Agnote

No: 564 E9

October 2021

Pasture Establishment

A. G. Cameron, Principal Pastures Agronomist, Darwin

"Pasture" is used here to denote any planned establishment of grasses or legumes and could equally apply to pasture established for grazing, soil stabilisation, weed control, ley pasture establishment in a crop rotation, native pasture revegetation and amenity plantings.

INTRODUCTION

Establishing a new pasture can represent a considerable outlay of time and expense and requires some forward planning to be successful. A two-year planning cycle may be required where seed or planting material for the proposed pasture needs to be sourced ahead of time.

There are a number of factors which can influence the successful establishment of pastures. The factors that can be controlled are:

- cultivar selection
- type of planting material
- sowing or planting rate
- time of planting both from year to year and within one season
- method of sowing or planting
- weed management
- use of appropriate fertilisers and;
- time of first grazing or cutting.

Rainfall cannot be controlled, but correct planning goes a long way towards making the best use of rainfall events to successfully establish a pasture.

Some pastures can be established in new areas with minimal disturbance, but most require some form of cultivation to ensure adequate establishment either because of soil surface conditions or competition from existing vegetation, particularly perennial grasses.

CULTIVAR SELECTION

The first step in the process is to select a cultivar or mix of suitable cultivars (cultivated varieties).

These cultivars need to be adapted to the local climate (rainfall and temperature), the soils on which they are to be grown and their intended use. For example, some grasses tolerate heavy grazing better than others and some legumes are more palatable in the growing season.

Other legumes are less palatable until late in the wet season. They are more suitable as a saved pasture for grazing during the dry season.

Many cultivars used in other parts of Australia are not suitable for the long dry seasons, high temperatures and sometimes humid conditions experienced in the Northern Territory.

There are adapted, productive and persistent pastures available for most areas and situations in the NT receiving 600mm or more of annual rainfall. Agnotes on most of these are available our website.

PLANTING MATERIAL

The majority of pasture cultivars can be sown by seed. Seed is available from businesses which deal in farm supplies or directly from a specialist seed producer. Pasture seed can be grown on the property specifically as a seed crop or harvested from an area of well fertilised saved pasture.

Some grasses do not produce viable seed and must be planted by runners or cuttings. They include pangola grass and Aleman grass. Other grasses such as Jarra, Strickland, or Tully can be established either by sowing seed or planting cuttings.

Cuttings for vegetative plantings will not be available in large quantities unless you harvest then from your own pastures. Initially, only enough planting material will be available to establish a nursery area. The source of these cuttings will mostly be a neighbouring property. The nursery area, if well cared for, will provide the cuttings or runners to sow larger areas of pasture in following years.

SEED QUALITY

Bags of seed can also contain sticks, stones, other seeds, dead and damaged seeds, and foreign material. Once you have decided what you want to plant, and before you commit to purchase a bag or a lot of seed, ask the seller for a recent seed analysis certificate. If it has not already been done, you can have a sample sent to a seeds laboratory for a germination test and a bulk search to find out if there are any other seeds present, If there are weeds in the seed lot that you do not have and do not want, do not buy the seed.

Seed, particularly grass seed, which has been incorrectly stored or has been in the hot sun on a truck from interstate, could be completely dead. If you buy seed ahead of time, keep it in an air-conditioned room until you are ready to use it.

SEEDING OR PLANTING RATE

Sowing rates are presented in the individual Agnotes for each species or cultivar, but when a single cultivar of a grass or legume is sown, the sowing rate for bare seed is generally in the range of 2 to 6 kg per hectare, depending on seed size, hard seed content for legumes and seed quality.

When a mixture of cultivars is sown, the sowing rate of each of the components of the mixture should be reduced so that the total amount sown remains the same. As a general rule, the lower the sowing rate used, the longer the pasture will take to reach its full grazing potential. A high sowing rate should be used to ensure that a pasture establishes quickly, particularly where there is a high weed population which will compete with the establishing pasture.

Many pasture cultivars are currently sold as coated or pelleted seed. Seed is coated mainly to make it smooth so that it will flow through planters and be easier to sow. Coatings can also incorporate nutrients, fungicides and insecticides. Coated seed may contain as little as 22 to 25 % seed because of the number of coats put on the seed. Sowing rates for coated seed should be at least double that used for bare seed.

When planting vegetatively, plant a runner approximately 50 cm long, containing two to three nodes, at a rate of one per square metre (1 m apart in 1 m row spacing).

Most of the currently used cultivars can effectively fill the gaps in the pasture by seed or runners. An alternative to sowing a whole paddock is to sow or plant the desired cultivar in widely spaced strips. In subsequent years, the unsown strips can be fertilised, sprayed with herbicide and/or cultivated to encourage and assist spread. As with using a lower sowing rate, the full grazing potential of the paddock will not be realised for a number of years.

TIME OF SOWING

The aim of picking a sowing date is to maximise the likelihood of there being sufficient soil moisture for seed to germinate and the young seedling to survive until the next rainfall event. This varies between species but is generally four to seven days of moist surface soil.

