

Community Stratum Species	Common Name	Density*	Notes	
Queensland Blue-gum and Bloodwood Open Forest				
Tree layer				
<i>Eucalyptus tereticornis</i> ¹	Queensland Blue-gum	2m centres	In general, this community does not require revegetation. However, where weeds are eradicated supplementary plantings may be required to prevent re-invasion when canopy gaps exceed 50m (measured from the drip zone).	
<i>Eucalyptus seeana</i>	Narrow Leaved Queensland Blue-gum	2m centres		
<i>Eucalyptus siderophloia</i>	Broad-leaved Grey Ironbark	2m centres		
<i>Corymbia intermedia</i>	Pink Bloodwood	2m centres		
Sub-canopy				
<i>Allocasuarina littoralis</i>	Black She Oak	2m centres		
<i>Alphitonia excelsa</i> ^{1 2}	Red Ash	2m centres		
<i>Trema tomentosa</i>	Poison Peach	2m centres		
<i>Breynia oblongifolia</i> ²	Breynia	2m centres		
<i>Dodonaea triquetra</i> ²	Hop Bush	2 m centres		
Ground Layer				
<i>Lomandra longifolia</i> ^{1 2}	Matrush	1m centres	Weed control of this community will enhance the natural recruitment of locally endemic flora species.	
<i>Hardenbergia violaceae</i> ²	Native Sarsaparilla	1m centres		
<i>Hibbertia stricta</i>	Guinea Flower	1m centres		
<i>Hibbertia vestita</i>	Guinea Flower	1m centres		
<i>Imperata cylindrica</i>	Blady Grass	1m centres		
<i>Dianella caerulea</i> ²	Blue Flax Lily	1m centres		
Woodland with native grassy understorey				
Tree layer				
<i>Eucalyptus tereticornis</i> ¹	Queensland Blue-gum	4m centres		Trees are not to be planted within areas associated with high voltage power lines (i.e. within powerlines easements). Revegetation of this community is to occur at the recommended densities.
<i>Eucalyptus siderophloia</i>	Broad-leaved Grey Ironbark	4m centres		
Shrub Layer				
<i>Acacia dispartima</i>	Hickory Wattle	4m centres		
<i>Acacia leiocalyx</i>	Black Wattle	4m centres		
<i>Acacia fimbriata</i> ¹	Brisbane Golden Wattle	2m centres		
<i>Alphitonia excelsa</i> ^{1 2}	Red Ash	4m centres		
<i>Dodonaea triquetra</i> ^{1 2}	Hop Bush	4 m centres		
Ground Layer				
<i>Hardenbergia Violaceae</i> ²	Native Sarsaparilla	1m centres		
<i>Dianella caerulea</i> ²	Blue Flax Lily	1m centres		
<i>Imperata cylindrica</i>	Blady Grass	1m centres		
<i>Cymbopogon refractus</i>	Barb-wire Grass	1m centres		

Community Stratum Species	Common Name	Density*	Notes
<i>Themeda triandra</i>	Kangaroo Grass	1m centres	
<i>Hibbertia stricta</i>	Guinea Flower	1m centres	
<i>Hibbertia vestita</i>	Guinea Flower	1m centres	

¹ Indicate species recommended for planting directly adjacent to stormwater management areas.

² Indicate fire-retardant species. Note that none of these provide food for Squirrel Gliders.

* A schematic indicating spacing is provided in **Plate 1**

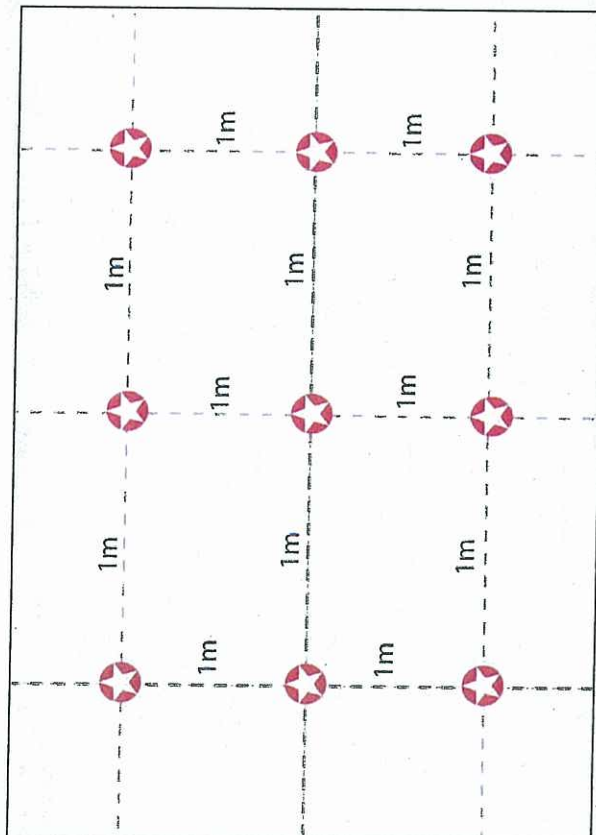


Plate 1: Schematic indicating the planting arrangement for planting at 1m centres (location of plants is indicated by stars encircled by red).

Table 4: Rehabilitation Methodology

Task	Recommendations
Delineate Rehabilitation Areas	Rehabilitation areas are to be clearly delineated on the ground with fencing where necessary.
Weed and Exotic Plant Removal and Control	Priority and environmental weeds are listed in Table 6 and control methods for grassy, herbaceous and woody weed species are illustrated in Appendices B and C. Hand removal is the preferred method of weed control near creeks and waterways, however, where this is ineffective Round-Up Bioactive[®], or a similar product suitable for use near waterways, may be used. Particular care must be taken to avoid poisoning native species, particularly young saplings, native grasses and herbaceous species. Exotic grasses are to be treated (by spraying) 2-3 weeks prior to planting – particular care must be taken to avoid spraying native grasses. Woody and herbaceous species are also to be treated prior to planting. Two weeks following spraying of rank exotic grasses these are to be knocked down by brushcutting – particular care must be taken to avoid slashing native species. For specific control requirements for priority weeds see Appendices B and C.
Site Preparation	Any rubbish will need to be collected and disposed of offsite at a Council approved location or rubbish disposal depot. No ripping is required.
Mulch	Mulching will be undertaken across the rehabilitation site. A weed free mulch is to be applied to a depth of 100mm across the rehabilitation area.
Plant Supply	Seedlings shall be sourced from local provenance stock (where possible). Species and numbers are scheduled in Table 3. Planting stock shall be provided in forestry tubes with a minimum plant height of 20cm and a well developed root system. Seedlings are to be healthy and displaying signs of active growth – any plants displaying yellowing, disease, root curling or are root bound are not to be planted, nor are any plants with weeds growing in the pot.
Planting	Tubestock Planting Plant in a slight shallow twice the size of the tube container, ensuring rootball is just below soil surface. Fertiliser tablet to be placed adjacent to, but not touching, the rootball. Soil to be backfilled to the same level as when the plant was in the container Mulch to a depth of 100mm to surround plant, but not touch the stem. Seedlings are to be randomly arranged at the minimum densities identified in Table 3. Seedlings must be moist at time of planting, if necessary water stock prior to planting.
Watering	Seedlings are to be watered with a minimum of 5 – 10 litres of water each at the time of planting and then watered as part of general maintenance requirements.
Habitat Features	For all Rehabilitation Zones, habitat features such as rocks, fallen branches and dead trees and shrubs in all zones are to be retained in situ unless they pose a safety risk.
Maintenance and Monitoring	Plantings will be maintained for a period of 24 months during the rehabilitation phase. Subsequent management will then be as per Table 2 . In order to reduce an increase in the mosquito population, fill or drain any areas of standing water within rehabilitation areas that may act as mosquito breeding sites.

4.6 REHABILITATION TARGETS

Rehabilitation and revegetation efforts conducted within Precinct 4 of the UDA aim to re-establish vegetation communities that are predicted to have occurred onsite prior to human disturbance and modification. To achieve this target, each of the vegetation communities currently on site (**Figure 3.1**) have been assigned a Target Climax Community designation (**Table 5** and **Figure 2.1**).

Recommendations regarding the species to be used within each of the management units and methodologies are provided in **Tables 3** and **4**. These recommendations have been prepared to achieve each of the climax communities listed in **Table 5** and indicated in **Figure 2.1** with the long term target of each community reaching remnant status under the provisions of the *Queensland Vegetation Management Act 1999*.

Table 5: Rehabilitation Targets

Target Climax Community (see Figure 2.1)	Extant Vegetation Community (see Figure 3.1)	Performance indicators/targets
Melaleuca quinquenervia Open Forest	<i>Melaleuca</i> regrowth	- Eradicate extant weeds; - Maintain community condition; - Promote natural regeneration; and - Revegetation as per Table 3 where required to close gaps in canopy. Where revegetation has occurred the following Targets are to be achieved: 70% survival of canopy species outlined in Table 3 after 5 years; and 50% survival of shrub and ground layer species outlined in Table 3 after 5 years.
	<i>Melaleuca</i> Open Forest	- Eradicate extant weeds; - Maintain community condition; and - Promote natural regeneration.
Queensland Blue-gum Open Forest	Queensland Blue-gum Regrowth	- Eradicate extant weeds; - Maintain community condition; - Promote natural regeneration; and - Revegetation as per Table 3 where required to close gaps in canopy. Where revegetation has occurred the following Targets are to be achieved: 70% survival of canopy species outlined in Table 3 after 5 years; and 50% survival of shrub and ground layer species outlined in Table 3 after 5 years.
	Queensland Blue-gum Open Forest	- Eradicate extant weeds; - Maintain community condition; and - Promote natural regeneration.

Performance indicators and targets for each of the Target Climax Communities are contained in **Table 5**.

4.7 WEED MANAGEMENT

Of the 38 invasive weed species identified or predicted to occur within the rehabilitation areas of Precinct 4 (**Table 6**), three species are declared as Class 2 and eight species are declared as Class 3 under the LP Act.

Landholders must take reasonable steps to keep land free of Class 2 pests, whilst it is illegal to sell Class 3 plant or its seed anywhere in Queensland without permission from the Minister for Natural Resources and Mines.

Specific management requirements for declared plant species are provided within **Appendices B** and **C**.

Target Climax Community (see Figure 2.1)	Extant Vegetation Community (see Figure 3.1)	Performance indicators/targets
Queensland Blue-gum and Bloodwood Open Forest	Queensland Blue-gum and Bloodwood regrowth	• Eradicate extant weeds; • Maintain community condition; • Promote natural regeneration; and • Revegetation as per Table 3 where required to close gaps in canopy. Where revegetation has occurred the following Targets are to be achieved: • 70% survival of canopy species outlined in Table 3 after 5 years; and • 50% survival of shrub and ground layer species outlined in Table 3 after 5 years.
	Queensland Blue-gum and Bloodwood Open Forest	• Eradicate extant weeds; • Maintain community condition; and • Promote natural regeneration.
Woodland with native grassy understorey	Grassy areas with scattered trees	Aim: Sparse canopy of mixed Eucalypt species at 70% original canopy Height, 50% of original canopy cover with an understorey consisting of native grass species Targets: • 70% survival of canopy species outlined in Table 3 after 5 years. • 50% survival of shrub and ground layer species outlined in Table 3 after 5 years. • No woody weeds. • <10% herbaceous weeds.

