

Carpet Burweed (*Soliva sessilis*)

Literature Review

April 14, 2014



Photo: A. Millham, Carpet Burweed at Smelt Bay Provincial Park 2009

prepared by:

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CARPET BURWEED (*SOLIVA SESSILIS* RUIZ & PAV.) Local Information

Plant Growth

- Early start, as early as December some years to February
- Flowers from February to July depending on temperature
- Forms dense carpets and smothering other plants
- Produces sharp pointed seeds, seeds have sharp spines (150 seeds from one plant)
- Spread by tires, feet and fur of animals, recreational vehicles
- Seed bank survival is thought to be 1 year

- **Dave Polster: March 12, 2014**

- Germinate roughly September to mid-May- almost year round
- Winter annual
- Flowering late March to late July, first ripe seed early May
- Behaviours of carpet burweed:
 - It germinates anytime there is moisture
 - Habitat: compact paths to shaded woodlands in BC
 - It hasn't been found to sprout from roots
- ID:
 - Leaflets sub-opposite is diagnostic
 - Easier to ID in a burn patch and pull new germinants
 - Walking bare feet through the patch and see what sticks
- Seed banking was suspect

- **Sally John and Jean Brouard on Ruckle Park burweed research**

- Approximately 115 seeds/plant counted - **Thomas Munson City of Victoria Parks**



photo: Alex SL

Local Distribution

- In British Columbia, Carpet burweed was first collected in Ruckle Provincial Park, Saltspring Island, on May 18, 1996 by Frank Lomer, who later reported this find in BEN (Botanical Electronic News) # 163 (Lomer 1997).
- Found in Victoria and Gulf Islands, West Coast, Central VI, Cortez Island and Tsawwassen
- Rathrevor was first noted in 2005
- Cowichan River Park in the gravel, using hand pulling, successfully eradicated! (with 6 years of monitoring)
- As of 2014 there are 23 sites that we know of - **Dave Polster: March 12, 2014**
- Typically it is found where people have been or are. Don't believe that animals or geese are major vectors. Humans are the prime vectors.
- Outbreak on D'Arcy Island 2005 – **Dave Polster**
- First found in 2005 in Beacon Hill Park in 2 locations, now in 2014 there are 13 sites - **Thomas Munson, City of Victoria Parks**

Ceska Inventory in 2007:

Site	Location				Jurisdiction	Area of infestation (m ²) (approx.)
	Lat		Long			
Beachcomber RV	N48 29.3	33	W123 47.9	21	Private campground	200 ²
Beacon Hill Park (dog run)	N48 31.3	24	W123 01.6	22	City of Victoria park	100 ¹
Beacon Hill Park (Playground)	N48 51.2	24	W123 45.4	21	City of Victoria park	200 ¹
Bella Pacifica Campground Tofino	N49 41.0	07	W125 57.7	53	Private campground	150 ²
Big Tent RV and Campground	N49 07.4	19	W124 09.0	17	Private campground	150 ²
Cattle Point (Uplands Park)	N48 17.4	26	W123 35.9	17	Muni. Of Oak Bay Park	100 ¹
Cowichan River Provincial Park	N48 21.7	46	W123 53.6	53	Provincial Park	10 ¹
D'Arcy Island (GI National Park)	N48 06.6	34	W123 21.6	16	National Park	10 ¹
French Beach Provincial Park	N48 34.9	23	W123 42.4	56	Provincial Park	100 ¹
Island View RV Campground	N48 37.2	34	W123 06.1	22	Private campground	600 ²
Jordan River Campground	N48 14.8	25	W124 17.1	03	Forest Company site	100 ²
KOA Victoria West Campground	N48 49.4	32	W123 58.1	33	Private campground	200 ²
Living Forests RV Site	N49	08	W123	54	Private	600 ²

	02.6	53.7	campground	
Park Canada site Tsawwassen	N49 02 07.8	W123 05 29.8	Private campground	10 ¹
Rathtreavor Group Site 1	N49 19 00.7	W124 16 13.9	Provincial Park	200 ¹
Rathtreavor Group Site 2	N49 19 01.4	W124 16 13.1	Provincial Park	150 ¹
Rathtreavor Group Site 3	N49 19 01.1	W124 16 10.4	Provincial Park	10 ¹
Rathtreavor Walk-in Site 1	N49 19 21.1	W124 16 00.0	Provincial Park	200 ¹
Rathtreavor Walk-in Site 2	N49 19 21.2	W124 16 01.3	Provincial Park	10 ¹
Rathtreavor Walk-in Site 3	N49 19 25.9	W124 15 58.1	Provincial Park	10 ¹
Rathtreavor Parking Lot 5	N49 18 56.8	W124 15 53.7	Provincial Park	50 ¹
Ruckle Provincial Park	N48 46 15.7	W123 22 06.1	Provincial Park	50,000 ^{1,3}
Ruckle Provincial Park (exclosure)	N48 46 17.3	W123 22 03.1	Provincial Park	5,000 ^{1,3}
Smelt Bay Provincial Park (Cortez)	N50 01 53.9	W124 59 48.0	Provincial Park	10 ¹
Sooke River RV Site	N48 23 35.3	W123 42 34.6	Private campground	200 ²
Sunny Shores Resort & Marina	N48 46 21.7	W123 53 53.6	Private campground	400 ²
Thetis Lake Regional Park	N48 27 49.3	W123 28 07.7	Regional Park (CRD)	200 ¹
Thetis Lake RV & Campground	N48 27 44.9	W123 28 07.4	Private campground	22,000 ²
Westwood Lake RV & Campground	N49 09 49.4	W123 59 41.5	Private campground	100 ²
Ucluelet Campground	N48 56 49.5	W125 33 29.1	Private campground	150 ²
	Total			81,170 m²

- Ceska, A. 2007, CARPET BURWEED (*SOLIVA SESSILIS* RUIZ & PAV.) IN CANADA, Botanical Electronic News, ISSN 1188-603X, No. 373, Victoria BC, CANADA link: <http://www.ou.edu/cas/botany-micro/ben/ben373.html>

- First detected at Fort Rod Hill in 2009 in 4 places. The site where carpet burweed was found is a high traffic area - **Aimee Pelletier, Parks Canada**
- Carpet burweed infestations at Thetis Lake: first noted in 2004 and again in 2005, in addition to the berm by the campground parking lot.
- 2011 found an occurrence at the North end of the lake
- 2010 Campground at Island View Beach: Scalped the gravel and left it in a pile and fenced it.
- 2013 some along the road
- 2013 Jordan River Campground
- Suspected vectors: camper vans, trailer parks - **Marilyn Fuchs, Capital Regional District Parks**

