

Establishing Short Term Ryegrass in the Subtropical Dairy Region

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In the Subtropical dairy region of NSW, short term ryegrass (*Lolium multiflorum*) is commonly oversown each autumn into a perennial summer grass, such as kikuyu, setaria, paspalum or rhodes grass. Ryegrass can be an expensive pasture to establish and grow, hence, it is important to get all facets of management correct to maximise the profitability of the exercise.

Therefore the annual establishment phase is very important for a successful ryegrass system and this forms the basis of this Factsheet. The Management process is covered in the companion Factsheet titled 'Managing Short Term Ryegrass in the Subtropical Dairy Region'.

Area of ryegrass required

Ideally, the area of ryegrass should be sufficient to:

1. 'Fully' feed (apart from concentrates in the dairy) cows in the spring (15 August to the 15 October). For a typical dairy farm on the north coast of NSW with Friesian cows peaking at 24L milk/cow and fed 5.6kg/ cow concentrate in the dairy, the area of ryegrass required would be 20ha (50 acres) per 100 cows.
2. Provide sufficient surplus ryegrass to feed as silage in autumn to allow the dairy herd to maintain reasonable milk production, and allow an appropriate grazing rotation to be built up going into winter. To conserve adequate surplus ryegrass in spring to feed the following autumn, an additional 12.5ha (27 acres) would be required. Making the total area of ryegrass required 32.5ha per 100 cows.

Usually a 'surplus' in spring can only be obtained with irrigation or in the years when rainfall in spring is above average.

Planting times

While March is the best month to plant annual ryegrass, in terms of soil moisture availability (see Figure 1), it is often delayed until the beginning of April when temperatures are lower.

More specific planting times for commencement of planting ryegrass are:

- First week of March on lower north coast of NSW.
- Last week of March for the mid and far north coast of NSW.

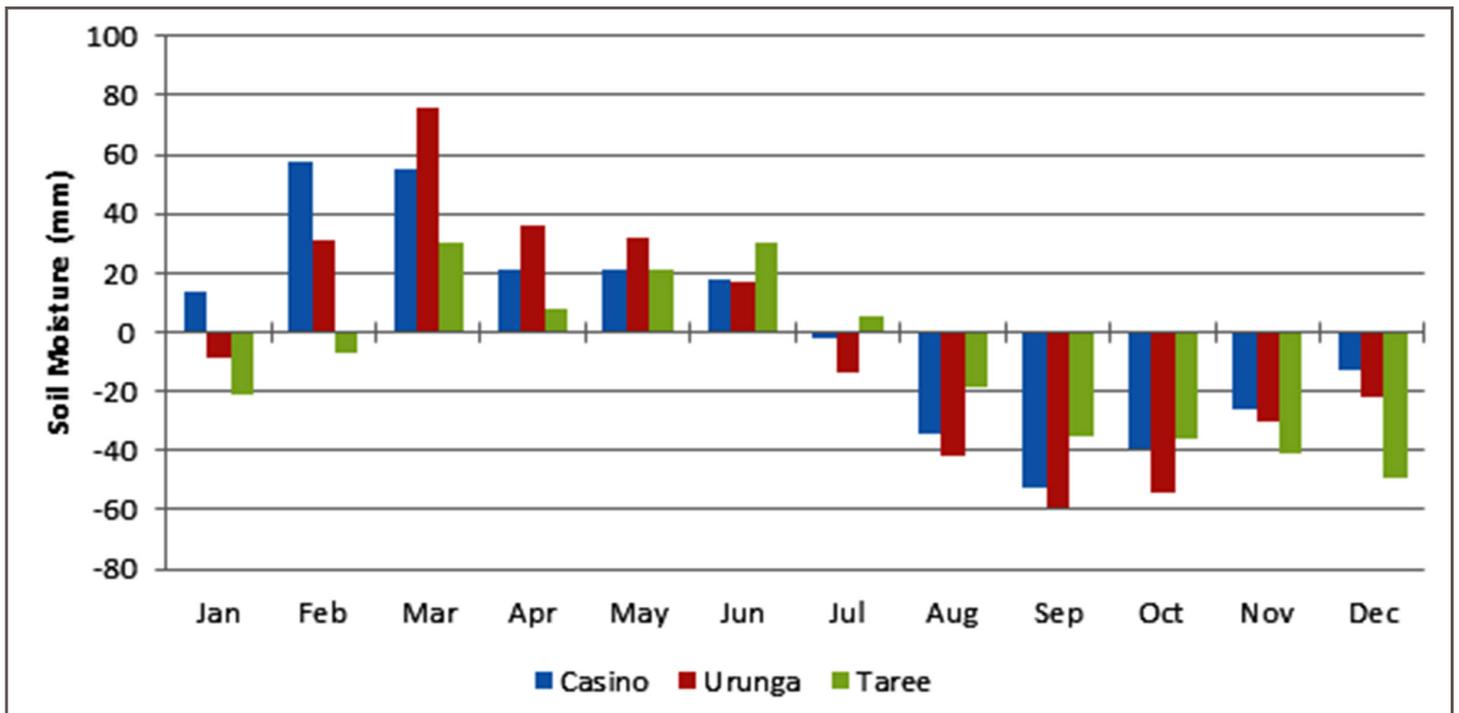
The optimal air temperature to establish annual ryegrass is between 19°C and 24°C. However, in practice the ideal temperature for establishing ryegrass into a summer grass pasture is when the minimum temperature is below 15°C. It is a compromise between higher temperatures which favour germination of the ryegrass and lower temperature to slow summer grass growth and hence reduce its competition with ryegrass.

