



Establishing pastures - Readers' Note

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Sowing

Successful pasture establishment requires manipulation or control of several factors at the time of sowing:

- **Competition**—Total or partial removal or manipulation to prevent competition for light, moisture and nutrients from existing plants to allow seed to germinate and establish. This can be achieved through cultivation, herbicides, grazing, mulching or slashing. See section 2.2.
- **Soil moisture**—There needs to be sufficient soil moisture available (for dryland sowings) or supplementary irrigation to allow for establishment. Reliability of soil moisture can be improved by using a fallow period (by cultivation or chemical) before sowing, sowing in the most reliable rainfall period, or sowing in autumn, when evaporation is declining and the available soil moisture is more effective.
- **Seed placement**—Pasture seeds require shallow sowing as they are small and often have little seedling vigour. See section 2.6.
- **Insect pest control** —See section 2.3.

Sowing methods

Conventional (broadcast) sowing

In conventional sowing, seeds are broadcast or dropped on the ground and then covered using a pasture harrow or rolling to ensure effective contact between seed and soil so that the seed can take up moisture for germination.

Drilling

A band seeder attached to the combine's small seedbox, or a standalone seedbox – band seeder – roller assembly, is the best sowing equipment. If the combine tines are working in the soil, it is essential to use levelly bars in front of the band seeder. The band seeder creates a groove 10 mm deep and places the seed in it. A trailing chain then covers the seed. Use a rubber-tyred roller to firm the soil to help germination, except on soils that develop a surface crust. (Alluvial soils containing silt are prone to surface soil crusting. Gypsum will reduce the crusting of soils that contain at least 30% clay. It is important that these soils be moist at sowing and be kept moist for the first 3 weeks after sowing.)

Do not plant small-seeded species such as white clover too deeply. It can be more effective to broadcast white clover on the surface, provided the seed is covered by covering harrows and rolled, and drill the ryegrass into rows.

Drilling allows you to band fertiliser close to the seed, where it can be readily available to the germinating seedling. Don't apply high rates of soluble fertiliser, such as nitrogen or potassium, too close to the seed because the high salt concentration may kill the seedlings.

Direct-drilling

Direct-drilling or minimal tillage is the most popular technique for establishing winter pastures: it saves time; the soil organic matter is improved after 3 years, which means less nitrogen fertiliser is required and more soil moisture is conserved; and the pasture is more productive because it is available for

grazing. However, in the first 3 years the pasture requires more nitrogen, the crop runs out of moisture quickly, and it is susceptible to competition from weeds, especially couch grass.

When to sow

There are two general guidelines:

- Winter-growing annuals such as subterranean clover need to be sown by mid winter to ensure that they set sufficient seed to regenerate next autumn.
- Perennial species can be sown in autumn or spring depending on reliable soil moisture.

Autumn sowing is less risky because seedlings are growing in a cool, moist period. However, the unreliable and often late autumn break in many regions and years means that plants have to battle through cold, wet conditions as very small and vulnerable seedlings. On the Tablelands, try to avoid July sowings.

Late winter – early spring sowings can be very successful, provided the sowing takes place early August – mid September. By the time the seedlings emerge, the temperatures are beginning to warm up, and the seedlings develop rapidly with ample soil moisture.

Ryegrass–clover pastures are best sown in March–June. If the pasture is required for winter feed, sow in March–April. If the paddock has a history of winter weed competition, sow in May–June.

Lucerne, clovers, vetches and lotus: Generally an autumn sowing is prone to competition from broadleaf weeds and ryegrass. A spring sowing is prone to summer grass invasion. Use trifluralin as a pre-emergence herbicide to stop grass and wireweed competition in the first 12 weeks of growth. Sow winter-active

lucerne varieties in the coolest months. Note that because Maku lotus has very poor winter growth, August sowing is recommended, but autumn sowing is also acceptable.

Kikuyu requires warm soil temperatures. The biggest problem is that annual summer grass weeds also germinate at this temperature. Sow late February – early March on the Central Coast.

Brassicas: Spring plantings can begin as early as September but sowing time will depend on crop selection and feed requirements.

Soil moisture

Soil moisture losses are greatly reduced if weeds are removed. Most rainfall or irrigation that falls on a bare fallowed paddock is saved.

The correct sowing time is when adequate soil moisture is present. The rate of germination and growth will then depend on temperature.

The aim is to have sufficient moisture at the surface when the seed is sown to achieve immediate germination, as well as moisture down to 200mm to permit seedling survival if further rain doesn't fall or irrigation isn't available.

Winter weeds germinate with the first autumn rain. This is especially important with direct drilling. This will create a problem if sowing takes place on the first rain. It is preferable to control these weeds and wait for subsequent rain before sowing. However, in recent years, dairy farmers who have sown on the first rain have produced winter feed, while others have missed out. There is an advantage in producing good winter feed by direct-drilling on the first autumn rain. The disadvantage is competition from winter weeds. Good weed control is essential.

Sowing into moisture gives the slower-growing perennial pasture seedlings an

even start with vigorous annual weed seedlings, which can often germinate from a greater depth, where moisture is present.

Frost

‘Frost lift’ will kill seedlings sown into ploughed ground in higher parts of the Tablelands. It kills by tearing the plants in two as the surface soil freezes, expands

and separates from the soil below. Direct-drilled pastures are rarely affected by frost lift.

Except in very dry conditions when seedlings are under moisture stress, -4°C frosts will not harm pasture seedlings. On the Southern Tablelands young pastures have survived -8°C frosts for more than a week.

