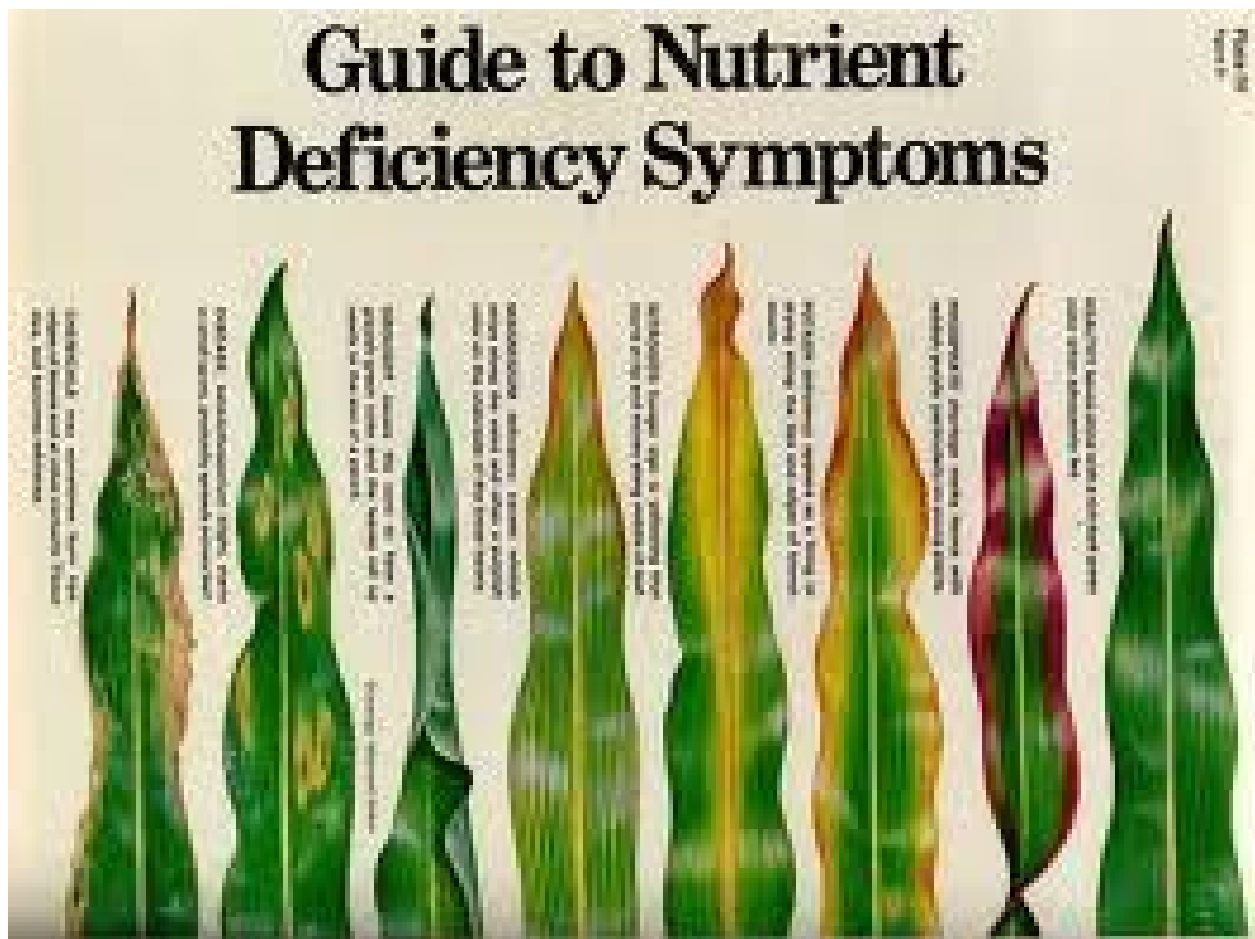


## Lecture 5

### ESSENTIAL SOIL NUTRIENTS FOR PASTURE PRODUCTION

- **NITROGEN:** Legumes may supply substantial quantities of N to the soil through fixation by symbiotic relationship with rhizobia.
- Legumes can absorb nitrogen from that which is available in the soil.
- Nitrogen made available to plants from the soil is derived from applied fertilizer, precipitation and non-symbiotic fixation.
- Negative effects of N fertilizer in grass-legume sward





## Nitrogen (N)

### - mobile

**Deficiency:** The most common nutrient deficiency. Cornish, wheat, sugar beets, sorghum, grain sorghum, alfalfa, and various legumes are highly deficient. Nitrogen deficiency causes yellowing of the leaves, starting at the tip and moving down the length of the leaf. The leaves may become necrotic and fall off. The plants may be stunted and have a poor yield.

**Plant symptoms:** Yellowing of the leaves, starting at the tip and moving down the length of the leaf. The leaves may become necrotic and fall off. The plants may be stunted and have a poor yield.

