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Frequently asked questions

Herbicide FAQs

Selective and residual herbicides

Q. Does a selective herbicide only kill lantana?

A. No. Selective herbicides (e.g. Grazon® Extra, Brush-Off®, Lantana 600) will kill lantana and certain other plant species while leaving some desired plants, such as pasture, undamaged. Non-selective herbicides (e.g. Roundup®) affect most plants they come in contact with. Information on selectivity is provided on the herbicide label; however, the list of species affected by the herbicide will not be exhaustive and care should always be taken. For further information contact the relevant herbicide company representative.

Q. What does a residual herbicide do?

A. Residual herbicides (e.g. Grazon® Extra) are designed to remain active in the soil, keeping treated areas lantana free for up to twelve months. It is important to note that follow-up control is still required, as the residual effect alone will not completely suppress or kill treated plants/areas.

Spray timing

Q. Sometimes I spray lantana regrowth or new seedlings as soon I see them. Is this the correct approach?

A. No. Although some people spot-spray regrowth as soon as they see a few leaves this is the wrong thing to do. Regrowth after burning, cutting, slashing, dozing or frost is best treated with foliar spraying when it reaches a height between 300 mm and 1 m. If you spray too early there will not be sufficient foliage (leaf area) to actively translocate enough herbicide to the roots and little control will be achieved.

Q. When is the best time to spray 'old man' (mature) lantana?

A. Mature lantana is best treated by foliar spraying between February and the first frosts (i.e. after the growth of the wet season). Many herbicide labels suggest higher rates for plants above 1 m in height, so it is advisable to read the label before spraying. In many instances mechanical control is a better first option, especially for plants greater than 2 m.

Q. I know I should spray lantana when it is actively growing but can I still spray it as long as it is flowering?

A. Yes. Flowering is a clear sign the plant is actively growing. Nevertheless, better results are usually achieved in late summer, early autumn (see Appendix 2a).

Q. What is the best way to check the plant is actually dead?

A. Check by snapping the stem close to the ground to see if there is any moisture present. If there is not, presume the plant is dead. Cattle will generally be able to push dead lantana plants out of the ground about nine months after herbicide application.

Q. It is recommended that most herbicide be applied when the plant is actively growing. Is this the case for basal bark and cut-stump applications?

A. Although all herbicide treatment is best done when the plant is actively growing, these application techniques can be used on defoliated plants, as foliage is not required for herbicide uptake. This can extend the treatment period into the drier months of the year.

Spray techniques

Q. What happens if I spray too much herbicide mix; that is, beyond the initial point of run-off?

A. Depending on the herbicide used, this can put the plant into shock and reduce the chance of herbicide absorption and, therefore, the kill rate.

In addition, excessive use of herbicide (even selective herbicides) can kill grass in the area surrounding the target plant, decreasing pasture competition and potentially causing increased establishment of other weeds.

Q. Do I need a permit or licence to spray lantana?

A. In most cases you do not need a permit; however, there are exceptions and it is recommended you check the herbicide label or consult with your local authority to be certain.

If you are contracted to spray or are spraying on somebody else's property, then you do need a licence.

- In Queensland, a 'commercial operator's licence' is required under the *Agricultural Chemicals Distribution Control Act 1966* and these are issued by the Department of Employment, Economic Development and Innovation. It is also important to take note of the Agricultural Chemicals Distribution Control Regulation 1988 (ACDC Regulation).
- In New South Wales, the *Pesticides Act 1999* requires all commercial operators to be trained in pesticide application, with a minimum of an AQF2 unit of competency (applying chemicals under supervision).
- For working near threatened species or ecological communities in New South Wales, a Section 132C licence is required (see www.environment.nsw.gov.au/lantanaplan/implementation.htm).
- For other states please check with your local authority.

Aerial spraying

Q. How much does aerial spraying of lantana cost and how long does it take to spray a certain area?

A. The only registered method for aerial spraying lantana is via helicopter. Hourly rates for helicopter contractors range from $1000–$1500/hour depending on location and size of machine. Depending on the size of the job, some contractors also charge ferrying costs (cost of flying to and from the job).

Using the best practice method of a 200 L/ha solution mix and the half-over-pass method, a helicopter can expect to cover 3–6 ha in one hour. The approximate cost of herbicide required to cover:

- 3 ha would range from ~$300 (Lantana 600 @ 8 L/ha i.e. 24 L) to ~$1100 (Grazon® Extra @ 10 L/ha, i.e. 30 L)
- 6 ha would range from ~$600 (Lantana 600 @ 8 L/ha i.e. 48 L) to ~$2200 (Grazon® Extra @ 10 L/ha, i.e. 60 L)

Therefore aerial spraying costs, including chemical, would be approximately:

- $1300 and $3750 per hour *or*
- $400 and $600 per hectare.

Splatter guns

Q. I have heard of the splatter gun being used by national parks but can I use it in agricultural situations?

A. Absolutely. The splatter gun works very well in all situations as long as the lantana is bushy/compact. The splatter gun can be used effectively on anything from isolated plants to dense infestations and is a cheaper option than purchasing and using high volume spray equipment.

Q. Is the splatter gun easy to use?

A. Yes. The splatter gun is quite efficient and easy for an individual operator to use. The actual technique is as easy as shooting a water pistol. There are manual or gas powered options available commercially. Some operators find that using the manual splatter gun is tiring because of the additional force required to pump the fluid through the gun. Comparatively, the gas-powered option only requires the use of a finger to release the herbicide mixture. The additional costs of gas and maintaining the regulator should be considered.

According to John Hunter (Department of Environment and Climate Change, New South Wales), 'To get the maximum range, incline the gun at a 45 degree angle and squeeze out a continuous stream as you smoothly bring the gun to the horizontal position. This gives a line of 9:1 (9 parts water: 1 part glyphosate 360 g/L) across 15 metres or more of the thicket'.

Q. Does the splatter gun method really control lantana?

A. Most definitely. Research trials from North Queensland to south coast New South Wales show it works well in both forested and open situations. Less follow-up control is required on pink lantana than other flower forms, but with a small amount of follow-up great results can still be achieved.

According to Susan Somerville, an experienced splatter gun user from northern New South Wales, 'It is very successful in forested areas with some canopy already in place. We are getting good regeneration of native vegetation and very little lantana reinfestation from seed. Those areas in the forest treated one to two years ago are stable and regenerating nicely. Open areas of lantana where the lantana gets full sun and does not have much native vegetation to compete with it, tends to recolonise and requires follow-up'.

Spray volumes and mixes

Q. People in my area talk about a 'special brew' of herbicides they mix together to spray. Can all herbicides be mixed together?

A. No, only some of the herbicides registered for lantana control are compatible. Mixing non-compatible herbicides can result in reduced control and can effect spray equipment by causing excess foaming, increasing precipitates in the tank, and clogging spray nozzles.

It is important to take note of the information on each label when mixing herbicides. In general the order to mix any herbicides is:

1. wettable powders or dry flow formulations (e.g. Brush-Off®)
2. suspension concentrates (flowables)
3. water soluble salts (e.g. Tordon® 75-D, Amicide® 625)
4. emulsifiable concentrates (e.g. Starane® Advanced)
5. if required, add surfactants and penetrants last to minimise foaming.

Read and follow all label directions, restraints, plant-back periods, withholding periods and safety directions for the tank mix products.

Q. What herbicides that are registered for lantana can be used on other associated weeds?

A. Many herbicides registered for lantana can be used to treat other weeds simultaneously (see Appendix 2d), thus achieving greater efficiency in your spray operations. In this instance it is important to balance overall efficacy, time investment, cost of the product and range of plants controlled when choosing which herbicide to use. Please ensure you read the labels carefully as rates for other weeds may differ.

