

Chemical Free Weed Management

For decades now chemicals have been administered into public spaces quite readily with the assumption that they are safe for the people who use them, those who use the spaces and the environment. Quite recently there has been a change to this thinking and Australian Councils across the board are beginning to rethink the use of chemicals. Councils are investigating alternatives and seeking solutions that will have similar outcomes to the chemicals but without detrimental effects on the health of the people and the environment.

Chemicals are readily used in our environment to reduce the amount of weed growth. For local government this is commonly along roads, pathways and in gutters. Use is also in parks and reserves including children's playgrounds and around wetlands and waterways. When sprayed the herbicide can come into contact with humans and animals alike via vectors such as spray drift, through contact with the ground or by rain washing it off and it entering into our waterways and streams.

One of the main chemicals used for this type of treatment is Glyphosate (known by common names including Roundup). Glyphosate is a broad spectrum herbicide currently used in most LGAs in Australia to manage weeds.

On the 20th of March 2015 the International Agency for Research on Cancer (IARC) assessed the herbicide Glyphosate (the active ingredient in Roundup) and classified the chemical as "probably carcinogenic to humans" (The IARC is the specialist cancer agency for the World Health Organisation).

Local Government has been requested to review its use of glyphosate (an organophosphate broad-spectrum systemic herbicide used to kill weeds) by State Cover. State Cover provides the workers compensation insurance for local government. State Cover issued a letter requesting feedback from local councils in response to the World Health Organisation (WHO) report that Glyphosate has been categorised as probably carcinogen.

As a result of the classification of Glyphosate as a probable carcinogen, Local Government and State Agencies are assessing and reviewing the use of Glyphosate by all workers, including contractors. This may impact on how and if they will use Glyphosate and similar herbicides in their areas of control, in particular public spaces.

Some Councils e.g. Leichardt Council in NSW have led the way in embracing chemical free technology prior to the release of the IARC findings. Other councils that are trialling the use of chemical free methods (mostly steam weeding) for all or a significant part of their works include: City of Freemantle, Waverly Council, Leichardt Council, City of Yarra Melbourne and Byron shire.

While others, such as Marrickville, have put a ban on the use of Glyphosate while they investigate alternatives to its use.

So what exactly is Chemical Free Weed Management?

What are the alternatives to using chemical and herbicides in our environment? With uncertainty about the safety of using chemicals to control weeds, there is an increasing desire for chemical free weed management. There are weed management alternatives to Glyphosate which can be grouped in the following way:

- Mechanical / manual removal
- Heat treatments (steam, water-vapour, flame and bio-thermal (hot water))
- Habitat removal and alteration (covering/removing habitat and planting areas)
- Chemical (using other chemicals in place of Glyphosate)

One alternative includes engaging with the community to foster a cultural change to a higher level of acceptance of 'weeds' in public spaces reducing herbicide use by reducing the service level provided (while retaining safety management such as keeping sight-lines open).

Mechanical and manual removal involve techniques such as hand removal – seeds and propagules. The use of animals – chooks, goats, guinea pigs etc. to eat and disturb undesirable vegetation. Mechanical – land and water, includes the use of whipper snippers, mowers and plant like excavators to remove the unwanted plants from the environment.

Physical Removal

Physical removal – containment and cover. Barriers including: mulch, on-site composting – high heat black plastic and promoting shade can also be effective. Using pioneer plants and densely planting landscape areas and growing species to out reduce habitat for weed species is important.

Thermal Weeding (flame, steam and bio-thermal weeding)

Thermal refers to heat and includes flame weeding, steam weeding and use the use of boiling water to treat weeds. Thermal weeding is a method where high temperatures are applied to weeds, causing the plant to die. Thermal weeding is particularly useful in situations where conservation or health considerations are high and weed density is low such as waterways where herbicide use is not permitted. Dragonfly Environmental an industry leader in ecological restoration techniques has been trialling this method and has had good results on treating Alligator Weed and Ludwigia peruviana seedlings.

While flame weeding is not suited to most streetscapes due to the fire hazard nor can it be used on materials such as soft fall and similar playground equipment it is noted that 'flame' weeding in waterways allows weed management in areas where herbicides are not permitted.