Table 6: Invasive Weed Species on the Site

Family	Scientific Name	Common Name	Status (LP Act 2002)	Recommended Control Techniques
Amaranthaceae	<i>Gomphrena celosioides</i>	Gomphrena Weed	Environmental weed	QPIF website
Anacardiaceae	<i>Schinus terebinthifolius</i> *	Broad-Leaved Pepper	Class 3	Appendices B and C
Asparagaceae	<i>Asparagus aethiopicus</i>	Asparagus Fern	Class 3	Appendices B and C
Asteraceae	<i>Ageratum houstonianum</i>	Blue Billygoat Weed	Environmental weed	Appendices B and C
Asteraceae	<i>Ambrosia artemisiifolia</i> *	Annual Ragweed	Class 2	Appendices B and C
Asteraceae	<i>Baccharis halimifolia</i> *	Groundsel Bush	Class 2	Appendices B and C
Asteraceae	<i>Bidens pilosa</i>	Cobbler's Pegs	Environmental weed	QPIF website
Asteraceae	<i>Conyza bonariensis</i>	Fleabane	Environmental weed	QPIF website
Asteraceae	<i>Crassocephalum crepidioides</i>	Thickhead	Environmental weed	QPIF website
Asteraceae	<i>Hypochaeris radicata</i>	Catsear	Environmental weed	QPIF website
Asteraceae	<i>Senecio madagascariensis</i> *	Fireweed	Class 2	Appendices B and C
Asteraceae	<i>Sphagneticola trilobata</i> *	Singapore Daisy	Class 3	Appendices B and C
Bignoniaceae	<i>Tecoma stans</i> *	Yellow Bells	Class 3	Appendices B and C
Fabaceae	<i>Crotalaria lanceolata</i>	Rattlepod	Environmental weed	QPIF website
Fabaceae	<i>Desmodium uncinatum</i>	Silver-Leaf Desmodium	Environmental weed	QPIF website
Fabaceae	<i>Macroptilium atropurpureum</i>	Siratro	Environmental weed	QPIF website
Lauraceae	<i>Cinnamomum camphora</i>	Camphor Laurel	Class 3	Appendices B and C
Ochnaceae	<i>Ochna serrulata</i>	Ochna	Environmental weed	QPIF website
Passifloraceae	<i>Passiflora suberosa</i>	Corky Passion Flower	Environmental weed	QPIF website
Passifloraceae	<i>Passiflora subpeltata</i>	White Passion Flower	Environmental weed	QPIF website
Pineaceae	<i>Pinus elliottii</i>	Slash Pine	Environmental weed	QPIF website
Poaceae	<i>Andropogon virginicus</i>	Whiskey Grass	Environmental weed	QPIF website
Poaceae	<i>Avena sativa</i>	Common Oats	Environmental weed	QPIF website
Poaceae	<i>Cynodon dactylon</i>	Couch Grass	Environmental weed	QPIF website
Poaceae	<i>Echinochloa colona</i>	Awnless Barnyard Grass	Environmental weed	QPIF website
Poaceae	<i>Eragrostis mexicana</i>	Mexican Lovegrass	Environmental weed	QPIF website
Poaceae	<i>Megathyrsus maximus</i>	Green Panic	Environmental weed	QPIF website
Poaceae	<i>Paspalum dilatatum</i>	Paspalum	Environmental weed	See QPIF website
Poaceae	<i>Phalaris canariensis</i>	Canary Grass	Environmental weed	QPIF website
Poaceae	<i>Setaria parviflora</i>	Slender Pigeon Grass	Environmental weed	QPIF website
Poaceae	<i>Setaria sphacelata</i>	Pigeon Grass	Environmental weed	QPIF website
Poaceae	<i>Urochloa mutica</i>	Signal Grass	Environmental weed	QPIF website

Family	Scientific Name	Common Name	Status (LP Act 2002)	Recommended Control Techniques
Solanaceae	<i>Datura stramonium</i>	Common Thornapple	Environmental weed	QPIF website
Solanaceae	<i>Solanum seaforthianum</i>	Brazilian Nightshade	Environmental weed	QPIF website
Ulmaceae	<i>Celtis sinensis</i> *	Chinese Elm	Class 3	Appendices B and C
Verbenaceae	<i>Lantana camara</i> *	Lantana	Class 3	Appendices B and C
Verbenaceae	<i>Lantana montevidensis</i> *	Creeping Lantana	Class 3	Appendices B and C
Verbenaceae	<i>Verbena bonariensis</i>	Purpletop	Environmental weed	QPIF website

*Status under LP Act:

Class 2 Plant – Landholders must take reasonable steps to keep land free of Class 2 pests.

Class 3 Plant – It is illegal to sell a declared plant or its seed anywhere in Queensland without permission from the Minister for Natural Resources and Mines.

4.7 MAINTENANCE

The maintenance plan provided in **Table 7** is applicable for a total of five years following commencement of rehabilitation.

Table 7: Maintenance Plan for Rehabilitation Works

Timing	Recommended Action
First three months after planting	Control weeds – Check for weeds monthly and control by hand removal, spot spraying e.g. of grasses, taking care not to damage planted and regenerating native species, including grasses and forbs. Watering – Water each seedling with a minimum of 8 – 10 litres of water weekly during the first month depending upon prevailing weather conditions and then monthly or as necessary until seedlings are established (approximately 3 – 6 months). General Site Maintenance – e.g. Remove any rubbish dumped on site; check for signs of erosion; replace mulch as required. Fill or drain any areas of standing water within the rehabilitation areas that may increase the incidence of mosquitoes. Replacement Planting – Replace dead or senescent plants according to the methods detailed in Table 4. Monitoring – Undertake regular monitoring.
3-24 months after planting	Control weeds – Continue monthly weed checks and control as required as specified for first three months. Watering – Continue to water each seedling as necessary until seedlings are established (approximately 3 – 6 months). Any replacement seedlings should be watered weekly during the first month following planting, then water as necessary until seedlings are established (approximately 3 – 6 months after planting). Replacement Planting – Replace dead or senescent plants according to the methods detailed in Table 4; and continue replacement planting until 95% survival rate achieved. Mulching – If mulch is depleted thereby allowing significant weed growth, replace mulch around affected plants with coarse forest mulch or sugar cane to a depth of 100mm and diameter of 1m, ensuring mulch does not contact any stems/trunks of native species. General Site Maintenance – e.g. Remove any rubbish dumped on site; check for signs of erosion; replace mulch as required. Fill or drain any areas of standing water within the rehabilitation areas that may increase the incidence of mosquitoes. Monitoring – Undertake regular site monitoring tasks and photos.

5.0 REFERENCES

BAAM (2009). 'Flora and Fauna Management Plan – Fitzgibbon ULD – Precinct 4.' Unpublished report prepared for ULDA.

BAAM (2008). 'Flora and Fauna Habitat Assessment – Fitzgibbon Urban Development Area.' Unpublished report prepared for ULDA.

Appendix A

Stage Specific Edge Rehabilitation

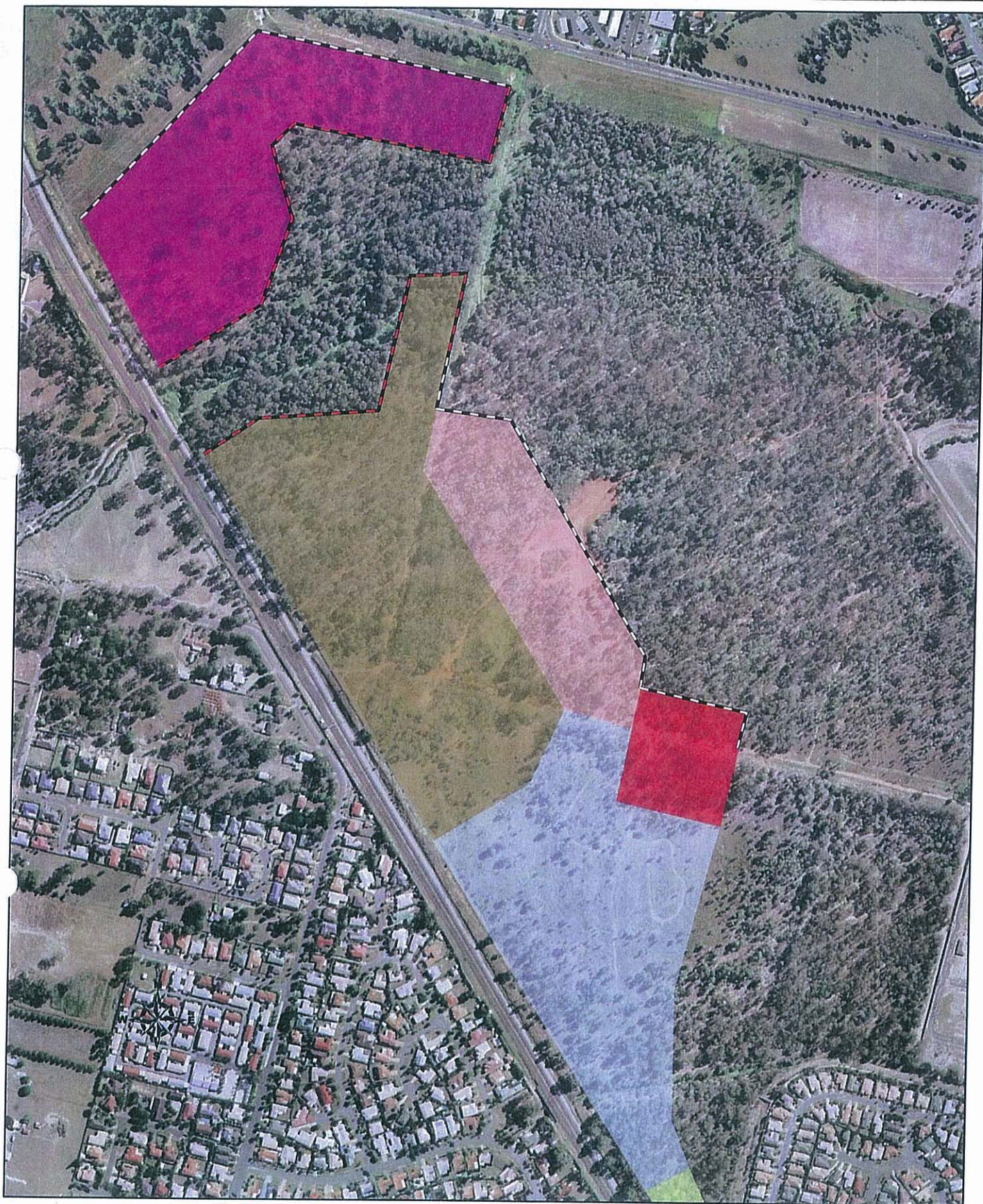
APPENDIX A: STAGE SPECIFIC EDGE REHABILITATION

Development Stage E

It is understood that Stage E is the next area to be developed and development will occur in two stages. This area currently supports a mixture of remnant and non-remnant vegetation and abuts areas that currently contain Melaleuca Open Forest, Melaleuca regrowth and Grassy Areas with scattered Trees. However, the proposed climax communities of bushland that will be adjacent to this stage will ultimately consist of Eucalypt derived communities and Melaleuca derived communities. In addition, management area 2 (see the below table and **Plate A**) is subject to prolonged periods of waterlogged soils. As such the species selection provided below complements the surrounding climax communities and environmental conditions. Species have been selected to provide maximum potential forage for squirrel gliders.

Management Strategies and Actions for Stage E.

Rehabilitation Intent	Management Area (see Plate A)	Implementation Strategy	Species Selection	Planting Density	Estimated Costings
To minimise weed intrusion, stabilise soil, reduce incidents of erosion and provide food for native species.	1	Control Exotic species as outlined within Appendix C and D and revegetate a 10m area between the impact zone and the bushland and open space area to provide a vegetated buffer to vegetation contained within the bushland and open space area. Revegetation to be as directed in Table 4 .	<i>Themeda triandra</i> (kangaroo Grass)	1m centre	Weed management (incl. labour): Herbicide - \$7.00/L (Glyphosate), Spraying / brush-cutting and labour - \$200/ha
			<i>Cymbopogon refractus</i> (Barb-wire Grass)	1m centre	
			<i>Imperata cylindrica</i> (Blady Grass)	1m centre	Revegetation: Tube stock - \$1.50/ea, Labour - \$800/ha
			<i>Acacia fimbriata</i> (Brisbane Golden Wattle)	1m centre	Mulching: Free (sourced from site)
			<i>Dodonaea triquetra</i> (Hop Bush)	2m centre	Monitoring & Maintenance: \$200/ha over a 12 month period
			<i>Acacia leiocalyx</i> (Black Wattle)	2m centre	
			<i>Eucalyptus racemosa</i> (Scribbly Gum)	2m centre	
	2	Control Exotic species as outlined within Appendix C and D and revegetate a 10m area between impact zone and the bushland and open space area to provide a vegetated buffer to vegetation contained within bushland and open space area. Revegetation to be as directed in Table 4 .	<i>Callistemon salignus</i> (Bottlebrush)	1m centre	Weed management (incl. labour): Herbicide - \$7.00/L (Glyphosate), Spraying / brush-cutting and labour - \$200/ha
			<i>Acacia fimbriata</i> (Brisbane Golden Wattle)	1m centre	
			<i>Lomandra longifolia</i> (Mat Rush)	1m centre	Revegetation: Tube stock - \$1.50/ea, Labour - \$800/ha
			<i>Imperata cylindrica</i> (Blady Grass)	1m centre	Mulching: Free (sourced from site)
			<i>Lophostemon suaveolens</i> (Swamp Box)	4m centre	Monitoring & Maintenance: \$200/ha over a 12 month period
			<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	4m centre	



Legend

Rehabilitation Area

Area 1

Area 2

Phase

Phase B

Phase C

Phase D

Phase E

Phase F

Phase G

0 40 80 160 240 320 Meters



**Biodiversity
Assessment**
AND MANAGEMENT

Plate A Edge Rehabilitation Areas

Rehabilitation Plan-Precinct 4,
Fitzgibbon Urban Development Area

APPENDIX A: STAGE SPECIFIC EDGE REHABILITATION

Development Stage F

The eastern boundary of Stage F forms the western boundary of the Precinct 4 bushland and open space area. The proposed climax communities for areas adjacent to Stage F are dominated by Eucalypt forest species. Therefore the species selection provided below will complement this community. Species have been selected to provide maximum potential forage for squirrel gliders.

