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# VGCSA

## POA ANNUA CONTROL TRIALS

## WINTER 2019

## Report

SE\_10454\_Report\_001\_A

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## 1. INTRODUCTION

Herbicide trials have been undertaken over the past 3 years to evaluate the efficacy of the available turf registered herbicides and new actives, either by themselves or in combination with other herbicides.

As a follow up to the trials undertaken in 2018, trials were initiated to evaluate the use of glyphosate and glufosinate combinations as well as other herbicide actives that are not yet registered for use on turf.

## 2. METHODOLOGY

The trial was conducted in the winter of 2019 using non-selective herbicides at low application rates to provide selective control of the *Poa annua* while minimising damage to the couch. The trials also included PoaCure™ (active Methiozolin) and another herbicide not yet registered for use on turf. There were 5 trial sites which are detailed in table 1.

Table 1: Trial Sites

Location	Couch cultivar	Soil type
Sorrento Golf Club Sorrento, VIC	'Legend' Practice Fairway	Loamy sand over heavy soil
Devil Bend Golf Club Moorooduc VIC	'Santa Ana' 16 <sup>th</sup> fairway	Loam – clay loam
The National Golf Club Cape Schanck VIC	'Legend' Turf nursery	Calcareous sand
Commonwealth GC Oakleigh South, VIC	'Legend' Near 13 <sup>th</sup> tee	Loamy sand
Kingston Heath GC Cheltenham, VIC	'Santa Ana' Turf Nursery	Loamy sand

In addition to assessing the individual herbicides, the “double knock” method was also assessed where a systemic herbicide of one mode of action (Glyphosate) is applied and then followed up with a contact herbicide (Glufosinate) of a different mode of action. The theory is to allow the systemic herbicide to be taken into the plant and then to further damage the plant by following up with an application of a contact herbicide. The Glufosinate was applied as a treatment across all main treatments.

**Treatments:** The treatments and dates of application are detailed in tables 2 and 3.

Table 2: Herbicide treatments

	Treatments	Product	Active	Rate of application of product	No. applications
T1	G0.5	Roundup™	Glyphosate (a.i. 360g/L)	0.5L/ha	1
T2	G0.75	Roundup™	Glyphosate (a.i. 360g/L)	0.75L/ha	1
T3	G1.0	Roundup™	Glyphosate (a.i. 360g/L)	1.0L/ha	1
T4	G0.5 + Adj	Roundup™	Glyphosate (a.i. 360g/L)	0.5L/ha + adjuvant	1
T5	E001				2
T6	Metribuzin	Metric Turf™	400g/L Metribuzin	840g/ha	1
T7	Methiozolin	PoaCure™	240g/L Methiozolin	8L/ha	4
T8	Glufosinate	Basta™	200g/L Glufosinate-ammonium	0.5L/ha	1
T9	UTC	-	-	-	-



Table 3: Trial Sites

Location	Glyphosate	Glufosinate	Methiozolin	E001
Sorrento Golf Club	22/7/19	27/7/19	22/7/19 + 3 applications 2 weeks apart	22/7/19 6/8/19
Devil Bend Golf Club	25/7/19	1/8/19	25/7/19 + 3 applications 2 weeks apart	25/7/19 8/8/19
The National Golf Club	2/8/19	7/8/19	2/8/19 + 3 applications 2 weeks apart	2/8/19 23/8/19
Commonwealth GC	5/8/19	8/8/19	5/8/19 + 3 applications 2 weeks apart	NA
Kingston Heath GC	1/8/19	5/8/19	1/8/19 + 3 applications 2 weeks apart	NA

There were 3 replicates of each treatment including an untreated control giving a total of 27 plots. Each plot was 2m x 2m (4m<sup>2</sup>) with the herbicides applied using the B.A greenkeeper sprayer with yellow air inject nozzles from Teejet™ and a water volume of 450L/ha.

### 3. TRIAL ASSESSMENT CRITERIA

The plots were assessed as follows;

***Poa annua* %:** A visual assessment was made of the % living *Poa annua*. The *Poa annua* assessments were undertaken at pre-treatment and at 4 and 8 weeks (WAT) depending on the trial site. *Poa annua* was considered severely damaged if there was less than 75% green colour.

**Normalized Difference Vegetation Index (NDVI):** The NDVI was used as a method of empirically measuring the effects of the treatments on the colour of the couch and the spring green up in the couch.