Q. What does brown-out indicate in terms of plant health and does a quicker brown-out mean a better kill rate?

A. Brown-out (or brown-off) refers to the wilting and yellowing of plant foliage. Brown-out does not necessarily indicate plant death but does mean the plant is being affected by the herbicide. It can be used to identify any missed spray areas.

A quick brown-out does not necessarily mean a greater kill rate. Herbicides have variable rates of brown-out. However, a quick brown-out can sometimes be a symptom of a herbicide rate that is too high, which can cause a stress response and quick defoliation before translocation of the herbicide is complete. Often a slower brown-out implies a slower and more complete progression of herbicide through the plant and a better chance of control.

Once brown-out and leaf drop has occurred, trampling by cattle can be an effective means of reducing the biomass of canes and opening up the country for good fodder growth. If sufficient fuel loads are present, fire can also be an effective tool follow-up technique.

Off-target damage

Q. How do I prevent pasture and native plants being affected by herbicide?

A. Spray drift from some herbicides will cause off-target damage. Read the herbicide label to ensure the use is appropriate and reduce off-target damage by careful application to protect desirable plants, crops, cropping land, pasture legumes or native vegetation.

- Still days with no wind are not ideal, as spray drift cannot be predicted. Wind conditions of up to 15 km/hr are preferable.
- Avoid draining or flushing equipment near native or non-target plants or in locations where the chemical may be washed or moved into contact with their roots.
- Exercise caution when spraying near water systems as some herbicides are toxic to aquatic animals. Herbicide labels recommend not spraying over water bodies and provide guidelines to spraying distances from any portable water source—either still reservoirs or flowing creeks.
- Roundup® Biactive™ is specifically developed for use in aquatic situations, but adding a surfactant will negate its environmental suitability unless specified on the label.[52]
- On contact with soil, glyphosate tightly binds to soil particles,[61] becomes inactive and will have no residual effect.
- When treating plants adjacent to desirable species, cut, scrape and paint or cut stump applications may be a preferable option.

Withholding periods

Q. When can I let my stock animals back into an area sprayed by herbicide?

A. As some herbicides will make lantana more palatable to stock after treatment [20,50] it is a general rule that stock should not be allowed to re-enter paddocks until treated plants have died back. In addition, some herbicides have withholding periods detailed on their labels. Stock should not be allowed back in to sprayed areas until after these withholding periods.

Q. What does the term 'withholding period' mean on a herbicide label?

A. A withholding period is the time required between the last application of a herbicide and the harvesting, grazing or slaughtering of beasts from within the treated area. Although some herbicides have a nil withholding period for stock, the advantage of de-stocking areas prior to treatment is that it allows herbicide uptake into the plants for at least seven days without disturbance.[22] If using pasture for fodder, follow the label recommendations regarding time requirements before harvesting pasture. This can be up to eight weeks when using Tordon® 75-D.

Manual control FAQs

Q. Is there a best time of year to clear lantana or can I do it any time?

A. You can clear your lantana anytime of year. However to maximise chances of removing lantana and producing a good seed bed for improve pastures, clearing when soil moisture is present is best. Avoid clearing your lantana until you are ready to improve pastures/regenerate native vegetation, as clearing lantana without planting, or at least the presence of competitive plants, may result in an increase in other weeds as well as the strong return of lantana.

Q. Can I clear other vegetation at the same time as clearing my lantana?

A. There is no simple answer to this question. Land managers should consult their relevant local government and state agencies before conducting any lantana management to ensure they comply with all relevant state legislation and local by-laws.

Examples:

- In Queensland, the *Vegetation Management Act 1999* (Queensland) stipulates that a permit is not required to clear non-native vegetation, including declared weeds. However, it is noted that it is an offence to clear or destroy remnant vegetation without a permit (whether by ring barking, cutting down, pushing over, burning or flooding), including destroying native plants while undertaking control of non-native species.
- In New South Wales, contact the Department of Environment and Climate Change before undertaking any mechanical control, particularly along creeks or on steep slopes.
- In New South Wales, many local governments also have environmental by-laws pertaining to what control is allowed in certain areas. An application for physical removal of the lantana may be required, but often foliar spraying and other non-destructive techniques will be fine.

For example, the Shoalhaven City Council Environmental Protection Zoning criteria stipulates physically removing lantana may require a Development Application to be submitted outlining control methods to be used and waste and soil management plans.

Always check your local and state government laws before beginning a lantana control plan, especially involving any mechanical control!

Machinery

Q. Will repetitive slashing ultimately kill my lantana?

A. Yes and No. The results of a twice annual slashing program (early spring, late summer) at Yarraman in South-east Queensland on a medium density 2 ha area of lantana showed that after three years lantana density had only been reduced from 60 to 50%.

Slashing is effective for opening up dense stands of lantana and, provided follow-up control by other techniques is undertaken, lantana can be effectively controlled. Slashing by itself will not generally kill lantana—it will merely suppress its growth.

Slashing is more often used as a maintenance method. It can reduce the spread of lantana and reduce the seed bank (if slashed before flowering). However, to successfully remove lantana follow-up spraying will be required when regrowth has reached at least 300 mm. An integrated program like this can result in quick clearing of low to medium density infestations (within two years in some cases).

Q. Many bobcats come with different attachments for grubbing—for example buckets, combo-buckets or forks. Does it matter which I use to grub lantana?

A. There is a difference between normal buckets and forks. Forks allow for more accurate removal of individual plants in low to moderate density lantana, with less soil disturbance than buckets. However, buckets and combo-buckets can be more useful when dealing with high density lantana where individual plants are hard to distinguish. Therefore, the plant density and situation will determine which option will be best for you.

Revegetation/regeneration FAQs

Q. Can I cut the bulk of the lantana away, then re-cut the stems for cut stump herbicide application or does it all have to be done in one go?

A. If it is difficult to access the base of the lantana plants for cut stump or basal bark herbicide application, the lantana plants can be 'pruned' to create pathways. For cut stump herbicide application, the final cut must be made close to the ground and the herbicide applied within 15 seconds to ensure the wound does not seal before the herbicide penetrates.

Q. After controlling lantana in a conservation situation, should I replant with natives or allow natural regeneration to take place?

A. Again there is no single answer but in general it is best to follow the 'three Rs' of bushcare as prescribed by the Australian Association of Bush Regenerators (AABR) and they are:

- first r**etain**

  … all the patches of native vegetation we still have. We are not able to recreate bush once it is gone—it is far too complex. Even tiny patches are important and protecting them is the priority.

- then **regenerate**

  … whenever we can. Damaged bush can recover with the right assistance. Even cleared or mown areas can sometimes regenerate if the original soil profile is intact. Natural regeneration preserves the unique character of each patch of bush and offers the best chance for a degraded area to become a balanced eco-system that needs minimal maintenance.

- finally **replant**

  … only where there is no bush and no potential for it to naturally regenerate (often where long-term disturbance has occurred). Planting is often seen as a quick and easy way to restore the bush. Nevertheless, it can damage a bush remnant by changing its species composition and genetic make up, and undermine its ability to ever recover naturally. Planted areas require more continuing attention than real bush and do not recover well from natural disturbances such as fire.

(The above text was taken from the AABR's poster 'The three Rs of bush regeneration')

For further detail, see Figure 3.2 of the Plan to Protect Environmental Assets from Lantana.[47] This matrix helps land managers determine if additional restoration activities, such as replanting, are required for a site.

Q. When clearing lantana should I cut it down for mulch or take it off-site?

A. It is usually best to leave the lantana bulk on-site if it does not obstruct other management activities. Lantana breaks down quickly, with the benefit that resources taken by the lantana plant are returned to the soil.

