Manual Control

Manual invasive plant control usually refers to hand-pulling or digging out. Manual control works well for dealing with single plants or small infestations that can be eradicated with a small amount of labour. One should be aware this type of control may not be effective for invasive plants that also reproduce by roots and rhizomes like ***Gunnera tinctoria***. In these instances, limited hand-pulling or digging may actually increase the size of the infestation. For ***Gunnera tinctoria*** small infestations can be controlled by 'cutting and painting' the individual plant stalks with an approved concentrated herbicide. This is also a preferred method in areas of environmental sensitivity.

Considerations for manual control of *Gunnera tinctoria*

- Follow-up monitoring and further cutting back of plants is needed for some years to follow first removal of seed spikes
- Just removing the seed heads will not kill the parent plant, but it will stop dispersal of seed, preventing the establishment of new populations but it is a worthwhile stop-gap measure
- Once cut from the plant, the seed heads should be neatly piled up on the ground and completely covered - leaves cut from the parent *Gunnera* plant are ideal for this
- Neatly piling the fruiting bodies and covering them, reduces airflow and speeds up the rotting process. It also hides the seeds from birds that will potentially transport them elsewhere
- The only way to ensure eradication of *Gunnera tinctoria* is to completely remove all plant material and uproot rhizomes
- *Gunnera* plants spread via their root system or rhizomes and entire new plants can regenerate from small fragments of broken root
- To be effective, glyphosate based products need to be applied at the maximum label rate and repeated for multiple years. This is obviously not ideal for the local environment, so manual/mechanical methods will always be looked upon preferably by the Department

Benefits of manual control of *Gunnera tinctoria*:

- Digging up is an option if conditions prohibit the safe use of herbicides
- Using a sharp spade to dig up seedlings and young plants is surprisingly easy, the *Gunnera* rhizome is often right on the surface

- Be aware that the whole rhizome needs to be removed and do not leave any pieces on the ground or the plant will regenerate

***Gunnera* plants being cut to apply herbicide to cut surfaces**

Photo credit: The National Botanic Gardens of Ireland

Photo credit: Michael Mc Laughlin

Chemical treatment

- The Department will always encourage landowners to attempt to treat invasive plants without the use of herbicides wherever possible - Chemical treatment must only be considered as a last resort

- If a particular brand of herbicide is mentioned in the management measures, the land manager must have checked that it is approved for their planned use. This can be done by accessing the HSE approved pesticides register - https://secure.pesticides.gov.uk/pestreg/ProdSearch.asp

- As a government agency we cannot recommend a specific branded product, we can only recommend the generic type such as Glyphosate systemic based herbicides which are the most successful for dealing with invasive non-native plants and many are also approved for use near water

- Herbicides can be applied by a variety of means including boom sprayers (tractor or quad mounted), weed wipers, back pack sprayers, hand lance, spot spraying and stem injection

- Selection of herbicide should depend on other crops or plants on site, environmental considerations, and meeting your management measures objectives

- Large infestations, infestations near water, or infestations on steep slopes may be too costly or too environmentally sensitive to control by chemical means. In these situations, it is important to look at other management measure options

- For ***Gunnera tinctoria,*** **foliar herbicide applications** can be undertaken under most circumstances. It can be highly effective if repeated over time and is the least labour intensive among herbicide application methods. This measure has proved to be effective at reducing the standing biomass of this species, particularly when treating large areas

- ***Gunnera tinctoria*** can also be treated via a combination of chemical and mechanical/manual control, but only on sites where the plants are easily accessible

- Cut & Paint and Cut & Inject methods have been seen to greatly reduce the standing plants in the first season but this must be repeated seasonally to have any long term success of complete removal

First, consider if the location is suitable for application of herbicides;

1. Is it on a designated site and have you got 'consent' from NIEA CDP team

2. Are there any protected species on site that could be damaged by applying herbicides in a non-target manner

3. Is it an adequate distance away from watercourses and ditches

4. Is it away from existing amenity areas, lawns and gardens with large amount of footfall

5. Is it free from disturbance by people or livestock

6. Is it a suitable distance away from neighbouring properties

Also, if chemical control leaves a site bare, it is important to consider, **before you apply herbicide regime**, how you plan to re-vegetate the site so that control is achieved over the long-term **(see notes on Site Restoration)**.

Factors that can affect the effectiveness of herbicides include:

- Invasive plants with waxy or hairy leaves may not easily adsorb the required amount chemical to kill the plant

- Invasive plants are most susceptible to systemic herbicides, such as those that contain glyphosate, during its active growth stage, so timing of treatment is critical

- Soils with high organic matter or clay content may require higher rates of chemical than sandy soils

- Soil moisture and pH can also affect persistence and effectiveness of some

herbicides

- DAERA – Code of Practice for Using Plant Protection Pesticides

- The 'DAERA – Code of Practice for Using Plant Protection Pesticides' is commonly referenced, although published in 2011, much of the document is still relevant and of use. However just note that, with regards spraying pesticides *'grandfather rights'* no longer exist & the document also states that "*Before you use any product approved for use in or near water (this is usually a herbicide used to remove plants in or around water) first contact the NI Environment Agency (NIEA) on 028 9263 3445*." As mentioned previously this is not the case anymore, there is no requirement to contact NIEA, unless it is in a designated site/ASSI/SAC etc. when you must get 'consent' from the Conservation Designation & Protection (CDP) team

