



[Environmental Horticulture Program Research Summaries](#)

IR-4 Environmental Horticulture Program Clopyralid Crop Safety

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Acknowledgements

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Abstract

Lontrel (clopyralid) was initially registered in 1998 for environmental horticulture uses. This initial label contained an extensive list of environmental horticulture plants where Lontrel could be used without causing phytotoxicity. From 1985 to 2021, IR-4 examined 71 environmental plant species for phytotoxicity related to Lontrel applications. Of the researched crops, the following twelve can be added to the label at this time based on the data provided here:

*Abies balsamea**
*Acer rubrum**
Acorus sp.
Carex sp.
Hemerocallis sp.
Ilex cornuta

Juncus effusus
*Juniperus horizontalis**
*Picea pungens**
*Pinus mugo**ssp. *Mugo*
*Pinus strobus**
*Pseudotsuga menziesii**

*Already registered

The remaining seven crops that showed minimal or no injury are currently in the label. Forty-nine other species or genera treated with over the top applications exhibited minimal or no injury in the limited number of trials (one or two) for each crop.

Ten species or genera exhibited moderate to severe negative impacts, one of which is currently in the product label.

Introduction

Lontrel (clopyralid) was initially registered in 1998 for environmental horticulture uses. This initial label contained an extensive list of environmental horticulture plants where Lontrel could be used without causing phytotoxicity. From 1985 to 2021, IR-4 tested 71 environmental plant species examining phytotoxicity related to Lontrel applications.

Materials and Methods

Lontrel was applied as foliar treatment typically once at 0.125, 0.25 and 0.50 lb ai per acre. A minimum of three plants (replicate treatments) were required with most researchers exceeding this minimum. Phytotoxicity was recorded on a scale of 0 to 10 (0 = No phytotoxicity; 10 = Complete kill) one to three times typically from 1 week to 2 months after initial application. For IR-4 testing, the following protocols were used: 09-011 and 21-022. For more detailed materials and methods, including application rates for various products, please visit <https://www.ir4project.org/ehc/ehc-registration-support-research/env-hort-researcher-resources/#Protocols> to view and download these protocols.

Lontrel was supplied to researchers (See list of researchers in Appendix 1) by Dow Elanco and Dow Agrosiences.

Results and Summary

Phytotoxicity

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

Lontrel exhibited no or minimal negative impact on 12 plant genera or species with over the top applications (Table 1). Seven of these are already in the Lontrel label. One crop, already in the Lontrel label, and nine others that are not currently in the label, showed no or minimal transitory injury seen at the 1X rate, but the 2X and/or 4X rates did cause significant phytotoxicity. (Table 2). For forty-nine genera/species, more information is needed because only 1 or 2 trials were conducted (Table 3).

See Table 4 for a list of completed trials.

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

*Abies balsamea**
*Acer rubrum**
Acorus sp.
Carex sp.
Hemerocallis sp.
Ilex cornuta

Juncus effusus
*Juniperus horizontalis**
*Picea pungens**
*Pinus mugo**ssp. *Mugo*
*Pinus strobus**
*Pseudotsuga menziesii**

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

Cornus amomum
Cornus sericea
Erigeron karvinskianus
Euonymus alatus
Fraxinus sp.
Hydrangea paniculata
*Juglans nigra**
Trifolium repens
Tulbaghia violacea
Weigela florida

* Already registered

Table 3. List of Lontrel treated crops where more information is needed.

<i>Abies grandis</i> ¹	<i>Oenothera pallida</i> ²
<i>Abies procera</i> ²	<i>Photinia fraserii</i> ¹
<i>Arenaria montana</i>	<i>Picea abies</i> ^{1*}
<i>Aubrieta deltoidea</i> ²	<i>Picea glauca</i> ^{1*}
<i>Berberis buxifolia</i> ²	<i>Pinus palustris</i> ^{1*}
<i>Berberis thunbergii</i> ²	<i>Pinus sylvestris</i> ²
<i>Cerastium tomentosum</i> ²	<i>Quercus agrifolia</i> ^{2*}
<i>Cyperus</i> sp. ¹	<i>Quercus coccinea</i> ^{2*}
<i>Dianthus deltoides</i> ¹	<i>Quercus nuttallii</i> ^{2*}
<i>Equisetum hyemale</i> ²	<i>Quercus virginiana</i> [*]
<i>Forsythia intermedia</i> ²	<i>Rhododendron catawbiense</i> ^{2*}
<i>Fragaria</i> sp. ²	<i>Rhododendron obtusum</i> ^{2*}
<i>Ilex crenata</i>	<i>Rhododendron roseum elegans</i> ^{1*}
<i>Ilex meserveae</i>	<i>Silene caroliniana</i> ²
<i>Juniperus conferta</i> ^{1*}	<i>Taxus eupidata</i> ¹
<i>Lamiastrum galeobdolon</i> ²	<i>Thuja nigr</i> ^{2*}
<i>Leymus arenarius</i> ¹	<i>Thuja occidentalis</i> ^{2*}
<i>Lilium longiflorum</i> ¹	<i>Thymus praecox</i> ²
<i>Liriope muscari</i> ²	<i>Thymus serpyllum</i> ¹
<i>Liriope muscari variegata</i> ²	<i>Trifolium repens</i>
<i>Liriope spicata</i> ¹	<i>Tsuga canadensis</i> ¹
<i>Mazus reptans</i>	<i>Veronica repens</i> ¹
<i>Mentha x piperita</i> ²	<i>Vinca minor</i> ¹
<i>Muhlenbergia capillaris</i>	<i>Zephyranthes</i> sp. ¹
<i>Nepeta faassenii</i> ¹	

