

Statice (winged sea-lavender)

Biology, Ecology & IWM Tactics

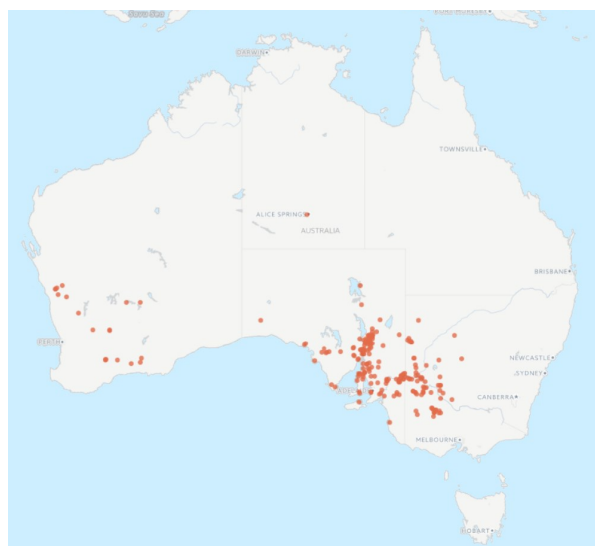


Statice (*Limonium lobatum*) is a winter annual dicotyledonous weed of Mediterranean origin that has naturalised inland and along some coastal areas of southern Australia. This herbaceous weed from the Plumbaginaceae family is often found in areas of low to moderate rainfall on sandy to loamy soils that are calcareous, sodic and of neutral to high pH.

Long-range dispersal is by seed, either through contamination of grain crops, harvest or tillage machinery, or by movement with livestock.

Infestations are more common in pastures, roadsides and undisturbed habitats, however recently this weed has invaded cropping areas, particularly where crops are rotated with pasture.

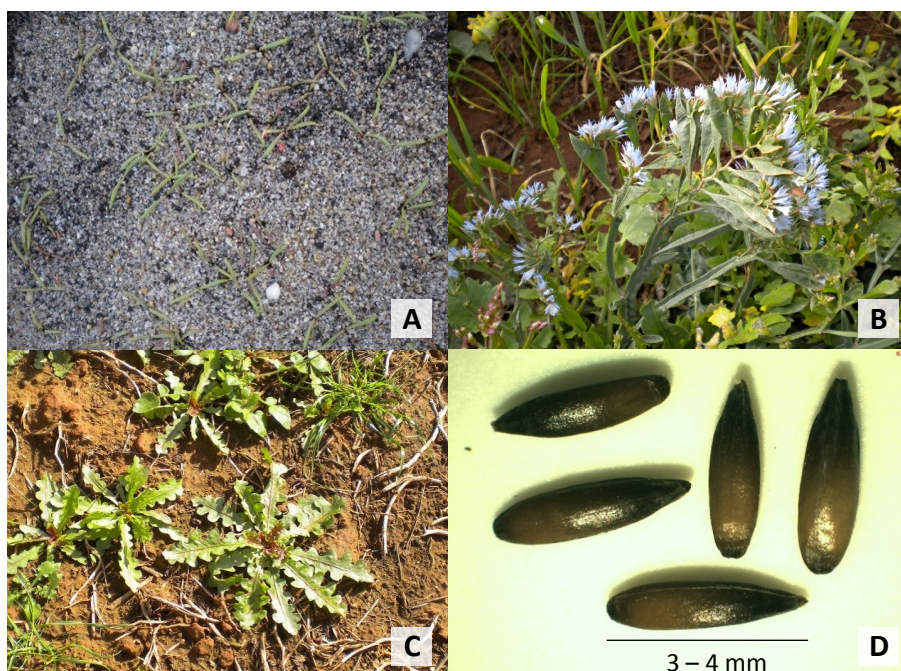
In the absence of effective early control, deep-rooted statice plants can compete with crops for nutrients and moisture, reducing crop growth and yield potential. In dense stands, crop yield losses can be as high as 20 to 30%. Statice can also cause problems at harvest, with green leaf material often discolouring and contaminating grain.



Distribution of statice in Australia.
Map sourced from Australia's Virtual Herbarium (<http://avh.ala.org.au>; Sep 2017).