- Uplands Park at Cattle point a 76 acre park has infestation. Suspected vector is four buses. 2013 Found it outside the main infestation and in larger areas than ever before. - **Chris Paul, City of Oak Bay arborist**

Treatment

- Treatment: searching is part of the treatment, burning, Herbicide- Killex and hot foam system - **Dave Polster: March 12, 2014**
- Ruckle Park Techniques used: 1997-hand pulling+plastic covering+exclosure; 1998 &1999-Killex (2,4-D); 2000- hand pulling; 2001-none; 2002- tiger torch+plastic covering+temporary closures; 2003 -tiger torch+herbicide+hand pulling; 2004 -tiger torch+ herbicide+ hot foam+hand pulling. Roaming hand pulling crews ongoing.
- No mowing, no camping and annual systematic monitoring (survey and removal at 2 m x 2 m cell level)
- On year 3 it went from a trace to very little
- Key is no mowing...letting the grass grow and little public access
- Conclusion: Take the long view, several treatments and use an experimental approach
- Contain strategy: focus on controlling outlier populations first and contain large infestations
- In polygon 3: 30000 plants (2005) – 0 plants found (2010)
- Labour intensive, they have a committed group of volunteers
- Initially survey in April, early May (before flowering)
- Ecosystem Recovery Benefits (from letting grass grow): Camas, Voles, Snakes and Raptors have rebounded in exclosure
- The volunteers survey again in the late fall when the grass has died off. - **Tory Stevens/ Kathy Reimer: March 12, 2014**
- 15 years of hand picking with no success of eradication, it is still present at low numbers and persistent in some areas (return each year).
- Bio-control may be a good option, currently none exist in Canada
- Best Strategy: Control 'slow' the spread, reduce the populations locally, search for biocontrol - **Sally John and Jean Brouard on Ruckle Park burweed research**
- British Columbia Parks, who administer Ruckle Park, responded to carpet burweed soon after the infestation was detected. Carpet burweed was weeded out by hand in sensitive areas with native plants, and the areas with massive infestation were covered with black plastic tarps. Mulching did not prove effective, merely giving the managers a false impression that carpet burweed problem in Ruckle Park was under control. In addition, the BC Parks budget was reduced and did not allow funds to be spent on carpet burweed control. Within a few years, the seed bank in the mulched areas germinated, and the burweed problem in Ruckle Park erupted again. The history of the carpet burweed infestation in Ruckle Park as well as the history of the various treatments until the year 2004 has been summarized by Stevens et al. (2004 or 2005). - **Ceska, A. 2007, CARPET BURWEED (SOLIVA SESSILIS RUIZ & PAV.) IN CANADA, Botanical Electronic News, ISSN 1188-603X, No. 373, Victoria BC, CANADA link: <http://www.ou.edu/cas/botany-micro/ben/ben373.html>**

Table 2. Treatment history in Ruckle Provincial Park

Date	Coverage (m ²)	Treatment
1996	Several hundred plants	none
1997	900 (estimated)	Hand pulling; plastic covering; area closures
1998	Thought to be very low or nil after treatment	Killex (2,4-D)
1999	--	Killex
2000	--	Hand pulling
2001	--	--
2002	1468 (measured)	Tiger torch; plastic covering; temporary closures
2003	5260 (measured)	Experimental approach using several eradication techniques
2004	7000 (estimated)	Tiger torch; herbicide; hot foam; hand pulling, area closures

Stevens, V., E. Lofroth, B. Costanzo, & S. Walsh. [2004 or 2005]. *Invasive burweed in Ruckle Provincial Park, British Columbia*. [Poster] Available from:

http://www.env.gov.bc.ca/bcparks/explore/parkpgs/ruckle/burweed_poster.pdf

- Treatment includes isolating major outbreaks by fencing, burning areas and then re-seeding with turf grass
- Interpretive signs and public outreach seems to work well to keep people out of exclosures
- Seemed as though burning, fencing and seeding was effective but there was some discussion around whether burweed was actually growing under long grasses and just couldn't see it? - **Thomas Munson**
City of Victoria Parks

- Fort Rodd Hill National Historic Site of Canada - Parks Canada Agency. Treatment includes burning of the infested area and a small buffer around the infestation: Treatments have occurred in 2009, in 2010 (April), in 2011 (March) including follow-up monitoring and in 2012 with only monitoring and no burning since only one plant was found. In early May of 2013 rebounding of the infestation occurred follow up burning and mulching occurred in June. In 2014, so far the mulching conducted in 2013 seems to have been successful in reducing germinants, however some germinants were noted along the path where mulch was thin.
- No re-seeding of burned areas at this site. - **Aimee Pelletier, Parks Canada**

- Thetis Lake Treatment: burning, fencing, closing the gate between the lake and parking area -
- 2013 Jordan River Campground: closed 2 camp sites to prevent the further spread
- Burning in March and grass seeding – successful approach - **Marilyn Fuchs, Capital Regional District Parks**

