

# ATTACHMENT B: BUSH FOR LIFE MINIMAL DISTURBANCE BUSH REGENERATION TECHNIQUES

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## Manual Weed Control Methods

### Hand weeding

This needs to be done carefully to ensure minimal disturbance is caused to existing plants and the soil. Many bushland weeds flourish when the soil is disturbed. Appropriate removal can be achieved by placing one hand flat on the ground with the weed between two fingers. As the hand is pressed toward the ground the second hand can carefully remove the weed. If soil is disturbed it should be tamped back in place and leaf litter replaced to minimise the opportunity for another weed to become established. The same principle is used when removing slightly larger weeds like young broom and boneseed. In this situation place a foot on either side of the stem base and, bending the knees, firmly grasp the base of the stem, and then straighten up using the legs to pull the plant out gradually. A pair of pliers can be useful for gripping the base of small woody weeds, such as broom and Erica, and then slowly levering them out of the ground.



For plants with bulbous or truncated roots a levering device such as a knife, screwdriver or two pronged weeder can get under the root system so as to lever the plant up out of the ground. This method helps overcome the possibility of leaving bulbs or roots in the ground from which the weed species may re-grow. Pulled bulbs and roots should be removed from the site.



A grape knife or serrated knife can be used to cut below the crown of some perennial weed grasses, such as pentaschistis and perennial veldt grass, where the crown is fairly shallow. These don't tend to regrow from the fine fibrous roots that are left in the ground and, if they do, are smaller and weaker so that they are more easily removed when following up.

**Note:** hand pulling of weeds should only be done when the soil is relatively moist. If the soil is too dry, it will be excessively disturbed or the plant may break away from the roots resulting in regrowth from roots left in the ground. When soil is dry, weeds should be cut and swabbed using the method described later in this section.

## Slashing

Strategic slashing can be used on annual and perennial weed grasses. It can be undertaken using a brushcutter or in sensitive areas using hedge shears. Brushcutters are available for loan from Trees For Life to volunteer bushcarers who have done the required training. When using this method, care needs to be taken to minimise damage to herbaceous native plants.

With annual grasses, preventing the production of seed will ensure their seed bank will diminish with time. The best result for minimising production of viable seed in annual grasses is achieved by slashing just below their flower heads and then slashing again close to the ground. This should be done before seed heads start to develop, typically in late winter to early spring, and may require follow-up slashing after 4-6 weeks. Depending on the year and rainfall received it may be necessary to follow-up slash several times. Slashing close to the flower head will reduce the opportunity for the cut flowers to continue to develop into seed while on the ground. Slashing low means the grass has less resources left to produce more flower heads.

In large areas of native grassland, mowing or grazing can be excellent methods of controlling annual weed grasses if these methods are timed to coincide with annual grass flowering and conducted in a way that minimises disturbance to native plants.

Perennial weed grasses can be slashed at any time of the year, however best results will be obtained during winter and spring. Once slashed, the grasses should be allowed 3-4 weeks to develop lush growth and then spot sprayed (see Herbicide Application Methods below). The herbicide works best when the plants are healthy and actively growing. By removing dry stems and forcing the plant to put on new growth the uptake of herbicide will be improved and the success rate will be greatly improved.

**Note:** when slashing with a brushcutter it is essential that the equipment is clean and completely free of weed seeds. Mechanical slashing is frequently responsible for the introduction of new weeds or further spread of existing weeds.



## Herbicide Application Methods

This section deals with the application of herbicide by various means to the targeted weed species. Numerous herbicides are available from local hardware shops, however each herbicide has advantages and disadvantages. Used carefully and appropriately for bush regeneration, Glyphosate is a very useful herbicide.

The main advantages of Glyphosate are:

- generally less persistent in soil, although will persist longer in sandier soils;
- generally considered less harmful to humans and animals;
- easy to measure and use; and
- relatively inexpensive.

The most important disadvantage with Glyphosate is that it is non-selective, this means that it can potentially kill any plant that it comes into contact with. It is essential that correct training in bush regeneration be undertaken before Glyphosate is used amongst native vegetation.

Irrespective of which herbicide is used, all people to come in contact with the herbicide must read the label to ensure they are familiar with application rates and safety requirements. It should be noted that very little information is available on the long-term effects of any herbicide. Caution should always be used and it is recommended that no herbicide be used if the operator is pregnant or breastfeeding.

**Note:** herbicide use should be avoided near creeks, drainage lines and dams, as it may be toxic to aquatic wildlife. Weedmaster Duo is the usual Glyphosate product supplied by Trees For Life and is considered to be of lower toxicity to aquatic wildlife. Any addition of surfactant to a herbicide will make it harmful to aquatic wildlife.

## Spraying

Spraying with herbicide is often the most efficient method of controlling herbaceous weeds. Before using herbicide people should be trained in the safe use of chemicals. Appropriate safety equipment and training must be undertaken to minimise harm to the operator and the environment.

