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SEPASAL is a database and enquiry service about useful "wild" and semi-domesticated plants of tropical and subtropical drylands, developed and maintained at the Royal Botanic Gardens, Kew. "Useful" includes plants which humans eat, use as medicine, feed to animals, make things from, use as fuel, and many other uses.

Since 2004, there has been a Namibian SEPASAL team, based at the National Botanical Research Institute of the Ministry of Agriculture which has been updating the information on Namibian species from Namibian and southern African literature and unpublished sources. By August 2007, over 700 Namibian species had been updated.

Work on updating species information, and adding new species to the database, is ongoing. It may be worth visiting the web site and querying the database to obtain the latest information for this species.

## Internet SEPASAL

New query

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 *Display help*In names list include:  synonyms  vernacular names and display: 10  names per page*Your query found 1 taxon***Cenchrus ciliaris L. [1808]**

Family: POACEAE

**Synonyms**

Pennisetum ciliare (L.) Link

Pennisetum cenchroides A. Rich.

**Vernacular names**

- (India) dhaman grass [1375], anjan grass [1375], koluk katai [1375]
- (India, Rajasthan) dhaman [2162]
- (Mexico) zacate buffel [1680]
- Afrikaans buffelsgras [2837]
- Afrikaans (Namibia) Bloubuffelsgras [5083] [5115] [5116]
- Afrikaans (South Africa) Pokogras [2259], breëblaar(gras) [2259], donkiegras [2259], drooglandgras [2259], droëland (e/s)gras [2259], katstertbuffel [2259], katstertgras [2259], litjiesgras [2259], skaapgras [2259], pêrelmanne [2259], bloubuffel [2259] [5117], bloubuffel gras [2259] [5117], bloubuffels [2259] [5117], bloubuffels gras [2259] [5117], katstertjie [2259], katstert [2259]
- Afrikaans (Southern Africa) buffelsgras [2182] [2259]
- Afrikaans (Zimbabwe) Buffelgras [2259]
- Arabic (Sudan) danab el kalib [2837]
- Damara (Namibia) |Uiobagea [5095], lhoobe |gâ.n [5095], lhuru |gâ.n [5095]
- English buffel grass [2837]
- English (Australia) buffel grass [1375] [2259]
- English (Kenya) African foxtail [1375]
- English (Namibia) buffalo grass [5083] [5115] [5116]
- English (South Africa) Malopo blue buffel grass [2259], blue buffalo grass [2259] [5117], buffalo grass [2259] [5117], buffel grass [2259], pearl millet [2259], poko grass [2259]
- English (U.S.A.) African foxtail [1375]
- English (Zimbabwe) foxtail [2259], foxtail grass [2259]
- German (Namibia) Blaubüffelgras [2259] [5083] [5115] [5116], Foxtail [2259], Fuchschwanz [2259], Katstert [2259]
- Hausa haufato [2837]
- Herero (Namibia) orurenda [5083] [5091] [5115]
- Jul'hoan (Namibia) glurill'a-nllae (-si) [5083] [5101] [5115]

Khoekhoegowab (Namibia)	lgâ.n [5083] [5115], lhoobe [5083] [5115], lhuru [5115] [5400], luiobageda [5083] [5115]
Maasai	enkopikedongoi [2837], oloju [2837]
Rukwangali (Namibia)	kandjata [5083] [5115]
SeTswana (Botswana)	Molekangwetsi [5186]
Setswana (Botswana)	Modikangwetsi [5186]
Somali	agar [2837], arapsur [2837], gudomad [2837], gurde agar [2837], irdug [2837], lyah makarri [2837]
Sotho (South Africa)	Modula-tjava [2259], Se-be-kxare-ya-weso [2259]
Turkana	amerukwa [2837]
Unknown (Mozambique)	Chiundo [2259]
Zulu (South Africa) [fibre]	InTungamusi [2259]

## Distribution

Plant origin	Continent	Region	Botanical country
Native	Africa	East Tropical Africa	Kenya [1362] [2259] [2837], Tanzania [1362], Uganda [1362] [2259] [2837]
		Macaronesia	Azores [2255], Canary Is [2255], Madeira [2255]
		Northeast Tropical Africa	Chad [2255], Djibouti [2255], Ethiopia [2255] [2837], Socotra [2255], Somalia [2255] [2837], Sudan [2255] [2837]
		Northern Africa	Algeria [2255], Egypt, Libya [2255], Morocco [2255], Tunisia [2255]
		South Tropical Africa	Angola [2259] [2837] [5126], Malawi [2259], Mozambique [3] [2259] [2837], Zambia [3] [2259] [2837] [5481], Zimbabwe [3] [2259] [2837] [5125]
		Southern Africa	Botswana [3] [2259] [2837] [5104] [5186], Cape Province [2259] [5104], Caprivi Strip [3] [2259] [5115], Namibia [2259] [2837] [5104], Natal [2259] [5104], Orange Free State [2259] [5104], Swaziland [2259] [5104] [5452], Transvaal [2259] [5104]
		West Tropical Africa	Ghana [2255] [2837], Mali