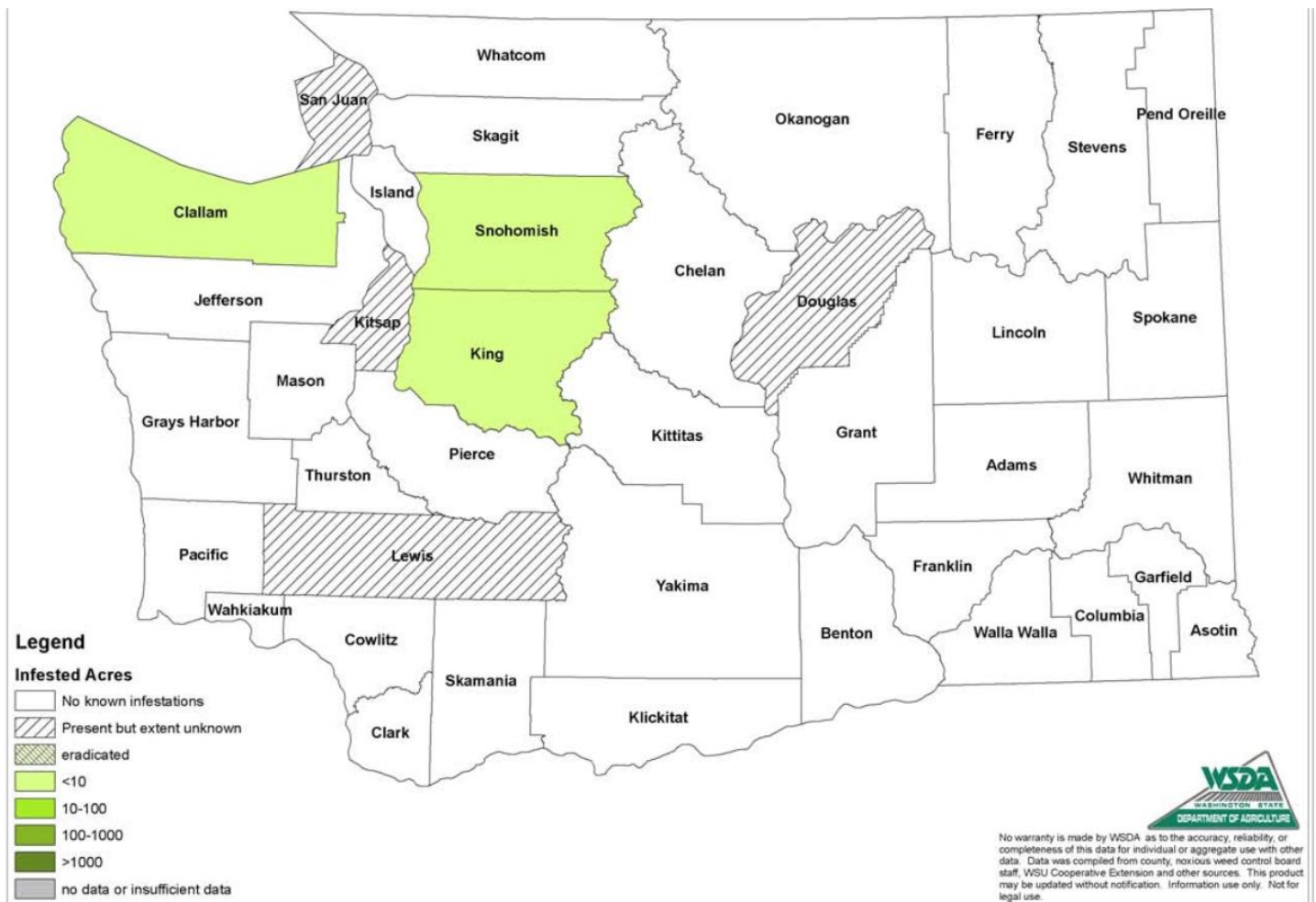
- Friends of Uplands park have volunteers hand pull the carpet burweed
- Monitoring challenging since it is a volunteer program
- Have installed fencing to keep people on main trails and put wood chips. Don't know how successful this method has been on reducing infestations. - **Chris Paul, City of Oak Bay arborist**

CARPET BURWEED (*SOLIVA SESSILIS* RUIZ & PAV.) North American Information

also known as lawngrass, spurweed, lawn burweed, burweed,

Distribution

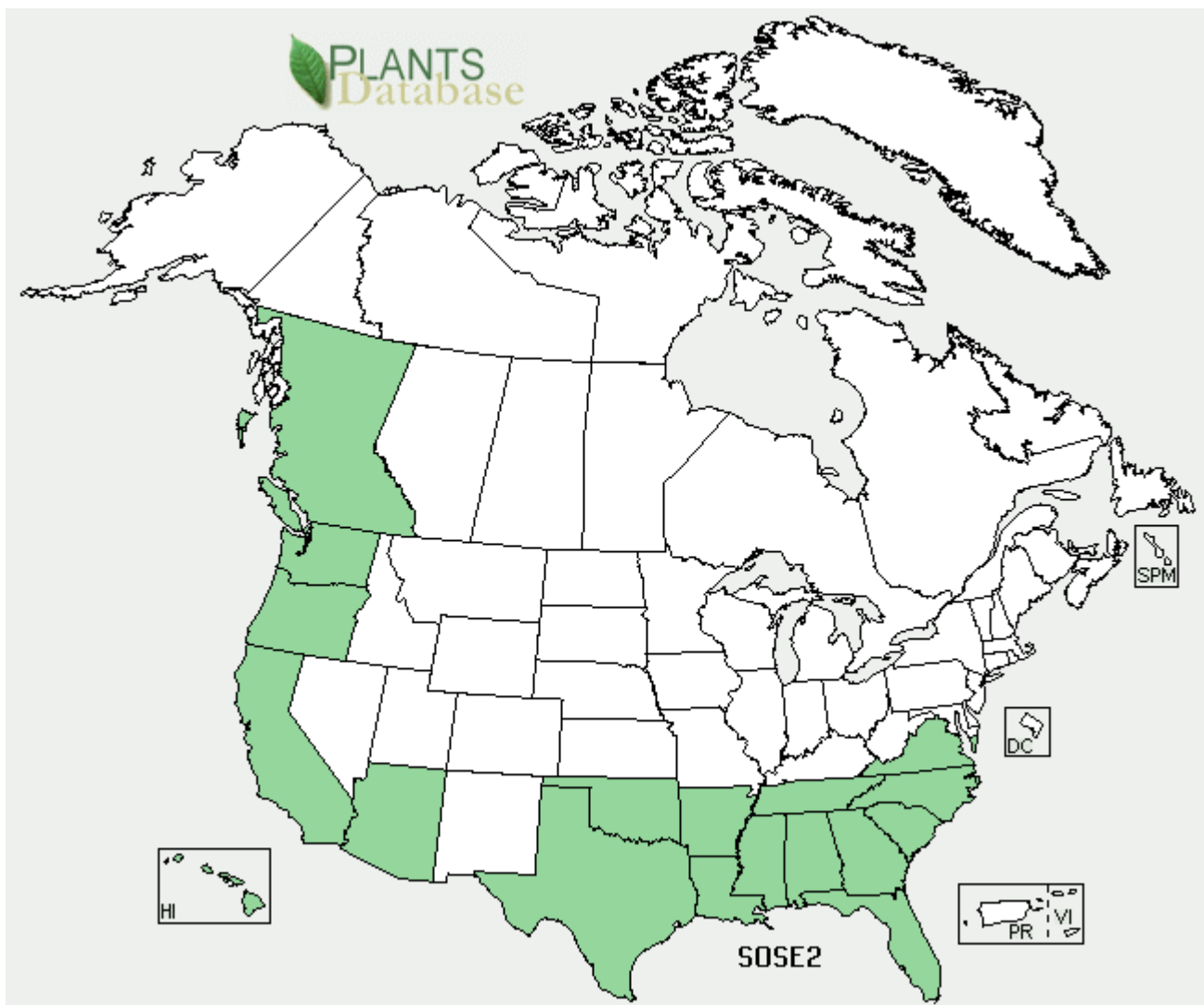
Washington State: It is found in managed perennial grass areas usually associated with heavy foot traffic, public swim areas, and boat launches of public lakes, watered lawns, golf courses, and hard-packed soils near paths and roadsides. Please [click here](#) to see a county level distribution map of lawnweed in Washington.



