



Pastures for discharge areas

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Discharge occurs in low lying areas of the landscape where upward movement of groundwater causes seepage at the soil surface. Soaks from mid-slopes or higher ground may also be described as discharge areas.

As the groundwater rises through capillary action and evaporates, salts in the groundwater are left behind and accumulate in the soil. Traditional pasture species are not able to adapt to this new saline environment resulting in reduced growth and/or death.

Discharge saline areas are divided into 4 categories:

Class 1: Areas of low level salting, ECe reading of 2 to 10dS/m (*decisiemens/metre*).

Class 2: Areas of moderate level salting, ECe reading of 10 to 25dS/m

Class 3: Areas of high-level salting, ECe reading of 25 to 50dS/m

Class 4: Extreme, above 50dS/m

The above measurements are taken in the 0 to 10 cm zone during the summer/early autumn period.



Figure 1. Typical low-lying class 2 discharge area.

Salt tolerant weeds such as Sea Barley Grass (*Critesion marinum*) and Buck's Horn Plantain (*Plantago coronopus*) usually volunteer into these areas replacing productive pasture species. In a worse case scenario soil will become extremely saline (*class 4*) where nothing will grow resulting in bare ground prone to erosion.

Water quality entering our rivers and streams from these saline areas can become significantly contaminated with higher salt and nutrient loads. Treatment of saline discharge areas has a multiple benefit effect. Watertables are lowered benefiting the environment whilst increasing production for the landholder. Ground cover should be the main focus of such works reducing erosion, evaporation and therefore salt accumulation.

Primary saline discharge areas (*natural swamps, flood plains, riparian zones etc.*) should not be sown to improved pastures but simply fenced off. Pasture renovation works should only be conducted on Secondary saline sites (*man induced*). Priority for controlling watertables and salinity for the long term should be concentrated on treating recharge areas (*groundwater intake areas*).

Where local ground water systems occur, recharge areas may only be a few 100 meters away from a discharge area. In these situations and providing annual rainfall figures are taken into consideration they can be treated successfully at a local catchment level. In areas where regional groundwater systems occur, recharge may be occurring from 100's of kilometers away. This makes treatment more difficult and whole catchment plans involving different community groups would need to be followed if effective treatment is to be achieved.



Figure 2. Discharge areas need to be fenced off and treated as a different soil type.

Salt tolerant plants for grazing

There are a number of salt tolerant plants that are commercially available and are suitable to sow in saline areas.

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

Plant Species.	Cultivar/s available.	Soil Salinity Tolerance levels ECe (dS/m).
Sub clover	Leura, Trikkala, etc.	< 2 dS/m (Sensitive)
Per. ryegrass	Ellett, Vic, Fitzroy, etc.	< 4.5 dS/m (Sensitive)
Phalaris	Australian, Sirosa, Holdfast, Uneta.	< 6 dS/m (Moderately tolerant)
Balansa Clover	Bolta, Paradana, Frontier.	< 8 dS/m (Moderately tolerant)
Strawberry Clover	Palestine, Onward.	< 10 dS/m (Tolerant)
Tall Fescue	Advance, Resolute, Demeter, Quantum.	< 10 dS/m (Tolerant)
Tall Wheat Grass	Dundas, Tyrell.	12 to 25 dS/m (Highly tolerant)
Puccinellia	Menemen,	> 25 dS/m (Highly tolerant)

In most situations a pasture mix of some of the species detailed above is recommended. The more tolerant species would colonize the worst effected areas and the less tolerant species would establish on the fringe areas resulting in a well-balanced pasture base. Care needs to be taken when preparing mixes, as some species are **not** compatible, (unless sown at different times), eg: Phalaris and perennial ryegrass.



Figure 3. Dundas Tall wheat grass pasture (three years old)

Paddock Preparation

A soil test should be conducted to determine the fertilizer requirements and ECe levels of the soil. Saline discharge areas should be fenced off from the rest of the paddock and managed as a different soil type. Fencing should be erected as per land class to assist in management.

