Policy and guidelines on herbicide use for pest plant control

V1.0

1. PFK Policy on Herbicide Use

Overview

Herbicides provide a useful tool in our fight to protect native biodiversity from invasive pest plants. Pest Free Kaipātiki Restoration Society's (PFK) policy is wherever possible, use mechanical or manual methods of pest plant control, but if it's necessary to use herbicides - use the minimum possible product that will still generate effective results.

In some cases, herbicide may be required in order to safely and effectively kill the plant and prevent regrowth, e.g. on a site where there is risk of soil erosion from digging out roots and rhizomes, or the roots are embedded in rocks such as a gabion basket. Careful use of herbicide can also make all the difference in success and the speed of completion of a job, further encouraging volunteering for biodiversity.

Individual's can make their own decisions about the use of herbicide (in accordance with legal and manufacturers' guidelines), while reserve volunteers can speak further with PFK and our Auckland Council park representative Ranger if they believe chemical application on the park is needed.

When herbicide is the chosen control method, Pest Free Kaipāiki (PFK) recommends 'cut and paste' gels, as the most contained yet also effective method of using herbicides. PFK support and facilitate the use of Bamboo Buster (active ingredient – glyphosate) and MetGel (active ingredient – metsulfuron), as there are higher risks with other herbicides if not used correctly.

Under certain circumstances, the only other methodology we recommend is hand-sprayer; spot spraying in a very controlled manner of liquid glyphosate or metsulfuron by people who have undergone appropriate training. Details of this can be found in section 4 of this document. This can be very useful in certain pest control situations and to help preserve funding as gels are expensive.

1. Application of Herbicide Gels

Glyphosate and Metsulfuron-Methyl based gels (such as Bamboo Buster™ and MetGel™) are thick gels, marked with a dye. They can be carefully smeared onto a cut stump or a slashed stem of ginger or arum lily, for example. They can also be dabbed very carefully onto cut vine stumps or the scraped stem of madeira vine or trunk of tree privet.

In order to keep the user and the environment safe, Pest Free Kaipātiki recommends to:

- Use a very sparing amount. The moment you see blue/green dye on your stump, that is enough as the concentrations of these products are high. Use only a thin smear and it will dry within a few minutes on a sunny day.
- Don't use a blob or allow blobs to drop onto the ground , as there is a chance the interior of the blob won't dry, and if it rains, the herbicide could run off and damage trees and plants downhill.
- Apply the gel soon after cutting or scraping the plant - within 10-20 seconds is best otherwise the cells close quickly and the herbicide won't be transmitted as well into the plant.
- Only use gel when you have a few hours of sunny weather predicted. Wear gloves, cover up when applying and avoid any contact with the skin and eyes.
- Keep herbicide away from children and pets, and withhold chickens for example from an area for 24h if applying herbicide.
- Read the back of the label for other recommendations.
- Take particular care to avoid getting Bamboo Buster in the eyes.
- Follow up every three months, with at least three applications in total to ensure the pest plant has been successfully controlled before proceeding with planting.

2. About Bamboo Buster™ (active ingredient – glyphosate)

- When working near fresh water use Bamboo Buster - never any other kind of herbicide, surfactant or penetrant. Glyphosate is the only herbicide approved for use near water – all the others have negative ecological effects on waterways.
- Bamboo Buster should be used when controlling species such as woolly nightshade, bamboo and giant reed where MetGel is not effective..
- Glyphosate is a low toxicity, non-residual herbicide, meaning it breaks down relatively quickly and the site can be planted in just 3 weeks after use.
- The use of this gel herbicide can be a very useful technique for sites where slope stability would be severely compromised by digging out rhizomes and roots.

3. About Met Gel™ (active ingredient – metsulfuron methyl)

- MetGel works systematically, i.e. through the whole plant and into the roots.
- It is very effective for pest plants with a large rhizome, such as ginger or arum lily.
- MetGel must **never be used near waterways** (instead use Bamboo Buster within at least 4 metres of a stream).
- MetGel has a low toxicity and a short but very active residue. This means it will break down, but it's recommended to wait about 3–6 months before planting after using it.
- Metsulfuron may transmit from the roots on one plant to adjacent plants. Avoid its use near other particularly precious plants, make sure you only use a very sparing amount or switch to using Bamboo Buster if particularly concerned.
- The use of this gel herbicide can be a very useful technique for sites where slope stability would be severely compromised by digging out rhizomes and roots.

