Herbicide resistance in amenity weed control situations

Amenity weed control presents a particular risk for the development of herbicide resistance due to the reduced herbicide options now available. This leaflet provides information on the resistance threat and indicates how to spot and manage developing risks.

What is resistance?

- Herbicide resistance is the inherited ability of a weed to survive a dose of herbicide which would normally give effective control.
- Any weed population may contain a very small proportion of plants resistant to a specific herbicide. Repeated use of that herbicide removes susceptible plants, allowing the resistant plants to survive and multiply. Eventually the resistant plants dominate the population and the herbicide fails to give any useful level of control.
- Resistance is usually a progressive process, with susceptible weed populations gradually becoming more resistant over time as a consequence of repeated application of the same herbicide type.
- Annual weeds are more likely to develop resistance than perennial weeds.
- The reduction in number of herbicides available for amenity weed control increases the risk of resistance due to greater reliance on a smaller number of active ingredients (e.g. glyphosate)

This table highlights both the loss of herbicides and the increase in resistance that has occurred since 1995

Facing withdrawal

Withdrawn

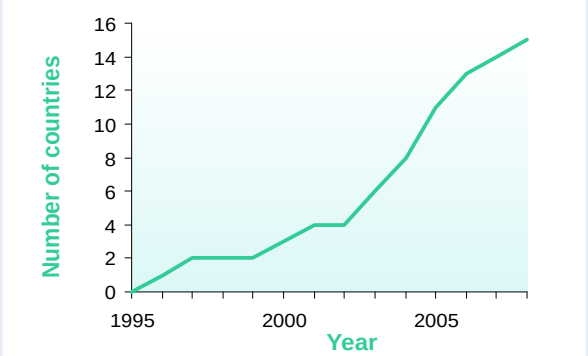
Number of resistant weed species worldwide by herbicide group (Heap 2007)

Herbicide Group	Examples		Number of species		Increase (%)
	Active ingredients	Products (example)	1995	2007	
Glycines	Glyphosate	*Roundup*	0	15	-
Carotenoid biosynthesis inhib.	Diflufenican (DFF)	in *Pistol*	0	2	-
Synthetic auxins	2,4-D, MCPA, Triclopyr, Dicamba	various	14	27	93
Ureas	Diuron	*Diurex*	18	21	17
Triazines	Atrazine	*Gesaprim*	60	67	12
Bipyridyliums	Paraquat	*Gramoxone*	21	24	14

Glyphosate resistance:

- Glyphosate is the most commonly used herbicide in amenity weed control operations.
- Preventing resistance to glyphosate is a priority because alternative herbicides are often more expensive and less effective.
- Glyphosate resistance was first reported in 1996 and has now been found in 15 different weed species. The number of countries affected has grown steadily (see graph).
- In Europe, glyphosate resistant weeds have been found in France, Italy and Spain, but have not yet been reported in the UK.

Increase in glyphosate resistance over time



Procedure for spray operators and managers in the event of herbicide control failure:

If spraying fails to control weeds and you suspect resistance to any herbicide, first check that the following apply to your particular situation before taking further action:

- The herbicide is recommended for control of that particular weed species.
- The correct herbicide dose and application method was used.
- The weather and other conditions were favourable for control at the time of spraying.
- That surviving weeds were not simply spray misses 'shaded' from the spray, or plants that emerged after spraying.

The resistance danger signs – what to look for:

- Isolated plants surviving treatment when most plants of the same species are killed.
- Patches of weeds surviving treatment for no obvious reason.
- A gradual decline in control over several years.
- Herbicide history—repeated annual use of the same herbicide type.

Practical measures to manage herbicide resistance risk in amenity areas:

- Avoid over-reliance on a single herbicide (e.g. glyphosate). Use mixtures of herbicides whenever possible.
- Consider non-chemical control measures (for example hand weeding, cutting, flaming, steam treatments) as a supplement or alternative to herbicide treatment.
- Monitor and assess herbicide efficacy after spraying in order to detect any loss of control.
- If herbicide resistance is suspected, act quickly to prevent it spreading. Use a strategy involving alternative herbicides and non-chemical methods and continue to monitor.
- Consider collecting and testing seed samples to confirm resistance (see contacts below).
- Good record keeping and assessment after spraying is essential in the early detection of herbicide resistance.

Canadian fleabane (*Conyza canadensis*) is one of the 15 weeds that has developed resistance to glyphosate worldwide. The seeds of Canadian fleabane are easily spread by wind, which is one reason why glyphosate-resistant forms have become a major problem in several countries. However, it should be emphasised that resistance to glyphosate, and other herbicides, can potentially develop in *any* weed.

Photographs courtesy of the Weed Science Society of America

Prevention of resistance is much easier than cure. Early detection of resistance is vital. Resistance has the potential to increase the costs and complexity of amenity weed control. If resistance is ignored, weeds can rapidly become unmanageable using herbicides. Recognition of resistance must become a priority in all amenity weed control areas.

If you suspect resistance, in the first instance contact the company selling the product or a suitably qualified technical expert or agronomist.

Useful contacts:

- **Amenity Forum:** www.amenityforum.org.uk
- **Crop Protection Association:** http://www.cropprotection.org.uk/content/home.asp
- **Pesticides Safety Directorate:** http://www.pesticides.gov.uk/home.asp
- **Weed Resistance Action Group:** http://www.pesticides.gov.uk/rags.asp?id=714

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