Watering points for stock and subdivision fence lines need to be considered to ensure effective grazing management. Rotational grazing is essential for these areas and provision of high quality water is required for stock grazing saline pastures.

Ideally the area should be spray topped in spring to reduce annual grass seed set. The area should be resprayed after the autumn break to achieve a total kill and then direct drilled to minimise soil disturbance. Weed control before sowing is crucial as most salt tolerant pasture species are inherently weak as seedlings. Soil structure within these areas is usually very sensitive and prone to erosion so minimum tillage is a must where possible. Shallow cultivation such as scarifying down to 10 cm will provide a soil tilth, leaching surface salts beyond the A1-A2 horizon after rain creating an ideal seedbed.



Figure 4. Shallow cultivation is a must for these areas to minimize erosion, leach surface salt (after rain) beyond the A1-A2 horizon and create an ideal seedbed.

Sowing the Pasture

Seeding rates will vary according to soil ECe levels. As the salinity levels increase so does the seeding rate (Kg/ha).

Soil acidity may also be a crucial factor when trying to establish pasture in saline areas and needs to be considered when choosing pasture species. However most saline soils are alkaline. Some species such as Strawberry Clover will not persist or may not even germinate in acidic soils (< pH6 CaCl₂).

For moderately saline areas (10 to 25dS/m) an ideal mix would be:

- Dundas Tall wheat grass at 10 kg/ha
- Bolta Balansa clover at 1 kg/ha
- Palestine Strawberry clover at 2 kg/ha
- Puccinellia at 6 kg/ha.

For mild saline areas (2 to 10dS/m) an ideal mix would be:

- Dundas Tall wheat grass at 6 kg/ha
- Advance tall fescue at 10 kg/ha
- Phalaris at 2 kg/ha
- Bolta Balansa clover at 0.5 kg/ha
- Palestine Strawberry clover at 1.5 kg/ha

For high to extreme saline areas (<25 dS/m) sow down with appropriate species, fence off and defer from grazing until adequate ground cover is achieved. In some cases this could take 2 or more years.

If the ECe levels are below 2dS/m than the area is not considered salty (*class 0*) and should be able to grow any traditional pasture species such as perennial rye grass and sub clover. Water logging may be an issue however and needs to be taken into consideration.

Pasture should be sown in the autumn or before the area gets too wet for machinery access. Pasture may be dry sown providing weed control measures have been taken. Most saline areas have a lack phosphorous and nitrogen so the pasture should be sown with at least 100 kg/ha of a high nitrogen fertilizer such as M.A.P or D.A.P. Soil tests for P and K should also be considered.

Pasture pests will need to be monitored pre and post emergence. Failing to control pests will most likely result in pasture establishment failure. In spring top-dress with 100 kg/ha of urea and a high phosphorous fertilizer to maintain a high quality pasture.

Riparian zones and sensitive areas such as creek banks need to be considered and excluded from fertilizer applications.

To avoid the possibility of exotic salt tolerant pasture species spreading outside the targeted areas a buffer zone of at least 20 m wide adjacent to creeks, riparian zones and significant native vegetation sites needs to be observed.

Grazing Management

Well-established pasture sites may be able to have a light grazing 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 your thumb. If plants come out of the ground easily than the pasture is not anchored well enough to be grazed and grazing should be deferred to late December after Balansa clover has set seed.

After Balansa has set seed (critical for next year's germination), pasture should be crash grazed to about 10 cm in height. This will encourage leaf growth, root development, control weeds and improve quality. Do not graze the pasture if the site is too wet.

From second year on, the pasture should be maintained to a maximum of about 10cm in height and correctly fertilized. This will ensure a high quality green pasture in summer that can be used strategically to finish stock prior to selling without the need of supplementary feeding. Well managed, these pastures are highly productive and have the potential to be cut for hay or silage.



Figure 5. A well managed Balansa clover/Tall wheat grass pasture in its second year.

The previous version of this note was published in May 1996.

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