

# Transport & Environment Committee

10am, Tuesday 1 November 2016

## Alternatives to the use of glyphosate-based herbicide to control weeds on streets and green spaces

Item number	7.3
Report number	
Executive/routine	
Wards	All

### Executive Summary

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Following Committee instruction to ascertain alternatives to using glyphosate-based herbicides for the control of weeds, officers have investigated a range of potential options.

An Integrated Weed Control Programme is recommended, combining a mix of techniques, including greater use of mulch and strimming in public parks and green spaces; mechanised control on roadsides, pavements, cycleways, footpaths and other hard landscape features; electricity for hard-to-reach or particularly resistant weeds such as giant hogweed and Japanese knotweed; and the application of acetic or citric acids where required.

### Links

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Coalition Pledges	P44 Prioritise keeping our streets clean and attractive.
Council Priorities	CP9 An attractive city. CP12 A built environment to match our ambition.
Single Outcome Agreement	SO4 Edinburgh's communities are safer and have improved physical and social fabric.

# Alternatives to the use of glyphosate-based herbicide to control weeds on streets and green spaces

## 1. Recommendations

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It is recommended that Committee:

- 1.1 Adopt a policy that seeks to reduce the amount of glyphosate-based herbicide used by the authority to control weeds, limits the use of chemical herbicides only where there is no effective or reasonable alternative, uses the least harmful product and is applied in the safest way using the minimal amount of herbicide.
- 1.2 Notes the intention to develop, implement and report back on an Integrated Weed Control Programme with achievable targets and objectives for the control of weeds along roadsides, pavements, other hard surfaces, and in parks and other green spaces. This Programme to focus on the application of mulches and cultural maintenance, mechanised weed brushes, rippers and path edgers, and electricity.

## 2. Background

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- 2.1 Within the last five years many residual (forms a chemical barrier on plant surface for long term control) herbicides have been removed from the Government's approved list of available products. All remaining residual herbicides are water based and require regular application throughout the growing season (March - October). The Council currently uses glyphosate-based products for control of weeds on all hard standing areas as well as the spot-treating of weeds in beds and channels etc. Glyphosate prevents plants from making certain proteins that are needed for plant growth by stopping a specific enzyme pathway, the shikimic acid pathway, which is necessary for plant survival.
- 2.2 Glyphosate binds tightly to soil. It can persist in soil for up to 6 months until broken down by bacteria, and may therefore be detrimental to local ecology. However, unless applied directly over water courses it is not likely to get into groundwater. Pure glyphosate is low in toxicity, but herbicide products usually contain other toxic ingredients that help it to get into plants. Potential symptoms of exposure to these products include nasal, eye or skin irritation. Pets may also be at risk if they touch or eat plants that are still wet with spray from such products.
- 2.3 Some studies suggest that glyphosate has carcinogenic potential, but studies on cancer rates in people have provided conflicting results. Other studies have associated glyphosate use with non-Hodgkin lymphoma.
- 2.4 The majority of herbicide application is carried out using knapsack sprayers and CDA (Controlled Droplet Applicator) lances. CDA lances significantly reduce the

volume of glyphosate used. They produce a controlled droplet which minimises the production of very tiny droplets, which are prone to drift, ensuring that the chemical goes exactly where it is put.

