



primefacts

FOR PROFITABLE, ADAPTIVE AND SUSTAINABLE PRIMARY INDUSTRIES

JUNE 2010

PRIMEFACT 1026

Tropical perennial grasses – sowing machinery

GM Lodge

Principal Research Scientist, Industry & Investment NSW, Tamworth

When sowing, the aim is to choose sowing machinery that gives good soil–seed contact and to sow at the optimum depth in the soil (10 mm).

Reliability of establishment is highest when seed is sown into a conventionally prepared seedbed, followed by direct drilling, and lastly aerial or surface sowing into crop stubble. Aerial sowing into undisturbed pasture country is not recommended.

In conventionally prepared seed beds, rough surfaces and furrows can lead to seeds being buried too deeply by trailing harrows or rolling. Harrow before sowing to reduce the risk of sowing too deeply.

Heavy rainfall after furrow sowing can also cause seeds to be buried too deeply.

Direct drilling retains cover on the soil surface, providing protection from water loss and soil erosion. It may be a better option than cultivation on poorly structured and hard-setting soils.

For native pastures, the need to introduce tropical grasses should be carefully balanced against the risks and costs and the potential to be able to improve these grass-based pastures by strategic grazing management or improved fertility to introduce tropical grasses into native pastures.

Other options include band and crocodile seeders, aerial sowing, strip planting and using livestock.

A wide variety of methods can be used for sowing tropical perennial pastures. These include precision seed drills on conventionally prepared, fully cultivated seedbeds; combines with small seed boxes and harrows; band seeders; fertiliser spreaders or drum seeders, with or without prior soil disturbance;

direct drilling into both conventional prepared and undisturbed pasture or crop country; aerial application into crop stubbles; and using cattle to spread seed through dung. The methods are listed in order of reliability with the latter methods being generally less forgiving of poor management and climatic variability.

Most commercially available seed drills cannot adequately control sowing depths to consistently place seed at the required shallow depths (10–25 mm), particularly if the soil surface is uneven. To overcome this, seed is often broadcast or dropped on the soil surface of a cultivated paddock and then covered by lightly harrowing or rolling to provide good soil–seed contact. However, if the seedbed is rough and cloddy, results can be variable with seeds falling into depressions and down soil cracks. Aim to sow at 10 mm depth or cover seed with this depth of soil to allow for paddock variation and surface roughness. High soil surface temperatures in summer and high evaporation rates provide a hostile environment for seeds, with soil surfaces drying rapidly. Also with unprotected seed, losses from ant predation on the soil surface can be very high.

Many tropical perennial grasses (e.g. buffel grass, Rhodes grass and creeping blue grass) have light, fluffy seeds that do not flow well in conventional machinery. To overcome these problems coated seed can be purchased or seed is often mixed with a carrier such as cracked grain, fertiliser, sawdust or bran. If using coated seed, you will need to increase the sowing rate to allow for the weight of the coating; ensure that you use seed that has high purity and germination.

In most situations, sowing under a cover crop cannot be recommended. Winter crops are sown when temperatures are too low for adequate tropical perennial grass germination. Summer cereals and crops are sown when high

temperatures and evaporation rates rapidly dry the soil surface and the crop provides too much competition for moisture to ensure adequate establishment.

Sowing into conventionally prepared, cultivated seed beds

In most situations, fully cultivated seedbeds give reliable establishment. The main exceptions are where soil is poorly structured and hard-setting, saline sites with high erosion potential, where direct drilling may give better results. Results will be best where a fallow period of up to 2 years has been used pre-sowing to control weeds (particularly summer-growing annual grasses) and allow for adequate soil moisture storage (up to 1 m of subsoil moisture is preferred).

Seed is commonly sown using a combine with a small seeds box, or through the grain or fertiliser box with covering harrows – adding a band seeder provides more reliable seed placement. For smaller areas, seed mixed with fertiliser and distributed through a fertiliser spreader and harrowed or rolled has given successful establishment.

In finely prepared seedbeds, furrows created by a combine seed drill can result in the seed being buried too deeply if the soil is harrowed or rolled after the seed is dropped. Similarly, furrow sowing where seed is directed from the small seeds box down behind the last row of cultivating tynes may be unsuccessful. This can be a major problem, particularly with self-mulching soils, if heavy rain results in excessive soil being washed into the furrows. To avoid these situations and achieve a more satisfactory sowing depth, harrow the paddock to fill in the depressions and furrows before the seed is dropped. After sowing, a final harrowing or rolling will improve soil–seed contact.

Conventional combine row spacings are adequate. Widening the row spacing may benefit companion legumes or provide space for subsequent legume sowings, but it can also allow for increased weed invasion and may increase the risk of erosion.

When using carriers some tips are to:

- Mix 1 part of seed to 3 parts of carrier when using a combine grain box and adjust rates to suit your machine.
- Mix 1 part of seed to 15–25 parts of super-phosphate when using a combine fertiliser box, with the rate set for the fertiliser only.
- Check that the overlap is adequate for even seed distribution when using a fertiliser spreader.

