

# 5 CONTROL METHODS

A number of techniques are available that can successfully control camphor laurels. With each of the techniques there are important points that need to be considered to ensure success. The following chapter describes both chemical and non-chemical methods that have been successfully used to control camphor laurels and other threatening weeds. Information about biological and other control agents are briefly discussed in 5.3.

When using herbicide techniques, make sure you read the label and be aware that changes to herbicide registrations will occur from time-to-time – there may be a new product available that is more successful. With all techniques, follow up is essential.

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## 5.1 **Herbicide-based control techniques**

### 5.1.1 Important notes for use of herbicides

Camphor laurel trees are most effectively killed using herbicides. It is important to use the correct technique and method to ensure that they are killed the first time.

***Before using any herbicide, read and heed the label,  
it is your legal responsibility and legal protection.***

- Wear **protective clothing**. Avoid **inhalation** and **skin** contact. **Wash hands** after use and before eating or smoking;
- When spraying, choose a **calm day**;
- Follow label or permit directions regarding use before or after **rainfall** and near **waterways**. Draft guidelines for herbicide use near waterways can be obtained from EPA by phoning (02) 9995 5750;
- **Seek** the **advice** of staff with chemical training at your local rural store;
- Undertake training in chemical use through the National Farm Chemical Users Program (Chemcert 02 9387 4714) or the NSW Agriculture / TAFE Smart Train Chemical Program (Port Macquarie TAFE 65882177, may soon be offered elsewhere)

Residual chemicals - Tordon DSH<sup>®</sup> and Grazon DS<sup>®</sup> are residual chemicals; they can remain active in the soil for a period and can prevent the germination of seeds. They can also affect non-target plants nearby and hence must be used cautiously in significant environments or near non-target plants. Glyphosate based products may be more appropriate for these locations as it is not a residual chemical in most situations (glyphosate breaks down rapidly, especially in clay soils). Research by NSW Agriculture has found Tordon to be only marginally more effective than glyphosate products (e.g Cook 1998). In most situations relevant to this publication Metsulfuron methyl (for Privet control) is not a residual chemical (especially in more acid clay soils) but it behaves differently with different temperature, pH, moisture levels etc. (Sarmah et. al. 1998)

#### Amount of herbicide to use

- Fox (1997) found the amount of herbicide used was more important than the technique used to stem-inject camphors and that larger trees required more herbicide than smaller trees.
- Jim O'Brien (NSW State Forests) has found that the amount of herbicide needed also depends on the total leaf area, i.e. trees in open paddock situations require more herbicide than those growing in forests.
- When using glyphosate for stem injection Far North Coast Weeds has found that the registered number of cuts is inadequate. They are currently seeking registration of this technique with twice as many pockets cut, i.e. two rows of pockets cut 13 cm apart around the tree instead of one row (one slightly higher, the next row lower and offset from the first).

Marker dyes and pigments - Use of marker dyes with herbicides ensures that each weed is only treated once, helps reduce off-target damage and alerts people to the fact that herbicide has been used in the area. Commonly used tracers contain either red fluorescent dyes or white pigment and are sometimes used in combination, e.g. 50mL white pigment with 10mL red fluorescent dye and 10L of spray mix (Big Scrub Rainforest Landcare Group 2000).

Use glyphosate correctly - Many people use Glyphosate-based products in ways not included on the label. This is illegal, unless a special permit has been obtained from the National Registration Authority. NPWS and Big Scrub Rainforest Landcare Group have permits for various uses of the product not specified on the label for land under their control. The Environmental Weeds Taskforce is currently seeking a regional permit for the same purposes.

Tadpoles and frogs - The glyphosate-based products Roundup Biactive® and Weedmaster 360® are promoted as being safe to use near waterways without adverse affects on tadpoles or frogs.

Surfactants (such as Li 700 or Pulse®) are additives that help facilitate the transfer of herbicide through the surface tissue (especially when the plant has waxy leaves). Li700 in particular is recommended for use with some techniques (e.g foliar spraying camphor with glyphosate, foliar spraying privet with metsulfuron methyl, control of Madeira Vine etc.) (e.g Joseph, pers. comm.).

