



CONTROLLING WEEDS IN RIPARIAN MARGINS

A guide to restoration projects and other plantings

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Disclaimer: The chemical control methods in this guide were devised by Waikato Regional Council staff and should not be used as a substitute for manufacturers' label instructions. Waikato Regional Council takes no responsibility for any damage to any person, property or thing that may occur as a result of the use of chemicals in accordance with this guide.

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1 Introduction

The value of our waterways and native biodiversity in the Waikato is being increasingly recognised. This is evident in the number of landcare and beachcare groups, restoration projects, QEII covenants and native forest fragment protection projects. It is also evident in the number of land owners adopting Waikato Regional Council's Clean Streams project.

This guide has been produced to help in such restoration projects, as weed control – especially before planting – has a vital role in ensuring plants have the best chance of survival. This particularly applies to streamside areas that have become weed infested. Well established weeds like blackberry and convolvulus need to be thoroughly cleared to avoid plantings being overtaken in their first spring. Weeding before planting begins is easier and reduces the likelihood of plant casualties due to weed competition.

It is also essential to realise that weed management is important even if your fenced off riparian areas are not replanted – once 'retired' the area will be prone to weeds. This guide outlines **non-chemical** and **chemical** ways to control weeds, including their advantages and disadvantages. It's important to note that often a combination of weed control methods gives plants the best opportunity to survive.



Open spaces encourage weed invasion.



A well managed weed control programme.



Japanese honeysuckle smothering riparian planting.

2 Pre-planting

It is important to factor in time and resources for weed control in order to protect your planting. At the pre-planting stage there are several things you can do which can reduce the impact of weeds.

- Eliminate weeds on site before planting.
- Once weeds are eliminated do not 'over clear' the planting area – weeds love open spaces and disturbed soil – spray or grub out planting spots only.
- Consider controlling nearby sources of weed seeds and fragments (for example, weeds which may invade from the roadside).
- Plant only an area you can manage – better to plant a smaller area that can be looked after than lose large areas of plantings.
- Plan to allow time and resources for weed control. You may need to release plantings several times in the first year. Ongoing weed control at least once a year for several years may be required.
- Choose good size plants, preferably sourced locally (or well hardened/suited to climate).
- Consider closer plant spacings (0.5-1 m). Although more expensive initially, 'canopy closure' (which reduces weed invasion) is achieved earlier.
- Plant fast growing species to begin with. These are better able to compete with weed species. You can interplant with slower growing species later.
- It is a good idea to visit other planting projects in your area and talk to people involved. Find out from them what plants have done well, what sort of weed problems they have encountered, what weed control has worked well and what hasn't.

Note: Before using herbicides see section [Using herbicides](#).



The closer the plants are planted the less likely weeds will establish.

3 Non-chemical control methods

Hand weeding or mechanical control

Hand weeding can be done with tools such as weed-eaters and grubbers, or by digging up the weeds by hand.

Some weeds can sprout from fragments, so all plant material (including roots) should be removed from the site. If you wish to compost the weeds, put them in plastic shopping bags and leave them tied up to rot for 12-18 months before adding them to your compost. You can also dry or burn weeds, but make sure there is no objectionable smoke beyond your property boundary and that smoke doesn't cause a hazard.

Advantages: You're only removing the plants you don't want. Other desirable plants are generally undamaged.

Disadvantages: Weeding is labour intensive and time consuming. The soil disturbance may also encourage weed seeds buried in the soil to germinate. Inexperienced weed-eater operators can easily damage native plants.



Wandering willie being put into a bag and water being added to help it rot.

Weed mats

You can stop weed germination by putting weed mats around plants, either as a blanket over the entire area or around individual plants. Each weed mat should be at least one square metre in size around individual plants.

Recommended matting materials include used natural fibre carpet, woollen weed matting, cardboard and wet newspaper. If you're using carpet, make sure plants don't rub against the hard edge – they can die from the 'ring barking' this causes.

We don't recommend polythene because it is not biodegradable and must be removed after the plants have grown. Also, it prevents rain from penetrating the soil, drying out the streamside zones.

It's important to make sure matting is held down firmly to stop it moving in flooding or high winds. Try using mulch or rocks, or holding it down with wooden or wire pegs. Alternatively, push the mat corners into the ground with a spade.

Advantages: Matting helps to retain moisture and offers some weed control, depending on the material you use.

Disadvantages: In windy conditions, matting can blow around and damage the plants.



A young cabbage tree with carpet around the base to protect it from weeds.

Mulch

You can spread organic material (at least 100mm thick) around the base of your plants. This prevents weed invasion and stops the soil drying out.

Ideal mulch materials are bark, untreated sawdust and plant materials (pulled weeds). If you're going to use pulled weeds, make sure they are not the kind that sprout from small fragments or have viable seed attached.

It's a good idea to add fertiliser as the mulch decomposition process takes nitrogen from the soil, depriving the plants.

Avoid putting mulch too near the stream – if it floods, the material might be washed away and cause downstream blockages.

Advantages: Mulch helps to retain moisture and provides long-term weed control depending on the material you use.