			[2255] [2837], Mauritania [2255] [2837], Niger [2255] [2837], Nigeria [2255] [2837], Senegal [2255] [2837], Sierre Leone [2255]
		West-Central Tropical Africa	Cameroon [2255], Congo [2259], Gabon [2259], Rwanda [2255], Zaire [2259]
	Asia-Temperate	Western Indian Ocean Arabian Peninsula	Madagascar [2255] Bahrain [2255], Kuwait [2255], North Yemen [2255], Qatar [2255], Saudi Arabia [2255], South Yemen [2255], United Arab Emirates [2255]
		Western Asia	Afghanistan [2255], Iran [2255], Iraq [2255], Israel [2255], Jordan [2255], Syria [2255]
	Asia-Tropical	Indian Subcontinent	Pakistan [2255], Punjab [2255], Rajasthan [2162] [2255], Tamil Nadu [2255], Uttar Pradesh [2255]
	Europe	Indo-China Southeastern Europe	Burma [2255] Sicilia [2255]
Introduced	Asia-Temperate	Western Asia	Cyprus [2255]
	Asia-Tropical	Malesia	Jawa [2255], Papua New Guinea [2255]
	Australasia	Australia	Australian Capital Territory [1655], New South Wales [1655], Northern Territory [1655], Queensland [1655], South Australia [1655], Victoria [1655], Western Australia [1655]
	Europe	Northern Europe	Great Britain [2255]
	Northern America	Northern Mexico	Baja California Sur [1680], Coahuila [2255], Sonora [2255]
		South-Central U.S.A.	Texas [2255]
		Southwestern U.S.A.	Arizona [2255]
	Pacific	Southwestern Pacific	Fiji [2255], Phoenix Is [2255]
	Southern America	Brazil	Bahia [2255], Brazilia Distrito Federal [2255], Parana [2255]
		Mesoamerica	El Salvador [2255]
		Western South America	Bolivia [2255], Peru [2255]
Status Unknown	Africa	Macaronesia	Cape Verde [2255]

**ISO countries:** Argentina [[2255](#)] , Indonesia [[2255](#)] , India [[1362](#)] [[2182](#)] [[2259](#)] , Mexico [[2255](#)] , South Africa [[2259](#)] [[2837](#)] [[5104](#)]