- 2.5 Nevertheless, in an average year the Council will use approximately 4500 litres of glyphosate-based weed killer; repeat treatments being necessary throughout the growing season.
- 2.6 At its meeting of 27 October 2015 the Transport & Environment Committee approved the following motion:
  - 2.6.1 That earlier this year, the International Agency for Research on Cancer (IARC), an arm of the World Health Organisation (WHO), classified glyphosate as “probably carcinogenic to humans”;
  - 2.6.2 That several countries, including Holland, Denmark and Sweden, have banned or restricted the use of glyphosate by local authorities and that some cities, including Chicago and Paris, have voluntarily made their public spaces glyphosate-free;
  - 2.6.3 That glyphosate forms the basis of herbicides used by the Council to control weed growth on streets and in parks and green spaces, and that around 4,700 litres of herbicide are applied by the Council each year;
  - 2.6.4 That council officers are already investigating alternatives to the use of glyphosate;  
This committee believes that:
    - 2.6.5 Where substantial evidence of the negative impact of chemicals on human health and the wider environment exists, the Council should pursue the precautionary principle and should seek to utilise other weed control methods where evidence of such negative impacts does not exist;  
The Committee therefore agrees:
      - 2.6.6 To continue to investigate alternatives to the use of glyphosate for weed control and undertake at least two pilots to trial alternative weed control strategies, presenting a report to committee within twelve months with options and costs of alternative weed control methods.
      - 2.6.7 To phase out the use of glyphosate by the Council as soon as an effective and cost-effective alternative weed control strategy has been identified.
- 2.7 On 29 June 2016 the European Union refused to authorise the use of glyphosate-based weed killers when its official approval ran out at the end of June. However, it did not instigate an outright ban, instead deciding to wait for a new ruling on their safety by the European Chemicals Agency. This is expected towards the end of 2017. Following the extension, EU member state experts voted to strengthen restrictions on use of the weed killer, including a ban on the toxic co-formulant polyethoxylated (POE) tallowamine being used in glyphosate-based products.

- 2.8 The recommendations also reminded member states to follow the rules in the EU's Sustainable Use Directive, including that they must pay particular attention to the risks in "places such as public parks and gardens, sports and recreation grounds, school grounds and children's playgrounds, and in the close vicinity of healthcare facilities". The directive says risks from exposure to pesticides are high in these areas and pesticide use should be minimised or prohibited.

### 3. Main report

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- 3.1 Following service transformation the control of weeds on public highways and within parks, cemeteries and other green spaces is now principally the responsibility of the Parks, Greenspace & Cemeteries service. All officers of the Council applying herbicides are trained in NPTC Certificate of Competence PA1 & PA6.
- 3.2 During the spring and summer of 2016 officers identified, investigated and trialled a number of alternatives to glyphosate-based herbicide. Findings for each of those alternatives researched is summarised, as follows:
- 3.2.1 Toleration
  - 3.2.2 Design out problem
  - 3.2.3 Growth barriers (e.g. fabrics, wood mulch and bonded materials)
  - 3.2.4 Cultural maintenance and mechanical tools
  - 3.2.5 Turf edging
  - 3.2.6 Thermal treatment
  - 3.2.7 Electrical treatment
  - 3.2.8 Alternative chemicals and applicators

The outcomes from each of these potential options are considered in turn:

- 3.3 Toleration
- 3.3.1 The principal reason for controlling weeds in amenity areas is aesthetic – areas look neat and tidy. When managing any amenity area the level of toleration needs to be understood. Does an area need to be completely weed-free or can a lower tolerance level be set? The growing popularity of wildflower meadows and less-frequently cut grasslands under the Edinburgh Living Landscape initiative has shown that people's perceptions of attractiveness is changing – with increasing acceptance of more natural and biodiverse landscapes in some locations, notably "countryside" sites such as woodlands, nature reserves, and some walkways and cycleways.
- 3.4 Design out the problem
- 3.4.1 A continuous surface cover such as asphalt generally has less weed growth than slab, block or sett paving because the majority of hard surface weed problems occur in cracks and joints where there is a build up of detritus which provides a substrate for weeds to germinate. Many weed problems

can therefore be minimised by considering materials that reduce maintenance requirements at the design stage, as well as regularly replacing cracked or broken surfaces, adequately closing joints with appropriate sealant, and frequently sweeping and collecting detritus build-up.