4. About Herbicide Spraying

- Generally, PFK doesn't recommend spraying, unless it is very careful spot spraying.
- Spraying in reserves and public places such as roadsides should only be undertaken by people trained in safe herbicide use such as a Growsafe Course and as part of a planned restoration activity. Permission is required via our Council Park Ranger. These courses are available on occasion for free through Auckland Council's. Register for the PFK newsletter to receive updates on upcoming opportunities to participate in training courses.
- We recommend spot spraying as a time and effort saving activity, and can often be done after previously cutting pest plants, and allowing them to regrow in 2–3 months. They often then grow new leaves in tight, tidy bunches that are easy to see, and can be carefully spot sprayed from only a few centimetres away. This is the safest way to reduce the chance of 'spray drift' or damaging nearby natives.
- PFK recommend only two forms of herbicide for spraying:
    - Glyphosate based liquid herbicide with the trade names of AgPro Green Glyphosate 360® and Ravensdown Glyphosate G360® - *allowable within reserves after a Growsafe course*

- Metsulfuron in granular form for mixing - i.e Escort® or Meturon® - *not allowable for use in reserves except when you have express permission to use this by the Council and after completing a Growsafe Course*

- Spray must always be accompanied with a blue marker dye, which is available from the PFK toolshed. It helps you see where you have applied spray and where you have not, and warns other people that spraying has occurred in this area recently.
- Spot spraying can be a very useful technique for sites where slope stability would be severely compromised by digging out rhizomes and roots.
- Always put up signage when spraying to warn the public to stay away from the site if working in a reserve.
- It's very important that exact quantities are mixed, and ideally only that which you intend to use immediately is mixed up. Metsulfuron for example rapidly looses its potency and effectiveness so it's recommended it is used within a day or two. Glyphosate lasts longer mixed up. Correct and appropriate disposal of extra mix and triple rinsing should be conducted. Read a products SDS for further guidelines or visit the AgRecovery website for more information.
- All people using herbicide spray should wear appropriate PPE (Personal Protection Equipment). This is always referred to on a herbicide label or SDS sheet. If unsure, ask. We recommend glasses for all work with glyphosate based products in particular.

5. Alternatives to Herbicides

- There are a range of alternatives to herbicides.
- Alternatives such as steam, hot water, pine, vinegar or 'organic sprays' and coconut sprays exist, but PFK do not recommend them. Many of these organic sprays have their own unique serious health & safety concerns - some of them can be quite nasty to human health if used incorrectly, and often only knockdown the growth above ground - meaning an invasive weed may regrow and continue to damage native ecosystems.. They can also damage soils and change the delicate balance of soil biology into the future. This is why PFK recommend the use of only two products - glyphosate and metsulfuron.

- The North Shore Forest & Bird Weed Control Guide lists a range of mechanical weed control methods for various weed types. The Weed Busters and Auckland Council sites also provide useful techniques. These methods are very effective and recommended but the tradeoff is they often require more time and effort to reach eradication.
- An important element in controlling weeds is to dispose of seeds, roots and other plant parts that will grow vegetatively if left on the ground.
- Careful disposal of plant fragments is essential.

6. About Glyphosate - Risk, Benefits and Overuse

- All chemicals, including herbicides, pose certain risks and hazards. These range from physical risks (such as corrosiveness to metals, explosiveness), risks to humans, and risks to the environment. These risks are assessed and can be mitigated by best practice in storage, handling and application.
- Glyphosate is one of several herbicides used in ecological restoration and evidence indicates that it is the safest available.
- PFK recommend only two herbicides (glyphosate and metsulfuron) because these two products, when used as directed, are associated low levels of risk. Other higher risk substances are available from garden centers and stores - these are not recommended by PFK. It is not possible for volunteers to get access to other types of herbicide that are associated with very high levels of risk.
- All chemicals, from household bleach and other cleaning products, car products, to herbicides such as glyphosate all pose different ‘hazard classifications’ to the environment and forms of life including people, and each is either present, absent or rated at different levels. We recommend you familiarise yourself with the hazards to be fully informed, and use herbicides carefully as described to protect non-target plants and animals, cover your skin, store in a safe way and use in the recommended way mentioned on the product label, ad in our recommendations below. Please note also, not all herbicides with glyphosate in them as the active ingredient are made the same either. We recommend Ravensdown glyphosate 360 green or Apro Green Glyphosate 360 as having the lowest hazards found in the range.
- Glyphosate spray is often overused by some weed control contractors working around trees and on the edge of bush and paths in reserves. This should not be necessary in our view.

- Glyphosate is also used to mass spray genetically modified food crops, which likely has associated risks for human health. Monsanto's use of glyphosate resistant crops is extremely unwise. It ensures that glyphosate will enter the food chain.

