Lippia
Invasive Species Unit

Introduction

Lippia (Phyla canescens) is a serious environmental and pastoral weed of the inland river systems of New South Wales (NSW) and Queensland. It is a major threat to watercourses, floodplains and pastoral areas but it is not considered a major threat to farming and cultivated lands. It is estimated 5.3 million hectares of floodplain grazing country in the Murray–Darling Basin is affected by lippia.

Lippia is one of eleven species in the genus Phyla and belongs to the Verbenaceae family. In Australia, there are two closely related species of Phyla: lippia (Phyla canescens) and phyla weed (P. nodiflora).

The species of major concern to subtropical and temperate inland NSW is lippia. Phyla weed is less widespread and restricted to the higher rainfall and more humid coastal areas of NSW and tropical Australia. This Primefact only deals with lippia.

Distribution

Lippia is widely distributed in tropical and subtropical areas of the world. It is believed to be native to the Americas.

In central NSW, lippia poses a major threat along the Lachlan River and floodplain system west of Forbes. Winter floods and good summer rainfall in the late 1990s resulted in the rapid spread of the weed. Lippia is now considered a major environmental threat in this area.

In southern NSW, lippia is of increasing concern on the Murrumbidgee River floodplains around Narrandera and Hay.

Figure 1. Lippia is a prostrate, mat-forming environmental and agricultural weed.
In northern NSW, lippia is well established in the Macquarie Marshes, throughout the lower Gwydir Valley, the lower McIntyre Valley and the Namoi Valley.

Lippia is rapidly spreading within these floodplain regions and into adjacent higher areas.

Lippia’s prostrate mat-like growth habit has made it a popular low-maintenance turf species in some areas, but lippia must not be sold in NSW. *P. nodiflora* is available for sale in NSW and there have been cases where lippia (*P. canescens*) has been sold incorrectly labelled as *P. nodiflora*.

**Habitat**

Lippia is well adapted to the floodplain environments of river systems in temperate to subtropical areas. The plant tolerates frost and drought and established plants can survive inundation by floodwater for at least three months. Lippia will grow in heavy clay soils, as well as lighter clays and sandy soils.

**Description**

Lippia is a prostrate perennial broadleaf herb, with numerous branched stems up to 1 m long.

It has the ability to root at nodes along the stems, providing a solid mat-like groundcover. The stout central taproot (80 cm long) has fibrous secondary roots. Fibrous roots also arise from the stem nodes.

Leaves arise in pairs from stem nodes. They are 2–5 cm long, covered in minute hairs, and have a greyish-green appearance.

Flowers appear any time from spring to autumn when soil moisture is favourable. The flowers are small, 5–10 mm in diameter, lilac or pinkish in colour and form a dense rounded flower.

**Impact**

In Australia lippia is a major pastoral and environmental weed. It has little to no grazing value and causes major environmental impacts in terms of increasing soil erosion and decreasing stream bank stability due to loss of perennial grasses and the reduction of plant diversity. Lippia can be difficult to control as it is an aggressive plant that dominates pastures where ground cover has been reduced by overgrazing.
**Lifecycle and spread**

Lippia spreads both vegetatively and by seed. Plants break up during flooding and can quickly re-establish in moist soil as floodwater subsides. Fragments and seed can also be spread by vehicles, machinery and animals but most spread occurs in response to flood events.

Seed can remain viable for many years (probably well over 10) and seed banks under infestations can contain up to 10 000 seeds per square metre.

Seeds must be covered with water for a short period in order to germinate. Any area where water may sit for a week or more (including cattle hoof prints or wheel ruts) provides opportunity for lippia seed to germinate. Lippia seeds also require light and fluctuating temperatures (daily temperature fluctuations of 10 degrees or more) in order to germinate.

**Control and management**

**Cropping enterprises**

Use of herbicides, cultivation and cropping generally controls lippia infestations if the land is cropped for several years. Even in frequently flooded areas there may be an opportunity in certain seasons to crop as a ‘once-off’ strategy to suppress lippia prior to establishing a perennial grass pasture.

Due to erosion risks on floodplain soils, it is not recommended that large areas be cultivated simultaneously for lippia control. Risk of erosion can be minimised by cultivating strips across the direction of water flow. Uncultivated strips can be cultivated and sown to pasture in subsequent years.