Disadvantages: Weeds will penetrate mulch if you lay it too thinly. It can also be blown away by wind, disturbed by birds, dogs and other animals, and washed away by rain or in high stream flows.



Mulch has been used around these plants to suppress weeds.

4 Chemical control methods

You'll need to apply herbicides in most situations. How much you apply, and how you apply it, will depend on the weed species and infestation levels.

You can apply herbicide:

- by foliage spraying
- onto a cut stump
- by stem injection
- after 'frilling' the trunk
- with a weed wiper

Take care when using herbicides near streams. If you're working on public land, use a professional contractor qualified to use herbicides. You'll find an overview of the regional rules on this at the back of this guide.

Foliage spraying

Foliage spraying is the most common chemical weed control method in riparian areas. It is best suited to low weed growth or for re-sprouting stumps, and can be used to control weeds before planting and/or around established plants. You can either spray the entire area or spot spray – but to be successful, you must spray the entire plant.

Before spraying consider:

- how long the chemical will stay in the soil (residual herbicides)
- how close to the stream you can spray
- the weather conditions
- whether you're using a 'broad spectrum' (which affects all plants) or 'selective' (which doesn't affect desirable plants) herbicide. You can get this information from the manufacturer's product label.

Add a wetting agent ('surfactant') to the mixed herbicide. This will help it stick to the weed and increase the amount of herbicide it absorbs.

When applying the herbicide, place a shield around the plants to protect them from spray drift. Shields are simply two pieces of material at right angles to each other, with a handle protruding from the top. See example on page 8.

Advantages: Foliage spraying provides long-term weed control if you use a residual herbicide. You can also use selective herbicides. It is usually less labour intensive than other weed control methods.

Disadvantages: You can damage the non-target plants if you don't apply herbicides carefully and correctly. Chemicals can leach into the waterways.

Cut stump method

The cut stump method involves cutting the tree or shrub as low as possible and applying the herbicide immediately to the stump.

However, if you don't do it immediately, a protective skin will form over the wound (usually within five minutes) and the stump will need re-cutting.

Advantage: Stump cutting destroys standing trees and allows a natural breakdown. It requires only small amounts of herbicide and poses minimal risk to desirable plants or water. It is also simple to use.

Disadvantages: Stump cutting opens areas to light, which can trigger weed germination.



Applying herbicide to cut stump.

Stem injection

This is suitable for larger shrubs or trees. Drill holes sloping down into the trunk at regular intervals around the base of the tree or shrub. You can use a disused animal drench pack and gun, or a plastic squeeze bottle with a long nozzle, to place the herbicide into each hole as soon as possible.

Advantages: Useful for trees or shrubs where their removal is difficult or would cause damage to surrounding vegetation. Avoids overall spraying of large plants.

Disadvantages: Stem injection opens up areas to light, which can trigger weed germination. There are also dangers from dead trees falling, including into streams where they can obstruct the flow.



Drench gun used to apply herbicide into hole.

Frilling

Frilling involves making deep cuts into tree trunks at regular intervals around the base. Herbicide is applied to the fresh cut using a paintbrush or low pressure sprayer (such as a knapsack). It is important not to ring bark (that is, to remove a ring of bark from the tree), as this reduces the herbicide absorption.

Advantages: Frilling stops the plant from seeding almost immediately. Avoids overall spraying of large plants.

Disadvantages: Frilling opens areas to light, which can trigger weed germination. There are also dangers from dead trees falling, including into streams where they can obstruct the flow.



A sycamore getting deep axe cuts into the trunk before being treated.

Weed wiper

Weed wipers are herbicide applicators that disperse herbicide by 'wiping' it onto the plant.

Advantages: Removes the risk of spray drift.

Disadvantages: You can damage the non-target plants if you don't apply herbicides carefully and correctly. Chemicals can leach into the waterways.

5 Helpful hints

Alongside weed control, you can do a number of other things to enhance plant growth and make weed control easier.

- Tackle weed control promptly. Weeds are much easier to control when small.
- Learn to recognise weeds. Some weeds are more of a threat to your plantings than others. For example, a priority for control would be fast growing climbers such as Japanese honeysuckle, which can take over large areas and invade even mature plantings.
- Staking plants makes it easier to find them later, and easier to avoid if herbicide spraying.
- Reduce the risks of herbicide damage to non-target plants. You can make a simple shield to protect your plants by cutting a plastic 20 litre container in half and attaching it to a stick. Spray drift can be avoided by using a 'weed wiper' to apply herbicide, and some herbicides are available in granulated form.



A home made shield made from a 20 litre container protects plantings from spray drift.

6 Weed control for specific plants

Agapanthus (*Agapanthus praecox*)

An evergreen plant forming dense clumps to 60cm tall, with thick rhizomes and long narrow leaves, and blue to white flowers.

Treatment methods

- Dig out – on large sites, follow up with spraying.
- Spray with metsulfuron-methyl (Escort or equivalent). We recommend you bruise the leaves before spraying.
- Cut stump – cut leaves close to ground. Treat the fresh stump with metsulfuron-methyl (Escort or equivalent) or with Vigilant gel. At least three to four follow-up treatments will be needed.



