

Managing Giant Reed

(Arundo donax)



Local Land
Services
Hunter

Published by Hunter Local Land Services

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First published March 2017

www.hunter.lls.nsw.gov.au

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Disclaimer: The information contained in this publication is based on knowledge and understanding at the time of writing February 2017. However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of Local Land Services or the user's independent adviser.

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Plant details

Giant Reed (*Arundo donax*) is a tall clumping perennial grass originating from India, tropical Asia or the Mediterranean where it has been cultivated for thousands of years for various purposes. Introduced to Australia as an ornamental plant, it has become a major weed of disturbed areas near waterways.

Giant Reed is often mistaken for Bamboo and young individual plants can be confused with the native Common Reed (*Phragmites australis*). Bamboo is also an exotic grass species and grows to a similar height as Giant Reed with harder more wood-like stems, and a deeper colour to the

leaves. Bamboo leaves are generally much smaller than Giant Reed and grow from small branches rather than directly off the main stem. The native Common Reed has some key identification differences to Giant Reed, growing to a smaller height of up to 2.5 metres with a less woody stem. In addition, it does not form clumps and has a red/brown colour where the leaf joins the main stem.

Giant Reed can grow up to 10m in height and has tall woody, hollow canes with blue/grey/green leaves that are attached to the stem or cane via a sheath that wraps around the stem. It does not spread via seed but rather from rhizomes and stems, regrowing from growth nodes. Giant Reed usually forms thick multi-stemmed clumps



Giant Reed both banks, outcompeting natives on Pages River at Murrurundi



Clumping behaviour of Giant Reed on Pages River at Murrurundi



Giant reed growth from rhizome

that spread from horizontal rhizomes. These root masses can spread over several hectares, quickly forming dense colonies with a massive underground network of rhizomes that out-compete native species. These rhizomes or stems can extend up to 1 metre deep in the soil but this is not deep enough to hold stream banks together. In fact it leaves riverbank areas prone to “undercutting” during floods. Even canes or stems that are cut off can reshoot so care must be taken with disposal of plants. Flood debris from Giant Reed can disperse the weed over large areas downstream from infestations whilst causing damage to existing river-bank vegetation as well as infrastructure such as crossings, bridges and pumps.

Giant Reed produces a tall plume-like flower head at the top of its stems in early Spring. Although Giant Reed produces flowers, research has shown that it is a sterile clone and does not set viable seed in the Hunter, instead

propagating through its rhizomes or roots. Research in America has found that Giant Reed can use up to 2000 litres of water per square metre of plants. (S.Csurhes, Queensland Government 2009). An early successional plant, it is well adapted to colonising riparian areas frequently disturbed by flood events or other activities. Giant Reed is one of the fastest growing plants in the world. During summer, plants that have ample access to water can grow up to 10cm a day. The dense clumping growth habit excludes all other vegetation from where it is growing. Once established, it is extremely labour intensive and time consuming to treat. The rhizomes are quite brittle and can easily fragment, taking root downstream to form new colonies. Floods will often disperse stem fragments and clumps further downstream. For this reason, Giant Reed control efforts need to begin upstream and work down to reduce re-infestation of cleared areas.



Giant reed in flower (photo courtesy of Harry Rose).



A flood rack of Giant Reed along fencelines after flood event



Undercutting of gravel bank under Giant Reed plants

Uses

Giant Reed (*Arundo donax*) has been used for a variety of purposes:

- Woodwind musical instruments use the vibrating cane reed
- Wind breaks
- Erosion control, including saline ground reclamation
- Garden ornamentals
- Paper production
- Source of biofuel

Risk to Native Habitat

Native wildlife does not use Giant Reed for habitat and the plants out-compete existing native riparian vegetation, causing mono-specific stands that do not allow anything else to grow.

Giant Reed is also highly flammable for most of the year, creating a fire hazard for nearby vegetation, buildings and people. It is well adapted to fire and will often re-sprout from its roots after it has been burnt. In fire events, Giant Reed encourages fire along areas that would not normally burn (eg. the riverbanks and rainforest pockets) destroying native vegetation and animals and later quickly re-colonising the burnt patches.

The vertical growth form of Giant Reed also causes ecological problems as very little shade is provided to the adjacent rivers. The increased sunlight, due to the lack of shade from native trees in areas where Giant Reed has taken over, creates warmer waterways, increased algae growth and an ideal habitat for introduced fish species such as carp.

Controlling Giant Reed

The eradication of Giant Reed requires the participation of all landholders and requires vigilance and persistence. Eradication efforts will only succeed if landholders assist to locate and remove Giant Reed infestations, starting at the top of the catchment and working down. Satellite or drone imagery can show dense clumps but smaller clumps particularly on bars and sand banks within the stream often go unnoticed.

Controlling Giant Reed is not complicated but requires targeted timing of weed control efforts, thoroughness, and a commitment to ongoing follow-up treatment of inevitable regrowth. Treatment projects generally need to run for 3 to 5 years with use of chemical or mechanical methods.