## Descriptors

<b>Category</b>	<b>Descriptors and states</b>
DESCRIPTION	Herb [ <a href="#">2255</a> ]; Prostrate/Procumbent/Semi-erect [ <a href="#">3</a> ] [ <a href="#">1362</a> ]; Tussock Forming/Tufted/Caespitose [ <a href="#">3</a> ] [ <a href="#">2182</a> ] [ <a href="#">2259</a> ] [ <a href="#">5117</a> ]; Erect [ <a href="#">5117</a> ]; Terrestrial [ <a href="#">2259</a> ] [ <a href="#">5117</a> ]; Shrub [ <a href="#">2837</a> ]; Rhizomatous [ <a href="#">2259</a> ]; Perennial [ <a href="#">3</a> ] [ <a href="#">1362</a> ] [ <a href="#">2182</a> ] [ <a href="#">2259</a> ] [ <a href="#">2837</a> ] [ <a href="#">5115</a> ] [ <a href="#">6671</a> ]; Stoloniferous [ <a href="#">2837</a> ]; Plant Height 0.1-1.5 m [ <a href="#">3</a> ] [ <a href="#">1362</a> ] [ <a href="#">2182</a> ] [ <a href="#">5104</a> ] [ <a href="#">6671</a> ]
CLIMATE	Frost Tolerant [ <a href="#">1375</a> ]; Subtropical, Hot and Arid [ <a href="#">2259</a> ] [ <a href="#">5117</a> ] [ <a href="#">5119</a> ]; Annual Rainfall 250-1070 mm [ <a href="#">2255</a> ] [ <a href="#">2837</a> ]
SOILS	Limestone Parent Material [ <a href="#">2837</a> ]; Well Drained [ <a href="#">2837</a> ]; Sometimes Waterlogged (frequency unknown) [ <a href="#">2837</a> ]; Gravels/Stony [ <a href="#">5117</a> ]; Alkaline [ <a href="#">5116</a> ] [ <a href="#">5117</a> ]; Sandy [ <a href="#">2182</a> ] [ <a href="#">2259</a> ] [ <a href="#">5117</a> ]; Sands [ <a href="#">2837</a> ]; Organic Parent Material [ <a href="#">2837</a> ]; Dry [ <a href="#">5116</a> ] [ <a href="#">5117</a> ]
HABITAT	Coastal Regions [ <a href="#">6671</a> ]; Pioneer Species [ <a href="#">2259</a> ]; Non-Coastal Regions; Woodland [ <a href="#">2259</a> ]; Shrubland/Bushland/Scrub [ <a href="#">1362</a> ] [ <a href="#">2259</a> ] [ <a href="#">2837</a> ]; Grassland/Forb-Land [ <a href="#">2259</a> ] [ <a href="#">2837</a> ] [ <a href="#">5117</a> ]; Wooded Grassland [ <a href="#">3</a> ] [ <a href="#">1362</a> ] [ <a href="#">5117</a> ] [ <a href="#">6671</a> ]; Termitaria [ <a href="#">2259</a> ]; Anthropogenic Landscapes [ <a href="#">6671</a> ]; Altitude 0-2000 m a.s.l. [ <a href="#">3</a> ] [ <a href="#">1362</a> ] [ <a href="#">5104</a> ]
PHYSIOLOGY	Grazing/Browsing Resistant [ <a href="#">2259</a> ]; C4 [ <a href="#">123</a> ]; Drought Tolerant [ <a href="#">2259</a> ]
PRODUCTION AND VALUE	'Semi-Domesticated' Plants Utilised [ <a href="#">2182</a> ] [ <a href="#">5116</a> ] [ <a href="#">5117</a> ]; Recommended for Cultivation [ <a href="#">2182</a> ] [ <a href="#">5116</a> ] [ <a href="#">5117</a> ]
CONSTRAINTS	Agricultural Weed [ <a href="#">5095</a> ]
SOURCES OF PLANTING MATERIAL	RBG Kew Seed Bank [ <a href="#">2255</a> ]; Other Seed Sources [ <a href="#">5181</a> ]
FURTHER DATA SOURCES	Botanical Illustration [ <a href="#">3</a> ] [ <a href="#">2182</a> ] [ <a href="#">2259</a> ] [ <a href="#">5116</a> ]; Regional Distribution Map [ <a href="#">2259</a> ]; Botanical Photograph [ <a href="#">5117</a> ]; Databases [ <a href="#">5123</a> ] [ <a href="#">5341</a> ]; Habit Illustration/Photograph [ <a href="#">5115</a> ] [ <a href="#">5116</a> ] [ <a href="#">5117</a> ]; Grid Map [ <a href="#">2182</a> ] [ <a href="#">5115</a> ] [ <a href="#">5116</a> ] [ <a href="#">5117</a> ] [ <a href="#">5123</a> ]
SEPASAL DATASHEET STATUS	Nomenclature Checked; Geographical Checks Completed for Australasia
CHEMICAL ANALYSES	Nutritional Analyses - aerial parts [ <a href="#">388</a> ] [ <a href="#">5251</a> ]; Proteins - entire plant [ <a href="#">2837</a> ]; Proteins - leaves [ <a href="#">2837</a> ]

## Uses

<b>Major use</b>	<b>Use group</b>	<b>Specific uses</b>
ANIMAL FOOD	Aerial Parts	leaves, grazing [ <a href="#">5117</a> ]; unspecified aerial parts, hay/straw [ <a href="#">2259</a> ] [ <a href="#">5117</a> ]; camels, grazing [ <a href="#">2162</a> ]; unspecified aerial parts, forage [ <a href="#">2259</a> ] [ <a href="#">5117</a> ]; unspecified aerial parts, grazing [ <a href="#">5117</a> ] [ <a href="#">5186</a> ]; unspecified aerial parts, mammals, grazing [ <a href="#">5091</a> ] [ <a href="#">5115</a> ]; unspecified aerial parts, cattle, grazing [ <a href="#">5095</a> ]; unspecified aerial parts, horses, grazing [ <a href="#">5095</a> ]; unspecified aerial parts, reptiles [ <a href="#">5095</a> ]; unspecified aerial parts, game mammals, browse [ <a href="#">388</a> ]; unspecified aerial parts, fodder, dry season [ <a href="#">5663</a> ]; unspecified aerial parts, grazing, summer [ <a href="#">5663</a> ]; unspecified aerial parts, grazing, spring [ <a href="#">5663</a> ]; unspecified aerial parts, grazing, autumn [ <a href="#">5663</a> ]; unspecified aerial parts, hay/straw, summer [ <a href="#">5663</a> ]; unspecified aerial parts, hay/straw, winter [ <a href="#">5663</a> ]; unspecified aerial parts,

MATERIALS	Fibres	grazing, winter [5663]; forage, winter [5663]; grazing [2837] [6671]; hay/straw [2837]
ENVIRONMENTAL USES	Ornamentals	unspecified aerial parts, thatch, buildings [2259] [5091] [5101] [5115]; unspecified aerial parts, basketry (from fibre), baskets [2259]; unspecified aerial parts, matting, mats [2259]
		live plant in situ, lawns [2259]

## Picture

None recorded

## Notes

## NOMENCLATURE/TAXONOMY

### *Name derivation:*

From 'kegchros', Greek name for a kind of millet and 'ciliaris' Latin for 'like an eyelash or short hair', possibly alluding to the hairy bristles surrounding the spikelets [2259].