Arum lily (*Zantedeschia aethiopica*)

An evergreen, clump-forming perennial up to one metre tall, with large, arrow-shaped leaves and distinctive white, funnel-shaped flowers.

Treatment methods

- Dig out the tubers. Dispose of them in plastic bags or bury them deep.
- Spray metsulfuron-methyl (Escort or equivalent).
- Cut stump and mulch the stems and leaves. Treat the stump with metsulfuron-methyl (Escort or equivalent).



Bamboo (*Phyllostachys species*)

Bamboo has thick or woody grass-like canes with alternating leaves. Height and size varies with species – 2-15 metres high. Species with running root forms can be invasive.

Treatment methods

- Dig out. Large clumps will require heavy machinery (eg tractor or digger) to remove.
- Herbicide spray. Cut down and then let foliage regrow. Spray regrowth with Activated Amitrol + penetrant or Haloxyfop (eg Gallant® or Agpro Haloxyfop).

Bamboo is difficult to eradicate and will require follow-up treatments



Banana passionfruit (*Passiflora tripartita* and *P. mixta*)

A vigorous climbing vine with three-fingered leaves. Pink tubular flowers throughout the year develop into oval fruit that turn yellow when ripe. Banana passionfruit is subject to control rules under Waikato Regional Council's Regional Pest Management Strategy (RPMS).

Treatment methods

- Pull the roots up. Cut the plant off above ground or tie the stems in the air to prevent the vines touching the ground and growing new roots.
- If there are large masses of foliage on the ground, spray with triclopyr (Grazon or equivalent).
- Where you can't pull the roots up, use Banvine at a vine application rate or triclopyr (Grazon or equivalent) at a gorse application rate.
- Stump swab with metsulfuron-methyl (Escort or equivalent).



Barberry (*Berberis glaucocarpus*)

A spiny, woody, evergreen or semi-deciduous shrub growing to three metres tall. It has very sharp spines that are single or divided into three. Small yellow flowers are followed by small purple berries covered in a yellow bloom.

Treatment methods

- Spray Tordon Brushkiller or equivalent + penetrant.
- Cut stump and treat with metsulfuron-methyl (Escort or equivalent) at label application rate or Tordon Brushkiller or equivalent.



Blackberry (*Rubus fruticosus*)

A scrambling, prickly shrub, up to three metres tall. Stems are erect, arching and covered with numerous prickles. Leaves are dark green with a lighter underside. White or pink flowers in summer are followed by black fruit. Roots can spread for metres, making mature plants difficult to dig out.

Treatment methods

- Dig out (small patches only). Dispose of root crowns and rhizomes.
- Spray metsulfuron-methyl (Escort or equivalent), Tordon Brushkiller or equivalent or triclopyr (Grazon or equivalent), all at label application rates, in late summer to autumn. If you are spraying regrowth, make sure the stems are at least one metre long and have fully grown leaves to allow maximum chemical absorption.



Good control of blackberry relies on the herbicide being absorbed by the leaves through to the extensive roots and therefore there needs to be enough large leaves on the plant to take in the herbicide.

Blue morning glory (*Ipomoea indica*)

A vigorous, climbing vine up to 12 metres high. Has attractive bright blue/purple trumpet shaped flowers. Leaves are usually three-lobed and hairy underneath.

Treatment methods

- Hand pull, dig out roots. Roots should go to landfill or be buried deeply. Leave vines to rot on site.
- Stump swab with glyphosate or metsulfuron-methyl (Escort or equivalent).
- Spray – cut vines at waist height and spray foliage below (summer-autumn) with glyphosate + penetrant or metsulfuron-methyl (Escort or equivalent) + penetrant.



Broom (*Cytisus scoparius*)

An erect, much-branched, almost leafless, deciduous shrub up to three metres tall. It produces beautiful golden-yellow flowers in spring, followed by explosive pods. Broom is subject to control rules under Waikato Regional Council's Regional Pest Management Strategy (RPMS).

Treatment methods

- Dig out small plants, while minimising any soil disturbance.
- Spray triclopyr (Grazon or equivalent) + penetrant from spring to summer.
- Stump swab with triclopyr (Grazon or equivalent) or metsulfuron-methyl (Escort or equivalent) at label rates.
- Weed wiper – triclopyr (Grazon or equivalent) from spring to summer.



Buddleia (*Buddleja davidii*)

A many-stemmed shrub, up to four metres tall with dull green, narrow, tapering leaves up to 20 cm long. The leaves are usually serrated and often hairy, as is the stem. In early summer, the plant produces numerous tapering heads of sweetly scented lilac flowers with orange centres.

Treatment methods

- Pull or dig out small plants.
- Spray with glyphosate from February to April.
- Follow up six-monthly.



Chilean rhubarb (*Gunnera tinctoria* and *G. manicata*)

An invasive large clump forming herbaceous plant which grows up to 3m high. It has stout rhizomes and massive umbrella-sized leaves. The plant resembles a giant rhubarb. Chilean rhubarb is subject to control rules under Waikato's Regional Pest Management Strategy (RPMS).