Identification and attributes

Statice, also called winged sea-lavender, is a winter annual herb with a basal rosette, waxy lobed leaves, erect broadly winged stems and one sided clusters of purple and white flowers.



Statice seedlings (A), mature plant with purple flowers (B), rosette plants with lobed leaves (C) and seeds (D).

Photos by Sam Kleemann and Ben Fleet.

- Seedlings emerge as 2 long and thin cotyledons with rounded hairless tips, with the first leaves lobed at the margins and opposing each other.
- Plants rapidly develop a rosette with lobed hairy leaves, ranging in length from 30 to 250 mm, from a tapered base.
- Branched stems with 3 wings form at the rosette centre, ranging in size from 100 to 400 mm, and develop short, dense flower heads with spikelets with 3 bracts.

Statice Biology and Ecology

Statice is emerging as a significant weed of field crops in the low to medium rainfall areas of southern Australia. Although little information is available on its ecology, there is evidence to suggest it behaves like a winter annual; germinating over late autumn/early winter, then producing seed during spring/early summer.

Seed dormancy and germination

Statice seeds are dormant at seed-shed and require a short after-ripening period (2 months) over summer before dormancy release, allowing germination when conditions are suitable. Recent research found germination was strongly stimulated by light exposure and dormancy was overcome by scarification (breaking the seed coat). Statice seeds rapidly imbibe water, meaning the seed coat doesn't impair water uptake (not hard-seeded). Dormancy appears to be related to the pigmented nature of the seed coat, which may reduce permeability of oxygen into the seed.

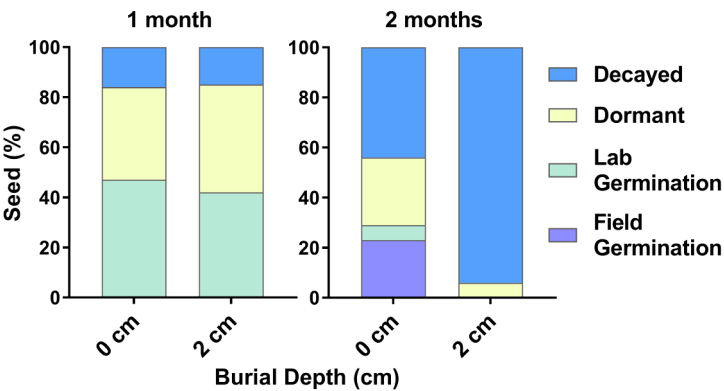
Germination is usually initiated at the autumn break (April-May), once temperatures are within the optimum range of 15 to 25°C and seeds have had an opportunity to imbibe following rainfall. Statice has a clear preference for germination from the soil surface, where seeds are exposed to light (*see graph*). This could explain the increase in statice abundance since the adoption of no-till farming systems that concentrate the weed seeds on or near the soil surface.

Seed persistence

Statice seeds (collected from Warnertown, SA) that failed to germinate were vulnerable to rapid decay, with more than 95% of seeds losing viability after only 2 months burial in the field.

Seeds on the soil surface decay at a slower rate than those buried at 2 cm depth (*see graph*). This attribute partially explains why greater infestations of statice occur in pastures and no-till systems.

Seedbank persistence is likely to be short for statice, meaning high seed production would be an important factor in the persistence of this weed. Therefore, tactics that focus on seed set control are likely to have significant impact for successful management of statice.



Effect of burial depth on seed fate of statice. Statice seeds that failed to germinate were vulnerable to rapid decay after only 2months. Buried seeds decayed faster.

Seed production and salt tolerance

In the absence of competition, a single statice plant can produce more than 60 dense flower heads, and more than 2000 seeds. Flowering tends to occur in spring to early summer (Oct-Dec), with a majority of flowers retained on the plant at maturity. Therefore, weed seed capture or destruction at harvest could be quite effective in reducing seedbank replenishment in this weed species.

Statice seeds are more tolerant to salt stress than many other local weeds. This trait allows statice to invade saline soils and may explain its greater prevalence in areas where soil salinity is known to be a problem.



Statice can thrive where soil salinity is high as seen in this salt scald near Ouyen, Victoria. Photo by Sam Kleemann.