-Washington State Control Board Info: (link: <http://www.nwcb.wa.gov/detail.asp?weed=125>)

Washington State lists Lawnweed (*Soliva sessilis*) in the control category: Class B Weeds: Non-native species presently limited to portions of the State. Species are designated for control in regions where they are not yet widespread. Preventing new infestations in these areas is a high priority. In regions where a Class B species is already abundant, control is decided at the local level, with containment as the primary goal. Please contact your County Noxious Weed Control Coordinator to learn which species are designated in your area. (link: <http://www.weedcenter.org/resources/state.html#bc>)

San Juan County list Carpet Burweed as Class B and C Selected Weeds. Many of the county's Class B weeds are covered under the State plant quarantine laws, including Lawnweed. Known populations are limited to campsites on Turn, Posey and Matia Islands. We have had no reports of this species in 2012. (link: <http://sanjuan.wsu.edu/noxious/documents/SJCNoxiousWeed2012StatusReport.pdf>)



Present Absent/Unreported

See U.S. county distributions (when available) by clicking on the map or the linked states below:

USA ([AL](#), [AR](#), [AZ](#), [CA](#), [FL](#), [GA](#), [HI](#), [LA](#), [MS](#), [NC](#), [OK](#), [OR](#), [SC](#), [TN](#), [TX](#), [VA](#), [WA](#)), **CAN** (BC) - <http://plants.usda.gov/core/profile?symbol=SOSE2>

Treatment

Cultural Control

Because lawnweed (carpet burweed) is so widespread, property owners in King County are not required to control it and we are not tracking infestations. We can provide advice on how to control lawnweed, but there is no legal requirement to do so. link <http://www.kingcounty.gov/environment/animalsAndPlants/noxious-weeds/weed-identification/lawnweed.aspx>

Establishing thicker lawns and appropriate timing herbicide applications should help prevent the establishment of lawnweed. Lewis County removed infested ground cover and replaced with sod. - Washington State Control Board Info: (link: <http://www.nwcb.wa.gov/detail.asp?weed=125>)

Properly caring for your lawn in combination with using selective herbicides to encourage it to become thick and dense should alleviate most annual weed problems within a few seasons. Long-term weed control relies on correct cultural practices for your turf type that will allow your grass to become a dense carpet that annual weed seed cannot penetrate. These cultural practices include mowing at the right height and frequency, fertilizing at the correct rate and time, and controlling thatch or alleviating soil compaction if they are a problem. (Master Gardener Control options link: <http://www.starnewsonline.com/article/20100311/ARTICLES/100319931?tc=ar>)

Winter annual broadleaf weeds germinate at North Carolina State University in the fall or winter and grow during any warm weather, which may occur in the winter, but otherwise remain somewhat dormant during the winter. They resume growth and produce seed in the spring and die as temperatures increase in late spring and early summer. They quickly invade thin turf areas especially where there is good soil moisture. Shade may also encourage growth. Many have a prostrate growth habit and are not affected by mowing. A dense, vigorous turf is the best way to reduce the encroachment of winter annual weeds. First, select adapted turfgrass cultivars for your area and then properly fertilize, mow, and water to encourage dense growth. (link: http://www.turffiles.ncsu.edu/PDFFiles/004366/Burrweed_Lawn.pdf)

Chemical Control

Griffin, Georgia

Table 5. Expected control of selective weeds with preemergence herbicides¹.

Herbicide	Crabgrass	Goosegrass	Annual bluegrass	Common Chickweed	Henbit	Lawn Burweed
atrazine	P-F ²	P	E	G	G	E
benefin	G-E	F	G-E	G	G	F
benefin + oryzalin	E	G	E	G	G	--
benefin + trifluralin	E	G	E	G	G	--
bensulfide	G-E	P-F	F	F	F	F
bensulfide + oxadiazon	E	G-E	--	--	--	--
DCPA	G-E	F	G	E	F	P
dithiopyr	E	G-E	G-E	--	--	--
fenarimol	P	P	G	P	P	P
isoxaben	F	P	F	G	G	--
metolachlor	F-G	F	F-G	--	--	--
napropamide	G-E	G	G	E	P	E
oryzalin	E	F-G	G-E	G	G	--
oxadiazon	G	E	G	P	P	P
pendimethalin	E	G-E	G-E	E	G	--
proflaminate	G-E	G-E	G	--	--	--
pronamide	F	P	G-E	E	P	P
siduron	F	P	P	P	P	P
simazine	F	P	E	G	G	E

¹Adapted from Lewis, 1992; McCarty, 1993; and Murphy, 1988.

²F=Excellent. >89% control; G=Good. 80 to 89% control; F=Fair. 70 to 79% control; P=Poor. <70% control.

- Control of Turfgrass Weeds, Lambert B. McCarty - UNIVERSITY OF FLORIDA & Tim R. Murphy - UNIVERSITY OF GEORGIA

(link:<http://www.commodities.caes.uga.edu/turfgrass/georgiaturf/WeedMngt/weedcontrol/ControlOfTurfgrassWeeds.htm>)

To control lawn burweed and other cool season annual weeds, selective herbicides can be applied in the fall (October through November) and early spring (February through March) to kill these weeds when they are still small and actively growing. Using herbicides to kill young weeds will help reduce the amount of weed seed in the soil by preventing these plants from reaching maturity and returning new seed to the soil. Herbicides available to homeowners that will control lawn burweed and many other cool season annual weeds while not harming turf grasses contain the active ingredient atrazine or a combination of the active ingredients 2,4-D, mecoprop and dicamba. The latter product is referred to as a three-way spray and is available under brand names including Weed-B-Gone and Lesco Three Way. (Master Gardener Control options link: <http://www.starnewsonline.com/article/20100311/ARTICLES/100319931?tc=ar>)

Postemergence Chemical Control in South Carolina: The key factor to effectively controlling lawn burweed is to apply a postemergence herbicide during the winter months of December, January and February. The weed is smaller and easier to control during this time of year and has not yet developed the spine-tipped burs. Control is not impossible in March, April, and May, but the spines have already formed by this time and will remain after the weed dies. Because lawn burweed is a winter annual, it will begin to die in late spring as air temperatures reach 90 °F. Once the weed has reached a more mature state, multiple herbicide applications may be necessary which increases the potential for turfgrass injury. Dead or alive, lawn burweed poses a painful problem. The only solution to this is early identification and control.