Treatment methods

- Dig out small patches taking care to get all root parts.
- Stump treatment. Cut back stems and treat with a concentrated herbicide such as Vigilant® or a glyphosate gel.



Photo: Carolyn Lewis
Weedbusters

Climbing asparagus (*Asparagus scandens*)

A scrambling, shade-tolerant climber with tuberous roots. Feathery leaves support small orange berries in autumn. A total control plant under Waikato Regional Council's Regional Pest Management Strategy (RPMS). Land owners are required to remove climbing asparagus from their property.

Treatment methods

- Dig out the tubers and dispose of them. Mulch the stems.
- Spray with glyphosate in spring to early summer only. Do not add penetrant when spraying against tree trunks. Spray lightly, avoid run-off, and note total coverage is not required. Autumn to winter, spray only in frost-free areas on healthy growth.
- Weed wiper – glyphosate, no penetrant. Total coverage is not required.



Climbing dock (*Rumex dagittatus*)

A climbing or scrambling perennial with shoots up to three metres long. Small green, pink or reddish flowers in late spring or summer are followed by green or reddish fruits. The leaves are large and arrow-shaped.

Treatment methods

- Dig out tubers and rhizomes (small sites only). Dispose of them at your local landfill.
- Spray in summer with metsulfuron-methyl (Escort or equivalent) + penetrant or use Tordon Brushkiller or equivalent.



Cotoneaster (*Cotoneaster franchetii*)

An evergreen shrub or small tree up to four metres tall with grey-green leaves (younger leaves have a white, hairy underside). It has white flowers in summer, followed by bunches of glossy red fruit.

Treatment methods

- Dig out small plants.
- Spray with metsulfuron-methyl (Escort or equivalent) + penetrant in summer to autumn.
- Stump swab with metsulfuron-methyl (Escort or equivalent), triclopyr (Grazon or equivalent) or Vigilant.



Elaeagnus (*Elaeagnus x reflexa*)

A vigorous scrambling shrub up to 20 metres tall with long, arching, tough, spiny stems. Suckers readily from tough rootstock. Leaves are hairless above and silvery with dotted clusters of small scales underneath. Tiny whitish flowers in autumn followed by pale reddish fruit.

Treatment methods

- Dig out with machinery. Dispose of vegetation and roots by deep burial, burning or landfill.
- Stump swap with glyphosate, undiluted Tordon brushkiller or equivalent or Vigilant Gel.
- Injection – in autumn with glyphosate, metsulfuron-methyl (Escort or equivalent) or undiluted Tordon Brushkiller or equivalent.
- Frilling with glyphosate or undiluted Tordon Brushkiller or equivalent.
- Follow-up work is required.



Gorse (*Ulex europaeus*)

A very spiny, woody perennial shrub up to two metres tall. It produces glorious yellow flowers, mostly in autumn and early spring, followed by explosive seed pods. Gorse is subject to control rules under Waikato Regional Council's Regional Pest Management Strategy (RPMS).

Treatment methods

- Pull or dig out small plants.
- Cut stump and treat with triclopyr (Grazon or equivalent), Tordon Brushkiller or equivalent or metsulfuron-methyl (Escort or equivalent).
- Spray with triclopyr (Grazon or equivalent), Escort or Tordon Brushkiller or equivalent at label rates.



Greater bindweed (*Calystegia silvatica*), also known as convolvulus

A robust, sprawling, climbing, hairless perennial, growing to four metres and producing very large, white, trumpet-shaped flowers. It has large triangular or arrow-shaped leaves. The aerial parts usually die down in winter, while an extensive underground rhizome system makes the plant difficult to control.

Treatment methods

- Spray with Banvine at vine rates, metsulfuron-methyl (Escort or equivalent) + penetrant, or with Tordon Brushkiller or equivalent.
- Stump swab with metsulfuron-methyl (Escort or equivalent), glyphosate, or Banvine. Mulch the stems.



Hawthorn (*Crateagus monogyna*)

An erect, many-branched shrub, up to six metres tall. The stems have numerous small branchlets armed with spines and thorns up to 25 mm long. The leaves are variable, triangular to ovate and coarsely serrated. It forms white, cream or pink scented flowers in clusters at the branchlet ends, which are followed by clusters of shiny red berries.

Treatment methods

- Dig out small plants.
- Cut stump and treat with metsulfuron-methyl (Escort or equivalent) at label rates, or triclopyr (Grazon or equivalent), or Tordon brushkiller or equivalent.
- Spray metsulfuron-methyl (Escort or equivalent) at label rates.



Himalayan honeysuckle (*Leycesteria Formosa*)

Deciduous/semi evergreen shrub up to two metres tall. The many straight hollow stems are green when young, becoming woody in second year. Leaves are heart shaped. White funnel shaped flowers with deep reddish-purple bracts appear December to May.

Treatment methods

- Dig out. Leave to rot down on site.
- Stump swap with glyphosate, metsulfuron-methyl (Escort or equivalent) or triclopyr (Grazon or equivalent).
- Spray from spring to summer with metsulfuron-methyl (Escort or equivalent) or triclopyr (Grazon or equivalent).