Salt (NaCl) required for 50% inhibition of seed germination of common weeds.	
Weed Species	NaCl (mM)
Marshmallow	32
Bedstraw	54
Indian hedge mustard	68
Sowthistle	90
Wild turnip	135
Annual ryegrass	148
Statice	230

Tactics for integrated weed management (IWM)

Overreliance on glyphosate in no-till farming has favoured static, which appears to have a higher tolerance to this herbicide than other weeds present. However, this weed can be effectively managed with an integrated weed management (IWM) plan. Seed production is the only reproductive means for static. As seed viability in the soil appears to be short (12 months), weed control strategies should mainly focus on two areas: prevention of seed-set; and high seedling mortality to exhaust and deplete the seedbank.

Herbicide options

Achieving effective control of static with herbicides has been a significant issue for growers. Recent research found group B herbicides, Eclipse® (metosulam), Raptor® (imazamox) and Logran® (triasulfuron) as well as mixtures of glyphosate (Raze®) plus Goal™ (oxyfluorfen), had limited efficacy on static (< 42% control). Group C herbicides Igran® (terbutryn) and diuron applied as tank mixtures with MCPA and Ally® (metsulfuron) were extremely effective (92-99%). Precept® (MCPA and pyrasulfotole) was the most effective option, providing 100% control of static. Whilst these options have potential to provide good control in cereals, management in pulse crops is far more difficult where the herbicide options available are limited and less effective (i.e. Raptor®, Broadstrike®).

Effect of different herbicide applications on post-emergent control (%) of static, 30 days after treatment (DAT).
Currently there are no herbicides registered for the control of static with post-emergent application in crop.

Treatments	Control % (30 DAT)	Herbicide Group
Eclipse® (metosulam) @ 50 mL/ha + Activator (0.2% w/v)	11	B
Raptor® (imazamox) @ 45 g/ha + Activator (0.2% w/v)	20	B
Amicide Advance® (2,4-D) @ 1.5 L/ha	32	I
Logran® (triasulfuron) @ 15 g/ha + Hasten™ (1% w/v)	39	B
Jaguar® (bromoxynil, diflufenican) @ 1 L/ha	41	C, F
Raze® (glyphosate) @ 1 L/ha + Goal™ (oxyfluorfen) @ 75 mL/ha	42	M + G
Diuron (900) @ 280 g/ha + MCPA (750) @ 330 mL/ha + Activator (0.2% w/v)	92	C + I
Igran® (terbutryn) @ 550 mL/ha + MCPA (750) @ 330 mL/ha + Ally® (metsulfuron) @ 5 g/ha	99	C + I + B
Diuron (900) @ 280 g/ha + MCPA (750) @ 330 mL/ha + Ally® (metsulfuron) @ 5 g/ha	99	C + I + B
Precept® (MCPA, pyrasulfotole) @ 1 L/ha + Hasten™ (1% w/v)	100	H, I

Cultural options

- Growing herbicide tolerant crops, such as triazine tolerant (TT) canola, provides an opportunity to apply group C herbicides for effective static control. Growing more competitive crops like barley can help suppress weed seed production while maintaining yield even in the presence of weeds.
- Higher seed rates and narrow row spacing will help to increase a crop's ability to suppress static growth and seed production.

Other useful methods to help manage static include:

- Maintaining clean fence-lines and other non-crop areas. Aim for 100% seed set control; spray small plants and avoid herbicide applications during times of water stress;
- Delay sowing to allow for greater weed control with knockdown herbicides. (*Caution:* effectiveness depends heavily on rainfall amount and frequency, and rate of knockdown herbicide);
- Green and brown manuring;
- Residue and seed collection at harvest;
- Narrow windrow burning of header rows where seed has been concentrated;
- Grazing infested areas heavily and continuously during late winter and spring (*Caution:* movement of livestock could result in longer-range weed dispersal).

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Resources:

Statice control – 2014 trial report for Birchip Cropping Group (<https://www.farmtrials.com.au/trial/17658>)

Latest research on emerging weeds: brome grass, statice and common sowthistle.

(<https://grdc.com.au/resources-and-publications/grdc-update-papers/tab-content/grdc-update-papers/2017/07/latest-research-on-emerging-weeds-brome-grass,-statice-and-common-sowthistle>)