Plants can either be cut into small pieces as mulch, or the structure left intact to act as cover and shade for emerging plants (preferably native). It can also provide short-term habitat for native animals, provide protection from feral predators, and act as a deterrent to hungry wallabies!

If mulching lantana, it is vital that you monitor for regrowth as lantana readily shoots from nodes in the stems. Care must be taken to ensure pieces are not trodden into the ground—this effectively 'plants' the stems and increases the chance of regrowth.

Uprooted plants should be turned on their crowns so roots are not given the chance to reshoot.

Biocontrol FAQs

Q. If biocontrol agents are attacking my lantana, what should I do next?

A. There are 18 biocontrol agents established in Australia that aid in the control of lantana through suppression of spread. However, none of these will cause the complete control of lantana infestations without integration of other management techniques.

Some landholders mistakenly believe biocontrol agents are incompatible with other control methods or that the presence of biocontrol agents alone makes further control unnecessary. However, active management *should* be continued in the presence of biocontrol agents to capitalise on the control they have already provided. Concerns about the impacts of control techniques on the agents themselves are unfounded as populations will recolonise from adjacent areas in the following seasons.

Extensive leaf damage and leaf drop caused by biocontrol agents can limit control options as foliar spraying will be less effective. However, recent limited trial work in South-east Queensland has shown Fluroxypyr (e.g. Starane®), used at registered foliar spray rates, is effective on plants that have been partially defoliated by *Teleonemia scrupulosa*, a leaf sucking bug. Starane® has also been shown to be effective on stressed plants.[41] More research is needed for other herbicides, locations and flower forms.

In many instances mechanical or manual control methods, or basal bark and cut stump herbicide application are more suitable. Control by fire is another possibility, as long as fuel loads are adequate. In these instances, the benefit of biocontrols is that the plants are under stress when active management techniques are used so levels of regrowth are likely to be less.

Q. How can I tell if biocontrol agents are present?

A. Look for beetles or bugs on the tops of leaves, bugs or larvae underneath the leaves, or insects in the flowers or on the fruit or stems. Sometimes the agents themselves are difficult to see and only the damage they cause to leaves or flowers will be evident. The biocontrol fact sheets provided in the attached CD provide images of the insects and the damage they cause. Biocontrol agents act seasonally, so although they may cause significant damage at certain times of the year, at other times they may be low in number and cause no apparent damage.

Q. Do I need to spread the agents around?

A. This a matter for debate. Many lantana biocontrol agents have been established in Australia for more than 30 years and the most effective and proven biocontrol agents have already spread throughout areas to which they are suited, following their host plant and preferred conditions. In most instances it is suggested that landholders do not need to collect insects and relocate them to their property as they will recolonise through natural processes if the area is suitable. There may be benefits in community-based rearing and distribution of new biocontrol agents that have not yet reached their full distribution.

New agents are being researched by Biosecurity Queensland. In partnership with community groups and local government authorities, Biosecurity Queensland and the New South Wales Department of Primary Industries release new agents in areas where they are likely to survive and establish.

Q. Do I need to keep some lantana for the biocontrol agents to live on?

A. No. If it is possible to remove all the lantana and carry out proper follow-up and revegetation, there is no reason to leave part of the infestation for the sake of biocontrols. Where incomplete control is achieved, biocontrol agents will re-colonise from adjacent areas.

Camels and goats FAQs

Q. I have heard of people using camels and goats to control lantana. Are the animals affected by the lantana toxins?

A. Goats and camels are sometimes used for weed control. Nonetheless, caution is advised as outside of Australia there have been deaths attributed to lantana poisoning for goats.[7,38]

Information about the toxicity of lantana on camels is inconclusive at this stage. Some Queensland Government testing indicated there was no evidence of toxicity from lantana, but this did not explore the long-term effects and results were likely reduced because of the low-toxicity form of pink lantana on which the camels were feeding.

Land managers using goats and camels for grazing lantana should monitor for any poisoning effects over time. It should also be noted that camels and goats are considered feral animals in many places, are not a suitable means of lantana control in conservation areas and must be contained on private properties.

Appendix 1 Example map and data record for Decision Support Tool

To effectively use the Lantana Decision Support Tool a map is needed similar to the one shown below. The map outlines each infestation with details of its access, density and size.

Example map

Example data record

Infestation number	Access*			Density**			Size***					Other information relevant to potential control
	E	M	D	L	M	H	LC	S	M	L	VL	
1	×					×		×				1.8 m tall, east facing slope
2	×					×		×				1.5 m tall, east facing slope
3	×				×			×				1.5 m tall, east facing slope, regrown from recent aerial spraying
4	×			×			×					1.5 m tall, scattered bushes, relatively flat ground
5		×			×		×					1.5 m tall, signs of biocontrol damage, relatively flat ground
6		×				×		×				lantana in creek, some native vegetation
7			×			×		×				1.8 m tall, on south-west facing slope, some native trees present
8			×			×			×			1.8 m tall, on west facing slope, some native trees present
9	×					×			×			1.8 m tall, on west facing slope, some native trees present
10		×		×			×					1 m tall, on west facing slope, regrowth from recent slashing
11	×				×		×					1.2 m tall, on west facing slope moderately sized bushes
12	×				×		×					1.5 m tall, north-west facing slope
13	×				×			×				1.5 m tall, north-west facing slope

*Access E = easy, M = moderate, D = difficult

**Density L = low (0–10%), M = medium (11–50), H = high (› 50%)

***Size LC = localised (‹ 0.25 ha), S = small (0.25–1 ha), M = medium (1–10 ha), L = large (10–25 ha), VL = very large (› 25 ha)

Appendix 2a Recommended spray seasons

Active ingredient	Example product name	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Foliar spraying, aerial spraying and splatter gun													
Glyphosate	Roundup® Glyphosate 360 Weedmaster® Duo Credit®	×	×	❀	✓	✓	✓	✓	✓	✓	✓	❀	×
Picloram + triclopyr	Conqueror® Fightback®	×	×	×	×	×	❀	❀	✓	✓	✓	❀	×
Picloram + triclopyr + aminopyralid	Grazon® Extra	×	×	×	×	×	❀	❀	✓	✓	✓	❀	×
Picloram + 2,4-D	Tordon® 75-D	×	×	×	×	❀	✓	✓	✓	✓	✓	❀	×
Dichlorprop	Lantana 600	×	×	❀	❀	❀	✓	✓	✓	✓	✓	❀	×
Fluroxypyr	Starane® Advanced Flagship® 200 Comet® 400	×	×	×	×	❀	✓	✓	✓	✓	✓	❀	×
2,4-D amine	Amicide® 625 Amine 625	×	×	×	×	×	×	×	×	✓	✓	✓	×
Metsulfuron methyl	Brush-Off® Brushkiller™ Lynx® 600 Bushwacker® WG Savannah®	×	×	×	×	×	×	×	×	✓	✓	✓	×
Metsulfuron methyl + glyphosate	Cut-Out® Trounce®	×	×	❀	❀	❀	❀	❀	❀	✓	✓	✓	×
Aminopyralid + fluroxypyr	Hotshot®	×	×	❀	❀	❀	❀	✓	✓	✓	✓	✓	×
Basal bark and cut stump													
Picloram + triclopyr	Access®	❀	❀	✓	✓	✓	✓	✓	✓	✓	✓	✓	❀
Picloram	Vigilant® Gel	❀	❀	✓	✓	✓	✓	✓	✓	✓	✓	✓	❀
Triclopyr	Garlon® 600	❀	❀	❀	❀	✓	✓	✓	✓	✓	✓	❀	❀
2,4-D n-butyl ester	Agricrop Rubber Vine Spray®	❀	❀	❀	❀	❀	❀	❀	❀	❀	❀	❀	❀