Grasses, with their relatively smaller seeds, produce seedlings which cannot tolerate drying out. Commercial legume seed often contains a significant proportion of hard seed, which softens during the wet season and germinates on later rainfall or in subsequent years. Grasses do not have hard seed and are particularly susceptible to establishment failures due to a dry spell after sowing.

The time of sowing depends on the start and duration of the wet season. The earliest reliable sowing dates range from the first week of December in the Darwin-Coastal Plains area, through mid-December in the Douglas/Daly area, late December in the Katherine area, to the first week of January in the VRD/Sturt Plateau.

Ideally, have ground prepared and equipment ready to sow when the weather is right. The start of the wet season varies between years, but the long range weather forecasts can give you an estimate of the risk associated with sowing at a particular time in a particular year.

On upland soils, pasture species should not be sown or planted out after early February, as the wet season may not last long enough for the newly established plants to flower and set seed (if annuals), or to develop an adequate root system to survive the dry season (if perennials).

On flooded soils, seed or cuttings can be sown or planted in wet soil when there is a good likelihood of follow up rain, or cuttings can be sown into shallow water or mud when the flood waters are receding. On these soils, rapid flooding can drown small seedlings or small establishing plants. Unless there is good control of water depth, planting runners is a more reliable method of establishing grasses on flooded soils, even if seed is available.

Vegetatively propagated cultivars cannot be planted out until the new season's runners are available. Unless an irrigated nursery is maintained, new runners are usually not available until January.

CONTROL OF COMPETING VEGETATION

An establishing pasture needs protection from competition from other vegetation until it gets strong enough to out compete it; otherwise it may never establish properly. Consider a few issues at the planning and sowing stage:

1. What and how much vegetation is already there and what impact is it likely to have?
2. What is the best method to deal with this vegetation - cultivation, herbicide before sowing, herbicide after sowing, fertiliser before sowing, fertiliser after sowing, grazing or a combination of these methods? Will herbicide or grazing harm the young pasture if it is used at the wrong time?
3. Make sure you do not accidentally sow a crop of weeds either by using weedy machinery or by sowing weedy seed.
4. Learn the limits of your pasture and plan to keep it in a strong healthy condition so it can resist weed invasion.

GROUND PREPARATION

Pasture seed needs a seedbed where it can get good contact with moist soil. The better the seedbed, the better your chances of a good establishment.

For grasses, at least, that means a ploughed seedbed. A rough cultivation is the minimum requirement. It aids establishment as it reduces runoff and holds moisture longer after rain, in small depressions and furrows. Cultivation also reduces competition from existing vegetation, which is required to ensure establishment.

An alternative to full cultivation is the use of a no-till planter following chemical control of existing vegetation.

The minimum requirement to establish pasture legumes is to burn the standing dry material early in the wet season and over-sow seed into the ash (called augmentation). This method of establishment has only been successful with the stylo legumes and Wynn cassia and is more applicable to the drier, more extensive areas of the Northern Territory. This method of sowing should be followed up with grazing during the wet season to reduce competition with the establishing seedlings from the established perennial grasses present.

Cattle graze the grasses preferentially during the wet season.

SEED TREATMENT

Heat Treatment of Legume Seed

Legume seed can be heat-treated in a hot drum designed for the purpose or hot water treated to soften the hard seed and enhance germination. This is generally not recommended for the NT as the hard seed component is regarded as insurance against a false start to the wet season or a poor wet season. Some of the hard seed will break down with exposure to the environment in the field and establish later in the wet season or during the next wet season. It is difficult to treat large volumes of legume seed.

Exceptions to this are the tree-legume leucaena for which hot water treatment should be used to enhance germination, and some legume hay crops where good control over planting conditions is possible and uniform quick establishment is required.

Scarification

Cavalcade and Bundey seed can be mechanically scarified using a clover scarifier. This is generally done to create more germinable seed for sowing hay crops. This process can double the germination of the seed.

Inoculation of Legume Seed

In areas where legumes have not been sown previously, pasture legume seed can be inoculated with compatible rhizobium inoculant to ensure that effective nodulation occurs. All the pasture legumes commonly sown in the Northern Territory are not specific in their rhizobial requirements. This means that they will freely nodulate with native soil rhizobia - thus inoculation is not necessary in most cases. The vegetation of most areas of the Top End Northern Territory contains a range of herbaceous legumes which maintain adequate levels of native soil rhizobia. Inoculation is required for growing Leucaena.

Pelleting/Coating

Pelleting of pasture seed has been claimed to enhance establishment. Pelleting is the process of coating seed with materials which produce a smooth product which will flow through planters. The coating is often rock phosphate, but can be lime or an inert polymer. Insecticides can be added to prevent predation against seed harvesting ants. Fungicides can be added to protect seedlings against diseases. There are often many layers in a pellet.

Trials by Departmental Officers and by producers have generally shown a severe negative effect of pelleting on establishment in the Northern Territory. Pelleted seed needs to be sown into a moist seedbed to ensure establishment. The experience in the Northern Territory is that coated seed is slower to germinate than uncoated seed. Moisture takes longer to soak into and break down the coating before the seed begins to germinate. Because of the delayed germination, seedlings can run out of moisture before they get their roots into soil moisture.