¹ In two trials, no or minimal transitory injury at all rates.

² In one trial, no or minimal transitory injury at all rates.

* Already registered

Table 4. Detailed Summary of Crop Safety Testing

PR#	Product Actives	MOA Class	Target	Crop	Production Site	Researcher	State	Year	Application Type	Results
34493	Clean Slate (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Sweet Flag (<i>Acorus</i> sp.)	Field Container	Derr	VA	2021	Over the top	No injury with 0.67, 1.3 and 2.6 pt per acre applied twice.
34492	Clean Slate (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Sedge (<i>Carex</i> sp.)	Field Container	Senesac	NY	2021	Directed	Minor to Moderate injury at all rates (0.124, 0.248, and 0.496 lb ai per acre).
34501	Clean Slate (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Common Rush (<i>Juncus effusus</i>)	Field Container	Derr	VA	2021	Over the top	No injury with 0.67, 1.3 and 2.6 pt per acre applied twice.
34507	Clean Slate (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Society Garlic (<i>Tulbaghia violacea</i>)	Field Container	Derr	VA	2021	Over the top	Unacceptable injury and flowering inhibition with 0.67, 1.3 and 2.6 pt per acre applied twice.
34505	Clean Slate (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Zephyr-lily (<i>Zephyranthes</i> sp.)	Field Container	Derr	VA	2021	Over the top	No injury and flowering reduction with 0.67 and 1.3, moderate with 2.6 pt per acre applied twice.
10424	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Fir (<i>Abies</i> sp.) <i>A. balsamea</i>	Field In-Ground	Ahrens	CT	1985	Over the top	No injury at 0.133 and 0.266 lb ai per acre; no control of viola.
10424	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Fir (<i>Abies</i> sp.) <i>A. balsamea</i>	Field In-Ground	Ahrens	CT	1985	Over the top	No injury at 0.133, 0.266 and 0.562 lb ai per acre.
10424	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Fir (<i>Abies</i> sp.) <i>A. balsamea</i>	Field In-Ground	Ahrens	CT	1986	Over the top	No injury at 0.133, 0.266 and 0.562 lb ai per acre (August applications).
10424	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Fir (<i>Abies</i> sp.) <i>A. balsamea</i>	Field In-Ground	Ahrens	CT	1988	Over the top	No injury at 0.133, 0.266 and 0.562 lb ai per acre.
10424	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Fir (<i>Abies</i> sp.) <i>A. balsamea</i>	Field In-Ground	Ahrens	CT	1989	Over the top	No injury at 0.125, 0.25, and 0.5 lb ai per acre.
10424	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Fir (<i>Abies</i> sp.) <i>A. grandis</i>	Field In-Ground	Baunworth	OR	1987	Over the top	No injury at 0.125, 0.25, and 0.5 lb ai per acre.
10424	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Fir (<i>Abies</i> sp.) <i>A. grandis</i>	Field In-Ground	Baunworth	OR	1987	Over the top	No injury at 0.125, 0.25, and 0.5 lb ai per acre; good control of canada thistle.
10424	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Fir (<i>Abies</i> sp.) <i>A. procera</i>	Field In-Ground	Baunworth	OR	1987	Over the top	No injury at 0.125, 0.25, and 0.5 lb ai per acre; good control of canada thistle.
11088	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Maple, Red (<i>Acer rubrum</i>)	Field Container	Glaze	GA	1992	Over the top	Slight injury at 0.125, 0.25 and 0.5 lb ai per acre, but many plants were not marketable at the end of the experiment.
11088	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Maple, Red (<i>Acer rubrum</i>)	Field Container	Glaze	GA	1993	Over the top	No significant injury at 0.125, 0.25 and 0.5 lb ai per acre.
11088	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Maple, Red (<i>Acer rubrum</i>)	Field Container	Linderman	OR	1993	Over the top	No injury at 0.125, 0.25 and 0.5 lb ai per acre.