✓ Best time to spray/treat

❀ Can spray if conditions are suitable

× Do not spray/treat

Appendix 2b Herbicide volumes tables

Method of application	Lantana density	Lantana height			
		< 0.5 m	0.5–1.0 m	1.0–1.5 m	1.5–2.0 m
High-volume and high-pressure foliar spraying (hand gun, hose and reel)	Heavy		3000 L/ha	4000 L/ha	5000 L/ha
	Medium		2000 L/ha	3000 L/ha	4000 L/ha
	Light		1000 L/ha	2000 L/ha	3000 L/ha
High-volume and low-pressure foliar spraying (knapsack and spot- spraying)	Medium		20 L/100 m²		
	Light		10 L/100 m²		
Aerial application by helicopter (boom spray)	Heavy			200 L/ha	200 L/ha
Splatter gun (approximate values to equate to registered rate)	Per bush (applicable for heavy, medium and light infestations)	4 mL (2 × 2 mL)	4–8 mL	8–12 mL	12–16 mL
Basal barking (sprayed)	Light to medium		< 100 mL/bush		
Cut stump	Light to medium	Dependent of density and thickness of stems			

Appendix 2c Other species to spray while treating lantana

Herbicide	Active/s	Reference	Method
Grazon®, DS, Conqueror®	Picloram + triclopyr	*Dow Woody Weed Guide*	Foliar spray
Grazon® Extra	Picloram + triclopyr + aminopyralid		
Hotshot®	Aminopyralid + fluroxypyr		
Ripper® 480	Glyphosate		
Starane® Advanced	Fluroxypyr		
Tordon® 75-D	Picloram + 2,4-D amine		
Statesman® 720	2,4-D amine		
Lantana 600	Dichlorprop	Lantana 600 label	
Brush-Off®	Metsulfuron methyl	Brush-Off® label	
Access®	Picloram + triclopyr	*Dow Woody Weed Guide*	Basal bark
Garlon® 600	Triclopyr		
Access®	Picloram + triclopyr	*Dow Woody Weed Guide*	Cut-stump
Garlon® 600	Triclopyr		
Vigilant® Gel	Picloram	Macspred	
Grazon® Extra	Picloram + triclopyr	*Dow Woody Weed Guide*	Aerial
Grazon® + 2,4-D amine	Picloram + triclopyr + 2,4-D amine		
Lantana 600	Dichlorprop	Lantana 600 label	
Roundup®	Glyphosate	Roundup® label	Gas gun
Brush-Off®	Metsulfuron methyl	Brush-Off® label	

						✓	✓						✓		✓		✓	✓	**African boxthorn,** *Lycium ferocissimum*
							✓										✓	✓	**Angophora regrowth,** *Angophora* spp.
						✓	✓			✓							✓	✓	**Australian blackthorn,** *Bursaria spinosa*
												✓							**Balloon cotton bush,** *Gomphocarpus physocarpus*
																	✓	✓	**Banksia,** *Banksia* spp.
												✓		✓					**Bathurst burr,** *Xanthium spinosum*
										✓				✓					**Bellyache bush,** *Jatropha gossypifolia*
								✓	✓										**Bitter bark,** *Alstonia constricta*
				✓						✓			✓		✓		✓	✓	**Blackberry,** *Rubus fruticosus*
														✓					**Blackberry nightshade,** *Solanum nigrum*
												✓							**Blue billygoat weed/blue top,** *Ageratum houstonianum*
✓	✓			✓						✓					✓				**Boneseed/bitou bush,** *Chrysanthemoides monilifera*
										✓					✓				**Bracken fern,** *Pteridium esculentum*
									✓					✓			✓	✓	**Brigalow regrowth,** *Acacia harpophylla*
				✓										✓					**Broadleaf pepper tree,** *Schinus terebinthifolius*
							✓		✓										**Brush box,** *Lophostemon confertus*
					✓	✓	✓	✓	✓								✓	✓	**Camphor laurel,** *Cinnamomum camphora*
					✓	✓		✓				✓							**Castor oil plant,** *Ricinus communis*
																	✓	✓	**Casuarina regrowth,** *Casuarina* spp.
					✓	✓	✓	✓	✓								✓	✓	**Chinee apple,** *Zizphus mauritiana*
			✓		✓		✓		✓					✓			✓	✓	**Cockspur thorn,** *Maclura cochinchinensis*
																			Cocky apple, *Planchonia careya*
		✓									✓			✓		✓	✓	✓	**Creeping lantana,** *Lantana montevidensis*
			✓							✓			✓	✓	✓	✓	✓	✓	**Crofton weed,** *Ageratina adenophora*

Appendix 2c Other species to spray while treating lantana (cont.)

Herbicide	Active/s	Reference	Method
Grazon®, DS, Conqueror®	Picloram + triclopyr	*Dow Woody Weed Guide*	Foliar spray
Grazon® Extra	Picloram + triclopyr + aminopyralid		
Hotshot®	Aminopyralid + fluroxypyr		
Ripper® 480	Glyphosate		
Starane® Advanced	Fluroxypyr		
Tordon® 75-D	Picloram + 2,4-D amine		
Statesman® 720	2,4-D amine		
Lantana 600	Dichlorprop	Lantana 600 label	
Brush-Off®	Metsulfuron methyl	Brush-Off® label	
Access®	Picloram + triclopyr	*Dow Woody Weed Guide*	Basal bark
Garlon® 600	Triclopyr		
Access®	Picloram + triclopyr	*Dow Woody Weed Guide*	Cut-stump
Garlon® 600	Triclopyr		
Vigilant® Gel	Picloram	Macspred	
Grazon® Extra	Picloram + triclopyr	*Dow Woody Weed Guide*	Aerial
Grazon® + 2,4-D amine	Picloram + triclopyr + 2,4-D amine		
Lantana 600	Dichlorprop	Lantana 600 label	
Roundup®	Glyphosate	Roundup® label	Gas gun
Brush-Off®	Metsulfuron methyl	Brush-Off® label	

												✓						**Devil's fig,** *Solanum torvum*
✓	✓					✓	✓	✓	✓			✓		✓		✓	✓	**Ecualypt regrowth,** *Eucalyptus* spp.
															✓	✓		**Fireweed,** *Senecio madagascariensis*
✓	✓				✓	✓	✓	✓	✓			✓	✓		✓		✓	✓	**Groundsel bush,** *Baccharis halimifolia*
										✓			✓						**Inkweed,** *Phytolacca octandra*
										✓							✓	✓	**Japanese sunflower,** *Tithonia diversifolia*
							✓		✓										**Leucaena,** *Leucaena leucocephala*
														✓					**Madeira vine,** *Andredera cordifolia*
✓	✓		✓							✓			✓	✓	✓	✓	✓	✓	**Mistflower,** *Ageratina riparia*
												✓		✓			✓	✓	**Mother-of-millions,** *Bryophyllum* spp.
										✓		✓		✓					**Noogoora burr,** *Xanthium pungens*
					✓									✓			✓	✓	**Paddy's lucerne,** *Sida rhombifolia*
										✓		✓	✓						**Parthenium weed,** *Parthenium hysterophorus*
					✓	✓	✓	✓	✓	✓									**Privet (broadleaf),** *Ligustrum lucidum*
				✓	✓	✓	✓	✓	✓	✓			✓				✓	✓	**Rubbervine,** *Cryptostegia grandiflora*
					✓												✓	✓	**Siam weed,** *Chromolaena odorata*
											✓		✓				✓	✓	**Sicklepod,** *Senna obtusifolia*
										✓			✓				✓	✓	**Smartweed,** *Persicaria lapathifolia*
												✓		✓					**Snakeweed,** *Stachytarpheta* spp.
												✓			✓	✓	✓	✓	**Thistles,** *Cirsium* spp., *Carthamus* spp.
																	✓	✓	**Tobacoo weed,** *Elephantopus scaber*
						✓	✓	✓	✓					✓			✓	✓	**Wattle regrowth,** *Acacia* spp.
					✓		✓						✓				✓	✓	**Wild tobacco tree,** *Solanum mauritianum*

Appendix 3 Record of ground distribution (application) of herbicides

Based on *Agricultural Chemicals Distribution Control Act 1966* (Queensland)

Note: This record must be kept in a safe place for at least two years after the distribution is carried out.

