

Tropical Grasses

French: Graminées tropicales; Spanish: Gramineas tropicales; Italian: Erbe tropicali; German: Tropische Graeser

Crop data

Tropical pasture grasses cover a wide range of species. The environments in which they are grown include the wet tropics, the semi-arid tropics and the arid zone. Most of the species are perennials and are characterized by possessing the efficient C4 photosynthesis pathway. They are primarily used by grazing animals for meat, milk, hide or fibre production or for draft animals in cropping areas. They tend to occupy the lower fertility soils not used for cropping.

Semi-arid and arid tropical environments are characterized by strong seasonality. Grasses grow rapidly following the onset of rains in the wet season. They mature quickly and, during the dry season, the standing forage is high in fibre and low in protein and minerals. The low nutritive value of the forage during the dry period is the major limitation to animal production in such environments.

Nutrient demand/uptake/removal

Typical contents of nutrients in the whole tops of actively growing forage grasses as presented to animals are shown below. 8 000 kg/ha DM represents a high presentation yield for N-fertilized grasses in the better watered tropical environments. 4 000 kg dry matter per ha might be found in nitrogen fertilised grass pastures in areas subject to some drought, and 2 500 kg dry matter per ha in similar environments but without N-fertiliser.

Nutrient demand/uptake - Macronutrients						
Yield	kg/ha					
kg/ha DM	N	P2O5	K2O	MgO	CaO	S
8 000	170	46	240	34	28	16
4 000	90	23	120	17	14	8
2 500	35	16	66	10	10	4

Nutrient demand/uptake - Micronutrients						
Yield	g/ha					
kg/ha DM	Fe	Mn	Zn	Cu	B	Mo
8 000	640	560	240	56	160	2.4
4 000	300	280	120	25	80	1.2
2 500	200	175	75	16	50	0.8

Nutrient removal

Where "cut-and-carry" feeding systems are used or where forage is harvested for hay or silage, the total amount of nutrient in the standing forage as shown above may be removed from the field. However, where animals are grazed on the fields, considerable quantities of mineral nutrients are returned to the field in dung and urine. The amount returned depends upon the number of hours per day that the animals graze on the pastures. In grazed situations there can be considerable redistribution of nutrients to rest, shade, watering and yarding areas.

Plant analysis data

Concentration ranges commonly found in the green leaf + stem (whole top) material of normal grass plants are shown below.

Plant analysis data - Macronutrients					
% of dry matter					
N	P	K	Mg	Ca	S
1.5-3.0	0.20-0.35	2.0-3.5	0.2-0.5	0.18-0.5	0.12-0.35

Plant analysis data - Micronutrients					
ppm dry matter					
Fe	Mn	Zn	Cu	B	Mo
50-200	30-500	15-50	5-12	10-30	0.2-0.5

Critical values for yield:

Critical nutrient concentrations for yield in the whole tops (leaves + stems) of actively growing green vegetative material have been determined for only a few nutrients. Typical values are:

Species	% of dry matter		
	P	K	S
<i>Cenchrus ciliaris</i>	0.25		0.07-0.12
<i>Sorghum alnum</i>	0.20		-
<i>Panicum maximum</i>	0.20		0.07-0.12
<i>Pennisetum clandestinum</i>	0.22		0.07-0.12
<i>Melinis multiflora</i>	0.18		-
<i>Digitaria decumbens</i>	0.16		0.07-0.12
<i>Paspalum dilatatum</i>	0.25		0.07-0.12
<i>Chloris gayana</i>	0.22	0.50	0.07-0.12
<i>Setaria sphacelata</i>	0.21	1.6-1.8*	0.07-0.12

* 3.1 % for var. Kazungula

Fertilizer recommendations

For establishment:

Any soil nutritional problems that will restrict the establishment and economic production of the grass pasture should be overcome. In acid soils in which grasses not adapted to acidic conditions are to be established, lime will be required. 35-115 kg/ha P₂O₅ is commonly recommended on P-deficient soils, depending on the degree of deficiency and the P-fixing characteristics of the soil. 35 kg/ha K₂O is recommended when establishing grass pastures on sandy soils low in available K. 10-20 kg/ha S may be required on low-S soils, and any micronutrient deficiencies should be overcome when the pasture is being established.

For maintenance:

In high producing pastures, 35 kg/ha P₂O₅ each year or 70 kg/ha P₂O₅ every second year for most soils low in P. 100 to 300 kg/ha N in split applications during the year is recommended. The amount used depends upon the intensity of production from the pastures. On soils with less than 0.3 meq% K 60-120 kg/ha K₂O should be applied in split applications during the year. 10 kg/ha S each year is recommended on S-deficient soils. The sulphur is usually supplied in superphosphate or ammonium sulphate. Where a more highly concentrated form of P is used, it may be necessary to apply S in elemental form.

Preferred nutrient forms

Urea, triple superphosphate or DAP, potassium chloride. If S is deficient ammonium sulphate, single superphosphate or flowers of sulphur may be used in the fertilizer blend. Micronutrients are mixed in fertilizer blends with major nutrients.

Present fertilizer practices

Wet Tropics: 125-250 kg/ha superphosphate or molybdenized superphosphate (0.02 % Mo) and 60-125 kg/ha muriate of potash applied annually; 300-400 kg/ha urea in split dressings after the wet season.

Humid subtropics: 125 kg/ha urea in spring and autumn; 60-125 kg/ha superphosphate or molybdenized superphosphate (0.02 % Mo) in spring.

Dung is often returned to pastures from yards associated with dairy farms and intensive feedlot feeding systems.

Further reading

ANDREW, C.S.; ROBINS, M.F.: The effect of phosphorus on the growth, chemical composition, and critical phosphorus percentages of some tropical pasture grasses. *Aust. J. Agric. Res.* 22, 693-706 Australia (1971)

CIAT: Tropical pastures program report, 1981. CIAT series 02ETP(1) 82 (1982)

SMITH, F.W.: Pasture Species. In: Reuter, D.J.; ROBINSON, J.B. (eds.): *Plant Analysis - An Interpretation Manual*. Inkata Press, Melbourne, Australia (1986)

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