**Soil deficiency:** Indicated with N-15 tests. Low N-15 levels indicate low available N. Soil tests for nitrate and nitrite-N. Soil tests for nitrate and nitrite-N. Soil tests for nitrate and nitrite-N.

**Remedy:** Corn is a heavy feeder and requires high nitrogen fertilizer. Apply 150-200 lb N/acre. Apply 150-200 lb N/acre. Apply 150-200 lb N/acre.

**Plant symptoms:** Yellowing of the leaves, starting at the tip and moving down the length of the leaf. The leaves may become necrotic and fall off. The plants may be stunted and have a poor yield.

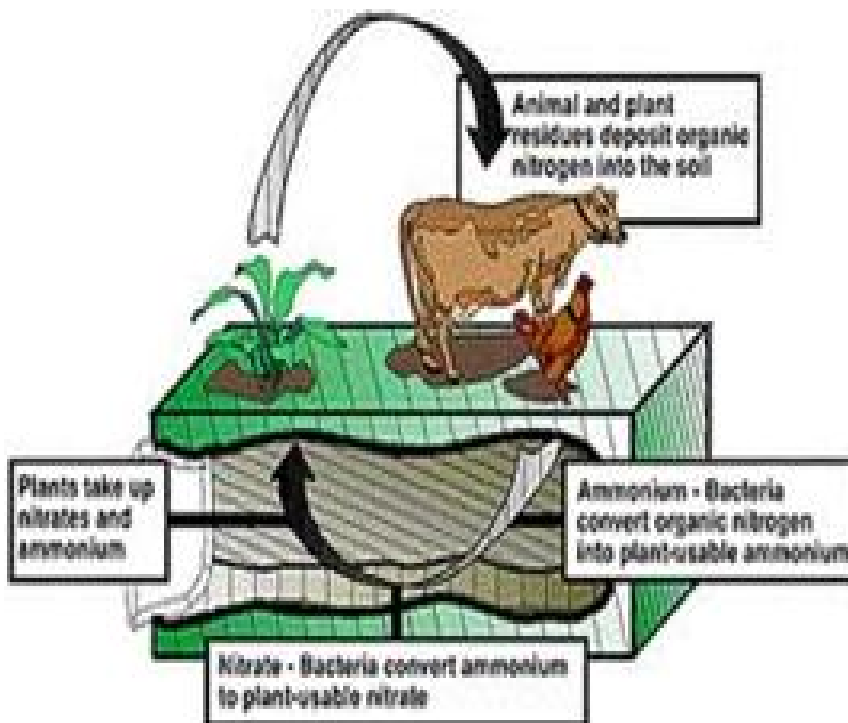
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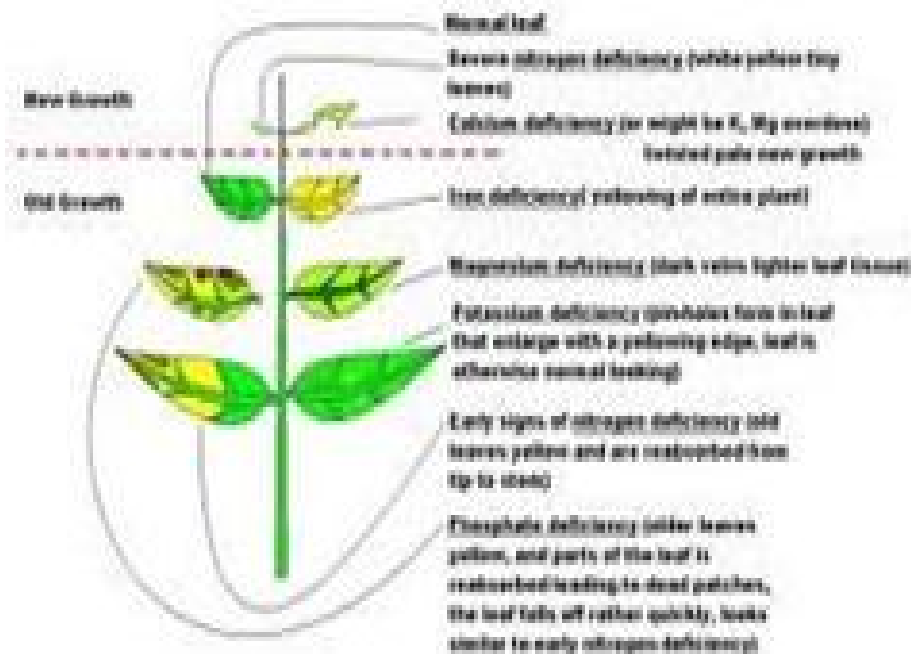
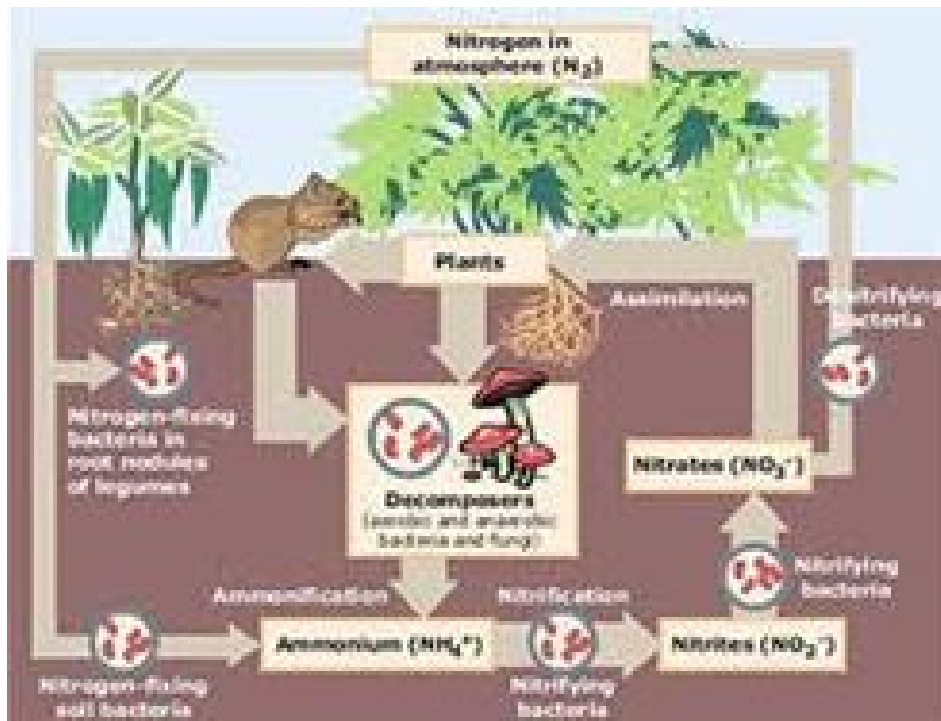
**Remedy:** Corn is a heavy feeder and requires high nitrogen fertilizer. Apply 150-200 lb N/acre. Apply 150-200 lb N/acre. Apply 150-200 lb N/acre.