1. Date of distribution _____

2. Name of licensed operator _____

3. Name of client _____

4. Address of client _____

_____ Postcode _____

5. Location (Real property description and map reference) _____

_____

6. Start time _____ 7. Finish time _____ 8. Block number _____

9. Crop/situation _____ 10. Area treated _____

11. Purpose/target (e.g. to treat lantana, broad leave weeds) _____

12. Type of equipment (e.g. boom, hand gun, knapsack) _____

_____ 13. Tank size _____

14. Herbicide mixture

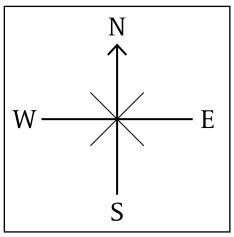
Spray mixture ingredients **A. Herbicide product used**	**Batch number** (where listed)	**Application rate** (e.g. per ha or per 100 L)	**Total volume**
Trade name			
Active constituent			
Manufacturer			
APVMA number			
B. Diluent (e.g. water/oil)			
C. Wetting agent			
D. Other ingredients (e.g. spreader, emulsifier etc)			

15. Weather conditions at commencement of distribution

Wind speed
- ☐ 0 Calm ‹ 1 km
- ☐ 1 Light air 1–5 km
- ☐ 2 Slight breeze 6–11 km
- ☐ 3 Gentle breeze 12–20 km
- ☐ 4 Gusty › 20 km

Temperature
- ☐ Cold (‹ 5 ˚C)
- ☐ Cool (5–15 ˚C)
- ☐ Warm (15–25 ˚C)
- ☐ Hot (25–30 ˚C)

Wind direction



16. Change in weather conditions once distribution commences (record changes in wind speed or direction once ground distribution has commenced including the time when the change occurred)

_____

_____

17. Additional notes _____

_____

_____

18. Signature _____ Date _____

19. Property map

An example of the type of information that might be listed on the property map could include, but need not be limited to, advice where 'north' lies in relation to the property, directional signs and distances from the nearest towns or cities, a rough sketch of the various blocks on the property and location of the farm residence.

Draw map here

Appendix 4 Table of active constituents registered for use on lantana

Active constituents registered for use on lantana	Product examples*
2,4-D/hydrocarbon liquid	Agricrop Affray 300
2,4-D as sodium salt	Tornado DF
2,4-D as the triisopropanolamine salt/picloram as the triisopropanolamine salt	Tordon® 75-D
2,4-D dimethylamine salt	Nufarm 2,4-D 720 Selective
2,4-D present as the diethanolamine and triethanolamine salt	Nufarm Emicide 625-Low Selective
2,4-D present as the diethanolamine salt	Ospray 2,4-D Low Odour 500 Selective
2,4-D present as the dimethyl amine salt	Baton, Dow Agrosciences Amine 625
2,4-D present as the dimethylamine and diethanolamine salt	Nufarm Surpass® 475, Nufarm Amicide® 625 Selective
2,4-D present as the dimethylethanolamine salt and dimet	Statesman® 720
2,4-D present as the isopropylamine salt	Smash 225, Mate 300, Abound® 400
Alkyl polyglycoside surfactant/glyphosate present as the isopropylamine salt	Farmoz Wipe-Out® 360 Non-residual
Aminopyralid present as hexyloxypropylamine salt/ picloram present as the hexyloxypropylamine salt/ triclopyr present as the butoxyethyl ester	Grazon® Extra
Aminopyralid present as triisopropanolamine salt/ fluroxypyr as the methyl heptyl ester/hydrocarbon liquid	Hotshot®
Dichlorprop present as the potassium salt	Agricrop Lantana 600
Fluroxypyr 1-methyl heptyl ester/hydrocarbon liquid	Kenso Agcare Fluroken 200
Fluroxypyr as the methyl heptyl ester	Starane® Advanced
Fluroxypyr as the methyl heptyl ester/hydrocarbon liquid	Starane® 200, Nufarm Comet® 200
Fluroxypyr as the methyl heptyl ester/hydrocarbon liquid/ n-methyl-2-pyrrolidone	Nufarm Comet® 400, Decoy 400®
Glyphosate isopropylamine salt	Yates Non-Selective Zero Glyphosate 360 and 490 G/L Weedspray
Glyphosate present as the isopropylamine and mono-ammoni	Nufarm Credit® Broadhectare, Weedmaster® Duo Dual Salt
Glyphosate present as the isopropylamine salt	Roundup®, Nufarm Glyphosate 360, Farmoz Wipe-Out® 450, Ripper® 480, Fire-Up 510, Sickle™ 540, Roundup® Biactive™, Roundup® Dry, Kenso Agcare Ken-Up Dry 680 Wg, Macspred
Glyphosate present as the mono-ammonium salt/ metsulfuron-methyl	Trounce® Brush-Pack by Monsanto
	Dupont Cut-Out® Brush Controller
Glyphosate present as the monoethanolamine salt	Roundup® Max by Monsanto, Farmoz Wipe-Out® Plus

Active constituents registered for use on lantana	Product examples*
Glyphosate present as the potassium salt	Touchdown® Hi Tech
	Roundup PowerMax® By Monsanto
Hydrocarbon liquid/picloram as isooctyl ester/triclopyr present as the butoxyethyl ester	Access®
Metsulfuron-methyl	Dupont Brush-Off®, Farmoz Bushwacker® Brush Control, Farmoz Lynx® Wg, Farmoz Bushwacker® WG
Picloram hexyloxypropylamine salt/triclopyr present as the butoxyethyl ester	Genfarm Triclopyr/Pic
Picloram present as the hexyloxypropylamine sal/ triclopyr butoxyethyl ester	Gallop
Picloram present as the hexyloxypropylamine salt/ triclopyr present as the butoxyethyl ester	Grazon® Ds, Grass-Up™, Farmoz Fightback®, Nufarm Conqueror®
Triclopyr present as the butoxyethanol ester	Triclon 600
Triclopyr present as the butoxyethyl ester	Garlon® 600, Farmoz Safari® 600 EC
2,4-D/hydrocarbon liquid	Agricrop Affray 300

*Various other products containing these active constituents are registered for use on lantana in various situations. Refer to the Australian Pesticides and Veterinary Medicines Authority up-to-date list of all herbicide products registered for use on lantana. Visit the website at www.apvma.gov.au

Always read the label carefully before use and only use a herbicide in accordance with label directions.

Appendix 5 Relevant legislation, policies, strategies and programs

The following tables are adapted from the 'Plan to Protect Environmental Assets from Lantana, which can be found at: www.environment.nsw.gov.au/lantanaplan

The main commonwealth and state legislation, policies, strategies and programs that influence lantana management are presented below.