The Normalized Difference Vegetation Index was measured at about the same time periods as the *Poa annua* counts.

**Visual Turfgrass Injury:** Turfgrass injury was assessed based on loss of colour, loss of leaf and reduction in turf density and presentation as a golfing surface. Turfgrass injury was based on 5 being severe injury, no green colour and some loss of turf density and 0 being no visible discolouration or loss of turf density. A rating of 3 is considered to be the maximum acceptable turf injury.

The Visual Turfgrass Damage ratings were undertaken at each assessment or when there was obvious turf damage.

### 4. WEATHER

The weather data over the trial period is detailed in Appendix 1 (figures A1-1 and A1-2 and can be summarised as follows;

#### August 2019

- Rainfall in August was below average in much of eastern Victoria;
- Daytime temperatures were cooler than average in much of western and central Victoria, while night-time temperatures were below average to very much below average in the north of the State.

- Overall, it was Victoria's driest August since 2015 and the coolest August since 2010.

### September 2019

- Below average to average rainfall was recorded over most of the State.
- The state-wide average rainfall total was 34% below average.
- Victoria's January to September rainfall totals were 22% below the long-term average.
- September's maximum temperature was close to average throughout much of Victoria.

### October 2019

- Below to very much below average rainfall was recorded across most of Victoria.
- The state-wide average rainfall total was 65% below the October average of 63.8 mm.
- Mean maximum temperatures for October were above average throughout Victoria
- The State's mean maximum temperature was 2.40 °C warmer than the October average, the eighth-warmest October on record

**Source:** [http://www.bom.gov.au/climate/current/statement\\_archives.shtml](http://www.bom.gov.au/climate/current/statement_archives.shtml)

## 5. RESULTS

The results are detailed in tables 4 – 15 and are summarised as follows;

### SORRENTO GC

- **4WAT:**
  - Most of the Roundup™ treatments provided significant *Poa annua* control when compared to the untreated control.
  - Gufosinate provides no significant benefit either alone or in conjunction with other herbicides.
  - Metribuzin was not significantly different to the UTC.
- **7WAT:**
  - E001 and PoaCure provided significant *Poa annua* control.
  - There had been some recovery of the *Poa annua* or new germinations in many of the plots which resulted in an increase in the *Poa annua* population.
- **9WAT:**
  - Spring green up and phytotoxicity was significantly affected by E001 and PoaCure.
  - The NDVI readings for E001 and PoaCure were significantly lower and by inference the phytotoxic effect was more prevalent compared to the UTC.
  - All other treatments were no different in spring green up or phytotoxicity compared to the UTC.
- **12WAT:**
  - There was no phytotoxic effects and the turf had recovered.

### DEVIL BEND GC

- **4WAT:**
  - All of the Roundup™ treatments provided significant *Poa annua* control when compared to the untreated control.
  - Glufosinate provided no significant benefit either alone or in conjunction with other herbicides.
  - Metribuzin was not significantly different to the UTC.
- **8WAT:**
  - All of the Roundup™ treatments provided significant *Poa annua* control when compared to the untreated control.
  - E001 provided significant control of *Poa annua* compared to the UTC.
  - Most Roundup™ treatments had greater phytotoxicity compared to the UTC.

- Lot of new *Poa annua* germination.
- NDVI significantly reduced by all Roundup™ treatments.
- **13WAT:**
  - Most herbicides providing significant control compared to the UTC.
  - E001 providing significant control compared to the UTC.
  - PoaCure treatments were swamped by new *Poa annua* germination.
  - NDVI and colour recovered across all Roundup™ plots.

## THE NATIONAL GC

- **4WAT:**
  - All of the treatments other than Metribuzin had greater *Poa annua* control when compared to the untreated control.
  - Metribuzin was not significantly different to the UTC.
- **6WAT:**
  - All of the treatments other than Metribuzin had greater *Poa annua* control when compared to the untreated control.
  - Metribuzin was not significantly different to the UTC.
  - E001 providing a good level of control.
  - NDVI was significantly less for the Roundup™ and E001 treatments compared to the UTC.
- **9WAT:**
  - All of the treatments other than Metribuzin had greater *Poa annua* control when compared to the untreated control.
  - E001 provided a high level of control.
  - Metribuzin was not significantly different to the UTC.
- **11WAT:**
  - PoaCure was the standout treatment.
  - *Poa annua* recovery and new seedlings.
  - No difference in the NDVI readings.