## Nitrogen Sources

Source Material	% Nitrogen Content
Anhydrous ammonia	82%
Aqua ammonia	20% to 25%
Ammonium nitrate	33.5% to 34%
Ammonium nitrate-sulfate	26%
Ammonium nitrate/lime	20.5%
Ammonium sulfate	21%
Urea-ammonium nitrate solution	28% to 32%
Ammonium chloride	26%
Urea	46%
Monoammonium phosphate	10% to 11%
Diammonium phosphate	18%
Sodium nitrate	16%
Potassium nitrate	13%
Calcium nitrate	15.5%
Sulfur-coated urea	39%
Urea-formaldehyde	38%

Source: University of Missouri





- Nitrogen is a mobile nutrient.
- PHOSPHORUS: The P requirement of grasses unlike that of N depends more on soil properties than on the grass species.

- P is likely to be limiting factor when grasses are established on land not previously cultivated and fertilized with phosphate.
- P is less mobile in soils than N and K and remains fairly close to the area in which it is placed.
- Molybdenum: It is essential in the formation of nitrate reductase and plays an important role in the symbiotic fixation of nitrogen
- Molybdenum deficiency resembles N starvation and plant symptoms are likely to occur when legumes grow on soils low in available N.
- Potassium: The influence of K on productivity of pasture species or cultivars varies with the requirement of this nutrient for plant growth, ability of plants to extract the nutrient from the soil.
- K Deficiency: a K content of less than 1.0-1.5% in 60 day old grass in an intensive management system will show K deficiency.
- The response of tropical legumes to applied K fertilizers has been variable.
- Sulphur: S deficient soils generally exhibit high allophane or oxides, low in organic matter and often sandy soils may be deficient in S where annual burning occurs.
- Boron: Deficiency not common but was corrected with 25-30kg/ha of borax when noted in lucerne growing on certain soils
- Aluminium: Al toxicity is likely to occur in tropical soils with a pH of 4.5 or less. The effect on plant is largely through root damage with restriction of terminal elongation and branching along with diminished nodulation.
- Manganese toxicity is sometimes compounded with Al toxicity since both ions are progressively released with increasing soil acidity.
- Calcium: Limestone ( $\text{CaCO}_3$ ) application to pastures in the tropics should be considered as a source of nutrient Ca rather than a soil amendment.
- If lime application is needed for maximum productivity of legumes
- Liming decreased the manganese content of soil and herbage but did not alter P or Mg contents.
- Ca can be transported from lower soil depths to upper layers by roots