



Upper North Farming Systems Factsheet

Experience with Sowing Native Grasses

BACKGROUND

Establishment and harvesting of native grasses has been very successful at a small scale (<10 ha), but is generally very intensive, with high production costs making the price of seed expensive (\$75 - \$130/kg, in some cases making total establishment costs > \$250/hectare). Such methods are therefore not suitable for large scale broad-acre application (>100 ha) in low rainfall areas, as:

- o There are limited resources in these communities (e.g. labour, time and cash);
- o There is a requirement for large amounts of suitable seed, which is not readily available and very expensive in comparison to introduced, annual crop and pasture species;
- o There is a need to establish/manage large areas with minimal inputs;
- o Pest and weed regimes for native grass establishment are not well understood for low rainfall areas (e.g. grasshoppers, termites and weeds); and
- o Plants can be difficult to establish and are slow growing.



UNFS Native Grass Harvester

The issues with seed cost and establishment techniques for native perennial grasses have been recognised as an obstacle to the broad scale implementation of native perennial grasses in pasture/cropping systems.

Australian native seeds are generally very hairy (fluffy) with long awns, which cause them to clump together and clog up standard sowing machinery. Much effort has gone into the design of specialised equipment that will handle fluffy seeds or seeds with scabrid or twisted awns.

GERMINATION

Temperature

Maximum germination of cool season species seems to occur in late autumn to early spring and high temperatures in summer might restrict germination. For summer species, germination tends to be highest between late spring and early autumn, and low temperatures in winter appear to limit germination.

Light

Bothriochloa macra (Red Grass) and *Austrostipa elongatus* (Elegant Spear Grass) require light for germination.

TIME OF SOWING

C3 / Cool season Grasses

Cool season (C3) grasses need a period of constant moisture for three weeks after sowing for good emergence. C3 species are capable of germinating all year round as long as soil moisture is adequate. However some species may take 3 to 4 weeks to germinate and emerge. Winter sowing allows better control of autumn germinating weeds and decreases the risk of moisture stress, however emergence and growth rates are slow.

TIME OF SOWING CONTINUED

C4 / Warm season Grasses

Warm season grasses (C4) are better adapted to more intermittent rainfall and wetting-drying cycles. Generally two or more wet days will result in germination when soil temperature is satisfactory. However, follow-up rains within 4-6 weeks of germination are necessary in low rainfall areas to ensure successful establishment. The rate at which the soil surface dries out is critical not only for germination, but also for establishment. With adequate ground cover and cloudy conditions the soil does not dry out as quickly and good follow-up rains will allow seedlings to develop adventitious (secondary) roots, which can access sufficient moisture for later seedling growth.

C4 plants require the soil temperature to be above 25°C before they will germinate. Therefore in southern Australia they will need to be sown in late winter/early spring to utilise the rise in soil temperature and better sunlight but to avoid the rapid soil drying. This allows cool season weeds to be controlled, but soil disturbance may stimulate the germination of summer weeds. Weed control and adequate stored soil moisture is essential to ensure seedlings survive over the summer.

Time of sowing should match the requirements of the grass species being sown, however this is not always practical and cost effective. Therefore it is sometimes best to sow mixtures of grasses in order to create a greater range of adaptability. Mixtures can cause problems with sowing equipment due to differences in size and structure of seeds.

PELLETISED SEED

The use of the pelletising process has been developed for native grass seed. Pelletising enables chaffy seed to be sown using conventional farming equipment. The pellets increase the weight of seed and retain fluffy appendages. Pelletised seed has higher germination rates and allows the sowing of seed

mixtures as it provides a more uniform product. However, not all species can be easily pelletised and some species still have a tendency to bunch together, due to their fluffy nature.



Pelletised Red Grass seed

SEEDING RATE

Seeding rates are based on the target seedling densities required to produce populations of robust plants rather than dense populations of weak plants. For the smaller seeded species such as *Chloris* spp. (Windmill Grass), seeding rates of 1 to 2 kg/ha is adequate. For larger seeded species (Wallaby Grass, Red Grass and Blue Grass) that establish more easily, 20 to 50 plants/m² is recommended. This equates to 5 to 10kg/ha of fluffy seed.

SOWING DEPTH

Optimum sowing depth is generally related to two major factors:

- o Seed size as this determines available energy reserves and seedling vigour; and
- o Soil type.