Due to its ability to re-invade from seed and plant fragments, lippia can quickly recover from short periods of cropping, especially following floods or wet summers. Landowner experience has shown that areas cropped for 2 years can have lippia re-invade to previous levels within one wet summer if further control measures are not used.

Careful management is needed to keep lippia from invading the pasture phase of a crop rotation.

**Pasture and grazing enterprises**

Lippia control on arable pasture land requires an integrated approach of suppression, pasture improvement and pasture maintenance. It is a long-term program and requires dedication and continued management.

There is some evidence that lippia residues can have allelopathic (toxic) effects on establishing pastures. Where possible, it is recommended that control with herbicides be carried out to maintain a lippia-free period of several months prior to planting pastures. This will also help reduce the seedbank of annual summer grass species like

**Figure 6.** Lippia can easily become dominant in overgrazed, unmanaged pastures.
stinkgrass (*Eragrostis cilianensis*), barnyard grass (*Echinochloa crus-galli*) and liverseed grass (*Urochloa panicoides*) which compete strongly with newly sown pastures.

Competitive and productive pastures are an essential part of long-term control, preventing rapid re-invasion. Grazing should be managed to maintain a minimum of 70% ground cover.

**Lippia suppression**

Cultivation and herbicides can be used to provide short-term lippia suppression while establishing a pasture. Cultivation will often be more practical due to the variable age and moisture stress levels of the plants present. Cultivate a number of times until the areas of lippia are visibly declining.

Landholder experience has shown that cultivation of dry soil in hot weather prevents lippia fragments from transplanting and gives the best lippia kill. In northern NSW, however, this is the period of highest erosion and flood risk. Blade ploughs and chisel ploughs with sweeps can give a better initial lippia kill.

With good soil moisture and actively growing lippia, applying herbicide prior to cultivation will give reliable control. Spot spraying is suitable for treating small infestations (see *Chemical control* below). Lippia can re-invade very quickly so regular monitoring and follow-up control is needed, especially after floods.

**Managing pastures**

Competitive and productive pastures are vital for long-term lippia control. Pastures that have a high percentage of ground cover prevent rapid lippia re-invasion.

In degraded native pastures, suppression of lippia can be achieved with the use of:

- selective herbicides, and
- strategic grazing to allow the better native grasses to increase in size and density (if there are sufficient numbers of productive native grass species present).

Sowing introduced pastures is generally required where lippia dominates degraded pastures.

Pasture mixtures should not be sown with a cover crop. Quick and even pasture establishment is vital. Good paddock preparation, adequate fertiliser and high grass pasture sowing rates will help to ensure adequate pasture density in the first year. High quality pasture seed is essential.

Pastures must include perennial grasses and annual legume species tolerant of waterlogging. Legume sowing time should correspond with the species and variety used.

Well-adapted perennial grasses provide good competition against lippia while the annual legumes supply nitrogen for the grasses and improve pasture quality. Phosphorus and sulfur are particularly important for good legume growth. Pasture maintenance and lippia suppression are vital to keep the pasture productive. Pastures degrade quickly if lippia is allowed to compete through over-grazing.

When selecting pasture species, consider persistence, competition between the grass species, which legume to include and what mixes are going to give good quality feed. Remember the chosen species may need to tolerate waterlogging and frequent flooding.

**Perennial grasses for southern NSW**

Phalaris is the best adapted perennial grass for southern NSW floodplain soils (greater than 400 mm of annual rainfall). Extensive areas of phalaris have been established on floodplains west of Forbes and with good management have proven to be persistent. Phalaris is tolerant of flooding but will not persist in areas that experience water inundation periods greater than 6 weeks.

Winter-active phalaris varieties such as ‘Holdfast’, ‘Atlas PG’, ‘Sirolan’ and ‘Sirosa’ have been widely sown on floodplains around Forbes. These winter-active varieties are more erect and susceptible to overgrazing than the more summer-active varieties such as ‘Australian’. Winter-active varieties generally have better seedling vigour than the ‘Australian’ variety however careful grazing management will be needed to ensure persistence. Phalaris should be sown in pasture mixes at 2 to 3 kg/ha.