PR#	Product Actives	MOA Class	Target	Crop	Production Site	Researcher	State	Year	Application Type	Results
34494	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Sweet Flag (Acorus sp.)	Field Container	Marble	FL	2021	Over the top	No injury at any application rate (0.25, 0.5, or 1.0 lbs ai per acre)
34494	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Sweet Flag (Acorus sp.) 'Variegatus'	Field Container	Witcher	TN	2021	Over the top	No injury or growth reduction when applied 2x with 4 weeks between at 10.7, 21.3 and 42.7 fl oz per acre rates.
23622	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Sandwort (Arenaria sp.) A. montana	Field Container	Senesac	NY	2001	Over the top	Slight to moderate injury at 0.125, 0.25, and 0.5 lb ai per acre.
23039	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Lilacbush (Aubrieta sp.) A. deltoidea	Field Container	Senesac	NY	2002	Over the top	No significant injury at 0.125, 0.25 and 0.5 lb ai per acre
11247	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Barberry (Berberis sp.) B. thunbergii	Field Container	Glaze	GA	1993	Over the top	Slight injury with quick recovery at 0.125, 0.25 and 0.5 lb ai per acre; all plants marketable.
11247	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Barberry (Berberis sp.) B. buxifolia 'Crymsom Pygmy'	Field Container	Linderman	OR	1993	Over the top	No injury at 0.125, 0.25 and 0.5 lb ai per acre.
23482	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Sedge (Carex sp.)	Field Container	Marble	FL	2021	Over the top	No injury at any application rate (0.25, 0.5, or 1.0 lbs ai per acre)
23482	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Sedge (Carex sp.) C. pennsylvanica	Field Container	Senesac	NY	2002	Over the top	No injury at 0.125, 0.25 and 0.5 lb ai per acre.
23482	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Sedge (Carex sp.) 'Firefox'	Field Container	Witcher	TN	2021	Over the top	No injury or growth reduction when applied 2x with 4 weeks between at 10.7, 21.3 and 42.7 fl oz per acre rates.
23054	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Snow-In-Summer (Cerastium tomentosum) C. tomentosum	Field Container	Senesac	NY	2002	Over the top	No injury at 0.125, 0.25 and 0.5 lb ai per acre
13621	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Dogwood, Silky (Cornus amomum)	Field In-Ground	Garrett	MD	2001	Over the top	Slight to significant injury increasing with rate 0.125, 0.25 and 0.5 lb ai per acre applied over the top of emerged seedlings; good control of dandelion, clover, vetch and eclipa.
18724	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Dogwood, Red Osier (Cornus sericea) 'Red Twig'	Field In-Ground	Ahrens/Mervosh	CT	1999	Over the top	Light, commercially acceptable injury at 0.125, 0.25 and 0.5 lb ai per acre, with good recovery by midseason
18724	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Dogwood, Red Osier (Cornus sericea)	Field In-Ground	Garrett	MD	2001	Over the top	Slight to significant injury increasing with rate 0.125, 0.25 and 0.5 lb ai per acre applied over the top of emerged seedlings; good control of dandelion, clover, vetch and eclipa.
34496	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Flat Sedge (Cyperus sp.)	Field Container	Marble	FL	2021	Over the top	No injury at any application rate (0.25, 0.5, or 1.0 lbs ai per acre)