These recommendations are based on results of many trials; however, one must make a year by year decision on an appropriate time of planting. It may be practical to plant small areas that can be adequately irrigated to get a start, yet minimise the risks associated with poor establishment.

Planting may need to be later in frost free areas nearer the coast where summer grass pastures continue to grow further into winter.

Planting ryegrass into setaria or rhodes grass pastures needs to be 1 to 2 weeks later than kikuyu-based pastures because they remain competitive longer into autumn.

Figure 1: Estimated soil moisture surplus/deficit (mm) per month for Taree, Urunga and Casino on the NSW North Coast. Calculated by rainfall minus evapotranspiration

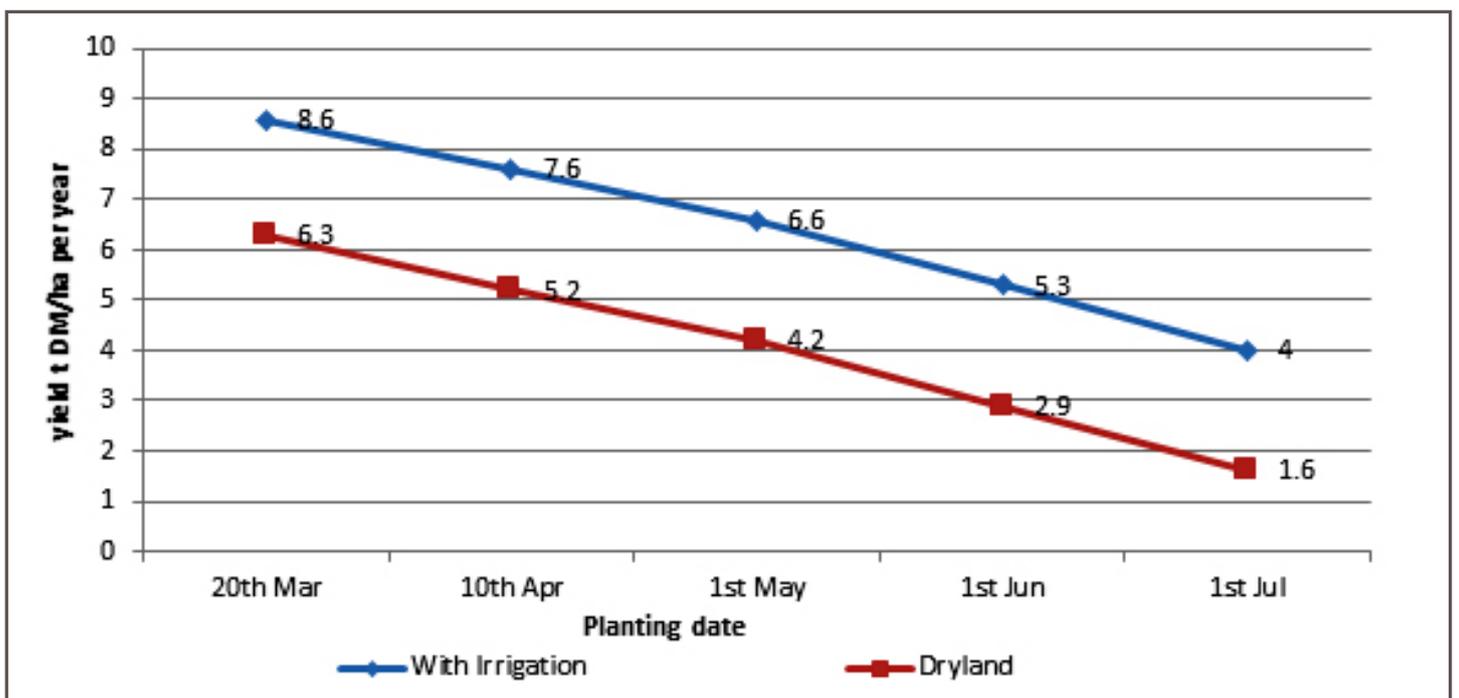


Planting time will significantly affect the length of the ryegrass season and hence total yield. Yield losses can be large if planting is delayed as demonstrated in Figure 2 which is based on average monthly growth rates for ryegrass. Figure 2 shows that under irrigation and planting on the 20th March, ryegrass yield would be 1 t DM/ha higher than planting 3 weeks later on 10th April, and 3.3 t

DM/ha higher than planting on 1st June. For dryland paddocks, the effect of late planting is even greater.

The cost of planting ryegrass at each planting time is very similar, therefore the higher yield from earlier plantings means it is far more cost effective. However, the probability of hot periods and army worm damage is greater with earlier plantings.

Figure 2: Impact of planting date on total yield of ryegrass (t DM/ha) on the Far North Coast NSW



Preparation before planting

Good preparation of paddocks is essential to reduce competition for light, moisture and nutrients from summer grasses at planting, it is even more critical for paddocks that are sown early.

The most common method of preparation, in kikuyu, paspalum and setaria-based pastures, is to graze, then mulch hard (to below 2cm stubble height with some soil exposed for kikuyu and rhodes grass but at 10cm for setaria) then drill or broadcast the seed. Problems arise if there is too much mulched residue from the summer pasture. This can restrict light and smother the emerging seedlings and if the seed is broadcast, the seedlings may aerially root in the mulch leaving it vulnerable to losses if a dry spell follows.

A better method of preparation is to graze and mulch the summer grass hard approximately 5-6 weeks before planting (this allows time for the mulched summer grass mat to breakdown) then mulch 2 weeks later and again before planting. Figure 3 shows this process diagrammatically::

Figure 3: Time line of preparation before early planting annual ryegrass on the far north coast

SUMMER GRASS COMPETITION