Phalaris is only moderately drought-tolerant and is unlikely to persist in western floodplain areas with less than 400 mm annual rainfall. Introduced perennial grass options in these lower rainfall areas are very limited. A program of lippia suppression using selective broadleaf herbicides will encourage native grass re-establishment, and the introduction of annual legumes is the best option in low rainfall areas.

Further information on establishing and managing pastures and pasture species selection is available at [www.dpi.nsw.gov.au/agriculture/field](http://www.dpi.nsw.gov.au/agriculture/field) or by contacting your nearest NSW DPI NSW office or agronomic advisor.

**Annual legumes for southern NSW**

Adding a legume to the pasture mix limits the herbicide options for managing lippia compared with a grass-based pasture.

The hard-seeded Persian clover varieties ‘Nitro Plus’ and ‘Prolific’ have performed well in trials on
the floodplain soils west of Forbes. Trials have shown Persian clovers are more productive in the spring and provide better competition for lippia than balansa clover. Persian clovers are very small-seeded and should be sown at 2–3 kg/ha in pasture mixes.

Balansa and strawberry clovers are well adapted to poorly drained areas. Trials have shown strawberry clover can be very productive but it is a perennial and is unlikely to persist in dry summer environments. The yaninicum sub clovers such as ‘Riverina’ can also tolerate some waterlogging. The brachycalycinum sub clovers such as ‘Clare’ are useful species to include in pasture mixes in well drained areas. Barrel medic species such as ‘Sephi’ and ‘Caliph’ are well adapted to floodplain soils but are not as tolerant of waterlogging as Persian and balansa clovers.

**Perennial grasses for northern NSW**

Bambatsi panic and Floren bluegrass are the main introduced perennial grasses ideally used for pasture improvement in lippia-infested summer rainfall regions. They are well adapted to floodplain soils and can tolerate 2 to 3 months of flooding. Bambatsi panic has been grown commercially in northern NSW for over 30 years. Once established, it has proven to be the most widely adapted exotic perennial grass available.

Floren bluegrass has proven particularly useful due to its ability to form a dense mat on the ground and impede lippia growth. Floren bluegrass is a very late maturing grass and does not seed readily in northern NSW. These grasses can be slow to establish.

Rhodes grass establishes very easily and can be used as a pioneer species to hold back lippia in the pasture establishment year. It is not tolerant of flooding, will not persist and can be competitive to other sown grass so limit it to 10 to 15% of the grass mix.

**Annual legumes for northern NSW**

Naturalised burr medic, if well-seeded in an area, may be the best of the annual legumes. Landholder experience suggests that burr medic competes well with lippia in spring. Other options for northern areas are barrel and snail medics, arrowleaf clover and sub clovers but these are not tolerant of waterlogging. Strawberry clover will persist better in very wet locations.

**Grazing management**

As a general rule, do not graze new pasture grasses until they have become well established and are producing tillers. Sensible grazing in the establishment year can promote tillering and increased seed production.

Grazing management should always address ground cover and preferably allow grasses to flower and set seed in the first season. Recent research on grazing management of lippia-infested pastures has shown that giving the pasture periods free of grazing pressure improves pasture growth, increases the number of species present and reduces the proportion of lippia in the pasture.

Field experience also shows that grazing management needs to ensure that good ground cover is maintained when conditions favour rapid lippia growth. Good rainfall and mild to warm weather can create ideal conditions for lippia growth for up to 10 months in northern NSW. In southern NSW, lippia’s ability to grow and spread is mainly limited to the period between October and April.

Graze to maintain a pasture bulk which shades lippia and competes for moisture. If pastures become too tall and rank for grazing under good seasonal conditions, slashing will promote new growth and may provide a mulch layer which covers and impedes lippia growth. Alternatively, the tall rank pasture can be used to shade lippia and become a source of winter feed for livestock.

**Biological control**

Efforts are currently under way by the National Lippia Working Group based in northern NSW to investigate biological control options.

Biological control of weeds is a long-term approach often taking 10 to 30 years to achieve results. A number of pathogens and insects have already been identified that may have the potential to assist in lippia control, but the outcome will not be known for 3 to 5 years. The management techniques recommended here should not be stopped in the hope of a successful biological control agent being found.

**Chemical control**

Herbicides are an important component of lippia management and should be used in conjunction with cropping, pasture improvement and grazing management where appropriate.