Rehabilitation Intent	Management Area (see Plate A)	Implementation Strategy	Species Selection	Planting Density	Estimated Costings
To minimise weed intrusion, stabilise soil, reduce incidents of erosion and provide food for native species.	1	Control Exotic species as outlined within Appendix C and D and revegetate a 10m area between the impact zone and the bushland and open space area to provide a vegetated buffer to vegetation contained within the bushland and open space area. Revegetation is to be as directed in Table 4 .	<i>Themeda triandra</i> (kangaroo Grass) <i>Cymbopogon refractus</i> (Barb-wire Grass) <i>Imperata cylindrica</i> (Blady Grass) <i>Acacia fimbriata</i> (Brisbane Golden Wattle) <i>Dodonaea triquetra</i> (Hop Bush) <i>Acacia leiocalyx</i> (Black Wattle) <i>Eucalyptus racemosa</i> (Scribbly Gum)	1m centre 1m centre 1m centre 1m centre 2m centre 2m centre 2m centre	<i>Weed management (incl. labour):</i> Herbicide - \$7.00/L (Glyphosate), Spraying / brush-cutting and labour - \$200/ha <i>Revegetation:</i> Tube stock - \$1.50/ea, Labour - \$800/ha <i>Mulching:</i> Free (sourced from site) <i>Monitoring & Maintenance:</i> \$200/ha over a 12 month period

APPENDIX A: STAGE SPECIFIC EDGE REHABILITATION

Development Stage G

The southern boundary of Stage G adjoins the western portion of the Precinct 4 Bushland and open space area. The investigation area supports a mixture of regrowth and mature Melaleuca trees that provide important feeding resources for Squirrel Gliders, Grey-headed Flying-Fox and to a lesser extent, Koala.

The proposed climax communities of bushland that will be adjacent to this stage will ultimately consist of Eucalypt derived communities and Melaleuca species selection provided below complements the surrounding climax communities and environmental conditions. Species have been selected to provide maximum potential forage for squirrel gliders.

Rehabilitation Intent	Management Area (see Plate A)	Implementation Strategy	Species Selection	Planting Density	Estimated Costings
To minimise weed intrusion, stabilise soil, reduce incidents of erosion and provide food for native species.	1	Control Exotic species as outlined within Appendix C and D and revegetate a 10m area between the impact zone and the bushland and open space area to provide a vegetated buffer to vegetation contained within the bushland and open space area. Revegetation is to be as directed in Table 4.	<i>Themeda triandra</i> (kangaroo Grass)	1m centre	Weed management (incl. labour): Herbicide - \$7.00/L (Glyphosate), Spraying / brush-cutting and labour - \$200/ha
			<i>Cymbopogon refractus</i> (Barb-wire Grass)	1m centre	
			<i>Imperata cylindrica</i> (Blady Grass)	1m centre	Revegetation: Tube stock - \$1.50/ea, Labour - \$800/ha
			<i>Acacia fimbriata</i> (Brisbane Golden Wattle)	1m centre	Mulching: Free (sourced from site)
			<i>Dodonaea triquetra</i> (Hop Bush)	2m centre	Monitoring & Maintenance: \$200/ha over a 12 month period
			<i>Acacia leiocalyx</i> (Black Wattle)	2m centre	
			<i>Eucalyptus racemosa</i> (Scribbly Gum)	2m centre	
	2	Control Exotic species as outlined within Appendix C and D and revegetate a 10m area between the impact zone and the bushland and open space area to provide a vegetated buffer to vegetation contained within the bushland and open space area. Revegetation is to be as directed in Table 4.	<i>Callistemon salignus</i> (Bottlebrush)	1m centre	Weed management (incl. labour): Herbicide - \$7.00/L (Glyphosate), Spraying / brush-cutting and labour - \$200/ha
			<i>Acacia fimbriata</i> (Brisbane Golden Wattle)	1m centre	Revegetation: Tube stock - \$1.50/ea, Labour - \$800/ha
			<i>Lomandra longifolia</i> (Mat Rush)	1m centre	Mulching: Free (sourced from site)
			<i>Imperata cylindrica</i> (Blady Grass)	1m centre	Monitoring & Maintenance: \$200/ha over a 12 month period
			<i>Lophostemon suaveolens</i> (Swamp Box)	4m centre	
			<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	4m centre	

APPENDIX A: STAGE SPECIFIC EDGE REHABILITATION

Development Stage D

The northern boundary of Stage D forms the southern boundary of the Precinct 4 bushland and open space area. The proposed climax communities for areas adjacent to Stage D are dominated by Eucalypt forest species. Therefore the species selection provided below will complement this community. Species have been selected to provide maximum potential forage for squirrel gliders.

Rehabilitation Intent	Management Area (see Plate A)	Implementation Strategy	Species Selection	Planting Density	Estimated Costings
To minimise weed intrusion, stabilise soil, reduce incidents of erosion and provide food for native species.	1	Control Exotic species as outlined within Appendix C and D and revegetate a 10m area between the impact zone and the bushland and open space area to provide a vegetated buffer to vegetation contained within the bushland and open space area. Revegetation is to be as directed in Table 4.	<i>Themeda triandra</i> (kangaroo Grass) <i>Cymbopogon refractus</i> (Barb-wire Grass) <i>Imperata cylindrica</i> (Blady Grass) <i>Acacia fimbriata</i> (Brisbane Golden Wattle) <i>Dodonaea triquetra</i> (Hop Bush) <i>Acacia leiocalyx</i> (Black Wattle) <i>Eucalyptus racemosa</i> (Scribbly Gum)	1m centre 1m centre 1m centre 1m centre 2m centre 2m centre 2m centre	Weed management (incl. labour): Herbicide - \$7.00/L (Glyphosate), Spraying / brush-cutting and labour - \$200/ha Revegetation: Tube stock - \$1.50/ea, Labour - \$800/ha Mulching: Free (sourced from site) Monitoring & Maintenance: \$200/ha over a 12 month period

APPENDIX A: STAGE SPECIFIC EDGE REHABILITATION

Development Stages B and C

Fauna habitats within Stages B and C have been highly degraded as a result of previous land clearing, and now consist of a patch of wattle regrowth, open grassy areas with some scattered trees and weeds. No rehabilitation of this area is proposed within this Management Plan.

APPENDIX A: STAGE SPECIFIC EDGE REHABILITATION

Tracks and Access Trails Requiring Revegetation

Numerous tracks and trails exist within the Bushland and open space areas located within Precinct 4. The species recommended for Revegetation activities (see table below) will complement suite of species that are predicted to have naturally occurred within the disturbance area. In addition, the recommended species will provide food and habitat resources for native fauna species. Species have been selected to provide maximum potential forage for squirrel gliders.

Rehabilitation Intent	Target Climax Communities (see Figure 2.1)	Implementation Strategy	Species Selection	Planting Density	Estimated Costings
To minimise weed intrusion, stabilise soil, reduce incidents of erosion and provide food for native species.	Melaleuca Open Forest	Control Exotic species as outlined within Appendix C and D and revegetate a 10m area between the impact zone and the bushland and open space area to provide a vegetated buffer to vegetation contained within the bushland and open space area. Revegetation is to be as directed in Table 4.	<i>Themeda triandra</i> (kangaroo Grass)	1m centre	Weed management (incl. labour): Herbicide - \$7.00/L (Glyphosate), Spraying / brush-cutting and labour - \$200/ha
			<i>Cymbopogon refractus</i> (Barb-wire Grass)	1m centre	Revegetation: Tube stock - \$1.50/ea, Labour - \$800/ha
			<i>Imperata cylindrica</i> (Blady Grass)	1m centre	Mulching: Free (sourced from site)
			<i>Acacia fimbriata</i> (Brisbane Golden Wattle)	1m centre	Monitoring & Maintenance: \$200/ha over a 12 month period
			<i>Dodonaea triquetra</i> (Hop Bush)	2m centre	
			<i>Acacia leiocalyx</i> (Black Wattle)	2m centre	
Queensland Blue Gum Open Forest; Queensland Blue Gum Open Forest; and Woodland with native grassy understorey	Queensland Blue Gum Open Forest; Queensland Blue Gum Open Forest; and Woodland with native grassy understorey	Control Exotic species as outlined within Appendix C and D and revegetate a 10m area between the impact zone and the bushland and open space area to provide a vegetated buffer to vegetation contained within the bushland and open space area. Revegetation is to be as directed in Table 4.	<i>Callistemon salignus</i> (Bottlebrush)	1m centre	Weed management (incl. labour): Herbicide - \$7.00/L (Glyphosate), Spraying / brush-cutting and labour - \$200/ha
			<i>Acacia fimbriata</i> (Brisbane Golden Wattle)	1m centre	Revegetation: Tube stock - \$1.50/ea, Labour - \$800/ha
			<i>Lomandra longifolia</i> (Mat Rush)	1m centre	Mulching: Free (sourced from site)
			<i>Imperata cylindrica</i> (Blady Grass)	1m centre	Monitoring & Maintenance: \$200/ha over a 12 month period
			<i>Lophostemon suaveolens</i> (Swamp Box)	4m centre	
			<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	4m centre	

TABLE 1 – HERBICIDES FOR CONTROL OF LANTANA

Method of application: active ingredient (trade name) ^a	Rate	Optimum time ^b	Remarks
Foliar (overall) spray			
Fluroxypyr (Starane® 200)	0.5–1 L/100 L water	December to April	Thorough wetting of plants is required, higher rate should be used for larger plants.
Glyphosate (Roundup® 360, Glyphosate 360®)	1 L/100 L water	October to April	Wet plant thoroughly. Glyphosate affects any green plant it comes into contact with. Glyphosate is available in a range of strengths.
Picloram + 2,4-D (Tordon® 75-D)	0.65 L/100 L water	February to April	Wet plant thoroughly. Legumes are affected if sprayed.
Dichlorprop (Lantana® 600)	0.5 L/100 L water	December to April	Must thoroughly wet all leaves. Please refer to product label for situation details.
Picloram + Triclopyr + Aminopyralid (Grazon Extra®)	0.35–0.5 L/100 L water	February to April	Wet plant thoroughly. Use the higher rate on larger plants. Legumes may be affected if sprayed.
2,4-D amine (Amicide® 625)	0.32 L/100 L water	March to May	Red-flowered lantanas are more resistant to 2,4-D. Will kill young legumes.
Metsulfuron methyl, (Brush-off®, Brushkiller® 600, Lynx® 600)	10 g/100 L water ^b	March to May	Results variable. Not found effective in tropics. Follow-up sprays are necessary.
Metsulfuron methyl + glyphosate (Cutout®)	95 g/100 L water	March to May	Apply to bushes up to 2 m tall. Spray to thoroughly wet all foliage and stems. Spray should penetrate throughout the bush.
Metsulfuron methyl + glyphosate (Trounce®)	173 g/100 L water	March to May	Apply when actively growing. Do not apply during periods of stress.
Aminopyralid + Fluroxypyr (Hotshot®)	0.5–0.7 L/100 L water	October to April	Spray all foliage, including stems, to the point of run-off.
(i) Basal bark (ii) Cut stump			
Triclopyr (Garlon 600®)	1 L/60 L diesel	Any time. Best results when actively growing	(i) Apply to lower 40 cm of every stem. Must ensure complete coverage around stem. (ii) Cut close to ground level. Immediately apply herbicide.
2,4-D Ester (AF Rubber Vine Spray®)	2.5 L/100 L diesel	Any time. Best results when actively growing	As above
Picloram + Triclopyr (Access®)	1 L/60 L diesel	Any time. Best results when actively growing	As above
Picloram (Vigilant® Herbicide Gel)	3–5 mm gel	Any time. Best results when actively growing	(ii) If diameter of stump is > 20 mm, use a minimum of 5 mm gel thickness.
Glyphosate (Roundup®, Weedmaster Duo®)	Neat	Any time. Best results when actively growing	Off-label permit.
Splatter gun			
Glyphosate (Roundup® 360)	1:9 glyphosate + water	October to April	2 x 2 mL dose per 0.5 m height of lantana
Metsulfuron methyl (Brushkiller® 600, Lynx® 600)	2 g/L water	March to May	As above
Aerial			
Picloram + Triclopyr + 2,4-D (Grazon® DS + 2,4-D amine 625 g/L)	1.5 L + 6 L/ha or 10 L/ha (Grazon®)	When plant actively growing	Helicopter only. Minimum of 200 L water per hectare. Follow-up re-spray will be required. Do not burn within six months of treatment.
Dichlorprop (Lantana® 600)	6–8 L/ha	When plant actively growing	As above

^a Only some common trade names provided.