Native grasses have evolved mechanisms of germination and emergence, which require minimal soil disturbance. Therefore small seeded, light responsive species should be sown shallow (<1 cm), while larger seeded species can be sown deeper (1-2 cm). Shallow sowing of native grasses generally results in better establishment.

The exception to this is on light sandy soils that may dry out rapidly and deeper sowing will ensure better germination.

SOWING TECHNIQUES

Australian native grasses usually have small seed; therefore seedbed conditions that enable accurate placement, good seed soil contact and moisture retention without crusting lead to improvements in establishment of native grasses.

Broadcasting is a surface sowing technique. Leaf and stem material in awned species ensures more intact awns when spreading, but there may be a need to use bulking materials to achieve uniform spreading. There needs to be some bare soil surface to ensure microsites for the seeds and biomass should be reduced to less than 2t/ha. Predation by insects can reduce emergence, however the application of appropriate insecticides can significantly reduce losses.

Drilling is best used where seed material is more consistent and free of stem or leaf material. Seed of some native species can be sown from the small seed boxes of conventional seed drills. Chaffy seeded species require special seed boxes and seed delivery mechanisms.

Taege Seeder

The box has been designed to handle chaffy seeds and contains an agitator with finger tines to stop bridging of the seed. The seed is metered through foam rollers with a disc opener and a press wheel to ensure good seed soil contact.

Ausbox

An all-purpose seed box designed to handle a wide range of slick and chaffy seeds. The box contains a rotating spirally fluted roller that meters the seed into delivery tubes below the roller. The size of the flutes can be modified to cater for different species.

UPPER NORTH FARMING SYSTEMS AIR-SEEDER

This machine has been developed and modified from a standard 12 metre, three rank Alfarm bar. Two thirds of the sowing tines were removed and the seed delivery tubes replaced with 5 cm flexible tube. This tubing feeds into a 5 cm metal tube which has been divided to distribute seed to two tine assemblies.



UNFS Air-seeder

The seeding bar is mounted behind a hydraulically driven air cart, which distributes seed and fertiliser via a belt mounted at the base of the seed box. This machine was built after visiting NSW and viewing the 'Ausbox' and 'Germinator' machines. For this machine to work successfully the native grass seed needs to be mixed with a carrier to enable even distribution and to avoid clumping.

SOWING EXPERIENCE IN THE UPPER NORTH

Air-seeder

The air-seeder developed by the UNFS group has been successfully in delivering the seed, however seeding depth was very variable and often too deep for smaller seeded species such as *Chloris* spp.

The addition of individual depth wheels would give greater depth control, improving emergence. The addition of an insecticide also helps establishment as seed loss through predation by ants and other insects is significantly reduced.

Although this machine can sow large areas quickly it is too wide to sow difficult areas (e.g. between stony reefs and native bushes).

Taege Disc Seeder

This machine has been used to sow a number of sites with variable results. It has reasonable seed metering, however fluffy seeds still tend to bridge and feed out in clumps. The use of either pelletized seed or a carrier ensured more even distribution of the seed. When using a carrier the large volume of material makes it difficult to sow the seed at an appropriate seeding rate.

Small seeded species (e.g. Windmill grass) are still sown too deep for good establishment.

Broadcasting

Establishment trials with different seeding techniques has shown that spreading the seed on the soil surface is effective, when there is sufficient ground cover (0.5 to 2t/ha) to protect the seed and stop the soil drying out too quickly.

Adequate weed control is essential. The use of glyphosate prior to sowing will ensure good weed control, while providing adequate ground cover.

AusBox

The UNFS has purchased an AusBox seed box and distributor, which has excellent seed distribution characteristics for a range of native grass species. Initially this was to be mounted on a disc seeder, however from experience it was decided that spreading the seed would give greater flexibility (able to sow into unarable areas) and give effective establishment for most species. The motor and fan from a mister has been used to distribute the seed.

Seed Quality

Commercial Seed - Although relatively expensive commercial seed has been cleaned with minimal trash and chaff and often comes with a minimum germination figure. Some seed suppliers also pelletise seed, which can improve

flow through seeding machinery and aid establishment.

Commercial stands are generally grown under irrigation and the providence (strain of seed) may not be as adapted to local conditions.

Locally harvested seed - Locally harvested seed can be cheaper, but can contain a mix of species with highly variable germination. This seed will need to be cleaned to enable it to be sown with different cleaning methods needed for different grass species.



Ian Ellery and Trevor Gum harvest local Wallaby grass

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Prepared by, Michael Wurst (Rural Solutions SA)

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