadStar 0.25G	Mugwort, White	<i>Artemisia lactiflora</i>	A. schmidtiana	Field Container	Boydston	2003	Broadcast foliar	No injury after single application at all rates (0.25, 0.5, 1.0 lb ai per acre), but plants were beginning to go dormant at the second application so data is inconclusive.
22935	BroadStar 0.25G	Mugwort, White	<i>Artemisia lactiflora</i>	'Guizho'	Field Container	Klett	2002		No visual phytotoxicity at 0.25 and 0.5 lb ai per acre; good weed control.

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		Common Name	Latin Name	Cultivar					
22935	BroadStar 0.25G	Mugwort, White	<i>Artemisia lactiflora</i>	'Guizho'	Field Container	Klett	2002		No visual phytotoxicity at 0.25 and 0.5 lb ai per acre; good weed control. (second trial)
19961	BroadStar 0.25G	Fern, Japanese Painted	<i>Athyrium goeringianum</i>	'Pictum'	Field Container	Anderson	2001	Broadcast over the top	Minor to moderate injury with all treatments (0.17, 0.34 or 0.68 lb ai per acre), but plants were not marketable; excellent control of yellow woodsorrel and hairy willowweed.
26669	BroadStar 0.25G	Barberry	<i>Berberis sp.</i>		Field Container	Hart	2003	Ground	No injury at 0.25, 0.5 and 1.0 lb ai per acre.
19963	BroadStar 0.17G	Barberry	<i>Berberis sp.</i>	B. gladwynensii	Field Container	Hart	2001	Broadcast	No injury at 0.17, 0.34 or 0.68 lb ai per acre.
19963	BroadStar 0.17G	Barberry	<i>Berberis sp.</i>	B. thunbergii 'Atropurpurea'	Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
26669	BroadStar 0.25G	Barberry	<i>Berberis sp.</i>	B. thunbergii 'Rose Glow'	Field Container	Altland	2003	Broadcast	No visible injury or growth suppression at 0.25, 0.5 or 1.0 lb ai per acre.
19963	BroadStar 0.17G	Barberry	<i>Berberis sp.</i>	B. thunbergii 'Rosie Glow'	Field Container	Altland	2002	Broadcast at budbreak	Significant injury increasing with rate when applied at bud break, but no injury occurred with applications to mature foliage (0.25, 0.5 and 1.0 lb ai per acre).
19963	BroadStar 0.17G	Barberry	<i>Berberis sp.</i>	B. thunbergii var. atropurpurea (Rose Glow)	Field Container	Gilliam	2002	Broadcast	No phytotoxicity observed at 0.25, 0.5 or 1.0 lb ai per acre; good to excellent weed control.
19963	BroadStar 0.17G	Barberry	<i>Berberis sp.</i>	B. thunbergii 'William Penn'	Field Container	Hart	2000	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19963	BroadStar 0.17G	Barberry	<i>Berberis sp.</i>	'Rosy Glow'	Field Container	Derr	2002		No visible injury or growth suppression at 0.25, 0.5 or 1.0 lb ai per acre; good to excellent spurge control and large crabgrass control increased with rate.
19874	BroadStar 0.17G	Butterfly Bush	<i>Buddleia davidii</i>		Field Container	Gilliam	2002	Broadcast	Minor but transient injury at 0.5 and 1.0 lb ai per acre; excellent weed control.
19874	BroadStar 0.17G	Butterfly Bush	<i>Buddleia davidii</i>		Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19874	BroadStar 0.17G	Butterfly Bush	<i>Buddleia davidii</i>	'Black Knight'	Field Container	Neal	2002	Over the top	Very slight to moderate injury increasing with rate (0.25, 0.5, 1.0 lb ai per acre) with no injury from newly emerged leaves.
19874	BroadStar 0.17G	Butterfly Bush	<i>Buddleia davidii</i>	'Lochinch'	Field Container	Anderson	2001	Broadcast over the top	No injury at 0.17, 0.34 or 0.68 lb ai per acre.

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		Common Name	Latin Name	Cultivar					
19888	BroadStar 0.17G	Butterfly Bush	<i>Buddleia davidii</i>	'Lochinch'	Field In-Ground	Anderson	2001	Broadcast over the top	No injury at 0.17, 0.34 or 0.68 lb ai per acre.
19964	BroadStar 0.17G	Boxwood	<i>Buxus sp.</i>	B. microphylla	Field Container	Gilliam	2002	Broadcast	Minor but transient injury with 0.5 and 1.0 lb ai per acre; some control of spurge, but impact was lost by 90 DAT.
19964	BroadStar 0.17G	Boxwood	<i>Buxus sp.</i>	B. microphylla	Field Container	Neal	2001	Broadcast	No injury at 0.25, 0.34, 0.5 and 1.0 lb ai per acre.
19964	BroadStar 0.17G	Boxwood	<i>Buxus sp.</i>	B. microphylla	Field Container	Neal	2002	Over the top	No injury at 0.25, 0.5 and 1.0 lb ai per acre.
20021	BroadStar 0.17G	Boxwood	<i>Buxus sp.</i>	B. microphylla koreana	Field In-Ground	Beste	2000	Broadcast over the top	No injury with 0.17, 0.34 or 0.68 lb ai per acre; only 0.68 lb ai per acre provided excellent control of chickweed.
19964	BroadStar 0.17G	Boxwood	<i>Buxus sp.</i>	B. microphylla var. japonica	Field Container	Derr	2002	Broadcast	No visible injury or growth suppression at 0.25, 0.5 or 1.0 lb ai per acre; good to excellent control of spurge, large crabgrass control increased with rate.
19964	BroadStar 0.17G	Boxwood	<i>Buxus sp.</i>	'Green Velvet'	Field Container	Anderson	2001	Broadcast over the top	No injury at 0.17, 0.34 or 0.68 lb ai per acre.
20021	BroadStar 0.17G	Boxwood	<i>Buxus sp.</i>	'Velvet Green'	Field In-Ground	Anderson	2002	Broadcast to soil surface	No injury with 0.25, 0.5 or 1.0 lb ai per acre.
19964	BroadStar 0.17G	Boxwood	<i>Buxus sp.</i>	'Winter Gem'	Field Container	Klett	2003	Soil	Fort Collins: No injury or growth suppression at 0.25, 0.5 or 1.0 lb ai per acre.
19966	BroadStar 0.17G	Heather	<i>Calluna sp.</i>	C. vulgaris 'H.E.Beale'	Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
25021	BroadStar 0.25G	Camellia	<i>Camellia sp.</i>	'Bessie Battle'	Field Container	Gilliam	2005	Ground	No injury at 0.25, 0.5 and 1.0 lb ai per acre.
24814	BroadStar 0.25G	Sedge	<i>Carex sp.</i>	C. buchananii	Field Container	Boydston	2004	Broadcast foliar	No injury at 0.375, 0.75, and 1.5 lb ai per acre; great control of liverwort, dandelion, northern willow herb, and prickly lettuce.
19762	BroadStar 0.25G	Sedge	<i>Carex sp.</i>	C. buchananii	Field Container	Klett	2003	Soil	Grand Junction: no injury at 0.25, 0.5 and 1.0 lb ai per acre.
26145	BroadStar 0.25G	Cedar	<i>Cedrus deodara</i>		Field Container	Altland	2003	Broadcast	No visible injury at 0.25, 0.5, and 1.0 lb ai per acre.
19971	BroadStar 0.17G	Snow-In-Summer	<i>Cerastium tomentosum</i>		Field Container	Klett	2003	Soil	Fort Collins: No injury at 0.25 lb ai per acre, but moderate injury to mortality with 0.5 and 1.0 lb ai per acre.
23642	BroadStar 0.25G	False cypress	<i>Chamaecyparis obtusa</i>	'Templehof'	Field Container	Altland	2003	Broadcast	No injury or growth reduction with two applications of 0.25, 0.5, and 1.0 lb ai per acre.

