Agnote

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Fertilisers for Grass Pastures

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SOILS

Upland soils in the Top End of the Northern Territory (NT) are deficient in a number of plant nutrients. Nitrogen (N), phosphorus (P) and sulphur (S) are deficient in most soils in their virgin state. The exceptions to this are some Tippera and Tindall clay loams soils, which have adequate levels of P.

Potassium (K) levels are deficient or low in many soils, except in Tippera and Tindall clay loams. Zinc (Zn) can be deficient or low, primarily in sandy soils.

Other plant nutrients such as calcium (Ca), magnesium (Mg), copper (Cu), iron (Fe), boron (B), manganese (Mn) and molybdenum (Mo) are generally adequate in soil to supply grass pasture needs.

SOURCES OF NUTRIENTS

Available soil N is low in the absence of inputs from either fertilisers or legumes, which fix N from the atmosphere.

The primary sources of available P for Top End soils are fertilisers and some residual soil P from previous fertiliser applications. The availability of soil P increases during periods of wet weather when soils are waterlogged. The reverse is true; that is in low rainfall wet seasons, soil P is less available.

Plant needs for S are supplied through fertilisers, the breakdown of soil organic matter and rainfall (a small amount). S is mobile in the soil and can be quickly leached below the pasture root zone.

Sources of available K are fertilisers, the breakdown of soil minerals and from inside clay particles in the soil. Significant amounts of K can become available in the soil from inside the clay particles during periods of wet weather. The reverse is true; that is in low rainfall wet seasons, K does not become available resulting in low yielding pastures, exhibiting deficiency symptoms unless K is applied in fertiliser. As K is also mobile in the soil, it can be leached below the pasture root zone. In virgin soils, K is often adequate initially, but can diminish in three to five years.

NUTRIENT REQUIREMENTS FOR GRASS PASTURES

Most soils of the Top End of the NT require N, P, K and S for growing grass pastures; additionally, Zn is required in sandy soils.

The amount of nutrients required depends on the end use of the pasture. Grazed pastures will generally require lower amounts than pastures cut for hay, where the removal of nutrients, particularly K, is high.

The recommended nutrient requirements for grazed pastures and hay production are presented in Tables 1 and 2, respectively.

In grazed grass pastures, high N applications of 100 kg/ha allow higher stocking rates of up to four animals/ha during the wet season. The stocking rate should be reduced to one animal/ha at the end of the wet season (within two weeks of the last significant rainfall) when pasture growth slows down.

Where Zn is deficient, a single application of 5 kg Zn/ha will suffice for from five to10 years.

Expected yields of hay from grass pastures, as listed below, depend on the amount of N applied: the more N is applied, the more hay is produced, provided other nutrients are in sufficient quantities in the soil.

Elemental N (kg/ha)	0	50	100	200
Expected yield (t/ha)	4-6	6-8	8-10	12-15

Yields can exceed those listed above in a good wet season, or when fertiliser efficiency is good.

Nutrient withdrawal from the soil in 10 tonnes of grass hay is shown below for grass cut in April.

Nutrient	N	P	K	S
Amount removed (kg)	100	10	100	10

FERTILISERS

Each nutrient element can be supplied by a number of fertilisers. It is generally cheapest to use the form with the highest nutrient content. This may mean that fertilisers need to be mixed on the property. However, this may not be convenient for some producers. For them, pre-mixed or compound fertilisers are available. However, such fertilisers often do not provide all the nutrients required in the recommended amounts.

The proportions of nutrients in a fertiliser are usually specified on the label or the bag. This facilitates the calculation of fertiliser application rates from Table 1 or Table 2 below.

NITROGEN

The locally available fertiliser with the highest N content is urea, with 46% N. In the Top End, there has been no difference in performance between N fertilisers with the same proportions of elemental nitrogen.

Generally, there is a slight advantage in pasture yield when fertiliser is split into two applications rather than applied all at once.

As a general rule, N fertilisers should not be applied to newly-established grass pastures until four to six weeks after sowing or planting. Early applications give weeds a competitive advantage.

Losses in N from applied fertilisers can be high when high rates of say 200 kg N/ha or more are applied and are not followed immediately by rain or irrigation to wash the fertiliser into the soil.