Sowing rates

Sowing rates of fodder crops suited to a pasture improvement program

Forage type	Sowing rate (kg/ha)		Sowing time	Uses	Time to first grazing (weeks)	Min. grazing height (cm)
	Dryland	Irrigated				
Japanese millet	20	25	late Sept – Jan	grazing	5–6	15–30
Pearl millet	8	15	late Oct – Dec	grazing	6–8	30–60
Hybrid millet	8	15	late Oct – Dec	grazing	5–7	30–60
Hybrid sudan grass	8–10	15–20	late Oct – Dec	grazing	6–7	100
Sorghum × sudan grass	10	15–20	late Oct – Dec	grazing	6–7	80–100
Sweet sorghum and hybrids	8	15	Nov–Jan	silage, autumn standover	7–8 or left for silage or stand-over feed	150
Cowpeas	30			grazing, silage, hay	12	
Chicory		2–4	spring–autumn	grazing, silage	8	Any
Rape		2–3 drilled, 4–5 broadcast	Sept–Jan	grazing	12	
Turnips	1–1.3		Sept–Jan	grazing	12	
Maize	18	25	mid Oct – Jan	grain, silage	13–18	20–30
Oats	60	120	late Feb – Jun	grazing, hay	6–8	15
Annual ryegrass	15	25	late Feb – early Apr	grazing	6–7	10
Balansa clover	2	4	Mar–Apr	grazing, silage, hay	8–10	10
Persian clover	4	8	Mar–Apr	grazing, silage, hay	8–10	10
Berseem clover	15	25	Mar–Apr	grazing, silage, hay	8–10	10
Lablab	15	30	Nov–Jan	grazing, silage, hay	12	150
Soybean	15	30	Oct–Dec	grazing, silage, hay	12	80
Pinto	15	20	Nov–Dec	grazing, silage, hay	12	80

Crop	Seeds per kilogram
Perennial ryegrass	295 000–640 000 (av. 500 000)
White clover	1 500 000
Red clover	500 000
Lucerne	400 000
Subclover	90 000–160 000
Kikuyu	50 000–400 000

Sowing equipment

Direct-drill pasture sowing

Machines for direct-drilling small pasture seeds must be able to place seed accurately on moisture at a given depth and place a shallow cover of loose soil over the seed.

Sow pasture seed no deeper than 25 mm. Because of the unevenness of ground the depth will vary from 10 to 40 mm. At the greater depth it is important that the furrow walls don't cave in as the seed will be buried too deep.

Direct-drilled seed is sown deeper than in a conventional ploughed seedbed.

Do not use harrows or a roller behind sowing equipment when direct-drilling as there will be a greater burial of seed resulting from filling the furrows in.

What's the best direct-drill seeder?

The coastal dairy area of NSW is dominated by kikuyu, couch and paspalum pastures. A direct-drill seeder must have a coulter (disc) to cut through the kikuyu and couch. The two most popular types are:

Tine coulter drill: Suited to smaller paddocks and paddocks that are prepared properly. Fitted with the inverted T Baker boot they provide an ideal seedbed.

Triple disc seeder: With a greater ground speed, can sow large areas quickly. On heavy wet clay soils smearing of the furrow may be a problem. Greater weight makes it ideal in rough country.

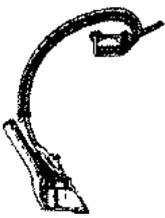
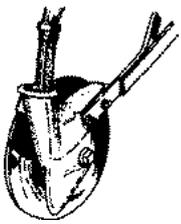
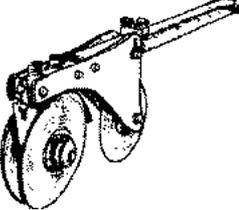
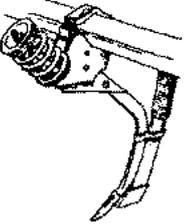
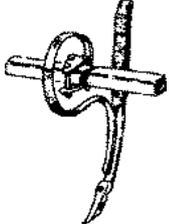
Seed machinery options. The table on the next page shows some of the sowing machinery that can be used for direct-drilling pastures. Machinery needs to be suited to your soil type and condition at sowing time.

Further reading

Agfact P2.2.6, *Nine Steps to Successful Pasture Establishment*

Agfact P2.2.3, *Pasture Establishment*

Agfact P2.E.1 *Band Seeders for Pasture Establishment*.

	Machine	Points to note
	<p>Trailed tine drill Caldow Grassliner Begg TD 150</p>	<p>Good ground-following and depth control. Suitable in rocky or tussocky ground. Caldow points on Grassliner.</p>
	<p>Disc seeder Connor Shea Super Seeder Massey 500 Disc Seeder Shearer Disc Seeder</p>	<p>Handles sticks and stones. Dry soil, full root release and fast speed critical to prevent soil either ribboning or being thrown out of the slot. Most machines suited to conversion to Caldow points.</p>
	<p>Triple disc drill Duncan 730/734 Multiseeder</p>	<p>Good ground-following and depth control. Suitable in stony or tussocky ground. Suited to higher ground speed (10–12 km/h). Can sow large areas quickly. Slot walls can become glazed in moist or heavy soils.</p>
	<p>Coil tine seeder Connor Shea Coil Tine Aitchison Seedmatic Agrowdrill</p>	<p>Fitted with Baker boots. Poor trash clearance in some makes. Excessive wear on points in abrasive soils.</p>
	<p>Spring-release rigid tine John Shearer Tine Drill CSN Tine Drill</p>	<p>Inverted T or bolt-on points. Tungsten tip on blade gives better wear. Cast points are even better. Rugged stump-jump action is severe on points in rocky ground.</p>
	<p>Spring tine drills Duncan 750 Till Drill Spring tine combines</p>	<p>Flexible machines for sowing crop and pasture. Flexible tines can create excessive disturbance.</p>

