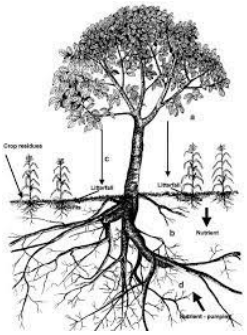


How to protect and increase deep rooted vegetation and remnant bushland

Blackwood Basin Group

Ngala kaaditj Noongar moort keyen kaadak nidja boodja.

We acknowledge the Noongar people as the Traditional Owners of this land

Australian Government | National Landcare Programme

Contents

The role of deep rooted vegetation in the landscape

Deep roots play an important role in a wide range of landscapes, from native forest and woodland ecosystems to forestry and farming. Out of reach of the shallow rooted crops covering much of todays farmland are often underutilized nutrient and water sources that have the potential to increase resiliency in our ever changing climate. Where deep rooted vegetation is established, nutrients otherwise locked up deep in the soil profile are accessed by the plants and then delivered to the surface in the form of leaf litter and plant residue, where it can be broken down and utilized by other plants. Nutrient leaching and deep drainage water loss can also be reduced with the deep rooted plants able to capture more as it passes out of reach of shallower roots. With the landscape becoming gradually drier, access to deeper water sources during drought builds higher drought resiliency amongst vegetation and crops. Additionally, the increase in microbial activity throughout deeper layers of the soil resulting from deeper roots may lead to enhanced carbon storage in the soil.

Remnant bushland

The development of much of the south west to agricultural land over the past century has produced a vibrant and productive farming landscape, but one which is now suffering wide spread degradation as a result of years of unsustainable practices and over clearing. Erosion, salinization, declining soil structure, waterlogging, and acidification are all symptoms of this and causes for lost agricultural production and income. Many farmers and organizations are now recognizing that protecting and revegetating remnant bushland and planting trees and shrubs in general are effective strategies for reversing many of these effects. Remnant bushland on farms maintains a level of native biodiversity and offers a host of other environmental benefits. Natural control of pests, maintenance of healthy living soils, drought and flood resilience, water filtration, pollution breakdown and pollination are all additional services that remnant bushland provides that is often taken for granted.

Retention of native vegetation on farms is important both from an ecological and an economic point of view. Productivity in the paddocks ultimately will depend on the retention and replacement of trees and shrubs in the landscape.

-REMNANT VEGETATION ON FARMS IS A VALUABLE RESOURCE by Richard Hobbs and Ken Wallace

Loss, fragmentation and degradation of native vegetation is the single biggest cause of biodiversity loss, the single biggest driver of dryland salinity, and among the largest components of our net greenhouse gas emissions.

-Andrew Campbell Executive Director Land and Water Resources Research and Development Corporation. 2000

What is biodiversity and why is it important to us

Biodiversity is the sum of all the different kinds of life and their interactions that you find in any one area. The variety of plants, animals, fungi, and even including microbial life such as bacteria. These organisms are intertwined like an intricate web maintaining balance and stability within ecosystems. It supports everything that we need to survive including food, drinkable water, medicine, and a stable climate. Biodiversity is the most complex feature of our planet and it is the most vital.

> *"Without biodiversity, there is no future for humanity"*
> *- Prof David Macdonald, Oxford University*

There are many reasons why biodiversity is important to us, whether they be economic, ecological, recreational, cultural, or scientific.

Economic - All raw products that we use to produce and consume are provided through biodiversity, and many occupations such as farmers, fishers, forestry workers and tourism operators rely on biodiversity to support their families.

Ecological - Biodiversity provides the life support system for our planet by maintaining balanced and functioning ecosystems that provide our clean air and water, nutrient cycling, pollination, pest control and waste management services among a myriad of others.

Recreational - Our unique biodiversity is a major drawcard for most tourism and recreational activities and attractions. Fishing, camping, hiking, and birdwatching are all heavily reliant on our biologically diverse ecosystems.

Cultural - Indigenous culture is deeply connected to biodiversity and balance within our ecosystems, and the overall Australian culture is also very much tied to our biodiverse landscape.

Scientific - Biodiversity presents us an immeasurable amount of data on the natural world which gives us the ability to predict future climate events and trends, as well providing us with a lot of the worlds modern medicines.