Ivy: Cape ivy (*Senecio angulatus*)

A scrambling perennial up to two metres tall. Stems usually form a dense mass. It has thick, fleshy, coarsely toothed leaves, with one to three teeth each side. It produces yellow daisy-like flowers in loose heads during winter.

Treatment methods

- Hand pull or dig out small plants. Dispose of the roots at your local landfill.
- Cut stems below waist height, then spray below this point with glyphosate, or metsulfuron-methyl (Escort or equivalent) + penetrant.
- Stump swab with metsulfuron-methyl (Escort or equivalent) or glyphosate.
- Follow-up work is required.



Ivy: German ivy (*Senecio mikanioides*)

A scrambling or climbing vine three to five metres tall, with ear-shaped appendages at the base of the leaf stalks. It produces yellow daisy flowers that lack the outer ring of ray florets.

Treatment methods

- Hand pull or dig out small plants. Dispose of the roots.
- Cut the stems below waist height, then spray below this point with glyphosate, or metsulfuron-methyl (Escort or equivalent) + penetrant.
- Spray with Tordon Brushkiller or equivalent + penetrant.
- Stump swab with metsulfuron-methyl (Escort or equivalent) or glyphosate.



Japanese honeysuckle (*Lonicera japonica*)

A vigorous, climbing shrub capable of growing up to 15 m, with opposite paired leaves. From September to May, tube-like white to yellow flowers appear in pairs, followed by glossy black berries.

Treatment methods

- Dig out small sites. Dispose of roots and stems.
- Spray with Tordon Brushkiller or equivalent or metsulfuron-methyl (Escort or equivalent) at old man's beard rates in summer to autumn. In sensitive areas use glyphosate + penetrant.
- Stump swab with metsulfuron-methyl (Escort or equivalent), or Tordon
- Brushkiller or equivalent+ penetrant. Dispose of as above.
- Check for new sprouts six-monthly until clear.



Jasmine (*Jasminum polyanthum*)

A vigorous, evergreen climber growing to 10 m that can twine up through supporting vegetation and smother host plants. Jasmine has small, shiny, dark green leaves with seven leaflets. The younger foliage is often tinged with red. The flowers are white-pinkish, tube-like and fragrant.

Treatment methods

- Spray in summer, with metsulfuron-methyl (Escort or equivalent) + penetrant, or Tordon Brushkiller or equivalent + penetrant.
- Stump swab with metsulfuron-methyl (Escort or equivalent). Dispose of all cut stems.



Kikuyu (*Pennisetum clandestinum*)

A vigorous, creeping, mat-forming grass with long stolons that root frequently. It can scramble over young or small plants to about 2 metres, completely smothering them. Leaves are alternate along the stem and sparsely hairy above and below. Leaf blades are folded, and there is a fringe of hairs around the leaf, where it wraps around the stem.

Treatment methods

- Spray with Gallant + crop oil, or glyphosate + penetrant.



Large-flowered mallow (*Malva sylvestris*)

A shrub up to two metres tall, usually with a single main stem. The lilac or deep pink flowers are four centimetres in diameter, in clusters of two to seven. The velvety leaves are almost round, up to 20 cm in diameter.

Treatment methods

- Dig or pull out.
- Spray with glyphosate or Tordon Brushkiller or equivalent.



Mexican daisy (*Erigeron karvinskianus*)

A sprawling perennial herb up to four centimetres tall with lawn-daisy-like flowers often tinged with pink. The stems are long, thin and much branched and the leaves are small, narrow and fragrant when crushed. The plant flowers all year round in warmer parts of the country.

Treatment methods

- Dig out small plants.
- Spray with Tordon Brushkiller or equivalent + penetrant, glyphosate + penetrant, or metsulfuron-methyl (Escort or equivalent) + penetrant.



Mile-a-minute (*Dipogon lignosus*)

A vigorous scrambler/climber whose leaves have three roughly heart-shaped leaflets, each up to 5.5 cm long. The flowers are pea-like and coloured white to pink or lavender. Mile-a-minute is an eradication pest plant under Waikato Regional Council's Regional Pest Management Strategy (RPMS). Land owners should advise Waikato Regional Council if they think they have seen Mile-a-minute on their land.

Treatment methods

- Hand pull small plants and dispose of them.
- Spray in spring to autumn with Banvine at vine rates, metsulfuron-methyl (Escort or equivalent) + penetrant, or Tordon Brushkiller or equivalent + penetrant.
- Stump swab with metsulfuron-methyl (Escort or equivalent), Tordon
- Brushkiller or equivalent or Banvine. Dispose of all cut material.



Montbretia (*Crocosmia x crocosmiiflora*)

A plant with broad, stiff, grass-like leaves growing from perennial corms, with attractive orange-red flowers in summer. It often forms large colonies along roadsides and streams.

Treatment methods

- Dig out very small sites. Dispose of the corms.
- Spray with glyphosate + metsulfuron-methyl (Escort or equivalent) + penetrant at full leaf stage.
- Weed wiper – metsulfuron-methyl (Escort or equivalent) + glyphosate + penetrant at full leaf stage.
- Follow up six-monthly.