- However, glyphosate remains a crucial tool for ecological restoration to help prevent collapse of ecosystem processes and loss of our native forests. We do not yet have enough volunteers and landowners controlling weeds manually to keep up with the rate of ecosystem loss. The reason our organisation, every volunteer or public member uses glyphosate is to protect our native heritage. We focus on pest plants that are disrupting or destroying the processes of nature, to such an extent that that natural place or ecosystem no longer has the ability to repair itself. If we lose our native biodiversity, we are directly impacting Tāria te wā and kaitiakitanga, or long term thinking and guardianship of our land. Ag-chemicals should of course not be used in Pā Harakeke, or in an area for rongoa collection or projects for obvious reasons.

References

- North Shore Forest and Bird Weed Control Guide
- Weedbusters Web Site
- Auckland Council Web Site and weed manual
- Glyphosate toxicity report 2017

2. PFK's Suggested Pest Plant Control Methods

1. Manual Control Methods

- Digging. Ensuring all root material is removed and disposed of appropriately..
- Pulling. Particularly useful with seedlings - quick and often easy and effective.
- Covering. Thick weedmat or wool carpet can be used to smother certain weeds - by starting them of light. A slow process however.

See the Forest & Bird Weed Guide for more detail

2. Herbicide Control Methods

- Cut and paste or scrape and paste
- Spot spraying
- Drill and fill

See the Forest & Bird Weed Guide for more detail

3. Herbicides Supported and Available at PFK Tool Library

- Bamboo Buster™ (Glyphosate gel)
    - Lowest risk herbicide
- Met Gel™ (Metsulfuron gel)
    - Risk to non-target plants if used incorrectly
    - Risk to aquatic organisms if used incorrectly - DO NOT USE near water
- Metsulfuron for spraying (Metsulfuron in granular form for mixing - i.e Escort® or Meturon®)
- Picloram gel
    - ONLY for trained and experienced volunteers in rare occasions - i.e Woolly Nightshade control
    - Risk of harm to people and animals and risk to non-target plants if used incorrectly - must wear protective equipment. Long soil residue.

4. Borrowing Pest Plant Equipment, Resources or Tools

PFK's Community Toolshed has a large range of pest plant control tools e.g:

- Tools - handsaw, loppers, snips, trowels, spades, forks
- Safety equipment - gloves, safety goggles, Hi-Vis vests
- Herbicide related resources
- Herbicide gel bottles (Bamboo Buster and MetGel)
- For those with training - hand spot sprayer, metsulfuron powder, measuring equipment, glyphosate concentrate

3. Summary of PFK's Recommended Control Methods

[See the Forest & Bird Weed Guide for more detail]

Methods	Risks*	When to use	When NOT to use	Example target species or stages
Manual methods - general	Can take far more time than herbicide application Not practical in some cases May cause erosion issues	Whenever possible Where herbicide application is not possible	When manual control will cause damage to sensitive stream banks or steep areas. Erosion once started is difficult to control.	**Tradescantia,** **fairy crassula,** **plectranthus are easily pulled up and placed into composting weed bags**
Pulling	Likely to leave roots/rhizomes remaining in soil.	Small plants. Easy to pull up. In combination with herbicide control.	Risk of leaving viable roots.	**Seedlings and small plants of:** **moth plant,** **woolly nightshade,** **ginger,** **monkey apple** and other pest plants.
Digging	Can be a very inefficient use of time with large or established plants. On slopes risks erosion.	Plants with roots/rhizomes which cannot be pulled up. When time allows and on nice flat areas.	Very large or established plants, especially trees, or on erosion sensitive stream banks and slopes.	**Tuber ladder fern**, **climbing and bushy asparagus**
Cutting	Almost all invasive pest plants will regrow if cut only	To slow down growth temporarily, to remove invasive seeds, or to remove mass of above ground vines, when followed up with control of regrowth.	We don't recommend using cutting on its own as a permanent control.	Cutting can be used for vines if then followed up in a month or so with control of regrowth via herbicide spot spraying or more targeted digging: **Jasmine**, **Blue morning glory**, **climbing asparagus**, **Japanese honeysuckle**.