Integrating trees into the farm landscape

There are many different ways of integrating trees and other deep rooted vegetation into farm landscapes. It could be as simple as protecting existing patches of remnant bushland and waterways from livestock, or as involved as agroforestry. Here are just a few examples of various degrees of tree integration:

Windbreaks/shelter belts

Wildlife/nature corridors

Revegetation of waterways

Silviculture/forestry

Agroforestry

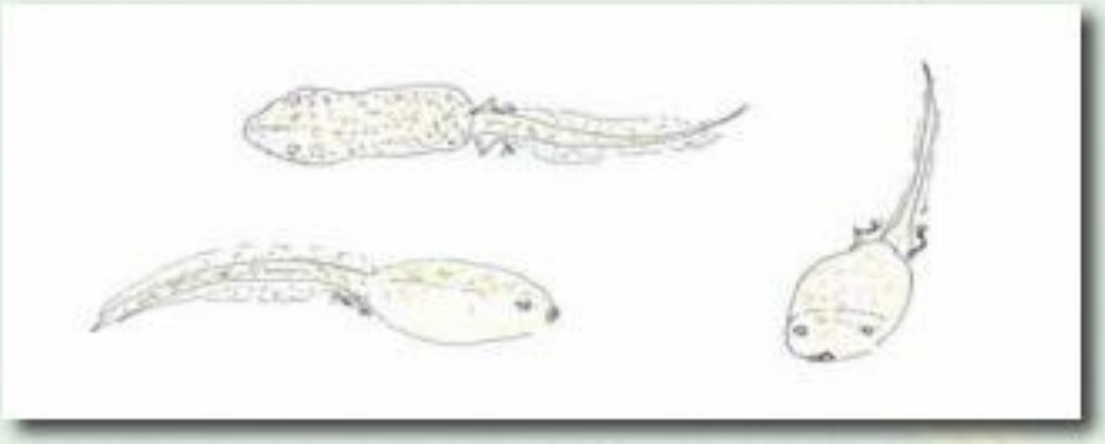
Protection and revegetation of existing remnant bushland

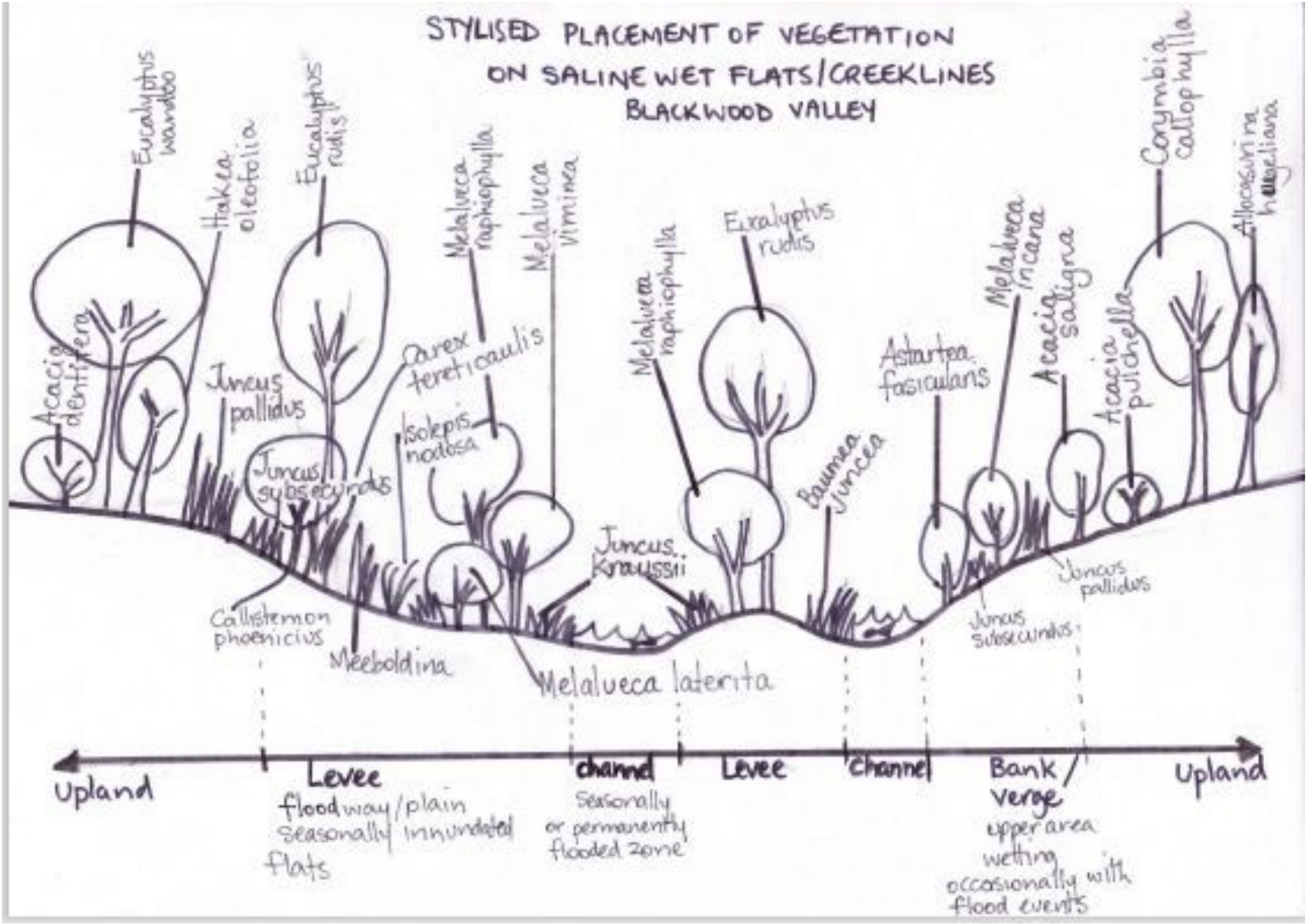
As tempting as it is to utilize waterways for livestock drinking water and remnant patches of bushland for shade and shelter, over time this degrades those ecosystems. Through a combination of soil compaction (Livestock will tend to use these areas regularly and congregate, more so than out in open pasture), nutrient build up from an excess of excrement, girdling of trees by rubbing and chewing on the trunk, and suppressing the growth of new and young vegetation while allowing weeds to prosper.