## 5.1.2 The techniques

### Stem injection (or tree frilling)

Tree injector kits are most commonly used for tree frilling. The kits comprise a backpack herbicide reservoir and a syringe that can be adjusted to deliver a measured dose.

1. Use a Tordon axe, normal axe or heavy tomahawk to cut pockets around the trunk at waist height or lower as shown below, or a tree injection spear to cut pockets close to the base of the trunk in a similar fashion.
2. With the axe or spear still in the cut, lean the top outwards (away from the tree) to open up a pocket. Apply 1-2mls of herbicide (see following page for herbicide dilution rates) per cut. **It is essential to inject the herbicide into each pocket immediately, or at most, within 20 seconds of inflicting the cut.** Pockets must penetrate the trunk to a depth which reaches the sapwood and they must be angled downwards to enable the herbicide to pool. Take care not to overfill the holes.
3. Repeat steps 1 and 2 as you circle around the trunk.

Ensure all suckers present are cut off flush with the trunk. No suckers should be left between the level of the cuts and ground level.

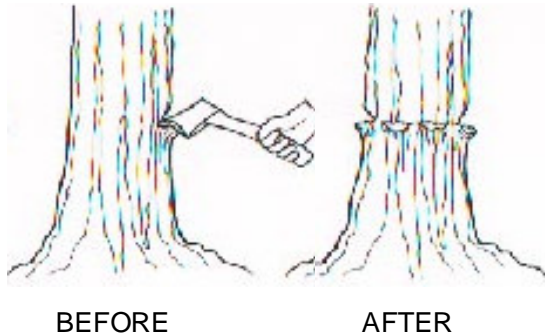
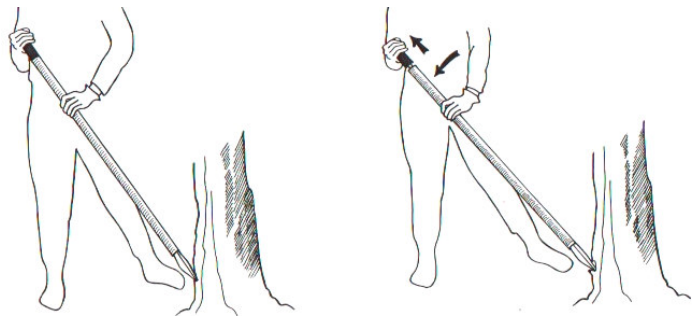


Plate 17: Stem-injection using a tomahawk. Figure 1 shows the cutting of pockets. Herbicide is injected whilst the tomahawk is still in the tree. Figure 2 shows the tree after all of the pockets have been made and the herbicide injected. Source: L.Skillings.

Plate 18: (Below) Stem-injection with a tree injection spear. Source: L. Skillings.

### Tree injection spears

Tree injection spears are quick and effective as they deliver a measured dose of herbicide to the base of the tree by pulling up and then down on the upper handle. Their negative side is that they are heavy and may leak herbicide.



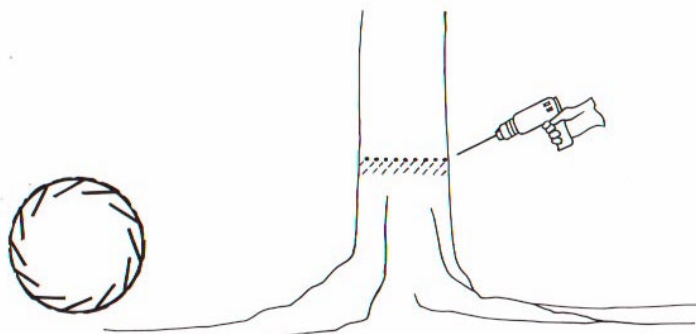
### Use of a chainsaw

Chainsaws can be used to cut pockets around the tree whilst another person, following immediately behind, quickly injects the pockets with herbicide once the chainsaw has been removed (and at a safe distance away). This is very quick, although a great deal of care must be exercised. It is recommended that you undertake an accredited chainsaw course before using this method. Care must also be taken not to cut pockets too deeply.