METHOD OF PLANTING

(a) Broadcast

Seed can be broadcast by hand on small areas or by fertiliser spreader or aircraft for large areas. It is often convenient to mix the seed with the fertiliser before spreading over the area. This helps to get a more uniform spread of the seed. If mixing seed with fertiliser, mixing should preferably be done immediately prior to sowing as the viability of the seed is reduced when it is in contact with the fertiliser. Seed mixed with fertiliser should be used within 2 days of mixing.

Seed which is broadcast onto a trafficable seedbed should be lightly covered by dragging a set of light harrows, a length of pipe, a chain, some arc mesh or a small log behind the seeder. The use of a light roller to compress the loose soil surface and give better soil-seed contact often enhances establishment.

(b) Drum Seeders

Usually used for fluffy seed such as buffel and Mitchell grasses.

(c) Conventional Sowing Machinery

Used where a cultivated seedbed is available. Depth of sowing is important for most of the pasture cultivars. Generally, they are small seeded and need to be sown on or near the soil surface. If sown too deep they will not emerge.

(d) Minimum/No-Till Machinery

Suitable for sowing legume seed after herbicide treatment. The use of press wheels often aids establishment.

(e) Runners

On upland areas runners should be spread onto moist soil from the back of a vehicle and lightly disced to cover part of the runners. On flooded soils, the cuttings can be planted by hand or foot into wet soil or mud, thrown under the wheels or tracks of a light amphibious vehicle, or planted using a disc planter. The Department and some pastoralists have developed their own disc planter machines for planting runners on floodplains.

(f) Legume seed in cattle lick

Some producers have purchased cattle loose lick supplements containing pasture legume seed. The observed success of this establishment method has been low. There are reasons for this. Seed loses its viability when mixed with fertilisers. The seed, if it will germinate, it is regarded as soft. Soft seed will be digested in the gut of cattle. Seed which has been harvested, processed and stored will have lower levels of hard seed. To use this method, seed would have to be mixed with smaller amounts of loose lick every 2 or 3 days. Hard seed will pass through the digestive system of cattle. Freshly harvested legume seed has a higher hard seed content. This seed is more likely to pass through the gut without being digested.

MANAGEMENT OF THE NEW PASTURE

Fertilisers

Fertilisers do not affect the number of seeds which germinate, emerge and establish but they enhance the early growth of the seedlings, ensuring they reach an adequate size and have a strong root system before the onset of the dry season. When fertilised, plants set more viable seed to allow the pasture to thicken up during the next wet season.

On most Northern Territory soils, with the exception of the flooded coastal clay soils, fertilisers are required to ensure establishment of a productive pasture. In the drier areas of the Northern Territory, soil fertility may be naturally higher, and responses to fertiliser lower.

Agnotes are available detailing fertiliser regimes for pasture grasses, pasture legumes and a mixture of grasses and legumes.

First Grazing

It is better not to graze a newly established pasture in the wet season of establishment or the first dry season (apart from the grazing of over-sown legume pastures to aid establishment).

Plants should be allowed to establish firmly in the ground and to set a seed crop to ensure persistence of the pasture. There have been many instances of newly established pastures being destroyed by heavy grazing during the wet season or the first dry season of establishment.

In some instances, strategic grazing may be used to enhance the establishment of a desired cultivar. In other instances, where a pasture is sown early and receives the benefit of a long wet season and good late rain, light grazing during the first dry season may not harm it. These are special circumstances and must be handled on an individual basis.

WHAT TO AVOID

Over the years, there have been large areas of introduced pastures sown in the Northern Territory, but in many cases there is little to show for it today because they were grazed too soon.

What should be avoided:

- Trying to sow an area which exceeds the capacity of the resources available.
- Trying to establish pastures without some soil disturbance.
- Trying to cut costs by using a low sowing rate.
- Trying to cut costs by not using fertiliser.

In short, do not try to get too big too quickly. Do smaller areas and do them well.

WARNING

Pasture plants have the potential to become weeds in certain situations. To prevent that, ensure that seeds and/or vegetative materials are not inadvertently transferred to adjacent properties or road sides. Contact your departmental extension officer for information on appropriate management.

CHECKLIST FOR PASTURE ESTABLISHMENT

- ☑ What species are suitable? Is seed/planting material available for a reasonable price? Where can it be stored? When should it be ordered?
- ☑ What ground preparation is needed? When can it be done? Do you have suitable machinery, can you hire it or is a contractor available? If using herbicides, is the spraying equipment in working order and calibrated?
- ☑ Will seed treatment or fertiliser be required? When will it be needed? When should it be ordered to ensure it is available when needed?
- ☑ What sowing methods are available to you? Will they be available when needed? Is the seeder calibrated?
- ☑ Can grazing be controlled? Is there a sufficient firebreak around the pasture?

Please visit us at our website:

Pastures and fodder crops - NT.GOV.AU

ISSN 0157-8243
Serial No. 564
Agdex No. 131/10