What is Fringing Vegetation?

Fringing vegetation –

- Includes trees, shrubs, understorey plants and other life forms such as fungi that grow along our creeks and rivers;
- Provides habitat for birds and animals and creates a wildlife corridor, including a refuge for birds and animals during the hot summer months; pools of water are important for wildlife in summer;
- Moderates the water temperature, which is important as many of our native fish and fauna cannot tolerate high temperatures; planting trees on the north side of waterways is important to lessen the impacts of climate change as this helps to keep the water temperature lower in summer;
- Starts the ecological processes in a watercourse or a pool. Leaves and insects dropping into the water from overhanging branches provides food for fish and other creatures;
- Stabilises the creek banks and helps prevent erosion, while woody debris such as logs and branches slowsthe water and create habitat;
- Helps to create a pool and riffle system;
- Acts like a filter as it captures and absorbs fertilizer and debris in runoff, keeping the water cleaner.




STYLISED PLACEMENT OF VEGETATION
ON SALINE WET FLATS/CREEKLINES
BLACKWOOD VALLEY
Eucalyptus wandoo
Hakea oleifolia
Eucalyptus rudis
Melaleuca raphiophylla
Melaleuca viminea
Melaleuca raphiophylla
Eucalyptus rudis
Melaleuca incana
Acacia saligna
Acacia pulchella
Corymbia calloph hylla
Allocasuarina huegeliana
Acacia dentifera
Juncus pallidus
Juncus subsecundus
Carex tereticaulis
Isolepis nodosa
Astartea fascicularis
Baumea juncea
Juncus kraussii
Juncus pallidus
Juncus subsecundus
Callistemon phoenicius
Meeboldina
Melaleuca laterita
Upland
Levee
floodway/plain
seasonally inundated
flats
channel
Seasonally or permanently flooded zone
Levee
Channel
Bank / Verge
upper area wetting occasionally with flood events
Upland

STEPS TO SUCCESSFUL REVEGETATION

If you are thinking about revegetation you need to plan at least **a year ahead. Start your planning and act now**.

Follow these steps at the recommended times to get the most benefit for your time, money and effort.

- **Site Assessment:** Know your site **Sept-Oct**
- **Species selection:** Order your plants **Oct-November**
- **Site preparation** is everything! **March-May**
- **Fence, plant and protect** **June-July**
- **Post planting maintenance/weed control** **September**
- **2nd year weed control** **June-August**

WEED CONTROL IS EVERYTHING

AIMS:

What are you trying to achieve?

- What is the bigger whole farm plan/ landscape picture?- how will your planned works address/ complement catchment issues of water quality, vegetation linkages etc.
- What is the main purpose of your revegetation?- erosion control, salinity control, habitat creation/encouraging wildlife, screening, beautification, shelter/windbreak etc.

Set measurable objectives.