PR #	Product	Crop			Production Site	Researcher	Year	Application Method	Results Summary
		Common Name	Latin Name	Cultivar					
19972	BroadStar 0.17G	Summersweet	<i>Clethra alnifolia</i>		Field Container	Anderson	2001	Broadcast over the top	No injury at 0.17, 0.34 or 0.68 lb ai per acre.
20029	BroadStar 0.17G	Summersweet	<i>Clethra alnifolia</i>		Field In-Ground	Beste/Frank	2005	Over the top broadcast	Slight injury at 0.25 and 0.5 lb ai per acre and moderate injury at 1.0 lb ai per acre after first application onto new foliage, but no significant injury after second application and no impact on flower spike number or plant growth.
26670	BroadStar 0.25G	Summersweet	<i>Clethra alnifolia</i>	C. japonica	Field Container	Gilliam	2003	Ground	Some injury appeared over time with 0.375, 0.75 and 1.5 lb ai per acre, however a number of plants died in the untreated controls so interpretation of phytotoxicity impact is confounding; good weed control.
26670	BroadStar 0.25G	Summersweet	<i>Clethra alnifolia</i>	'Hummingbird'	Field Container	Hart	2003	Broadcast	Slight injury at 0.25 and 0.5 lb ai per acre; moderate at 1.0 lb ai per acre.
19973	BroadStar 0.17G	Cleyera	<i>Cleyera japonica</i>		Field Container	Gilliam	2001	Broadcast - Actively Growing material	Slight injury but commercially acceptable at all rates (0.17, 0.34, and 0.68 lb ai per acre); excellent weed control.
19973	BroadStar 0.17G	Cleyera	<i>Cleyera japonica</i>		Field Container	Gilliam	2002	Broadcast - Actively growing	Slight to moderate injury increasing with rate (0.25, 0.5 and 1.0 lb ai per acre) with only the highest rate demonstrating slight injury at 90 DAT, but after second application all treatments resulted in marked but transient injury; good weed control.
19866	BroadStar 0.17G	Dogwood, Flowering	<i>Cornus florida</i>		Field Container	Anderson	2002	Broadcast to soil	No injury with 0.25, 0.5 or 1.0 lb ai per acre.
19974	BroadStar 0.17G	Dogwood, Red Osier	<i>Cornus sericea</i>		Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19764	BroadStar 0.25G	Pampas Grass	<i>Cortaderia</i>	C. selloana	Field Container	Gilliam	2004	Ground	Very slight transient injury at 0.5 and 1.0 lb ai per acre with no injury at 0.25 lb ai per acre; great weed control.
19823	BroadStar 0.25G	Pampas Grass	<i>Cortaderia</i>	C. selloana	Field In-Ground	Beste/Frank	2005	Ground directed broadcast spray	Transient, moderate injury increasing with rate (0.375, 0.75, 1.5 lb ai per acre) with significant growth reduction; excellent weed control.
19764	BroadStar 0.25G	Pampas Grass	<i>Cortaderia</i>	C. selloana 'Hoffman No. 5'	Field Container	Beste/Frank	2005	Broadcast	Moderate to significant injury increasing with rate (0.375, 0.75, 1.5 lb ai per acre) but plants recovered and were marketable at the end of the experiment.

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		Common Name	Latin Name	Cultivar					
19764	BroadStar 0.25G	Pampas Grass	<i>Cortaderia</i>	C. selloana 'Rosea'	Field Container	Ahrens/Mer vosh	2003	Over the top	Very slight injury increasing with rate (0.25, 0.5, 1.0 lb ai per acre).
19976	BroadStar 0.17G	Cotoneaster	<i>Cotoneaster sp.</i>	C. dammeri 'Coral Beauty'	Field Container	Neal	2002	Over the top	No injury at 0.25 lb ai per acre, but slight to moderate injury was observed with 0.5 and 1.0 lb ai per acre with plants recovering by the end of the study.
19976	BroadStar 0.17G	Cotoneaster	<i>Cotoneaster sp.</i>	C. lucidus	Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19976	BroadStar 0.17G	Cotoneaster	<i>Cotoneaster sp.</i>	'Striebs Findling'	Field Container	Anderson	2001	Broadcast over the top	No injury at 0.17, 0.34 or 0.68 lb ai per acre.
25297	BroadStar 0.25G	Mexican Heather, False Heather, Elfin Herb	<i>Cuphea hyssopifolia</i>		Field In-Ground	Chen	2005		Severe injury and mortality over time with all rates (0.375, 0.75, 1.5 lb ai per acre).
19908	BroadStar 0.17G	Cypress	<i>Cupressus sp.</i>		Field Container	Hitcher	2002	Broadcast over the top	No injury at 0.25, 0.5 and 1.0 lb ai per acre.
19978	BroadStar 0.17G	Broom	<i>Cytisus sp.</i>	C. purgans	Field Container	Klett	2003	Soil	Grand Junction: No injury at 0.25, 0.5 and 1.0 lb ai per acre.
19980	BroadStar 0.17G	Daphne	<i>Daphne sp.</i>	D. odora 'Aureo-marginata'	Field Container	Neal	2001	Broadcast	The only injury observed was where granules adhered to the foliage with no injury apparent after 4 weeks (0.25 and 0.5 lb ai per acre).
19765	BroadStar 0.17G	Hardy Ice Plant, Yellow Ice Plant	<i>Delosperma nubigenum</i>	D. alba	Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19766	BroadStar 0.25G	Hair Grass	<i>Deschampsia sp.</i>	'Goldehaedge'	Field Container	Anderson	2001	Broadcast over the top	No injury at 0.17, 0.34 or 0.68 lb ai per acre.
19979	BroadStar 0.25G	Pride-of-Rochester	<i>Deutzia sp.</i>	'Nikko'	Field Container	Anderson	2001	Broadcast over the top	Slight to significant injury increasing with rate (0.17, 0.34, 0.68 lb ai per acre).
20007	BroadStar 0.17G	Russian Olive	<i>Elaeagnus angustifolia</i>		Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19982	BroadStar 0.17G	Heath	<i>Erica sp.</i>	E. cinerea 'Purple Beauty'	Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
20156	BroadStar 0.17G	Winged Burning Bush	<i>Euonymus alatus</i>		Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19773	BroadStar 0.17G	Blue Fescue	<i>Festuca ovina glauca</i>		Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
26672	BroadStar 0.25G	Blue Fescue	<i>Festuca ovina glauca</i>	'Elijah Blue'	Field Container	Ahrens/Mer vosh	2003	Over the top	No injury at 0.25 lb ai per acre and very slight at 0.5 and 1.0 lb ai per acre; excellent control of large crabgrass and common groundsel.
19773	BroadStar 0.17G	Blue Fescue	<i>Festuca ovina glauca</i>	'Elijah Blue'	Field Container	Klett	2003		Grand Junction: No injury at 0.25, 0.5 and 1.0 lb ai per acre.

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19984	BroadStar 0.17G	Golden Bells	<i>Forsythia sp.</i>	F. suspensa	Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19984	BroadStar 0.17G	Golden Bells	<i>Forsythia sp.</i>	F. x intermedia	Field Container	Gilliam	2002	Broadcast	No injury at 0.25, 0.5 or 1.0 lb ai per acre; some control of weeds in this trial as measured by percent cover.
19871	BroadStar 0.17G	Ash	<i>Fraxinus sp.</i>	F. americana	Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19912	BroadStar 0.25G	Ash	<i>Fraxinus sp.</i>	F. pennsylvanica	Field In-Ground	Hitcher	2001	Broadcast	No injury at 0.17, 0.34 or 0.68 lb ai per acre.
19985	BroadStar 0.25G	Jasmine, Cape, Common Gardenia	<i>Gardenia sp.</i>		Field Container	Gilliam	2005	Ground	No injury at 0.25, 0.5 and 1.0 lb ai per acre.
19985	BroadStar 0.25G	Jasmine, Cape, Common Gardenia	<i>Gardenia sp.</i>	G. jasminoides 'Klines Hardy'	Field Container	Gilliam	2003	Ground	No to very slight injury was observed (0.375, 0.75, 1.5 lb ai per acre); excellent weed control.
19775	BroadStar 0.17G	Treasure Flower	<i>Gazania sp.</i>	'Sunshine Improved Mix'	Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19987	BroadStar 0.17G	Carolinia Jessamine; Evening Trumpet Flower	<i>Gelsemium sp.</i>	G. sempervirens	Field Container	Gilliam	2002	Broadcast	Injury (brown spots on upper leaf surfaces) only observed at 1.0 lb ai per acre; good to great control of oxalis.
19872	BroadStar 0.17G	Honey Locust	<i>Gleditsia sp.</i>	G. tricanthos	Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19776	BroadStar 0.17G	Baby's-Breath	<i>Gypsophila elegans</i>		Field Container	Anderson	2001	Broadcast over the top	No injury at 0.17, 0.34 or 0.68 lb ai per acre.
19835	BroadStar 0.17G	Baby's-Breath	<i>Gypsophila elegans</i>		Field In-Ground	Anderson	2001	Broadcast over the top	No injury at 0.17, 0.34 or 0.68 lb ai per acre.
19776	BroadStar 0.17G	Baby's-Breath	<i>Gypsophila elegans</i>	'Gypsy'	Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19777	BroadStar 0.17G	Hakone Grass, Japanese Forest Grass	<i>Hakonechloa sp.</i>	'Aureola'	Field Container	Klett	2003	Soil	No injury at 0.25 or 0.5 lb ai per acre, but 1.0 lb ai per acre reduced growth.
19779	BroadStar 0.17G	English Ivy	<i>Hedera helix L. ssp. Helix</i>		Field Container	Anderson	2001	Broadcast over the top	No injury at 0.17, 0.34 or 0.68 lb ai per acre.
19779	BroadStar 0.17G	English Ivy	<i>Hedera helix L. ssp. Helix</i>		Field Container	Derr	2001	Broadcast over the top	No injury at 0.17, 0.34 or 0.68 lb ai per acre.
19779	BroadStar 0.17G	English Ivy	<i>Hedera helix L. ssp. Helix</i>		Field Container	Gilliam	2002	Broadcast	No significant injury at 0.25, 0.5, and 1.0 lb ai per acre; weed control increased with rate.
19779	BroadStar 0.17G	English Ivy	<i>Hedera helix L. ssp. Helix</i>	H. colchica dentata	Field Container	Hitcher	2002	Broadcast over the top	No injury at 0.25, 0.5 and 1.0 lb ai per acre.