A three-way herbicide may be used on bermudagrass, zoysiagrass, centipedegrass, St. Augustinegrass and tall fescue. The active ingredients of a three-way herbicide often include the following broadleaf weed killers: 2,4-D, dicamba, and mecoprop (MCP). Examples of a three-way herbicide are Ferti-lome Weed-Out Lawn Weed Killer with Trimec®, Bayer Advanced Southern Weed Killer for Lawns, Spectracide Weed Stop Weed Killer for Lawns, Southern Ag Lawn Weed Killer with Trimec®, and Lilly Miller Lawn Weed Killer Concentrate.

Note: Herbicides containing 2,4-D should be applied at a reduced rate on St. Augustinegrass and centipedegrass to prevent damage to these lawns. If a second application is needed, apply the herbicide in spot treatments. Repeated applications of a three-way herbicide should be spaced according to label directions.

In addition to three-way herbicides, there are several other herbicides that can be used for lawn burweed control in home lawns. Atrazine may be used for control in centipedegrass and St. Augustinegrass. Atrazine applied in November will have postemergence activity against newly sprouted lawn burweed seedlings and also will have preemergence activity against those that have not yet germinated during the fall. Examples of products containing atrazine for home lawns are Southern Ag Atrazine Weed Killer, Hi-Yield Atrazine Weed Killer, Image for St. Augustinegrass & Centipedegrass with Atrazine and Spectracide Weed Stop for Lawns Concentrate for St. Augustine & Centipede Lawns.

Metsulfuron (such as in Manor and Blade) can be used for lawn burweed control in bermudagrass, centipedegrass, St. Augustinegrass, and zoysiagrass. Metsulfuron is packaged for landscape professionals. Due to the cost and application rate of this selective herbicide, it may be more practical to hire a landscape professional to apply the treatment. A non-ionic surfactant (such as Southern Ag Surfactant for Herbicides) is required at 2 teaspoons per gallon of spray mix for best control. Do not apply metsulfuron to lawn if over-seeded with annual ryegrass or over-seed for 8 weeks after application. Do not plant woody ornamentals in treated areas for one year after application of metsulfuron. Do not apply metsulfuron herbicides within two times the width of the drip line of desirable hardwood trees.

CAUTION: Postemergence herbicides should not be applied during spring transition (green-up of lawn) or when air temperatures exceed 90 °F as this can cause severe damage to the turfgrass. A newly seeded lawn should be mowed a minimum of three times before applying an herbicide.

Turf Tolerance to Herbicides for Lawn Burweed

Herbicide	Bermudagrass	Centipedegrass	St. Augustinegrass	Tall Fescue	Zoysiagrass
S = Safe at labeled rates I = Intermediate safety, use at reduced rates NR = Not registered for use on and/or damages this turfgrass D = Fully dormant turf only.					
atrazine	D	S	S	NR	NR
(3-way) 2,4-D + MCP + dicamba	S	I	I	S	S
metsulfuron	S	S	S-I	NR	S

Preemergence Control: Isoxaben is a preemergence herbicide for control of lawn burweed, as well as many winter broadleaf weeds in bermudagrass, centipedegrass, St. Augustinegrass, zoysiagrass and tall fescue. Apply isoxaben in late September to early October before the winter weeds germinate. Do not reseed or overseed within 60 days of application, and do not apply to newly seeded lawns until the lawn has been mowed three times. An example of a home lawn granular product containing isoxaben is Green Light Portrait Broadleaf Weed Preventer. Granular preemergence herbicides must be activated by 1/2 inch of rainfall or irrigation.

Note: Read and follow all label instructions when using herbicides. Repeat applications 10 to 14 days apart may be required for acceptable control. Do not mow within 48 hours after application of most herbicides. Most postemergence herbicides need to dry on the leaf surface before irrigation or rainfall occurs. (Clemson Cooperative Extension, link: <http://www.clemson.edu/extension/county/index.html>)

North Carolina State University states that lawn burweed is controlled postemergence in tolerant warm season turf with sulfonylurea and triazine herbicides in fall or spring. Atrazine provides good control if applied in the fall, but does less well if applied during the winter (December -March). Two, three, and four way broadleaf herbicides also provide postemergence control

Preemergence herbicides:

Herbicide	Tolerant Turfs ⁽¹⁾	Average Efficacy Rating ⁽²⁾	Range of Trial Efficacy Values, %	Number of Trials	Products ⁽³⁾
metolachlor	ba, be, c, sa, z	E		0	Pennant Magnum
atrazine*	be, c, sa, z	G-E		0	AAtrex 4L
rimsulfuron**	be	G-E		0	TranXit GTA

Postemergence herbicides:

Herbicide	Tolerant Turfs ⁽¹⁾	Average Efficacy Rating ⁽²⁾	Range of Trial Efficacy Values, %	Number of Trials	Products ⁽³⁾
trifloxysulfuron-sodium	be, z	E	91 - 100	7	Monument
metsulfuron	be, sa, z	E	99 - 100	5	Escort**, Manor
glyphosate		E	84 - 99	2	Glyphosate Original, Roundup, Touchdown Pro**
rimsulfuron**	be	E	98 - 100	2	TranXit GTA
simazine	be, c, sa, z	E	97	1	Princep
2,4-D & triclopyr*	bk, f, r	E		0	Chaser
bentazon	ba, bc, be, bk, c, f, sa, z	E		0	Basagran T/O
clopyralid**	ba, bc, be, bk, c, f, r, sa, z	E		0	Lontrel
dicamba	ba, be, bk, f, r, z	E		0	Banvel, Clarity, Vanquish
imazaquin	be, c, sa, z	E		0	Image
clopyralid & triclopyr**	be, bk, c, f, r, z	G	66 - 96	4	Confront

Postemergence herbicides:

Herbicide	Tolerant Turfs ⁽¹⁾	Average Efficacy Rating ⁽²⁾	Range of Trial Efficacy Values, %	Number of Trials	Products ⁽³⁾
metsulfuron & sulfosulfuron	be, sa, z	G	56 - 100	3	Certainty & Manor
atrazine & sulfosulfuron*	be, c, sa, z	G	79 - 100	2	AAtrex 4L & Certainty
bispyribac sodium	be, r	G	79 - 100	2	Velocity
atrazine*	be, c, sa, z	G	84	1	AAtrex 4L
metribuzin	be	G		0	Sencor 75 Turf
2,4-D	be, bk, f, r, z	G		0	2,4-D amine, Solution Water Soluble
fluroxypyr & sulfosulfuron	ba, c, sa, z	F	69 - 88	2	Certainty & Spotlight

* For use only by or under the supervision of a certified applicator, or by commercial nursery, turf, and landscape personnel.

