

Tips and Tactics

Refining Silverleaf Nightshade Best Management Strategies



Department of
Primary Industries



Improving long-term silverleaf nightshade control

Silverleaf nightshade (*Solanum elaeagnifolium* Cav.) is a native of the Americas and it was first reported in Bingara, NSW in 1901. Silverleaf nightshade (SLN) is a declared weed in New South Wales, Victoria, South Australia & Western Australia and was listed as one of the Weeds of National Significance (WoNS) in 2012.

This weed requires the adoption of medium to long term strategies using a range of chemical and non-chemical tactics appropriate to specific situations. SLN propagates not only by seeds, but also by root segments. For effective management, a 'Dual Action' approach is proposed. There is an early summer control action to target seedset and to exhaust the food reserves in the roots, through treating the new season stems before they flower and stopping carbohydrate return to the creeping roots. The second control action is in late summer or autumn to specifically target the eye buds on the roots. An effective management plan should address three key steps:

Step 1 - map the infested areas and mark out the boundary of isolated patch infestations.

Step 2 - consider the land use of each area, as this will affect the range of control tactics that can be economically employed.

Step 3 - assess what control options are appropriate for each area to be managed.

Previous best management strategies for SLN in Australia (<http://www.mla.com.au/globalassets/mla-corporate/blocks/research-and-development/silver-leaf-nightshade-best-practice-management-guide.pdf>) has been further refined based on the results from large scale on-farm grower participatory trials, established within a range of production systems and climatic zones across states.

KEY MESSAGES

- A quarantine area for stock movement, good farm hygiene and preventing new incursions are critical
- Avoid grazing when berries have formed
- Don't leave the infested area 'bare'. Where possible, provide competition through crop establishment
- 'Dual Action' control needs to be applied consistently, every year in summer and autumn, over a minimum of 3 years, to reduce infestations
- Timing the control measures is important for both seedbank and rootbank control
- Effective seedbank control is achieved when the plants are pre or at early flowering
- Collect and burn mature plants to reduce spread
- Close monitoring and vigilance is critical. New infestations are much easier to control than established ones
- Competitive crops and summer grasses help control this weed
- Cooperation with neighbours to combat weeds on fencelines and roadsides is essential
- Diligence: controls should be on time and done every year

Factors INCREASING silverleaf nightshade densities

- Cultivation
- Grazing advanced berries resulting in spreading to other paddocks and farms
- Infested fodder and seed contaminated vehicles and machinery
- Poor control timing when berries have already formed
- Inconsistent control: missing a spray will set you back

Promoting Dual-Action strategies for effective control

Best management practices for cropping systems

Silverleaf nightshade went quietly unnoticed for over 50 years following its introduction into Australia. The need for a summer weed control plan is imperative to preserve moisture and nutrients for subsequent crops, and to reduce the “green bridge” of pest and disease hosts during this period.

Farmers growing both summer and winter crops in a rotation usually have good control of SLN, mainly due to crop competition and more control options in summer crops and fallows. Well established crops will draw moisture from the soil profile, delaying SLN emergence and reducing subsequent growth and seedset.

Monitoring SLN before spraying is important for success. Timing spraying over summer to prevent 100% seedset is one key step in controlling this weed. The choice of adjuvants improves leaf penetration and herbicide uptake. Applying herbicide treatments following a rain event when the plant is not moisture stressed can give better control.

Excessive herbicide rates often do not necessarily give better results as this may burn off the top growth too quickly and reduce uptake and translocation.

Four herbicides, picloram, fluroxym, 2,4-D and glyphosate (under various trade names), are registered for control by spot spraying or boom application. Use of Grazon Extra® up to 30 June 2022 for control is also allowed under the APVMA permit PER12942 (NSW and QLD only). Picloram products are often used for spot spraying in late summer or autumn for maximum effects on rootbank.

Whole paddock infestations

> 30% ground cover occupied by SLN. Boom spray is recommended.

Scattered infestations

< 10% ground cover occupied by SLN, usually applicable for recent infestations (< 5 year old). Spot spray is recommended.

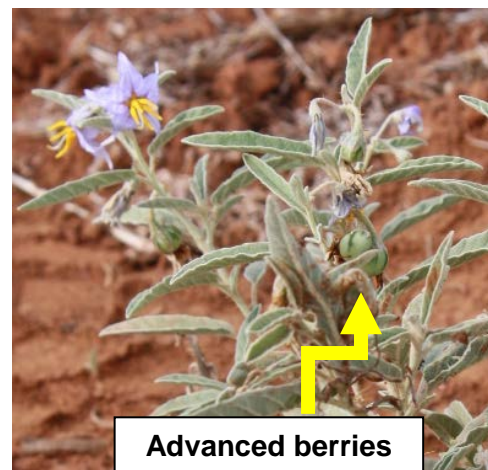


Before employing an appropriate control strategy it is necessary to map the distribution of infestations across the paddocks, with the primary control focus on the light infestations to avoid further spread. Efforts should also be taken to contain the heavy infestations.