National/state	Strategy/Act	Background/purpose
National	*Agricultural and Veterinary Chemicals Code Act 1994* (Agvet Act)	All pesticides, including herbicides, insecticides and fungicides, used, supplied or distributed in Australia must be registered under the Agvet Act by the Australian Pesticides and Veterinary Medicines Authority [APVMA: formerly the National Registration Authority for Agricultural and Veterinary Chemicals (NRA)].
	Australian Weeds Strategy	The Australian Weeds Strategy provides a framework to establish consistent guidance for all parties, and identifies priorities for weed management across the nation with the aim of minimising the impact of weeds on Australia's environmental, economic and social assets.
	Biological Control Act 1984	The use of non-native biological organisms (the agent) to control a specific pest or weed species (the target) is governed by the *Biological Control Act 1984*. This Act establishes a detailed set of procedures and a framework for the selection of agents (through host-specificity testing), the importation of agents into Australian quarantine and the intentional release of agents from quarantine.
	Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	Provides a national framework for environmental management (including the recognition of nationally threatened species and ecological communities) directing resources towards the delivery of improved environmental protection.
	Weeds of National Significance (WoNS)	The WoNS were determined from a list of 71 major weed species, which were derived using set criteria. A species was included if it: threatened the profitability or sustainability of Australia's principal primary industries threatened conservation areas or environmental resources of national significance required remedial action across several states and territories constituted a major threat to Australia's biodiversity.

Goals/actions
Before any chemical or product (e.g. commercially formulated pesticide) is registered for use, supply or distribution, the APVMA is required under the Agvet Act to conduct a rigorous assessment of potential impacts on the environment, human health and trade.
The goals of the Australian Weeds Strategy are to: • prevent new weed problems • reduce the impact of existing priority weed problems • enhance Australia's capacity and commitment to solve weed problems.
Prior to allowing importation and intentional release from quarantine, the impacts of the agent on the target as well as non-target species are assessed. In addition, the importation of biological control agents requires approval from Biosecurity Australia (part of the Department of Agricultural Forestry and Fisheries Australia), the Australian Quarantine and Inspection Service, and the Department of Environment, Water, Heritage and Arts. The Australian Weeds Committee, in conjunction with the Natural Resource Management Standing Committee (formerly the Standing Committee on Agriculture and Resource Management) must also approve all biological control proposals before any control is attempted. Approval includes wide consultation with all stakeholders.
With respect to threatened species and ecological communities, the EPBC Act provides for: • identification and listing of threatened species and threatened ecological communities • development of recovery plans for such species and ecological communities • recognition of key threatening processes • reducing these processes through threat abatement plans.
Lantana camara was listed as one of the 20 WoNS in 2000 (see Thorp and Lynch 2000), following which a national strategy was produced. The national strategy for lantana has five goals, which are to: • minimise impact • prevent the sale • increase community awareness • prevent spread • coordinate management.

Appendix 5 Relevant legislation, policies, strategies and programs (cont.)

National/state	Strategy/Act	Background/purpose
New South Wales	*Noxious Weeds Act 1993*	This Act provides for the identification, classification and control of noxious weeds in NSW. The lead agency for this Act is the NSW Department of Primary Industries (formerly NSW Agriculture), with the Act administered by Local Control Authorities (usually local councils, but can be a combination of council areas).
	NSW National Parks and Wildlife Act 1974	This Act established the National Parks and Wildlife Service (NPWS), now part of DECC. The Parks and Wildlife Division of DECC is responsible for the care, control and management of all national parks, historic sites, nature reserves, Aboriginal areas, state conservation areas, karst conservation reserves, marine parks and regional parks within NSW.
	Pesticides Act 1999	The *Pesticides Act 1999* regulates the use of all pesticides in NSW, after the point of sale. This includes pesticides used in agriculture, on public lands and on domestic and commercial premises.
	Threatened Species Conservation Act 1995 (TSC Act)	In January 1996, the *NSW Threatened Species Conservation Act 1995* (TSC Act) commenced with the purpose of conserving threatened species, populations and ecological communities in NSW. Contained within the TSC Act are three schedules: Schedule 1 contains lists of critically endangered species and communities, endangered species, populations and communities, and extinct species; Schedule 2 contains lists of vulnerable species and communities; and Schedule 3 contains a list of key threatening processes (KTPs). In 2004, several additional amendments were made to the TSC Act. The amendments relevant to this Plan are: i) the preparation of a TAP is no longer mandatory; and ii) the development of a Priorities Action Statement (PAS). The PAS outlines recovery and threat abatement actions for the biodiversity listed under the TSC Act.

Goals/actions
The Act defines the roles of government, councils, private landholders and public authorities in the management of noxious weeds. The Act sets up categorisation and control actions for the various noxious weeds: • the control objective for weed control Class 1 is to prevent the introduction and establishment of those plants in NSW • the control objective for weed control Class 2 is to prevent the introduction and establishment of those plants in parts of NSW • the control objective for weed control Class 3 is to reduce the area and the negative impact of those plants in parts of NSW • the control objective for weed control Class 4 is to minimise the negative impact of those plants on the economy, community or environment of NSW • the control objective for weed control Class 5 is to prevent the introduction of those plants into NSW, the spread of those plants within NSW or from NSW to another jurisdiction.
The aims of weed management undertaken by the National Parks and Wildlife Service are to: • conserve biodiversity and cultural heritage on-park • minimise the spread of weeds to and from neighbouring properties • raise community awareness of the impacts of weeds • encourage community involvement • conform to legislative requirements for the control of noxious weeds.
Additional amendments have been included under the Pesticides Regulation 1995 to include: • Pesticide record keeping: records must be kept by all people who use pesticides for commercial or occupational purposes such as on a farm, on produce, or as part of their occupation or business. • Pesticide training: people who use pesticides in their business or as part of their occupation must be trained in how to use those pesticides. Any person employed or engaged to use pesticides must also be trained. • Pesticide notification: from 1 February 2007, new notification requirements applied to pesticides applications by public authorities in outdoor public places and to pesticide applications by licensed pest management technicians in common areas of multi-occupancy residential complexes.
The objectives of the TSC Act are to: • conserve biological diversity and promote ecologically sustainable development • prevent the extinction and promote the recovery of threatened species, populations and ecological communities • protect the critical habitat of those threatened species, populations and ecological communities that are endangered • eliminate or manage certain processes that threaten the survival or evolutionary development of threatened species, populations and ecological communities • ensure that the impact of any action affecting threatened species, populations and ecological communities is properly assessed • encourage the conservation of threatened species, populations and ecological communities by the adoption of measures involving cooperative management.

Appendix 5 Relevant legislation, policies, strategies and programs (cont.)

National/state	Strategy/Act	Background/purpose
Queensland	*Agricultural Chemicals Distribution Control Act 1966*	The Queensland Department of Employment, Economic Development and Innovation (DEEDI) administers the *Agricultural Chemicals Distribution Control Act 1966*. This Act controls aerial distribution (spraying, spreading or dispersing) of agricultural chemicals from aircraft to which aerial equipment is installed or attached. The Act also controls ground distribution of herbicides from ground equipment.
	Biological Control Act 1987	The *Biological Control Act 1987* provides for biological control of agricultural pests for the protection of the environment. This Act is jointly administered by DEEDI and Department of Environment and Resource Management (DERM). The Act provides for the case of biological control agents to control agricultural pests through the declaration of target organisms and the declaration and release of agent organisms to combat them. The Act also establishes the Queensland Biological Control Authority and prescribes its powers and functions.
	Chemical Usage (Agricultural and Veterinary) Control Act 1988 and Chemical Usage (Agricultural and Veterinary) Control Regulation 1999	This legislation, administered also by DEEDI, provides for controls over the use of agricultural and veterinary chemical products by all chemical users.
	Land Protection (Pest and Stock Route Management) Act 2002	This Act provides a framework and powers for improved management of weeds and pest animals. It governs the actions for the control and management of declared plants and animals in Queensland. It also provides local governments with the legal instrument they need to enforce the management of high-priority weeds and pest animals.