### Battery powered drill

A recently developed, physically easier method is the use of a battery powered drill and hydraulic injection delivering 20mls of 1:10 (one part herbicide to 10 parts water). This method is more time consuming but the results are excellent. NB: If drilling becomes more difficult and/or the shavings become darker or drier, it is likely that you have drilled too far and have entered the heartwood or pith – if this occurs start again next to it.

Plate 19: Cross-section and side view of drill injection. Source: L. Skillings



The use of a drill and then squirting spray solution into the hole, without it being under pressure is not as effective at entering the Cambium layer. Pressurised Banana or Avocado tree injectors are available from some rural stores.

Herbicides registered for stem injection: Glyphosate<sup>1</sup> based products; Tordon DSH<sup>®</sup>.

Herbicide	Tree size	Rate/ratio	Comment
Glyphosate 360	0-25cm diameter	1:1 with water 2 ml / cut	5cm cuts at 13 cm centres around each stem.
Glyphosate 360	25-60cm diameter	Undiluted 2 ml / cut	5cm cuts at 13 cm centres around each stem.
Tordon DSH <sup>®</sup>	Single stems up to 25cm diameter at base (waist height application)	1:4 water. 1ml / cut at 10-13cm centres	Please read label instructions for stem injection. Do not treat trees with poor sap flow.
Tordon DSH <sup>®</sup>	Single stems up to 25cm diameter at base (ground level application)	1:4 water. 1ml / cut at 12-15cm centres	Please read label instructions for stem injection. Do not treat trees with poor sap flow.
Tordon DSH <sup>®</sup>	Multiple stems or more than 25cm diameter at base (waist height application)	1:4 water. 2ml / cut at 10-13cm centres	Please read label instructions for stem injection. Do not treat trees with poor sap flow.
Tordon DSH <sup>®</sup>	Multiple stems or more than 25cm diameter at base (ground level application)	1:4 water. 2ml / cut at 12-15cm centres	Please read label instructions for stem injection. Do not treat trees with poor sap flow.

### **Basal bark method**

This is an effective, quick and relatively easy method of treating **saplings** and regrowth with a diameter at the base of the tree of less than 10cm. As the herbicides registered

<sup>1</sup> Glyphosate is sold under various tradenames and in various formulations including Roundup<sup>®</sup>, Roundup Biactive<sup>®</sup>, Weedmaster 360, Glyphosate 360, Glyphos, Glykill, Glyph 360 and Ken-up.

for this purpose are diluted with diesel, it can be used where adverse weather conditions may restrict some other methods (but as with others, do not use prior, during or after rain). It should be noted that both chemicals are relatively slow to act.

1. Partially clear grasses and other vegetation from around the tree to maximise coverage.
2. Paint or spray (using low pressure with a coarse hollow or solid cone nozzle; i.e a large opening to create a stream, not a fine spray) the whole stem(s) from a height of 30cms down to ground level. Ensure the spray mix wets a ring of soil at the base of the stem. Avoid off target damage.
3. Repeat on the opposite side of the stem.

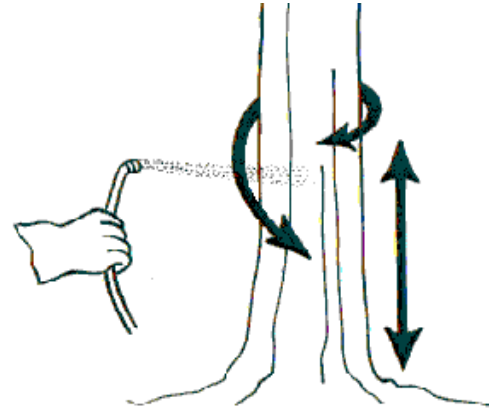


Plate 20: Basal bark application. Source: Adapted from L.Skillings

Herbicides registered for basal bark applications: Garlon 600<sup>®</sup>, Access<sup>®</sup>

Herbicide	Tree size	Rate/ratio	Comment
Garlon 600 <sup>®</sup>	Up to 10cm diameter	1:60 diesel	Dilute with 60 parts diesel. Fully wet stems from ground level to 30 cm above ground.
Access <sup>®</sup>	Up to 10cm diameter	1:60 diesel	Dilute with 60 parts diesel. Fully wet stems from ground level to 30 cm above ground.