Prioritize.

Decide which areas you will address in what order. What will give you the most/best results for effort etc.

Available Resources.

- What are your available resources? – Budget for fencing, plant, chemical, machinery, labour & pest/feral control costs.
- Some of these costs will be ongoing & should be included in the yearly farm budget.

SITE ASSESSMENT:

What is the existing condition of your site/waterway?

Existing remnant native vegetation, species & condition of-

- Remnant vegetation can indicate landscape health e.g. soil salinity, waterlogging etc.
- Existing species also provide the most appropriate planting selections as they are suited to landscape conditions.
- Note where each type of plant is naturally growing. This will help you to place your plantings in the appropriate area for successful establishment.
- Be particularly aware of remnant local native grasses & sedges which are easily overlooked. These species play an incredibly important role in landscape protection, particularly in wetlands, & with correct selective weed control can be encouraged to recolonize large areas.
- It is a good idea to employ the services of someone who is able to identify the remnant native vegetation present on site. Your Local Land for Wildlife Officer, Natural Resource Management Officer, Land care group, Flora group, or a revegetation specialist may be able to help you with this.

Weeds-

- You need to be able to identify the weeds present on your site so that you can manage them effectively across time.
- Some of these weeds may be inappropriate plantings from earlier restoration attempts.

Soil Type & Land Use-

- Are soils sandy, sand/loam, clay, gravel, shallow, poorly drained, non-wetting, saline etc.
- Are soils being affected by land use practices, eg fertilizer/nutrient or chemical runoff.

Predators-

- Look at rabbit & kangaroo activity. Plan rabbit control measures.
- You may wish to cull kangaroo numbers if they are high, as they will predate your plantings.

APPROPRIATE SPECIES SELECTION & ON SITE PLACEMENT:

Species selection-

- Use only endemic plant species that naturally occur in your specific geographic region.

These species have adapted to the climatic conditions & have co evolved with the local fauna.

- If possible it is best to obtain plants grown from local seed of those species ie. **Local Provenance**.
- These plants have evolved over a long period to suit quite specific conditions of rainfall, topography & soil.
- They can have distinctive genetic variations displaying clear physical differences such as flower colour, flowering time & leaf shape.
- They tend to be longer lived, display greater survival rates, & have a strong interdependence with the local flora, fauna & microorganism community with which they have evolved.
- Ask you grower if they can grow seedlings from local provenance seed from your area.
- Importantly these plants should they move in the landscape won't be future weed species as they are part of the naturally occurring plant community.
- Look at existing intact remnant vegetation on or off farm to see what species & in what sort of combinations would be best for your site. Your local Community Nursery or revegetation specialist should be able to advise you of appropriate species.

Order your plants at the latest by October- November

See attached plant lists for the Blackwood Valley.

Plant Placement-

- Local native plants grow best when planted in similar landscape sites to where they naturally occur.

- Use existing remnant vegetation on your site as a guide to what normally grows in the wetter, drier, upland areas etc. If your site has no remnant vegetation find a similar landscape site (eg an intact creek line) & try to copy the vegetation structure across your site.

For Riparian, i.e. wetland, areas the landscape can be broadly broken into 3 zones each accommodating a different suit of plants. **See attached diagram generalised plant placement in South West WA wetlands.**

Plant groupings-

- Local natives often naturally occur in groups or clumps of a single or couple of species. This may be because of specific soil/moisture conditions or they may actively out compete other species that try to establish in their vicinity.
- Group multiple individuals of each species together rather than randomly mixing all species.
- If you mix species make sure they have similar growth habits. This ensures that species of different height & growth habits are able to successfully establish.
- Create plant groupings of differing heights & structures for varied wildlife habitat. eg plant large sedge beds adjacent to shrubby thickets.

Planting densities/ spacings-

- Minimum recommended planting densities for revegetation works are 3000 plants per hectare. That equates to one plant every 1.8 square metres.
- The aim with plantings is to get as much growth & ground coverage as quickly as possible in order to shade out/outcompete weed competition.
- Closer plantings also create a beneficial microclimate, aiding plant establishment& leaving them less prone to predation.
- This spacing is adequate for larger shrubby species allowing them to create a fairly solid canopy cover over time.
- However for smaller species, native rushes, sedges & grasses these spacings are far too great. These plants should be group planted quite densely to establish good solid clumps as quickly as possible.
- These species should be planted where there is less weed competition & given good follow up weed control.
- Do not under plant sedges amongst your shrubs as they will be shaded out.