There are many different methods of controlling Giant Reed and many control programs will end up using many or all of the different control methods depending on the individual situation. Control methods will be determined based on:

- The size of the infestation
- The amount of cane debris at the site
- The terrain
- Whether native plant species are dispersed amongst the infestation
- Whether the riparian area is fenced off and has stock excluded



Juvenile plant mechanically removed with rhizome and root system attached

Treatment Options

There are a number of treatment methods that can largely be divided into:

- Manual/Physical removal – cutting down canes and digging out rhizomes
- Chemical control – application of herbicide to foliage or to the cut stem or rhizome.

The application of herbicide can be done using three different methods:

1. Foliar spray onto leaves or stems without any cutting or removal of the plant
2. Cutting the stems and painting or spraying herbicide onto the cut plant stems
3. Cutting the stems, allowing them to resprout and spraying the resprouting stems

Root Removal

This method involves digging up the roots and hauling roots and canes out of the river/creek bed for disposal. It is quite effective for removing small, manageable sized clumps. Digging out Giant Reed may be undertaken at any time of year.

If using mechanical means to remove Giant Reed, a “Controlled Activity” Permit will be required from DPI Water. An excavator is used to remove the rhizomes and care will need to be taken as removing large clumps with machinery will cause significant soil disturbance. Some rhizomes may fall into the water and infest new sites downstream so barrier nets will need to be put in place.

The site will be susceptible to erosion and many sites will need silt traps installed, depending on the steepness of the bank. The site will need to be fenced to control stock access, and revegetated with native grass, shrub and tree species to stabilise the site.

Giant Reed will re-sprout from any rhizomes that are missed and these will need to be hand dug and removed or cut and sprayed (see cut and spray method) over successive years to eradicate the weed from the infestation site. Regular weed control is a must-do job on the worksite. When done properly this method is highly successful.

Foliar Spraying

Giant Reed is a grass and therefore many of the selective herbicides commonly used around the farm such as Grazon, etc will be ineffective. As most infestations are in riparian areas, adjacent to waterways, the recommended type of herbicide is a Glyphosate compound with the trade name Roundup Biactive. Only chemicals such as Roundup Biactive registered for use near waterways can be used.

The optimal time for foliar application is after flowering or in late summer/autumn when the plant is becoming dormant. This is the time the plant has the greatest translocation (the movement of food in plants) and readily moves the herbicide from leaves and stems to the roots. In the Allyn River it was found that the application of a registered plant hormone for suppressing growth, in combination with registered herbicide application provided the best results.

The greatest risk with foliar spraying of Giant Reed is the potential for spray drift onto desirable vegetation. Using a ladder to reach the top of stands will improve the effectiveness and reduce overspraying. This method is best used on small stands of pure Giant Reed that have not yet reached full height as younger foliage will absorb herbicide more readily than the older, woodier foliage.

For thick clumps, it is advisable that trails are cut through the clumps to improve access. Sprayed stems should be left intact for the first year to prevent re-sprouting. Stems may be left indefinitely unless they pose a flood or fire risk.

Drones have also been trialled to foliar spray large areas of giant reed or inaccessible areas in Autumn and Spring. This needs to be undertaken by a qualified operator. Spraying has been more successful with higher recommended rates of herbicide. Drones are very effective at getting the herbicide on and into the plant without drift. However like other methods it needs to have follow up treatment and is most effective when used with other treatments such as foliar spraying of regrowth. In dense clump areas consideration needs to be given on how to manage the large areas of dead biomass that might remain after repeated treatments.

Reported effectiveness of this method ranges between 50-90% in the first year and complete eradication can be expected within 3-5 years. The effectiveness depends on the herbicide mixture, weather conditions (rain and wind reduce effectiveness), amount of coverage and time of year.

Cut, Re-sprout and Spray

This method requires cutting and removal of canes, allowing the plant to re-shoot and then following up with foliar herbicide sprays. Cutting of the canes can be done by hand or with power tools (eg. chainsaw) depending on the



Drone used to foliar spray Giant Reed.



Giant Reed regrowth ready for foliar respraying



Canes cut and painted

size of the infestation. The best time to cut Giant Reed and force re-sprouting is during spring and summer. Cutting should take place early in the growing season to allow time for re-sprouting in the same year. Follow-up spraying should be scheduled when regrowth is still small and easy to reach sometimes as soon as three weeks after cutting depending on rainfall.

This method is reported to have a success rate of 50% in the first year and 75% in the second year with total eradication taking between 3-5 years. Effectiveness depends on the herbicide mixture used, weather conditions, the time of year and the amount of leaf coverage.

Cut and Paint

This method entails cutting off canes and applying undiluted Glyphosate directly to the stump. This method is widely used for the control of Giant Reed. Sometimes the canes are first removed by cutting them off at 30-60 cm above the ground. With the area cleared of debris, access is easier and safer. The stumps are then re-cut within 5-7cm from the ground and treated with herbicide.

It is very important to cut only what can be treated with herbicide within 10 seconds as the longer the wait, the less likely the cut stem will draw the herbicide down to the roots. The addition of marker dyes in the spray applicators helps to reduce overuse of chemicals by showing which stumps have been treated.