## VERNACULAR NAMES

### *South Africa:*

The Zulu name 'InTungamusi' refers to the grass when it is used for mat and basket making, thatching etc [2259].

### *Namibia:*

In Damara 'Uibageda' describes the species as the 'brother- in-law' to wheat. Ihuru lgâ.n is referring to the 'ripe' lhoobe lgâ.n [5095].

### *South Africa:*

'Donkiegras' and 'skaapgras' refers to the stunted form [2259].

## DISTRIBUTION

### *Southern Africa:*

Common [2182].

### *Worldwide:*

Indigenous to hotter and drier parts of India, Mediterranean Region as well as tropical and southern Africa [2259].

### *Worldwide:*

Throughout Africa, extending through Arabia and the middle East to India; widely introduced in the Old World [1362].

Reported from southern Pali District, Rajasthan [2162].

### *South Africa, Cape province:*

Northern and central Cape [2259].

### *Namibia, Kaokoland:*

Widespread on the highlands, but now scarce in heavily grazed areas [5091].

## DESCRIPTION

### *Height:*

1 m [6671].

### *Habit:*

Forming clumps which may be shrubby [2837].

### *Habit:*

A leafy variable perennial, with a woody, sometimes shortly creeping rootstock. Often forms large, bushy tufts [2259].

### *Habit:*

Almost woody [3] [1362].

### *Inflorescences:*

A dense, hairy cylindrical spike, up to 100 mm long. Spikelets up to 5 mm long and surrounded basally by numerous wavy bristles up to 10 mm long [5117] .

### *Leaves:*

Leaf blade up to 8 mm wide, bright green or blue-green, usually glabrous, or with scattered hairs, particularly near the ligule. Leaf sheath keeled. Ligule a ring of short hairs [5117] .

## **IDENTIFICATION**

### *Southern Africa:*

Cenchrus can look superficially like Enneapogon cenchroides. They can be distinguished at once by the shape of the 'spike'; in Cenchrus it is almost the same width throughout, while in Enneapogon it commonly tapers upwards. This superficial difference is not always reliable, because of variation in Enneapogon; and it is more satisfactory to note whether the bristles associated with the spikelets are at the base (Cenchrus) or their apex (Enneapogon) [2259] .

### *Southern Africa:*

The plant has a somewhat bushy growth. The inflorescence is a bristle 'spike', (like the tail of a cat), and is nearly always purple or flushed with purple. When mature, the spikelets fall off together with the bristles that surround them. The bristles are often bent. Those closest to the spikelets are hairy, and joined to a small flat disc at the base of the spikelet or group of spikelets [2259] .

May be confused with Pennisetum foermerianum which has an interrupted panicle, with bristles shorter and plumose and with Enneapogon cenchroides, which has 9-lobed lemmas with long awns and no bristles at the base of the spikelets [2182] .

### *South Africa:*

Cenchrus ciliaris may be confused with Enneapogon cenchroides and Enneapogon scoparius, which often occur in the same habitat, and with certain species of Setaria. Enneapogon cenchroides and Enneapogon scoparius have spike-like, contracted panicles and no bristles at the base of the spikelets. In species of Setaria the spikelets drop from the spike without the bristles, whereas in Cenchrus ciliaris the bristles are attached to the spikelets [5117] .

## **ANIMAL FOOD - AERIAL PARTS**

### *Unspecified aerial parts, cattle, grazing:*

Cows are described as eating this grass in !Khomani Damara in Namibia [5095] .

### *Unspecified aerial parts, forage:*

Yielding good, palatable forage [2259] .

### *Unspecified aerial parts, grazing:*

Grazing value mostly high [5117] .

### *Unspecified aerial parts, hay:*

Suitable for hay. However it becomes hard and fibrous in winter and late in the growing season [5117] .

### *Unspecified aerial parts, hay:*

Yielding hay of high feeding value [2259] .

### *Unspecified aerial parts, horses, grazing:*

Horses are described as eating this grass in !Khomani Damara in Namibia [5095] .

### *Unspecified aerial parts, mammals, grazing:*

Valuable grazing for livestock [5091] .

### *Unspecified aerial parts, reptiles:*

Tortoises are described as eating this grass in !Khomani Damara in Namibia [5095] .

### *Unspecified aerial parts, grazing:*

Used for grazing in Botswana [5186] .

### *Grazing:*

A valuable pasture grass [6671] .

### *Leaves, grazing:*

Animals tend to graze the leaves of buffel grass selectively and reject the stems [5663] .

### *Unspecified aerial parts, game mammals, browse:*

In Kenya the whole plant, early and full flowering, was browsed by elephant [388] .

### *Stems, grazing:*

If lactating or young, growing animals are forced to eat the stems, their food intakes will become suboptimal and productivity will be adversely affected [5663] .

