

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 no soil is removed or disturbed. 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 to minimise the opportunity for another weed to become established. The same principle is used when removing slightly larger weeds like young pine trees. In this situation the weed can be removed by hand with minimal disturbance by placing a foot either side of the stem base, bending the knees and using the legs to pull the plant out gradually.

For plants with bulbous or truncated roots a levering device such as a knife or screwdriver 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.

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

Slashing can be used on annual and perennial weed grasses. Annual grasses should be high slashed (10cm above the ground) before seed heads start to develop, typically in late winter, 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. As they are annuals, preventing the production of seed will ensure their seed bank will diminish with time. When using this method, care needs to be taken to minimise damage to herbaceous native plants. Slashing can be undertaken using a brushcutter or in sensitive areas using hedge shears. Brush cutters are available for loan from Trees For Life to volunteer bushcarers who have done the required training.

Perennial weed grasses can be slashed 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 resultant 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 in sand for several weeks,
- less harmful to humans and animals,
- easy to measure and use, &
- relatively inexpensive.

The most significant *disadvantage* with Glyphosate is that it is non-selective, which 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 dosage 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, especially if the operator is pregnant, possibly pregnant or breastfeeding.

Note: herbicide use should be avoided near creeks and drainage lines as it may be toxic to aquatic wildlife. If the use of herbicide is considered to be unavoidable then one that is considered to be of lower toxicity should be used. WeedMaster Duo and Roundup Biactive are two products that are considered to be of low 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 removing 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.

When spraying, Glyphosate is generally used at a rate of 1:100 (60ml of Glyphosate with 6 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 requires very little pressure when spraying weeds in a bushland setting. Ideally, herbicide should be dribbled onto weeds, but not to the point where herbicide run off occurs. This will greatly 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. Drilling and Filling is a better alternative and is 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 (2003) found that metsulfuron methyl (BrushOff) was highly effective at a concentration of 2gms per hectare and had minimal impact on native vegetation. A significant finding was that bridal creeper was not affected in the year it was sprayed. The plant continued to flourish, but did not reappear the following season. A 95% kill rate was achieved with this herbicide. 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 (BrushOff) 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 must not be used 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: 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. When using the Weedbrush, 280ml of clean water is mixed with 70ml concentrated Glyphosate. Directions are clearly labelled on the Weedbrush. A small amount of dye marker should also be added. The brush is wiped 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 tea bag or kitchen tongs (depending on the size of the target weed). Mix Glyphosate at the rate of 1:5 (one part Glyphosate to 5 parts clean water) with 2ml dye marker per 100ml of prepared mixture. Use a 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’ and chemical wash bottles are available from Trees For Life for volunteer bushcarers.

Figure 4. Two types of ‘Tongs of Death’ and chemical wash bottle.



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. This method is best carried out by two people. One cuts the stem close to the ground, the second quickly applies Glyphosate (using a ‘shoe polish’ applicator, available from Trees For Life) to the exposed stump at the rate of 1:5 (one part Glyphosate to five parts clean water with a few drops of dye marker). The herbicide needs to be applied immediately, otherwise the absorption and effectiveness of herbicide is reduced as some weeds begin sealing wounds within seconds. Roughing up the sides of the remaining stem and swabbing this area is another way to ensure that as much herbicide as possible is absorbed. Trimming the cut weed foliage into small (30-60cm) lengths and spreading around the ground avoids piling up of cut material, which can create a compost heap, aids decomposition and reduces tripping hazards. Native plants are also able to grow up through the cut material.



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.

There are a number of ecological advantages in using the drill and fill technique over cut and swab. Primarily, habitat structure remains in place. It is possible that birds and other animals utilise the structure provided by these weeds for shelter. The drill and fill technique allows nesting birds to continue raising their young as the weed dies. Cut and swab would result in an abandoned nest. Retaining the structure will give native animals time to re-locate to new areas that provide suitable shelter.