## COMMONWEALTH GC

- **4WAT:**
  - Most Roundup™ treatments provided significant *Poa annua* control compared to the untreated control.
  - The 0.5L/ha Roundup™ + Glufosinate treatment was not significantly different to the UTC.
  - There was no difference between the 0.5L/ha Roundup™ and the 0.5L/ha Roundup™ plus adjuvant treatments.
  - The NDVI was significantly less for the Roundup™ treatments.
  - Glufosinate provided significant control compared to the UTC
- **8WAT:**
  - All treatments other than Glufosinate provided significant *Poa annua* control.
  - No significant difference in NDVI between any of the treatments.
  - No significant difference in phytotoxicity between the treatments.

## KINGSTON HEATH GC

- No significant difference between any of the treatments compared to the untreated control at any of the assessment dates.

## 6. CONCLUSIONS

In reviewing the data across all of the trial sites the following conclusions are made;

### Roundup™

- Across all sites most Roundup™ treatments, other than Roundup™ at the 0.5L/ha application rate provided significant *Poa annua* control compared to the untreated control.
- There was no benefit using a lower rate of Roundup™ and including an adjuvant.
- Most Roundup™ treatments had a phytotoxic effect on the couch with a loss of colour and a low NDVI reading.
- All Roundup™ treatments had recovered from the phytotoxic effects by weeks 10 – 12 after treatment.
- Roundup™ at 0.75L/ha provided effective control with no significant difference when compared to the Roundup™ at 1L/ha.

### Glufosinate

- In these trials the Glufosinate provided very little added benefit in controlling *Poa annua*.
- In some trials the Glufosinate appeared to retard the effectiveness of the Roundup™.

### E001

- E001 shows promise for the control of *Poa annua* and further research is warranted.
- E001 provided as good a control of *Poa annua* as Roundup™ in some trials.
- The two applications appeared to control new germinations in some situations.
- E001 has a phytotoxic effect on the couch.
- The phytotoxic effect lasted about 4 – 6 weeks after the second herbicide application.

### PoaCure™

- The PoaCure™ treatments varied between the sites in the level of effectiveness. Because the trials were planned to be monitored for a minimum of 8 weeks after the first treatment, some sites were assessed for up to 12 weeks to gain better data on the effectiveness of PoaCure™. It is possible that the full efficacy was not noted until at least 8 weeks after the first treatment.
- The PoaCure™ treatments at some sites were infested with new *Poa annua* germinations. This made it impossible to gain a full assessment of efficacy.
- Factors affecting the efficacy of the PoaCure™ treatments on couch maintained at fairway height include:
  - The height/depth of the turf which may affect the ability to get the PoaCure™ to the site of activity.
  - Volume of water to be applied to get the chemical to the site of activity may have been insufficient.
  - The *Poa annua* plants tended to be larger and possibly had a deeper root system and may not have been exposed to sufficient herbicide active.
  - Over the four treatments it appears at some sites this permitted new germinations to occur.
  - Four treatments possibly allows too much time for new germinations to occur.

## 7. RECOMMENDATIONS

Based on the trial data from the 5 trial sites the following recommendations are made:

- Roundup™ (360g/L active) is best applied at 0.75L/ha.
- All post-emergent herbicide treatments need to include a pre-emergent herbicide.
- The herbicide E001 appears to have reasonable efficacy and it is worth investigating further because it offers another herbicide grouping. Key factors include:
  - Effective rate of active.
  - Volume of water during application.
  - Time of year.
- PoaCure™ has potential in high cut turf though further data is required on:
  - Quantity of water after application to wash in the herbicide.
  - Can the number of applications be reduced.