^b Optimum times are only a guide. Lantana must be actively growing for the herbicide to work.

® = Registered trade name.

Labels often recommend the additional use of a wetting agent or surfactant within the mix. Herbicides types vary in their selectivity against other species and soil residual.

Fact sheets are available from DPI&F service centres and the DPI&F Information Centre phone (13 25 23). Check our website www.dpi.qld.gov.au to ensure you have the latest version of this fact sheet. The control methods referred to in this pest fact should be used in accordance with the restrictions (federal and state legislation and local government laws) directly or indirectly related to each control method. These restrictions may prevent the utilisation of one or more of the methods referred to, depending on individual circumstances. While every care is taken to ensure the accuracy of this information, the Department of Primary Industries and Fisheries does not invite reliance upon it, nor accept responsibility for any loss or damage caused by actions based on it.

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options because of the danger of overturning machinery and soil erosion.

Fire

Regular burning will reduce the capacity of plants to survive, however initial kill rates are variable. The effectiveness of this method will depend on the suitability of available fuel loads, fire intensity, temperature, relative humidity, soil moisture and season. Pasture re-establishment can then provide competition to inhibit lantana seed germination.

Fire is not recommended in non-fire tolerant vegetated areas such as rainforest, wooded or plantation areas.

A typical control program for fire may include:

- exclude stock to establish a pasture fuel load
- burning (may require a permit)
- sow improved pastures (consult your local Department of Primary Industries and Fisheries extension agronomist for advice)
- continue to exclude stock until pasture has established and seeded
- burn again in summer before rain and spot spray lantana regrowth when > 0.5 m high and when it is actively growing (see Table 1).

Herbicide control

Herbicide recommendations for lantana are shown in Table 1. Users of herbicides have a legal obligation to read herbicide labels and use only the registered rates. Herbicides should always be used responsibly, adhering to legislation and safety requirements.

Variation in results can be a result of inconsistent application methods, mix rates or seasonal variation. Red-flowered and pink-edged red-flowered lantana are often considered the most difficult to control because their leaves are often smaller and tougher. However, herbicides can kill these varieties if there is careful adherence to application procedures.

For single-stemmed lantana, basal bark spraying and cut stump methods also give good results at any time of year (but best when the plant is actively growing). On multi-stemmed varieties, variable results will be obtained if care is not taken to apply herbicide to each stem.

When treating actively growing plants less than two metres in height, overall spraying of foliage to the point of run-off is recommended. Splatter gun techniques are also effective and particularly useful in hard to access areas. This is best done in autumn when sap flows draw the poison down into the root stock but before night temperatures get too cold.

Grazing animals should be removed from spray areas during and soon after treatment because stress can cause increased sugar levels in the leaves of lantana plants, making them more palatable.

Landholders and contractors should check if the property is situated in a hazardous area. This prevents the use of some chemicals, as defined in the *Agricultural Chemicals Distribution Control Act 1966*.

Biological control

Since 1914, 31 biological control agents have been introduced into Australia in an attempt to control lantana. Seventeen have established, of which several insect species cause seasonal damage, reducing the vigour and competitiveness of lantana in some areas.

DPI&F research programs continue to investigate agents suitable for release in Australia, and test the viability of these agents in an effort to identify more effective biological control agents.

It is important to remember that biological control alone should not be relied upon for managing lantana infestations. Consideration should be given to other available control techniques.

The four most important biological control agents are:

- **sap-sucking bug (*Teleonemia scrupulosa*)**
Found in dry areas from Cooktown to Wollongong, this small, mottled, bug feeds on the underside of leaves, growing tips and flower buds, causing the leaves to drop early and stopping the plant from flowering.
- **leaf-mining beetle (*Uroplata girardi*)**
Found in most lantana infestations from Cape Tribulation to Sydney as well as around Darwin, except in very dry or high altitude areas. The adult beetles are dark brown. They shelter in curled leaves and feed on the upper leaf surfaces. Larvae feed in leaves causing blotches to spread across the leaf. This beetle reduces plant vigour and can suppress flowering.
- **leaf-mining beetle (*Octotoma scabripennis*)**
Found in most lantana infestations from Atherton to Wollongong. Adults of this species feed on the upper leaf surface, while larvae feed and mine the centre of the leaf and cause blotches. This activity reduces plant vigour and can suppress flowering.
- **seed-feeding fly (*Ophiomyia lantanae*)**
Found from Cape Tribulation to Eden in New South Wales and also around Darwin and Perth. *Ophiomyia* is a small black fly that feeds on flowers and lays eggs on the green fruits. The maggots of the fly eat the seed and make the fruit unattractive to birds, reducing seed spread.

Other agents such as *Aconophora compressa* (a stem-sucking bug) and *Leptobyrsa decora* (a sap-sucking bug) have caused some damage in specific geographic areas.

Please note: Landholders are advised not to consume their time collecting established insects for distribution. Due to their own ability to disperse, these insects will be periodically/seasonally present in areas that are climatically suitable for them.

Further information

Further information is available from vegetation management/weed control/environmental staff from your local government or email LantanaWoNS@dpi.qld.gov.au.

For rural producers lantana poses problems of stock poisoning and invasion of desirable pasture. An economic impact assessment indicated lantana costs the Queensland grazing sector in excess of \$70 million (2005/06 values) per year.

It is now illegal to sell or distribute any variety of lantana in Queensland. However, garden plantings are still common in many areas and have the potential to cause problems of their own.

Despite being sold and marketed as 'sterile' plants, research indicates some ornamental lantana varieties have the ability to set seed and can spread vegetatively. They also produce some viable pollen and have the potential to cross pollinate with wild forms, creating new varieties that could naturalise in the environment.

If the number of naturalised varieties increases due to genetic drift from ornamental varieties it will make finding effective biological control agents even more difficult and potentially extend the climatic tolerances and range of the weed's spread.

Distribution and habitat

Lantana is native to the tropical and sub-tropical regions of Central and South America. It is found throughout most coastal and sub-coastal areas of eastern Australia, from north Queensland to southern New South Wales. It grows in a wide variety of habitats, from exposed dry hillsides to wet, heavily shaded gullies.

Toxicity

Many lantana varieties are poisonous to stock. It is difficult to distinguish which varieties are toxic so it is better to treat all forms as potentially poisonous. The toxins in lantana include the triterpene acids, lantadene A (rehmannic acid), lantadene B, and their reduced forms.

Most cases of lantana poisoning occur when new stock are introduced into lantana infested areas. Stock bred on lantana-infested country avoid lantana unless forced to eat it due to lack of other fodder. Young animals introduced to lantana areas are most at risk.

Symptoms of lantana poisoning depend on the quantity and type of lantana consumed and, under some circumstances, the intensity of light to which the animals are exposed.

Early symptoms of depression are noticeable, with head swaying, loss of appetite, constipation and frequent urination. After a day or two the eyes and the skin of the nose and mouth start yellowing with jaundice, and the muzzle becomes dry and warm. The eyes may become inflamed and have a slight discharge. The animal also becomes increasingly sensitive to light. Finally, the muzzle becomes inflamed, moist and very painful ('pink nose'). Areas of skin may peel and slough off. Death commonly occurs 1–4 weeks after symptoms occur. In an acute form, death occurs 3–4 days after eating the plant.

If animals show any of the early symptoms, they should be moved to lantana-free areas, kept in the shade and monitored. Veterinary treatment should be sought immediately. Some remedies may

include intravenous fluids, treating skin damage with anti-biotics, or drenching with an activated charcoal slurry.

Care should be taken when introducing new or young animals into a paddock if lantana is present. Ensure they have enough fodder to prevent them eating lantana in quantities sufficient to result in poisoning. During drought, animals should not be placed in lantana-infested areas without alternative food.

Declaration details

All lantana species are declared Class 3 plants under the *Land Protection (Pest and Stock Route Management) Act 2002*. Lantana species cannot be sold or distributed and landholders may be required to control these plants if they pose a threat to an environmentally significant area.

Management program

Using a mix (integration) of control methods gives the best results. Size, density and geographic location of infestations are important considerations before choosing which control methods to use. A general principle is to commence control programs in areas of light infestations and work towards the denser infestations.

For large lantana infestations, treatment with herbicides by foliar spraying is usually not economically feasible. However, fire, dozing/stickraking, slashing/cutting, aerial helicopter spraying can reduce dense infestations, making follow-up spot treatments with chemicals more economically viable.

Lantana seed banks remain viable for at least four years, so follow-up control to kill seedlings before they mature is vital to ensure initial management efforts to control the parent bush are not wasted.

Appropriate fire regimes may become part of a management program to ensure lantana invasiveness is reduced and pasture is maintained.

Removal of lantana within areas of remnant vegetation may require a permit under the *Vegetation Management Act 1999*. Further information should be sought from the Department of Natural Resources and Water before works commence.

Mechanical control

Stickraking or ploughing can be effective in removing standing plants. However, regrowth from stumps and/or increased seedling germination in disturbed soil is common and the site will require follow-up treatment.

Grubbing of small infestations—for example, along fence lines—can be a useful and effective method of removing plants, though this is time consuming.

Repeated slashing can also reduce the vigour of lantana, exhausting its stored resources and reducing its likelihood of re-shooting.

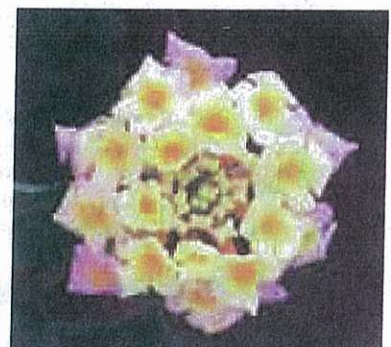
Some locations—for example, very steep inclines or gullies—are not suitable for mechanical control

Lantana

Lantana camara



DECLARED CLASS 3



Description

Lantana is a heavily branched shrub that can grow in compact clumps, dense thickets or as a climbing vine.

The stems are square with small, recurved prickles. Most leaves are about 6 cm long and are covered in fine hairs. They are bright green above, paler beneath and have round-toothed edges. Leaves grow opposite one another along the stem. When crushed the leaves produce a distinctive odour.

Flowers appear throughout most of the year in clustered compact heads about 2.5 cm in diameter. Flower colours vary from pale cream to yellow, white, pink, orange and red. Lantana produces round berry-like fruit that turn from glossy green to purplish-black when ripe.

The problem

Currently, lantana covers more than \$4 million ha of the east coast from southern New South Wales to far north Queensland. Small infestations of lantana have also been found in central west Queensland, the Northern Territory, Western Australia, South Australia and Victoria. Efforts are under way to control these.

Lantana is mainly spread by people (as ornamental plants) and fruit-eating birds. It forms dense thickets that smother and kill native vegetation and are impenetrable to animals, people and vehicles.

Research indicates more than 1300 native species are negatively affected by lantana invasion, including many endangered and threatened species. As lantana is a woody shrub that has small diameter, combustible canes, its presence can also create hotter bushfires.

Declaration details

Broadleaved pepper tree is a declared Class 3 plant under the *Land Protection (Pest and Stock Route Management) Act 2002*. The Act prohibits the supply or sale of Class 3 plants and may require their removal from environmentally significant areas.

Further information

Further information is available from the vegetation management/weed control/environmental staff at your local government.

TABLE 1 – HERBICIDES REGISTERED FOR THE CONTROL OF BROADLEAVED PEPPER TREE

Method	Herbicide	Rate	Registration status	Comments
Basal bark spray	fluroxypyr (200 g/L)	35 mL per 1 L diesel or kerosene	PERMIT 7485	Spray or paint the chemical on the full circumference of each stem.
Cut stump	glyphosate (360 g/L)	1 L per 1 L water	PERMIT 7485	Paint within 15 seconds of cutting
Foliar spray	fluroxypyr (200 g/L)	500 mL per 100 L water	Registered	Winter application or while the tree is in berry, providing that no replanting of desirable broadleaf plants is intended for 6 months.