A kikuyu pasture grazed and mulched ready to sow on the left, paddock on the right is before preparation

Herbicide suppression of summer grass pastures. Glyphosate at 300 to 500ml/ha (450g a.i /L concentration) can be used to suppress kikuyu and setaria prior to sowing. However, repeated use will reduce the persistence of the summer grasses over time and lead to their replacement by couch and

other undesirable grasses.

Glyphosate at a very low rate (100ml/ha) has been used to suppress kikuyu growth for about 1 week and this does not affect its persistence, allowing earlier sowing. Higher rates of herbicide are required for rhodes grass, carpet grass and couch grass-based pastures. The desiccant, Gramoxone, can suppress summer grass growth for 2-3 weeks but it is not pleasant to apply.

Take a silage cut. Making silage from kikuyu, immediately prior to sowing ryegrass, will set back growth of the summer grass for 2 to 3 weeks, allowing earlier sowing. This is because the stems of kikuyu grow upright during the lock up period and the growing points on the stems are removed at mowing, severely setting back growth. Silage of reasonable quality can be made from kikuyu or setaria if the paddock is grazed, topped, fertilised and locked up for no more than 3 weeks. An inoculum should always be used in the silage making process.

Disturbing the soil by a light discing or the use of aerators is common when preparing to plant ryegrass into rhodes, carpet or couch grass-based pastures as they compete more with ryegrass than kikuyu or setaria, and require a more severe method of suppression. This severe preparation does not seem to adversely affect the persistence of these grasses.

Planting

Variety selection. An inexpensive tetraploid ryegrass such as Tetila should be sown in the early plantings as the chances of failure from hot weather is greater and tetraploids have larger and more vigorous seed and therefore can compete better with summer grass. More expensive, longer season, varieties should only be considered if the summer grass base is poor or non-existent, the land is not required for planting summer crops until after mid-November and irrigation is available in late spring.

Tetraploid ryegrass varieties have a higher ratio of cell contents to fibre and often higher levels of sugars than diploids. As a result, palatability and intake tend to be higher with tetraploid ryegrasses. They also have fewer but thicker stems and broader leaves and hence a tetraploid ryegrass pasture is not as dense as a diploid one.

Ryegrass should be sown at 30kg/ha (diploids) to 35kg/ha (tetraploids).

The aim is a stable plant population of about 100 plant/m² in spring. Higher seeding rates, up to 100kg/ha, will produce more grass at the first grazing and perhaps a bit more at the second grazing but the cost is rarely worth it.