SITE PREPARATION & WEED CONTROL:

Good site preparation is **critical** to the success of any planting.

Fencing-

Good secure fencing is essential. Livestock will eat your plants they do not graze selectively.

Ripping-

- Is beneficial for most sites & should be carried out in summer or early autumn when the site is dry.
- This fractures the clay layer allowing better water penetration & an easier establishment site for seedlings. It also allows for much easier planting.
- Do not rip site when wet as this only slices though the soil providing little benefit in terms of soil fracturing/compaction reduction.
- Space rip lines 1.8 m apart which allows for a planting density of one plant every 1.8m & also enables a quad bike access between rows for follow up weed control.
- Spray rip lines after breaking rains in autumn germinate weeds.

Access Tracks-

- Design planting areas with good vehicular access tracks to allow for easy planting & ongoing maintenance/weed control works.
- Access tracks also enable you to experience & enjoy your plantings across time.
- A maximum distance of 20m from track to outer vegetation allows for reasonably easy hose movement from a vehicle for the first couple of seasons.

Weed Control-

- Weed control is essential for seedling establishment. Weeds have large soil seed banks & germinate rapidly in favourable conditions. Weeds outcompete seedlings for space water & nutrients.
- Start your weed control the year prior to planting to give better management.
- Sites with perennial weeds especially bulbous species such as Bridal Creeper, Watsonia etc. need extra weed control.
- Consider creating a weed map & management plan.
- Know your site weeds & how to manage them. **See attached methods of weed control**.For more information on weed control http://florabase.calm.wa.gov.au/
- Keep records of what you did, when & the results/effectiveness of control measures.

PLANTING & GUARDING:

Planting-

As you can see planting is a small step in the revegetation process but is important to take some extra time to make sure it is done well.

- Plant after break of season into moist ground.
- Seedlings need to be well watered prior to planting. Dry seedlings will not wet up even in wet ground.
- Rain should be expected within the week or hand water to settle plants in.
- Seedlings should be planted at or slightly below soil level so that plant pot soil level does not sit above the ground level.
- Firm seedlings in well with your foot. This expels air from around the roots & makes the seedling harder to dislodge.

Guarding-

On most sites tree guarding is advisable. Guards:

- Provide protection from rabbit & roo grazing which can be devastating.
- Create a microclimate, a mini greenhouse, to protect against frosts & desiccating winds & encourage establishment.
- Rigid plastic guards held in place with a bamboo stake have proven most effective & have a lifespan of several years.
- Milk cartons are also a useful guard if there is not significant predator/grazing pressure.
- Place the guard around the plant without pushing it into the soil. Mound soil around the outside of the guard & firm down with your foot. Pushing the guard into the soil can create a plug which pulls out the plant upon guard removal.
- Guards are usually removed at the beginning of the hot weather & stored for future use. If the plant is out of the top of the guard you can leave the guard on for longer but it may be more difficult to remove it from a larger plant.
- On sites with intensive roo grazing you may have to leave guards on longer.

Fertilizing-

Is optional & can be carried out at time of planting or in early spring.

- Use a native blend fertilizer such as Osmocote native or a slow release native tree tablet.
- Do not use superphosphate.
- Us a pottiputki tree planter or a spade to bury the fertilizer approximately 10-15cm from the seedling.

POST PLANTING MAINTENANCE:

Continually assess & review weed control.

- **Well-designed access tracks make maintenance easier.** Keep them spayed/slashed.
- **Post planting weed control is critical for maximum plant establishment**, particularly in a wet spring when extra weed germination occurs.
- Properly planted seedlings on well prepared sites with good weed control do not need extra watering.
- **Your seedlings will benefit from year 2 and year 3 weed control.** This allows them to get big enough to begin shading & outcompeting surrounding weeds.
- **Monitor your site and tackle weeds early in the second growing season**. Talk to Blackwood Waterwatch for tips on low dose & selective herbicide spraying to control weeds without damaging native plants. **Refer to attached methods of weed control.**

Local Contacts-

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Blackwood Waterwatch

Blackwood Waterwatch

CARING FOR OUR COUNTRY

Produced by
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Blackwood Basin Group

References, further Information and acknowledgments

Understanding deep roots and their functions in ecosystems

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Remnant vegetation on farms is a valuable resource

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Western Australia's unique biodiversity

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Department of Biodiversity, Conservation and Attractions, Parks and Wildlife Services

www.dpaw.wa.gov.au

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www.blackwoodbasingroup.com.au

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