3.4.2 Similarly, the design of new landscaping areas should consider weed maintenance factors. For example, combining wildflower plantings with grass mixtures on road verges can naturally suppress unwanted weed growth, and replacement of formal shrub beds, which have significant weed maintenance demands, with flowering meadow areas.

### 3.5 Growth barriers

3.5.1 Weed-suppressant fabrics can be laid over recently cleared soil to suppress re-growth of old weeds and prevent new weeds from establishing. However, this will restrict the amount of air and water reaching the soil, and can inhibit soil organism activity. Furthermore, any organic material laid over the barrier, or detritus that forms on top of the barrier, will become a new growth medium. This method is therefore best limited to locations where there is no desire to grow plant material, and should be done in combination with a non-biodegradable “topping” such as gravel.

3.5.2 The use of slow-biodegradable organic mulch such as woodchip and barkchip is a better solution for most formal perennial shrub and flower beds and at the base of trees. However, once applied, it will need to be regularly replenished to an appropriate depth. The Council chips much of its own felled tree material so has a sustainable source of woodchip.

3.5.3 The base of many street trees is covered by impervious tarmac or paving, preventing water and air from reaching the soil and tree roots. Other trees sit within poorly maintained or damaged tree pits, which attract detritus, litter and weeds. Resin-bonded surfaces are recommended for such locations as they are both porous and an efficient weed barrier.

### 3.6 Cultural maintenance and mechanical tools

3.6.1 Manual weeding and the use of hand tools (e.g. hoes, weed pullers, claws and spinners) can be used in some hard surfaces, but is usually more suited to controlling weeds in shrub and flower beds. However, these methods, although precise, are comparatively labour intensive.

3.6.2 Mechanical weed-ripping machines that use stiff rotating brushes can be used to control weeds on hard surfaces. As well as removing the weeds they also help remove the detritus which forms the seed bed for later growth, and do not leave dying or dead weeds in-situ as with chemical application. They are available in both pedestrian operated and vehicle operated formats and are particularly effective on block paving, cobbles and setts. However, pedestrian operated usage has to be limited due to high vibration levels and potential Hand & Arm Vibration Syndrome (HAVS) implications.

### 3.7 Turf edging

3.7.1 Only the Council's botanic gardens currently receive any regular turf edging alongside footpaths and other boundaries, the vast majority of amenity grassland areas having their boundary growth either left unchecked or suppressed by glyphosate herbicides. The use of mechanical edgers would be an effective form of growth control in many locations – notably parks and gardens.

### 3.8 Thermal treatment

3.8.1 Treating weeds with heat destroys plant cells and causes plant proteins to coagulate, disabling normal plant functions. This can kill or weaken weeds. Sources for this thermal action can come from open flame, hot water, steam, hot foam, infrared, or electricity. Weeds vary in their response to heat control. Newly emerged, small, or weeds with small root reserves are more likely to be killed by heat. Well established weeds, perennial weeds and weeds with substantial root systems recover from heat control. Repeated treatments are therefore often necessary to keep an area free of weeds.

3.8.2 A plant-based foam additive/surfactant (which enhances contact between the spray droplet and the plant by reducing surface tension) can help penetrate and collapse more resistant cell walls. The foaming action also helps the heat surround the target weeds and insulate the area.

3.8.3 The main advantages over glyphosate are that they can be applied in both wet and dry conditions, and do not require operators to have pesticide application certification. The main disadvantage is that the volume of hot water required is such that a suitable vehicle carrying the water-boiler and its fuel is required, as is easy access to street water standpipes, and because root structures are not always killed, application may need to be more frequent.

3.8.4 Flamers are portable gas torches that produce intense heat that quickly boils the water in plant cells, causing them to burst. Again, flaming kills annual weeds, but it doesn't kill the roots of perennial weeds. These will send up new shoots within a week or so after flaming. Additional treatments will eventually deplete the roots' stored energy, and the weeds will die. Propane is typically the fuel used to create the flame. Some flamers attach directly to small propane tanks but have limited operational time, whilst others can attach to larger tanks but require vehicle carriage.

