



agriculture & rural development

Department:
agriculture
& rural development
PROVINCE OF KWAZULU-NATAL

PASTURES IN KWAZULU-NATAL

ADAPTATION OF PASTURES SPECIES

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INTRODUCTION

Cultivated pasture species, as we know them to-day, originate from all parts of the world. Depending on the conditions under which they evolved, different pasture species have become adapted to:

- a wide range in climatic conditions;
- different soil types;
- different soil moisture regimes;
- different soil fertility regimes;
- different intensities of defoliation;
- different frequencies of defoliation.

Researchers have used this diversity in adaptability of species to select and breed "superior" plants of the different species for different conditions and uses.

No one pasture species can be expected to sustain high growth rates throughout the year. Consequently, no one species can fulfil the grazier's requirements all year round. For pasture based animal systems it is necessary to select those species that are adapted to the environment in question and to the livestock enterprise envisaged.

CLASSIFICATION OF PASTURE SPECIES

Pasture species can be broadly classified as:

- tropical or temperate;
- tufted or creeping;
- annual or perennial;
- grass or legume.

Tropical species grow best during the warmer (25 to 35EC) months of the year. Temperate species may grow during the summer and winter months (depending on temperatures) but exhibit

highest growth rates during spring and autumn (15 to 25EC). Temperate species are generally more digestible and nutritious than are tropical species.

Tufted species show limited horizontal spread: increase in size of the tuft is as a result of tillering. Creeping species spread horizontally by means of stolons (above ground stems) and/or rhizomes (underground stems).

Annual species have a lifespan of one year which, in some instances, can be extended by certain management practices. Perennial species have a lifespan of several years.

Grasses are generally less nutritious than are legumes. While grasses are often grown in pure swards, legumes, with the possible exception of lucerne, are usually grown with grasses. Legumes, generally speaking, have more exacting fertility requirements (except for nitrogen) than do grasses. Legumes, if well nodulated, can fix atmospheric nitrogen while grasses need to have nitrogen applied if high yields are required.

Table 1 gives an indication of the adaptability of some selected pasture species to soil type, landscape position, soil drainage, effective rainfall and soil fertility requirements. The suitability of different species for foggage (*i.e.* standing "hay") is also indicated in Table 1. While the adaptability of a species is dependent largely on rainfall and temperature, irrigation can be used to improve the "adaptability" rating (and the yield) and to extend the growing season of a species.

The "absence" of some well known pasture species from Table 1 does not mean that these species are not recommended, only that insufficient data are available for general recommendation. This is the case with the tropical legumes and medics, as well as with some of the annual "grain type" grasses (sorghums, babala) which also fall into this class.

TABLE 1. The suitability of selected pasture species for different sites and situations in Natal Region.

Pasture species	Foggage		Soil type		Elevation		Soil drainage		Soil fertility		Effective rainfall (mm)		
	g o o d	f a i r	l i g h t	h e a v y	b o t t o m	u p l a n d	g o o d	p o o r	l o w	m e d i u m	h i g h	>800	600-800	400-600

Tropical grasses:	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	.	.	*	*	.	*	*	.	*	*	.	.	*	*
Blue buffalo grass	.	.	*	.	.	*	*	.	.	*	*	.	*	*
Coastcross II	.	*	.	*	*	*	*	*	.	*	*	*	*	.
Dallas grass	.	*	*	*	.	*	*	.	*	*	*	*	*	*
Guinea grass	.	*	*	*	.	*	*	.	.	*	*	*	*	.
Kikuyu	.	.	*	*	*	*	*	.	*	*	.	*	*	*
Napier grass/Bena	*	.	*	*	*	.	*	*	.	*	*	*	*	.
Nile grass	.	*	*	.	.	*	*	.	*	*	*	*	*	*
	.	.	*	.	.	*	*	.	.	*	*	.	*	*
Rhodes grass	.	.	*	.	.	*	*	.	*	*	.	*	*	.
Star grass	.	*	*	*	.	*	*	.	*	*	*	*	*	*
Setaria	.	.	*	*	.	*	*	.	*	*	.	*	*	.
Smuts finger grass	.	.	*	*	.	*	*	.	*	*	*	*	*	*
Teff														
Weeping love grass														
Temperate grasses:	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	*	.	*	*	*	*	*	*	.	*	*	*	.	.
Cocksfoot	*	.	*	*	*	*	*	.	.	.	*	|	|	|
Italian ryegrass	.	*	*	*	*	*	*	.	*	*	.	*	|	|
Oats	*	.	*	*	*	*	*	.	.	*	*	*	|	.
	*	.	*	*	*	*	*	*	.	*	*	*		

Perennial ryegrass														
Tall fescue														
Legumes:	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lucerne			*	.	*	*	*			*	*	*	*	|
Red clover			*	*	*	*	*			*	*	*	|	|
White clover			*	*	*	*	*			*	*	*	|	|

* = suitable

| = only with irrigation

Note:

An appropriate sub-division according to rainfall would be as follows:

Bioclimatic Groups 1, 2, 3, 4 and 5 would fall into the > 800 mm rainfall category.