**Tables 4 - 15****SORRENTO GC**Table 4: % *Poa annua* control at 4 and 7 weeks after treatment (WAT)

<b>Treatments</b>	<b>4WAT</b>	<b>Treatments</b>	<b>7WAT</b>
Roundup 1L	97 <sup>a</sup>	E001	99 <sup>a</sup>
Roundup 0.5L	88 <sup>ab</sup>	E001 + Glufosinate	91 <sup>ab</sup>
Roundup 0.75L	86 <sup>ab</sup>	PoaCure	79 <sup>abc</sup>
Roundup 0.5L + Adjuvant	72 <sup>abc</sup>	PoaCure + Glufosinate	69 <sup>abc</sup>
Roundup 0.5L + Glufosinate	71 <sup>abc</sup>	Roundup 0.5L	53 <sup>bcd</sup>
Roundup 0.75L + Glufosinate	63 <sup>abc</sup>	Glufosinate	50 <sup>bcd</sup>
Roundup 0.5L + Adjuvant + Glufosinate	54 <sup>abc</sup>	Roundup 0.75L	46 <sup>cde</sup>
Roundup 1L + Glufosinate	48 <sup>bc</sup>	Roundup 0.75L + Glufosinate	42 <sup>cde</sup>
E001	45 <sup>bcd</sup>	Roundup 0.5L + Glufosinate	41 <sup>cde</sup>
PoaCure	43 <sup>bcd</sup>	Roundup 1L + Glufosinate	36 <sup>cde</sup>
E001 + Glufosinate	42 <sup>bcd</sup>	UTC	31 <sup>de</sup>
PoaCure + Glufosinate	17 <sup>cd</sup>	Metribuzin + Glufosinate	29 <sup>de</sup>
Glufosinate	-6 <sup>d</sup>	Roundup 0.5L + Adjuvant	29 <sup>de</sup>
Metribuzin + Glufosinate	-10 <sup>d</sup>	Roundup 1L	25 <sup>de</sup>
Metribuzin	-44 <sup>e</sup>	Metribuzin	18 <sup>de</sup>
UTC	-50 <sup>e</sup>	Roundup 0.5L + Adjuvant + Glufosinate	6 <sup>e</sup>
<b>LSD (P&lt;0.05)</b>	<b>53</b>	<b>LSD (P&lt;0.05)</b>	<b>44</b>

Table 5: NDVI Readings at 4 and 9 weeks after treatment (WAT)

<b>Treatments</b>	<b>4 WAT</b>	<b>9 WAT</b>
Roundup 0.5L + Adjuvant	0.469	0.648 <sup>a</sup>
Roundup 0.5L	0.449	0.645 <sup>a</sup>
UTC	0.553	0.628 <sup>a</sup>
Roundup 0.5L + Glufosinate	0.494	0.628 <sup>a</sup>
Roundup 0.75L + Glufosinate	0.430	0.625 <sup>ab</sup>
Roundup 0.5L + Adjuvant + Glufosinate	0.500	0.624 <sup>ab</sup>
Roundup 1L + Glufosinate	0.414	0.611 <sup>ab</sup>
Roundup 1L	0.446	0.611 <sup>ab</sup>
Glufosinate	0.476	0.604 <sup>ab</sup>
Metribuzin	0.487	0.597 <sup>abc</sup>
Roundup 0.75L	0.451	0.596 <sup>abc</sup>
Metribuzin + Glufosinate	0.396	0.582 <sup>abc</sup>
E001 + Glufosinate	0.425	0.555 <sup>bcd</sup>
PoaCure	0.471	0.530 <sup>cd</sup>
PoaCure + Glufosinate	0.490	0.503 <sup>cd</sup>
E001	0.457	0.490 <sup>d</sup>
<b>LSD (P&lt;0.05)</b>	<b>NS</b>	<b>0.071</b>

Table 6: Phytotoxicity at 4 and 9 weeks after treatment (WAT)  
(0 = nil phytotoxicity, 5 = severe phytotoxicity)

Treatments	7 WAT	9 WAT
PoaCure + Glufosinate	4 <sup>c</sup>	1 <sup>a</sup>
E001 + Glufosinate	2 <sup>a</sup>	2 <sup>b</sup>
PoaCure	4 <sup>c</sup>	2 <sup>b</sup>
Metribuzin	3 <sup>b</sup>	2 <sup>b</sup>
Glufosinate	3 <sup>b</sup>	3 <sup>c</sup>
Roundup 1L	3 <sup>b</sup>	3 <sup>c</sup>
E001	2 <sup>a</sup>	3 <sup>c</sup>
Roundup 1L + Glufosinate	3 <sup>b</sup>	3 <sup>c</sup>
Roundup 0.5L + Glufosinate	3 <sup>b</sup>	3 <sup>c</sup>
Metribuzin + Gluf	3 <sup>b</sup>	3 <sup>c</sup>
Roundup 0.5L + Adjuvant + Glufosinate	3 <sup>b</sup>	3 <sup>c</sup>
Roundup 0.75L + Glufosinate	3 <sup>b</sup>	3 <sup>c</sup>
Roundup 0.5L	3 <sup>b</sup>	3 <sup>c</sup>
UTC	3 <sup>b</sup>	3 <sup>c</sup>
Roundup 0.5L + Adjuvant	3 <sup>b</sup>	3 <sup>c</sup>
Roundup 0.75L	3 <sup>b</sup>	3 <sup>c</sup>
<b>LSD (P&lt;0.05)</b>	<b>0.9</b>	<b>0.7</b>