Read the label carefully before use and always use the herbicide in accordance with label directions.

It is a requirement of a permit that all persons using the products covered by this off-label permit comply with the details and conditions listed in the permit. In addition read the herbicide label carefully before use and always use the herbicide in accordance with label directions. The above permit can be used by pest control operations, members of environmental groups such as Bushcare, Catchment Care, Coast Care and people employed as or working under supervision of local and state government officers.

Broadleaved pepper tree

Schinus terebinthifolius



DECLARED CLASS 3



The problem

The broadleaved pepper tree is invading coastal dune areas, wetlands and along stream banks. It harbours a disease which can kill mangroves. The tree is choking out native plants and is becoming a serious problem. Broadleaved pepper tree is a garden escapee and native to Brazil.

The broadleaved pepper tree can also affect human and animal health as it contains toxic resins. Contact with the sap can cause persistent swelling, rashes, welts, running sores, swollen faces, colic and haemorrhages in the eyes. The pollen can cause respiratory difficulty.

Description

Broadleaved pepper trees can grow into a large spreading tree, up to 10 m high and broad. The leaves consist of 5–9 dark green leaflets and at the ends of the branches are small whitish flowers, followed by bunches of glossy, round red fruits 6 mm across. There are male and female trees, so not all bear fruit.

Management

Birds are attracted to the trees bright red berries and are the main method of spread of this tree. Removal should be done in winter. Revegetation of the cleared area should be pre-planned to ensure that other weeds do not gain a foothold in the disturbed area, and should include mulching to keep weeds down.

Hand pull or chip out young plants.

If the tree is chopped down be prepared for it to regrow and the roots to sucker, sometimes for up to six months. Treat these as they occur. Try cutting 2 inches below the soil, chip away all the bark and nail a tin plate down over the stump. Sometimes the plant won't start to regrow until 18 months after initial chopping.

Broadleaved pepper tree can be put through a wood chipper to make mulch.

Management strategies

Singapore daisy produces variable amounts of seeds but is mainly spread by cuttings via slashing and pruning. Revegetation of the cleared area should be pre planned to ensure that other weeds do not gain a foothold in the disturbed area, include mulching to keep weeds down.

Take care when mowing or slashing around areas planted with Singapore daisy, so as not to transfer the problem elsewhere.

Hand pull and dig up runners. The plant will regrow from the smallest cutting so dispose of waste carefully. Either burn waste or put into a black plastic bag and leave in the sun for a few days before putting into the refuse bin. Repeat hand pulling will need to be done as new regrowth appears.

Declaration details

Singapore daisy is a declared Class 3 plant under the *Land Protection (Pest and Stock Route Management) Act 2002*. The Act prohibits the supply or sale of Class 3 plants and may require their removal from environmentally significant areas.

Further information

Further information is available from the vegetation management/weed control/environmental staff at your local government.

TABLE 1 – HERBICIDES REGISTERED FOR THE CONTROL OF SINGAPORE DAISY

Method	Herbicide	Rate	Registration status	Comments
Foliar spray	metsulfuron-methyl (600 g/L)	10 g per 100 L water plus wetting agent	DPI Board approval	Spray thoroughly to wet all foliage, but not to cause run-off. Minimise contact with desirable species.

Read the label carefully before use and always use the herbicide in accordance with the directions on the label.

Singapore daisy

Sphagneticola trilobata

DECLARED CLASS 3



The problem

Singapore daisy spreads rapidly and smothers seedling, ferns and shrubs and will out-compete them for survival. It is invading all different environmental areas, even living in sand. Singapore daisy is difficult to control.

Description

Singapore daisy is a vigorous ground cover with lush glossy green leaves. The leaves are usually 3 lobed and in pairs up the stem. It produces yellow to orange-yellow daisy flowers about 2 cm across all year round. The flowers are held above the leaves on short stalks. Singapore daisy is a garden escapee and native of tropical America.

Table 1 Herbicides registered for the control of fireweed

Situation	Herbicide	Rate	Registration status	Comments
Agricultural non-crop land, bushland, forests, wetlands, coastal and adjacent areas	2,4-D (625 g/L)	300 ml/100 L water or 3 L/ha	PERMIT 11463	Spot spray only.
Agricultural non-crop land, commercial and industrial land, forests, pastures and right-of-way areas	Aminopyralid (10 g/L) + fluroxypyr (333 g/L)	500 ml/100 L water	Registered	Apply as a high-volume or spot spray to flowering plants up to 30 cm tall.
Agricultural non-crop land, commercial and industrial land, forests, pastures and right-of-way areas	Triclopyr (300 g/L) + picloram (100 g/L) + aminopyralid (10 g/L)	350 ml/100 L water	Registered	Apply as a high-volume or spot spray when the plant is flowering.
Agricultural non-crop land and pastures	2,4-D (300 g/L)	700 ml/100 L water	Registered	Apply as a high-volume spray when the plant is actively growing.
Pastures and improved pastures (containing clover and/or lucerne)	Bromoxynil (200 g/L)	1.4 L/ha seedling control, 2.8 L/ha for early flowering plants	Registered	Apply during the autumn–winter period when plants are young and actively growing. Not effective on mature plants.
Improved pastures (containing clover and/or lucerne)	Bromoxynil (250 g/L) + diflufenican (25 g/L)	500 ml/ha	Registered	Seedling control up to the four leaf stage
Improved pastures (containing clover)	MCPA (250 g/L) + diflufenican (25 g/L)	1 L/ha	Registered	Seedling control up to the four leaf stage

It is a requirement of a permit that all persons using the products covered by the off-label permit PER11463 comply with the details and conditions listed in the permit. In addition, read the herbicide label carefully before use and always use the herbicide in accordance with label directions. The above permit can be used by pest control operators, members of environmental groups such as Bushcare, Catchment Care, Coast Care, and people employed as or working under supervision of local and state government officers.

Fact sheets are available from Queensland Primary Industries and Fisheries service centres and the Queensland Primary Industries and Fisheries Business Information Centre (telephone 13 25 23). Check our website at www.dpi.qld.gov.au to ensure you have the latest version of this fact sheet. The control methods referred to in this pest fact should be used in accordance with the restrictions (federal and state legislation, and local government laws) directly or indirectly related to each control method. These restrictions may prevent the use of one or more of the methods referred to, depending on individual circumstances. While every care is taken to ensure the accuracy of this information, Queensland Primary Industries and Fisheries does not invite reliance upon it, nor accept responsibility for any loss or damage caused by actions based on it.

Control

Management strategies

The best approach to fireweed control is to prevent it establishing by ensuring that there is a dense cover of pasture in autumn and winter. Waiting until autumn to begin pasture improvement will worsen the fireweed problem because fireweed (which germinates in autumn) will be promoted ahead of the pasture by fertilising and direct drilling of winter pasture species.

When small infestations of fireweed are identified, act immediately to prevent the situation from becoming worse and to increase the likelihood of eradication.

The best control for fireweed incorporates integrated management strategies, including herbicides and mechanical methods in addition to vigorous permanent pastures that can compete strongly with fireweed seedlings.

Biological control

A number of organisms can be found attacking fireweed, but any effect they have is temporary and isolated. An orange rust (*Puccinia lagenophorae*) is common and often affects fireweed, particularly in lower country. The blue stem borer moth (*Patagoniodes farinari*) is also common, but the larvae usually develop too slowly to have an impact. Two moths imported from Madagascar were host tested. In controlled tests they were found to feed on important non-target plants so no releases were made and all these insects were destroyed.

Other potential biological control agents have been identified, but rigorous testing is needed to ensure that they do not feed on closely related Australian native plants. No new agents are expected to be released in the near future.

Mechanical control

Chip out, bag and burn any isolated plants or dispose of them at council-approved landfill tips. You should not burn any toxic plants in household wood-burning stoves or heaters. Remove chipped-out plants from paddocks because they may still set seed and poison stock.

Slashing is usually not effective as it may lead to increased stock poisoning. Slashing tends to give a good visual effect because it removes the flowers, but at best it delays flowering and seeding and at worst damages the pasture, making conditions more favourable for fireweed.

Fireweed remains toxic after being cut and becomes more attractive to stock and thus more likely to cause poisoning.

Herbicide control

Herbicides are most effective if sprayed before plants reach maturity. However, application during flowering will be effective if higher recommended rates of herbicide are applied.

Research is ongoing at the Alan Fletcher Research Station for herbicide controls against fireweed, including residual control methods. Trials have shown herbicide application in the autumn period during April provides good control. Before undertaking such programs landholders are advised to determine the infestation levels.

An effective application method in an open pasture situation is a boom spray. Follow this up by spot spraying, or pulling and bagging any regrowth or missed plants.

Boom spraying is also suitable for follow-up treatments, as it allows destruction of immature plants, which may otherwise grow to re-seed the area before they can be noticed.

Bromoxynil (trade names Bromicide 200, Brominil 200 and Buctril 200) is suitable for use in pastures containing clovers, medics and lucerne, and it will not affect grass.

Bromoxynil is effective if used on seedlings, which usually appear in autumn and early winter but may appear later following rain. Twice as much bromoxynil is needed if it is applied to plants that are just beginning to flower. Bromoxynil is less effective on mature plants, as it is a contact herbicide only. Mature plants will only be killed off where the bromoxynil comes into contact with the plant, allowing recovery of the plant from lower, untouched portions.

Unfortunately, fireweed control is often not considered until the highly visible flowers appear and it is too late for effective control with herbicide.

Table 1 (overleaf) lists herbicides registered for fireweed control. Before using any herbicide always read the label carefully. All herbicides must be applied strictly in accordance with the directions on the label.

Further information

Further information is available from your local government office, or from your local primary industries and fisheries biosecurity officer: contact details are available through 13 25 23.

Description and general information

Fireweed is an annual or a short-lived perennial. It is a daisy-like herb that can vary greatly in size and shape depending on environmental conditions. In dry, harsh conditions it may be less than 20 cm tall with narrow leaves, no branching and few flowers. In ideal conditions fireweed will grow to 50 cm tall with multiple branches, long wide leaves (6 cm × 2 cm) and about 100 flowers.

The leaves are alternate, dark green with serrated margins, and are usually 2–6 cm long. The flowers are bright yellow, daisy-like with a diameter of approximately 2 cm, and produce up to 100 seeds each. It is very similar to a range of native *Senecio* species.

Seeds are small, cylindrical in shape, and 2–3 mm long. Each seed has rows of very fine short hairs and a silky pappus (parachute). Flowers and seeds are produced continuously over the growing season. An average plant can produce over 10 000 seeds during this time.

Fireweed has a shallow branched taproot with many fibrous roots. The shallow roots often allow plants to fall over in windy conditions. When this happens the stem will sprout roots wherever it touches the ground.

Life cycle

Fireweed can be an annual but many plants do survive through the summer, so plants of all ages can be present at the same time.

Seeds germinate in mild, warm conditions (15–27 °C) in the presence of light and moisture. Most seedlings appear between March and June then grow quickly to produce their first flowers in 6–10 weeks.

Fireweed usually begins to die back in spring. The top growth dies, leaving the base and roots that can last through the summer and re-grow in the following autumn. Depending on rainfall, some plants continue to grow and produce flowers, and seed through summer.

A dry summer followed by autumn or winter rains leads to heavy fireweed infestations.

Poisoning

Unless fireweed poisoning is severe it can be difficult to detect, because the symptoms (such as reduced weight gain and/or low milk production) can have a variety of causes.

Symptoms of more severe poisoning are loss of appetite, aimless wandering, loss of coordination, sensitivity to sunlight, jaundice and abdominal straining with rectal eversion. Severe poisoning will result in death, and an autopsy will reveal chronic liver sclerosis.

All growth stages contain pyrrolizidine alkaloids that damage the liver. Fireweed is toxic when green or dry, therefore contaminated hay or silage may be toxic.

Fireweed is generally unpalatable to cattle, so poisoning is most likely to occur when fireweed plants are dense and stock can not feed selectively, or when there is a shortage of pasture and hungry stock are less selective about food.

Sheep and goats are less susceptible to fireweed poisoning and can graze in fireweed-infested paddocks for at least one season. Toxins found in fireweed are able to taint the milk of goats that graze this plant. Goats for milk production should not be allowed to graze in fireweed-infested paddocks.