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19780	BroadStar 0.17G	Daylily	<i>Hemerocallis sp.</i>		Field Container	Gilliam	2001	Broadcast	Slight to moderate injury increasing with rate (0.17, 0.34, 0.68 lb ai per acre), but by 90 DAT the injury was not significantly different than untreated; excellent control of spurge.
19780	BroadStar 0.17G	Daylily	<i>Hemerocallis sp.</i>		Field Container	Fraelich	2002	Broadcast	No phyto at 0.25 lb ai per acre, and very slight phyto at 0.5 and 1.0 lb ai per acre
19780	BroadStar 0.17G	Daylily	<i>Hemerocallis sp.</i>	'Campfire Embers'	Field Container	Linderman	2001		No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19780	BroadStar 0.17G	Daylily	<i>Hemerocallis sp.</i>	'Janice Brown'	Field Container	Hitcher	2002	Broadcat over the top	No injury at 0.25, 0.5 and 1.0 lb ai per acre.
19780	BroadStar 0.17G	Daylily	<i>Hemerocallis sp.</i>	'Ming Toy'	Field Container	Knight	2002	Ground	Moderate injury increasing with rate (0.25, 0.5, 1.0 lb ai per acre) with some minimal recovery.
19780	BroadStar 0.17G	Daylily	<i>Hemerocallis sp.</i>	'Red Cadet'	Field Container	Hart	2000	Broadcast	Severe leaf burning and growth reductions after single application of 0.17, 0.34, and 0.68 lb ai per acre.
19780	BroadStar 0.17G	Daylily	<i>Hemerocallis sp.</i>	'Stella d'Oro'	Field Container	Beste	2000	Broadcast over the top	Slight, transient chlorosis at 0.17, 0.34, and 0.68 lb ai per acre.
19780	BroadStar 0.17G	Daylily	<i>Hemerocallis sp.</i>	'Stella d'Oro'	Field Container	Derr	2001	Over the top	Slight transient injury at 0.17, 0.34, and 0.68 lb ai per acre; great pre-emergent control of yellow woodsorrel.
19781	BroadStar 0.17G	Hosta	<i>Hosta sp.</i>	H. fortunei 'Francee'	Field Container	Derr	2001	Over the top	Moderate to significant injury increasing with rate (0.17, 0.34, and 0.58 lb ai per acre); good to excellent control of spotted prostrate spurge.
19781	BroadStar 0.17G	Hosta	<i>Hosta sp.</i>	H. nigrescens 'Eliator'	Field Container	Gilliam	2002	Broadcast	Significant injury occurred with all rates (0.25, 0.5 and 1 lb ai per acre), with only the 0.25 lb ai per acre recovering by 90 DAT; good weed control.
19781	BroadStar 0.17G	Hosta	<i>Hosta sp.</i>	H. plantaginea 'Albo Marginata'	Field Container	Hart	2001	Broadcast	Significant leaf burning and growth reductions occurred at 0.17, 0.34, and 0.68 lb ai per acre.
20155	BroadStar 0.17G	Hydrangea	<i>Hydrangea sp.</i>	H. arborescens 'Annabelle'	Field Container	Klett	2003	Soil	Fort Collins: Moderate chlorosis to necrosis increasing in severity with rate (0.25, 0.5, 1.0 lb ai per acre).
20155	BroadStar 0.17G	Hydrangea	<i>Hydrangea sp.</i>	H. macrophylla 'Nikko Blue'	Field Container	Fraelich	2002	Broadcast	No injury at 0.25 and 0.5 lb ai per acre, slight at 1.0 lb ai per acre.
20154	BroadStar 0.25G	Hydrangea	<i>Hydrangea sp.</i>	H. quercifolia	Field Container	Hart	2003	Ground	Slight injury at 0.25 lb ai per acre with severe injury at 1.0 lb ai per acre.

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20155	BroadStar 0.17G	Hydrangea	<i>Hydrangea sp.</i>	'Sister Teresa'	Field Container	Gilliam	2002	Broadcast	Significant injury even mortality with 0.5 and 1.0 lb ai per acre; good weed control.
19783	BroadStar 0.17G	Candytuft	<i>Iberis sp.</i>	I. pygmae	Field Container	Anderson	2002	Granular to soil surface	No injury with 0.25, 0.5 or 1.0 lb ai per acre.
19783	BroadStar 0.17G	Candytuft	<i>Iberis sp.</i>	'Iceber Superior'	Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19989	BroadStar 0.17G	Holly	<i>Ilex sp.</i>	'Berry Heavy/Southern Giant'	Field Container	Hitcher	2002	Broadcast over the top	No injury at 0.25, 0.5 and 1.0 lb ai per acre.
19989	BroadStar 0.17G	Holly	<i>Ilex sp.</i>	I. cornuta 'Dwarf Buford'	Field Container	Neal	2002	Over the top	No injury with 0.25, 0.5, and 1.0 lb ai per acre.
19989	BroadStar 0.17G	Holly	<i>Ilex sp.</i>	I. crenata compacta	Field Container	Derr	2002	Broadcast	No injury with 0.25, 0.5 or 1.0 lb ai per acre; excellent spurge control and large crabgrass control increased with rate.
19989	BroadStar 0.17G	Holly	<i>Ilex sp.</i>	I. crenata compacta	Field Container	Gilliam	2002	Broadcast	No injury with 0.25 and 0.5 lb ai per acre and slight transient with 1.0 lb ai per acre; good weed control.
19989	BroadStar 0.17G	Holly	<i>Ilex sp.</i>	I. crenata 'Compacta'	Field Container	Gilliam	2001	Broadcast	No injury at 0.17, 0.34 and 0.68 lb ai per acre.
20046	BroadStar 0.17G	Holly	<i>Ilex sp.</i>	I. crenata 'Compacta'	Field In-Ground	Beste	2000	Broadcast over the top	Slight injury at 0.34 and 0.68 lb ai per acre, but none at 0.17 lb ai per acre; morningglory, annual chickweed, knawl, maretail and barnyardgrass were controlled at all rates.
20046	BroadStar 0.17G	Holly	<i>Ilex sp.</i>	I. crenata 'Green Lustre'	Field In-Ground	Beste	2000	Broadcast over the top	Unacceptable injury at 0.17, 0.34, and 0.68 lb ai per acre; no control of yellow nutsedge and limited control of barnyardgrass.
19989	BroadStar 0.17G	Holly	<i>Ilex sp.</i>	I. crenata 'Honey Bee'	Field Container	Hart	2000	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
20046	BroadStar 0.17G	Holly	<i>Ilex sp.</i>	I. glabra 'Compacta'	Field In-Ground	Beste	2000	Broadcast over the top	Slight but acceptable injury increasing with rate (0.17, 0.34, 0.68 lb ai per acre); excellent control of chickweed, prostrate spurge and maretail, but marginal control of ivyleaf morningglory, yellow nutsedge, Eclipta, smooth crabgrass, grasses and Poa annua.
19989	BroadStar 0.17G	Holly	<i>Ilex sp.</i>	I. x meserveae 'Blue Girl'	Field Container	Hitcher	2002	Broadcast over the top	No injury at 0.25, 0.5 and 1.0 lb ai per acre.