*Unspecified aerial parts, hay/straw, winter:*

The quality of the hay, if cut at the right stage, is sufficient to maintain the condition of dry and pregnant cattle during the winter months. Overmature hay is rejected by animals. One bale (20 kg) is sufficient hay for a mature cow for one day. A bale will feed 10 sheep for a day. For sheep it is better to mill the material through a 3 or 4 cm sieve [5663] .

*Unspecified aerial parts, hay/straw:*

One of the greatest factors influencing the quality of buffel grass hay is the age of the material since the last cut. The older the material, the poorer the acceptability of the hay to the animal. Digestibility, and therefore nutritive value, drops rapidly with increasing maturity [5663] .

*Grazing, hay:*

This species is widely recognised as a very valuable grazing grass for the dry tropics, and a large number of varieties have been selected, propagated and distributed widely. Some of these are upright and suitable for harvesting as hay others are more prostrate, with creeping stolons which form a good ground cover. In Sudan, all species eat it when it is young, but refuse it later if anything else is available. However, in times of scarcity and in more barren sites it is eaten at any time [2837] .

*Leaves, grazing:*

A palatable species with a high leaf production [5117] .

## **MATERIALS - FIBRES**

*Thatch, buildings, unspecified aerial parts:*

Used as thatching grass for shelters [5091] [5101] [5115] .

*Basketry, baskets, unspecified aerial parts:*

In South Africa the Zulu name 'InTungamusi' refers to the grass when it is used for mat and basket making, thatching etc [2259] .

*Matting, mats, unspecified aerial parts:*

In South Africa the Zulu name 'InTungamusi' refers to the grass when it is used for mat and basket making, thatching etc [2259] .

*Thatch, buildings, unspecified aerial parts:*

In South Africa the Zulu name 'InTungamusi' refers to the grass when it is used for mat and basket making, thatching etc [2259] .

## **ENVIRONMENTAL USES**

*South Africa:*

Where day temperatures are high but night temperatures are moderate to low, production will be adversely affected [5663] .

## **ENVIRONMENTAL USES - ORNAMENTALS**

*Lawns, live plant in situ:*

Said to have been used as a lawn grass in India (Bor, 1960) [2259] .

## **NUTRITIONAL VALUE**

*Unspecified aerial parts, hay:*

Yielding hay of high feeding value [2259] .

*Unspecified aerial parts:*

Grazing value mostly high [5117] .

*Unspecified aerial parts:*

The quality of the pastures is said to be low in winter [2259] .

*Aerial parts, hay:*

Digestibility, and therefore nutritive value, drops rapidly with increasing maturity [5663] .

*Aerial parts, ash, crude protein, ether extract, crude fibre, nitrogen free extract, silica, silica free extract, Ca, P, Na, K:*

Early flowering; ash 13.22%, crude protein 12.27%, ether extract 1.58%, crude fibre 34.45%, nitrogen free extract 38.48%, silica 4.87%, silica free ash 8.35%, Ca 0.33%, P 0.332%, Na 0.022%, K 4.27%. Full flowering; ash 16.96%,



crude protein 7.41%, ether extract 1.64%, crude fibre 34.84%, nitrogen free extract 39.15%, silica 7.80%, silica free ash 9.16%, Ca 0.64%, P 0.502%, Na 0.095% [388] .

*South Africa:*

Six to eight week regrowth of buffel grass, properly fertilised, should have a protein content of 8 to 10%, contain 35 to 40% fibre and be about 60% digestible. This should be sufficient to provide for lactating beef cows and for young growing stock [5663] .

*South Africa:*

The quality of the hay, if cut at the right stage, is sufficient to maintain the condition of dry and pregnant cattle during the winter months. Overmature hay is rejected by animals. One bale (20 kg) is sufficient hay for a mature cow for one day. A bale will feed 10 sheep for a day [5663] .

*Entire plant, Nutritional analyses:*

Protein (3%) in the dry season [2837] .

*Green leaves, Nutritional analyses:*

Protein (6-16%) [2837] .

*Aerial parts, crude protein, P, Ca, OM, DM, crude fibre, ADF, NDF, fat, In vitro digestibility, metabolizable energy, gross energy:*

In Namibia 20 samples (included samples taken which imitated sheep) were analysed. The following results are a summary of the tests presented as ranges (minimum to maximum). Crude protein 1.61-9.54%, P 0-19%, Ca 0-1.24%, OM 0-94.80%, DM 0-99.47%, crude fibre 0-41.03%, ADF 0-62.52%, NDF 0-76.33%, fat 0-1.77%, in vitro digestibility 0-47.50%, metabolizable energy 0-7.10 MJ/kg, gross energy 0-17.35 MJ/kg [5251] .

*Unspecified parts, nutritional analyses:*

NFE (45-50%) of digestible matter, phosphorous (0.15-0.65%) [2837] .