- Mix 1:1 to 1:4 seed to sawdust if using sawdust as a carrier (cypress pine is preferred).
- Sow Rhodes grass with a carrier through the coarse side of the grain box or through the fertiliser box.
- Sow panic grass and pigeon grass through the fine side of the grain box when mixed with a carrier or if available through a small seeds box.
- When using air seeders, the air velocity required to move the fertiliser–seed mix may cause ‘seed bounce’. It may be necessary to fit a ‘diffuser’ just above the seeding boots to allow the seed to drop into the furrow (or onto the soil surface) under gravity.

Direct drilling

Direct drilling can be used in both old cropping country and previously undisturbed areas. Since direct drilling retains cover on the soil it provides protection from water loss and soil erosion and it may be a better option than cultivation on poorly structured and hard-setting soils. However, results tend to be less reliable and more variable than with conventional sowing.

In previously cropped areas, stubble can also have the advantages of reducing soil temperatures and helping to retain moisture, but in thick stubbles specialised sowing machinery may be required. When intending to direct drill into crop stubbles use a header that spreads straw relatively evenly.

In previously undisturbed country, the need to introduce tropical grasses should be carefully balanced against the risks and costs and the potential to be able to improve existing native perennial grass-based pastures by strategic grazing management. Often sowing is more applicable where the existing native perennial grasses only provide poor quality grazing or ground cover and the better quality grasses have been lost by cropping or overgrazing.

A range of direct drill machines are available, but some are better and/or more cost effective than others. Existing equipment may be modified to achieve shallow seed placement (e.g. the use of small seed boxes on scarifiers). Machines need to be able to prepare the seedbed by soil disturbance, place seed and fertiliser at about 10 mm depth, cover the seed with soil and firm the soil around the seed using press wheels. On poorly structured soils, a tyne that creates till below the seed can assist establishment, by allowing more rapid root development. On heavy clay soils, establishment failures have been associated with rapid drying of the root zone caused by cracking of the soil below the tyne mark.

Other options

Band seeding is a specialised form of sod seeding, a one-pass sowing method that partially disturbs the existing pasture. The machine can drill seed at a constant shallow depth, even under rough conditions. A band of herbicide is sprayed to control competition from existing vegetation and wide row spacings are used to minimise disturbance and inputs of herbicide, fertiliser and seed.

Sowing pastures in strips covering one-quarter to one-half of a paddock can assist with erosion control in sloping areas. Areas to be sown can be conventionally prepared or direct drilled. However, the rate of spread from sown to non-sown areas can be slow and livestock may concentrate on, and overgraze the sown strips.

Animals may eat large quantities of seeds and these can pass through undigested and be deposited in the dung, but long periods of continued use may be required to gain noticeable benefits. The amount and viability of the seed is variable and cattle digest less seed than sheep or goats. Furthermore, dung is not evenly distributed over the paddock and dry pats can be difficult to wet up.

Aerial sowing into crop stubbles has the advantages of speed, reduced cost, and low erosion risk, but an increased chance of failure compared with conventional sowing or direct drilling. Successful establishment is highly dependent on good rainfall after sowing, but immediately following a crop subsoil moisture levels may be low. Use a header that spreads straw evenly and treat seed to prevent predation by ants. Aerial sowing into seedbeds prepared by conventional cultivation and then harrowing after sowing has had some success.

Crocodile seeders drop seed into small holes or pits dug by the implement. The seeder scoops out soil and drops the seed into a small pit and the seed is then covered by varying quantities of soil, depending on soil type and the speed of operation. The scooping action kills plant growth in the pit, reducing the need for herbicide application. Pits can also accumulate water, enhancing establishment. They have disadvantages of poor control over tilth and soil cover, and no ability to firm the soil around the seed.

Acknowledgements

Much of the information in this Primefact was previously prepared by Warren McDonald, Alison Bowman and Sid Cook.

Further reading

Band seeders for pasture establishment. NSW Agriculture Agfact P2.E.1

Cook SJ, Clem RL, MacLeod, ND, Walsh PA. (1993) Tropical pasture establishment. 7. Sowing methods for pasture establishment in northern Australia. *Tropical Grasslands* **27**, 335–343.

McDonald W, Bowman A (2002) *Successful establishment of tropical perennial grasses in North West NSW*. Agnote DPI-156. NSW Agriculture, Orange. Also available at: <http://www.dpi.nsw.gov.au/agriculture/field/pastures/establishment/perennial-grasses>

The department's website www.industry.nsw.gov.au contains other useful information.

Pasture improvement cautions

Pasture improvement may be associated with an increase in the incidence of certain livestock health disorders. Livestock and production losses from some disorders are possible. Management may need to be modified to minimise risk. Consult your veterinarian or adviser when planning pasture improvement.

The *Native Vegetation Act 2003* restricts some pasture improvement practices where existing pasture contains native species. Inquire through your office of the Department of Environment, Climate Change and Water for further details.

© State of New South Wales through Department of Industry and Investment (Industry & Investment NSW) 2010. You may copy, distribute and otherwise freely deal with this publication for any purpose, provided that you attribute Industry & Investment NSW as the owner.

ISSN 1832-6668

Check for updates of this Primefact at: www.dpi.nsw.gov.au/primefacts

Disclaimer: The information contained in this publication is based on knowledge and understanding at the time of writing (June 2010). However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of Industry & Investment NSW or the user's independent adviser.

Job number 10091 PUB10/98