**DEVIL BEND GC**Table 7: % *Poa annua* control at 4, 8, 10 and 13 weeks after treatment (WAT)

<b>Treatment</b>	<b>4WAT</b>	<b>8WAT</b>	<b>10WAT</b>	<b>13WAT</b>
Roundup 1L	82	62	78 <sup>a</sup>	51 <sup>a</sup>
Roundup 0.75L	72	19	76 <sup>a</sup>	49 <sup>ab</sup>
Roundup 0.75L + Glufosinate	77	-87	43 <sup>a</sup>	27 <sup>ab</sup>
Roundup 0.5L	80	-38	33 <sup>a</sup>	-22 <sup>ab</sup>
Roundup 1L + Glufosinate	77	-107	17 <sup>ab</sup>	-147 <sup>ab</sup>
Roundup 0.5L + Glufosinate	-3	-300	-17 <sup>ab</sup>	-67 <sup>ab</sup>
E001 + Glufosinate	-200	-167	-50 <sup>ab</sup>	-133 <sup>ab</sup>
E001	-300	-267	-50 <sup>ab</sup>	-167 <sup>ab</sup>
Glufosinate	-111	-317	-144 <sup>abc</sup>	-183 <sup>b</sup>
PoaCure + Glufosinate	-250	-289	-194 <sup>bb</sup>	-539 <sup>c</sup>
PoaCure	-450	-467	-217 <sup>b</sup>	-700 <sup>c</sup>
UTC	-267	-608	-233 <sup>b</sup>	-408 <sup>b</sup>
Metribuzin + Glufosinate	-317	-533	-283 <sup>c</sup>	-375 <sup>b</sup>
Metribuzin	-580	-770	-373 <sup>d</sup>	-553 <sup>c</sup>
<b>LSD (&gt;0.05)</b>	<b>294</b>	<b>237</b>	<b>225</b>	<b>309</b>

Table 8: NDVI Readings at 4, 7 and 10 weeks after treatment (WAT)

<b>Treatment</b>	<b>4 WAT</b>	<b>7 WAT</b>	<b>10 WAT</b>
PoaCure + Glufosinate	0.531	0.575 <sup>a</sup>	0.656
E001 + Glufosinate	0.530	0.567 <sup>a</sup>	0.672
Metribuzin + Glufosinate	0.500	0.566 <sup>a</sup>	0.687
Metribuzin	0.519	0.566 <sup>a</sup>	0.649
PoaCure	0.605	0.566 <sup>a</sup>	0.638
UTC	0.499	0.562 <sup>a</sup>	0.649
Glufosinate	0.508	0.553 <sup>a</sup>	0.662
E001	0.556	0.530 <sup>ab</sup>	0.703
Roundup 0.5L + Glufosinate	0.449	0.456 <sup>bc</sup>	0.695
Roundup 0.5L	0.465	0.425 <sup>c</sup>	0.676
Roundup 0.75L	0.443	0.394 <sup>c</sup>	0.604
Roundup 1L	0.477	0.393 <sup>c</sup>	0.671
Roundup 0.75L + Glufosinate	0.469	0.393 <sup>c</sup>	0.599
Roundup 1L + Glufosinate	0.428	0.383 <sup>c</sup>	0.660
<b>LSD (P&lt;0.05)</b>	<b>0.07</b>	<b>0.08</b>	<b>NS</b>

Table 9: Phytotoxicity at 8 weeks after treatment (WAT)

(0 = nil phytotoxicity, 5 = severe phytotoxicity)

Spring Green up at 10 weeks after treatment (WAT)

(0 = no green leaf, 5 = 100% green leaf)

