



Salt-tolerant pasture establishment

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Salt-tolerant pastures are usually sown in low-lying, water-logged (discharge) areas where an upward movement of the watertable causes saline groundwater to seep from the soil surface.

Discharge saline areas in Victoria are usually divided into four categories:

Class 0:

Non Saline

ECe level of less than 2dS/m (decisiemens/metre).

Class 1:

Areas of low to mild-level salinity

ECe level of 2 to 4 dS/m.

Class 2:

Areas of moderate-level salinity

ECe level of 4 to 8 dS/m.

Class 3:

Areas of high-level salinity

ECe level of 8 to 16 dS/m.

Class 4: Areas of severe-level salinity

ECe level of greater than 16dS/m.

Salt-tolerant weeds such as Sea Barley Grass (*Critesion marimum*) and Buck's Horn Plantain (*Plantago coronopus*) usually replace productive pasture species in these areas. When soil becomes extremely saline (Class 4) and nothing will grow, the result is bare ground prone to erosion.

Naturally saline discharge areas (natural swamps, flood plains, riparian zones, etc) should not be sown to improved pastures. Pasture renovation works should only be conducted on secondary saline sites (man induced) and priority should be given to the long-term control of watertables and salinity by treating groundwater recharge areas.



Typical low-lying Class 2 discharge areas on-farm. These areas respond well to sowing with salt-tolerant pasture species. Areas should also be fenced off for better grazing management.

Paddock preparation

The first step in establishing a salt-tolerant pasture is a soil test (0 to 10 cm) to determine the paddock's soil salinity levels and fertiliser requirements.

Saline discharge areas should be fenced off from the rest

of the paddock and treated as a different soil type. Fencing according to land class makes management easier. Watering points for stock and subdivision fence lines need to allow rotational grazing of salt-tolerant pastures.

Areas to be sown should be spray topped in spring before sowing to reduce annual grass seed set, then resprayed after the autumn break to control weeds. Most salt-tolerant pasture species have inherently weak seedlings, so weed control before sowing is crucial. Direct drill the pasture to minimise the soil disturbance. Soil structure within these areas is usually very sensitive and prone to erosion, so minimum tillage is best. Shallow cultivation, such as scarifying down to 10 cm, provides a soil tilth and any rain will leach salt from the surface, creating an ideal seedbed.



Shallow scarifying down to about 10 cm will provide soil tilth and create an ideal seedbed for sowing.

Sowing the pasture

Seeding rates will vary according to soil ECe levels. The seeding rate (kg/ha) will increase with the salinity levels.

Soil acidity and water logging also need to be considered when choosing pasture species. Most saline soils are alkaline and most salt-tolerant pasture species can withstand some waterlogging. Some species, such as Strawberry Clover, do not persist or may not even germinate in acidic soil (pH <6 in CaCl₂). Lime may be necessary.

For severe saline areas (>16 dS/m) an ideal mix is:
Dundas Tall Wheat Grass at 10-15 kg/ha
Bolta Balansa Clover at 1-2 kg/ha
Palestine Strawberry Clover at 2-3 kg/ha
Puccinellia at 6 kg/ha.
For moderately saline areas (<8 dS/m) an ideal mix is:
Dundas Tall Wheat Grass at 6-10 kg/ha
Advance Tall Fescue at 10-15 kg/ha
Bolta Balansa Clover at 1-2 kg/ha
Palestine Strawberry Clover at 1.5 kg/ha

Pasture should be sown in autumn or before the area gets too wet for machinery access. Pasture can be sown into dry soil, providing weed control measures have been taken. Most saline areas lack phosphorous and nitrogen, so the pasture should be sown with at least 100 kg/ha of a high nitrogen fertiliser, such as MAP or DAP.

Some species, such as Tall Fescue, prefer to be sown in spring. Balansa Clover should be kept out of spring-sown pasture mixes, as there will not be time for the Balansa to set seed for the following year.

It is important not to put too much (use <1 kg/ha) Balansa Clover seed into a mix for mildly saline areas, as it can dominate a first-year pasture and smother the other pasture seedlings. Balansa Clover can be easily introduced into an established pasture the following autumn by broadcasting the seed on the surface when applying fertiliser.

Pasture pests need to be monitored pre- and post-emergence, as they can cause the pasture to fail. New pastures should be top-dressed in spring with at least 100 kg/ha of urea and a high phosphorous fertiliser to maintain pasture quality. Riparian zones and sensitive areas, such as creek banks, should not be fertilised.



Before sowing, autumn 2004.



Tall Wheat grass pasture (eight months old).

Salt-tolerant plants for grazing

There are a number of commercially available salt-tolerant plants suitable for sowing in saline areas.

The table lists some of these species and their relative soil salinity tolerance levels ECe (dS/m).

Plant species	Cultivars available	Soil salinity tolerance levels ECe (dS/m)
Sub clover	Leura, Trikkala, etc	<2 dS/m (sensitive)
Perennial Ryegrass	Ellett, Victorian, Fitzroy, etc	<4 dS/m (sensitive)
Balansa Clover	Bolta, Paradana, Frontier	<6 dS/m (moderately tolerant)
Phalaris	Australian 2, Sirosa, Holdfast, Uneta, Maru	<6 dS/m (moderately tolerant)
Strawberry Clover	Palestine, Onward	<8 dS/m (tolerant)
Tall Fescue	Advance, Resolute, Demeter, Quantum	<10 dS/m (tolerant)
Tall Wheat Grass	Dundas, Tyrell	>12 dS/m (highly tolerant)
Puccinellia	Menemen	>25 dS/m (highly tolerant)

In most cases, a mix of species gives the best result. More-tolerant species tend to colonise the worst-affected areas, while less-tolerant species establish on the fringe areas, resulting in a well-balanced pasture base. Be careful when preparing mixes because some species are not compatible, unless sown at different times, e.g. Phalaris and Perennial Ryegrass.



Tall Wheat Grass plants, 18 months old.



Strawberry Clover, 12 months old.

Grazing management

Well-established pasture can be lightly grazed in late September, but only if the perennial grass is well anchored. An easy way to test this is by pulling at the base of the plants using your forefinger and thumb. If plants come out of the ground easily the pasture is not anchored well enough to be grazed.

It is important to let Balansa set seed (critical for next year's germination), after which the pasture can be crash grazed to about 10 cm to encourage leaf growth and root development, control weeds and improve quality. Do not graze the pasture if the site is too wet.

From the second year on, the pasture should be managed to a maximum height of about 10 cm and correctly fertilised. This ensures that a high-quality green pasture in summer is available to finish stock before selling, without the need for supplementary feeding. Well-managed salt-tolerant pastures are highly productive and have the potential to be cut for hay or silage.

Mean feed quality results for spring 2002

Species	CP (Protein) %	Digestibility %	EST_ME (Energy MJ/kg)
Tall Fescue	20.0	74.5	11.2
Perennial Ryegrass	21.2	77.3	11.3
Phalaris	14.3	74.9	11.0
Mixed Pasture	19.3	72.7	10.6
Dundas Tall Wheat Grass (<20cm)	22.6	75.3	12.0
Tall Wheat Grass (>20 cm)	15.2	66.4	9.6
Tall Wheat Grass (>1 m)	7.6	52.4	7.4



Well-established salt-tolerant pasture (12 months old).

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