DEPARTMENT OF
PRIMARY INDUSTRIES

Irrigated Winter Forages in Northern Victoria

Managing Balansa & Berseem Clovers

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Irrigated Winter Forages: Managing Balansa & Berseem Clovers

Balansa and Berseem clovers are annual clovers used in irrigated pastures in northern Victoria. They are generally used when salinity is an issue. They may be grown alone or in combination with other annual clovers or short-lived ryegrasses.

The key principles for the management of Balansa or Berseem clover based annual pastures relate to:

- **achieving a high plant density at establishment**
- **optimising management of grazing, water, and soils and fertilisers.**

Balansa clover *(Trifolium michelianum)*:

- is an annual, self-regenerating clover characterised by high levels of "hard seed"
- grows in most soils where subclover grows, and also in waterlogged and slightly salt affected soils
- has early, mid or late maturing cultivars
- has semi-erect hollow stems that can grow up to 80 cm tall, but remains prostrate under grazing.

Berseem clover *(Trifolium alexandrinum)*

- is an annual clover with high levels of "soft seed" which means that regeneration in subsequent years is unreliable and annual sowings are required
- cultivars may differ in their proportions of hard seed
- is more salt tolerant than subterranean, Persian or balansa clover
- is erect growing and has hollow stems.

"Hard" and "soft" seeds

- "Hard seeds" are seeds with an impermeable seed coat that prevents water uptake and hence germination.
- "Soft seeds" are seeds with a permeable seed coat that allows water uptake and germination if moisture and temperature conditions are suitable.
- The progressive breakdown of the "hard seed" coat over summer results in an increasing proportion of seeds with a "soft seed" coat. This "soft seed" is then capable of germinating when temperature and moisture conditions are suitable.
- Cultivars which produce a high proportion of "soft seeds" in spring are not capable of reliably regenerating each autumn and so usually need to be sown each year.
- Cultivars with a high proportion of "hard seeds" are generally capable of reliably regenerating in autumn. The annual re-establishment of "hard seeded" clover cultivars is covered in the subterranean clover brochure.

1. Establishment

1.1. Time of establishment

The germination of both Balansa and Berseem clovers can be reduced at high temperatures and, while they can be started any time from early February onwards, start-ups from late February onwards are most reliable.

When short-lived ryegrass is included in the mix, start-ups may need to be delayed as high temperatures limit the germination of ryegrass and the likelihood of achieving a high ryegrass content.

1.2. Seedbed conditions

Balansa and Berseem clovers can be sown into a cultivated, weed-free seedbed by either broadcasting onto the surface and lightly covering with a roller (the preferred option), or sown at no more than 5 mm depth, and irrigated up.

Balansa and Berseem clover seed should always be inoculated prior to sowing, using an appropriate inoculum, to ensure that the appropriate rhizobium are present for nitrogen fixation.

If the initial irrigation is in February or March, the subsequent irrigation should be 3–5 days after the first in order to avoid a surface crust. (A close second irrigation requires good surface drainage and slope in order to avoid scalding). This is particularly important for Balansa clover due to its small seed size. Subsequent irrigations should be at the same interval as for perennial pasture, ie. a cumulative evaporation less rainfall interval (E-R) of 50 mm.

1.3. Sowing rates

Sowing **balansa** clover alone:
- balansa clover seed @ 8–10 kg/ha

Sowing **balansa** clover with short-lived ryegrass:
- balansa clover seed @ 6–8 kg/ha
- short-lived ryegrass seed @ 10–15 kg/ha

Sowing **berseem** clover alone:
- berseem clover seed @ 15–20 kg/ha

Sowing **berseem** clover with short-lived ryegrass:
- berseem clover seed @ 12–15 kg/ha
- short-lived ryegrass seed @ 10–15 kg/ha

1.4. Early season growth

The keys to early season growth of annual pastures are:
- high establishment density. This can have large impacts upon autumn-winter production.
- use of best management practices (BMPs) for grazing, water, and soils and fertilisers (see sections 2, 3 and 4).
- control of pests and diseases (see section 8).

1.5. Establishment in subsequent years

Balansa clover is a self-regenerating clover with a high proportion of hard seed. This means that it can reliably re-establish in subsequent years from seed produced the previous spring.

The management requirements for the successful re-establishment of self-regenerating annual clovers (such as balansa) is covered in Section 2 in the subclover brochure in this series.

Berseem clover generally needs to be resown each autumn.

2. BMPs - grazing

The first grazing of balansa and beseem clover pastures is often associated with controlling summer weeds.

When short-lived ryegrass is included in the mix, subsequent grazings should be:

- when the ryegrass is at the 2½–3 leaf stage.
- to a residual height of 4–5 cm. Grazing to a lower residual height will reduce regrowth rates and annual production.

When there is no short-lived ryegrass in the mix, subsequent grazings should be:

- when there is sufficient pasture present to graze (this corresponds to minimum rotation lengths of 30–40 days in late autumn and early spring, and up to 50–60 days in winter).
- to a residual pasture height of 2–3 cm during autumn and winter. This will optimise pasture removal and quality at this time of the year.
- to a residual pasture height of 4–5 cm during spring. This will optimise pasture removal and pasture regrowth rates at this time of the year.

Do not graze new regrowth (ie. a maximum of 3 days on the one area) as this will reduce regrowth rates.

Note that bloat can potentially be a problem when stock are grazing pastures with a high clover content.