Habitat and distribution

Fireweed is native to Madagascar and southern Africa, and was first recorded in Australia in the Hunter Valley in 1918. It is not known how it was introduced, but it could have been brought in privately as a garden plant. It spread slowly at first, but in the last 30 years it has rapidly increased its range, most likely aided by modern transport and rural practices.

Fireweed is a weed of beef and dairy pasture east of the Great Dividing Range, and is currently established along the entire New South Wales coast and north to Brisbane.

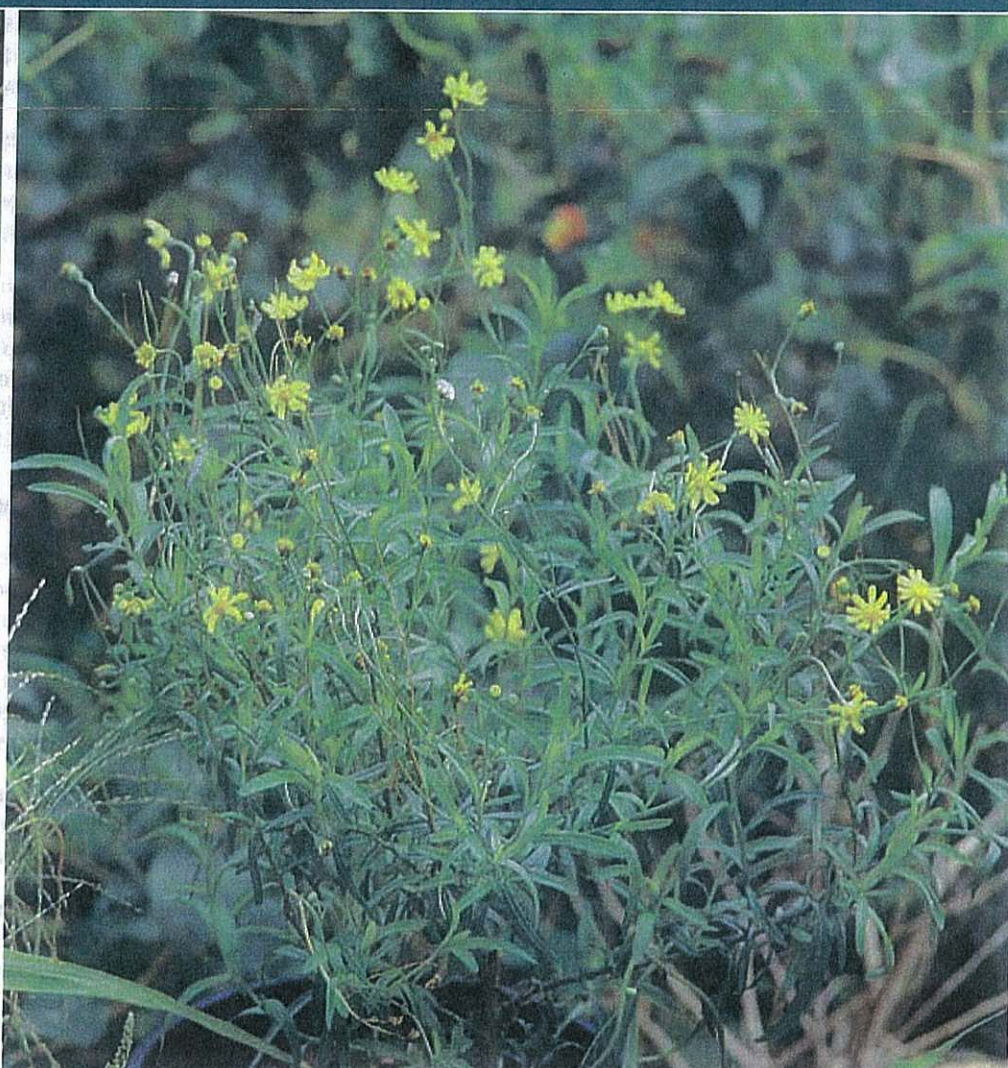
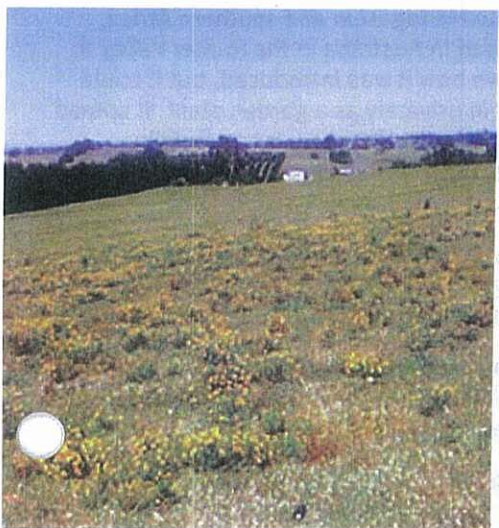
Isolated infestations have been found near Caboolture, Cooroy, Belli Park, Maleny, Yandina, Pelican Waters and as far north as Gympie.

Fireweed is spreading northward and has the potential to infest extensive areas of valuable pasture north of Brisbane. A prediction based on climate and land use suggests that fireweed has the potential to be a serious pest as far north as Rockhampton.

Even light infestations of fireweed can produce 1 million seeds per hectare. Seeds are light and have a pappus that enables them to be carried by the wind. The seeds also have rows of short hairs that can loosely cling to animals. Fireweed can be spread short distances by wind and stock. However, it is spread over greater distances in pasture seed, hay, turf, mulch and with stock transport. Fireweed seed can also be spread as a contaminant in transported materials such as hydromulch and grass seed.

Fireweed

Senecio madagascariensis



Fireweed is an introduced weed that competes strongly with pasture species and is toxic to livestock. It is responsible for illness, slow growth and poor conditioning of cattle, and can result in death.

Heavy infestations of fireweed often result from neglect of steadily increasing fireweed infestations in previous years, and lack of good ground cover caused by overgrazing, drought, fire or slashing.

Declaration details

Fireweed is a declared Class 2 plant under the *Land Protection (Pest and Stock Route Management) Act 2002*. A Class 2 pest is one that has already spread over substantial areas of Queensland, but its impact is so serious that we need to try and control it and avoid further spread onto properties that are still free of the pest. By law, all landholders must try to keep their land free of Class 2 pests and it is an offence to keep or sell these pests without a permit. A local government may serve a notice upon a landholder requiring control of declared pests.



Queensland Government

Management strategies

Prevention is the key and celtis should be removed before it has the chance to grow into a problem. Small seedlings can be hand pulled or dug out. Pre-plan your revegetation so other weeds do not invade the disturbed area. Dozing and burning dense infestations with controlled grazing gives best control. Herbicides may be necessary for killing larger specimens.

Further information

Further information is available from the vegetation management/weed control/environmental staff at your local government.

Declaration details

Chinese celtis is a declared Class 3 plant under the *Land Protection (Pest and Stock Route Management) Act 2002*. The Act prohibits the supply or sale of Class 3 plants and may require their removal from environmentally significant areas.

TABLE 1 – HERBICIDES REGISTERED FOR THE CONTROL OF CHINESE CELTIS

Method	Herbicide	Rate	Registration status	Comments
Basal bark	fluroxypyr (200 g/L)	35 mL per 1 L diesel or kerosene	Registered	Young plants up to 2 m high and 20 cm basal diameter
Stem injection	picoloram (100 g/L) + triclopyr (200 g/L)	1 L per 4 L water	PERMIT 7485	
Cut stump	picoloram (100 g/L) + triclopyr (200 g/L)	50 mL per 1 L water	PERMIT 7485	Cut stumps to less than 10 cm above the ground and immediately paint stump after cutting.
Stem injection	glyphosate (360 g/L)	Undiluted at 1 mL per 2 cm of hole or cut	PERMIT 7485	Plants up to 30 cm basal diameter.
Cut stump	glyphosate (360 g/L)	1 L to 12 L water	PERMIT 7485	
Spot spray	fluroxypyr (200 g/L)	500 mL per 100 L water	PERMIT 7485	Overall spray on young plants less than 2 m high.
Foliar spray	2,4-D acid (300 g/L)	1 L per 100 L water	Registered	Overall spray on young seedlings.

Read the label carefully before use and always use the herbicide in accordance with the directions on the label.

It is a requirement of a permit that all persons using the products covered by this off-label permit comply with the details and conditions listed in the permit. In addition, read the herbicide label carefully before use and always use the herbicide in accordance with label directions. The above permit can be used by pest control operations, members of environmental groups such as Bushcare, Catchment Care, Coast Care and people employed as or working under supervision of local and state government officers.

Chinese celtis

Celtis sinensis



DECLARED CLASS 3



The problem

Chinese celtis is an Asian tree that is naturalised throughout most of south-east Queensland. This fast growing species forms dense infestations along creek banks and prevents regeneration of native riparian vegetation. It also sucks up water and has the potential to affect populations of native animals through habitat destruction. Celtis is very common in and around Brisbane, due to its cultivation as a shade tree and garden plant. Celtis seeds are spread by birds, flying foxes and water.

This deciduous tree grows up to about 12 m tall and flowers in spring. Leaves are quite glossy, with a paler underside and pronounced veins. Thousands of small, orange berries are produced and are dispersed when eaten by birds. Celtis often grows in clay soils associated with alluvial creek flats and gullies. It is an invader of riparian habitats and seems particularly successful in areas where the original vegetation has been disturbed or fenced off from grazing stock.

Description

TABLE 1 – HERBICIDES REGISTERED FOR THE CONTROL OF GROUNDSEL BUSH

Situation	Herbicide	Rate	Comments ^{1,2,3}
pastures; non-agricultural, commercial, industrial land; rights-of-way	2,4-D amine (500 g/L)	3.6-5.5 L/ha 0.4 L/100 L 300 mL/15 L 1.2 L/15 L	air - higher rate for bushes high volume foliar spray cut stump misting
pastures; non-agricultural land	2,4-D acid	10 L/ha 33 mL/ 1 L kero or turps 100 mL/10 L 1 L/10 L	helicopter spraying basal bark or cut stump knapsack foliar spray sprinkler spray - 1 L/100 m ²
pastures	2,4-D ester 800 g/L 600 g/L e.g. AF rubbervine spray	0.25 L/ha 0.37 L/ha 1 L/40 L diesel	Do not spray in "hazardous areas" - consult local DPI office for further information Basal bark or cut stump
Commercial industrial land, pastures, rights-of-way	2,4-D sodium e.g. Tornado DF	0.275 kg/100 L	Spot spray
irrigation channels/banks; non-agricultural commercial industrial land; home gardens, pastures; rights of way; forests	glyphosate ⁴ - IPA 360 g/L	0.7-1 L/100 L 100 - 150 mL/15 L 1:9 (2x2 mL dose/0.5 m bush height)	handgun - high rate in winter knapsack foliar spray splatter gun foliage
commercial industrial land; pastures; rights-of-way	picloram + 2,4-D 75 g + 300 g e.g. Tordon 75-D ^R	0.65 L/100 L	spot spray foliage
commercial industrial land; pastures; rights-of-way; forests	picloram + triclopyr (premix) e.g. Grazon DS ^{R*} *Cannot be use in hazardous areas without a Department of Primary Industries Permit. Access	0.25-0.35 L/100 L 2.5 L/100 L 30 mL/15 L 1 L/60 L diesel	handgun foliage misting foliage knapsack foliage basal bark or cut stump
recreation commercial industrial land; pastures; rights-of-way; forests	Triclopyr 600g/L e.g. Garlon 600® home garden packs e.g. Defender Chemspray (Garden King)	0.16-0.32 L/100 L water 1 L/120 L diesel 25-50 mL/15 L 50 g/L 120 g/L 0.1-0.2 L/5 L water 0.1 L/0.5 L kerosene	overall spray foliage basal bark or cut stump knapsack foliage overall spray foliage basal bark or cut stump knapsack foliage basal bark or cut stump
grass pasture	dicamba + MCPA (premix) (e.g. Banuel M ^R)	2.8-4 L/ha 0.19-0.27 L/100 L 60 mL/15 L	knapsack foliage
pastures; forests; rights-of-way	Clopyralid e.g. Lontrel ^R	0.33-0.5 L/100 L	handgun foliage
pastures	Tebuthiuron 200g/kg e.g. Graslan®	1 gm/m ²	hand application (use restrictions apply)

Notes:

1. Pasture legumes are susceptible to these herbicides.
2. Cut stump treatments – cut as close to ground as possible and apply mixture immediately (within 15 seconds).
3. Basal bark treatments – paint/spray 25 cm band around base of each stem.
4. Do not apply during summer or winter drought.
5. Glyphosate will kill pasture species.