Goals/actions
A key control mechanism for aerial distribution of agricultural chemicals is the dual licensing of both the pilots, who are in command of aircraft from which aerial distribution is carried out, and the aerial agricultural businesses and individual contractors who carry on the business of aerial distribution, or direct or authorise an aircraft to be used to carry out aerial distribution of agricultural chemicals in Queensland.
The Act aims to provide a link with complementary legislation in the other states and the Northern Territory to ensure a uniform approach to biological control throughout Australia.
In general terms, agricultural chemical products are pesticides (including insecticides, fungicides and herbicides) that are used to control pests in food and fibre crops, aquatic situations and non-agricultural situations (e.g. commercial land, buildings). It should be noted that any substance used to control pests in these situations would be considered to be an agricultural chemical product. *The Chemical Usage Act 1988* allows all persons to use registered agricultural chemical products in certain ways (e.g. lower rate of use) that are not in accordance with the instructions on the label approved by Australian Pesticides and Veterinary Medicines Authority (APVMA) (i.e. off-label), without these uses being considered offences under the legislation. These off-label use allowances are limited. Refer to s. 13B of the *Chemical Usage Act 1988* (compliance with instructions). No other off-label use is permitted unless a permit for the use has been issued by APVMA. Agricultural chemical products that have not been registered by APVMA must not be used, unless a permit has been issued for use.
This legislation is administered by Biosecurity Queensland to ensure the fight against invasive pests in Queensland is coordinated, consistent, and does not waste precious resources. An important function of the Act is the ability to declare plants and animals that are considered serious or potentially serious pests in Queensland. Biosecurity Queensland imposes a range of restrictions on declared plants and animals in Queensland (including introduction, possession and sale) but allows certain activities under declared pest permits. All species of lantana, including ornamental varieties, have been declared in Queensland as Class 3 pest plants under the *Land Protection (Pest and Stock Route Management) Act 2002*. Class 3—pest plants established in Queensland that have or could have adverse economic, environmental or social impacts (including in another state). Because it is a Class 3 pest plant, it is an offence under the Act to introduce, release or supply (give, sell or otherwise supply) lantana (all species). It is also an offence to move or transport on a road anything containing reproductive parts of a Class 3 pest plant, unless steps have been taken to restrict the release of such reproductive material. As of 1 November 2003 all species of lantana were prevented from sale in Queensland. It is not an offence to hold a Class 3 pest plant (i.e. if lantana is already growing on your property), unless it threatens an environmentally significant area (as defined in a local government area Pest Management Plan). If the Class 3 pest threatens an environmentally significant area, the landowner may be required to take steps to control that pest on their land.

Appendix 5 Relevant legislation, policies, strategies and programs (cont.)

National/state	Strategy/Act	Background/purpose
Queensland	*Nature Conservation Act 1992* (NC Act)	In Queensland, legislation about conserving and managing native animals and plants and declaring and managing protected areas such as national parks is under the NC Act. This replaced the *Fauna Conservation Act 1974*, *National Parks and Wildlife Act 1975*, *Native Plants Protection Act 1930* and provisions of the *Land Act 1994* relating to environmental parks. The NC Act is based on principles to conserve biological diversity, ecologically sustainable use of wildlife, ecologically sustainable development and international criteria developed by the World Conservation Union (International Union for the Conservation of Nature and Natural Resources) for establishing and managing protected areas.
	Vegetation Management Act 1999	This Act is in place to regulate the clearing of vegetation in Queensland. The regional ecosystems classification scheme and the associated Biodiversity Planning Assessments are part of the biodiversity planning framework that has been developed to assist Queensland DERM to plan for biodiversity. The framework has been incorporated into planning initiatives including the development of guidelines for clearing on leasehold lands under the *Lands Act 1994* and the *Vegetation Management Act 1999*; the assessment of the comprehensiveness, adequacy and representativeness of the conservation reserve network; and as a guide for proactive conservation.

Goals/actions
The NC Act's objective is the conservation of nature. This is to be achieved by an integrated and comprehensive conservation strategy involving: • gathering, researching and disseminating information on nature, identifying critical habitats and areas of major interest, and encouraging the conservation of nature by education and cooperative involvement of the community • dedication and declaration of areas representative of the biological diversity, natural features and wilderness of Queensland as protected areas • managing protected areas • protecting native wildlife and its habitat • ecologically sustainable use of protected wildlife and areas • recognition of the interest of Aboriginal and Torres Strait Islanders in nature and their cooperative involvement in its conservation • cooperative involvement of landholders.
Regional ecosystems were defined by Sattler and Williams as vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil. The framework is dynamic and is regularly reviewed as new information becomes available. The Regional Ecosystem Description Database lists the status of regional ecosystems as gazetted under the *Vegetation Management Act 1999* (their vegetation management status) and their biodiversity status as recognised by the Environmental Protection Agency. The *Vegetation Management Act 1999* status is based on an assessment of the pre-clearing and remnant extent of a regional ecosystem. The biodiversity status is defined by the Environmental Protection Agency and is based on an assessment of the condition of remnant vegetation in addition to the pre-clearing and remnant extent of a regional ecosystem. The current biodiversity status is given on the Regional Ecosystem Description Database.

Appendix 5 Relevant legislation, policies, strategies and programs (cont.)

National/state	Strategy/Act	Goals/actions
Australian Capital Territory	*Pest Plant and Animal Act 2005*	Lantana is on the declared pest plant list under the ACT *Pest Plant and Animal Act 2005*.
Northern Territory	*Weeds Management Act 2001*	The Northern Territory has declared *L. camara* under the *Weeds Management Act 2001*. It is declared at two levels: • Class B Noxious Weed (regional declaration): growth and spread to be controlled outside town areas. • Class C Noxious Weed: not to be introduced to the Northern Territory. Declared weeds are restricted from sale in the Northern Territory.
South Australia	*Natural Resources Management Act 2004*	*Lantana camara* is a declared plant in South Australia. See above under the National Containment Zones Project for lantana.
Tasmania	*Weed Management Act 1999*	*Lantana camara* is declared under the *Weed Management Act 1999*. Lantana may not be imported into Tasmania, and its sale or other supply is not permitted. Landholders may be required to take steps to control lantana on their property.
Victoria	*Catchment and Land Protection Act 1994*	*Lantana camara* is declared under the *Catchment and Land Protection Act 1994*. Trade and distribution in lantana and materials containing it are prohibited.
Western Australia	*Agricultural and Related Resources Protection Act 1976*	*Lantana camara* is declared in Western Australia under the *Agricultural and Related Resources Protection Act 1976*. The movement of plants or their seeds is prohibited within the state.

Appendix 6 Lantana poisoning information sheet

Lantana poisoning

Lantana is a serious health risk to stock because of its toxicity. Red flowered varieties are usually more toxic than pink varieties, but results are variable and all lantana colour forms should be treated as poisonous.

Most lantana poisoning occurs when stock unfamiliar with the plant are introduced to areas where lantana is found. Young animals are most at risk. Stock bred in lantana-infested country tend to avoid it unless forced to eat the weed through lack of adequate food.

Species affected

Species affected by lantana poisoning include cattle, sheep, goats, guinea pigs and rabbits. Further research is needed to determine the long-term effects of lantana on goats and camels. Children can also be poisoned by eating berries, but their symptoms differ to those of livestock.