PR#	Product Actives	MOA Class	Target	Crop	Production Site	Researcher	State	Year	Application Type	Results
34496	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Flat Sedge (Cyperus sp.)	Field Container	Witcher	TN	2021	Over the top	No injury or growth reduction when applied 2x with 4 weeks between at 10.7, 21.3 and 42.7 fl oz per acre rates.
23481	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Maiden Pink (Dianthus deltoides) 'Brilliant'	Field Container	Senesac	NY	2002	Over the top	No significant injury at 0.125, 0.25 and 0.5 lb ai per acre
23481	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Maiden Pink (Dianthus deltoides) chinensis	Field Container	Williams	IL	2009	Over the top	No significant injury at 0.125, 0.25 and 0.5 lb ai per acre but growth reduction at 0.5 rate observed.
34498	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Scouringrush Horsetail (Equisetum hyemale)	Field Container	Senesac	NY	2021	Directed	Minor injury at highest rate (0.25, 0.5, and 1.0 lb ai per acre).
23055	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Fleabane (Erigeron sp.) E. karvinskianus 'Bluenmeer'	Field Container	Senesac	NY	2002	Over the top	Moderate to significant injury and reduction in fresh weight at 0.125, 0.25, and 0.5 lb ai per acre.
13598	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Burning Bush (Euonymus alatus) 'Compacta'	Field In-Ground	Ahrens/Mervosh	CT	1999	Over the top	Moderate to severe injury with 0.125, 0.25, and 0.5 lb ai per acre; excellent control of horseweed.
11064	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Forsythia (Forsythia sp.) F. intermedia	Field In-Ground	Ahrens	CT	1993	Over the top	Slight injury at 0.125, moderate at 0.25 and 0.5 lb ai per acre with X-77; excellent control of hairy vetch.
11064	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Forsythia (Forsythia sp.) F. x intermedia 'Lynwood Gold'	Field In-Ground	Ahrens/Mervosh	CT	1999	Over the top	Minor transient injury at 0.125, 0.25 and 0.5 lb ai per acre; excellent control of horseweed.
23623	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Strawberry (Non-Bearing) (Fragaria sp.) 'Pink Panda'	Field Container	Senesac	NY	2001	Over the top	Slight injury at 0.125, 0.25 and 0.5 lb ai per acre.
11054	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Ash (Fraxinus sp.)	Field In-Ground	Garrett	MD	2001	Over the top	Slight to significant injury increasing with rate 0.125, 0.25 and 0.5 lb ai per acre applied over the top of emerged seedlings.
11251	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Daylily (Hemerocallis sp.)	Field Container	Glaze	GA	1993	Over the top	No injury at 0.125, 0.25 and 0.5 lb ai per acre; all plants marketable.
11251	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Daylily (Hemerocallis sp.) 'Anzac', 'SummerWine', 'Catherine Woodbury'	Field Container	Linderman	OR	1993	Over the top	No injury at 0.125, 0.25 and 0.5 lb ai per acre.
11251	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Daylily (Hemerocallis sp.)	Field Container	Neal	NC	2001	Over the top	Very slight injury with quick recovery at 0.125, 0.25 and 0.5 lb ai per acre.
11251	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Daylily (Hemerocallis sp.) 'Signal'	Field Container	Senesac	NY	1993	Over the top	No significant injury at 0.125, 0.25, and 0.5 lb ai per acre.
11251	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Daylily (Hemerocallis sp.) 'Happy Returns'	Field Container	Senesac	NY	2001	Over the top	No injury at 0.125, 0.25 and 0.5 lb ai per acre.
13601	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Hydrangea (Hydrangea sp.) H. paniculata 'Peegee'	Field In-Ground	Ahrens/Mervosh	CT	1999	Over the top	Moderate to significant injury with 0.125, 0.25 and 0.5 lb ai per acre, but plants at

PR#	Product Actives	MOA Class	Target	Crop	Production Site	Researcher	State	Year	Application Type	Results
										the two lower rates recovered by August; excellent control of horseweed.
11245	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Holly (Ilex sp.) I. meserveae 'Blue Girl' & 'Blue Bloy'	Field In-Ground	Ahrens/Mervosh	CT	2000	Over the top	Moderate injury at 0.125, 0.25, and 0.5 lb ai per acre.
11246	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Holly (Ilex sp.) I. crenata 'Green Lustre'	Field Container	Beste (ARS)	MD	1993	Over the top	Moderate injury (leaf cupping) at 0.125, 0.25 and 0.5 lb ai per acre.
11246	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Holly (Ilex sp.) I. cornuta 'Rotunda'	Field Container	Glaze	GA	1993	Over the top	No injury at 0.125, 0.25 and 0.5 lb ai per acre.
11246	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Holly (Ilex sp.) I. cornuta 'Nana'	Field Container	Linderman	OR	1993	Over the top	No injury at 0.125, 0.25 and 0.5 lb ai per acre.
11246	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Holly (Ilex sp.) I. cornuta 'China Girl'	Field Container	Senesac	NY	1993	Over the top	No injury at 0.125, 0.25, and 0.5 lb ai per acre.
21418	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Walnut, Black (Non-Bearing) (Juglans nigra)	Field In-Ground	Garrett	MD	2001	Over the top	Slight to significant injury increasing with rate 0.125, 0.25 and 0.5 lb ai per acre applied over the top of emerged seedlings.
34502	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Common Rush (Juncus effusus)	Field Container	Marble	FL	2021	Over the top	No injury at any application rate (0.25, 0.5, or 1.0 lbs ai per acre)
34502	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Common Rush (Juncus effusus)	Field Container	Witcher	TN	2021	Over the top	No injury or growth reduction when applied 2x with 4 weeks between at 10.7, 21.3 and 42.7 fl oz per acre rates.
10413	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Juniper (Juniperus sp.)	Field In-Ground	Ahrens	CT	1989	Over the top	No trial report posted
10413	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Juniper (Juniperus sp.) J. conferta	Field In-Ground	Derr	VA	1988	Over the top	No injury at 0.125, 0.25 and 0.5 lb ai per acre.
11244	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Juniper (Juniperus sp.) J. conferta 'Blue Pacific'	Field Container	Derr	VA	1988	Over the top	No injury at 0.125, 0.25 and 0.5 lb ai per acre.
11244	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Juniper (Juniperus sp.) J. horizontalis	Field Container	Glaze	GA	1993	Over the top	No injury at 0.125, 0.25 and 0.5 lb ai per acre; all plants marketable.
11244	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Juniper (Juniperus sp.) J. horizontalis 'Plumosa'	Field Container	Senesac	NY	1993	Over the top	No significant injury at 0.125, 0.25 and 0.5 lb ai per acre.
10413	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Juniper (Juniperus sp.) J. horizontalis	Field In-Ground	Talbert	AR	1988	Over the top	No injury at 0.125, 0.25 and 0.5 lb ai per acre.
23624	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Yellow Archangel (Lamiastrum galeobdolon) 'Herman's Pride'	Field Container	Senesac	NY	2001	Over the top	No injury at 0.125, 0.25 and 0.5 lb ai per acre
23625	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Ryegrass, Sand (Leymus arenarius) 'Blue Dune'	Field Container	Senesac	NY	2001	Over the top	Slight injury at 0.125, 0.25 and 0.5 lb ai per acre