Collecting by hand	Collecting ripe berries or fruits, may inadvertently spread the seeds Leaving a mature plant, may lead to more fruits/seeds produced	Collecting berries, fruits, seeds, pods for safe disposal. Use in conjunction with another control method for the mature plant.	Be aware that the collection of seed from an area with a long lived invasive seed bank already - may not be an efficient use of your time.	**Berries, seedheads, or seed pods of any species, in particular:** **Woolly nightshade** - berries **Ginger** - seedheads **Moth plant** - seed pods **Pampas grass** - seed heads
Herbicide methods - general	Depends on herbicide used. Possible impact on non-target organisms if used incorrectly.	When manual methods are not possible or practical to achieve permanent control. When volunteer time is limited.	Where risk of herbicide affecting non-target organisms is too high. During or before rain.	There are herbicide control methods for all stages and species of pest plant as seen below
Cut and paste	If too much used, a blog of gel may not dry and if it rains, spread via water to unintended vegetation. Quite a costly product compared to other herbicides.	For species with a decent stem easily able to be slashed/cut and then pasted. For weedy trees that require scraping and pasting to kill prior to the mass coming down	Do not use Met-Gel near waterways (give at least 4m on either side). Only use Bamboo buster in this circumstance. Not ideal on small diameter stems - i.e vines if very small	**Ginger, blue spur flower, moth plant, arum lily, ivy** can all easily be cut and pasted, **monkey apple, privet, woolly nightshade** can be cut and pasted if small, scraped and pasted in larger and in a safe situation to later fall**
Scrape and paste	Possible impact on non-target organisms if used incorrectly or in too higher quantities	Excellent when the diameter of a vine or sapling too large to pull is too small. Scraping allows a greater surface area for herbicide absorption. Good for woolly nightshade in particular.	Larger weed trees that once dead will fall and could cause damage to people or property Trees over 4m in reserves without consent from the council	**Woolly nightshade,** **moth plant stems** (best cut and then ground attached piece is scraped and pasted too)
Spot spraying	Depends on herbicide used. Possible impact on non-target organisms if used incorrectly, if mixture left too long before using, or disposed of incorrectly	Particularly extensive vines. Manually cut/slash stems close to ground and allow to regrow. Follow up 1-2 months later with spot spraying regrowth with herbicide.	Wet or windy conditions. In reserves as a volunteer without a GrowSafe course Never metsulfuron near waterways.	**Climbing asparagus, jasmine** and other **vines** - cut, wait, spot spray **Ginger, bears breeches, arum** easily able to be cut/slashed and spot

		Weeds with a fleshy stem are easily cut and stumps spot sprayed (saves, product, time and money)	Only glyphosate solution used in these situations.	sprayed for speed and product efficiency
Ring bark and paste	Leaves dead standing trees that may fall on people or property	Shrubs or trees in a safe situation (i.e can't fall on people or property) or permitted by council in reserves Ring bark and paint top and bottom where bark meets the area you have just removed	Where the tree will eventually fall and could fall on someone, property or infrastructure Trees over 4m in reserves without consent from the council Where ground cover, shrub or vine weed species under the tree have not yet been controlled.	**Loquat, Evergreen Buckthorn (Rhamnus)** (use met-gel) **Wattle** (use Bamboo Buster)
Drill and inject to leave dead standing trees	Requires use of a drill (hand auger or mechanical) which itself poses a risk. Leaves dead standing trees that may fall on people or property	To save time and resources in appropriate (safe) areas instead of costly felling. Willows, alder in wetlands To prevent large trees growing next seasons seed. Useful to reduce weight of tree and reduce damage when it does fall to surrounding native bush	Where the tree will eventually fall and could fall on someone, property or infrastructure Trees over 4m in reserves without consent from the council Where ground cover, shrub or vine weed species under the tree have not yet been controlled.	**Cotoneaster, Evergreen buckthorn (Rhamnus), Elaeagnus, Monkey apple, privet (**use metsulfuron 10g/L) **Loquat, Wattle, Willow, Bangalow Palm** (use 50:50 glyphosate)

* Health and safety is very important in all activities related to pest plant control, and each method has its own risks. Always assess the risks in any activity, work safely, and read or follow instructions.

** Large pest trees should usually not be controlled until all surrounding groundcover or vine weed species are under control. Furthermore, trees should be assessed for safely prior to any activity if drilling and injecting, scraping and pasting or felling. Trees over 4m in public areas must be with consent from Auckland Council, and in all cases, not pose a risk to people or property if left dead standing.

4. Guide to Herbicide Spraying Facilitated by PFK

Guidance for the safe use and correct methods for preparation, application, and disposal of herbicide solutions.

