Agnote

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Fertilisers for Legume/Grass Mixed 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 except for some Tippera and Tindall clay loams, which have adequate amounts of P.

Potassium (K) is deficient or low in many soils, except in Tippera and Tindall clay loams. Zinc (Zn) and molybdenum (Mo) can be deficient or low, particularly in sandy soils.

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

SOURCES OF NUTRIENTS

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

The primary sources of available P for Top End soils are from fresh fertiliser applications and from some residual P in the soil from previous applications. The availability of soil P increases during periods of wet weather when soils are waterlogged. The reverse happens during low rainfall wet seasons, when soil P becomes 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 clay particles during periods of wet weather. The reverse happens in low rainfall wet seasons, when K does not become available and pastures become low-yielding and exhibit symptoms of K deficiency unless it is applied through fertilisers. 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 be depleted in three to five years.

NUTRIENTS REQUIRED FOR LEGUME/GRASS MIXED PASTURES

To grow mixed pastures on most soils in the Top End, you will need to apply P, K, S and Zn; moreover, you will also need to apply Mo on sandy soils. The requirements for N are the same as those for legume pastures because mixed pastures depend on the legume component to fix N for their productivity. An established mixed pasture will often consist of 25-30% legumes and 70-75% grass. Maintenance of the legume/grass balance can usually be achieved by managing stocking rates. There will, however, usually be cyclical variations in the legume/grass balance over three to five years.

If the grass becomes too vigorous, it will tend to choke out the legumes. When this happens, the productivity, yield and quality of a mixed pasture falls to that of a grass pasture that had no N applied.

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 more nutrients, particularly K.

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

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

HAY YIELD

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

Elemental P kg/ha	0	5	10	20
Expected yield (t/ha)	3-5	4-6	6-8	8-10

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

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 the fertilisers will need to be mixed on the property. This may not be convenient for some producers/users. Pre-mixed or compound fertilisers are available, but they may not provide all of the nutrients required in the required amounts.

The proportions of nutrients in a fertiliser are usually specified on the label or the bag. This allows the fertiliser application rates to be calculated from Tables 1 or 2.

NITROGEN

N fertilisers are generally not needed for mixed pastures. The legume component is expected to fix enough N to keep the pasture productive. A well inoculated and well fertilised legume will fix enough N to produce acceptable to high yields.

Table 1. Nutrients recommended for grazed legume/grass mixed 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/grass mixed hay pastures (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

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 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, while more expensive than single superphosphate, are applied at a lower rate. The cost works out to be about 70% 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 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 triple superphosphate.

There are various forms of muriate of potash available. The recommended type to use is the granulated form, as the other forms are hygroscopic, that is they take up water from the air, which makes them difficult to handle, mix and spread, 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 (0.5-.25% 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

Most compound fertilisers contain N and are generally not recommended for mixed pastures because they make grasses too vigorous and choke out legumes.

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. They would eliminate the need for 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 it once every five to 10 years as needed 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.

WARNING

Pasture plants have the potential to become weeds in certain situations. To prevent that, ensure that pasture seeds and/or vegetative material is 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.

Please visit us at our website:

www.nt.gov.au/d

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