PR#	Product Actives	MOA Class	Target	Crop	Production Site	Researcher	State	Year	Application Type	Results
10411	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Lily, Easter; Trumpet Lily (<i>Lilium longiflorum</i>)	Field In-Ground	Baunworth	OR	1987	Over the top	No significant yellowing, but slight twisting and slight reduction in bulblet weight at 0.125, 0.25, and 0.5 lb ai per acre.
11253	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Lilyturf (<i>Liriope sp.</i>) <i>L. muscari</i>	Field Container	Derr	VA	2001	Over the top	Virtually no injury or growth reduction at 0.125, 0.25 and 0.5 lb ai per acre.
11252	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Lilyturf (<i>Liriope sp.</i>) <i>L. muscari variegata</i>	Field In-Ground	Glaze	GA	1993	Over the top	Very slight injury at 0.125, 0.25 and 0.5 lb ai per acre.
11252	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Lilyturf (<i>Liriope sp.</i>) <i>L. spicata</i> 'Big Blue'	Field In-Ground	Hart	NJ	2000	Over the top	Slight injury at 0.125, 0.25 and 0.5, moderate at 1 lb ai per acre.
11252	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Lilyturf (<i>Liriope sp.</i>) <i>L. spicata</i>	Field In-Ground	Williams	IL	2009	Over the top	No crop injury at 0.125, 0.25 and 0.5 lb ai per acre.
23626	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Miquel's Mazus (<i>Mazus reptans</i>)	Field Container	Senesac	NY	2001	Over the top	Slight injury at 0.125 and 0.25, moderate at 0.5 lb ai per acre.
29227	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Peppermint (<i>Mentha x piperita</i>) <i>M. x piperita</i>	Field Container	Senesac	NY	2002	Over the top	No significant injury at 0.125, 0.25, and 0.5 lb ai per acre.
34504	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Muhly, Hairawn (<i>Muhlenbergia capillaris</i>)	Field Container	Senesac	NY	2021	Directed	Minor injury at highest rate (0.25, 0.5, and 1.0 lb ai per acre).
23058	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Catnip (<i>Nepeta cataria</i>) <i>N. faassenii</i> 'Walker's Low'	Field Container	Senesac	NY	2001	Over the top	No injury at 0.125, 0.25 and 0.5 lb ai per acre
23058	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Catnip (<i>Nepeta cataria</i>) <i>N. faassenii</i> 'Walker's Low'	Field Container	Williams	IL	2009	Over the top	No crop injury at 0.125, 0.25 and 0.5 lb ai per acre
23060	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Evening Primrose; Sundrops (<i>Oenothera sp.</i>) <i>O. pallida</i>	Field Container	Senesac	NY	2002	Over the top	No significant injury or growth reduction at 0.125, 0.25 and 0.5 lb ai per acre.
11249	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Chokeberry (<i>Photinia sp.</i>) <i>P. fraserii</i> 'Birmingham'	Field Container	Glaze	GA	1993	Over the top	Very slight injury at 0.125, 0.25 and 0.5 lb ai per acre; all plants marketable.
11249	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Chokeberry (<i>Photinia sp.</i>) <i>P. fraserii</i>	Field Container	Linderman	OR	1993	Over the top	No injury at 0.125, 0.25 and 0.5 lb ai per acre.
11073	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Spruce, Norway (<i>Picea abies</i>)	Field In-Ground	Ahrens	CT	1993	Over the top	No injury at 0.125, 0.25 and 0.5 lb ai per acre.
11073	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Spruce, Norway (<i>Picea abies</i>)	Field In-Ground	Talbert	AR	1988	Over the top	No injury at 0.125, 0.25 and 0.5 lb ai per acre; great control of <i>Amaranthus</i> but no control of <i>Digitaria</i> or <i>Setaria</i> .
11074	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Spruce, White; Cat (<i>Picea glauca</i>)	Field In-Ground	Ahrens	CT	1989	Over the top	No injury with 0.125, 0.25, and 0.5 lb ai per acre; good to great control of horseweed at the two high rates.
11074	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Spruce, White; Cat (<i>Picea glauca</i>)	Field In-Ground	Ahrens	CT	1993	Over the top	No injury at 0.125, 0.25 and 0.5 lb ai per acre.