This method can be used for most giant reed infestations and is the best method when working in mixed vegetation and near water courses. It can be undertaken throughout the growing season although is most effective when applied in late summer/autumn, before the plant enters its normal dormant stage in the cooler weather.

The effectiveness of this method ranges between 50-95% in the first year, though complete eradication can take between 3-5 years to achieve. Follow up treatment of re-growth is generally required more than once following initial treatment. Re-growth can be greatly reduced if surface rhizomes are also treated using the cut and paint method. All rhizome tips around the outer edge of the clump need to be cut and painted.



Canes cut and painted

A comparison of techniques for eradication

Method	Best use	Timing	Tools	Permits	Advantages	Disadvantages
Root Removal	For exposed or overhanging root wads, small infestations	Dry season to avoid soil loss	Loppers, pick, shovel; Backhoe or excavator for large clumps and deep roots	Controlled Activity Permit – DPI Water	No herbicide used; Low disturbance of other vegetation	Moderate to significant soil disturbance. Relatively high cost if using machinery & permit required. Need to ensure complete removal of rhizomes
Foliar Spraying	Small stands of pure giant reed, before canes are full height, located away from water	Best in late summer/early autumn when plant energy is transferred to roots	Glyphosate based herbicide appropriate for foliar application; Sprayer with directional nozzle	Chemical Users Safety Certificate	Low soil disturbance; Short duration of labour each season.	Takes 3-5 years of repeat herbicide applications; Risk from drift to non-target species. Extra cost input – herbicide and protective equipment
Cut, resprout & spray	Pure stands; Large infestations	Cut in spring/summer. Spray regrowth in late summer/ early autumn when plant energy is transferred to roots	Loppers or power brush cutter (steel blade); Glyphosate based herbicide suitable for foliar application; Sprayer with directional nozzle	Chemical Users Safety Certificate	Low soil disturbance; Less risk of non-target herbicide drift than when spraying full sized canes.	Takes 3-5 years of repeat herbicide applications; Risk from drift to non-target species; Extra labour, energy required. Extra cost input – herbicide and protective equipment
Cut and paint	Appropriate for most situations including giant reed mixed with native vegetation	Anytime during growing season. Best in late summer/early autumn when plant energy is transferred to roots	Loppers; Full strength glyphosate based herbicide; Herbicide Applicator	Chemical Users Safety Certificate	Low soil disturbance. Highest success rate. Low risk of non-target herbicide drift.	Requires handling full strength application of glyphosate based herbicide; Extra labour, energy required. Extra cost input – herbicide and protective equipment.

Regrowth Follow Up

When regrowth occurs following initial treatment, spot spraying is often the most practical and effective application method for follow up treatment. However spray drift is always a risk with foliar spraying and it is important to ensure that regenerating native plants are not killed.

Be prepared to apply follow-up treatments during the first 6 weeks and for at least the following 12 months, timing when required, not just when spraying it is convenient.

Removing debris, particularly cut canes is very important as they can regeminate if left on site. Removing giant reed canes from the immediate worksite is a chore in itself. A choke chain or rope can be used to tie a bundles of canes before they are cut to prevent them falling in the water and sprouting downstream. A winch or vehicle can be used to facilitate removal. If you have the space and don't mind the sight, composting canes on site is an effective disposal method. Make sure the pile is stacked above the high water zone. Canes can also be chipped on site – this is easier when the canes are dry and brittle. A chipper may not be practical in areas that are difficult to access. The canes can also be placed in a pile and burnt. This is ideal if you have time to wait for the material to dry and are able to get a Fire Permit.

Be aware that debris still has the potential to re-sprout due to the presence of stem nodes. Make sure you stockpile in a dry area and monitor the stockpile for 12 months.



Regrowth from the root system occurring 2 weeks after cut and paint treatment



Cane piles need to be removed from site and mulched or burned to avoid reshooting

Site Rehabilitation

When removing either large clumps or scattered plants of Giant Reed, it is essential to replant the worksite with native species as soon as possible. This will help to restabilise the banks and bed of the stream as well as provide shade and improve habitat and biodiversity. Revegetation is the most important part of the weed control project as it puts deep rooted vegetation back into the streambank. The revegetation of heavily infested sites should be undertaken following a staged removal process of the Giant Reed starting at the upstream end. This ensures you can keep the weeds in check whilst the native vegetation gets established.

The use of local native species of plants in your revegetation project (ie plants that are native to your local area) is recommended. A mix of groundcover, grasses, shrubs and trees should be used in any revegetation project. Assistance is available to plan and possibly to fund your revegetation project through Hunter Local Land Services.

Plants can be small tubestock, long-stem tubestock or advanced pots. The longstems are planted quite deeply with a water lance or shovel, so that just the last 20-30 cm of the plant is showing. This gives the tubestock the opportunity to develop an extensive root system and helps to prevent the plants from being washed out in a flood.

The best time of year to plant trees in the Hunter catchment is in autumn when the weather is cooler. You should consider waiting until spring to plant species that may suffer from frost if your worksite is exposed or open to the elements. Spring plantings however are likely to require regular watering through summer.

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