** Not for application to residential lawns.

Footnotes:

(1) **Turfgrass Codes:**

- ba bahiagrass
- bc bentgrass, creeping
- be bermudagrass
- bk bluegrass, Kentucky
- c centipedegrass
- f fescue, tall
- r ryegrass, perennial
- sa St. Augustinegrass
- z zoysiagrass
- blank No turfgrass in the database is completely tolerant. Check label to see if chemical can be used at a reduced rate or during the dormant season on your turfgrass.

(2) **Efficacy Ratings:**

- E excellent control (90 to 100%)
- G good control (80 to 90%)
- F fair control (70 to 80%)

Efficacy ratings are based on herbicide trials performed by weed scientists at North Carolina State University between 1997 and 2007. The number of trials included in the efficacy ratings is displayed in the next-to-last column. The higher this number, the more confidence can be placed in the efficacy values. Trials may have involved sequential applications of one or more chemical. Details of individual trials (herbicide rates, dates of application, environmental conditions at time of application, etc) can be viewed on the TurfFiles web site, through the [Turf Weed Management Decision Aid](#).

Efficacy ratings for chemicals lacking trial data are from "[Pest Management Strategic Plan for Turfgrass in the Southern United States](#)," a summary of a workshop for turf experts from multiple universities held in Griffin, GA in October, 2004. The workshop was sponsored by the Southern Region Integrated Pest Management Center.

- (3) Recommendations of specific chemicals are based upon information on the manufacturer's label and performance in a limited number of trials. Because environmental conditions and methods of application may vary widely, performance of the chemical will not always conform to the safety and pest control standards indicated by experimental data. The order in which brand names are given is not an indication of a recommendation or criticism.

Recommendations for the use of agricultural chemicals are included in this publication as a convenience to the reader. The use of brand names and any mention or listing of commercial products or services does not imply endorsement by North Carolina State University or discrimination against similar products or services not mentioned. Other brand names may be labeled for use on turfgrasses. Individuals who use agricultural chemicals are responsible for ensuring that the intended use complies with current regulations and conforms to the product label. Be sure to obtain current information about usage regulations and examine a current product label before applying any chemical. For assistance, contact your county's Cooperative Extension agent.

(link: http://www.turffiles.ncsu.edu/PDFfiles/004366/Burrweed_Lawn.pdf)

Biological control

No Biological controls used in Lewis County. (link: <http://www.nwcb.wa.gov/detail.asp?weed=125>)

CARPET BURWEED (*SOLIVA SESSILIS* RUIZ & PAV.) International Information

also known as lawnweed, common soliva, Onehunga weed, field burrweed, bindyi, jo jo bindi weed, bindii, or bindi-eye

Description

Plants (1–)2–5(–25+) cm (high or across), ± villous, glabrescent (not stoloniferous, stems purplish, prostrate to ascending, often rooting at nodes). **Leaves** basal and cauline; blades ± oblanceolate, 1–2(–3)+ cm, 2(–3)-pinnately palmately lobed. **Heads** mostly scattered along stems. **Involucre**s 2–4(–5) mm diam. **Pistillate florets** 5–8(–17+) in 1–2+ series. **Disc florets** 4–8+; corollas 1.5–2.5 mm. **Cypselae**: bodies ± obovate to lanceolate, (1.5–)2.5–3+ mm, usually winged (wings entire or ± sinuate to incised, each shoulder usually distally projecting as spinelike tooth), faces glabrous or ± scabrellous to hirtellous; **pappi** 0 (persistent stylar sheaths indurate, spinelike, 1–2+ mm, erect or slightly inflexed). **2n** = ca. 92 (as *S. pterosperma*), 110+ (from Portugal), 118–120.

In Australia it grows very low to the ground, making it impossible to be mown out. Its favourite haunts include worn areas around playgrounds, picnic spots, under trees and other shady areas. (Technigrow link: <http://www.technigrow.com.au/documents/Bindii%202013.pdf>)

Soil drainage: Seasonally waterlogged

Soil reaction: neutral

Soil texture:

- heavy
- light
- medium

- Invasive Species Compendium (link: <http://www.cabi.org/isc/datasheet/108899>)

Similarities to Other Species/Conditions

S. sessilis looks like the following species that occupy similar habitats, but with some differences: *Matricaria discoidea*; *Aphanes arvensis*; and *Daucus carota*. *M. discoidea* is a common weedy species of compacted trails, parking lots, roadsides and other similar sites; it has dissected leaves, but lobes that extend far down the rachis. *A. arvensis* is similar, but with rounded dissected leaves. *D. carota* has more uniformly dissected leaves than *S. sessilis* and does not have the arching habit that *S. sessilis* leaves and stems have. In addition, young *Achillea millefolium* plants have much more finely divided leaves than *S. sessilis*, as does *Lomatium utriculatum*. Foliage colour and texture can aid in finding young *S. sessilis* plants among other similar species, although when the plants are very young, they can blend in with mosses and other seedlings (Castro, 2006).

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Achillea millefolium; plants have much more finely divided leaves than *S. sessilis*

Lomatium utriculatum; Foliage colour and texture can aid in finding young *S. sessilis* plants among other similar species, although when the plants are very young, they can blend in with mosses and other seedlings (Castro, 2006).