1. Health & Safety Precautions

1.1. PPE (Personal Protective Equipment)

Gloves
Goggles/Safety glasses
Long sleeves and pant legs
Hard/covered shoes

1.2. Read Herbicide Labels

Safety Data Sheets:

Bamboo Buster
Met-Gel
Metsulfuron granules for hand sprayer (Escort or Meturon)
Glyphosate for hand sprayer (Agpro or Ravensdown)

1.3. Signage for location of spraying

Template text to include:

WARNING! Herbicide application in progress for control of environmental weeds. Avoid areas with blue dye.
Expires [enter time and date 24 hours after application].
By [enter name or organisation] [include phone number/ email].

1.4. Follow instructions to maximise safety and minimise negative impacts

1.5. Council Facilitated GrowSafe Certification required for spraying in public areas. Only glyphosate is permitted for use on Parks with express permission by Park Ranger and after completion of GrowSafe.

2. Equipment and Materials Needed

- Spray bottle (1 litre)
- Measuring jug (for water)
- Small measuring cylinder (for herbicide)
- Container to catch drips or spills while mixing/preparing

- Nitrile gloves for protection
- Disposal bin
- Safety glasses
- Metsulfuron granules or Glyphosate liquid
- Water
- Blue marker dye

3. Instructions for Preparing Herbicide for Spraying

1. Determine your pest plant target and select appropriate herbicide.
2. Ensure to prepare ONLY SUFFICIENT spray mixture for the job on hand - you ideally do not want extra herbicide to then have to deal with and dispose of
3. Plan to use metsulfuron solution that day or the next if possible - it does not last long
4. Wear gloves, glasses and prepare work space
5. Ensure spray bottle is clean of previous substance and nozzle clear
6. Ensure spray lid is tightly closed (not miss-threaded)
7. CAUTION: 1L SOLO spray triggers are easily bumped when walking or transporting. Be particularly aware of this when transporting to avoid damage to the environment or people

7.1. Glyphosate mix:

- Add glyphosate to the spray bottle at appropriate rate for your weed target using small measuring cylinder used only for that purpose (label it)
- Add a little water, stop and swill a small amount first to better mix with the herbicide before then filling to the 1L mark
- At the end, add at a rate of 1ml/L to the bottle and gently stir with a dedicated stick - this is only a couple of drops. It is extremely staining so do this is a purposeful place (a shallow plastic tub for mixing is perfect).

7.2. Metsulfuron mix:

- Add a small amount (about 50ml) of water to the bottom of a clean spray bottle.
- Add metsulfuron granules at a rate appropriate for your target species. The PFK small sachets of metsulfuron are 5 grams each when unopened.
- Gently swirl the solution in the bottle. It will turn white and cloudy as it dissolves.
- Add water to the 1L mark

- At the end, add at a rate of 1ml/L to the bottle and gently stir with a dedicated stick. It is extremely staining so do this is a purposeful place (a shallow plastic tub for mixing is perfect).

8. When spraying, avoid or minimise spray drift by only employing spot spraying and always:

8.1. Direct the spray towards the spray target, never away from it or up in the air

8.2. Keep as close as possible to the spray target while still getting even coverage. The SOLO spray bottles have a cone that enables close, targeted spray control

8.3. Make sure you know which way the wind is blowing, and ideally choose fine conditions with no wind

8.4. Consider prior to spraying, cutting and allowing pest plants to regrow to provide an easier, more compact target for you to later spray.

4. After Spraying (dealing with leftover herbicide and cleaning)

Following application, equipment should be cleaned and rinsed with water when finished and returned to Pest Free Kaipatiki. Even ‘empty’ tanks can contain surprising amounts of herbicide - so correct disposal and rinsing is important.

4.1. **Concentrated herbicide (unmixed):**

- Find an alternative use for the chemical and spray it on invasive material
- Return to manufacturer or supplier
- Take herbicide to waste disposal company (i.e Waste Management will often take small quantities for free)

4.2. **Diluted (mixed) herbicide:**

- Apply to the target area or another area of invasive weeds (preferred)
- Dispose onto waste ground (i.e beside a farm track that is NON-PRODUCTIVE) where no run-off into streams or sensitive sites is possible, or where animals graze
- Store for later use and above two options in labelled containers (i.e when weather becomes poor and the above two options are no longer safe)

4.3. **Emptied herbicide tanks fresh after use:**

- Tanks that have been emptied must be further diluted with rinse water and the washings sprayed onto a target area or waste ground area. This is often referred to ask ‘Triple Rinsing’:

  Partly fill with clean water
  Mix, swill and pump
  Spray washings onto target area or waste ground.
  Return equipment to PFK, supplier or storage area

- Containers that have contained herbicide undergo the same triple rinsing process before disposal.
- Visit www.agrecovery.co.nz for recycling options