Bioclimatic Groups 6 and 8 would fall into the 600 to 800 mm rainfall category, and

Bioclimatic Groups 7, 9, 10 and 11 would fall into the 400 to 600 mm rainfall category.

NOTES ON INDIVIDUAL SPECIES

Blue buffalo grass (*Cenchrus ciliaris*): tropical, perennial, tufted grass.

Once established, blue buffalo grass is very drought tolerant. Although relatively unpalatable when old, young growth is readily eaten by stock. Due to the "fluffy" nature of the light seed, special attention is required at establishment. It is advised not to plant freshly harvested seed and not to bury the seed too deep at planting. Active growth occurs during the warm summer months.

Coast cross II, often referred to as K11, (*Cynodon* species): tropical, perennial, rhizomatous and stoloniferous grass

Coast cross II is more tolerant of drought than is kikuyu. Establishment is by means of runners. Young regrowth of coast cross II is palatable and nutritious. Older growth, however, tends to be unpalatable. If coast cross II is heavily grazed for extended periods then invasion by grass weeds can become a problem. Coast cross II produces well during the hotter months of the year, but it does not produce a good quality foggage. It is not recommended for very cold areas.

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Dallis grass (*Paspalum dilatatum*): tropical, perennial, tufted grass

Dallis grass is a palatable and nutritious grass that can withstand heavy utilisation provided that it is rested following grazing. Under lax utilisation a profusion of seed heads is produced during December/January. The Dallis grass pasture should be grazed relatively frequently and hard during this seeding phase to reduce the number of seedheads produced. This is because the seed, on ripening, is often infected by ergot. Ergot is a fungus which tends to make the pasture unpalatable. Dallis grass produces foggage that is reasonably palatable and nutritious. It is well adapted to heavy bottomland soils. Clover should be included with plantings of Dallis grass.

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Guinea grass (*Panicum maximum*): tropical, perennial, tufted grass

Guinea grass can withstand extended dry periods, but will not tolerate heavy frosts. It is a palatable grass that does not like severe defoliation. Guinea grass is not suited to continuous grazing.

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Kikuyu (*Pennisetum clandestinum*): tropical, perennial, creeping grass

Kikuyu is a palatable and nutritious grass that can withstand severe defoliation. Although kikuyu exhibits maximum growth rates in summer, growth will commence in spring (with adequate soil moisture) when daily minimum temperatures are above 10°C. Kikuyu provides reasonable foggage. Kikuyu is not as drought tolerant as is coast cross II.

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Napier fodder, Elephant grass or Bana grass (*Pennisetum purpureum*): tropical, perennial grass with short creeping rhizomes

Napier grass is fairly palatable when young and leafy but becomes very stemmy and unpalatable when not utilised for extended periods. Maximum growth occurs during hot summer months.

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Nile grass (*Acroceras macrum*): tropical, perennial, rhizomatous and stoloniferous grass

Nile grass is established from runners. It is a highly palatable grass that retains reasonable quality and palatability when put up as foggage. Old stands of Nile grass may become "sod-bound", resulting in reduced yields. Regeneration can be achieved by disking or shallow ploughing. It is essentially a summer producing grass that can withstand severe defoliation provided that a good rest is given following grazing.

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Rhodes grass (*Chloris gayana*): tropical, perennial, creeping grass

Rhodes grass establishes rapidly from seed. It is palatable to both sheep and cattle, but, unlike most creeping grasses, Rhodes grass cannot withstand severe defoliation for extended periods. Rhodes grass is thus not generally recommended for sheep. Resistance to frost is largely determined by the amount of herbage protecting the growing points during the winter (in cooler areas it should not be grazed short before winter). Rhodes grass is not recommended for areas with heavy frost.

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Star grass (*Cynodon* species): tropical, perennial, creeping grass

Establishment of star grass is from runners. Although palatable when young,

older growth tends to become matted (due to vigorous runners) and unpalatable. Star grass is not very frost hardy. Maximum growth occurs during the hotter months. Because of the "twining" growth habit under lax management star grass is not generally recommended for sheep.

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Setaria (*Setaria sphacelata*): tropical, perennial, tufted grass
Although not particularly palatable when old, setaria is a palatable nutritious grass when well managed under rotational grazing systems. Setaria should not be allowed to grow taller than 45 cm before being utilised. Setaria can withstand severe defoliation provided that an adequate rest is allowed following defoliation. Maximum growth occurs during summer.

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Smuts finger grass (*Digitaria eriantha*): tropical, perennial, tufted grass
Smuts finger grass, like nile grass, is a palatable and nutritious grass that maintains a reasonable quality and palatability when dormant. Smuts finger grass is a slow starter. A well compacted seedbed, avoidance of planting the seed too deep (less than 5 mm), good compaction following planting and avoiding utilisation too soon after establishment, are important in obtaining a good stand. Smuts finger grass can withstand heavy defoliation but requires a long regrowth period following severe defoliation. Maximum growth occurs during the hotter months. A good grass for foggage.