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20046	BroadStar 0.17G	Holly	<i>Ilex sp.</i>	I. x meserveae 'Blue Girl' 'Blue Boy'	Field In-Ground	Ahrens/Mer vosh	2000	Broadcast over the top	Slight to moderate injury increasing with rate (0.17, 0.34, 0.68 lb ai per acre) with recovery occurring in 6 weeks to an acceptable level at the two lower rates; moderate suppression of mugwort.
19989	BroadStar 0.17G	Holly	<i>Ilex sp.</i>	I. x meserveae 'Blue Prince'	Field Container	Altland	2002	Broadcast	No injury with single application prior to bud break, but slight injury (foliar spotting) increasing with rate (0.25, 0.5 and 1.0 lb ai per acre) after second application onto new foliage.
19989	BroadStar 0.17G	Holly	<i>Ilex sp.</i>	I. x meserveae 'Blue Prince' & 'Blue Princess'	Field Container	Anderson	2001	Broadcast over the top	No injury at 0.17, 0.34 and 0.68 lb ai per acre.
19784	BroadStar 0.17G	Jasmine, Jessamine	<i>Jasminum sp.</i>	J. nudiflorum	Field Container	Knight	2002	Ground	Significant damage at all rates (0.25, 0.5, 1.0 lb ai per acre).
19864	BroadStar 0.17G	Juniper	<i>Juniperus sp.</i>	J. communis 'Effusa'	Field Container	Altland	2002	Broadcast	No injury with 0.25, 0.5 or 1.0 lb ai per acre.
19864	BroadStar 0.17G	Juniper	<i>Juniperus sp.</i>	J. conferta 'Blue Pacific'	Field Container	Beste	2000	Broadcast over the top	No injury at 0.17, 0.34, or 0.68 lb ai per acre.
19864	BroadStar 0.17G	Juniper	<i>Juniperus sp.</i>	J. conferta 'Blue Pacific'	Field Container	Gilliam	2002	Broadcast	No injury at 0.25, 0.5 or 1.0 lb ai per acre; good weed control.
19875	BroadStar 0.25G	Juniper	<i>Juniperus sp.</i>	J. conferta 'Blue Pacific'	Field Container	Gilliam	2003	Ground	No injury at 0.375, 0.75, and 1.5 lb ai per acre; great weed control.
19864	BroadStar 0.17G	Juniper	<i>Juniperus sp.</i>	J. conferta 'Blue Pacific'	Field Container	Neal	2002	Over the top	No injury with 0.25, 0.5 or 1.0 lb ai per acre.
19864	BroadStar 0.17G	Juniper	<i>Juniperus sp.</i>	J. horizontalis 'Bar Harbor'	Field Container	Ahrens/Mer vosh	2000	Broadcast	No injury at 0.17, 0.34, or 0.68 lb ai per acre.
19864	BroadStar 0.17G	Juniper	<i>Juniperus sp.</i>	J. horizontalis 'Bar Harbor'	Field Container	Ahrens/Mer vosh	2001	Broadcast - actively growing	No injury at 0.17, 0.34, or 0.68 lb ai per acre with second year applications on same plants.
19864	BroadStar 0.17G	Juniper	<i>Juniperus sp.</i>	J. horizontalis 'Wiltonii'	Field Container	Neal	2001	Broadcast over the top	No injury at 0.25, 0.34, 0.5 and 1.0 lb ai per acre.
19864	BroadStar 0.17G	Juniper	<i>Juniperus sp.</i>	J. rigida	Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19864	BroadStar 0.17G	Juniper	<i>Juniperus sp.</i>	J. squamata 'Blue Star'	Field Container	Ahrens/Mer vosh	2000	Broadcast	No injury with 0.17, 0.34 or 0.68 lb ai per acre.
19864	BroadStar 0.17G	Juniper	<i>Juniperus sp.</i>	J. squamata 'Blue Star'	Field Container	Ahrens/Mer vosh	2001	Broadcast - actively growing	No injury at 0.17, 0.34 or 0.68 lb ai per acre with second year applications on same plants; excellent weed control.
19864	BroadStar 0.17G	Juniper	<i>Juniperus sp.</i>	J. squamata parsoni	Field Container	Fraelich	2002	Broadcast	No injury at 0.25, 0.5, and 1.0 lb ai per acre.

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19893	BroadStar 0.17G	Crape Myrtle	<i>Lagerstroemia indica</i>	'Tuscarora'	Field Container	Gilliam	2001	Broadcast	Slight injury increasing with rate (0.17, 0.34, 0.68 lb ai per acre), but not apparent at 90DAT; excellent weed control.
25694	BroadStar 0.25G	Crape Myrtle	<i>Lagerstroemia indica</i>	'Tuscarora'	Field Container	Gilliam	2003	Ground	No injury at 0.375, 0.75, or 1.5 lb ai per acre; excellent weed control.
19893	BroadStar 0.17G	Crape Myrtle	<i>Lagerstroemia indica</i>	'Tuscarora'	Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
25694	BroadStar 0.25G	Crape Myrtle	<i>Lagerstroemia indica</i>	'Zuni'	Field Container	Gilliam	2005	Ground	No injury at 0.25, 0.5 and 1.0 lb ai per acre.
24983	BroadStar 0.25G	Shrub Verbena	<i>Lantana sp.</i>	'New Gold'	Field In-Ground	Chen	2005	Broadcast	Slight injury at 0.375 and 0.75 lb ai per acre, high at 1.5 lb ai per acre.
25023	BroadStar 0.25G	Privet	<i>Ligustrum sp.</i>		Field Container	Gilliam	2005	Ground	No significant injury at 0.25, 0.5 and 1.0 lb ai per acre.
19788	BroadStar 0.17G	Lilyturf, Big Blue;Giant	<i>Liriope muscari</i>	'Big Blue'	Field Container	Beste	2000	Broadcast	No injury observed with 0.17, 0.34, or 0.68 lb ai per acre.
19788	BroadStar 0.17G	Lilyturf, Big Blue;Giant	<i>Liriope muscari</i>	'Big Blue'	Field Container	Gilliam	2002	Broadcast	No injury observed with 0.25, 0.5 and 1.0 lb ai per acre; good weed control.
19788	BroadStar 0.17G	Lilyturf, Big Blue;Giant	<i>Liriope muscari</i>	L. spicata 'Big Blue'	Field Container	Gilliam	2001	Broadcast	Minor, but transient, with 0.17, 0.34, 0.68 lb ai per acre.
19788	BroadStar 0.17G	Lilyturf, Big Blue;Giant	<i>Liriope muscari</i>	'Variegata'	Field Container	Anderson	2002	Broadcast to soil surface	No injury with 0.25, 0.5, and 1.0 lb ai per acre.
19789	BroadStar 0.25G	Lilyturf, Creeping	<i>Liriope sp.</i>		Field Container	Gilliam	2004	Ground	Minor injury at 0.25, 0.5 and 1.0 lb ai per acre.
19891	BroadStar 0.17G	Lilyturf, Creeping	<i>Liriope sp.</i>	'Big Blue'	Field Container	Fraelich	2002	Broadcast	No injury at 0.25 and 0.5 lb ai per acre, slight at 1.0 lb ai per acre.
19848	BroadStar 0.25G	Lilyturf, Creeping	<i>Liriope sp.</i>	'Big Blue'	Field In-Ground	Chen	2005	Broadcast	Moderate injury (0.375, 0.75, 1.5 lb ai per acre).
19891	BroadStar 0.17G	Lilyturf, Creeping	<i>Liriope sp.</i>	L. muscari 'Variegata'	Field Container	Derr	2001	Over the top	Slight injury at all rates (0.17, 0.34, 0.68 lb ai per acre), but no impact on fresh weight or number of flower spikes.
19891	BroadStar 0.17G	Lilyturf, Creeping	<i>Liriope sp.</i>	L. muscari 'Variegata'	Field Container	Neal	2002	Over the top on actively growing plants	Moderate injury as exhibited by necrotic spots increasing with rate (0.25, 0.5, 1.0 lb ai per acre); foliage emerging after treatment was not visibly affected, but plants treated with 1.0 lb ai per acre were stunted.
19789	BroadStar 0.25G	Lilyturf, Creeping	<i>Liriope sp.</i>	L. spicata	Field Container	Gilliam	2003	Ground	Very slight, transient injury was observed at all rates (0.375, 0.75, 1.5 lb ai per acre); excellent weed control.
19990	BroadStar 0.17G	Honeysuckle	<i>Lonicera sp.</i>	L. japonica	Field Container	Gilliam	2002	Broadcast	No phytotoxicity was observed at 0.25, 0.5 and 1.0 lb ai per acre; good weed control.