Distribution

- First described in Chile in 1974

Native range includes

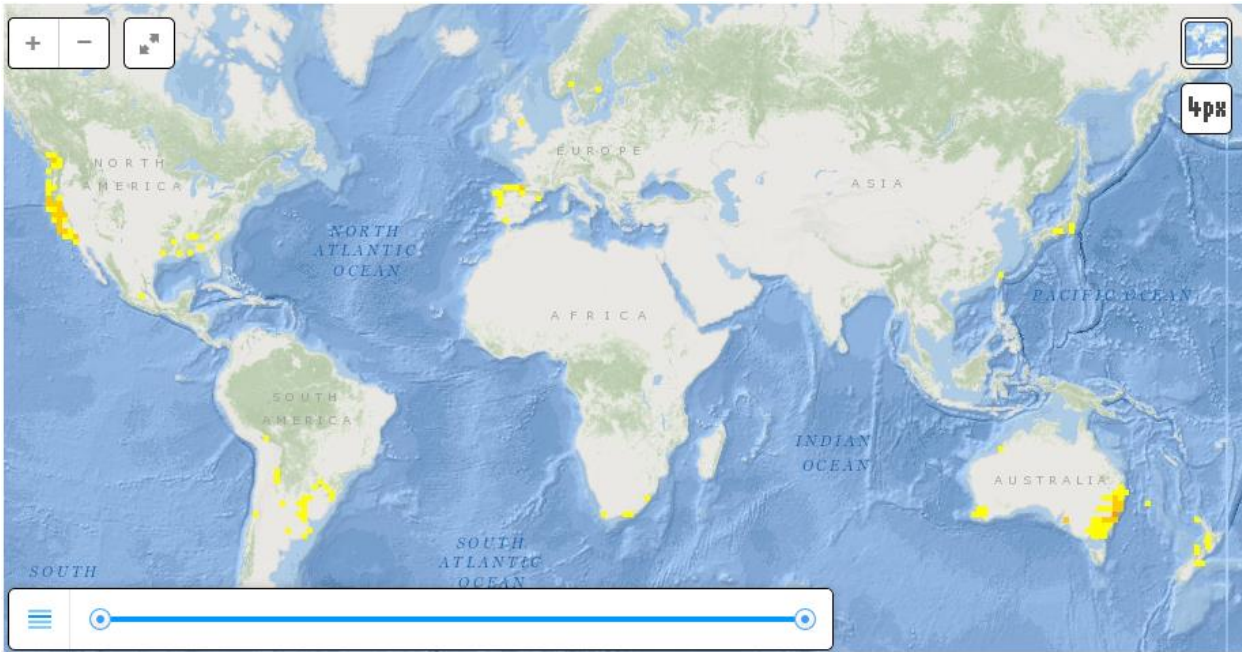
- ▶Argentina
- ▶Brazil
- ▶Chile
- ▶Paraguay
- ▶Peru
- ▶Uruguay

- Global Invasive Species Listings
- Global Invasive Species Listings
- Global Invasive Species Listings
- Global Invasive Species Listings
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Introduced range includes

- ▶Canada
- ▶China
- ▶France
- ▶Hawaii, USA
- ▶Japan
- ▶Lower 48 United States of America
- ▶Mexico
- ▶New Zealand
- ▶Norfolk Island
- ▶Norway
- ▶Portugal
- ▶South Africa
- ▶Spain
- ▶Taiwan
- ▶United Kingdom

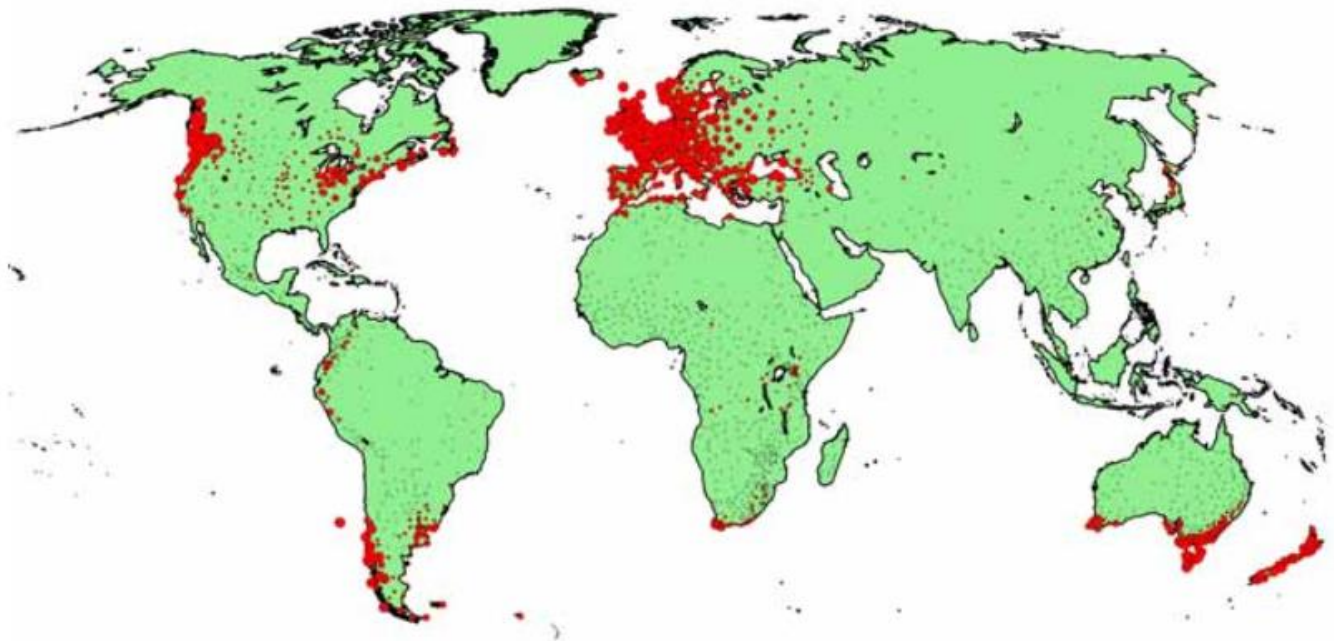
- USDA NRCS PLANTS Database
- Global Invasive Species Listings
- Global Invasive Species Listings
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Encyclopedia of Life (<http://eol.org/pages/397208/data>)

Regions of the world showing levels of climate matching each Canadian ecozone based on the CLIMEX® modeling system. http://publications.gc.ca/collections/collection_2008/inspection/A104-74-2008E.pdf

Pacific Maritime



Treatment

Carpet Burweed is one of many invasive plants being controlled in **Hawaii**, and while not one of the priority species in this study; the best technique used was "uproot" with success found to be controlled from 125 plants down to 5 plants from 1883 to 1986 and while this did not totally remove population, it was noted that plants

were "reduced to seedling stages" (Tunison, J.T. and Simmer, N.G. Success in Controlling Localized Alien Plants in Hawaii Volcanoes National Park.

