Agnote

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Fertilisers for Legume Pastures

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SOILS

Upland soils in the Top End of the Northern Territory 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 are some Tippera and Tindall clay loams, 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) and molybdenum (Mo) can be deficient or low, primarily in sandy soils.

Other plant nutrients such as calcium (Ca), magnesium (Mg), copper (Cu), iron (Fe), boron (B) and manganese (Mn) are generally adequate in the soil to supply legume pastures.

SOURCES OF NUTRIENTS

Available soil N is low but legume pastures fix their own N from the atmosphere as long as the nodules on the roots of the plants are functioning effectively.

The primary sources of available P in 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 and declines during low rainfall wet seasons when soils are drier.

S is supplied through fertilisers, the breakdown of soil organic matter and rainfall (a small amount). It 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 clay particles during periods of wet weather and decline in low rainfall wet seasons, when pasture yields decline and exhibit symptoms of K deficiency unless K fertilisers are applied. K is also mobile in the soil and can be leached below the pasture root zone. It is often adequate initially in virgin soils, but can decline in three to five years.

NUTRIENTS REQUIRED FOR LEGUME PASTURES

The nutrients required for growing legume pastures in the Top End are P, K, S in most soils, and Zn and Mo in sandy soils.

The amount of nutrients required depends on the end use of the pasture. Grazed pastures will generally require lower inputs than pastures cut for hay, which remove large quantities of nutrients, particularly K.

The amount of nutrients recommended for grazed pastures and hay production are presented in Tables 1 and 2, respectively.

Where Zn is deficient, 5 kg Zn/ha overcomes the deficiency for five to10 years; where Mo is deficient, 200-400 g Mo/ha overcomes the deficiency for five to 10 years.

YIELD AND NUTRIENT REMOVAL IN HAY

Expected hay yields for legume pastures, listed below, are related to the amount of P applied, that is, the more P is applied, the more hay is produced, provided other nutrients are in sufficient quantities in the soil.

Elemental P kg/ha	0	5	10	20
Expected yield (t/ha)	1-3	4-6	5-10	7-12

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

Removal of nutrients in hay is demonstrated in the figures for a legume cut in April.

Nutrient removal in 6 t of legume hay

Nutrient	N	P	K	S
Amount removed (kg)	120	9	90	9

FERTILISERS

Each of the nutrient elements can be supplied by a number of fertilisers. It is generally cheapest to use the form with the highest nutrient concentration. This may mean that fertilisers will need to be mixed on the property. This may not be convenient for some producers/users. Although pre-mixed or compound fertilisers are available, they may not provide all of the needed nutrients in the appropriate amounts.

The proportion of nutrients in a fertiliser are usually specified on the label or the bag. This allows for the calculation of application rates from Table 1 or Table 2.

NITROGEN

N fertilisers are not needed by legume pastures. A well-inoculated and well-fertilised legume will fix enough N to produce high yields.

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 more concentrated forms now available, based on triple superphosphate (19% P, 2% S) - triple super with added S (16 - 18% P, 10 - 20% S). These fertilisers are more expensive than single superphosphate but are applied at a lower rate. Therefore, the cost works out to be about ¾ of that for single superphosphate for the same amount of nutrients.

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 because it is about twice the cost 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 triple superphosphate.

Various forms of muriate of potash are available. The recommended type to use is the granulated form because 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 zinc sulphate monohydrate (35.5% Zn, 17.5% S) or heptahydrate (23% Zn, 11% S), or as Zn fortified single superphosphate (0.25-0.5% Zn).

MOLYBDENUM

Mo can be applied as sodium molybdate (39% Mo) or as Mo fortified single superphosphate (0.015 - 0.025% Mo).

COMPOUND OR MIXED FERTILISERS

Since most compound fertilisers contain N, they are generally not recommended for use in pure legume pastures.

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 and/or Mo are required, it may be easier to apply superphosphate with the required trace element(s), and reapply this fertiliser 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 legume pastures (kg/ha of elemental P, K, S)

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

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

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

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.

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