3.8.5 Infrared radiation in combination with hot air is an alternative option. Propane is again required to fuel infrared weed burners, which apply heat via a hooded wheeled-frame. This technology is only useable on paving and other hard surfaces, but does use less fuel than flamers.

3.8.6 All heat treatments may damage materials such as plastic, paintwork, asphalt, and other surfaces. They may also impact on nearby soil micro-flora, desirable plants, tree trunks and surface roots. Foam surfactants may be of

concern in sensitive areas, particularly aquatic sites, and flame may become hazardous in extended dry periods.

### 3.9 Electrical treatment

3.9.1 Electricity is a relatively new weed killing technology. Essentially, electric lances powered by a diesel generator put a high voltage through the plant, destroying cells from stem to root. The generator can be carried on relatively small vehicles or a trolley. Although it can be used on wet ground it should not be used during periods of rainfall.

3.9.2 Given the potential hazards associated with operating a 2500V charged machine, usage is limited to trained operatives and safeguarded by a biometric authorisation system.

### 3.10 Alternative chemicals and chemical applicators

3.10.1 A number of new herbicide products are being introduced to the market with reduced amounts of hazardous active ingredients. Using these products in combination with a Total Droplet Control system virtually eliminates spray drift and run-off, making it safer for operators, people, animals and the environment.

3.10.2 Where appropriate, suitable herbicide can also be applied to larger, hollow stemmed, non woody weeds by stem injection, whereby a concentrated dose of herbicide is injected into each plant stem so that it trans-locates throughout the roots and rhizome of the plant. As stem injection is specific to the target species, the treatment can be completed in all weather conditions and near water. It can be particularly effective at controlling Japanese knotweed, Himalayan balsam and giant hogweed, invasive non-native species particularly prevalent alongside water courses and walkways/cycleways. However, application is also very labour intensive.

3.10.3 As well as glyphosate-based products with improved chemical action and application, there is also the option of non-selective products based on highly concentrated acetic or citric acid. If the product is created by the distillation or freeze evaporation of plant sources it is considered organic. Acetic acid made by synthetic processes is not. Repeat treatments will be required for perennial weeds as the product is non-residual; that is, it is not trans-located throughout the plant. It cannot be applied in wet or windy conditions, it cannot be applied via Controlled Droplet Applicator so will spray onto non-target plants/areas, and regular application may increase soil and water acidity/salinity over time.

3.10.4 Salt desiccates plant cells and so can be effective as a weed killer. However, salt will not biodegrade and excess will kill earthworms, soil bacteria, fungi, and other micro-fauna; so regular use is not advised.

3.11 All these methods have their pros and cons, different surfaces, locations and plant materials requiring different solutions. The introduction of a Council policy that

seeks to reduce the amount of glyphosate-based herbicides used by the authority to control weeds is therefore recommended, backed up by an Integrated Weed Control Programme that clearly identifies the most suitable approach for weed control specific to roadsides, pavements, other hard surfaces, parks and other green spaces, including water-courses. Areas and features can be zoned to indicate form of control measure and frequency of its application.

- 3.12 Investigation and tests to date suggest that this programme focus on the increasing application of mulches and cultural maintenance, mechanised weed brushes, rippers and path edgers, and electricity methods of control. Policy, programme and practice should also ensure that where chemical herbicides must still be used, it is carried out using the least-harmful effective product and is applied in the safest way using the minimal amount of herbicide. Where practical, acetic or citric acid-based products should increasingly be used to substitute for glyphosate-based products.
- 3.13 It is therefore proposed to develop an Integrated Weed Control Programme using the following methods:

<b>Method</b>	<b>Target use</b>
Mulching and strimming	Parks and green spaces
Turf Edging	Paths in parks and green spaces, off-road cycle ways.
Mechanised removal	Road channels, footways and hard landscaped areas
Manual removal	Shrub and flower beds, road channels footways and hard-landscaped areas
Electricity	Hard to reach areas, resistant weeds e.g. giant hogweed
Acetic/Citric Acids	As a chemical alternative to glyphosate where appropriate

- 3.14 It is intended to carry out a programme of mechanical and manual removal of weeds and the detritus that they grow in from roads, footways and other hard landscaped areas over this autumn and winter.