3. BMPs – water

The key aims of water management are to irrigate the pasture before it is moisture stressed, and to minimise waterlogging. This is particularly important for areas established early and involves attention to:

- **irrigation frequency.** For early start-ups, the second irrigation should be 3–5 days after the first, provided surface drainage is good, in order to avoid a surface crust. Subsequent irrigations should be at the same interval as for perennial pasture, ie. a cumulative evaporation less rainfall interval (E-R) of 50 mm.
- **speed of irrigation.** Water should flow onto bays for a maximum of 4 to 6 hours. This requires good channel structure, good flow rates and well laid out bays. (The first irrigation in autumn is usually slower than this due to the large volume of water required).
- **quick drainage.** Surface water needs to drain of the bays quickly to minimise the period of water logging (ie. no standing water 18 hours after starting to irrigate). This requires well laid out bays with good slope for water flow over the pasture, well sealed channel plugs to avoid seepage, the use of spinner cuts (except on very short bays) to enhance surface drainage, clean drains so that water is able to drain off the end of the bays, and drains that run into a reuse system.
- **water quality.**
  - **Balansa clover** is *moderately sensitive* to salt. This means that there will be little or no decline in its growth through the use of irrigation water with a salinity content of **up to 1,500 µS/cm** (1,000 ppm).
  - **Berseem clover** is *moderately tolerant* to salt. This means that with good management there will be little impact on its growth through the use of irrigation water with a salinity content of **over 1,500 µS/cm** (1,000 ppm), but some yield loss will occur when the salinity content **approaches 3,000 µS/cm** (2,000 ppm).
  - For both **Balansa** and **Berseem** clovers, these salinity tolerance levels hold if there is deep drainage of approximately 10% of applied water (irrigation plus rainfall) and no saline water table.
  - The quality of the water can be tested with an EC meter. Water from alternative water sources such as a drain, bore or spear should also be tested regularly.

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4. BMPs – soils and fertilisers

A program to ensure adequate soil fertility includes:

- soil testing representative areas.
- setting nutrient targets.
- developing a fertiliser program. This needs to take into account nutrient imports and exports, so that the required nutrients are applied in the most economical way.
- implementing BMPs for fertiliser applications.
- planning a nitrogen use approach (if appropriate).

Phosphorus (P) targets for perennial pastures used for dairy production are in the range of 18–22 ppm of Olsen P. However, P targets for irrigated annual pastures are not known, but are likely to be marginally lower than that for perennial pastures. Typically, maintenance applications of P for balansa or berseem clover pastures are in the order of 20–25 kg P/ha.year.

Nitrogen fertilisers can be used to increase pasture growth when short-lived ryegrasses are included in the mix. The best responses to nitrogen are achieved when the pasture is ryegrass dominant and during winter and spring. Nitrogen fertilisers should be applied as soon as possible after grazing to allow the pasture sufficient time to respond prior to the next grazing. Urea needs to be washed into the soil within 24 hours of application to minimise losses.

Surface crusting is a common problem on sodic and newly land-graded soils and can be a major concern when establishing a new pasture as it can prevent seedling emergence. In this situation, the use of gypsum can be beneficial.

Soil salinity can affect pasture growth with the effect more pronounced on some species than on others. Approaches include ensuring use of low EC water, applications of gypsum or lime (containing calcium) to displace sodium, using salt tolerant species or lowering the water table.

5. Fodder conservation

The supply of pasture during spring usually exceeds herd requirements on most dairy farms. To maximise the benefits of the surplus pasture, feed surpluses need to be identified and conserved.

During spring when there is a feed surplus, the first priority for conservation are annual pastures. (Note that BMPs are required to maintain the density of perennial pastures and hence the priority for the conservation of annual pastures).

When ryegrass is included in mixtures with annual clovers it is important that the pasture is grazed during late winter and early spring to ensure a high clover and protein content in the conserved forage.

6. Cultivars

A range of berseem and balansa cultivars are available. When choosing a cultivar consider:

- time to seed set or maturity. This will affect potential dry matter production and water use during spring.
- soil type.
- disease tolerance.
- likelihood of waterlogging.

When including short-lived ryegrass in a mix containing balansa or berseem clovers, it is important that the maturity of the short-lived ryegrass is matched to that of the clover ie both the grass and clover grow until a similar time.

Finding information on cultivars

Grassland Society of Victoria – Pasture species database. Go to www.grasslands.org.au, and click on the link to the pasture species database.

Sales brochures – pay attention to where the trials were located.

Seed merchants – should be more tailored to the local region than sales brochures.

7. Weeds

Both balansa and berseem clovers are sensitive to competition from weeds during the early growth stages. Common weeds include:

- Barnyard grass *(Echinocloa sp.)* is often a problem in early irrigated paddocks. Barnyard grass is best controlled by early grazing once the clover is established.
- Winter broadleaf weeds can be controlled using herbicides but some plant damage is likely as clovers may be sensitive to some commonly used broad-leaf weed control herbicides.

Always consult the label before applying herbicides.

8. Pests and Diseases

The major pests and diseases of **balansa** clover are:

- **redlegged earth mites** (RLEM) and **lucerne flea.** These pests can have severe impacts upon balansa clover during the seedling stage. Control is often required within a week of germination. Effective management relies upon early identification of the problem and spraying if required.
- Balansa clover is highly tolerant of **clover scorch** *(Kabatiella caulivora)* and of many other diseases that affect clovers, but is susceptible to *Pythium spp.* during the seedling stage.

The major pests and diseases of **berseem** clover are:

- **redlegged earth mites** (RLEM) can result in severe impacts upon berseem clover during the seedling stage. Effective management relies upon early identification of the problem and spraying if required.
- berseem clover is susceptible to **leaf and stem blight** and to **clover scorch** *(Kabatiella caulivora).*

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For more information contact:
DPI Dairy extension officers at Cobram on (03) 58 710 600, Echuca on (03) 54 821 922 or Kyabram on (03) 58 520 500. Alternatively, contact Alister Lawson at DPI, Kyabram or Kaye Hildebrand at DPI, Cobram.