


Soil Management for Grassland

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Grass and Animal Nutrition from the Soil

Macro	Micro
<ul style="list-style-type: none">• NITROGEN• PHOSPHATE• POTASSIUM (Potash)• SULPHUR• CALCIUM• MAGNESIUM	<ul style="list-style-type: none">• CHLORIDE• BORON• IRON• MANGANESE• COPPER• ZINC• COBALT• MOLYBDENUM

Sodium, Iodine , Selenium :
specifically for animal nutrition



Soil Nutrients


There are 13 nutrients that are essential for plant growth.

However, for grassland production the ones that need to keep track of :-

NITROGEN
PHOSPHATE
POTASSIUM
SULPHUR

For animal nutrition :-
MAGNESIUM

Nitrogen




N

- Nitrogen is needed for almost every plant process. It forms amino acids, proteins, chlorophyll.
- The reserves of N in soil are actually very high : between 4,000 and 5,000 kg/ha (3,200 to 4,000 units/acre)
- Most of this is locked up in the soil organic matter.
- It is released to the grass through bacterial activity---which is both temperature dependent and pH dependent.
- Between 1 and 2% can be released per annum 40 to 100 kg/ha (32 to 80 units/acre)

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Phosphorus




P

- Phosphorus (phosphate) is needed for plant cell division. It also provided energy reserves.
- Very important for root development
- Uptake by grass is temperature dependent. Deficiency most likely to be seen in spring when soil temperatures remain low.
- Soil tests are good predictors of availability

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Potassium



K

- Potassium (potash) is needed for carbohydrate production in the plant.
- It is also important for drought tolerance
- It tends to be fairly mobile; it can even be washed out of the grass leaf.
- Soil tests are good predictors of availability

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Sulphur

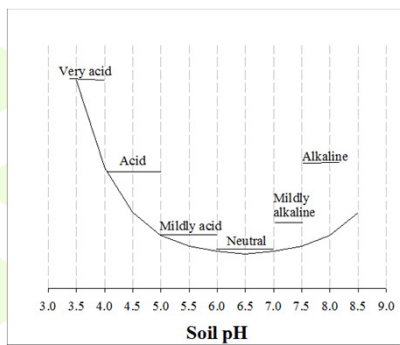


S

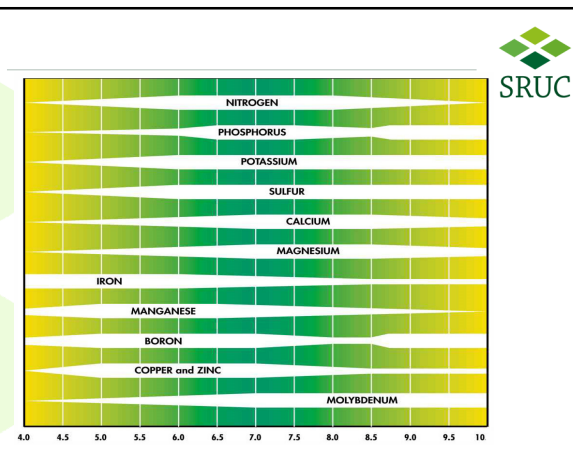
- Sulphur is needed for amino acid and proteins.
- Deficiency symptoms tend to be similar to nitrogen – general lack of growth.
- If growth is poor after application of N fertiliser, then the cause could be S deficiency
- Leaf tests are used to determine availability

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Soil pH




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Soil pH




The acidity of soil has a major impact on grass growth. The trend is normally towards acidity due to rainfall (pH 5.5) and fertiliser application :

For example:- The following fertiliser products applied over a 5 year period would need the amount of lime shown to return to original pH

FERTILISER	Total applied cwt/acre	Lime required cwt/acre	Total applied kg/ha	Lime required kg/ha
34.5-0-0	10	6.2	1250	780
25-5-5	10	4.4	1250	550
16-16-16	10	2.9	1250	360
8-24-24	10	1.4	1250	170

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Soil pH



- A number of trials have shown that :-


Raise soil pH from 4.5 to 6.0 →
increases herbage production from 6 to 9 tonnes DM /ha per year

(Approximately every 0.1 pH unit → 200 kg DM/ha increase)

To increase soil pH from 4.5 to 6.0 would require approx. 5 Tonnes of lime per ha,
To increase herbage production from 6 to 9 tonnes DM/ha per year would require 100kg Nitrogen/ha per year.

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Raising soil pH



Various liming materials :-

- Limestone (Calcium carbonate)
- Dolomitic limestone (Magnesium carbonate)
- Burnt lime (Calcium oxide)
- Slaked lime (Calcium hydroxide)


- Other by-products eg ground scallop shell waste

Their effectiveness assessed by neutralising value, but particle size is also important.

Application of nitrate fertiliser also raises pH


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Soil Ecology




- Grassland type may have an effect :-
- Trial established (*Wageningen University*) Spring 2004

December 2005	Root biomass g/m ² 0-10 cm	Earthworm Number/m ² (0 to 20cm depth)	Earthworm Burrows/m ² (10 cm depth)
Grass only	218	326	67
Grass /clover	193	359	138
Clover only	73	480	225



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The Root of the Matter



It is inevitable that root growth is often forgotten about.

However, all plant nutrients are derived from the root system; and, like the grass leaves, the roots need air-----

So any maintenance to help root growth will have a major impact on grass growth.

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Any Questions?

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