PR#	Product Actives	MOA Class	Target	Crop	Production Site	Researcher	State	Year	Application Type	Results
10503	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Spruce (Picea sp.) P. pungens	Field In-Ground	Ahrens	CT	1985	Over the top	No injury at 0.133, 0.266 and 0.532 lb ai per acre; excellent control of bird vetch.
10503	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Spruce (Picea sp.)	Field In-Ground	Ahrens	CT	1986		clopyralid + glyphosate - need to move to different Prnumber.
10503	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Spruce (Picea sp.) P. pungens	Field In-Ground	Ahrens	CT	1986	Over the top	No to slight needle chlorosis at 0.266, 0.532, and 1.064 lb ai per acre; excellent control of bird vetch.
10503	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Spruce (Picea sp.) P. pungens	Field In-Ground	Ahrens	CT	1987	Over the top	No injury at 0.133, 0.266, and 0.399 lb ai per acre; good to excellent control of bird vetch.
10503	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Spruce (Picea sp.) P. pungens	Field In-Ground	Ahrens	CT	1988	Over the top	No significant injury with 0.125, 0.25, and 0.5 lb ai per acre after two seasons of single applications.
10503	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Spruce (Picea sp.) P. pungens	Field In-Ground	Ahrens	CT	1988	Over the top	No significant injury with 0.133 and 0.266 lb ai per acre with June or July applications; excellent control of bird vetch, no control of field horsetail.
10650	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Pine, Mugo (Pinus mugo)	Field Container	Ahrens	CT	1989	Over the top	No injury at 0.125, 0.25, 0.5 lb ai per acre; good to excellent control of galinsoga but poor of spurge.
10650	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Pine, Mugo (Pinus mugo)	Field Container	Beste (ARS)	MD	1992	Over the top	No injury or significant growth reduction at 0.125, 0.25 and 0.5 lb ai per acre.
10650	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Pine, Mugo (Pinus mugo)	Field Container	Glaze	GA	1992	Over the top	Slight injury at 0.125, 0.25 and 0.5 lb ai per acre.
11090	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Pine, Longleaf (Pinus palustris)	Field Container	Glaze	GA	1992	Over the top	No significant injury at 0.125, 0.25, and 0.5 lb ai per acre; most plants marketable.
11090	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Pine, Longleaf (Pinus palustris)	Field Container	Glaze	GA	1993	Over the top	No significant injury at 0.125, marginal at 0.25 and 0.5 lb ai per acre; all plants marketable.
10502	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Pine (Pinus sp.) P. strobus	Field In-Ground	Ahrens	CT	1985	Over the top	Slight curling of needles and crooked stems.
10502	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Pine (Pinus sp.) P. strobus	Field In-Ground	Ahrens	CT	1986	Directed	No injury at 0.133 and 0.266 lb ai per acre.
10502	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Pine (Pinus sp.) P. strobus	Field In-Ground	Ahrens	CT	1986	Directed	No significant injury at 0.133 and 0.266 lb ai per acre.
10502	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Pine (Pinus sp.) P. strobus	Field In-Ground	Ahrens	CT	1987	Directed	No significant injury at 0.125 and 0.25 lb ai per acre.
10502	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Pine (Pinus sp.) P. strobus	Field In-Ground	Ahrens	CT	1989	Directed	No significant injury at 0.125 and 0.5 lb ai per acre.