Sheep showing symptoms of lantana poisoning.

Toxicity

Significant lantana toxins are the triterpene acids: lantadene A (rehmannic acid), lantadene B, and their reduced forms. A toxic dose for a 500 kg cow varies from about 5 to 20 kg of fresh leaf (one per cent or more of the animal's body weight), depending on the toxin content of the lantana eaten.

Symptoms of lantana poisoning in cattle

Symptoms of lantana poisoning depend on the amount and type of lantana consumed and the intensity of sunlight to which the animals have been exposed. Signs can appear after one feed and, in acute cases, within 24 hours. In severe cases, death may occur in two to four days, but it is more common for affected animals to take one to three weeks to die if untreated.

Affected animals may:

- avoid sunlight (photophobia)
- stop eating
- appear sluggish, weak and depressed
- urinate frequently
- become constipated (most commonly) or have diarrhoea with strong-smelling black fluid faeces in severely affected animals
- become dehydrated.

Cattle may become sun-sensitive and their skin may blister after eating lantana.

Poisoned animals may show signs of:

- excessive skin sensitivity to sunlight (photosensitisation)
- liver damage
- yellow discolouration (jaundice) of the whites of the eyes and gums, and skin of the nose and mouth
- reddening and inflammation of the unpigmented (white) skin. Muzzle may become inflamed, moist, ulcerated and very painful (pink nose)
- in severe cases, skin may slough (fall off) leaving raw ulcerated surfaces
- swelling of unpigmented areas of the ears and eyelids
- reddening and discharge from the eyes (conjunctivitis)
- ulceration of the tip and under surface of the tongue (if unpigmented)
- blow fly and bacterial invasion of raw, exposed flesh, in chronic cases.

Animals killed by lantana poisoning display the following post-mortem symptoms:

- yellow discolouration of tissues (jaundice)
- hard, dry, mucus-covered faecal masses in the large intestine
- dry, undigested plant material in the rumen
- swollen and discoloured (yellow to orange) liver
- swollen gall bladder
- swollen and pale kidneys that turn green when exposed to air and cutting
- ulcerated cheeks, muzzle, nostrils, tongue and gums (in severe cases in cattle).

Calves poisoned by lantana stop eating and become weak and depressed.

Post-mortem changes—note the enlarged gall bladder and yellowing of all tissues.

Jaundice (yellow discolouration) of the eye.

Photosensitisation (pink nose) in a cow.

Treatment

Contact your vet quickly!

If animals lose their appetite, stop drinking, show signs of jaundice and/or develop reddening of the muzzle, they should be moved to lantana-free areas and kept in the shade. Unless treated quickly, severely affected cattle almost invariably die within 10 days of eating the plant. Even if an animal's lesions begin to heal and their liver function appears to return to normal, many cattle will die up to six weeks after being poisoned.

Effective treatment may include:

- giving intravenous fluids and encouraging the animal to eat
- treating skin damage with antibiotics and sunscreens. Other drugs can provide relief but are available only on veterinary prescription
- drenching with an activated charcoal slurry (2.5 kg activated charcoal in 20 litres of electrolyte replacement solution for cattle; 500 g in four litres for sheep and goats).

Activated charcoal is an effective but expensive poisoning antidote and a second dose may be required 24 hours after the first if the animal has not improved. Bentonite can be substituted for activated charcoal but is not as effective and may take up to two days longer to produce the same results. Use the same dose, as for charcoal, in a slurry with water.

The outlook for recovery is good provided animals are treated quickly. Delay reduces the effectiveness of treatment because kidney function may be seriously damaged.

Preventing lantana poisoning

To prevent your animals from being poisoned by lantana:

- treat all lantana as potentially poisonous
- keep your property lantana free
- ensure stock have adequate feed
- do not put new or young stock in areas where lantana is present
- act quickly if poisoning is suspected—call your vet.

Appendix 7 Lantana biocontrol table

Scientific name/common name	Locations where established *locations where release is continuing
Teleonemia scrupulosa leaf-sucking bug	From Cairns to Wollongong and around Darwin.
Octotoma scabripennis leaf-mining beetle	Subtropical shady coastal areas from Atherton to Kiama.
Uroplata girardi leaf-mining beetle	From Cape Tribulation to Sydney and around Darwin.
Ophiomyia lantanae fruit-mining fly	From Torres Strait Island to Eden, also around Darwin and Katherine and Perth and Geraldton.
Leptobyrsa decora sap-sucking bug	Only in high altitude, drier areas of Atherton Tablelands in Queensland.
Prospodium tuberculatum rust	Atherton Tablelands, Paluma, Kin Kin to Port Macquarie.
Phenacoccus parvus mealy bug	Isolated populations from Atherton to Kempsey and around Perth.
Aconophora compressa stem-sucking bug	Atherton Tablelands, Mount Fox, Miriam Vale to South West Rocks, and around Sydney.
Calycomyza lantanae leaf-mining fly	From Torres Strait to Kempsey and around Darwin and Katherine.
Hypena laceratalis leaf-feeding moth	From Mossman to Kempsey.
Neogalea sunia leaf-feeding moth	From Atherton Tablelands to Eden.
Salbia haemorrhoidalis leaf-feeding moth	From Mossman to Coffs Harbour.
Lantanophaga pusillidactyla flower-feeding moth	From Cooktown to Merimbula and around Darwin and south-west Western Australia.
Epinotia lantana flower and bud-feeding moth	From Cooktown to Ulladulla and around Darwin.
Octotoma championi leaf-mining beetle	Atherton Tableland and Myall Lakes to Merimbula.
Uroplata fulvopustula leaf-mining beetle	Only in North Queensland Mossman to Paluma.
Falconia intermedia leaf-sucking bug	Only on Atherton Tablelands.
Ophiomyia camarae leaf-mining fly	Established at various sites from from Atherton Tablelands to Rockhampton.

Preferred habitat	Lantana type affected	Effectiveness	Greatest seasonal damage
Warm dry areas such as central and southern Queensland, central New South Wales.	Prefers white, red and pink-edged red over pink	High	Late summer to autumn
Prefers mild conditions.	All varieties	High	Late summer to autumn
Warm humid areas of the tropics, and subcoastal regions.	All varieties	High	Late summer to autumn
Moist, warm areas where lantana flowers readily.	All varieties	High	Late summer to autumn
Sunny, open, dry, high altitude areas in the tropics.	All varieties	High	Late summer to autumn
Moist areas where leaves are wet for 9–15 hours, and temperatures of at least 20 °C.	Common pink only	Potentially high	In summer months when rainfall is higher
Drier regions of southern Queensland and northern New South Wales.	All varieties	High	
Mild, dry areas.	All varieties	High	Spring and early summer
Tropical Queensland, preferring warm moist areas.	All varieties	Medium	Late summer to autumn
Warm, moist areas.	All varieties	Low	Late summer to autumn
Warm, semi-dry areas, subcoastal regions.	All varieties	Low	Late summer to autumn
Warm, moist regions of the tropics, not found in drier subcoastal regions.	Al varieties	Low	Late summer to autumn
Warmer coastal regions where lantana flowers readily.	All varieties	Low	Late summer to autumn
Warmer coastal areas where lantana flowers readily.	All varieties	Low	Late summer to autumn
Cool, shady, moist conditions.	All varieties	Low	Late summer to autumn
Warm, moist areas.	All varieties	Low	Late summer to autumn
Warm, humid areas where plants are in leaf all year round.	All except common pink	Unknown	Late summer to autumn
Warm humid areas where plants are healthy and in leaf all year round.	All varieties	Unknown	Late summer to autumn

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