When seasonal conditions allow, two herbicide applications within a growing season have been shown to give significantly better control of lippia than single applications. A late spring or early summer application combined with a late summer application is recommended. Single applications can leave small amounts of viable rhizome/root tissue, allowing rapid re-infestation of treated areas.
Herbicide application timing is critical – herbicides should only be applied when lippia is actively growing and starting to flower prolifically.

Table 1 (below) lists the herbicides registered or permitted for lippia control in NSW.

Table 1. Herbicides for lippia control in NSW

<table>
<thead>
<tr>
<th>Situation</th>
<th>Herbicide</th>
<th>Rate</th>
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<tbody>
<tr>
<td>PER10917 (Expires 31 July 2013)</td>
<td></td>
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<tr>
<td>Fallow</td>
<td>Glyphosate ipa (450g/L) plus 2,4-D ipa (475g/L)* and 1% crop oil.</td>
<td>2.6L to 5.4L of glyphosate plus 1.15 L of 2,4-D amine and 1% crop oil.</td>
</tr>
<tr>
<td></td>
<td>Glyphosate ipa (450g/L) plus metsulfuron (600g/kg) and 1% crop oil</td>
<td>2.6L to 5.4L glyphosate plus 15 to 30 g metsulfuron and 1% crop oil.</td>
</tr>
<tr>
<td></td>
<td>Glyphosate ipa (450g/L) plus Metsulfuron (600g/kg) plus 2,4-D ipa (475g/L)* and 1% crop oil</td>
<td>2.4 L to 5.4 L of glyphosate plus 15 to 30 g metsulfuron plus 1.15 L of 2,4-D amine and 1% crop oil.</td>
</tr>
<tr>
<td>Pastoral land</td>
<td>2,4-D amine (625g/L)** and 1% crop oil</td>
<td>1.7 to 3.1 L/ha 2,4-D amine plus 1% crop oil.</td>
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</tbody>
</table>

* Other registered products containing 2,4-D present as ISOPROPYLAMINE SALT as its only active constituent (with different concentration of active constituent) may be used at the equivalent rate of active ingredient per hectare.

** Other registered products containing 2,4-D present as DIMETHYLAMINE AND DIETHANOLAMINE SALTS as its only active constituent (with different concentration of active constituent) may be used at the equivalent rate of active ingredient per hectare.

Lantana 600® (label registration for lippia)

<table>
<thead>
<tr>
<th>Non-crop/Rights of way</th>
<th>Herbicide</th>
<th>Rate</th>
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<tbody>
<tr>
<td></td>
<td>Dichlorprop 600g/L</td>
<td>1 L per 200 L water</td>
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<td></td>
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<td>5–7 L/ha</td>
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Generally the first application of herbicide will kill a high percentage of lippia plants. However, the small number of plants that survive need to be controlled or they will rapidly re-invade the following season.

At least 50 mm of rainfall (over one or two days) is needed before spraying to provide adequate subsoil moisture for good growth and to allow the lippia to flower. However, herbicides should not be applied within 4 days of heavy rainfall nor if heavy rainfall is forecast to prevent pollution of streams and aquatic environments with the herbicide.

In pastures a summer spray program will need to be repeated every 2-3 years. This interval will be dictated by seasonal conditions and pasture competitiveness. Wet summers will favour rapid lippia re-invasion, but these conditions are also ideal for achieving good lippia suppression using timely herbicide applications.

Two applications of 2,4-D amine (625 g/L) at least three months apart give the best control of lippia in pastures. The second application should be carried out when the regrowth lippia begins to flower, and should be made even if a high kill rate has been achieved with the first application.

In fallow situations ensure the minimum cropping interval for metsulfuron-methyl is observed. Do not use metsulfuron-methyl if sowing susceptible crops or pastures within the minimum cropping interval (nine months for most pulse crops, pasture legumes and oats and 14 months for summer crops such as sorghum, maize, millet, sunflowers and soybeans). Extended dry periods, such as drought, may lead to longer plant back periods for metsulfuron-methyl.

Using herbicides near waterways

Great care should be taken to avoid contaminating waterways and standing water bodies with herbicides.