PR#	Product Actives	MOA Class	Target	Crop	Production Site	Researcher	State	Year	Application Type	Results
10502	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Pine (Pinus sp.) P. sylvestris	Field In-Ground	Baunworth	OR	1987	Over the top	No injury at 0.125, 0.25, and 0.5 lb ai per acre; good control of canada thistle.
10502	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Pine (Pinus sp.) P. strobus	Field In-Ground	Derr	VA	1988	Over the top	No injury at 0.125, 0.25, and 0.5 lb ai per acre.
10415	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Fir, Douglas (Pseudotsuga menziesii)	Field In-Ground	Ahrens	CT	1985	Over the top	No injury at 0.133, 0.266, 0.375 and 0.562 lb ai per acre.
10415	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Fir, Douglas (Pseudotsuga menziesii)	Field In-Ground	Ahrens	CT	1986	Directed	No injury at 0.133 and 0.266 lb ai per acre.
10415	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Fir, Douglas (Pseudotsuga menziesii)	Field In-Ground	Ahrens	CT	1988	Over the top	No injury at 0.125, 0.25, and 0.5 lb ai per acre.
10415	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Fir, Douglas (Pseudotsuga menziesii)	Field In-Ground	Regan	OR	1987	Over the top	No injury at 0.125, 0.25, and 0.5 lb ai per acre; excellent control of canada thistle.
11060	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Oak (Quercus sp.)	Field In-Ground	Garrett	MD	2001	Over the top	Slight to significant injury increasing with rate 0.125, 0.25 and 0.5 lb ai per acre applied over the top of emerged seedlings; excellent control of dandelion, clover, and eclipta.
11255	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Oak (Quercus sp.) Q. nuttallii	Field Container	Glaze	GA	1993	Over the top	Slight injury at 0.125, 0.25 and 0.5 lb ai per acre; all plants marketable.
11255	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Oak (Quercus sp.) Q. coccinea	Field Container	Linderman	OR	1993	Over the top	No injury at 0.125, 0.25 and 0.5 lb ai per acre.
11089	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Oak, Southern Live (Quercus virginiana) Q. agrifolia	Field Container	Glaze	GA	1992	Over the top	Slight injury at 0.125, 0.25 and 0.5 lb ai per acre.
11089	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Oak, Southern Live (Quercus virginiana) Q. virginiana	Field Container	Glaze	GA	1993	Over the top	Virtually no injury at 0.125, 0.25 and 0.5 lb ai per acre; all plants marketable
11087	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Azalea & Rhododendron (Rhododendron sp.) 'Roseum 'Elegans'	Greenhouse	Ahrens	CT	1989	Over the top	No injury at 0.125, 0.25 and 0.5 lb ai per acre.
10651	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Azalea & Rhododendron (Rhododendron sp.) R. catawbiense 'Roseum Elegans'	Field Container	Beste (ARS)	MD	1992	Over the top	No significant injury or growth reduction at 0.125, 0.25 and 0.5 lb ai per acre.
10651	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Azalea & Rhododendron (Rhododendron sp.) R. obtusum 'Hino Crimson'	Field Container	Beste (ARS)	MD	1992	Over the top	Slight initial injury with complete recovery in 5 weeks at 0.125, 0.25 and 0.5 lb ai per acre; no growth reduction.
10651	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Azalea & Rhododendron (Rhododendron sp.)	Field Container	Glaze	GA	1992	Over the top	Moderate injury at 0.125, 0.25 and 0.5 lb ai per acre.