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		Common Name	Latin Name	Cultivar					
19990	BroadStar 0.17G	Honeysuckle	<i>Lonicera sp.</i>	L. tartarica 'Arnold Red'	Field Container	Klett	2003	Soil	Grand Junction: All rates (0.25, 0.5, 1.0 lb ai per acre) caused veinal chlorosis and leaf cupping.
24751	BroadStar 0.25G	Loropetalum	<i>Loropetalum sp.</i>	L. chinense 'Ruby'	Field Container	Gilliam	2005	Ground	No injury at 0.25, 0.5 and 1.0 lb ai per acre.
19790	BroadStar 0.17G	Oregon Grape	<i>Mahonia aquifolium</i>		Field Container	Klett	2003	Soil	No injury at 0.25, 0.5 and 1.0 lb ai per acre.
19992	BroadStar 0.25G	Wax Myrtle	<i>Myrica cerifera</i>		Field Container	Gilliam	2003	Ground	No injury at 0.375 lb ai per acre and very slight injury with 0.75 and 1.5 lb ai per acre; excellent weed control.
23662	BroadStar 0.17G	Bayberry	<i>Myrica pensylvanica</i>		Field Container	Hart	2001	Broadcast	No injury at 0.17, 0.34 and 0.68 lb ai per acre.
26668	BroadStar 0.25G	Bayberry	<i>Myrica pensylvanica</i>		Field Container	Hart	2003	Broadcast	No injury at 0.25, 0.5 and 1.0 lb ai per acre.
20050	BroadStar 0.25G	Heavenly Bamboo	<i>Nandina domestica</i>		Field In-Ground	Beste/Frank	2005	Ground Broadcast	Moderate to significant injury and decreased growth increasing with rate (0.375, 0.75, 1.5 lb ai per acre) but plants exhibited minimal visible phytotoxicity at trial's end.
19993	BroadStar 0.17G	Heavenly Bamboo	<i>Nandina domestica</i>	'Firepower'	Field Container	Neal	2001	Broadcast over the top	No injury after single application, however after the second application slight to moderate injury occurred at all rates (0.25, 0.34, 0.5, and 1.0 lb ai per acre).
19851	BroadStar 0.25G	Mondo Grass, Lilyturf, Ker-Gawl	<i>Ophiopogon sp.</i>	O. japonicus	Field Container	Fain	2003	Broadcast over the top	Slight injury at all rates (0.25, 0.5, 1.0 lb ai per acre): excellent weed control.
19792	BroadStar 0.17G	Mondo Grass, Lilyturf, Ker-Gawl	<i>Ophiopogon sp.</i>	O. japonicus	Field Container	Gilliam	2002	Broadcast	None to minor injury increasing with rate (0.25, 0.5 and 1.0 lb ai per acre) with the 0.5 rate exhibiting transient phytotoxicity; good to excellent weed control.
24960	BroadStar 0.17G	Hopflower Oregano	<i>Origanum libanoticum</i>		Field Container	Klett	2002	Ground	No injury at 0.25 and 0.5 lb ai per acre; excellent weed control.
24960	BroadStar 0.17G	Hopflower Oregano	<i>Origanum libanoticum</i>		Field Container	Klett	2002	Ground	No injury at 0.25 and 0.5 lb ai per acre; good to excellent weed control.
19793	BroadStar 0.17G	African Daisy	<i>Osteospermum sp.</i>	'Gaiety Orange'	Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19794	BroadStar 0.17G	Japanese Spurge	<i>Pachysandra terminalis</i>	'Green Sheen'	Field Container	Klett	2003	Soil	No injury at 0.25, 0.5 and 1.0 lb ai per acre.
19854	BroadStar 0.17G	Fountain Grass	<i>Pennisetum setaceum</i>	'Hamelin'	Field In-Ground	Anderson	2002	Granular to soil surface	No injury at 0.25, 0.5 and 1.0 lb ai per acre.
19795	BroadStar 0.17G	Fountain Grass	<i>Pennisetum setaceum</i>	'Hameln'	Field Container	Anderson	2001	Broadcast over the top	No injury at 0.17, 0.34, and 0.68 lb ai per acre.

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19855	BroadStar 0.25G	Ribbon-Grass, Gardeners-Garters	<i>Phalaris arundinacea</i>		Field Container	Boydston	2003	Broadcast foliar	Minor to severe necrosis increasing with rate (0.375, 0.75, 1.5 lb ai per acre).
19796	BroadStar 0.17G	Ribbon-Grass, Gardeners-Garters	<i>Phalaris arundinacea</i>	'Feesey's Form'	Field Container	Anderson	2002	Granular to soil surface	Moderate to severe chlorosis and necrosis increasing with rate (0.25, 0.5 and 1.0 lb ai per acre).
19796	BroadStar 0.17G	Ribbon-Grass, Gardeners-Garters	<i>Phalaris arundinacea</i>	'Picta'	Field Container	Klett	2003	Soil	No injury at 0.25 and 0.5 lb ai per acre and only slight reduction in plant size with 1.0 lb ai per acre.
24987	BroadStar 0.25G	Phlox	<i>Phlox sp.</i>	'Candy Strip'	Field In-Ground	Chen	2005	Broadcast	Minor to moderate injury after first application increasing with rate (0.375, 0.75, 1.5 lb ai per acre) but severe injury and mortality occurred after second at all rates.
19881	BroadStar 0.25G	Spruce	<i>Picea sp.</i>	P. abies 'Nidiformis'	Field Container	Altland	2003	Broadcast	No injury at 0.25, 0.5 and 1.0 lb ai per acre.
19881	BroadStar 0.25G	Spruce	<i>Picea sp.</i>	P. glauca conica	Field Container	Altland	2003	Broadcast	No injury at 0.25, 0.5 and 1.0 lb ai per acre.
19867	BroadStar 0.17G	Spruce	<i>Picea sp.</i>	P. omorika	Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
20054	BroadStar 0.25G	Andromeda	<i>Pieris sp.</i>	'Dorothy Wycoff'	Field In-Ground	Beste/Frank	2005	Ground Broadcast	No significant injury
19997	BroadStar 0.17G	Andromeda	<i>Pieris sp.</i>	P. japonica 'Flamingo'	Field Container	Anderson	2001	Broadcast over the top	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19997	BroadStar 0.17G	Andromeda	<i>Pieris sp.</i>	P. japonica v yakushimanum 'Brouwer's Beauty'	Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19997	BroadStar 0.17G	Andromeda	<i>Pieris sp.</i>	P. japonica 'Valley Valentine'	Field Container	Altland	2002	Broadcast	Single application prior to bud break caused slight injury at only the highest rate of 1.0 lb ai per acre; no visible injury occurred after the second application at any rate, but 1.0 lb ai per acre did cause stunting.
19998	BroadStar 0.17G	Pine, Mugo & Mugho	<i>Pinus mugo ssp. Mugo</i>		Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19928	BroadStar 0.17G	Pine, Mugo & Mugho	<i>Pinus mugo ssp. Mugo</i>		Field In-Ground	Anderson	2001	Broadcast over the top	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
26673	BroadStar 0.25G	Pine, Mugo & Mugho	<i>Pinus mugo ssp. Mugo</i>	'pumilo'	Field Container	Altland	2003	Broadcast	No injury at 0.25, 0.5, and 1.0 lb ai per acre.
23644	BroadStar 0.25G	Pine, Austrian	<i>Pinus nigra</i>		Field Container	Altland	2003	Broadcast	No injury at 0.25, 0.5 and 1.0 lb ai per acre.