Moth plant (*Araujia sericifera*)

A vigorous vine subject to Waikato Regional Council Regional Pest Management Strategy (RPMS) rules. Land owners are required to remove moth plant on their property. Grows to six metres. Small creamy tubular flowers appear December to May followed by large choko-like pods which burst at maturity, releasing seeds and a kapok-like substance.

Treatment methods

- Hand pull seedlings.
- Stump swab in summer-autumn with Tordon Brushkiller or equivalent, Banvine or Yates woody weed killer.
- Spray in Summer-autumn with Tordon Brushkiller or equivalent, Banvine or Yates woody weed killer.
- Dispose of pods at landfill or bury deeply.



Old man's beard (*Clematis vitalba*)

A deciduous woody vine with strongly ribbed stems and leaves arranged in groups of five. It produces small, creamy flowers from December to February, followed by masses of fluffy seeds. An eradication pest plant under Waikato Regional Council's Regional Pest Management Strategy (RPMS). Waikato Regional Council works with land owners to control old man's beard.

Treatment methods

- Spray with Tordon Brushkiller or equivalent + penetrant in spring to autumn.
- Stump swab – cut stems at ground level and treat with metsulfuron-methyl (Escort or equivalent), Tordon Brushkiller or equivalent, triclopyr (Grazon or equivalent), Banvine or Vigilant gel.
- Leave stems in the air to dry. Dispose of cut-away segments.



Pampas (*Cortaderia selloana/jubata*)

A very tall grass (up to three metres) with large, fluffy seed heads – very similar to toetoe, although pampas snaps easily when pulled and toetoe does not. The leaves are dark green on both surfaces and the leaf sheaths of mature plants have long hairs. The seed heads are either cream or pink. Pampas is subject to control rules in some parts of the Waikato region. Contact Waikato Regional Council for more information.

Treatment methods

- Dig out small plants and mulch or compost them.
- Spray with glyphosate + penetrant at label rates in summer to autumn.
- Chainsaw at ground level and treat with Tordon Brushkiller or equivalent.



Periwinkle (*Vinca major*)

Periwinkle forms a dense mat of long-running, hairless stems with roots at the nodes. It has dark green, glossy, sometimes variegated leaves up to four centimetres long. It produces purple-blue tubular flowers up to five centimetres in diameter all year round.

Treatment methods

- Dig out very small sites and dispose of the plant. Check for regrowth.
- Spray with glyphosate + penetrant, or metsulfuron-methyl (Escort or equivalent) + glyphosate + penetrant.
- Weed wiper – glyphosate + penetrant.



Plectranthus (*Plectranthus ciliatus*)

A very vigorous runner that spreads along the ground. The undersides of the leaves, and the veins that show through to the upper side, are purple.

Treatment methods

- Pull up and dispose of the plant.
- Spray with metsulfuron-methyl (Escort or equivalent) + penetrant, glyphosate + penetrant, or triclopyr (Grazon or equivalent) at fennel rate.
- Weed wiper – metsulfuron-methyl (Escort or equivalent) + penetrant, glyphosate + penetrant or triclopyr (Grazon or equivalent) + penetrant.
- Weed mat – leave for three to six months.



Privet (*Ligustrum lucidum* and *Ligustrum sinense*)

Tree privet is a small to large evergreen tree with strongly scented creamy white flowers appearing between January and March. Chinese privet is a small evergreen tree or shrub with strongly scented white flowers appearing from September to December. Both species have purple-black berries. Privet is a pest plant under Waikato Regional Council's Regional Pest Management Strategy (RPMS).

Treatment methods

- Hand pull or dig out seedlings and small plants.
- Stump swab with glyphosate or metsulfuron-methyl (Escort or equivalent) + penetrant.
- Frilling – metsulfuron-methyl (Escort or equivalent).
- Injection – metsulfuron-methyl (Escort or equivalent) or undiluted Tordon brushkiller or equivalent.
- Spray in spring to autumn with metsulfuron-methyl (Escort or equivalent)+ penetrant.
- Follow-up work may be required.



Pussy willow (grey willow) (*Salix cinerea* and *S. fragilis*)

A deciduous, shrubby, thicket-forming small tree, sometimes growing as tall as five metres. Several sturdy branches arise at ground level, and the tree has a rounded crown. Its oval leaves are shiny above and covered with soft, usually grey, hairs underneath. Abundant yellow or silky white catkins appear before the leaves in early spring.

Treatment methods

- Spray – total coverage of glyphosate + penetrant, at full leaf stage only.
- Drill and fill or cut and squirt in summer to autumn – one hole (two centimetres deep) or cut every 10 cm of trunk circumference, and treat with glyphosate. Continue to fill each hole until the chemical has stopped draining.



Smilax (*Asparagus asparagoides*)

Scrambling or twining vine with twisting wiry stems arising from white, fleshy tuberous roots. Small greenish white flowers in winter are followed by red berries.

Treatment methods

- Dig out tubers.
- Weed wipe – glyphosate.
- Spray with glyphosate (spring-early summer only). Spray lightly, avoiding run-off. Total coverage is not required.