Seed should be sown at 1cm to 2cm deep. Ryegrass seed only has enough energy (sugars) to emerge from this depth. If planted deeper many seedlings will fail to emerge or emerge more slowly over a period of 2 weeks with less vigour. If drilling seed, a heavy rolling can improve germination unless the soil is really wet.

Ryegrass seed can be coated with various insecticides and micro nutrients, their benefit will depend on local conditions.

Method of sowing

If broadcasting the seed, always **broadcast seed before grazing** to let the cows' hooves tread the seed into the ground - there is no logic in sowing after grazing.

Drilling or sod seeding is often used for early plantings or if it is dry but broadcasting can be just as good and with late plantings and in really wet conditions it is the preferred method.

An advantage of the disc drill is that it cuts through the summer grass mat/roots/stolons and the ryegrass seed establishes slightly better than if broadcast, as competition is reduced. However, in late spring, the summer grass tends to commence growth more slowly for the same reason. Tyned drills can be difficult to operate and achieve an even planting depth if there is not a good coulter system or if the summer grass is long.

Management immediately after planting

The ryegrass seed only has enough stored energy to emerge from the soil and then grow for a further 6 days after which the energy-depleted seedling must start to produce its own energy (sugars) through photosynthesis from its new leaf. If the new leaf cannot photosynthesise, due to shading by summer grass growth, the seedling will die.

The solution is to graze the pasture lightly over a short period (3-10 hours) every 10-12 days and remove stock before they start to 'search'. Do this until the ryegrass can grow over the top of the summer grass (usually about 6 weeks after sowing).

In the past, many farmers have been hesitant to do this but the damage to ryegrass seedlings from cows' hooves is far less than the losses from shading. It is a must in warm wet autumns and for the early-sown paddocks. If stock cannot completely control the summer grass growth or grazing is uneven, a light mulching after grazing is useful.



Milking cows grazing a kikuyu based pasture 16 days after sowing ryegrass-seed in the drilled rows

Apart from removing shade, a light grazing has 2 other benefits:

1. Grazing kikuyu/setaria also sets back its growth reducing the below ground competition to ryegrass seedlings.
2. Being able to graze the ryegrass lightly every 10-14 days after emergence significantly reduces the feed deficit in autumn, previously created by waiting for 6-7 weeks before the first ryegrass grazing.

In a prepared seedbed, or in one sprayed out with herbicide, wait until the ryegrass seedlings have grown 3 leaves and then graze lightly to let the light into the bottom of the canopy. Ultimate density of a ryegrass pasture depends on initiating daughter tillers as soon as possible. This, in turn, depends on adequate soil Nitrogen (N) and light reaching the base of the plant-hence the need to remove shade by light grazing, probably for up to 5-6 weeks after sowing.

Fertiliser management

The key to fertiliser management is to minimise soil nutrient limitations to ryegrass growth. Ryegrass is more susceptible to soil nutrient deficiencies than summer grasses.

Soil test each paddock, or combine a number of paddocks with the same management history and soil type every three years and fertilise according to soil test results. This will ensure that no macro nutrients (Phosphorus, Potassium and Sulphur) or pH (particularly if Aluminium levels are high) are limiting the response to N fertiliser. It is a waste of money growing ryegrass without some form of N fertiliser or manure.

Maintenance lime and fertiliser applications will be required if soil analysis shows pH/nutrient levels are below the critical values outlined below:

Soil pH (CaCl₂) for ryegrass should be above 5.3.

Raising the pH will increase availability of most of the key macro nutrients in the soil through increased soil bioactivity and hence mineralisation from the organic matter.

Increased soil pH will also improve the palatability of herbage grown and remove the toxic effects of high Aluminium levels, which restrict root growth.

In a typical clay or clay loam soil, commonly found on dairy farms on the far north coast of NSW, 2.5t lime/ha should raise soil pH by about 0.4 units in the top 10cm.

Phosphorus (P) on clay/clay loam soils, where the Phosphorus Buffering Index (PBI) is high (above 280), Colwell Phosphorus should be above 70mg/kg (this is equivalent to about 25mg/kg for the Olsen Phosphorus test). For loams or sandy loams the critical Colwell Phosphorus can be around 40mg/kg (see Table 1).

If soil Colwell Phosphorus levels are below these critical levels, Phosphorus- based fertilisers or manures should be applied. Critical levels are the point at which 95% of growth is achieved.

Table 1: Critical soil Colwell Phosphorus levels (mg/kg) relative to Phosphorus Buffering Index (PBI)

PBI	Soil critical Colwell Phosphorus Level
<35	30
140	40
140 – 279	60
>280	70

The approximate kg Phosphorus/ha required to raise Colwell Phosphorus levels by 1mg/kg soil are shown in table below.