When spraying, Glyphosate 360g/L is generally used at a rate of 1:100 (50ml of Glyphosate 360g/L with 5 litres of clean water). The manufacturer's label rates should be referenced and used accordingly. Dye marker should be added to the spray unit. This is to ensure that weeds are not sprayed twice, to avoid off target damage and to increase personal safety levels.

Great care needs to be taken as it is easy for off target damage to occur. The spray unit often requires very little pressure when spraying weeds in a bushland setting. In some circumstances the herbicide can be dribbled onto weeds, but not to the point where herbicide run off occurs. This will help minimise the potential for off target damage.



**Note 1:** It is inappropriate to spray larger woody weeds in remnant vegetation. Unacceptably high levels of off target damage usually occur due to spray drifting onto native plants or dripping from the woody weed. Sometimes native plants are entwined in woody weeds. Cutting and Swabbing or Drilling and Filling are better alternatives and are discussed below.

**Note 2:** Glyphosate should not be sprayed in close proximity to any delicate or threatened species, to ensure these plants do not become victims of off target damage.

**Note on bridal creeper:** when spraying bridal creeper amongst native vegetation, Pritchard (2002) found that metsulfuron methyl (Brush-Off) was highly effective at a concentration of 1.5gms per 100L (volume 500L or 7.5gms per hectare) and had minimal impact on native vegetation (foliage of trees and shrubs, ground vegetation comprised mainly *Lepidosperma* spp. and grasses).

A significant finding was that bridal creeper was not noticeably affected in the year it was sprayed. The plant continued to flourish, but did not reappear the following season. After one year a 97% control of foliage was achieved with this herbicide, although there was a high variation in the results for control of roots. Follow-up spraying of seedlings using Glyphosate is essential in subsequent years.

**Note on broad leaved weeds:** When spraying broad leaved weeds amongst native grasses some practitioners have found that metsulfuron methyl (Brush-Off) is effective at a concentration of 3gms per hectare if applied when weeds were young. At this low rate native grasses and hard leaved shrubs are little affected. It should be noted that J. Stafford in Davies (1997) found *Themeda triandra* (kangaroo grass) became stunted and produced less seed when metsulfuron methyl was applied at a higher rate. He also found some dieback in older trees of *Eucalyptus leucoxylon* (SA blue gum). Care must always be taken before using this herbicide to ensure no native herbaceous species are present. If so, this herbicide should not be used.

Metsulfuron methyl can be persistent in soils for up to 22 months (Davies 1997) and therefore should not be used in consecutive years to avoid accumulation in the soil. A surfactant needs to be used with herbicide, but penetrants should be avoided as some practitioners have found this will also kill native grasses.

Metsulfuron methyl herbicide is only available to bushcarers who have undertaken specific training in its use from Bush For Life and have calibrated their spraying technique with their spray unit to ensure the appropriate per hectare rate is applied. This will vary between individuals and spray units.

### **Wiping Foliage: Foam Swabber**

A foam swabber (shoe polish applicator) can be used to dab individual broadleaf weeds and small perennial grasses, both tussock and rhizomatous. Tussock grasses, such as pentaschistis, tend to need some herbicide to be applied to all leaves for best effect. This can be achieved by pushing the leaves on the edge of the tussock towards the middle with the swabber. Fill the 75ml foam swabber with a mix of Glyphosate 360g/L at the rate of 1:5 (one part Glyphosate 360g/L to five parts clean water with a few drops of dye marker). The foam swabber can also be used on climbing weeds, such as bridal creeper, by bunching the foliage together and dabbing, either onto bare ground or into a hand wearing a chemical glove. Foam swabbers are available from Trees For Life for volunteer bushcarers to use on their BFL site.



### Wiping Foliage: Weedbrush

A Weedbrush is extremely useful where isolated broadleaf weeds occur in good quality vegetation. The Weedbrush is light and easy to carry when walking in bushland. Weeds can be treated immediately, avoiding the need to return at a later time and relocate the weed. It is also useful when there is a high risk of off target damage, eg broadleaf weeds occurring amongst native grasses and lilies. Mix Glyphosate 360g/L at the rate of 1:5 (one part Glyphosate 360g/L to five parts clean water) with 2ml dye marker per 100ml of prepared mixture. The Weedbrush holds 375ml of herbicide mixture, so add about 62.5ml Glyphosate 360g/L, 7ml dye marker and top up with clean water. The brush is dabbed onto the foliage of individual weeds.



### Wiping Foliage: “Tongs of Death”

Pre-made ‘Tongs of Death’ are used to apply herbicide on to the leaves of strappy bulbous weeds such as watsonia, sparaxis, freesia and cape tulip. You can make your own using twine to attach foam sponge to both sides of appropriately sized stainless steel kitchen tongs (depending on the size of the target weed). Mix Glyphosate 360g/L at the rate of 1:5 (one part Glyphosate 360g/L to five parts clean water) with 2ml dye marker per 100ml of prepared mixture. Use a 500ml chemical wash bottle to apply the herbicide mixture to the foam on the tongs, then wipe up and along the leaves of the weed. “Tongs of Death” can also be used on climbing weeds, like bridal creeper, by bunching the foliage and squeezing between the tongs along as much of the stem as possible. Using a wiping action along the stem is likely to defoliate or break the stem on these weeds. ‘Tongs of Death’ and chemical wash bottles are available from Trees For Life for volunteer bushcarers to use on their BFL site.