Tutsan (*Hypericum androsaemum*)

A small perennial, semi evergreen shrub which grows to 1.5 metres high. Tutsan has pale yellow terminal bunches of flowers from November to February followed by small round green fruit which ripen to red then black. Stems are reddish and foliage turns reddish in autumn/winter. Tutsan is subject to control rules under Waikato's Regional Pest Management Strategy (RPMS).

Treatment methods

- Dig out small infestations
- Herbicide. Use Picloram 20 Granular (such as Tordon®2G) applying to ground covered by the drip line of the plant or foliage spray with Picloram/Triclopyr (such as Tordon® Brushkiller or Conquest®).

For more effective control it is important for herbicide spraying to be done early summer before the leaf forms a waxy coating.



Photo: Dr Trevor James

Wandering willie/Jew (*Tradescantia fluminensis*)

Also known as Wandering Jew. A dark green, creeping ground cover, it has shiny, fleshy leaves and small white flowers. *Tradescantia* forms dense mats, smothering all native ground cover and preventing seedlings from establishing.

Treatment methods

- Rake and roll up (usually only in small spots, to minimise the initial spray) – this is best done in times of drought. Work towards the centre. A follow-up spray is usually required. Note – *tradescantia* presents major disposal problems, as dropped fragments can spread infestation.
- Spray with triclopyr (Grazon or equivalent) or Hydrocotyle Killer + penetrant. Follow up quickly (within two to three months). You need two to three treatments for total control and are likely to achieve limited results during colder months.
- Weed wiper – triclopyr (Grazon or equivalent) or Hydrocotyle Killer + penetrant. Follow up after two to three months.



Wattle (*Paraserianthes lophantha*)

A fast-growing evergreen up to five metres tall with greenish-yellow bottlebrush-like flowers. It has flat, green or brown seed pods up to 15 cm long and each tree can produce large quantities of black seed.

Treatment methods

- Hand pull or dig small plants, ensuring minimum soil disturbance.
- Spray with triclopyr (Grazon or equivalent) at label rates in spring to summer.
- Stump swab with triclopyr (Grazon or equivalent) or metsulfuron-methyl (Escort or equivalent) at label rates. Large trees don't need to be stump treated.
- Drill and fill large trees – one hole (two centimetres deep) every 10 cm of trunk circumference, using triclopyr (Grazon or equivalent) or metsulfuron-methyl (Escort or equivalent).



Wild ginger (*Hedychium gardnerianum* and *H. flavescens*)

Kahili and yellow ginger produce thick beds of rhizomes, forming a dense ground cover. Sweetly scented flowers appear in late summer. Wild ginger is a total control plant under Waikato Regional Council's Regional Pest Management Strategy (RPMS). Land owners are required to control it on their land.

Treatment methods

- Dig or pull out small plants and dispose of the rhizomes.
- Spray – cut stems right down and spray with metsulfuron-methyl (Escort or equivalent). Add penetrant in winter.
- Drill and fill – cut stems right down and drill one centimetre into at least every second rhizome. Squirt metsulfuron-methyl (Escort or equivalent) into each hole.



Woolly nightshade (*Solanum mauritianum*)

A rapidly growing invasive tree up to nine metres tall. It has grey-green hairy leaves and small mauve flowers with a yellow centre, followed by green then yellow berries. It has an unpleasant kerosene-like smell. Under Waikato Regional Council's Regional Pest Management Strategy (RPMS) land owners are required to control all woolly nightshade on their land.

Treatment methods

- Hand pull small plants.
- Stump swab with Tordon brushkiller or Vigilant Gel.
- Frilling – use Tordon Brushkiller or equivalent or Yates woody weed killer.
- Injection – glyphosate or Amitrol undiluted.
- Spray with Tordon Brushkiller or equivalent.



Yellow flag iris (*Iris pseudacorus*)

A marginal aquatic perennial with thick creeping rhizomes which can form floating mats over shallow water. It has sword-like leaves and yellow to golden-orange iris flowers in October to December, followed by seed capsules containing many brown flattened seeds. Yellow flag iris is a pest plant under Waikato Regional Council's Regional Pest Management Strategy (RPMS) and landowners are required to control it on their land.

Treatment methods

- Spray in spring to summer with glyphosate + penetrant. Yellow flag on land can be sprayed with metsulfuron-methyl (Escort or equivalent).
- Weed wipe in spring to autumn with glyphosate + penetrant.



Please note: Mention of herbicide trade names implies neither endorsement of these products or criticisms of similar products not mentioned. For more advice on herbicide products contact herbicide distributors.

7 Using herbicides

Regional rules

Herbicides are part of the definition of 'contaminant' in the Resource Management Act 1991. Discharges of herbicides are controlled in Waikato Regional Council's Regional Plan Air Module (Section 6). Rule 6.2.4.8 allows spot spraying herbicide application as a permitted activity, provided the application is not in a public amenity area and the herbicide is being used in accordance with the manufacturer's instructions.