Fact sheets are available from DPI&F service centres and the DPI&F Information Centre phone (13 25 23). Check our web site <www.dpi.qld.gov.au> to ensure you have the latest version of this fact sheet. The control methods referred to in this Pest Fact should be used in accordance with the restrictions (federal and state legislation and local government laws) directly or indirectly related to each control method. These restrictions may prevent the utilisation of one or more of the methods referred to, depending on individual circumstances. While every care is taken to ensure the accuracy of this information, the Department of Primary Industries and Fisheries does not invite reliance upon it, nor accept responsibility for any loss or damage caused by actions based on it.
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Biological control

Biological control in the process of introducing the natural enemies of the weed to reduce their growth and seed production, or kill them. Biological control agents are specific to that weed, they will not harm native or economically important plants. Biological control agents are released at specific locations from which they will naturally start seeking out more areas of the targeted weed.

Since the biological control program began for Groundsel bush in 1967 over thirty-five different insects have been tested but only six have become permanently established in the field.

The six insects established are:

1. Stem borer (*Megacyllene mellyi*). This beetle is restricted to areas adjacent to salt marshes where the sap flow in the host plant is lower. Newly hatched larvae are drowned by the heavier sap flow in plants growing in non-saline soils. Dense populations of this insect can reduce groundsel bush infestations in suitable habitats.
2. Plume moth (*Oidaematophorus balanotes*). This insect is present in all areas. Damage is caused by larvae tunnelling in the stems and varies from severe dieback to death of individual branches. Populations of the moth appear to be restricted by ant predation on the eggs and young larvae. This in turn restricts plant damage.
3. Gall-fly (*Rhopalomyia californica*). The larvae of this mosquito-like fly feed within development shoots and buds. Initially this insect caused heavy damage when it was released. However, soon after its release it was attacked by a small native wasp that drastically reduced gall numbers. Galls can always be found in low numbers, but occasionally higher numbers are found in patches. Overall damage to the plant is minimal.
4. Groundsel bush leaf beetle (*Trirhabda baccharidis*). This beetle is restricted to similar habitats as the stem borer where the larvae can form suitable cocoons and pupate in the soil. Plants will be totally defoliated in autumn but can recover and are in full leaf next spring. In some years larvae severely damage the buds and flowers.
5. Leaf skeletoniser (*Aristotelia ivae*). The larvae of this moth eat the soft leaf tissue leaving the skeletal woody veins. Though widespread, populations do not become large enough to cause significant damage. It is most commonly found in the spring on new leaves.
6. Leaf miner (*Buccalatrix iveila*). The larvae of this small moth mine in the leaf blades and later skeletonise the leaves in a manner similar to *Aristotelia*. This insect is widespread within the range of groundsel bush and causes minor damage.

Recent research has seen the move away from insect to plant disease biological control agents. Two diseases have been studied in Florida, USA. Experimental field releases of a rust fungus *Puccinia evadens* from Florida were commenced in 1998 and this pathogen is now established at several sites.

7. Groundsel bush rust (*Puccinia evadens*). This pathogen acts as both a leaf and a stem parasite causing defoliation during summer and winter and stem dieback over summer. The infection process requires a moisture film on the leaf or stem surface. The dry spores are spread by wind.

The presence of these biocontrol agents does not relieve landholders from their responsibility under Queensland legislation to control declared plants.

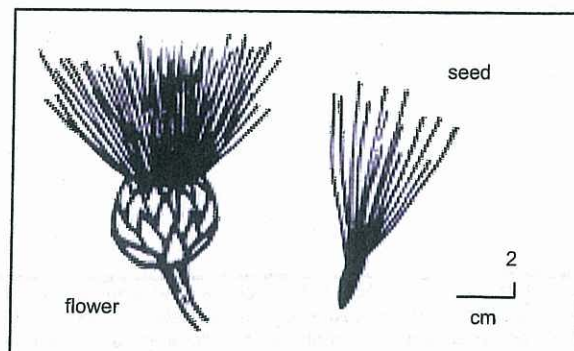
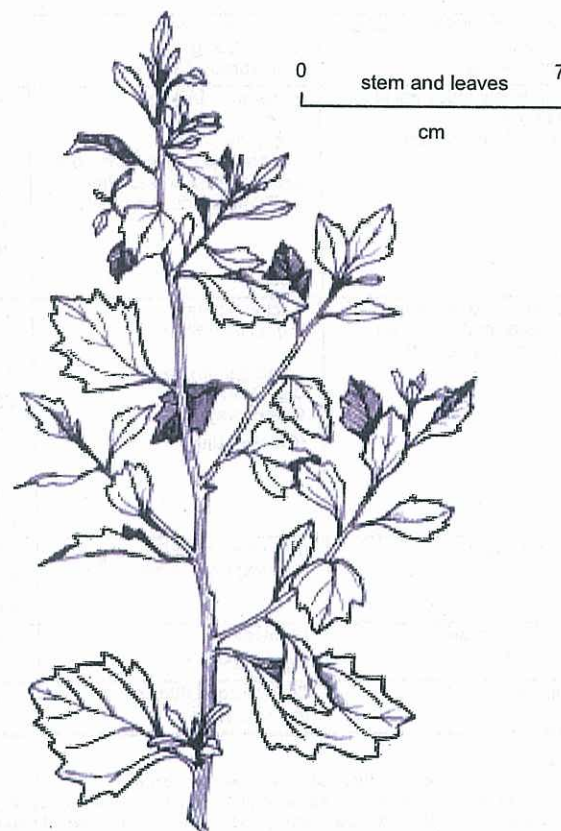
Herbicide control

Before using any herbicide always read the label carefully. All herbicides must be applied strictly in accordance with the directions on the label.

Table 1 details the herbicides registered for groundsel bush control.

Further information

Further information is available from the vegetation management/weed control/environmental staff at your local government.



Problem

Economic

Groundsel bush rapidly colonises disturbed areas, especially overgrazed pastures. It competes with pasture species for water and nutrients. It spreads rapidly from windbourne seed making clearing groundsel bush from paddocks a very time consuming and expensive task.

Environmental

In native *Melaleuca* wetlands, groundsel bush can form a dense understorey, suppressing growth of native sedges and interfering with the natural ecosystem. Fire management may play an important role in controlling groundsel bush in this environment although no formal research has yet been conducted.

Groundsel bush can become abundant in the vegetation along watercourses and in coastal woodlands and forest areas if not controlled.

Social

The wind dispersed seed can be a nuisance in urban areas where it sticks to insect screens and germinates in home gardens. Urban problems include potential allergies caused by air-borne pollen and the air-borne seed 'fluff'.

Habitat and distribution

Groundsel bush is a native of Florida and coastal areas adjacent to the eastern side of the Gulf of Mexico.

It was introduced into the Brisbane region as an ornamental plant in the year 1900 and has spread along the coastal areas of south-east Queensland (north to Miriam Vale Shire) and down the New South Wales coast. Scattered plants have occurred as far west as the Chinchilla region.

Groundsel bush is a rapid coloniser of cleared, unused land and is particularly suited to moist gullies, salt marsh areas and wetlands. It also does well on high, cleared slopes.

Most germination occurs in the autumn/winter period. Plants normally do not flower in the first year of growth. Two metre tall plants can produce half up to a million seeds.

Seeds from mature plants drift in the breeze like thistle seeds, most falling within a few metres of the parent bush. Wind updraughts can carry seeds many kilometres.

Seeds germinate readily with rainfall, however, if they become buried they can remain dormant for several years.

Seeds are readily transported by wind, running water, vehicles and machinery. Soil disturbance in infested areas usually leads to substantial germination. Further infestation occurs unless the ground is sown to pasture or other competitive ground cover.

Declaration details

Groundsel bush is a declared Class 2 plant under the *Land Protection (Pest and Stock Route*

Management) Act 2002. A **Class 2** pest is one that has already spread over substantial areas of Queensland, but its impact is so serious that we need to try and **control** it and avoid further spread onto properties that are still free of the pest. By law, all landholders must try to keep their land free of Class 2 pests and it is an offence to keep or sell these pests without a permit. A Local Government may serve a notice upon a landholder requiring control of declared pests.

Prevention

The spread of groundsel bush threatens the sustainability of agriculture and other land uses. Groundsel bush can replace plants and destroy habitat for native wildlife.

The best form of weed control is prevention. Always treat weed infestations when small, do not allow weeds to establish. Weed control is not cheap, but it is cheaper now than next year, or the year after. Proper management planning ensures you get value for each dollar spent.

Look at your weed problem carefully. Can you realistically eradicate it? Or should you contain the weed to stop new infestations developing while you reduce existing ones? What are you required to do by legislation? How does weed control fit into your property management plan? What can you do to restore areas and prevent re-establishment?

The best approach is usually to combine different methods. Control may include chemical, mechanical, fire and biological methods combined with land management changes. The control methods you choose should suit your particular situation.

Management strategies

In grazing situations good pasture management will greatly reduce groundsel bush invasions. Slashing, timely use of fertiliser and management of stocking rates can assist in control by maintaining a healthy pasture. Good pastures provide competition to limit re-invasion of groundsel bushes. Consult the Department of Primary Industries Pasture Agronomists on the best options for your property.

For tall, dense infestations burning can reduce the amount of above-ground material (and even kill the odd plant) making it a lot easier to spray regrowth. Annual burning does not reduce existing plant numbers, but allows grasses to establish more quickly and outcompete groundsel bush seedlings.

Regular slashing over a period of several years will result in a decreased level of infestation. In non-grazing situations re-forestation will eventually assist in control of groundsel bush. However, it is important to ensure that seed production is prevented while trees are establishing.

Mechanical control

Hand pull out small plants. Larger plants dig plants out or cut them off more than 10 cm below ground level.

As groundsel bush is a perennial woody plant with underground growing buds, **slashing or burning will rarely kill plants** and such action will generally result in regrowth occurring. Therefore the regrowth will need to be promptly controlled.

Groundsel bush

Baccharis halimifolia

DECLARED CLASS 2



Description

Groundsel bush is a densely-branched shrub usually no more than 3 m high. Stems are green maturing to brown and woody. Bark of mature plants is deeply fissured. Leaves are dull green, alternate, wedge-shaped, 2.5–5 cm long, 1–2.5 cm broad, with a few lobes in the upper part. Has a deep branching taproot with numerous fibrous laterals in the upper soil.

Male and female flowers are borne on separate plants. Male flowers are pale yellow and open around mid to late March, slightly earlier than the female flowers. Female flowers are white and inconspicuous at the end of branches until seeds are fully developed. Then the plant has a fluffy appearance with tufts of white hair (around late March to early April) that begin to blow the fluffy seeds in the breeze from mid to late April.

Management strategies

This plant need not be a problem if it is kept in a pot or hanging basket in a location that can not be accessed by birds. Birds eating the berries disperse this plant. Unwanted plants should be dug out and disposed of at the appropriate Council landfill site.

Take care to remove the entire crown or underground stem of the plant, to reduce the chance of regrowth.

Declaration details

Basket or ground asparagus fern is a declared Class 3 plant under the *Land Protection (Pest and Stock Route Management) Act 2002*. The Act prohibits the supply or sale of Class 3 plants and may require their removal from environmentally significant areas.

Further information

Further information is available from the vegetation management/weed control/environmental staff at your local government.

TABLE 1 – HERBICIDES REGISTERED FOR THE CONTROL OF BASKET OR GROUND ASPARAGUS FERN

Method	Herbicide	Rate	Registration status	Comments
Spot spray	metasulfuron-methyl (600 g/L)	10 g per 100 L water plus wetting agent or 100 g/ha plus wetting agent	PERMIT 7485	Do not use on coastal dunes or near the root zone of casuarinas or pandanus trees.
Cut stump, spot spray	Diesel	Apply neat	PERMIT 7485	Trials suggest spraying the entire central crown to the point of runoff. This does not require cutting or disturbing the target plant or other surrounding vegetation.
Spot spray	dicamba (500 g/L)	200 mL on mature to 1 L on regrowth per 100 L water, or 2 L/ha	PERMIT 7485	Only for short-term knockdown.

Read the label carefully before use and always use the herbicide in accordance with the directions on the label.

It is a requirement of a permit that all persons using the products covered by this off-label permit comply with the details and conditions listed in the permit. In addition, read the herbicide label carefully before use and always use the herbicide in accordance with label directions. The above permit can be used by pest control operations, members of environmental groups such as Bushcare, Catchment Care, Coast Care and people employed as or working under supervision of local and state government officers.