### Foliar Spray

This method involves spraying the foliage of individual camphor laurels and is best used for spraying seedlings at low pressure. It should not be used before, during or after rainfall. For large accessible areas of infestation a tractor with a PTO pump, herbicide tank, hose reel and handgun can be used. For more sensitive or confined areas use a backpack spray unit with a cone-type spray nozzle that produces a solid, confined spray stream at low pressure. When used properly, Grazon<sup>®</sup> will not kill surrounding grasses whereas glyphosate-based products will (glyphosate with Li700 is being used by Big Scrub Rainforest Landcare group under a permit).



To keep track of which trees have been treated use a tracer dye. Avoid spraying native plants where these are to be retained. There can be a high risk of off target damage (damage to plants you want to keep) when foliar sprays are used. Ensure that great care is taken when spraying near waterways or steep areas. When spraying near waterways, spray in a direction away from the water and ensure that no herbicide flows near the water's edge.

Plate 21: Foliar spraying. Source: L. Skillings

Herbicides registered for foliar spray applications: Grazon DS<sup>®</sup>, Garlon 600<sup>®</sup>

Herbicide	Tree size	Rate/ratio	Comment
Grazon DS <sup>®</sup>	Less than 2 metres tall	35 mL / 10L of water	Apply as a thorough foliage spray
Grazon DS <sup>®</sup>	Above 2m tall	50 mL / 10L of water	Apply as a thorough foliage spray
Garlon 600 <sup>®</sup>	Seedlings up to 3 m tall.	17 mL / 10 L of water	Apply as a thorough foliage spray

### Cut stump (“cut & paint” or “cut, scrape & paint”)

Good results have been obtained using this technique, however, there are risks of regrowth if the stump and roots are not killed. Second attempts at control are best avoided.

If using a chainsaw, make sure that it is sharp and that the oil is changed regularly otherwise the herbicide will not be readily absorbed.

Despite a number of other herbicides being used without a permit, only two herbicides are registered for this method. An application is currently being prepared to also use glyphosate products across the region.

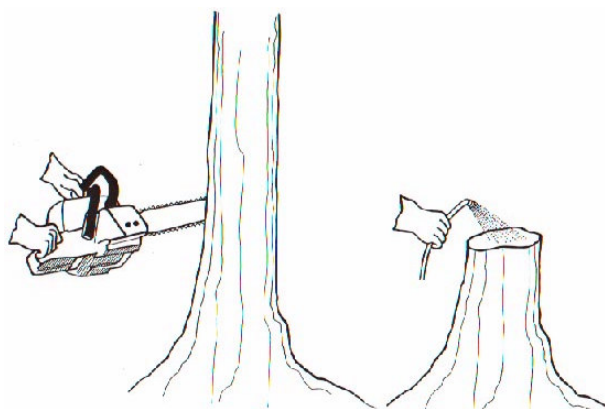


Plate 22: Cut stump using spray instead of painting (may be more expensive). Source: L. Skillings.

1. Cut the trunk(s) as close to the ground as possible using a chain saw, loppers, secateurs or bush saw. The cut should be made on a slight angle to horizontal so that you increase the area of sapwood exposed to the herbicide. Do not cut the stump at a steep angle otherwise there is a risk of herbicide running off it.
2. Immediately apply herbicide mixture by brush (or spray) to the exposed flat stump(s) surface and any damaged surfaces. Ensure the brush is not contaminated with soil.
3. If there are any exposed roots or stems, lightly scrape their outer surface and paint herbicide onto the exposed light green inner layer.
4. Follow up control as necessary.