<b>Treatment</b>	<b>8WAT Phytotoxicity</b>	<b>10WAT Spring Greenup</b>
Roundup 0.5L + Glufosinate	3	4
Roundup 0.5L	3	3
Roundup 0.75L + Glufosinate	2	2
Roundup 0.75L	3	2
Roundup 1L + Glufosinate	3	2
Roundup 1L	3	2
Metribuzin + Glufosinate	1	4
Metribuzin	1	4
E001 + Glufosinate	1	5
E001	1	4
PoaCure + Glufosinate	0	4
PoaCure	0	4
Glufosinate	1	4
UTC	0	5
<b>LSD (&gt;0.05)</b>	<b>2.2</b>	<b>1.3</b>

## THE NATIONAL GC

Table 10: % *Poa annua* control at 4 and 6 weeks after treatment (WAT)

Treatment	4WAT	6WAT
Roundup 1.0L	100 <sup>a</sup>	100 <sup>a</sup>
Roundup 1.0L + Glufosinate	100 <sup>a</sup>	93 <sup>a</sup>
Roundup 0.75L	93 <sup>a</sup>	70 <sup>a</sup>
Roundup 0.75L + Glufosinate	89 <sup>a</sup>	69 <sup>a</sup>
Roundup 0.5L	6 <sup>a</sup>	58 <sup>a</sup>
Roundup 0.5L + Glufosinate	12 <sup>a</sup>	56 <sup>a</sup>
E001 + Glufosinate	-33 <sup>a</sup>	43 <sup>a</sup>
E001	-89 <sup>a</sup>	11 <sup>a</sup>
PoaCure + Glufosinate	20 <sup>a</sup>	-8 <sup>a</sup>
PoaCure	-67 <sup>a</sup>	-33 <sup>a</sup>
Metribuzin + Glufosinate	-39 <sup>a</sup>	-61 <sup>a</sup>
Glufosinate	-117 <sup>a</sup>	-117 <sup>a</sup>
UTC	-433 <sup>b</sup>	-383 <sup>b</sup>
Metribuzin	-556 <sup>b</sup>	-867 <sup>d</sup>
<b>LSD (P&lt;0.05)</b>	<b>230</b>	<b>366</b>

Table 11: % *Poa annua* control at 9 and 11 weeks after treatment (WAT)

Treatment	9WAT	11WAT
PoaCure	-33 <sup>a</sup>	93 <sup>a</sup>
PoaCure + Glufosinate	-56 <sup>a</sup>	89 <sup>ab</sup>
E001 + Glufosinate	77 <sup>a</sup>	87 <sup>ab</sup>
Roundup 1.0L	93 <sup>a</sup>	70 <sup>abc</sup>
Roundup 1.0L + Glufosinate	53 <sup>ab</sup>	60 <sup>abcd</sup>
Roundup 0.75L + Glufosinate	48 <sup>a</sup>	59 <sup>abcd</sup>
Roundup 0.5L + Glufosinate	-15 <sup>a</sup>	58 <sup>abcd</sup>
E001	29 <sup>a</sup>	29 <sup>abcd</sup>
Metribuzin + Glufosinate	6 <sup>a</sup>	11 <sup>bcd</sup>
UTC	-300 <sup>c</sup>	3 <sup>cde</sup>
Roundup 0.75L	70 <sup>a</sup>	0 <sup>cde</sup>
Glufosinate	-183 <sup>bc</sup>	-13 <sup>de</sup>
Roundup 0.5L	-30 <sup>a</sup>	-21 <sup>de</sup>
Metribuzin	-528 <sup>c</sup>	-72 <sup>e</sup>
<b>LSD (P&lt;0.05)</b>	<b>237</b>	<b>81</b>



Table 12: NDVI Readings at 4, 6 and 11 weeks after treatment (WAT)