## CHEMICAL ANALYSES - MISCELLANEOUS

*Wet hay; water:*

0, protein 9.0, fat 2.6, fibre 73.2, ash 31.9, Dry hay; water 0, protein 7.4, fat 1.7, fibre 79.2; ash 11.7 [2089] .

## POLITICAL/SOCIOECONOMIC CONSTRAINTS

*South Africa:*

Permanent cultivated pastures are expensive to establish. Establishment costs must be spread over the whole productive life of the pasture, and cannot be recouped in the first season [5663] .

## WEED PROBLEMS CAUSED

*Namibia:*

In Kaokoland it commonly grows in irrigated gardens where wheat is grown [5095] .

## CONSTRAINTS - MISCELLANEOUS

If lactating or young, growing animals are forced to eat the stems, their food intakes will become suboptimal and productivity will be adversely affected [5663] .

## RAINFALL

*Southern Africa:*

Especially valuable in lower rainfall areas because it is drought resistant and competitive [2259] .

*South Africa:*

375-750 mm per year [5664] .

The minimum rainfall requirement is variously stated to be between 350 and 55mm but there is doubtless considerable variation between strains, of which there are many [2837] .

## ALTITUDE

*Southern Africa:*

50-1500 m [5104] .

*Southern tropical Africa:*

0-1500 m [3] .

*Tropical East Africa:*

0-2000 m [1362] .

*South Africa:*

Not recommended for use in South Africa at altitudes above 1 550 m [5663] .

## TOPOGRAPHY/SITES

Abundant on rubbish tips, roadsides and waste ground in Accra and near the coast, it is rapidly spreading along roadsides outwards into the country, especially to the east [6671] .

## SOILS

*Southern Africa:*

On all types of soil [3] [1362] [2259] .

*South Africa:*

Buffel grass is best suited to near-neutral, deep, well-drained soils of light to medium texture. Certain heavier soils are also suitable, but establishment and waterlogging problems are often encountered. Brack, infertile, shallow, poorly-drained or heavy-textured self-mulching soils are not entirely suitable. Soils with pH values below 5.5 are also not suitable unless they are limed [5663] .

Usually on open-textured soils that are well drained. Various soil types are recorded, including ones developed on quartz sands, limestones and coral rock. It does not withstand waterlogging well [2837] .

*Namibia:*

Occurs practically on all types of soil, but is particularly characteristic of limey soil (i.e. soil with a relatively high pH) [5116] .

*South Africa:*

Grows on all types of soil, with a preference for sandy, limey and stony soils [5117] .

## VEGETATION

*Southern Africa:*

It is adapted to fairly heavy grazing, and a wide variety of conditions [2259] .

*Southern Africa:*

Often a ruderal [2259] .

*Southern tropical Africa:*

Savanna woodland [3] .

*Tropical East Africa:*

Deciduous bushland and wooded grassland [1362] .

Associated with numerous other secondary weeds including *Sporobolus pyramidalis*, *Eleusine indica*, *Digitaria* spp., etc [6671] .

Occurring in dry grasslands and bushlands [2837] .

*Namibia:*

A climax grass [5115] .

*South Africa:*

A decreaser; dominates in good veld but decreases when veld is mismanaged [5117] .

*South Africa:*

Savanna, Grassland and Nama-Karoo [2182] [5117] .

## ENVIRONMENTAL FACTORS - MISCELLANEOUS

*South Africa, carrying capacity:*

Under dryland conditions in an average environment, a carrying capacity of one cow and calf per ha from the beginning of November to the end of May can be reasonably be expected while under irrigation with maximum intensification, five cows and calves could be carried on one hectare for the 7 month period. In a normal season grazing can usually commence early November and can continue until May or June [5663] .

*Southern Africa:*

Especially valuable in lower rainfall areas because it is drought resistant and competitive [2259] .

*Namibia:*

It is not resistant to severe defoliation [5116] .

## **FLOWERING/FRUITING/SEED SET**

*Flowering, Southern Africa:*

From August to April [2182] [2259] [5117] .

## **DISPERSAL**

*South Africa:*

Common in hot and dry parts, but also widespread in other regions, where it is dispersed by man [5117] .

## **CYTOLOGY**

$2n = 32, 36, 40, 54$ . Generally apomictic, but also  $2n = 32, 34, 36, 52, 54$  [1375] .

## **HYBRIDISATION**

Pearl millet (*Pennisetum glaucum*) has been crossed with species of completely different genera, including buffel grass (*Cenchrus ciliaris*) [5608] .

## **SEED/GENE BANK STORAGE**

131 samples in Kenya (National Agricultural Research Centre); 24 in South Africa (Division of Plant and Seed Control). A collection of cultivars was reported to exist (September 1959) at the Institut de Recherche Agronomique de Madagascar, Alaotra, Madagascar (c/o J. Birie-Habas) [2837] .