Basket or ground asparagus fern

Asparagus aethiopicus cv. *Sprengeri*

DECLARED CLASS 3



The problem

Basket asparagus is one of the most significant garden escapes invading the coastline. It survives well on sand dunes, shallow-soiled headlands and in rainforest understorey. In some places it has become the dominant ground cover displacing native plants, even in undisturbed systems. A problem along the entire coast, it is also known as ground asparagus or simply asparagus fern. It was introduced from Africa.

Description

Basket asparagus has long, arching, prickly stems up to 2 m long. The slender leaves are light green. It produces clusters of small, creamy flowers and fruits up to 8 mm in diameter. Fruits ripen to bright red and each contains a single, black, round seed. Tubers bearing starch and water are present, but these do not regrow or reproduce.

Appendix C
Pest Fact Sheets

APPENDIX B – WEED CONTROL TECHNIQUES

Tree Spearing

Tree spearing uses a specifically designed tree spear and technique. Useful for killing trees and shrubs to be left *in situ* to naturally decay

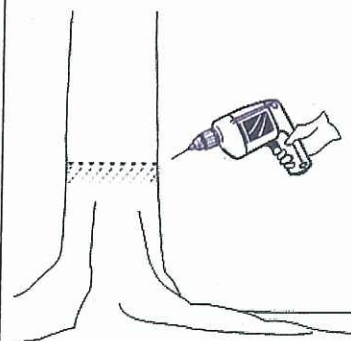
- The spear is thrust into the tree at an angle of 30° to 40° from the vertical,
- Apply the appropriate herbicide amount into the cut.
- Repeat the process, forming a row of cut approximately 50 mm apart.



Tree injection

Useful for killing trees and shrubs >5cm in circumference to be left *in situ* to naturally decay:

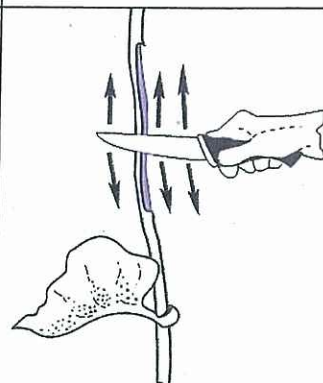
- holes are drilled at a downward angle into the tree's sapwood at 5cm spaces;
- if a "Side Winder" or similar device is not employed herbicide is then applied immediately (within 30 seconds) into each hole small with a squeeze bottle.
- drill to make downward-angled holes into the sapwood approximately 5 cm apart.
- The placement of herbicide into the hole is usually made using a backpack reservoir and syringe that can deliver measured doses of herbicide solution.
- Best results are achieved with plants, which are actively growing.
- Generally 1 part Glyphosate to 1.5 parts of water is suitable to achieve a kill with most species.



Scraping the stem method

This method is used for plants with aerial tubers:

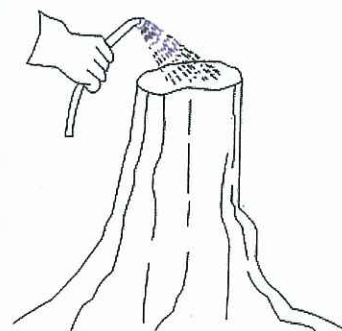
- a sharp knife is employed to lightly scrape a section of stem (approximately 10-30 cm) removing bark and exposing the living tissue;
- Apply herbicide immediately (within 30 seconds) to the exposed soft underlying green tissue with a small squeeze bottle.
- With some woody weeds you can peel away the bark surface and paint the exposed wood or spray it with herbicide.
- Generally 1 part Glyphosate to 1.5 parts of water is suitable to achieve a kill with most species



Cut stump method

This method is ideal for woody plants and vines without aerial tubers:

- cut the stem close to the ground, if possible below the lowest branch;
- apply herbicide immediately (< 10seconds for water-based and 1 minute for diesel soluble herbicides) using a small squeeze bottle or spray pack to the cut surface.
- Generally 1 part Glyphosate to 1.5 parts of water is suitable to achieve a kill with most species
- Two operators working as a team can use this method effectively
- It is a good idea to use a brightly coloured dye in the solution to mark the stumps that have been treated



This method has the appeal of removing the weed immediately, and is used mainly for trees and woody weeds. Warning: Many species will sucker if treated by this method.

Line Drawings by Lyn Skillings, QLD Natural Resources and Mines.



Description and general information

Annual ragweed is an erect plant, 1–2 m high with slightly rough, fern-like leaves. The leaves are deeply divided with hairy undersides. Flowers are not conspicuous. They are small, greenish and in spikes up to 20 cm long in the upper part of the plant. Flower spikes appear yellow when mature because of pollen production. Male flowers are at the top of the spike and females at the base. Seeds are black, small, top-shaped and rough.

Life cycle

As the name suggests the plant establishes each year, normally germinating from spring through to summer. Germination can occur at other times of the year if conditions are suitable. Flowering usually occurs from mid to late March, after which plants die. Late-germinating plants may survive over winter until the following autumn.

Habitat and distribution

Annual ragweed is a native of eastern North America and is now naturalised in south-eastern Queensland and northern New South Wales. Infestations also occur near Stanthorpe, Inglewood, Gympie, Gin Gin and Atherton.

Annual ragweed often colonises bare areas on roadsides and banks of watercourses. It may invade pasture from these areas. Seed may be spread by floodwater, be introduced with stock or arrive as a contaminant in fodder or topsoil from infested areas. Horse paddocks are often infested in coastal areas.

Control

Prevention of annual ragweed is more effective than control. Infestations can be minimised by maintaining healthy, dense pastures that suppress ragweed germination and growth.

Where possible, check the source of hay and other stockfeed before purchase. Also check the origin of stock (particularly horses, which are often associated with annual ragweed and its spread in coastal areas). Also check the origin of topsoil, which is a major source of seed.

Infestations can be controlled with biological, mechanical and herbicide controls, and pasture management.

Biological control

A leaf-eating beetle and a stem-galling moth have been introduced into Queensland and have reduced the size and vigour of annual ragweed. Despite this biological control, annual ragweed is still a significant problem and other control methods are necessary.

Mechanical control

Where feasible, plants can be pulled by hand; however, if anyone is prone to allergies, contact with flowering plants and pollen should be avoided.

Plants may be slashed or mown prior to setting seed (i.e. at the early flowering stage or immediately prior to flowering). Checks should be carried out to ensure flowering is prevented in any regrowth that occurs. Regrowth may occur from soil seed banks and these plants must also be controlled.

Herbicide control

Details of registered herbicides and application rates are listed in Table 1. Before using any herbicide always read the label carefully. All herbicides must be applied strictly in accordance with the directions on the label. These herbicides may damage legume species.

Pasture management

Although cattle will eat annual ragweed to a small extent, they prefer other pasture species.

Overgrazing will result in the loss of grass cover and a population explosion of annual ragweed and other weeds. Stock will only occasionally eat ragweed when it has set seed, and will subsequently pass the seed.

Most improved pasture grasses will suppress annual ragweed, provided a dense, healthy ground cover is maintained.

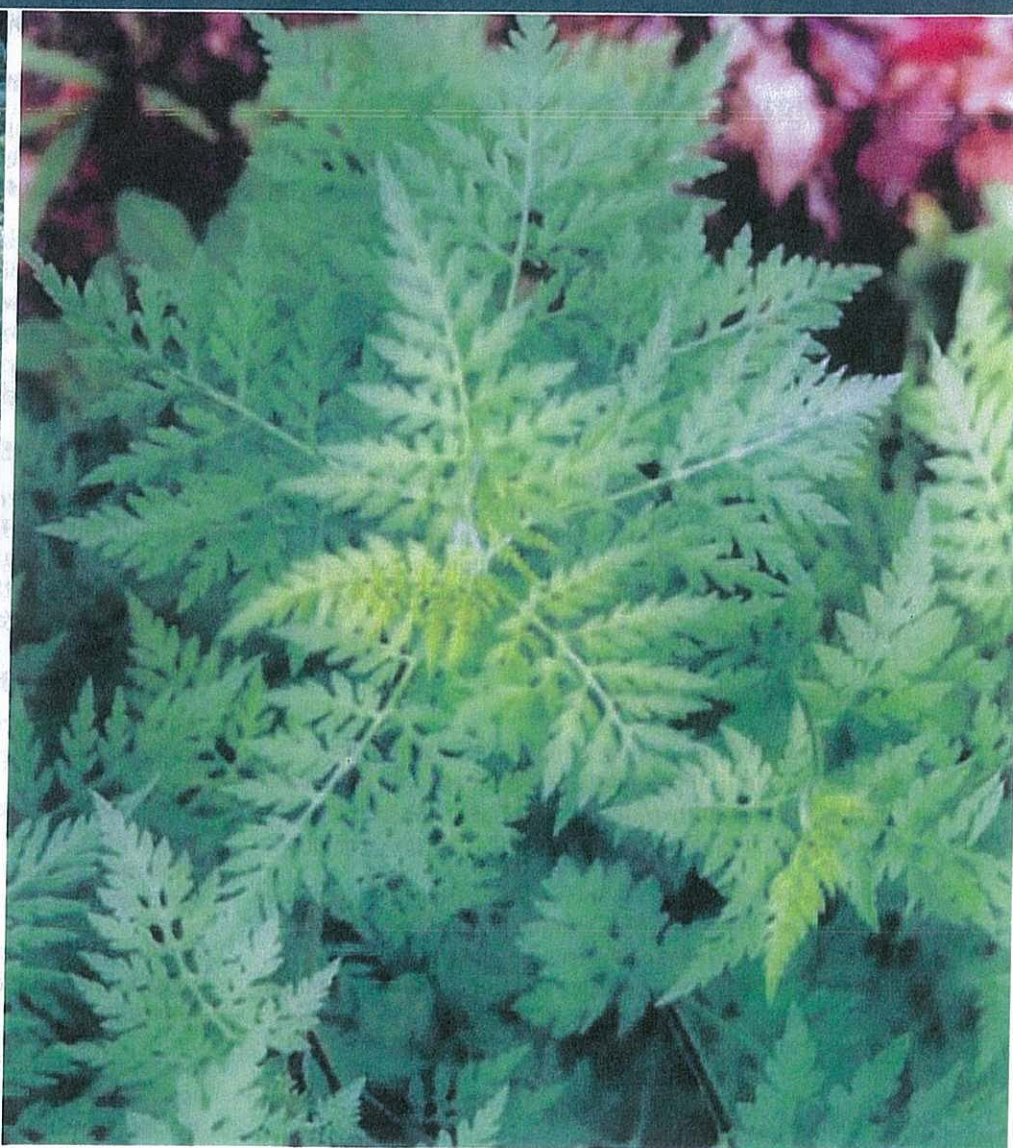
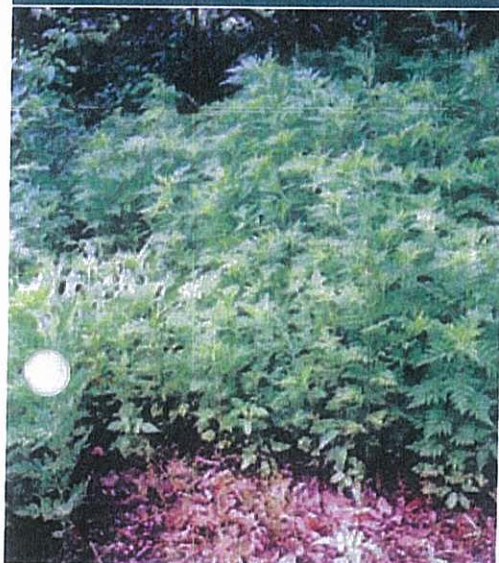
For heavy infestations, opportunistic burning can be a useful tool in controlling annual ragweed if paddocks have not been overgrazed. Burning needs to be done when adequate soil moisture will allow good grass cover to grow back. Follow-up herbicide treatment is essential.



Annual ragweed

Ambrosia, horseweed or asthma plant

Ambrosia artemisiifolia



Annual ragweed (also called ambrosia, horseweed or asthma plant) is a fast-growing plant introduced from North America.

It can invade and suppress weak and overgrazed pastures, reducing productivity. The pollen of this plant can cause health problems such as hay fever and can aggravate asthma.

Declaration details

Annual ragweed is a declared Class 2 plant under the *Land Protection (Pest and Stock Route Management) Act 2002*. Declaration requires landholders to control declared pests on the land and waters under their control. A local government may serve a notice upon a landholder requiring control of declared pests.



Queensland Government