#### **4. Measures of success**

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- 4.1 Successful development and implementation of an Integrated Weed Control Programme that sees significant reduction in the use of glyphosate-based herbicide by the Council.



## 5. Financial impact

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- 5.1 The control of weeds across Edinburgh using glyphosate-based herbicide currently costs the Council around £200,000 per year. This includes expenditure on chemicals, chemical applicators, training, and operator costs. As application is largely by operator-borne knapsack sprayers and CDA (Controlled Droplet Applicator) lances, capital costs are minimal.
- 5.2 Alternative methods of control will require variable levels of operator time, mechanisation generally being the least labour intensive method of control. Additional budget will be required for the purchase and maintenance of machinery and materials such as water, fuel, foam etc. Ultimate costs will be dependent on the number and mix of machines/techniques applied, and will be subject to competitive procurement.
- 5.3 Initial estimates suggest that the on-going purchase and application of growth barriers/mulching for parks and trees will be around £15,000 per year; and acetic/citric acid-based herbicides around £25,000 per year. For the purpose of comparison the initial estimated capital purchase costs for other methods of control are listed below:
- 5.3.1 Mechanical Weed-rippers: £140,000 (4 x pedestrian + 4 x vehicle mounted)
  - 5.3.2 Steam/Foam : £502,000 (4 x pedestrian + 2 x vehicle mounted)
  - 5.3.3 Infrared Burners/Flamers: £150,000 (4 x pedestrian + 4 x vehicle mounted)
  - 5.3.4 Electric: £60,000
- 5.4 Given the recommendation of increasingly using a mix of mechanical, cultural, electric and organic chemicals it is estimated that an initial capital outlay of up to £200,000 is therefore required, along with an ongoing revenue commitment for materials of £40,000. The cost of any new equipment will be contained within existing budgets.

## 6. Risk, policy, compliance and governance impact

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- 6.1 There is a risk that alternative approaches to the use of glyphosate-based herbicide will be less effective. Evidence from research and trials has been used to reduce this risk, but trials have only been on a localised basis.
- 6.2 It is recommended that a Council policy that seeks to reduce the amount of glyphosate-based herbicide used by the authority to control weeds is drafted and implemented.

## 7. Equalities impact

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- 7.1 Given recent research findings, a reduction in the use of Glyphosate-based herbicide may have a positive impact on both life and health. There are no identified infringements of rights or protected characteristics.

## 8. Sustainability impact

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- 8.1 The reduction of glyphosate-based herbicides may lesson impact on local ecology. However, greater use of machinery and the introduction of electricity to control weeds means that additional carbon fuels will be consumed.

## 9. Consultation and engagement

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- 9.1 To date, there has been no public consultation on the report recommendations.

## 10. Background reading/external references

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- 10.1 Information of the EU Sustainable Use Directive can be found at:  
[http://ec.europa.eu/food/plant/pesticides/sustainable\\_use\\_pesticides/index\\_en.htm](http://ec.europa.eu/food/plant/pesticides/sustainable_use_pesticides/index_en.htm)
- 10.2 Best practice guidance for non-chemical weed control can be found at:  
<http://www.emr.ac.uk/wp-content/uploads/2015/03/BPWeeds2015web1.pdf>

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## 11. Links

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<b>Coalition Pledges</b>	P44 Prioritise keeping our streets clean and attractive.
<b>Council Priorities</b>	CP9 An attractive city. CP12 A built environment to match our ambition.
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<b>Appendices</b>	