Treatment	4WAT	6WAT	11WAT
Glufosinate	0.418	0.616 <sup>a</sup>	0.626
UTC	0.490	0.555 <sup>ab</sup>	0.595
PoaCure	0.516	0.553 <sup>ab</sup>	0.646
Roundup 0.5L	0.445	0.544 <sup>ab</sup>	0.623
PoaCure + Glufosinate	0.379	0.527 <sup>bc</sup>	0.624
Metribuzin	0.456	0.516 <sup>bcd</sup>	0.626
E001	0.510	0.469 <sup>bcd</sup>	0.631
Roundup 0.5L + Glufosinate	0.403	0.458 <sup>cde</sup>	0.629
Roundup 0.75L + Glufosinate	0.357	0.446 <sup>cdef</sup>	0.668
Roundup 0.75L	0.460	0.441 <sup>cdef</sup>	0.597
E001 + Glufosinate	0.372	0.432 <sup>def</sup>	0.651
Metribuzin + Glufosinate	0.381	0.429 <sup>ef</sup>	0.673
Roundup 1.0L	0.449	0.413 <sup>ef</sup>	0.664
Roundup 1.0L + Glufosinate	0.310	0.364 <sup>f</sup>	0.690
<b>LSD (P&lt;0.05)</b>	<b>NS</b>	<b>0.086</b>	<b>NS</b>

**COMMONWEALTH GC**Table 13: % *Poa annua* control at 4 and 8 weeks after treatment (WAT)

Treatment	4WAT	8WAT
0.5L Roundup + adjuvant	88 <sup>a</sup>	92 <sup>a</sup>
Roundup 1L	89 <sup>a</sup>	90 <sup>ab</sup>
Roundup 0.75L	84 <sup>a</sup>	89 <sup>ab</sup>
Roundup 0.75L + Glufosinate	82 <sup>a</sup>	84 <sup>ab</sup>
0.5L Roundup + adjuvant + Glufosinate	80 <sup>a</sup>	80 <sup>ab</sup>
Roundup 0.5L	67 <sup>a</sup>	80 <sup>ab</sup>
Roundup 1L + Glufosinate	85 <sup>a</sup>	79 <sup>ab</sup>
PoaCure + Glufosinate	10 <sup>c</sup>	75 <sup>ab</sup>
Roundup 0.5L + Glufosinate	9 <sup>c</sup>	60 <sup>ab</sup>
PoaCure	-2 <sup>c</sup>	57 <sup>b</sup>
Glufosinate	38 <sup>b</sup>	12 <sup>c</sup>
UTC	-6 <sup>c</sup>	-13 <sup>c</sup>
<b>LSD (P&lt;0.05)</b>	<b>27</b>	<b>33</b>

Table 14: NDVI Readings at 4 and 8 weeks after treatment (WAT)

	4WAT	8WAT
UTC	0.567 <sup>a</sup>	0.573
PoaCure	0.546 <sup>ab</sup>	0.430
UTC + Glufosinate	0.521 <sup>ab</sup>	0.596
PoaCure + Glufosinate	0.489 <sup>bc</sup>	0.471
Roundup 0.5L + G	0.435 <sup>c</sup>	0.562
0.5L Roundup + adjuvant + Glufosinate	0.422 <sup>cd</sup>	0.546
0.5L Roundup + adjuvant	0.410 <sup>d</sup>	0.491
Roundup 0.5L	0.409 <sup>d</sup>	0.554
Roundup 1L	0.405 <sup>de</sup>	0.558
Roundup 1L + Glufosinate	0.366 <sup>de</sup>	0.540
Roundup 0.75L	0.360 <sup>de</sup>	0.470
Roundup 0.75L + Glufosinate	0.337 <sup>e</sup>	0.489
<b>LSD (P&lt;0.05)</b>	<b>0.07</b>	<b>NS</b>

Table 15: % *Poa annua* control at 4 and 8 weeks after treatment (WAT)

Treatment	4WAT	8WAT	Greenup
UTC	-233	-13	5
Roundup 1L	-67	-33	5
PoaCure + Glufosinate	-100	-33	4
UTC + Glufosinate	-167	-33	5
Roundup 0.5L	-150	-50	5
Roundup 0.5L + Glufosinate	-183	-67	5
Roundup 1L + Glufosinate	-83	-67	5
Roundup 0.75L	-67	-83	5
PoaCure	-83	-83	3
0.5L Roundup + adjuvant	-67	-83	5
Roundup 0.75L + Glufosinate	-67	-100	5
0.5L Roundup + adjuvant + Glufosinate	-167	-100	5
<b>LSD (P&lt;0.05)</b>	<b>NS</b>	<b>NS</b>	<b>NS</b>

## ACKNOWLEDGEMENTS

Thanks to the Victorian Golf Course Superintendents Association for funding this project.