PR#	Product Actives	MOA Class	Target	Crop	Production Site	Researcher	State	Year	Application Type	Results
10651	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Azalea & Rhododendron (Rhododendron sp.) 'Ocean Lake'	Field Container	Linderman	OR	1993	Over the top	No injury at 0.125, 0.25 and 0.5 lb ai per acre.
10651	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Azalea & Rhododendron (Rhododendron sp.) R. roseum elegans	Field Container	Senesac	NY	1993	Over the top	No significant injury at 0.125, 0.25, and 0.5 lb ai per acre.
23061	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Sea Campion (Silene uniflora) S. caroliniana	Field Container	Senesac	NY	2002	Over the top	No to slight injury increasing with rate (0.125, 0.25 and 0.5 lb ai per acre)
10504	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Yew (Taxus sp.) T. europaeata	Field In-Ground	Ahrens/Mervosh	CT	1999	Over the top	Slight curling of needles, but transient, at 0.125, 0.25, and 0.5 lb ai per acre.
10412	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Red Cedar, Arborvitae (Thuja sp.) T. nigra	Field In-Ground	Ahrens	CT	1989	Over the top	No injury at 0.125, 0.25 and 0.5 lb ai per acre.
10412	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Red Cedar, Arborvitae (Thuja sp.) T. occidentalis	Field In-Ground	Talbert	AR	1988	Over the top	No injury at 0.125, 0.25 and 0.5 lb ai per acre.
23063	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Thyme (Non-Bearing) (Thymus sp.) T. praecox 'Albiflorus'	Field Container	Senesac	NY	2001	Over the top	Very slight injury with complete recovery at 0.125, 0.25 and 0.5 lb ai per acre.
23063	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Thyme (Non-Bearing) (Thymus sp.) T. serpyllum	Field Container	Senesac	NY	2002	Over the top	No injury at 0.125, 0.25 and 0.5 lb ai per acre.
23063	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Thyme (Non-Bearing) (Thymus sp.) T. serpyllum	Field Container	Williams	IL	2009	Over the top	No crop injury at 0.125, 0.25 and 0.5 lb ai per acre.
23064	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Clover, White (Trifolium repens) 'Atropurpureum'	Field Container	Senesac	NY	2002	Over the top	Moderate to severe injury at 0.125, 0.25 and 0.5 lb ai per acre.
10684	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Hemlock, Eastern (Tsuga canadensis)	Field In-Ground	Ahrens	CT	1989	Over the top	No injury at 0.125, 0.25 and 0.5 lb ai per acre
11072	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Hemlock (Tsuga sp.) T. canadensis	Field In-Ground	Ahrens	CT	1993	Over the top	Minor transient injury at 0.125 and 0.25, moderate transient at 0.5 lb ai per acre with X-77; negligible injury by 5 months posttreatment
34508	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Society Garlic (Tulbaghia violacea)	Field Container	Marble	FL	2021	Over the top	Minor to severe injury increasing with rates (0.25, 0.5, or 1.0 lbs ai per acre), plant growth reduced at all rates.
23065	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Speedwell (Veronica sp.) V. repens	Field Container	Senesac	NY	2002	Over the top	No injury at 0.125, 0.25 and 0.5 lb ai per acre.
23065	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Speedwell (Veronica sp.) V. repens	Field Container	Williams	IL	2009	Over the top	No crop injury at 0.125, 0.25 and 0.5 lb ai per acre.
13614	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Periwinkle (Vinca sp.) V. minor	Field In-Ground	Derr	VA	2001	Over the top	Virtually no injury or growth reduction at 0.125, 0.25 and 0.5 lb ai per acre.
13614	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Periwinkle (Vinca sp.) V. minor	Field In-Ground	Williams	IL	2009	Over the top	No crop injury at 0.125, 0.25 and 0.5 lb ai per acre.

PR#	Product Actives	MOA Class	Target	Crop	Production Site	Researcher	State	Year	Application Type	Results
11070	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Weigela (Weigela sp.) W. florida 'Java Red'	Field In-Ground	Ahrens/Mervosh	CT	1999	Over the top	Significant injury, even mortality, at 0.125, 0.25, 0.5 lb ai per acre; excellent control of horseweed.
34506	Lontrel T&O (Clopyralid)	WSSA 4	Phytotoxicity (Phytotoxicity)	Zephyr-lily (Zephyranthes sp.) 'Pink'	Field Container	Senesac	NY	2021	Directed	Minor injury at highest rate (0.25, 0.5, and 1.0 lb ai per acre).

Label Suggestions

In this report, twelve species and genera exhibited no or minimal injury after over the top treatments of Lontrel at 0.125, 0.25 and 0.5 lbs ai per acre. Seven of those crops are already in the product label. If tested crops will be listed on the label, these can be included in a future label:

*Abies balsamea**
*Acer rubrum**
Acorus sp.
Carex sp.
Hemerocallis sp.
Ilex cornuta

Juncus effusus
*Juniperus horizontalis**
*Picea pungens**
*Pinus mugo**ssp. *Mugo*
*Pinus strobus**
*Pseudotsuga menziesii**

Given the lack of phytotoxicity across so many different plant species and genera, it is suggested that a general statement can be placed on the label such as 'over the top applications have not been demonstrated to cause damage on various environmental horticulture plant species according to labeled use instructions. Lontrel may be used on a wide number of crops, but must be tested on a limited portion of the crop prior to applying to the whole crop if the grower has no previous experience applying Lontrel to that crop.

In this report, ten species and genera exhibited moderate to severe injury after a single over the top application of Lontrel at 0.125, 0.25 and 0.5 lbs ai per acre. It is recommended that the following should be listed in a section of the label cautioning against use with over the top applications:

Cornus amomum
Cornus sericea
Erigeron karvinskianus
Euonymus alatus
Fraxinus sp.
Hydrangea paniculata
*Juglans nigra**
Trifolium repens
Tulbaghia violacea
Weigela florida

*Already registered

Appendix 1: Contributing Researchers

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