Also for native vegetation areas thermal weeding, with a flame weeder, has been shown to stimulate germination of native plants while killing the seeds of annual weeds such as Devils Pitchfork, Bidens pilosa. Flame weeding is also effective in killing persistent weeds like Mother of Millions.

Best results are obtained when follow up weed control is undertaken 4-6 weeks after treatment. In addition, weed control should be conducted periodically after that for example to control weeds over a period of a year it is likely that between 3-5 applications will be necessary, depending on rainfall and the extent of the weed seed bank.

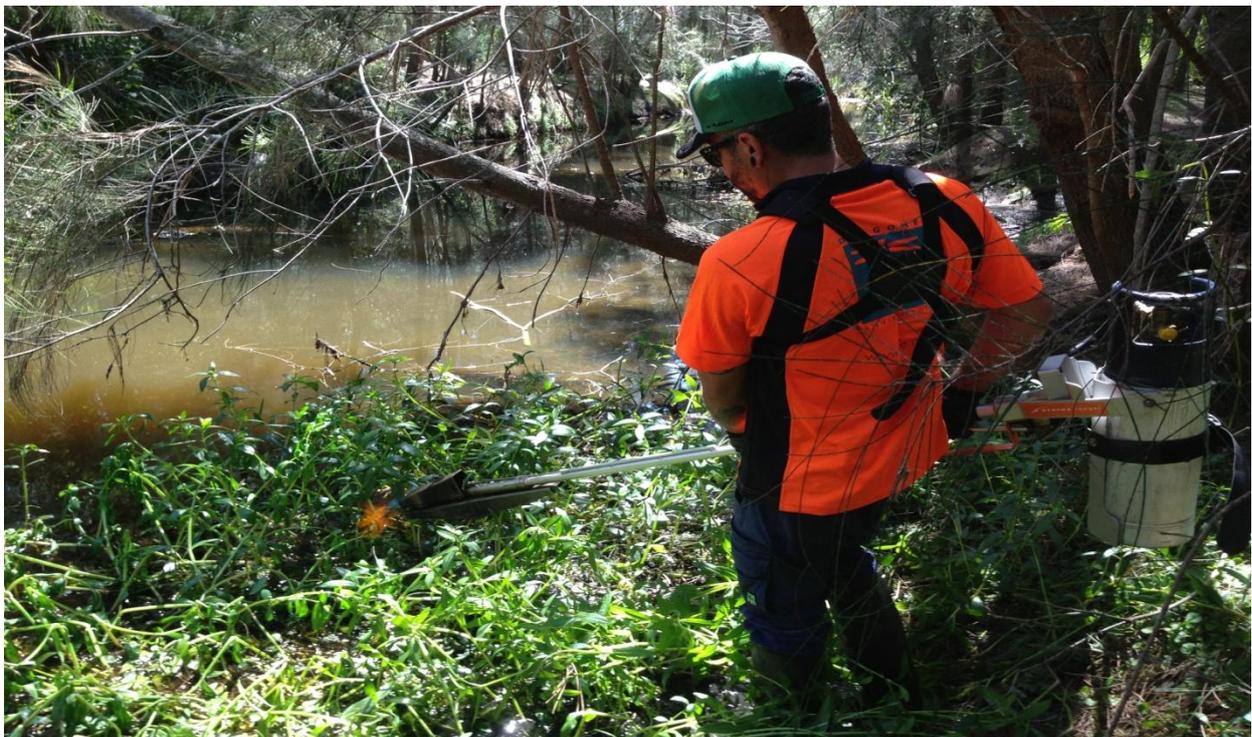
This method is most effective on young annual weeds and least effective on older perennial weeds. In some cases control of perennial weeds will be ineffective however this depends on the species present and its age.

FLAME WEEDER – ECO BURN

Case Study: Weed
Mgt and Eco-burn
Glenorie in the
Hills Shire Council



Flame weeding can be undertaken outside of the fire seasons and in wetlands. Flame weeding allows for the mimicking of a burn in areas where a control burn could not be undertaken. See native plants regenerating after flame weeding.