Thanks to Leigh Yanner (Course Manager) and Tony Gordon (Course Superintendent Moonah and Ocean Courses) at The National GC, Trevor Uren (Course Superintendent) at Devil Bend GC, Shane Greenhill (Course Superintendent) at Sorrento GC, John Mann (Course Superintendent) at Commonwealth GC and Hayden Mead (Course Superintendent) Kingston Heath GC for making the trial sites available and the assistance of their staff in setting up the trials.

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## Appendix 1: Weather Data

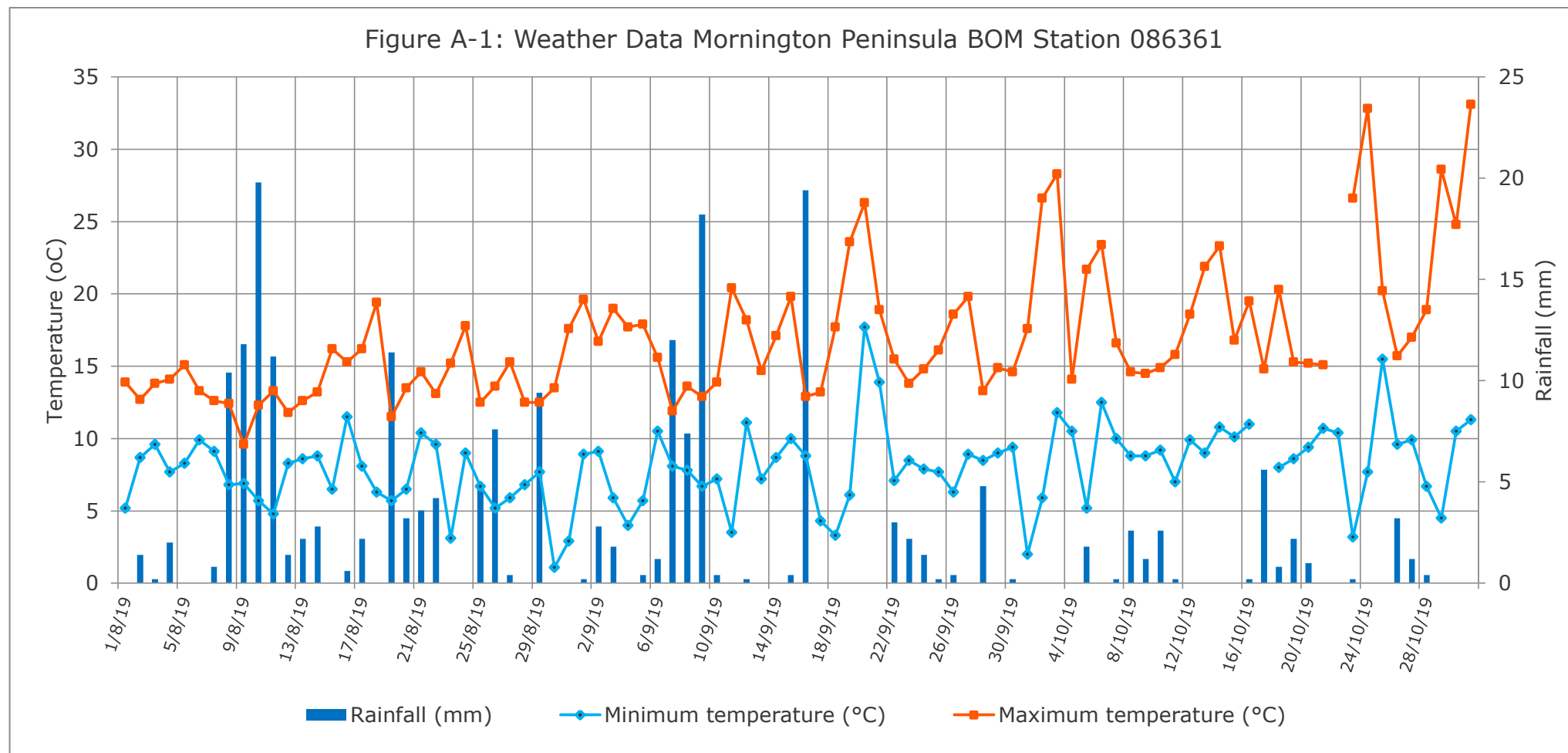




Figure A-2: Weather Data Moorabbin BOM Station 08677