**Above:** tongs and chemical wash bottle  
**Left:** tongs wiping foliage of watsonia

## Cut and Swab

The Cut and Swab technique is often used when a weed is too large or the soil too dry for hand weeding, but the weed is not large enough to drill and fill (see next section). This method is best carried out by two people where long handled loppers are required to cut the stem of the weed. One cuts the stem close to the ground, if possible within 1cm of it, while the second quickly applies Glyphosate using a foam swabber. The herbicide needs to be applied immediately, as some weeds begin sealing wounds within seconds and this can reduce the absorption and effectiveness of herbicide. The operation can be comfortably managed by one person if secateurs are used for cutting the stem.

Fill the 75ml foam swabber with a mix of Glyphosate 360g/L at the rate of 1:5 (one part Glyphosate 360g/L to five parts clean water with a few drops of dye marker). Use with a dabbing action rather than wiping, to ensure the herbicide mixture flows into the foam top and to avoid it tearing on the cut stem.



**Above:** Cut and swab demonstrated in the field

**Left:** Cut and swab herbicide applicator

Weeds like blackberry, which can be difficult to kill with Glyphosate, can be treated using the scrape, cut and swab method. In this case, scrape the sides of the base of the stem with secateurs, cut about 5cm high and swab both the sides and the cut to get some extra herbicide into the plant.

Trimming the cut weed foliage into small (30-60cm) lengths and spreading around the ground aids decomposition and reduces tripping hazards. This also avoids piling up of cut material, which can create a compost heap, and native plants are able to grow up through the cut material rather than being smothered by it.



**Above:** Cut and distribute debris, don't create piles.

### **Drill and Fill**

The Drill and Fill technique has been used successfully on a range of large woody weeds that have a base of 4cm in diameter or larger, but is best known for killing olive trees. The plant usually drops its leaves within six weeks and dies within a few months. It will be necessary to monitor the plant and if it resprouts, the process will need to be repeated. The soil beneath large woody weeds usually contains huge numbers of seeds from the parent plant. These seeds will germinate and if left untreated will become a worse problem than the original plant. It is essential that follow-up control of seedlings is undertaken in subsequent years.



**Above:** olive fruit

**Right:** olives infest large areas of the Adelaide Hills





There are a number of ecological advantages in using the drill and fill technique over cut and swab. Primarily, habitat structure remains in place. Birds and other animals utilise weeds for shelter, the drill and fill technique retains most of the plant in the short term and is therefore less disruptive on an animal using the plant as habitat.

The drill and fill technique usually achieves a better kill rate on larger woody weeds than cut and swab, because the plant absorbs more herbicide. This is because the herbicide is applied into the plant's cambium layer (where sap flows under the bark) and is then transported, by the plant itself, throughout its root and branch network. The plant's foliage helps distribute the herbicide, so only prune off branches that prevent you from accessing its base. There is also much less cut material to be disposed of using this technique.



**Above:** volunteers drill & fill a multi-stemmed olive

A cordless drill is used to drill steep angled holes into the base of the lignotuber of olives and into the stem of other weeds. If the lignotuber is not easily located near the soil surface it may be necessary to scrape some of the soil away to expose it. The holes should be about 20mm apart and as deep as possible, taking care not to drill right through to the other side. Wipe away any sawdust to prevent loss of herbicide by capillary action and fill the holes with the herbicide mixture.

The hole is filled by inverting a 500ml laboratory wash bottle just outside the hole and filling with the herbicide mixture, making sure it is filled with liquid rather than froth. The bottle is filled with Glyphosate 360g/L at the rate of 1:5 (one part Glyphosate 360g/L to five parts clean water) with 2ml dye marker per 100ml of prepared mixture. We find that higher volumes of weaker strength herbicide solution seem to work best, as it appears to be more readily taken up by the plant. Continue drilling and filling around the entire base of the tree, filling each hole as it is drilled, one at a time. On larger trees, after going around the trunk once, the holes can be topped up again with the herbicide mixture. It is also beneficial to drill holes in the middle of lower forks in the stem. A narrower diameter drill bit can be used to drill and fill smaller woody weeds, such as olive and wild rose, that may be difficult to kill with Glyphosate using the cut and swab technique.



**Above:** cordless drill and laboratory wash bottle



**Above:** it is easiest to drill & fill olives when they are single trunked, before they coppice from a cut or burnt trunk



**Left:** holes drilled steeply around edge of lignotuber

**Right:** two rows were drilled around the base of this olive to ensure sufficient herbicide uptake to kill the lignotuber



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