For application within 20 m of waterways use only glyphosate products that are approved for use in aquatic situations. (Trials have shown Roundup® Biactive to have lower efficacy on lippia than other glyphosate formulations. The maximum label rate of glyphosate should be used when using Roundup® Biactive or equivalent formulations). Even when using a glyphosate product that is approved for use in aquatic situations, care must be taken to ensure that the herbicide mixtures as specified in permit PER10917 are prevented from entering the waterway.

The user must not apply any of the herbicides specified in permit PER10917 immediately after rain or if rain is forecast within 4 days of the proposed application. This is to prevent chemical run-off and possible contamination of local streams.

Glyphosate formulations with added wetting agents should not be used for lippia control within 20 m of a waterway or standing water body. If control using
glyphosate is needed within this distance, only the formulations registered for use in water must be used.

**Control on non-arable land**

Options for the control of lippia on non-arable land are more limited.

Spot spraying with selective herbicides using vehicle-mounted hose-reel and hand-gun sprayers can control lippia in areas where access for cultivation is limited and cultivation is not possible. If pasture establishment is feasible, clovers and fertiliser can be broadcast into lippia areas and may provide some extra winter and spring feed for livestock. Initial spot spraying with herbicide will provide a fallow for pasture establishment. If access is possible, small machinery can be used to direct drill perennial grasses and annual legumes. Once established the pasture will need on-going maintenance to remain productive and suppress lippia.

**Legislation**

Lippia is a Class 4 noxious weed across NSW. The plant must not be sold, propagated or knowingly distributed except by people involved in hay or lucerne production, and the growth of the plant must be managed in a manner that reduces its spread and continuously inhibits its reproduction.

The responsibility for control of noxious plants and appropriate disposal of weed plant material on private land rests with the owner or occupier of the land. Failure to do so could result in the local control authority issuing a weed control notice, court action and a fine.

Local control authorities must control noxious weeds on public land adequately to prevent the infestation of adjoining land. Community members can assist the control of this weed by notifying the local control authority of any known infestation on public land.

See [www.dpi.nsw.gov.au/weeds](http://www.dpi.nsw.gov.au/weeds) for a complete list of declared noxious weeds for each control area in NSW.

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**Images**

Figures 1 and 5 – J. Dellow

Figure 2, 3, 4 and 6 – K. Motley

**References**


**Publications available**

Lippia Management – Challenges, opportunities and strategies (2008), National Lippia Working Group. For copies contact the NSW DPI Bookshop on 1800 028 374.

Pastures in cropping rotations – North West NSW Agfact P2.3.10, NSW Department of Primary Industries.

Phalaris pastures, 2nd edition Agfact P2.5.1, NSW Department of Primary Industries.

Persian Clover. Agfact P2.5.26, NSW Department of Primary Industries.

Balansa clover. Primefact 385 Department of Primary Industries.

Successful establishment of tropical perennial grasses in north-western NSW, Agnote DPI-156, NSW Department of Primary Industries.

A complete list of I&I NSW weed publications can be found at [www.dpi.nsw.gov.au/weeds](http://www.dpi.nsw.gov.au/weeds). Printed copies are available by contacting the NSW DPI.
Always read the label

Users of agricultural or veterinary chemical products must always read the label and any permit, before using the product, and strictly comply with the directions on the label and the conditions of any permit. Users are not absolved from compliance with the directions on the label or the conditions of the permit by reason of any statement made or not made in this publication.

Lippia management permits

Note: The usage described in this publication is permitted under Permit 10917 (in force until 30 September 2013). This permit applies to NSW only. The Permit is issued by the Agricultural Pesticides and Veterinary Medicines Authority (APVMA) and is in force at the time this publication was prepared. Persons wishing to use a chemical in a manner approved under Permit must obtain a copy of the relevant Permit from the APVMA, must read all details, conditions and limitations relevant to that Permit and must comply with the details, conditions and limitations before use.

Pasture improvement cautions

Pasture improvement may be associated with an increase in the incidence of certain livestock health disorders. Livestock and production losses from some disorders are possible. Management may need to be modified to minimise risk. Consult your veterinarian or adviser when planning pasture improvement.

The Native Vegetation Act 2003 restricts some pasture improvement practices where existing pasture contains native species. Contact your local Catchment Management Authority office for further details.

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