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19929	BroadStar 0.25G	Pine, Austrian	<i>Pinus nigra</i>		Field In-Ground	Beste/Frank	2005	Granular Broadcast	Slight injury increasing with rate (0.25, 0.5, 1.0 lb ai per acre), but all plants marketable at end of the study; good weed control.
19868	BroadStar 0.17G	Pine	<i>Pinus sp.</i>	P. bungeana	Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19999	BroadStar 0.17G	Pittosporum, Japanese	<i>Pittosporum tobira</i>	'Wheeler's Dwarf'	Field Container	Neal	2002	Over the top	No significant injury with 0.25 lb ai per acre, but injury to new growth was observed at 0.5 and 1.0 lb ai per acre. Researcher noted that if applications occur when tender new growth is not present it is unlikely for phytotoxicity to be observed.
20001	BroadStar 0.25G	Southern Yew	<i>Podocarpus macrophyllus</i>		Field Container	Gilliam	2004	Ground	No injury at 0.25, 0.5 and 1.0 lb ai per acre.
20003	BroadStar 0.17G	Cinquefoil	<i>Potentilla sp.</i>	P. fruticosa 'Gold Finger'	Field Container	Ahrens/Mer vosh	2000	Broadcast	No injury at 0.17, 0.34 or 0.68 lb ai per acre; excellent efficacy.
20003	BroadStar 0.17G	Cinquefoil	<i>Potentilla sp.</i>	P. fruticosa 'Gold Finger'	Field Container	Ahrens/Mer vosh	2001	Broadcast	No injury with 0.17 and 0.34 lb ai per acre after the second years applications, but visible injury and reduced vigor was observed with the 0.68 lb ai per acre rate; excellent weed control.
20003	BroadStar 0.17G	Cinquefoil	<i>Potentilla sp.</i>	P. tabernaemontani 'Verna'	Field Container	Anderson	2002	Broadcast to soil surface	No injury with 0.25, 0.5 or 1.0 lb ai per acre.
20003	BroadStar 0.17G	Cinquefoil	<i>Potentilla sp.</i>	'Pink Beauty'	Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
20004	BroadStar 0.17G	Almond (Non-Bearing)	<i>Prunus dulcis</i>	P. d. amara	Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19797	BroadStar 0.17G	Cherry (Non-Bearing)	<i>Prunus sp.</i>	P. maritima	Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19939	BroadStar 0.17G	Cherry (Non-Bearing)	<i>Prunus sp.</i>	P. x cistena	Field In-Ground	Anderson	2002	Broadcast to soil surface	No injury at 0.25, 0.5 or 1.0 lb ai per acre.
19896	BroadStar 0.17G	Fir, Douglas	<i>Pseudotsuga menziesii</i>		Field Container	Anderson	2002	Broadcast to soil surface	No injury at 0.25, 0.5 or 1.0 lb ai per acre.
19896	BroadStar 0.17G	Fir, Douglas	<i>Pseudotsuga menziesii</i>		Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19943	BroadStar 0.17G	Oak, Northern Red	<i>Quercus rubra</i>		Field In-Ground	Hitcher	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19943	BroadStar 0.17G	Oak, Northern Red	<i>Quercus rubra</i>		Field In-Ground	Hitcher	2001	Ground	No injury at 0.17, 0.34, and 0.68 lb ai per acre.

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19745	BroadStar 0.17G	Azalea	<i>Rhododendron sp.</i>		Field Container	Hitcher	2001	Broadcast	No injury at 0.17 lb ai per acre, and slight contact injury with 0.34 and 0.68 lb ai per acre which was not apparent at 30DAT.
19744	BroadStar 0.17G	Rhododendron	<i>Rhododendron sp.</i>	'Blue Peter'	Field Container	Altland	2002	Broadcast	No injury at 0.25 lb ai per acre, but moderate to severe injury with 0.5 and 1.0 lb ai per acre.
19745	BroadStar 0.17G	Azalea	<i>Rhododendron sp.</i>	'Delaware Valley White'	Field Container	Ahrens/Mer vosh	2001	Broadcast	Moderate transient injury with 0.17 and 0.34 lb ai per acre with the second year's application and injury was commercially unacceptable at 0.68 lb ai per acre; excellent weed control.
19745	BroadStar 0.17G	Azalea	<i>Rhododendron sp.</i>	'Delaware Vally White'	Field Container	Ahrens/Mer vosh	2000	Broadcast	Slight to moderate transient injury with 0.17, 0.34, and 0.68 lb ai per acre.
19745	BroadStar 0.17G	Azalea	<i>Rhododendron sp.</i>	'Fashion'	Field Container	Fraelich	2002	Broadcast	No injury at 0.25, 0.5, and 1.0 lb ai per acre.
19744	BroadStar 0.17G	Rhododendron	<i>Rhododendron sp.</i>	'Firestorm'	Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19745	BroadStar 0.17G	Azalea	<i>Rhododendron sp.</i>	'Formosa'	Field Container	Derr	2002	Broadcast	Little to no visible injury or growth suppression with 0.25, 0.5 and 1.0 lb ai per acre; excellent spurge control and large crabgrass control increased with rate.
25487	BroadStar 0.25G	Azalea	<i>Rhododendron sp.</i>	'Formosa'	Field Container	Gilliam	2005	Ground	No injury at 0.25, 0.5 and 1.0 lb ai per acre.
19745	BroadStar 0.17G	Azalea	<i>Rhododendron sp.</i>	'Girard Rose'	Field Container	Neal	2001	Broadcast over the top	Slight contact injury increasing with rate (0.25, 0.34, 0.5, 1.0 lb ai per acre), but new growth was not impacted.
25487	BroadStar 0.25G	Azalea	<i>Rhododendron sp.</i>	'Hino'	Field Container	Gilliam	2005	Ground	None at 0.25 lb ai per acre, minor at 0.5 and 1.0 lb ai per acre, but plants grew out of it through the season.
19745	BroadStar 0.17G	Azalea	<i>Rhododendron sp.</i>	'Klondyke'	Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19804	BroadStar 0.17G	Azalea, & Rhododendron	<i>Rhododendron sp.</i>	R. catawbiense	Field In-Ground	Beste	2000	Broadcast over the top	Slight to moderate necrotic injury which persisted through the winter; smooth and large crabgrass and ivyleaf morningglory were managed at all rates, but yellow nutsedge and garlic were not controlled.

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19804	BroadStar 0.17G	Azalea, & Rhododendron	<i>Rhododendron sp.</i>	R. catawbiense	Field In-Ground	Beste	2001	Broadcast over the top	Slight, transient injury at all rates (0.17, 0.34, and 0.68 lb ai per acre) applied for a second year; smooth and large crabgrass and ivyleaf morningglory were managed at all rates, but yellow nutsedge and garlic were not controlled.
19744	BroadStar 0.17G	Rhododendron	<i>Rhododendron sp.</i>	R. catawbiense 'Roseum Elegans'	Field Container	Ahrens/Mer vosh	2000	Broadcast	Slight injury at 0.17, 0.34, and 0.68 but at a commercially acceptable level.
19744	BroadStar 0.17G	Rhododendron	<i>Rhododendron sp.</i>	R. catawbiense 'Roseum Elegans'	Field Container	Ahrens/Mer vosh	2001	Broadcast	Slight injury increasing with rate (0.17, 0.34, and 0.68 lb ai per acre), but commercially acceptable at the two lower rates; excellent weed control.
19745	BroadStar 0.17G	Azalea	<i>Rhododendron sp.</i>	R. eriocarpum 'Gumpo Pink'	Field Container	Gilliam	2001	Broadcast	No injury at 0.17 lb ai per acre with slight transient injury at 0.34 and 0.68 lb ai per acre; excellent weed control.
19745	BroadStar 0.17G	Azalea	<i>Rhododendron sp.</i>	R. obtusum 'Tradition'	Field Container	Beste	2000	Broadcast	Moderate transient injury with 0.34 and 0.68 lb ai per acre and very slight injury with 0.17 lb ai per acre.
19745	BroadStar 0.17G	Azalea	<i>Rhododendron sp.</i>	'Renee Mitchell'	Field Container	Gilliam	2002	Broadcast - Actively Growing	Minor injury (brown spots on upper leaf surfaces) at 0.25, 0.5 and 1.0 lb ai per acre, but it became unapparent by 90DAT.
19745	BroadStar 0.17G	Azalea	<i>Rhododendron sp.</i>	'Stewartsonia'	Field Container	Altland	2002	Broadcast	Slight visible injury across all rates with slight stunting increasing with rate (0.25, 0.5 and 1.0 lb ai per acre).
25487	BroadStar 0.25G	Azalea	<i>Rhododendron sp.</i>	'White Glacier'	Field Container	Gilliam	2005	Ground	No injury at 0.25, 0.5 and 1.0 lb ai per acre.
25487	BroadStar 0.25G	Azalea	<i>Rhododendron sp.</i>	'White Gumpo'	Field Container	Gilliam	2005	Ground	No injury at 0.25, 0.5 and 1.0 lb ai per acre.
19746	BroadStar 0.17G	Sumac	<i>Rhus sp.</i>		Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19748	BroadStar 0.25G	Rosemary	<i>Rosmarinus officinalis</i>	'Athens Blues Spires'	Field Container	Linderman	2002	Broadcast over the top	No injury at 0.17, 0.34 and 0.68 lb ai per acre.
25302	BroadStar 0.25G	Mexican Petunia	<i>Ruellia carolinensis</i>	R. brittoniana 'Katie'	Field In-Ground	Chen	2005	Broadcast	Slight to moderate injury after first application increasing with rate (0.375, 0.75, 1.5 lb ai per acre) but severe injury with mortality after second application.
22937	BroadStar 0.17G	Sage	<i>Salvia daghestanica</i>		Field Container	Klett	2002	Hand broadcast to soil	No visible injury at 0.25 and 0.5 lb ai per acre; excellent pre-emergent weed control.