The 1st Action, which may include knockdown herbicides, slashing, grazing or burning, needs to be applied to both heavy and light infestations. The 2nd Action, will vary between heavy and light infestations. Heavy infestations will require an application of knockdown herbicides by boom spray to gradually run down the rootbank, while light infestations will require spot spraying of picloram products to achieve maximum rootbank control.

Good ‘Dual Action’ control of heavy SLN infestations over summer fallow period needs to be followed by suitable crop rotation involving cereals and canola for a minimum of 3-5 years, then followed by a pasture phase if required.

Sometimes, multiple sprays are needed depending on initial infestation levels, summer climatic conditions and the stage of weed re-growth.



Advanced berries

Flowering plant but advanced berries already formed. Close monitoring is needed to make sure the application time is right!

‘Dual Action’ strategies

- An early action aims to achieve 100% seedset (seedbank) control in November or December when there are only a few stems distributed across the paddock which have just flowered. Options include knockdown herbicides, slashing, grazing, spray/graze or burning. The choice of products will be influenced by other weed species present and which crop types are to be planted in the future. Careful attention should be paid to plant-back periods listed on product labels to avoid damage to following crops.
- A late summer or autumn herbicide treatment is applied when plants start to shut down naturally as the temperature declines. This coincides with the translocation of carbohydrates from the growing points down into the creeping roots. The aim of the treatment is to utilise the carbohydrate transfer to carry herbicides into the roots, maximising the potential for injury to the rhizomes. The choice of product will be influenced by the plant-back requirement and levels of infestation.

Best management practices for livestock producers with silverleaf nightshade in pastures

Spread of SLN into new areas has mainly occurred with the transfer of seeds via livestock movement from infested areas or by feeding contaminated hay or grain that is ingested and spread around the farm.

The establishment of designated quarantine areas to manage stock movement is essential. Any new stocks or moving stocks from infested areas to other areas will need to be in the quarantine area for a minimum of seven days, to empty the majority of ingested seeds. Pastures need to be monitored for new seedlings to ensure timely and proactive control before the plant develops an established colony which is hard to kill.

The small list of registered herbicides can limit the effective control of SLN in pastures with lucerne or other summer growing legume species. When using fluroxypyr on lucerne, the stand must be defoliated first, such as grazing or hay-cut. Successful suppression relies on robust pasture competition and timely grazing.

Appropriate agronomic and husbandry practices will improve pasture competition on SLN. Livestock should not be grazing SLN with berries over summer. Grazing SLN when advanced berries have formed greatly increases the risk spreading within and between farms.

Grazing, cutting for hay or silage should be conducted when there are only a few flowers visible across the paddocks. Regular grazing is necessary to suppress the re-growth, stop seedset and exhaust the root reserves.

Hay or silage made from paddocks where SLN is present should be fed in containment areas or paddocks where it is easy to monitor and control any new infestations.

Grazing management should be planned so that pastures compete with SLN over spring and summer and where possible maintain groundcover. It is recommended to graze pastures over the summer for short periods using high stocking rates to weaken the plants and stop early berries forming viable seeds.

Selective herbicides should be used in pastures so that there are no bare areas that allow SLN to grow without competition.

Regular use of the spray/graze technique can improve the grazing efficacy on SLN. Alternatively, degraded pastures should be rotated to grazing cereals or cereal cropping for 3-5 years to reduce the infestation density.

Spray/graze or grazing control option can be conducted immediately after harvest on stubble for 3 weeks, at the standard stocking rates when there are very few other weeds present or at double the stocking rate when there is plenty of green feed available. Supplementary grain for livestock with high energy demands may be required for longer grazing periods.

However, care should be taken when grazing heavy infestations especially when berries are present, as stock poisoning has occurred overseas despite the absence of such reports in Australia.

Using competitive pastures

Summer active sub-tropical grasses are very effective in suppressing SLN by reducing the availability of moisture deep in the soil profile. This can be achieved by including summer active grasses (with an appropriate herbicide regime) into existing clover pastures. Summer grasses can greatly reduce the density and vigour of SLN.