Benefits of chemical control:

- Effective tool for new and small infestations of invasive plants

- Will kill target plants via spot treatment, cut and paint or stem injection methods

- Can have residual control of seed-bank for future years depending on the chemical selected

- Less labour intensive than alternative mechanical and manual methods

Limitations of chemical control:

- Precautions need to be taken to limit the effects on surrounding non-target plants

- Precautions must always be taken to avoid spraying or applying herbicides where pollinators are actively feeding, i.e. when plants are in flower

- Limited use in environmentally sensitive areas or steep slopes

- May have limitations on certain soil conditions or presence of water

- Some concern from public/community groups and local councils about the use of glyphosate based products

- Not always successful

- The use of glyphosate towards the end of the growing season has shown moderate efficacy for the control of *Gunnera tinctoria*. Its effectiveness depends on several factors, including the age of the plants and the timing of the application. Young plants can be readily killed by glyphosate but the control of mature plants requires the

application of large amounts of the herbicide

- Glyphosate application has been reported to be more effective at the beginning of the growing season of *Gunnera tinctoria* and it is thought, to be effective, glyphosate based products need to be applied at the maximum label rate and repeated for multiple years. This is obviously not ideal for the local environment, so manual/mechanical methods will always be looked upon preferably by the Department

Gunnera cut and painted stems

Photo credit: North Harris Trust

On-site biosecurity

- Strict biosecurity measures must be put in place on treatment sites to ensure land owners/ contractors/ members of the public do not act as vectors in spreading invasive plant species

- To reduce the spread of the invasive species, it may be necessary to set up cordoned off areas/ exclusion zones to stop people entering these areas whilst treatment is ongoing

- Create an exclusion zone (should include a buffer zone if possible), put up signs to make people aware

- Ensuring recreational (boats, boots, angling) and mechanical equipment is drained if operating in infested riparian locations and cleaned before leaving any infested water body (CHECK CLEAN DRY)

- Restrict access and cordon off stands or infestations until treatment is complete

- Thorough inspection and removal of contaminants by brushing is recommended for all tools and equipment used on site - this should include clothing and boots - if carrying out management, check clean any equipment, e.g. clean soil off spade

- Ensure that soils from within infested areas are not spread to other areas, treat contaminated soils carefully as *Gunnera tinctoria* can spread through fragments of its rhizomes

- If manual removal has to take place after the plants have flowered/seeded, make sure plant heads are placed in bags and sealed off to prevent further seed dispersal when the plant head is cut off

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Disposing of plant material

Any plant material generated from treatment, including soil that contains plant and rhizome fragments, must be removed from the site as controlled waste or by one of the methods below. Failure to remove all fragments will likely only exacerbate the problem and could aid in spreading the plant into new areas.

- Any above-ground plant material generated from treatment prior to the plant going to seed (i.e. excluding rhizomes) can be dried out (well away from water) or securely composted on site

- If the plant has already gone to seed when treatment takes place, plant material generated from treatment will now be considered as ‘controlled waste’

- Rhizomes are also considered as ‘controlled waste’
- This ‘controlled waste’ can either be buried on site or transported off site (see further details below)

Transfer to a licenced facility

- Any wastes (with or without propagules) being transported off-site, must be appropriately transported by a licensed waste carrier who is informed that the waste material contains an invasive species as part of the waste transfer documentation
- It is important to contact the licensed landfill site in advance to ensure they will accept the waste material
- Failure to inform the landfill site that the material contains an invasive species would be an offence under both wildlife and waste legislation

On-site burial

- This is usually carried out on larger sites
- It is suggested that contaminated soil and plant material are buried at depths of > 5 metres
- Shallower burials will require encapsulation in a root resistant barrier membrane

Drying out

- Place on a barrier membrane such as tarpaulin
- Ensure this is carried out well away from water bodies
- When plants are fully dried, compost securely

Secure composting

- The rhizomes are **not** suitable for composting, only the leaves of the plant can be disposed of in this way
- Care must be taken when composting on site. Wrap the plant material in a barrier membrane such as tarpaulin to prevent regrowth

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Site restoration

- This will depend on the site in question and what its main characteristics are – location, soil types, designation status etc.

- Many plant invasions can be reversed, halted or slowed, and in certain situations, even badly infested areas can be restored to healthy systems dominated by native species

- An invasive plant control regime is best viewed as part of an overall restoration program - focus on what should be in place of the invasive plant species after removal, rather than simply eliminating the weed then thinking about what is to go in its place afterwards
- This is especially important along riverbanks (riparian habitats) due to the potential erosion and bank instability that could be caused by removing the invasive plant species

- Establishing a good sward of grass soon after treatment will help reduce the risk of re-colonisation of the same or other INNS – this can also help supress regrowth of seedlings from the seedbank

- When selecting control methods, keep in mind that the ultimate purpose of the work is to preserve native species, communities, and/or functioning ecosystems

- Restoration management aims at restoring habitat functions and processes on sites disturbed by human activities - it requires that you replace the invasive non – native plants that have been removed with native plants which are able to provide the desired habitat structure and functions

- It is recommended you consult a professional ecologist to assist selection and sourcing on native species to plant

- Make sure all necessary precautions are taken to ensure that any topsoil brought onsite for restoration purposes is certified free from invasive plant species