Herbicides registered for cut stump applications: Garlon 600<sup>®</sup>, Access<sup>®</sup>

Herbicide	Tree size	Rate/ratio	Comment
Garlon 600 <sup>®</sup>	Trees in excess of basal bark application diameters	1:60 diesel	Cut stems less than 15cm above the ground. Immediately apply herbicide mixture liberally to the freshly cut stump by painting (or spraying) the cut surface and sides of the stem
Access <sup>®</sup>	Trees in excess of basal bark application diameters	1:60 diesel	Cut stems less than 15cm above the ground. Immediately apply herbicide mixture liberally to the freshly cut stump by painting (or spraying) the cut surface and sides of the stem

### 5.1.3 Techniques for control of other weeds

#### Scrape and paint

Scrape and paint is an effective control technique for a number of weeds, especially vines. The technique is similar to “cut, scrape and paint”, however, the stem is scraped to expose the sinew of the stem and not cut. This allows circulation of the herbicide throughout the plant and hence is effective for Madeira Vine (see Chapter 6.1.2) which has aerial tubers that need to be controlled, and plants that will propagate from segments such as Cape Ivy and other succulent species.

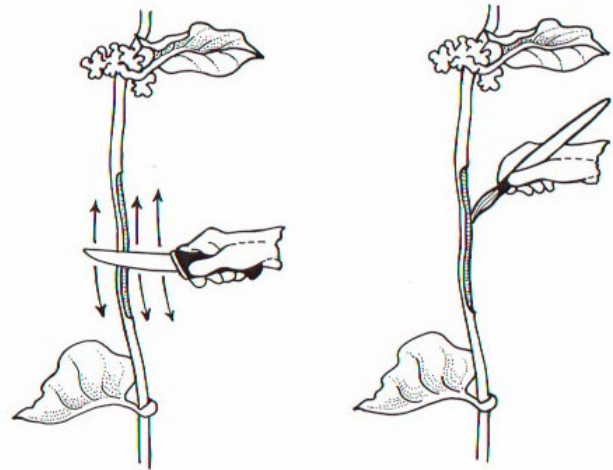


Plate 23: Scrape and paint technique.  
Source: L. Skillings

NPWS Lismore District and Big Scrub Rainforest Landcare Group have a permit for control of Madeira Vine using undiluted glyphosate for the “scrape and paint” technique within their reserve systems.

1. For Madeira Vine, bag and compost (under black plastic) any tubers found along the section of stem to be treated to ensure that they do not fall whilst you work.
2. **Scrape the stem along one side** as far as possible. For Madeira Vine it is necessary to scrape heavily. Do not cut through the stem. On thicker stems, make a lengthwise ditch into the stem using a knife.
3. Immediately paint the scraped surface (and the ditch if it was made) with herbicide with the use of a brush (refer to chapter 6.1 for concentrations).
4. For Madeira Vine, gouge the top of any tubers at the base of the vine with a knife to create a “well” and fill it with undiluted glyphosate, ensuring that it does not overflow.
5. For Madeira Vine, ensure that no tubers have lodged in your shoes, clothing etc. before leaving the site.

Regular follow up control of seedlings and any regrowth will be required for some time.

## 5.2 **Non-chemical control techniques**

### 5.2.1 Important notes on non-chemical control techniques

#### Follow up

As camphor laurels have a tendency to regrow if cut, lopped or ringbarked, follow up control of camphor laurel suckers and seedlings (and other weeds) is an essential part of the control process. If followed up regularly, camphor laurels that are ringbarked will die sooner.

#### Control erosion

If soil is disturbed during control, such as when mechanical or root-removal techniques are used, there is the risk of soil erosion. The threat of soil erosion can be reduced by:

- Controlling camphor laurels gradually on steep slopes;
- Disturbing the least area possible at any one time;
- Encouraging / planting of replacement species as soon as possible, before controlling camphor laurel where practical;
- Working across the slope instead of down the slope;
- Retaining some fallen logs / debris at least initially to slow water movement, and;
- Use of sediment control fencing where required.