## **CULTIVATION**

*South Africa:*

Various cultivars are available and are generally planted as pasture in warm and dry areas [5117] .

*Southern Africa:*

It is widely cultivated for improved pastures [2259] .

For good establishment, seed needs to be moist for about five days and a minimum of 30 mm of rainfall is needed for the pasture to respond to nitrogen fertilizer [1375] .

Many varieties have been selected and propagated throughout the tropics and subtropics [6671] .

*Cultivars:*

At present, only the Molopo cultivar is available in the trade. [5663] .

*South Africa:*

In some cases satisfactory stands have been obtained by sowing between maize rows [5663] .

*South Africa:*

It is suggested that, in higher rainfall areas of this region, the use of more than one pasture species should be considered. Species such as *Eragrostis curvula*, various *Cynodon* and *Panicum* species, *Digitaria* species or *Anthephora pubescens* (for sandy infertile soils) are worthy of consideration [5663] .

*Namibia:*

The Molopo cultivar can be used with considerable success as cultivated pasture [5116] .

## **SEED WEIGHT**

350,000-400,000 seeds per kg [2837] .

## **PROPAGATION FROM SEED**

*Southern Africa:*

It is easily established by seeding [2259] .

*Methods of sowing, broadcasting:*

In South Africa this method can be recommended where it is desired to obtain a dense population. The seed can be broadcast by hand with or without dilution of the appropriate amount of seed with sawdust, kraal manure etc. Seed can probably be mechanically broadcast by a fertilizer spreader, provided that the seed is diluted with moist sawdust or manure. After broadcast sowing it is essential that the seedbed be rolled. For this purpose a cambridge roller is best. Millipede rollers have given poorer results because the seed is too deeply covered. In the absence of other alternatives, the seed can be covered by dragging a branch of a tree or a piece of wire netting behind the tractor. Diamond harrows on their backs can also be used. In any event the seed should not be covered to a depth of more than 2 cm [5663] .

*Methods of sowing, rowplanting:*

This is to be recommended in areas in South Africa with lower production potential. The spacing between the rows should be varied according to the environmental conditions. In any environment the spacing on fertile soils can be closer than on infertile soils. Special mechanical planters are available for direct planting in rows, and their use is recommended where large areas are to be planted. These machines can be adapted to allow for fertiliser to be band-placed. For smaller areas it is usual to use the tractor tracks to mark out the rows. The seed is then sown by hand in the tracks and covered on the following pass of the tractor. It is usual to dilute the seed with sawdust or kraal manure and funnels made of rolled fertilizer bags attached to the sowers' belts can ensure that the seed is dropped precisely in the row. Other methods of mechanical planting in rows have been devised and can give a wide range of spacing by blocking the appropriate downpipes. In most cases, sowing when the surface of the soil is dry will give better results than sowing when the surface is damp. The reason for this is that the seed needs contact with moist soil for about 5 to 6 days for satisfactory establishment. If the seed is planted after rain the soil often dries out too rapidly. Avoid covering the seed to a depth of more than 2 cm since germination will be retarded, and establishment will be adversely affected [5663] .

*Seedbed preparation:*

The initial ploughing should be at a depth of 20 to 30 cm in the autumn of the preceding year or as early as possible in the season in which it is intended to plant. Lime (if required) can then be applied and disked into the soil. Light diskings should be continued to conserve moisture, control weeds and to prepare a satisfactory seedbed. Superphosphate can be spread before the last disked cultivation and also disked into the soil. On most soils, rolling before planting should not be required. Before planting make sure that the soil is moist to a depth of at least 50 cm. The seedbed should be fine, compact and free of weeds at planting time. Time of sowing: Late January to the end of February is usually the best. Earlier plantings are possible, but weeds are often a problem, especially on sandy soils. As a general rule plants should have enough time to set seed before the first frost. Seed and seeding rate: Do not sow freshly harvested seed - the ripening process is not completed until 9-12 months after harvesting. Seeding rates range from 6 kg/ha where the site has a high production to 3 to 4 kg/ha where the site has a lower production potential. Where 75 cm rows are sown 3 kg/ha will be sufficient provided that the seed is sown evenly [5663] . 2.5-3 kg of seed per hectare are needed to give 100 seeds per m<sup>2</sup>. A sowing method which immediately covers the seeds is desirable as otherwise they are liable to be blown away by the wind. It can be combined with legumes such as *Stylosanthes humilis* to raise the protein content of the grassland [2837] .

## **PROPAGATION - VEGETATIVE**

*Root plantings:*

It is possible to plant buffel grass from root cuttings. Cuttings with 3 or 4 active buds should be chosen. The roots should be planted in thoroughly moist soil and the soil around the roots well firmed. If the weather is hot the above-ground growth can be cut back to a length of about 10 cm. From 30 to 60 maize bags of roots are needed to plant 1 ha. Root plantings can often be used to increase the density of a stand which established poorly from initial seed planting, and is likely more to be successful than oversowing with more seed. Roots can be planted behind a plough and covered with the next pass of the plough or separate holes can be dug where a root is to be planted [5663] . Tests in Kenya suggested that the species reproduces apomictically [2837] .