PR #	Product	Crop			Production Site	Researcher	Year	Application Method	Results Summary
		Common Name	Latin Name	Cultivar					
22937	BroadStar 0.17G	Sage	<i>Salvia daghestanica</i>		Field Container	Klett	2002	Hand broadcast to soil	No visible injury at 0.25 and 0.5 lb ai per acre; excellent pre-emergent weed control.
19798	BroadStar 0.17G	Sage, Ramona	<i>Salvia sylvestris</i>		Field Container	Gilliam	2001	Broadcast	No injury at 0.17 and 0.34 lb ai per acre and moderate, transient injury at 0.68 lb ai per acre; excellent weed control.
19857	BroadStar 0.25G	Sage, Ramona	<i>Salvia sylvestris</i>	'Blue Hill' & 'Snow Hill'	Field Container	Boydston	2003	Broadcast foliar	No visible injury after single application with 0.375, 0.75, and 1.5 lb ai per acre.
22938	BroadStar 0.17G	Skullcap	<i>Scutellaria racemosa</i>		Field Container	Klett	2002		No visible injury at 0.25 and 0.5 lb ai per acre; excellent pre-emergent weed control.
22938	BroadStar 0.17G	Skullcap	<i>Scutellaria racemosa</i>		Field Container	Klett	2002		No visible injury at 0.25 and 0.5 lb ai per acre; excellent pre-emergent weed control.
19750	BroadStar 0.17G	Bridal-Wreath	<i>Spiraea sp.</i>	S. cantoniensis 'Lanceolata'	Field Container	Gilliam	2002	Broadcast	No injury at 0.25, 0.5 and 1.0 lb ai per acre; good weed control.
19750	BroadStar 0.17G	Bridal-Wreath	<i>Spiraea sp.</i>	S. nipponica 'Snowmound'	Field Container	Ahrens/Mer vosh	2000	Broadcast over the top	Slight commercially acceptable injury after single application, but vigor was significantly reduced after second application increasing with rate (0.17, 0.34, 0.68 lb ai per acre).
19750	BroadStar 0.17G	Bridal-Wreath	<i>Spiraea sp.</i>	S. nipponica 'Snowmound'	Field Container	Ahrens/Mer vosh	2001	Broadcast	Slight visible injury at 0.17, 0.34, and 0.68 lb ai per acre, but vigor was significantly reduced at the 0.68 lb ai per acre rate; excellent weed control.
26671	BroadStar 0.25G	Bridal-Wreath	<i>Spiraea sp.</i>	S. nipponica 'Snowmound'	Field Container	Ahrens/Mer vosh	2003	Over the top	Slight to moderate injury increasing with rate (0.25, 0.5, 1.0 lb ai per acre); excellent efficacy for large crabgrass and common groundsel.
19750	BroadStar 0.17G	Bridal-Wreath	<i>Spiraea sp.</i>	S. x japonica 'Little Princess'	Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19750	BroadStar 0.17G	Bridal-Wreath	<i>Spiraea sp.</i>	S. x vanhouttei	Field Container	Altland	2002	Broadcast over the top	Slight to moderate injury increasing with rate and with second application (0.25, 0.5 and 1.0 lb ai per acre).
19750	BroadStar 0.17G	Bridal-Wreath	<i>Spiraea sp.</i>	S. x vanhouttei	Field Container	Anderson	2001	Broadcast over the top	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19809	BroadStar 0.17G	Bridal-Wreath	<i>Spiraea sp.</i>	S. x vanhouttei	Field In-Ground	Anderson	2002	Broadcast to soil	No injury at 0.25, 0.5, and 1.0 lb ai per acre.
19751	BroadStar 0.25G	Lilac	<i>Syringa sp.</i>	S. josikaea	Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.

PR #	Product	Crop			Production Site	Researcher	Year	Application Method	Results Summary
		Common Name	Latin Name	Cultivar					
19811	BroadStar 0.17G	Yew	<i>Taxus sp.</i>	T. cuspidata	Field In-Ground	Ahrens/Mer vosh	2000	Broadcast over the top	No injury at 0.17, 0.34, and 0.68 lb ai per acre; good to great efficacy on large crabgrass and common ragweed.
19752	BroadStar 0.17G	Yew	<i>Taxus sp.</i>	T. x media 'Hicksii'	Field Container	Anderson	2002	Broadcast to soil	No injury at 0.25, 0.5, and 1.0 lb ai per acre.
19811	BroadStar 0.17G	Yew	<i>Taxus sp.</i>	T. x media 'Hicksii'	Field In-Ground	Anderson	2002	Broadcast to soil surface	No injury at 0.25, 0.5, and 1.0 lb ai per acre.
19754	BroadStar 0.25G	Ternstroemia	<i>Ternstroemia sp.</i>		Field Container	Gilliam	2005	Ground	Significant spotting initially at all rates (0.25, 0.5 and 1.0 lb ai per acre), but plants grew out of it through the season.
19755	BroadStar 0.17G	Arborvitae	<i>Thuja sp.</i>	T. occidentalis	Field Container	Hart	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19755	BroadStar 0.17G	Arborvitae	<i>Thuja sp.</i>	T. occidentalis	Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19755	BroadStar 0.17G	Arborvitae	<i>Thuja sp.</i>	T. occidentalis 'Emerald'	Field Container	Neal	2001	Broadcast over the top	No injury at 0.25, 0.34, 0.5 and 1.0 lb ai per acre.
19755	BroadStar 0.17G	Arborvitae	<i>Thuja sp.</i>	T. occidentalis 'Peabody'	Field Container	Anderson	2001	Broadcast over the top	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19814	BroadStar 0.17G	Arborvitae	<i>Thuja sp.</i>	T. occidentalis 'Peabody'	Field In-Ground	Anderson	2001	Broadcast over the top	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19755	BroadStar 0.17G	Arborvitae	<i>Thuja sp.</i>	T. occidentalis 'Smaragd'	Field Container	Altland	2002	Broadcast	No injury at 0.25, 0.5, and 1.0 lb ai per acre.
19755	BroadStar 0.17G	Arborvitae	<i>Thuja sp.</i>	T. plicata atrovirens	Field Container	Hart	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19800	BroadStar 0.25G	Jasmine, Asian	<i>Trachelospermum asiaticum</i>		Field Container	Gilliam	2004	Ground	No injury at 0.25, 0.5 and 1.0 lb ai per acre.
19897	BroadStar 0.17G	Hemlock	<i>Tsuga sp.</i>	T. mertensiana	Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19801	BroadStar 0.17G	Blueberry (Non-Bearing)	<i>Vaccinium sp.</i>	'Blue Crop'	Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19801	BroadStar 0.17G	Blueberry (Non-Bearing)	<i>Vaccinium sp.</i>	V. ashei 'Climax'	Field Container	Gilliam	2001	Broadcast	Slight to moderate injury increasing with rate (0.17, 0.34, and 0.68 lb ai per acre); excellent weed control.
19801	BroadStar 0.17G	Blueberry (Non-Bearing)	<i>Vaccinium sp.</i>	V. corym 'North Country'	Field Container	Anderson	2001	Broadcast over the top	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19802	BroadStar 0.25G	Vervain	<i>Verbena sp.</i>	'Quartz White'	Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19802	BroadStar 0.25G	Vervain	<i>Verbena sp.</i>	V. canadensis	Field Container	Anderson	2001	Broadcast over the top	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19861	BroadStar 0.25G	Vervain	<i>Verbena sp.</i>	V. canadensis 'Homestead Purple'	Field In-Ground	Chen	2005	Broadcast	No significant injury at 0.375 and 0.75 lb ai per acre, slight at 1.5 lb ai per acre.

PR #	Product	Crop			Production Site	Researcher	Year	Application Method	Results Summary
		Common Name	Latin Name	Cultivar					
26623	BroadStar 0.17G	Speedwell, Brooklime	<i>Veronica sp.</i>	'Lilac Karina'	Field Container	Hitcher	2002	Broadcast over the top	No injury at 0.25, 0.5 and 1.0 lb ai per acre.
19756	BroadStar 0.17G	Arrowwood	<i>Viburnum sp.</i>	V. dentatum 'Chicago Luster'	Field Container	Anderson	2001	Broadcast over the top	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19756	BroadStar 0.17G	Arrowwood	<i>Viburnum sp.</i>	V. plicatum var. tomentosum 'Mariesii'	Field Container	Neal	2001	Over the top	No injury from first application when little new growth was present, however after the second application contact foliar burn was observed on new foliage, but plants recovered.
19756	BroadStar 0.17G	Arrowwood	<i>Viburnum sp.</i>	V. x bodnantense 'Pink Dawn'	Field Container	Altland	2002	Broadcast	No injury at 0.25, 0.5, and 1.0 lb ai per acre; excellent oxalis control.
19803	BroadStar 0.17G	Periwinkle	<i>Vinca sp.</i>	'Sante Fe'	Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19803	BroadStar 0.17G	Periwinkle	<i>Vinca sp.</i>	V. minor 'Variegata'	Field Container	Derr	2001	Over the top	Slight to moderate injury increasing with rate (0.17, 0.34, and 0.68 lb ai per acre).
19757	BroadStar 0.17G	Weigela	<i>Weigela sp.</i>	'Pink Princess'	Field Container	Linderman	2001	Broadcast	No injury at 0.17, 0.34, and 0.68 lb ai per acre.
19759	BroadStar 0.25G	Adams-Needle	<i>Yucca filamentosa</i>	Y. smalliana 'White Edge'	Field Container	Hitcher	2002	Broadcast over the top	No injury at 0.25, 0.5 and 1.0 lb ai per acre.