The integration of summer active grasses into existing clover pastures can also increase livestock productivity and profits. Some promising tropical grass species include Bambatsi panic, Premier digit grass, Strickland finger grass and Rhodes grasses. A minimum of 3 t/ha of dry pasture biomass is required to have the effective suppression. Excess biomass above 3 t/ha can be grazed or hay-cut, then followed by spraying phenoxy herbicides in autumn to control SLN.

The faster a summer grass can convert moisture in the soil profile into forage, the greater the reduction in summer weed establishment. Nitrogen and phosphorus are important for rapid grass growth to then effectively suppress SLN.

'Dual Action' strategies

- **Dense infestations are often found in degraded pastures. It is suggested to renovate such paddocks through cropping prior to re-sowing a grass-based pasture which allows the use of selective herbicides during the season. Fluroxypyr, 2,4-D or even picloram products (depending on the SLN density) can be used in autumn to maximise rootbank control.**
- **For scattered infestations, consider the use of 'Dual Action' strategy. The 1st action uses grazing (or spray/graze), hay-cut or silage, followed by the 2nd action in autumn by spot spraying picloram products to target the rootbank.**



SLN in degraded lucerne pastures



SLN stems after grazing

Best management practices for roadsides and fencelines

Roadsides

Weed control along roadsides can be complicated because roadside groundcover is often both functional and aesthetic. Roadside vegetation needs to stabilise soil and prevent erosion under the gaze of the general public.

The methods and means of roadside weed control vary between council areas. Options will be constrained by the state Environmental Protection Authority legislation and the operational policies in individual councils. Farmers are required to negotiate with councils before applying a herbicide to the weeds on fencelines that border public lands.

A combination of mowing and herbicides is often used for weed management on roadsides. However, if the mowing areas contain silverleaf nightshade, the mowing needs to be conducted before it flowers. The use of non-selective herbicides such as glyphosate is not ideal for roadside SLN control, as it will create bare ground, leaving no vegetation to compete with SLN. Fluroxypyr, 2,4-D, picloram or their mixtures are often used for spot spraying, allowing grasses to compete with SLN.

Non-selective herbicides however are sometimes used to maintain the narrow margin of bare ground adjacent to the roadway to provide water movement and preserve line of sight for motorists.

Fencelines

The recommended best management practice for internal fencelines is to apply the 'Dual Action' strategy, including the use of grazing as the 1st Action before silverleaf nightshade flowers. Picloram-based products can be spot sprayed for rapid results on rootbank control. Common sense also dictates that landholders need to negotiate weed control options and treatments on fencelines with their neighbours.

SLN that has spread to inaccessible areas in rocky hilltops or along creeks, can become nursery areas, producing seed that can re-infest roadsides and clean paddocks. In inaccessible hilly areas consider planting eucalypt species that are known to have allelopathic capacities against SLN.



SLN along a roadside in Central Victoria



SLN fenceline trial in North Kukerin, WA



'Dual Action' strategies

1st Action of mowing, 2,4-D or fluroxypyr prior to SLN flowering, followed by **2nd Action** of picloram in Autumn. In many cases, one application of picloram as the **1st Action** at early flowering stage can also be highly effective. Often the **2nd Action** is not required.

SLN control calendar under different production scenarios

SEASON	Cropping/fallow	Pasture	Fallow/fencelines/non-arable areas
Spring	Good crop competition	Good pasture competition	Grazing or grass-selective Knockdown herbicides
Early summer (Dec)	Grazing, mowing or Knockdown herbicides	Grazing, hay cut or silage	Grazing or Knockdown herbicides
Late summer (Jan - Feb)	Grazing if needed	Grazing, hay cut, silage or spray/graze	Grazing if needed
Autumn	Picloram herbicides (Spot or boom spray)	Grazing, hay cut silage, or spray/graze Or spot spraying if possible	Picloram herbicides (spot or boom spray)
Winter	Hygiene and quarantine when re-stocking. Scout the paddocks, collect and burn any missed plants and berries		

Silverleaf nightshade detection, control and seasonal life stages

	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
Monitoring												
Dual Action timing												
Dormant												
Stem emergence												
Active growth												
Flowering												
Berry set												

 Contact	<i>A</i> Acknowledgements
Hanwen Wu hanwen.wu@dpi.nsw.gov.au Phone: (02) 6938 1602	This project gratefully acknowledges the financial support of Meat & Livestock Australia and Australian Wool Innovation, and collaborating institutions and farmers across states
 Useful resources	
Silverleaf nightshade website www.silverleafnightshade.org.au Best management practice guide http://www.mla.com.au/globalassets/mla-corporate/blocks/research-and-development/silver-leaf-nightshade-best-practice-management-guide.pdf	
'Dual Action' trials show promising results on SLN	