#### Increase competition

The effectiveness of several non-chemical techniques such as ringbarking (as well as growth of seedlings) is improved through shading and competition from other plants. Camphor laurels tend to have reduced canopy / leaf growth within 12 months of being ringbarked. If native seedlings or taller trees are located nearby they can compete with the camphor laurel for nutrients and assist the dieback process. Reduced light conditions will reduce the growth rate of camphor laurels.

#### Be aware of safety

Ensure that lopping or bulldozing of camphor laurels is only undertaken by qualified / experienced operators and that all safety precautions are met. Do not ringbark camphor laurels in high public use areas as branches may fall as the tree gradually decomposes.

## **5.2.2 The techniques**

### **Control of seedlings**

Camphor laurel seedlings are easily removed by hand pulling, especially after rain. Clasp the stem of the plant at its base, then gently rock the plant to and fro whilst lifting at the same time. Ensure that the entire root system is removed.

Weed burners (or “flame throwers”) are very successful at controlling seedlings, however, great care must be taken to avoid controlling off-target plants and as all vegetation will be burnt, there is a potential risk of erosion.

### **Ringbarking using a hammer**

Camphor laurel trees have been killed within a 2-3 year period using a hammer or the back of a tomahawk. The method does not disturb the soil and only requires occasional follow up if used correctly. There is often only limited root suckering as water is still allowed to circulate within the tree. The tree dies slowly as the inner bark dries out and sugars are unable to reach the root system.

As the camphor laurel dies over a longer period the canopy is opened up gradually, leading to slower germination of weeds whilst native plantings become established. The method was developed by members of the Bellingin Island Landcare group.

NOTE: Although this method has been used for over 100 years on various tree species and has been successful on a range of camphor laurel trees, it is a relatively new technique for controlling them. Control programs using this technique should be considered as trials until further results are obtained.

***IMPORTANT: SAFETY GLASSES MUST BE WORN when using this method due to the bark shattering and possibly flying long distances.***



Plate 24: Figure A (above) shows freshly ringbarked camphor laurels. Figure B (right) shows regrowth below the ringbark. Source: T. Scanlon

1. At waist height or below any branches, remove a 30+cm high strip of outer bark (0.5-1cm deep) by hammering the bark on a slight angle. The outer bark will fracture like an egg shell and can continue to be hammered or can be pulled off by hand. Ensure the moist yellow coloured cambium layer underneath the outer bark is not damaged and that a 30cm strip of the outer bark is removed all of the way around the tree. If the tree is multi-stemmed, repeat on all stems.
2. In approximately 5 months, return to the site. The tree will often be starting to show signs of stress such as dead leaves / dieback and weak suckers occasionally grow from below the ringbark (see plate 23 above). Remove them using the hammer. New bark may also start growing over the ringbark. Where this occurs, hammer it off again (it may only require 2 or 3 hits with the hammer).
3. Return to the site approximately 15 months after initial work and repeat step 2.
4. Where this method has been used, most trees are dead within 2-3 years, however, trees should be monitored to ensure that no new suckers etc. return.

### **Felling without painting with herbicide**

Where camphor laurels have been cut down and herbicide has not been applied, a similar process can occur to that listed above for ringbarking. Regular follow up control of suckers is required. Where native species are present or planted and encouraged to grow, they can eventually reduce light and compete with the camphor laurel for nutrients, hence reducing suckering and assisting in its death. Management of suckers / coppicing is much easier when the tree is lopped well above the ground so that suckers originate from the trunk and not from new shoots from the root system.



Plate 25: Felling without painting with herbicide highlighting regrowth. Source: T. Scanlon

1. Seek advice from a camphor laurel miller. Ensure that the trees are felled safely and with minimal impact on the surrounding environment.
2. Fell the tree(s) as high as possible above the ground (e.g 1.5m) using a chain saw, bush saw or loppers, depending on the size of the tree and the individual situation.
3. Return to control suckers every 3-6 months until the tree is dead. Control camphor laurels and other weed seedlings growing near the native species.