Table 2: Kilograms of Phosphorus (P)/ha required to raise Colwell Phosphorus by 1mg/kg soil.

Soil Phosphorus Buffering Capacity	Soil type	Kg P/ha to raise Colwell P by 1 mg/kg
0-50	Sand	2.4
51-100	Sandy	2.7
101-200	Loam	3.2
201-300	Loamy Clay	3.7
301-600	Clay	4.2
>600	Heavy Clay/red volcanics	4.7

Potassium (K), extractable Potassium on clay soils should be maintained above 0.5meq/100g or 200mg/kg soil. Where levels are below this, apply Potassium

in autumn and again in early spring or as a blend after each grazing. Potassium can be taken up in luxury amounts by plants and this can increase the risk of milk fever and other metabolic disorders in dairy cows. Seek advice and use soil tests to determine rates required.

Sulphur (S) levels in the soil should be above 12mg/kg soil. If levels are below this, apply 40kg Sulphur/ hectare over a number of split applications if possible. Gypsum is usually the best source of Sulphur to apply, if the levels required are above those that can be provided by superphosphate or if Phosphorus is not required. Sulphur in Gypsum is available almost immediately to the plant and Gypsum will also improve soil structure. Gran am can also be applied as a source of Sulphur but is more acidifying to the soil.

Nitrogen (N) is the major driver of pasture growth, if the other macro nutrients (Phosphorus, Potassium and Sulphur) are adequate in the soil.

Nitrogen for pasture growth will almost always need to be applied as fertiliser or manure. You cannot rely wholly on N mineralised from soil organic matter for total plant requirements unless the soil organic carbon levels are above 10%, and this is very rarely the case. The levels of soil organic carbon are typically about 2% under cropping or regularly renovated temperate pastures and 4% under summer grass pastures.

Nitrogen fertiliser should be incorporated into the soil, or broadcast, within two weeks of ryegrass seedling emergence in mulch-sown or sprayed-out paddocks. This is because N is required by decaying organic matter to aid in breaking down and by the seedling ryegrass for growth. The application of N can be delayed in a prepared seedbed until 2-3 weeks after emergence because N is made available from mineralisation through soil disturbance.

The rate of application of N to seedling ryegrass should be 23kg/N/ha (50kg urea/ha) or about half the normal rate, any more than this is soon lost below the shallow root zone of the seedling ryegrass and only promotes summer grass growth..

Pest control

Army Worms can be a major pest when establishing ryegrass, particularly at early sowings. Damage is most severe after extremely wet summers when ideal conditions are provided for the moths to lay their eggs in the overgrown summer grass, unable to be grazed or mulched due to the wet conditions.

The signs of impending damage include:

1. The presence of the grey moths about 1cm in size



Army Worm grey moth

2. Brown patches of dying summer grass (kikuyu is the preferred grass) where the grubs have been active. These will recover but ryegrass seedlings will not.
3. Large flocks of Egrets or Ibis feeding on the pasture.
4. At night with the aid of a torch, as the worms may be seen feeding on the soil surface. The technique of laying a bag on the soil surface at night and look under it in the morning to see the presence of any worms.



Army Worm grubs (caterpillars)

If the grubs are present at or after sowing ryegrass it is advisable to spray with a registered insecticide. The most commonly used spray contains the active ingredient chlorpyrifos. Apply at the rates recommended on the label. Preferably spray late in the afternoon as it is a contact insecticide and the grubs come out at night. Observe label withholding periods for grazing.

Some farmers spray for army worm at sowing as a precaution, irrespective of their presence. The disadvantage is that other beneficial soil organisms maybe needlessly killed.

Companion species

Other species can be sown at the same time as ryegrass and may be a better option than sowing ryegrass at higher rates and these include:

Hunter leafy turnip or other brassicas such as Pasja at 1kg/ha should double the yield at first grazing in a mixture with ryegrass. The low seeding rate of the turnip stops it competing with the emerging ryegrass and it is a cost effective addition.

Chicory at 4kg/ha or **red clover** at 3kg/ha can provide a high quality feed in late spring after the earlier season ryegrass varieties have seeded and if moisture/conditions are still favourable.

A mixture of **oats and ryegrass** is often a good option on dry land. In a good rainfall season the ryegrass will dominate whilst in a dry season the oats will survive. They can be mixed or oats can be drilled one way and ryegrass at right angles to it



Hunter Leafy Turnip and Ryegrass at Casino in early May

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