Here, a thermal weeder is being used on alligator weed

Some of the alternatives to chemical weed control that have been developed which Dragonfly Environmental have been implementing are:

- Thermal Weeding
- Physical removal
- Habitat removal and alteration

Steam and Hot Water Weeding

Steam weeding involves boiling water and utilising the released steam to rupture plant cells resulting in the decomposition of plant soft tissue. Prolonged contact of the steam on the plant kills the above ground portion of the plant.

Steam weeding technology is being refined and the technology is increasing in effectiveness. Super-heated saturated steam has been found to be the most effective in killing weeds (Winer, 2014). <http://go.weedtechnics.com/theweedsnetwork/>

Steam Weeding is currently used in parts of Marrickville and Waverly and much of Leichhardt. Dragonfly Environmental is currently using a combination of hot water-vapour treatment and other integrated approaches for Leichardt Council on streetscapes and reserves as part of a 3 year contract.

Hot water weeding is based on transferring the hot water to the plants cell tissues and root system. Hot water has the benefit of effective heat transfer to above and below ground portions of the plants. Hot Water Weeding is currently used on the NZ main road vegetation management contracts by Biothermal.

Hydro Mechanical Obliteration and Gurneys

Hydro Mechanical Obliteration uses high pressure water to blast apart plants. In this image a Pampas Grass is being obliterated. See video here: <https://www.youtube.com/watch?v=thDJxKWztYU>

Commonly called a high-pressure weeding it involves the use of a pressure washer. The washer can maintain pressure above 500 psi and can shred and obliterate a plant in situ. This is also referred to as Hydro Mechanical Obliteration (H_M_O). This technique used low volumes of water.

Mulching

Mulching of garden beds, with materials such as crushed sandstone reduce the likelihood of weeds growing vigorously. However, the weeds will still grow so on-going mulching is required (stone or wood).

Planting

Locally native species with dense growth can be planted to reduce habitat and outcompete common herbaceous weeds and grasses. This method is most effective with maintenance such as hand removal of grass weeds from densely planted areas to assist in the natural spread of native plants. In addition, mulch can be used to suppress weed growth in areas while the native species establish.

Lesser Known Techniques

The desire to reduce chemical usage is increasing as is the options for chem-free weed management. Weed management using salts, sugars and substances such pine oil are in trial stages. Sugars, salts and natural oils, like pine and cloves, as well as vinegar all have the ability to kill some target 'weed' groups. Effectiveness can be increased by combining methods. Data form tests are being collected both formally (see Ascard et al. in Upadhyaya and Blackshaw 2007) and informally through experiments by councils, contractors and others.

Weed management techniques that may be available commercially in the near future include:

- Microwave – the microwaves cause water molecules to vibrate rapidly and explode the cells. Microwave action has been shown to kill weeds and seeds (Ascard et al. in Upadhyaya and Blackshaw 2007).
- UV radiation
- Far-infrared lasers – to cut stems (can be used to weaken plants overtime or to cut aquatic weeds prior to submerging them).
- Freezing – using liquid nitrogen (similar effects to steaming but current technology uses 2-6 times more energy) Sugars, Salts, Pine Oil and Vinegar

The Way Forward

Dragonfly Environmental along with others in the field of contract weed management are conducting trials and sharing of information of success and failure through groups such as Australian Association of Bush Regenerators (AABR) and Sydney Weeds Committee. This is critical to the speed at which we can implement effective change.

No one solution to chemical free weed management exists for all needs. Reduced chemical use is occurring through an integrated approach of the above methods including cultural change.

Further reduction in chemical use and general maintenance requirements will come from upgrading assets, such as footpaths and gutters and removing areas for weed growth and through improved designs of public spaces to reduce the “edges” and create areas for dense planting of low growing plants to reduce the abundance of thin strips of lawn.

Trials and sharing is vital within the industry and this includes the testing of new technology in the near future. This is an exciting time as there are many alternatives to apply and modify for lasting success. Further small adjustments to current landscaping practices will lead us in the direction of chemical free outdoor spaces and that has got to be a good thing.

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