### **Ringbarking**

Ringbarking is a low impact technique most successful where there is native plant regeneration. Coutts Crossing Tidy Towns Committee has used this method to weaken the trees and reduce the amount of foliage / shading. With regular control of suckers and coppicing shoots, native plants have grown to form a new canopy and hence suppressed camphor laurel suckers and seedlings.

NOTE: Regular control of suckers may be required for up to 7 years or more. Consider safety in public areas due to the risk of dead branches or trees falling.

1. Ringbark camphor laurel trees growing near native trees at waist height using an axe by cutting into the trunk at 45°. Cut a 20-30cm high strip into the outer bark and moist cambium layer to expose the heartwood (approximately 3-5cm deep) all of the way around the trunk.
2. Return to the site every 3-6 months to control suckers until the tree is dead. Control camphor laurel and other weed seedlings growing near the native species.

### **Plastic, cuts and mulch**

Cut camphor laurel trees close to the ground and cover the stump with heavy grade black plastic held to the ground with soil or deep mulch to prevent the development of suckers. Cuts are also often made to increase fungal growth (increased by the mulch) and hence weaken the tree. Regularly control suckers until the tree is dead (possibly up to 7 years).

### **Goats, sheep and cattle**

Cattle and sheep will often eat camphor laurel seedlings. Goats can be an excellent weed control in some situations, however, some of their positive points are also their negative points: they will eat everything! Well built and maintained fencing to contain goats is vital. Escaped goats have caused significant environmental damage in several parts of Australia. Industry standards for goat farming are available from NSW Agriculture (see appendices for contact details).

### **Mechanical techniques**

Saplings can be readily pulled from the ground with a tractor and chain. Care should be exercised to ensure that the hitch point is low and the chain is strong enough.

Mechanical removal of trees is usually undesirable due to the expense, threat of soil erosion and mass germination of camphor laurel and other weed seedlings. Camphor laurel has a dense, wide but shallow root system. Removing trees with bulldozers etc results in massive soil disturbance. A permit is required from the Department of Land and Water Conservation before mechanical methods are used within 40 metres of a prescribed stream under the Rivers and Foreshores Protection Act (see Chapter 4.3.1).

### 5.3 **Biological and other control**

The spread of camphor laurel (like other introduced species) in Australia is partly caused by a lack of natural predators in this country. Natural predators have built up populations in East Asia over 1000's of years and help to maintain a balance by attacking various stages of the plants growth cycle, e.g immature plants, tips, flower buds, flowers, seeds.

Biological control projects have been successful in helping control numerous Australian weeds. Such a program could take several years and would require substantial funding, however, once a suitable agent is found, the future funding required is low. To undertake biological control:

1. The native range of the weed needs to be identified;
2. Conduct surveys in the native range for insects or pathogens that attack the plant;
3. Determine which insects and pathogens should be studied further, i.e. those with a known wide host range would be discarded;
4. Studies in the native range and under quarantine in Australia would then determine the host range of selected potential agents (i.e host specificity studies to determine the safety of a potential biological control agent);
5. Only those insects and pathogens that have an acceptably narrow host range would then be released in Australia;
6. A range of biological control agents that attack those plants parts mentioned above would likely to be required. (Julien, pers. comm.)

At least 5 insects / viruses cause substantial damage to camphor laurel in indigenous populations of East Asia. Preliminary investigations by Alan Fletcher Research Station, Brisbane, however, found that several native laurel species were extremely similar taxonomically to the introduced camphor laurel and they concluded that it would not be possible to introduce a species-specific control agent for the species.

#### Seed reduction through stress

Greater Taree and Grafton City Councils have successfully reduced the amount of seed produced from camphor laurel through stressing the plant. Greater Taree City Council have successfully used sub-lethal doses of a registered herbicide whilst Grafton City Council have been able to stop seed production in mature trees for up to 2 years by hard pruning / trimming. Further research is required on these and other alternate methods.

#### Diesel

Diesel has sometimes been applied to cut stumps where herbicide has not been used. The tree is lopped, the stump painted with diesel, and then covered in mulch. As with non-chemical methods, regular follow up control of suckers is required until the tree is dead.