Alternatives to glyphosate & the challenges.

Ian Graham
Who are we?
National application specialists serving the amenity sector.

Strong supporters of science leading best practice.
Alternatives to glyphosate & the challenges.

Ian Graham
The alternatives to glyphosate & the challenges.
Alternatives to glyphosate

- Do nothing
- Hand weeding
- Hot water
- Steam
- Infrared exposure
- Flame
- Hot foam
- Brushing
- Acetic acid
Viable alternatives to glyphosate
The Challenges

- Political
- Social
- Practical
- Labour
- Financial
- Environmental
Cardiff Council Weed Control Trial

How did the trial come about?
Cardiff Council Weed Control Trial

Background

Cardiff Council commissioned an independent trial of alternative weed control treatments on pavement areas over a whole growing season

Trials work

• Advanced Invasives (design)
• Complete Weed Control Ltd (delivery)
• Advanced Invasives, Agri-EPI Centre & Swansea University (reporting)
Trial design

Approach

• Large scale testing under ‘real world’ conditions

• Provide realistic data to underpin decision-making
  • 8 assessments were made at each monitoring site
  • Data collection on 4 occasions so 192 assessments made per treatment in total

Treatments

1. Acetic acid (contact herbicide)
2. Hot foam (contact herbicide)
3. Glyphosate (systemic herbicide) - used to benchmark alternative treatments
4. Scientific control (no weed treatment)
## Data analysis

### Cost
- Economic evaluation of all control treatments
- Treatment labour requirement to undertake each treatment per km pavement

### Environmental
- Measure use of herbicide products, water and fuel
- Life Cycle Analysis (LCA) modelling of carbon dioxide (CO2) emissions and other environmental burdens

### Customer
- Complaint data collected and compared to previous years

### Quality
- Weed level score assigned for each treatment and the untreated control

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Height (mm)</th>
<th>Weed diameter/length (mm)</th>
<th>Joint coverage (mm)</th>
<th>Score</th>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;10</td>
<td>&lt;50</td>
<td>&lt;10</td>
<td>&lt;3</td>
<td>1</td>
<td>No noticeable weeds</td>
</tr>
<tr>
<td></td>
<td>10-50</td>
<td>50-100</td>
<td>0-20</td>
<td>4-6</td>
<td>2</td>
<td>Occasional small weeds</td>
</tr>
<tr>
<td></td>
<td>50-100</td>
<td>100-150</td>
<td>20-30</td>
<td>7-9</td>
<td>3</td>
<td>Patchy weed growth with some flowering weeds</td>
</tr>
<tr>
<td></td>
<td>100-150</td>
<td>150-200</td>
<td>30-40</td>
<td>10-12</td>
<td>4</td>
<td>Numerous weeds, many flowering, view annoys/irritates public</td>
</tr>
<tr>
<td></td>
<td>150-200</td>
<td>200-300</td>
<td>40-50</td>
<td>13-15</td>
<td>5</td>
<td>Numerous large weeds presenting risk, slip and/or trip hazard</td>
</tr>
<tr>
<td></td>
<td>&gt;200</td>
<td>&gt;300</td>
<td>&gt;50</td>
<td>16-18</td>
<td>6</td>
<td>Numerous large weeds, many tall and flowering causing an obstruction</td>
</tr>
</tbody>
</table>

**Weed level scale**: evaluation criteria adapted from East Malling Research (2015) and Bristol City Council (2017).
**Results summary**

Analysis

- Acetic acid was the least effective of the herbicides tested
- Glyphosate was the most effective of the herbicides tested
- Hot foam was effective, though this was trialled in a predominantly tarmacked area

Results - Quality: Weed scores, assigned 1-6.
Life cycle analysis

Results - Environmental, LCA: comparison of the environmental impacts of 3 pavement weed control methods. Relative percentage (%) contribution of each treatment to assessed impact categories is shown (Dr Trisha Toop, Agri-EPI Centre).
Water Consumption

Results

Environmental – water use

• Less water used applying acetic acid as the product volume is significantly greater than that of glyphosate

• Hot foam uses 48 times more water than glyphosate application
Water Consumption

Glyphosate vs Acetic Acid Herbicide

25 times more waste packaging produced
### Results summary

<table>
<thead>
<tr>
<th>Control treatment</th>
<th>Cost</th>
<th>Environmental</th>
<th>Customer</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glyphosate</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Acetic acid</td>
<td>Medium</td>
<td>Medium</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Hot foam</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
</tbody>
</table>

**Results summary:** weed control treatment results evaluated against four key criteria.
Conclusions

• Hot foam has higher environmental impacts in all categories calculated except for freshwater eutrophication in which glyphosate had a higher impact.

• The treatment which has the lowest overall environmental impact was glyphosate.

• **Glyphosate-based control methods used the least materials, had the lowest environmental impacts and also the lowest economic costs.**

• Objectively, glyphosate was the most sustainable treatment.

Untreated control – Duty of care, infrastructure maintenance & maintain cleanliness.
Summing up

• Balancing the cost of weed control against results is vital

• If we are serious about controlling knotweed in particular, annual foliar glyphosate application is currently by far our best option

• We need to think carefully about how we evaluate sustainability

• New/alternative approaches must be rigorously tested before we consider adopting them as best practice