<http://hear.its.hawaii.edu/books/apineh1992/pdfs/apineh1992v2tunisonzimmer.pdf>)

Pot trials were also conducted at Massey University (**New Zealand**) to study the poor control of Onehunga weed (*Soliva sessilis*) by herbicides noticed in turf at Helensville. This trial showed the Helensville ecotype to be resistant to pyridine herbicides, resulting in no control by clopyralid, triclopyr, picloram/2,4-D and picloram/triclopyr mixtures. (Harrington, K.C., Ward, A.J. and Wells, S.M. 2001. HERBICIDE RESISTANCE IN BLACK NIGHTSHADE AND ONEHUNGA WEED. *Arable Weeds, Pests & Diseases*. 152. New Zealand Plant Protection 54:152-156 link: http://www.nzpps.org/journal/54/nzpp_541520.pdf)

Control in Australia - When the burrs can be seen (or felt!), it is too late to spray.

1. A few plants can be lifted with a fork or removed with a steel garden rake, but most infestations require treatment with selected turf herbicides to achieve effective control
2. If *Bindii* is identified early and treatment can occur before formation of the burrs, Spearhead®, which contains a mixture of Clopyralid, Diflufenican and MCPA, is the preferred herbicide as it contains some pre-emergent qualities. It is also useful for treating Clover and other broadleaf weeds.
3. If treated late in the season, Millennium®, which contains 2,4-D, Clopyralid & Dicamba, is the preferred herbicide as it provides quicker control. This herbicide also controls Clover and other broadleaf weeds which emerge over the winter period.
4. Depending on the season and infestation, *Bindii* can re-emerge weeks after an initial treatment. For this reason Technigro recommends a proactive approach be developed in late Autumn to ensure your program is planned well in advance of treatment being required. Experience has proven that customers who have targeted *Bindii* with Spearhead at the right time of the year have fewer complaints and reduce the need to undertake follow up treatments later in the same season (Technigrow link: <http://www.technigro.com.au/documents/Bindii%202013.pdf>).

Australian Home Remedy:

1. Try the home, where *bindi* infestations are a significant problem. Mix 2 tbsp. of iron sulfate with 4 1/2 liters of water and spray it on the *bindi*. Iron sulfate is available at home-and-garden stores.
2. Buy a weed killer from your local home-and-garden store. Weed killers that will attack this pest include Chemspray Bin-die; *Bindii* and Broadleaf Weed Killer; and Jo Jo Onehunga Weed Killer. Dilute the chemical according to the instructions on the container and spray it over the plant.
3. Adjust your lawnmower to maintain the grass in your yard at a higher level, and the grass should exclude the low-laying *bindi*. An intense *bindi* infestation is often a sign that your grass is too low. The weed also thrives in compacted earth, so aerating the soil can help.

(Instructions from EHow link: http://www.ehow.com/how_7466981_destroy-bindis-yard.html)

Cultural control

Maintenance of healthy turf areas is the most effective means of preventing the establishment and spread of *S. sessilis* (Castro, 2006). Leaving grass uncut can help control *S. sessilis* (Maxwell et al., 1986), as can fertilizer applications that promote grass growth (Matthews, 1972). Tent platforms rather than camping on the grass (and creating wear) have been suggested as helpful in the control of *S. sessilis* (Castro, 2006).

Hand plucking individual young plants is used in ecologically sensitive areas. Hot foam/water (Waipuna system) was tested in British Columbia, Canada. Flaming just before seed set has been found to be the most effective means of treatment for large patches of *S. sessilis* in areas where herbicides cannot be used. Propane roofing torches can be used to burn the plants, taking care to burn the root crown.

Chemical control

It is tolerant of 2,4-D, MCPA and mecoprop, but susceptible to mixtures containing dicamba, bromofenoxim, bromoxynil or bentazon. Clopyralid and picloram are also favoured, but resistance to these has recently been

observed in New Zealand (Harrington, 2009). In addition, where *S. sessilis* occurs in natural coastal bluff ecosystems, the application of herbicides may be restricted (Castro, 2006).

Recent herbicide resistance research in **New Zealand**

The number of published herbicide resistance cases in New Zealand is still quite minimal compared with Australia. However two new cases have been reported within the last year. The troublesome annual turf weed *Soliva sessilis* Ruiz Lopez & Pavón has developed biotypes in northern New Zealand resistant to picloram, clopyralid and triclopyr. This is the first case in New Zealand where resistance has developed to picolinic herbicides or within a turf situation. A glasshouse experiment has shown that commonly used turf herbicides such as clopyralid, picloram/triclopyr mixtures or picloram/2,4-D mixtures do not control this weed. However, bromofenoxim, bentazone and mecoprop/ioxynil/bromoxynil mixtures are still effective. (Recent herbicide resistance research in New Zealand, Kerry C. Harrington, Massey University (PN 621), PB 11-222, Palmerston North, New Zealand link: <http://www.caws.org.au/awc/2002/awc200216221.pdf>)

Hormone herbicides provide good control if applied in winter before flowering. Bromoxynil provides good control up to seed set. Eradication strategies: Spray with Bromoxynil plus MCPA in August and November each year. Small areas can be treated with 1 litre of Tordon 75-D in 250 litres of water in June to provide residual control for the season. (Herbguide.com link: http://www.herbguide.com.au/Descriptions/hg_Jojo.htm)

Controlling onehunga weed in **New Zealand**

This can be a little tricky. It is a very small plant and often it's not until we find it with our feet that we notice it. Non-chemical control is an option but doesn't tend to be effective. It is possible to dig them out but often there are too many plants for this to be practical. Topping is ineffective as the plants tend to be well below the level of the mowing blades. Chemical control is usually the best option. The usual herbicides we use (the Phenoxy group including MCPA and 2,4D) are not very effective in controlling it so you have to either spike the phenoxy's with products like dicamba or use a heavy hitting product like Versatil or Victory Gold. But be aware that these heavy hitters will take out clovers (not usually a problem in lawns and turf) and in certain parts of Auckland there is Onehunga weed that is resistant to these chemicals, so keep an eye on the areas you spray, and if there is no dieback then try a different product. Spray the weeds before they set seed. (link: http://www.pggwrightson.co.nz/Userfiles/files/Rural%20Supplies%20Publications/Technical%20Guides%20and%20Resources/Weed%20Watch_Onehunga_Feb14.pdf)

Biological Control

There are no known biological control agents (Castro, 2006). (Invasive Species Compendium link: <http://www.cabi.org/isc/datasheet/108899>)