In addition, a better kill rate is usually achieved with the drill and fill technique on larger woody weeds. This is because more herbicide is absorbed into the plant, which is then transported, by the plant itself, throughout its root and branch network. It also reduces the problem of removing the large quantities of cut branches that would result from cutting and swabbing from the bushland and the subsequent trampling that this causes.



Figures 7 and 8 Base of olive drilled and filled and, right, four weeks after treatment



Methodology

Outline: Holes are drilled into the target tree and then filled with suitable herbicide mixture. The tree's sap becomes contaminated with the herbicide and is distributed throughout the entire plant. The plant's foliage is vital to aid the distribution of the herbicide, so do not prune off any branches unless they prevent you from gaining access to the lignotuber. A noticeable change in the tree should be visible after about three weeks. Expect defoliation after several months and cracking and blackening of the bark after about six months.

The keys to success are:

- Knowing where to drill the holes;
- Knowing how big, how deep and how many holes to drill;
- Ensuring each hole is properly and adequately filled with the herbicide solution.

Herbicide dilution rate: Bush For Life uses only Glyphosate at the standard concentration of 360g/litre for drilling and filling woody weeds. Higher volumes of weaker strength herbicide solution work best. 1:5 dilution rate is recommended, as it appears to be more readily taken up by the plant.

Where to drill the holes: Wherever possible, the treatment must be focused entirely on the lignotuber of olives. Other woody weeds should be drilled and filled as low on the main stem as possible.

On quite small olives (with a lignotuber the size of a medium lemon), drill one or two holes that can hold 1-2ml of solution, taking care not to drill right through to the other side. On very large trees it is common to have several rings of holes around the perimeter of the lignotuber. Start from the top of the lignotuber, with holes no more than 50mm apart. In the top ring, the holes should be between vertical and 20 degrees tilt. Drill another ring of holes 50mm below the first ring but not directly in line with the holes above, then another ring 50mm below that. The number of rings is determined by the size of the lignotuber. As the rings extend down and outward, the holes may tilt to as much as 45 degrees, but keep them as vertical as possible. It is also beneficial to drill and fill in the middle of lower forks in the stem.

If the lignotuber is not easily located near the soil surface it may be possible to scrape some of the soil away to expose it. Alternatively, drill holes steeply into the cambium layer of the stem (where sap flows under the bark) as low as possible, filling each one as you go. This is likely to be less effective than drilling and filling the lignotuber.

How big, how deep, how many: Use a drill bit of approximately 10mm diameter. Dowelling bits give the best results. Holes can be as deep as 1.5-4cm. This is one occasion where 'overkill' is acceptable, so if you are concerned that there aren't enough holes, drill some more!

Filling the holes: Take care to ensure the holes are filled with liquid and not froth. Use a good herbicide dispenser, such as an appropriately labelled plastic laboratory wash bottle.

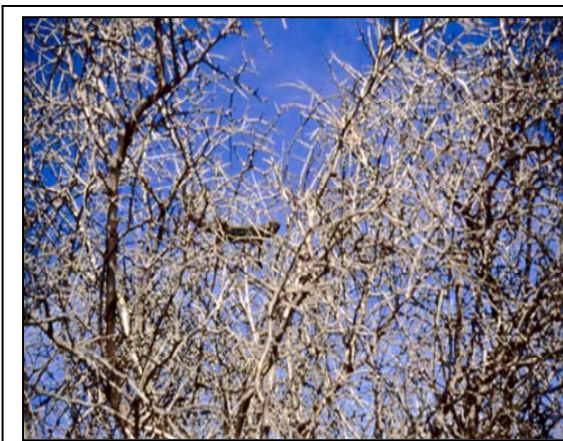


Figure 9. Dead African boxthorn providing habitat for bearded dragon.

For more information on Trees For Life's *Bush For Life* program please contact TFL on (08) 8406 0500. 5 May Tce, Brooklyn Park SA 5032.