Hay will have only about 1% N, or 6% crude protein, when cut in April, unless 100 kg or more N/ha is applied towards the end of the wet season in late February or March.

PHOSPHORUS AND SULPHUR

These two nutrients are generally required in about the same amounts. Single superphosphate (9.6% P, 10% S) has traditionally been the standard fertiliser used to supply these two nutrients. There are now more concentrated forms available, based on triple superphosphate (19% P, 2% S) and triple superphosphate with added sulphur (18-16% P, 10-20% S). These fertilisers, while more expensive than single superphosphate, are applied at a lower rate. The nutrient cost works out to be about ¾ of the single superphosphate cost for the same amount of nutrient.

POTASSIUM

The most common forms of K are muriate of potash (50% K) and sulphate of potash (43% K, 17.5% S). Sulphate of potash is generally not used on pastures because it is about twice the price of muriate of potash, but it may be used to balance S levels in a fertiliser mixture using a concentrated source of P, such as DAP (Di-ammonium phosphate, 20% P).

There are various forms of muriate of potash available. The type to use is the granulated form, as the other forms are hygroscopic, that is they take up water from the air. This makes them difficult to handle and mix, particularly in the wet season when humidity is high.

ZINC

Zn can be applied as Zn sulphate monohydrate (35.5% Zn, 17.5% S) or heptahydrate (23% Zn, 11% S), or as Zn fortified single superphosphate (0.25-05% Zn).

COMPOUND OR MIXED FERTILISERS

To supply 50 kg N, 10 kg P, 50 kg K and 10 Kg S to a grazed grass pasture, the cheapest option would be to apply 50 kg triple superphosphate plus sulphur (NPKS 0-16-0-20) and 100 kg muriate of potash (0-0-50-0) in December and apply 100 kg/ha urea (46-0-0-0) during the wet season.

Some options or alternatives, which would supply about the same amounts of nutrients, are listed in Table 3.

None of the other combinations provide all of the nutrients in the required ratios. There are a number of other compound fertilisers available and generally it is difficult to get the balance correct. While an excess of a particular nutrient may not cause a problem, the extra cost for the unnecessary nutrient may be significant.

There are some single superphosphate/muriate of potash blends (mixes/ratios 3:1, 2:1 or 1:1) which may be suitable in some instances. These would save on mixing on the property.

Where Zn or low amounts of Mo are required, it may be easier to apply superphosphate with the required trace element(s) at establishment and reapplied once every five to 10 years as required to maintain soil micronutrient level(s) and pasture productivity. Overall, producers need to balance the required level of production, the landed cost of the nutrients/fertilisers, the ease of use of the fertiliser combinations and the need for mixing.

Table 1. Nutrients recommended for grazed grass pastures (kg/ha of elemental N, P, K, S)

	Nutrient			
District	**N**	**P**	**K**	**S**
Darwin	25-100	10	25-50	10
Coastal Plains	25-100	10	25-50	10
Douglas Daly	25-50	5-10	0-25	5-10
Katherine	20-30	5	0-25	5

Table 2. Nutrients recommended for grass hay pastures (kg/ha of elemental N, P, K, S)

	Nutrient			
District	**N**	**P**	**K**	**S**
Darwin	50-200	10-20	50-100	10-20
Coastal Plains	50-200	10-20	50-100	10-20
Douglas Daly	50-150	10-15	25-75	10-15
Katherine	50-100	10	25-50	10

Table 3. Fertilisers for a grazed grass pasture

Fertiliser options and rates		**Rates of nutrient applied (kg/ha)**				
		Kg/ha	**N**	**P**	**K**	**S**
1.	Urea	100	46	8	50	10
	Triple super + sulphur	50				
	Muriate of potash	100				
2.	Crop King 88	200	31	9	23	27
3.	Nitrophoska Blue®	100	25	5	52	4
	Potassium nitrate	100				
4.	Nitrophoska blue®	100	26	8	44	4
	Banana special®	100				
5.	Crop King 88®	50	28	8	43	9
	Nitrophoska®	50				
	Banana Special®	100				

WARNING

Pasture plants have the potential to become weeds in certain situations. To prevent that, ensure that pasture seeds and/or vegetative materials are not inadvertently transferred to adjacent properties or road sides.

For further information please contact your nearest Weeds Branch of the Northern Territory Government, call (08) 8999 5511.

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