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Teff (*Eragrostis teff*): tropical, annual, tufted grass
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Weeping love grass (*Eragrostis curvula*): tropical, perennial, tufted grass
Weeping love grass is primarily a summer growing hay grass. This grass, if allowed to become rank and if not well fertilised (particularly if nitrogen is not applied), is unpalatable both as hay and as grazing. Although weeping love grass can be and is used for grazing, grazing management must be at a high level. Short defoliation (whether for hay or for grazing) reduces yields dramatically. Weeping love grass should not be defoliated shorter than 10 cm. This grass is one of the earliest of the tropical species to commence growth in spring. It is often used for grazing in spring and then for the production of hay later in the season.

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Cocksfoot (*Dactylis glomerata*): temperate, perennial, tufted grass
A highly palatable grass for cooler areas. Cocksfoot exhibits highest growth rates during spring and autumn. It is not as drought or heat tolerant as is tall fescue. Cocksfoot tillers are initiated above ground level and the grass should not be defoliated too severely. If cocksfoot is to be used for sheep then management should be at an optimum. It is recommended that red and white clover be planted with cocksfoot.

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Italian ryegrass (*Lolium multiflorum*): temperate, annual, tufted grass
Italian ryegrass has high soil fertility and soil moisture requirements. It is a highly palatable and nutritious grass. Italian ryegrass, when planted in early autumn, provides for good autumn growth, reasonable winter production (depending on the severity of the winter) and excellent spring growth. Italian ryegrass can withstand intense defoliation but requires adequate rest, following severe defoliation, before being re-utilised. It is recommended that white clover be included with Italian ryegrass.

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Oats (*Avena sativa*): temperate, annual, tufted grass

Oats has proved to be a good autumn-early winter pasture for grazing. A highly palatable and nutritious grass which can withstand fairly severe defoliation. Oats is preferred to Italian ryegrass under dryland conditions, but under irrigation Italian ryegrass is superior to oats.

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Perennial ryegrass (*Lolium perenne*): temperate, perennial, tufted grass

Perennial ryegrass has high soil fertility and moisture requirements. Although highly palatable and nutritious, problems are often experienced with longevity. Perennial ryegrass should not be allowed to grow out too tall, not more than 200 to 250 mm, before utilisation and should be grazed relatively short. In warmer areas perennial ryegrass should not be grazed too short during the hotter months of the year. White clover is particularly compatible with perennial ryegrass (both require high fertility and adequate moisture). Maximum growth of perennial ryegrass can be expected in autumn and spring. Summer and winter production are affected by extremes of temperature (both high and low temperatures restrict growth rates). Perennial ryegrass is not recommended for hot areas unless management (fertilisation, irrigation and severity of defoliation) are at an optimum.

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Tall fescue (*Festuca arundinacea*): temperate, perennial, tufted grass.

Of the temperate species grown, tall fescue is probably the most drought resistant and heat tolerant. Although often reported as unpalatable, palatability is largely related to management. Tall fescue should not be allowed to become too rank, except when put up for foggage. Tall fescue is one of the better species for foggage. Care should be exercised when lambing onto tall foggaged fescue, since the lambs can become entwined in the herbage. Inclusion of a legume with tall fescue improves animal performance and increases the palatability of the grass. Tall fescue is a "slow starter" and it is imperative that the seedbed is well prepared. Tall fescue exhibits high growth rates during spring and autumn, with fair growth during summer. Good management (frequent and/or severe defoliation) is required to reduce the production of seedheads (from October to December, depending on cultivar), which make the pasture unpalatable.

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Lucerne (*Medicago sativa*): temperate, perennial, tufted legume

Lucerne is a good species in terms of nutritive value. For maximum yields lucerne has exacting soil, fertility and management requirements. Lucerne can be grazed or used for the production of hay. When lucerne is being utilised care should be taken that the secondary tillers (shoots), which develop from the crown, are not defoliated. Maximum growth rates can be expected in summer, with reduced growth rates in spring and autumn. Lucerne, where adapted, is a good companion legume for tufted tropical grasses (e.g. Smuts finger grass).

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Red clover (*Trifolium pratense*): temperate, short-lived perennial, tufted legume

Red clover is a high quality pasture species suitable for grazing. Although red

clover is not as adapted to intense defoliation as is white clover, it can withstand more intense defoliation than can lucerne. Red clover is a good companion legume for tufted grasses. Red clover is more tolerant of moisture stress than is white clover, but is less tolerant than is lucerne. Although a perennial, the dry matter production of red clover declines after the second to third season. While the periods of active growth of red clover are similar to those of white clover, red clover is more tolerant of water stress and summer heat than is white clover.

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White clover (*Trifolium repens*): temperate, perennial, stoloniferous legume White clover is an excellent species for grazing. It produces a palatable, highly nutritious fodder. White clover can withstand severe defoliation provided that it is given a rest following defoliation and provided that fertility and soil moisture are not limiting. A shallow rooted species with high phosphorus and water requirements.

White clover is a good companion legume for most tufted grass species. It is particularly compatible with perennial ryegrass. When white clover is grown with grass the taller clover types should be used. Although a perennial, the longevity of white clover is largely dependant on management. Three years is regarded as a reasonable productive period. White clover grows best during spring and autumn with reasonable production during summer, provided that the summers are not too hot.