## **'CROP' MANAGEMENT**

*Fertilisation, dryland grazing:*

Phosphorus; In subsequent years, apply 100-300 kg/ha of single supers in the spring, preferably after ripping. It might be profitable to split the dressing between spring and summer on highly productive areas. Nitrogen; Should be applied annually at a rate of 360 to 720 kg LAN/ha. Two or three equal dressings are thought to be best, with a

spacing of about 6 weeks between applications. Hay production; phosphorus - should be applied at 100-300 kg/ha of single supers (8.3% P) from the second year on. Nitrogen - should be applied at 400-800 kg LAN/ha in one or two dressings, 6 weeks apart. Thereafter for each ton of hay removed apply 40-60 kg LAN/ha. It is important that the first dressing be applied early in the growing season. Potassium - could be applied at a rate of 50-100 kg/ha potassium sulphate, especially where hay yields are high and soil potassium levels are low [5663] .

*Fertilisation, irrigation:*

Phosphorus - can be applied up to 400kg/ha of supers per annum, but in most cases half the above amount should be sufficient. Nitrogen - can be applied at rates of up to 2 400 kg LAN/ha but in most cases 1 280 to 1 400 kg LAN/ha per year should be sufficient. Potassium - should be applied at a rate of 100 kg/ha of potassium sulphate if soil potassium levels are low [5663] .

*Grazing:*

Too lax grazing of the grass results in the accumulation of stemmy above-ground growth and the production of many tillers arising from the stems rather than from the roots. Tillers arising from above the ground are less robust than those arising from below ground level, and consequently it is desirable to treat the grass in such a way that basal tiller production is encouraged. To achieve this aim periodic cutting or heavy grazing is required [5663] .

*Hay:*

Digestibility, and therefore nutritive value, drops rapidly with increasing maturity. For these reasons one should aim to cut the hay every 6 to 8 weeks at a height of about 75 cm [5663] .

*Mowing:*

It is better to mow the pasture rather graze it in the first year. The grass should be allowed to flower before being either mown or grazed [5663] .

*South Africa, fertilizers:*

Lime; acid soils should be limed to a pH of about 6. If lime is to be applied it should be disked into the soil at least 2 months, preferably longer, before anticipated planting time. Phosphorus; seedlings have a high phosphorus requirement for optimum growth. The minimum phosphorus content of the soil for the first 15 cm should be 25 ppm at planting time. (For detailed treatment see ref.). Nitrogen; is not required at planting. It is best not to apply N until the grass has begun to tiller. At tillering, 240 kg LAN/ha can be applied as a topdressing. Make a decision as to whether to apply or not according to the colour and rate of growth of the grass. Potassium; Use potassium sulphate in preference to potassium chloride [5663] .

*South Africa, grazing:*

The leader herd is managed with the nutritional needs of the animals as the main consideration. The leaders are allowed to graze a camp selectively until about half the herbage has been eaten. They are then moved to the next camp and the followers are introduced to clean up as much of the grazing as possible. This latter herd is managed with the requirements of the grass in mind. Where the followers are unable to reduce the grass to an acceptable level, it will still be necessary to mow or slash [5663] .

*Namibia:*

It gives an exceptionally high yield, but requires heavy fertilization, both for high productivity and for palatability [5116] .

## HARVESTING

*Hay:*

Digestibility, and therefore nutritive value, drops rapidly with increasing maturity. For these reasons one should aim to cut the hay every 6 to 8 weeks at a height of about 75 cm [5663] .

## YIELDS

*South Africa, hay:*

Hay yields should range from 2-3 t/ha under dryland, low-rainfall conditions, to 25-30 t/ha under ideal conditions where irrigation is available. Drylands yields under good conditions could be as high as 8-12 t/ha [5663] .

*Namibia:*

It gives exceptionally high yield, but requires heavy fertilization, both for high productivity and palatability [5116] .

*South Africa:*

A palatable species with a high leaf production [5117] .

## PRODUCTION

### *South Africa:*

Generally the growing season of this grass extends from the onset of the spring rains to the first frost, with the bulk of its growth occurring in midsummer [5663] .

## **PRODUCTION POTENTIAL**

A great deal of work has already been done on this species, on a large scale. There is a good deal of morphological variation. There is some variation in chromosome number ( $2n=32,36,40,54$ ). The structure of the spikelets gives rise to problems in the harvesting, processing and sowing of the seeds, in addition low germination rates (below 40%) have been reported in East Africa [2837] .

## **SEED/GENE BANK SOURCES**

### *Namibia:*

National Plant Genetic Resources Centre, National Botanical Research Institute, Private Bag 13184, Windhoek, Namibia [5181] .

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