The following is a general description of the plan requirements. Before you use herbicides, please read the rules on our website www.waikatoregion.govt.nz or contact Waikato Regional Council on 0800 800 401.

Widespread application of herbicides is permitted provided:

- the herbicide is used according to manufacturer's instructions
- the herbicide is used in accordance with the New Zealand Standard 8409 Code of Practice for the Management of Agrichemicals, commonly known as GROWSAFE
- spray records are kept
- notification of neighbours is carried out if the application is within 50 metres of the property boundary

Hazardous Substances and New Organisms Act 1996 (HSNO)

Under HSNO, the use and storage of some agrichemicals (including some herbicides) now requires people to be qualified as 'approved handlers'. This can be done through a GROWSAFE course. The approved handler requirement is listed on the manufacturer's label. For more information visit the Environmental Protection Authority (EPA) website at www.epa.govt.nz.

Herbicides – general

Care must be taken when using herbicides to avoid 'off target' effects to other desirable plants, animals, or the environment.

- Do not apply herbicides in a manner which may result in the contamination of waterways. Do not use herbicides over water unless recommended on the manufacturer's label. At present only some glyphosate herbicides and diquat are approved for use on plants over water.
- Avoid using residual herbicides on weeds growing on stream banks.
- Herbicides are most effective when applied to actively growing plant.
- Do not spray in windy conditions or if rain is expected in the next few hours.
- Poisonous plants may become more attractive and palatable to livestock when they have been sprayed (for example, ragwort).

Herbicide persistence and accumulation

The period of time it takes for herbicides to break down into harmless products varies. Some break down very quickly while others such as residual herbicides are designed to break down slowly over several months. Sufficient time should be allowed for residual herbicides to break down before planting begins. Existing desirable plants in close proximity to weeds treated with residual herbicides may be adversely affected. Herbicide labels have information on environmental fate. Environmental fate of some common herbicides in this booklet is shown in the table below. Always read the label. For more information on herbicides contact the manufacturers.

Trade name	Chemical	Environment fate	Comment	Approved handler
Roundup, Agpro glyphosate	Glyphosate	Half life in aerobic soil less than 14 days and 14-22 days in anaerobic conditions. Glyphosate is strongly absorbed into soil and becomes practically immobile.	On-selective herbicide for control of a wide range of weeds.	Not required.
Escort, Zeal, Mustang, Eradicate	Metsulfuron-methyl	Residual. Broken down in soil with a half life of 1 to 5 weeks. Breakdown is more rapid in lower soil pH, higher temperatures and with higher soil moisture.		May be required during use of this herbicide.
Tordon brushkiller	Picloram and triclopyr	Residual. Picloram – half life approximately 30-330 days in soil. Triclopyr – approximately 40 days in soil.	Toxic to clover.	May be required during use of this herbicide.
Banvine	Phenoxy acetic and benzoic acid	Benzoic acid – rapid microbial degradation in soil, half life in soil less than 14 days.		May be required during use of this herbicide.
Vigilant	Picloram	Residual – half life in soil 30-330 days.	Pre-mixed herbicide gel for applying directly to cut stem.	May be required during use of this herbicide.
Grazon, Brush Off	Triclopyr	Residual. Half life in soil of approximately 40 days.	Controls many brushweeds without damaging grasses.	May be required during use of this herbicide.
No Weeds Gel® or Cut'n'Paste®	Glyphosate	Half life in aerobic soils less than 14 days and 14-22 days in anaerobic conditions.	For use on cut weeds and stumps. Apply immediately to cut parts	Not required
Agpro Haloxifop 100 Hurricane® Ignite™ Gallant™Ultra	Haloxifop	Half life in soils of less than 24 hours. Microbial degradation occurs.	Selectively controls grasses. Addition of crop oil recommended.	Required.

For more information on approved handler requirements visit the Environmental Protection Authority (EPA) website at www.epa.govt.nz.

8 Disposal of used agrichemical containers

In order to reduce the risks agrichemicals pose to people and the environment, it's important to dispose of unwanted agrichemicals and their containers safely. All hazardous agrichemicals should have instructions on how to dispose of them, either on the container label or in the accompanying information. In addition, the manufacturer, supplier or importer should provide you with a contact number for more information on appropriate disposal. This may involve taking the hazardous substance to a collection depot. See Waikato Regional Council's website for a list of the city and district council collection depots for hazardous substances.

When empty triple rinse container residues and dispose of the rinsing water:

- away from water supplies
- where it is unlikely to be licked by pets, animals or children before drying
- where grass or weed growth is not necessarily wanted, such as along the edge of a shed or under a fence line
- into a spray tank to reuse the residue.

9 References and further reading

Environment Waikato 2004: *Clean Streams. A guide to Managing Waterways on Waikato Farms.* Waikato Regional Council, Hamilton.

Waikato Regional Council Pest Management Strategy 2008 - 2013.

Waikato Regional Council Factsheet: *Biosecurity on the Farm.*

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Biological Control of Weeds — www.landcareresearch.co.nz

Porteous, T 1993: *Native Forest Restoration – A practical guide for landowners.* Queen Elizabeth the Second National Trust.

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www.weedbusters.org.nz

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