Label Suggestions

It is suggested that the following 13 genera or species exhibiting no injury in these experiments be added to the SureGuard 51.1WDG label. *Abies fraseri* should only have applications when the plants are dormant. Both *Buxus macrophylla* and *Festuca ovina* exhibited little or no transitory injury with over the top applications; these two species should be added to the label in addition to the listed conifers.

Conifers:

Abies balsamea
*Abies fraseri**
Juniperus communis
Juniperus squamata
Pinus eliottii
Pinus mugo
Pinus nigra
Pinus thunbergiana
Thuja sp.

Other Plants:

Buxus macrophylla japonica
Festuca ovina glauca

IR-4 has very limited data for following list of 19 plants. However, if other available data demonstrate no or minimal transient injury for these crops, IR-4 supports placing these on the SureGuard 51.1WDG labels also.

Abies bornmuelleriana
Abies lasiocarpa
Acer rubrum
Achillea millefolium
Buddleia davidii
Cedrus deodoara
Ceratiola ericoides
Chamaecyparis pisifera
Chamaecyparis obtusa
Cleyera japonica

Cotinus coggygria
Euonymus alatus
Fraxinus pennsylvanica
Hosta sp.
Sequoiadendron giganteum
Taxus cuspidata
Trachelospermum asiaticum
Verbena sp.
Viburnum trilobum

It is suggested that the following 12 genera or species exhibiting no injury in these experiments be added to Broadstar 0.25G with the provision for *Berberis thunbergii* that applications not occur during bud break.

Artemisia lactiflora
Berberis thunbergii *
Buddleia davidii
Festuca ovina glauca
Gypsophila elegans
Hedera helix

Juniperus communis
Juniperus ridiga
Liriope muscari
Pinus nigra
Taxus x media
Verbena sp.

IR-4 has very limited data for following list of 48 plants. However, if other available data demonstrate no or minimal transient injury for these crops, IR-4 supports placing these on the BroadStar 0.25G labels also.

Calluna vulgaris
Carex buchananii
Chamaecyparis obtusa
Cornus sericea
Cytisus sp.
Daphne sp.
Delosperma alba
Deschampsia sp.
Euonymus alatus
Forsythia sp.

Fraxinus sp.
Gazania sp.
Gleditsia tricanthos
Hakonechloa sp.
Iberis sp.
Ilex glabra
Liriope spicata
Myrica cerifera
Origanum libanoticum
Osteopermum sp.

Pennisetum setaceum
Podocarpus macrophyllus
Pseudotsuga menziesii
Rosmarinus officinalis
Salvia daghestanica
Salvia sylvestris
Scutellaria racemosa
Trachelospermum asiaticum
Veronica sp.
Yucca filamentosa

IR-4 suggests adding several crops or cultivars to the list of sensitive ornamental species already on the BroadStar 0.25G label.

Cleyera japonica
Cortaderia selloana
Hemerocallis sp.
Rhododendron sp. 'Blue Peter' Rhododendron and 'Girard Rose' Azalea
Spirea nipponica 'Snowmound'

Appendix 1: Available Protocols

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

Ornamental Protocol Number: 06-011

Objective: Determine phytotoxicity of Sureguard (Flumioxazin) to unlabelled perennial and deciduous woody 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: Dormant, over-the-top applications only.

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. Record phytotoxicity on a scale of 0 to 10 (0 = No phytotoxicity; 10 = Complete kill) soon after plants break dormancy (ie when 2 newly developed fully expanded leaves are present), and then 2 and 4 weeks later. 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, inner 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
SureGuard (Flumioxazin)	0.375 lb ai/acre	One application within 1-3 weeks before covering plants for winter or at appropriate time to control weeds while plants are dormant	Valent, Joe Chamberlin, 770-985-0303, ichamber@valent.com
	0.75 lb ai/acre		
Untreated	--	--	

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

Draft Date: 2/10/06

Revised By: CLP

PHYTOTOXICITY PROTOCOL FOR CLEARING FLUMIOXAZIN ON ORNAMENTALS

Date: 10/04

Ornamental Protocol Number: 651

General label directions: Refer to Product Label

Research program:

Site (species, variety, etc.) - As Attached

Pest(s) - As Attached

Pesticide (common name and trade name) - Flumioxazin (BROADSTAR 0.25G)

For label, material & if needed spray oil surfactant contact:

Valent, Joe Chamberlin, (770) 985-0303, FAX# 925-817-5097; e-mail: jcham@valent.com

Formulation- Use only EPA registered product

Experimental design:

Plot size (must be adequate to reflect actual use condition)

Replicates Minimum of 4 Treatment Units

Controls (untreated controls to be included in all experiments)

Application:

Dosages - 1x 0.375 lb.ai/A (150 lb product/A)

2x 0.75 lb.ai/A (200 lb product/A)

4x 1.5 lb.ai/A (600 lb product/A)

Volume -

Timing - (Interval) 8-12 weeks

Number Applications: **2 broadcast over the top**

Reports:

Method of application: (treatments should be made over the top of the plants using application equipment consistent with conventional commercial equipment).

Report completely on experimental design and method of application.

Weather - Maintain temperature and precipitation (including irrigation) data.

Soil type - Identify soil type used in experimental area.

Product - When submitting data, include EPA registration number of product used.

Efficacy - Data should include both actual counts and percent control as well as an indication that infestation was light, heavy, etc.

Record all application and evaluation dates.

Phytotoxicity - Record phytotoxicity data at all rates. Use a 0-10 scale. 0 = No Phytotoxicity 10 = complete kill.

If appropriate also include a rating for: Chlorosis, Percent of Defoliation (0-10 scale) and stunting (0-10). Indicate if marketable or not.

Please direct questions to: Ely Vea, 308 Aston Forest Lane, Crownsville, MD 21032, Phone & FAX#: 410-923-488, E-mail: evvea@comcast.net.

PHYTOTOXICITY PROTOCOL FOR CLEARING FLUMIOXAZIN (VALOR SureGuard 51WDG) ON ORNAMENTALS

Date: 10/04

Ornamental Protocol Number: 652

General label directions: Refer to Product Label

Research program:

Site (species, variety, etc.) - As Attached

Pest(s) - As Attached

Pesticide (common name and trade name) - Flumioxazin (SureGuard 51 WDG)

For label, material & if needed spray oil surfactant contact:

Valent, Joe Chamberlin, (770) 985-0303, FAX# 925-817-5097; e-mail: jcham@valent.com

Formulation- Use only EPA registered product

Experimental design:

Plot size (must be adequate to reflect actual use condition)

Replicates Minimum of 4 Treatment Units

Controls (untreated controls to be included in all experiments)

Application: **Container - Dormant over the top. Field - Direct spray only.**

Dosages - 1x 0.25 lb.ai/A

2x 0.50 lb.ai/A

4x 1.0 lb.ai/A

Volume - 30-50 gal/A

Timing - (Interval)8 to 12 weeks

Number Applications: **2 directed spray**

Reports:

Method of application: (treatments should be made over the top of the plants using application equipment consistent with conventional commercial equipment).

Report completely on experimental design and method of application.

Weather - Maintain temperature and precipitation (including irrigation) data.

Soil type - Identify soil type used in experimental area.

Product - When submitting data, include EPA registration number of product used.

Efficacy - Data should include both actual counts and percent control as well as an indication that infestation was light, heavy, etc.

Record all application and evaluation dates.

Phytotoxicity - Record phytotoxicity data at all rates. Use a 0-10 scale. 0 = No Phytotoxicity 10 = complete kill.

If appropriate also include a rating for: Chlorosis, Percent of Defoliation (0-10 scale) and stunting (0-10). Indicate if marketable or not.

Please direct questions to: Ely Vea, 308 Aston Forest Lane, Crownsville, MD 21032, Phone & FAX#: 410-923-488, E-mail: evvea@comcast.net.

Appendix 2: Contributing Researchers

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Appendix 3: Submitted Data

Data on following pages are arranged in PRnumber order.